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# ABOUT THE SOCIETY

**MOBILIZATION Society** was established in 2003 as an non-profit professional society aimed at sensitizing and mobilizing development partners and community for sustainable development. The Society, during these ensuing years has successfully mobilized researchers, academicians, planners, grass root mobilizers and student and created conducive intellectual atmosphere for introspective deliberations and conducted National seminars/workshop to address the emerging problems experienced by the agrarian mass. Presently the Society has more than 900 Life Members. The recognition of the Society in the efforts for strengthening the forum for scientific communication is growing among the related professionals and concerned agricultural stakeholders rapidly. The Society works on following objectives-

- 1. To document the on-farm and adaptive research experiences in multi-disciplinary agri-bio sciences and extension education.
- 2. To offer a platform for sharing the empirical experiences of development professionals, community mobilizers, academicians, multi-sectoral researchers, students etc. for the benefit of ultimate users.
- 3. To facilitate close and reciprocal linkage among the institutions for sustainable rural development.
- 4. Promoting potential and practicing entrepreneurs.
- 5. To disseminate the documented knowledge to the global partners through approach abstracting and indexing.

# ABOUT THE JOURNAL

Journal of Community Mobilization and Sustainable Development (print ISSN 2230 – 9047; online ISSN 2231 – 6736) is published by Society for Community Mobilization for Sustainable Development twice a year. The Journal of Community Mobilization and Sustainable Development has NAAS rating 3.46. The Journal of Community Mobilization and Sustainable Development, is also available on our website www.mobilization.co.in and it has been registered with www.indianjournal.com for national and global abstracting and indexing. MOBILIZATION envisages reorienting the young professionals and researches for imbibing the values of community participation in research, training and extension efforts.

# The aim and scope of the journal are:

- 1. Sharing the relevant experiences and issues related to agriculture and allied fields at the grass root level and global forum to create the necessary academic and development climate.
- 2. Sensitizing the different stakeholders about the knowledge and innovation management system in pluralistic agri-rural environment.
- 3. Developing network among the related partners for convergence of their efforts for sustainable academic development of extension education discipline.

# Editorial

India has experimented with different models of extension for reaching the farm operators of the country. The arrangements for agricultural extension in India have grown, over the last five decades, in terms of activities, organizational types and available manpower. The performance of public sector extension is under scrutiny for quite some time and questions are being raised on its capability to deliver goods in the rapidly changing environment.

In the current scenario of changing agri-rural environment the role of extension education and technology delivery system is also changing. Broad based extension approaches are the need of the day. Harnessing advances in frontiers of science in selected priority areas with larger spin-off benefits by focusing on basic and strategic research also assumes significance. A paradigm shift from single discipline orientation to multi-disciplinary approach is critical for research in the discipline.

Society for Community Mobilization for Sustainable Development (MOBILIZATION) is constantly striving for stimulating the multi-sectoral stakeholders *viz*, researchers and extension professionals, innovative farmers, development practitioners and students for igniting their passion through different activities like bringing out research Journal, capacity building of all stakeholders, mobilizing for group action and holding the National Conference, etc.

We are happy to bring out January-June, 2015 issue and the issue has enveloped the research domain in the areas of instructional effectiveness of online content, development of scales and indices for measuring behavioural changes, yield gap analysis, training needs, promotion of pulses production, traditional folk media, impact assessment, extent of entrepreneurial success, contextualizing community mobilization, adoption behaviour, capacity building and similar other aspects. The other issues like womenempowerment, gender mainstreaming, and entrepreneurship as well as ICT application in agriculture have also been covered in this issue.

I extend my heartfelt thanks to the members of the editorial team - Drs. Shantanu Kumar Dubey, M. S. Nain, R. Roy Burman, R. K. Dhaliwal, L. K. Tyagi, S. R. K. Singh and Souvik Ghosh who meticulously edited the papers to bring out the issue on time. I also express my sincere gratitude to the researchers for contributing the quality research papers for the journal. I extend my special thanks to Dr. Tulsi Bhardwaj in shaping this issue of the journal.

J.P. Sharma Chief Editor

# Capacity Building Skills: Promotion of Women Entrepreneurship Through Training Programmes to Initiate an Enterprise at Household Level for Income Generation

#### Anjuly Sharma\* and Narinderjit Kaur

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## ABSTRACT

Promotion of women entrepreneurship is a dependable path to economic stability of women and her family. It leads to more spending on education and health, increased decision making power and reduced gender discrimination. Besides there are certain other reasons for spread of women entrepreneurship viz. its close link to social, cultural, religious and psychological variables; the flexible nature of work that combines gainful employment with domestic responsibilities; economic demands specially in rural women, and above all the modernization that snatches bread and butter of an increasing number and proportion of women. This attracted the attention of policymakers and planners towards the significance of women's productive activities and their need of income generation through entrepreneurship. Keeping in view the above facts, All India Coordinated Research Project on Home Science, FRM component under the objective "Empowerment of Women through Capacity Building" conducted intensive training programmes in three adopted villages of Ludhiana district to improve the knowledge of women for better living and to empower them for undertaking income generating projects so that they can contribute towards family income and improve the financial status of their families. Different training programmes were conducted to impart knowledge to total 80 participants (at Bhata-Dhua village) Further, impact analysis of the training programmes was done and the results shows that almost all the respondents gain full knowledge of all the aspects of training programmes. But most of them used the knowledge gained through different trainings for making articles to fulfill their household needs or to give these items to their friends and relatives. There were only few respondents who use the knowledge of candle making for earning money for their families.

Keywords: Capacity building, Knowledge, Women entrepreneurship

## **INTRODUCTION**

# "If you are poor, you are disadvantaged' but if you are poor and also a woman, you are doubly disadvantaged."

Among various other ways of developing economically, promotion of entrepreneurship is presently being sought as one of the reliable and viable options. Our constitution, in its fundamental rights, has provision for equality, social justice and protection of all citizens irrespective of caste, creed, region and above all sex. These goals can be achieved through entrepreneurship

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so that no man or woman is discriminated, exploited and exposed to inequalities at any levels. The country, which is rich in entrepreneurship, can attain economic augmentation too. The entrepreneurs organize the economic ventures for producing goods and services at lower cost with objects of maximization of new employment and setting up new business (Nazar, 2005).

Promotion of women entrepreneurship is a dependable path to economic stability of women and her family. It leads to more spending on education and health, increased decision making power and reduced

gender discrimination. Besides there are certain other reasons for spread of women entrepreneurship viz. its close link to social, cultural, religious and psychological variables; the flexible nature of work that combines gainful employment with domestic responsibilities; economic demands specially in rural women, and above all the modernization that snatches bread and butter of an increasing number and proportion of women. This attracted the attention of policymakers and planners towards the significance of women's productive activities and their need of income generation through entrepreneurship. Training needs of women in the informal sector is another area therefore, that should be catered to. This could help women to strengthen their activities and move into the formal sector where appropriate training should address not only the business skills requirements of women running full time informal sector enterprise but also help them manage their dual workloads (Choudhary, 2006).

Attention of government and policy makers has been attracted towards rural women entrepreneurs and therefore some work has been done and policies have been made on promoting rural women for entrepreneurship by giving funds and training. But a large number of women are still in need of motivation, training and support for undertaking any economic activity. The present effort was made to study the entrepreneurial profile and entrepreneurial environment for promoting the entrepreneurship in the study area. Since entrepreneurship creates new markets and facilitates expansion. It generates immediate employment opportunities with relatively low capital, promotes more national income, makes effective mobilization of untapped capital and human skills and leads to dispersal of manufacturing activities all over the country leading to growth of villages, small towns and economically lagging regions. This promotes balanced regional development. In order to promote entrepreneurship in rural area a capsulated training package is developed for achievement motivation in women and also for providing strategies for solving short term and long-term problems.

The policy and institutional environment should be supportive of women in order to recognize the significance of their contribution and the ability to realize empowerment through their own skills & capacity. In order to encourage women towards income generating activities, different training programmes in Bhata-Dhua adopted village of Ludhiana district were undertaken for initiation of income generating activities so that they can contribute towards family income and improve the financial status of their families. On the basis of the survey conducted it was found that the women lack suitable training & exposure for setting up a profitable enterprise, therefore training on the, handicrafts like pot, glass painting, mural art, stone art and fabric painting were organized. The trainings were not only aimed at imparting skills in production but were also in some managerial skills and to develop competency to sustain the enterprises .Women other than the members of self help groups were also encouraged to participate and develop skill and competency in starting income generating enterprises.

#### MATERIALS AND METHOD

Trainings were organized for the empowerment of rural women in resource management practices on candle making, artificial flower making, pot decoration, and glass painting in operational village of Bhata-Dhua. Firstly a bench mark survey was carried out by the department. For this purpose one village (Bhata-Dhua) from the reachable vicinity of Punjab agricultural University, Ludhiana was selected. For capacity building and empowerment of rural women 4 training programmes on candle making, pot painting, glass painting and artificial flower making were selected to be undertaken in the adopted one village. The trainings were not only aimed to impart the skills for production of goods but also managerial skills to undertake and sustain the enterprise. Women other than self help groups were also encouraged to attend the training programmes. The total number of 80 women was educated related to the market strategies before undertaking any enterprise for income generation. The impact of training programmes was further evaluated. The responses were taken on questionnaire especially made for personal interviews with the rural women who attended the training programmes. The aspects included in the questionnaire were duration of each training programmes, number of participants, knowledge gained by the women through each training programmes, constraints perceived by the women for undertaking enterprises and the level of satisfaction. Knowledge

gained and the satisfaction level of the women were measured on three point scale i.e 1 for somewhat, 2 for partial and 3 for full knowledge gain and 3 for High, 2 for Medium and 1 for low level of satisfaction. Further, Mean scores were calculated for knowledge gained and level of satisfaction.

#### **RESULTS AND DISCUSSION**

For capacity building and empowerment of rural women 4 training programmes on following aspects such as candle making, glass painting, pot painting and artificial flower making conducted in adopted village.

Table 1: Detail of the training programmes conductedin the adopted village

Name of the training	Duration	Total time	No. of	
programmes		spent	partici-	
		(each day)	pants	
Candle making	4 days	4 hours/day	80	
Glass painting	4 days	4 hours/day	80	
Pot Painting	4 days	4 hours/day	80	
artificial flower making	4 days	4 hours/day	80	

Details of the training programmes conducted in the *Bhatha-Dhua* village are given in Table 1. From the table it is revealed that four training programmes were conducted in *Bhatha Dhua* village. The duration of these training programmes was 4 days. Total time spent on each training programme was 4 hours. The total numbers of participants were found to be 80. The impact of awareness knowledge training programmes was also assessed after providing them training on candle making, glass painting, pot painting and artificial flower making. Extent of knowledge gained by the beneficiaries from the training programmes was calculated on 3 point scale i.e. 1 for somewhat, 2 partial and 3 for full knowledge gained. Mean scores obtained are enclosed in Table 2. It is observed from the table that values on mean scores in respect of all the trainings for almost all the subjects is 3 or approximately 3 i.e. 2.81 for Pot making and Artificial flower making indicating that beneficiaries gained full knowledge in all the trainings however, the use of knowledge gained was made mainly for meeting household needs and only 33.3 percent respondents used the knowledge of candle making for commercial purpose. It is therefore recommended that rural women need appropriate motivation to use the knowledge for income generation which is required especially for lower income group families. Rural women also need selling tips for selling their products in the market. Few aspects where the knowledge gain was partial should again be included in the future training programmes so that the rural women can gain the full knowledge on these important aspects.

Table 3 gives the data on the 7 types of constraints perceived by the respondents for not using the knowledge gained through training programmes for commercial purpose. These were lack of money, lack of interest, inadequate knowledge, lack of time, lack of space in the house, no requirement at present and training contents has no relative advantage. From the data given in the table it is observed that most common constraints perceived by the respondents for not using the knowledge of training programmes for commercial purpose was lack of money, no requirement at present to take up some commercial ventures followed by lack of time. It can be therefore be concluded that the poor women need some financial support at the beginning to start some income generating ventures and therefore need the knowledge of the financial institutions who give loans for such purposes.

Table 4 highlights the data on the number of respondents satisfied and the level of satisfaction of the respondents regarding the training programmes

Table 2: Knowledge gained and the use of knowledge during training programmes

Name of the training programmes		Knowledge gained							Use of knowledge gained through training programme			through
	$\mathbf{F}_{1}$	ully	Par	tially	Son wh	me nat	Mean scores	Hous	ehold se	Comm	ercial e	Mean scores
	No	%	No	%	No	%		No	%	No	%	
Candle making	80	100	0	0	0	0	3	80	100	0	0	2
Glass painting	80	100	0	0	0	0	3	78	97.5	2	2.5	2
Pot Painting	68	85	12	15	5	6.25	2.81	75	93.7	5	6.25	2
Artificial flower making	60	83.8	20	11.42	5	4.76	2.81	60	75	20	33.3	2

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Name of the training			Const	raints	for no	t mak	ing the	e produ	ucts fo	r com	mercia	l use		
programmes	-	1	2	2	3	3		4	Ę	5		6	7	7
	No	%	No	%	No	%	No	%	No	%	No	%	No	%
Candle making (40)	30	75	0	0	0	0	0	0	0	0	10	25	0	0
Glass painting (78)	60	76.9	0	0	0	0	10	12.8	0	0	8	10.2	0	0
Pot Painting (75)	65	86.6	0	0	0	0	10	13.3	0	0	0	0	0	0
Artificial flower making (60)	50	83.3	0	0	0	0	0	0	0	0	10	16.6	0	0

Table 3: Constraints perceived by women for not using the knowledge

1. Lack of money 2. Lack of interest 3. Inadequate knowledge 4. Lack of time 5. Lack of space 6. No requirement at present 7. Training content has no relative advantage

	Table	4: Satisfaction	and the level	of Satisfaction	achieved tl	hrough tr	aining programm	es
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Name of the training	Satisfaction				Level of satisfaction						
programme	Satis	fied	Not s	satisfied	H	igh	Me	dium	Lo	ow	Mean
	No	%	No	%	No	%	No	%	No	%	scores
Candle making	80	100	0	0	80	100	0	0	0	0	3
Glass painting	80	100	0	0	70	87.5	10	12.5	0	0	2.85
Pot Painting	80	100	0	0	60	75	20	25	0	0	2.75
Artificial flower making	80	100	0	0	80	100	0	0	0	0	3

conducted and the contents of the training programmes. It is observed from the contents of the table that 100 percent of the respondents were satisfied from the training programmes conducted and the contents of the training programmes. Level of satisfaction of the respondents was found high for most of the training programmes as made clear from the values of mean score calculated on the basis of 3 point scale i.e. High, medium and low. The level of satisfaction of few respondents was found little lower than high but very close to high for glass painting and pot painting. It may be due to the reasons that these topics were related to personal qualities as everyone is not blessed with painting quality. However, all the respondents were highly satisfied with trainings.

#### CONCLUSION

The results for the impact of training programmes showed that almost all the respondents gained full knowledge of all the aspects of the training programmes, but most of them used the knowledge gained through training for making articles to fulfill their household needs or to give these items to their friends and relatives. There were only few respondents who used the knowledge for candle making for earning money for the family. When asked the reasons for not using the knowledge for income generation, they reported that there is lack of money and time to adopt any of this aspect for income generation.

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# Performance of Integrated Nutrient Management in Pigeonpea (Cajanus Cajana)

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#### ABSTRACT

A field experiment was conducted at Zonal Agricultural Research Station, RVSKVV, Khargone (M.P.), during *kharif* season of 2011 & 2012. The experiment comprising of 12 treatments consisted of all combinations of fertilizers: RDF 100% and 50% RDF, FYM: no FYM and FYM @ 5 t/ha, Rhizobium + PSB + PGPR: no Rhizobium + PSB + PGPR, inoculation of Rhizobium + PSB and inoculation of Rhizobium + PSB + PGPR. Among the treatments performance of pigeon pea was better with combined application of inorganic, FYM and biofertilizers. Application of 50% RDF through inorganic fertilizer + 5 tones FYM + (Rhizobium + PSB + PGPR @ 5g each/kg seed) at the time of sowing recorded higher grain yield 361.8 kg/ha followed by 50% RDF + FYM + (Rhizobium + PSB + PGPR) (309.6 kg/ha) and RDF + (Rhizobium + PSB + PGPR) (264.0 kg/ha). Thus it could be concluded that 50% RDF + 5 tonnes FYM/ha + (Rhizobium + PSB + PGPR) was the best combination for getting higher productivity with maximum net returns.

Keywords: Pigeon pea, Rhizobium, PSB, PGPR

#### **INTRODUCTION**

Pigeonpea (Cajanus cajana Millsp.) is an important pulse crop of India ranked second after chickpea, grown in an area of 3.63 m ha during 2011-12 with a production of 2.76 mt and productivity of 760.33 kg ha (http:// agropedia.iitk.ac.in/). Madhya Pradesh is one among the important states in the country cultivating pigeonpea and contributing 9.64% to area and 7.86% to the production. It provides protein rich food, firewood and income for resource poor small farmers. Continuous use of only chemical fertilizers in intensive cropping system is leading to imbalance of nutrients in soil, which has an adverse effect on soil health and also on crop yields. On the other hand, continuous use of organics helps to buildup soil humus and beneficial microbes besides, improving the soil physical properties. But use of organics alone does not result in spectacular increase in crop yields due to their low nutrient content and also availability. Therefore, in the present context, a judicious combination of organics and inorganic fertilizers with

bio-fertilizers help to maintain soil and crop productivity. To enhance the productivity of this crop, use of balanced fertilization by application of organic manures, NPK along with biofertilizers viz., Rhizobium and PSB is of great importance. Inoculation of pulses with PGPR and Rhizobium causes growth stimulation of plant and enhances crop yields (Sharma *et al.*, 2007). The synergism has also been reported between Rhizobium spp. and PSB in frenchbean (Kumar *et al.*, 2009) and pigeonpea (Kumar *et al.*, 2012).

Modern agriculture depends on the application of fossil fuel based inputs like chemical fertilizers, pesticides and herbicides. There is growing awareness and concern over their adverse effects on soil productivity and environmental quality. The high cost of chemical fertilizers, the low purchasing power of small and marginal farmers and their adverse effect on environment has led to look for some alternative strategies (Tilak, 2007) and Wankhede *et al* (2009). One such approach is the use of different integrated nutrient

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management systems, which can save the soil, environment and farmers limited resources. In Madhya Pradesh, redgram is often grown on marginal lands and is generally supplied with suboptimal doses of fertilizers in local varieties leading to low productivity of the crop. Balanced and efficient fertilizer application, combining inorganic, organic and biofertilizers are essential in realizing the higher yield and reducing cost of production (Kumar Anil *et al.*, 2011). Therefore the present investigation was taken up to assess the influence of organic and inorganic fertilizers and biofertilizers on growth and yield parameters of redgram.

#### MATERIALS AND METHODS

A field experiment was conducted at Zonal Agricultural Research Station, RVSKVV, Khargone (M.P.), during *kharif* season of 2011 & 2012 in black cotton soils having pH 8.2, organic carbon 4.9, low N (223.2), medium P (12.8) and high K (485.5). The experiment comprising of 12 treatments consisted of all combinations of fertilizers: RDF 100% and 50% RDF, FYM: no FYM and FYM @ 5t/ha, Rhizobium + PSB + PGPR: no Rhizobium + PSB + PGPR, inoculation of Rhizobium + PSB and inoculation of Rhizobium + PSB + PGPR .

All the treatments were replicated thrice in factorial RBD. The recommended dose of fertilizer i.e. 18 kg N and 46 kg  $P_2O_5$  and 20 kg  $K_2O$ /ha were applied as basal as per the treatment at sowing. Well decomposed FYM (5 t/ha) was applied as per the treatment and incorporated in to soil. Pigeon pea variety JKM 189 was sown in rows 90 cm apart during second week of July. The net plot sizes were 27.5 m<sup>2</sup>. The seeds were treated with Rhizobium, PSB cultures and PGPR (@ 5 g/kg seed) just before sowing as per the treatments. Recommended plant protection measures and other management practices were followed. Cost of cultivation, net returns as well as BC ratio were also worked out.

# **RESULTS AND DISCUSSION**

Table 1 reveals that all the treatment applications had no significant effect on plant height, number of branches per plant, seed weight, plant stand and stick yield. Whereas the other yield attributes like pods per plant and seeds per pod have shown significant differences. Performance of pigeon pea was better with combined application of inorganic fertilizers, FYM and biofertilizers. Application of 50%RDF through inorganic fertilizer + 5 tones/ha FYM + Rhizobium + PSB + PGBR at the time of sowing recorded significantly more number of pods (225.8/pl) and seeds per pod (3.64/pod) followed by 50%RDF + FYM + Rhizobium + PSB (221.5/pl and 3.47/pod) and RDF + Rhizobium + PSB (200.2/pl & 3.17/pod) respectively.

All the treatments had shown significantly higher yields than control. Among the treatments performance of pigeon pea was better with combined application of inorganic, FYM and biofertilizers. Application of 50% RDF through inorganic fertilizer + 5 tones FYM + (Rhizobium + PSB + PGPR @ 5g/kg seed) at the time of sowing recorded higher grain yield 361.8 kg/ha followed by 50% RDF + FYM + (Rhizobium + PSB) (309.6 kg/ha) and RDF + (Rhizobium + PSB + PGPR) (264.0 kg/ha). However the differences found non significant in these three treatments. Application of FYM, Rhizobium and PSB combination treatments recorded higher yields than only RDF treatment. The increase in yield with the addition of Rhizobium is possibly due to higher nitrogen availability as it improves growth, quality and yield of field crops. Jat and Ahlawat (2004) also reported that combined application of various organic and inorganic sources is capable of sustaining higher production by improving soil physical conditions and soil productivity. Application of FYM improves soil physical conditions and NPK content of soil there by increases yield and yield attributes. Rana et al. (2006) and Vyas et al. (2006) also reported favorable effect of FYM on seed yield of rajmash and pigeon pea respectively. Kaur and Khanna (2013) was also reported that combined inoculation of Rhizobium, PSB and PGPR enhanced the yield of Pigeon pea. Seed inoculation with biofertilizer treatments influenced the grain yield significantly over no inoculation. Thus combined inoculation of Rhizobium, PSB and PGPR improves nutrient status of soil and ultimately increase the nutrient uptake which enhanced the yield of crop. A similar result was also recorded by Devanand et al. (2002). In the present investigation improvement in growth and yield parameters like plant height, no. of branches and pods per plant may be the result of enhanced photosynthetic activity, followed by

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Table 1: Growth and yield parameters of pigeon pea as influenced by different INM treatments

Treatment	Grain	Stick	Plant	Plant	Pods	Seeds	100	Primary
	yield	yield	stand	height	per	per	seed	branches
	kg/ha	kg/ha		Ũ	plant	pods	weight	per plant
$F_1Y_1B_1$	236.6	9841	187	213.7	178.2	2.93	11.0	6.8
$F_1Y_1B_2$	238.5	9920	195	225.7	200.2	2.77	10.3	7.2
$F_1Y_1B_3$	264.0	10993	182	212.8	177.2	3.11	10.9	7.2
$F_1Y_2B_1$	212.0	8991	173	214.2	189.9	2.89	10.9	6.1
$F_1Y_2B_2$	244.0	10153	213	213.5	183.6	2.82	11.1	6.9
$F_1Y_2B_3$	221.7	9629	169	216.2	179.4	3.04	10.9	7.5
$F_2Y_1B_1$	220.6	8809	198	218.8	191.8	3.12	11.2	7.2
$F_{2}Y_{1}B_{2}$	230.7	9593	186	218.8	182.6	2.50	11.1	6.2
$F_{2}Y_{1}B_{3}$	268.4	11606	176	226.3	225.8	3.64	11.1	7.2
F <sub>2</sub> Y <sub>2</sub> B <sub>1</sub>	274.6	9281	187	214.4	174.9	3.15	10.1	7.5
F,Y,B,	326.8	13630	176	206.7	192.4	3.47	11.3	7.8
F <sub>2</sub> Y <sub>2</sub> B <sub>3</sub>	358.2	15084	166	229.0	225.8	3.64	11.1	7.9
Mean	251.8	10628	184	217.5	191.5	3.05	10.9	7.1
SE m	4.7	379	10	4.3	4.6	0.21	0.3	0.5
CD at 5%	13.8	NS	NS	NS	13.6	0.61	NS	NS
CV%	3.2	6	10	3.4	4.2	11.82	4.8	11.8

Table 2: Yield of pigeon pea as influenced by different INM treatments

Treatments	Grain	Cost of	Net	B:C
	yield	cultivation	return	ratio
	(kg/ha)	(Rs.)	(Rs.)	
$F_1Y_1B_1$	236.6	7500	20900	3.79
$F_1Y_1B_2$	238.5	7800	20800	3.67
$F_1Y_1B_3$	264.0	7900	23780	4.01
$F_1Y_2B_1$	212.0	8600	16840	2.96
$F_1Y_2B_2$	244.0	8750	20530	3.35
$F_1Y_2B_3$	221.7	8900	17700	2.99
$F_{2}Y_{1}B_{1}$	222.6	7500	19220	3.56
$F_{2}Y_{1}B_{2}$	230.7	8000	19680	3.46
$F_{2}Y_{1}B_{3}$	257.0	8200	22640	3.76
$F_{2}Y_{2}B_{1}$	223.3	8500	18300	3.15
F,Y,B,	309.6	8800	28360	4.22
F,Y,B,	361.8	9100	34300	4.77
SĒM	4.7			
CD 5%	13.8			
CV%	3.2			

efficient transfer of these metabolites in the seed. This improvement may not be solely due to the inoculation of seed with biofertilizers but because of several other factors such as release of growth promoting substances, suppression of plant pathogens and proliferation of beneficial microbes in the rhizosphere (Goud and Kale, 2010). Result from Table 2 shows that maximum benefit cost ratio (4.77) was recorded with 50% RDF through inorganic fertilizer + 5 tonnes FYM/ha + (Rhizobium + PSB + PGPR) followed by 50% RDF + FYM and dual inoculation with Rhizobium and PSB (4.22). Thus it could be concluded that 50% RDF + 5 tonnes FYM/ ha + (Rhizobium + PSB + PGPR) was the best combination for getting higher productivity with maximum net returns.

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# Instructional Effectiveness of Online Courses in Agriculture

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# ABSTRACT

The present study was carried out to know the instructional effectiveness of online courses in agriculture of IGNOU in 2014. The study was conducted in School of Agriculture in Indira Gandhi National Open University New Delhi purposively selected. Two courses namely Post graduate diploma in food safety and quality management and post-graduate certificate course in agriculture policy were selected for the study. Total 517 learners registered both in online courses were selected using census method. Analytical research design was used to meet the objectives of the study. The data were collected with the help of questionnaire mailed through post and electronic mail. The data were analyzed using appropriate statistical tool. Out of seven aspects of instructional effectiveness selected for the study majority of the learners found the online courses. Majority of the learners were highly active in online courses and found moderately authentic assessment of online courses. Majority of the learners found moderately developed technical infrastructure in online courses. Majority of learners also reported that the overall instructional effectiveness.

Keywords: Instructional effectiveness, Online learners, School of Agriculture

## **INTRODUCTION**

Education is seen as key in the process of achieving sustainable development. History of education is as old as human civilization as in each phase of civilization human being continued learning new things either informally or formally. Today we are facing an overwhelming challenge to increase efficiency and effectiveness of education system. Over the period with the advancement of educational technology the teaching learning process went through drastic changes. Conventional methods are less flexible interms of time, place and pace of study so there is a need to combat all challenges of conventional system so distance education may be seen as an approach which is more flexible and cost effective. Both conventional and distance system of higher education have witnessed a series of challenges like population explosion, information explosion, and changing educational scenario over the time. This trend of change in use of communication technology in education over different phases is continuing trend and now the focus is on online learning.

The instructional design and delivery in online courses is perhaps the most critical component of online learning as instructional effectiveness of learning is controlled primarily by these factors. Online courses provide a different kind of learning environment for instructors and students where students may share limited common background and typically have minimal face-to-face contact that calls for more systematic planning, developing, and adapting instruction based on identifiable learners needs and content requirements (Robles and Braathen, 2002). With the use of online learning environments firmly integrated into many higher education courses, the effectiveness of this mode in general and instructional effectiveness in particular has come under question and has been the subject of various studies in this area.

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## MATERIALS AND METHODS

All Schools of Study which comes under Indira Gandhi National Open University (IGNOU) offering online courses were the universe of the study. Out of 21 Schools of Study of IGNOU, School of Agriculture was selected purposively as it is related to discipline of Agricultural Extension and Communication. The School of Agriculture offers total 21 Ph.D., Post Graduate, Diploma, certificate and awareness courses in three modes i.e. correspondence, face-to-face and online. Out of these courses, two courses namely post graduate diploma in food safety and quality management and postgraduate certificate course in agriculture policy are being offered in online mode. Both these online courses offered by School of Agriculture of IGNOU were selected for the study. All 517 learners registered in both online courses i.e. Post Graduate Diploma in Food Safety and Quality Management and Post-Graduate Certificate Course in Agriculture Policy were selected using census method. Questionnaire was sent to all learners via email and post. However due to low response rate only 166 filled up questionnaires were received.

### **RESULTS AND DISCUSSION**

In present study instructional effectiveness was measured in terms of : Curriculum, Instructional design, Teacher quality, Student role, Assessment, Management and support systems and Technical infrastructure. The component wise findings have been presented as under.

Table 1:Distribution of learners according to curriculum (n= 166)

Category	Number	Percentage
Less relevant (>13)	29	17.47
Moderately relevant (13-19)	99	59.64
Highly relevant (<19)	38	22.89

Perusal of Table 1 depicts that majority of the learners i.e. 59.64 per cent found the curriculum moderately relevant followed by those who found it highly relevant (22.89 per cent) and less relevant (17.47 per cent) respectively. The results are in harmony with the findings of Rothman *et al.* (2011) who found thatthe items that were rated most positively by respondents were primarily those associated with course organization and formatting.

Table 2:Distribution of learners according to instructional design (n=166)

Category	Number	Percentage
Less effective (>29)	49	29.52
Fairly effective (29-37)	92	55.42
Highly effective (<37)	25	15.06

The data in the Table 2 shows that more than half of learners (55.42 per cent) found online instructional design fairly effective followed by less effective (29.52 per cent) and highly effective (15.06 per cent) respectively. This finding is supported by the findings of Lai (2004) who foundthat student found interface design and navigation of the courses as easy and students were pleased with online courseware design.

Table 3: Distribution of learners according to teacher quality (n= 166)

Category	Number	Percentage
Low (>17)	21	12.65
Medium (17-25)	53	31.93
High (<25)	92	55.42

The data in the Table 3 illustrates that majority of the learners found high level of teacher quality i.e. (55.42 per cent) followed by those found it medium (31.93 per cent) and low (12.65 per cent) quality of teacher.

Table 4:Distribution of learners according to student role (n=166)

Category	Number	Percentage
Less active (>14)	19	11.45
Moderately active (14-20)	27	16.26
Highly active(< 20)	120	72.29

It is apparent from Table 4 that majority (72.29 per cent) of the learners were highly active in online courses followed by 16.26 per cent of those who were moderately active and 11.45 per cent of those who were less active in performing online courses. The findings of the present investigation are in conformity with the findings of Redmon and Burger (2004) who found that online course provides students the flexibility of time and place to reflect on the previous postings to the discussion thread and thus actively engages them in a meaningful and intellectual experience.

Table 5:Distribution of learner	s according to assessment
(n= 166)	

Category	Number	Percentage
Less authentic (>16)	21	12.65
Moderately authentic (16-24)	97	58.43
Highly authentic ( $< 24$ )	48	28.92

It is clear from Table 5 that more than half of learners (58.43) reported that assessment in online courses was moderately authentic followed by those found it highly authentic (28.92 per cent) and less authentic 12.65 per cent.

Table 6:Distribution of learners according to management and support systems (n=166)

Category	Number	Percentage
Less appropriate (>29)	59	35.55
Moderately appropriate(29-39)	75	45.18
Highly appropriate (< 39)	32	19.27

Table 6 clearly shows that maximum number of learners (45.18 per cent) found online management and support systems moderately appropriate followed by less appropriate (35.55 per cent) and highly appropriate (19.27 per cent) respectively.

Table 7:Distribution of learners according to technical infrastructure (n=166)

Category	Number	Percentage
Less developed (>17)	63	37.95
Moderately developed (17-25)	86	51.81
Highly developed (<25)	17	10.24

Perusal of Table 7 reveals that majority (51.81 per cent) of the learners reported that technical infrastructure was moderately developed followed by those who found it less developed (37.95 per cent) and only 10.24 per cent learners found technical infrastructure highly developed.

Table 8:Distribution of learners according to overall instructional effectiveness (n= 166)

Category	Number	Percentage	
Less effective (>145)	20	12.05	
Fairly effective (145-187)	114	68.68	
Highly effective (<187)	32	19.27	

From the Table it is clear that majority (68.68 per cent) of learners reported that the instruction effectiveness of online courses was fairly effective. About 19.27 per cent learners reported that the

instructional effectiveness was highly effective. Only 12.05 learners reported that the instructional effectiveness was less effective. Similar results were also reported by Chan *et al.* (2003) and Rothman *et al.* (2011) who reported that majority of the students found the effectiveness and the organization of the online courses were better than average and indicated a general positive perception about online courses.

In order to find out the relationship between instructional effectiveness and selected socio personal, psychological and communication characteristics of learners correlation analysis was carried out.

Table 9: Relationship between instructional effectiveness and selected profile characteristics of online learners (N= 166)

Independent variables	Coefficient of correlation	t <sub>cal</sub>
	"r" value	
Age	0.1833*	2.387
Education	0.5938**	9.357
Family income	0.2954**	3.960
Achievement Motivation	0.1643*	2.133
Self confidence	0.1562*	2.026
Attitude towards ICT	0.2147**	2.816
ICT exposure	0.1571*	2.037

\*\*Significant at 0.01 LOS; \*Significant at 0.05 LOS

It is clear from Table 9 that age and education had positive and significant correlation with instructional effectiveness. It implies that with increase in age and gain of education, person's tendency to perceive instructional effectiveness in a positive manner increases.

Similarly other variables, family income, achievement motivation and self confidence were also found positively and significantly correlated with instructional effectiveness. It implies that increase in family income brings about exposure to various sources of information and person with higher impetus for achieving certain goals would have more thrust for understanding instructions effectively and an individual with high self confidence would obviously have a potency to efficiently understand instructions.

Attitude towards ICTs and ICTs exposure had a positive correlation with instructional effectiveness. It implies that favourable attitude towards ICT of learners would bring deeper understanding and helps in grasping more information and instruction inculcated and if a person is more exposed to ICT tools he or she ought to be highly effective in apprehending instruction.

#### CONCLUSION

The present study concludes that out of seven aspects of instructional effectiveness selected for the study majority of the learners found the online curriculum moderately relevant, instructional design fairly effective, high level of teacher quality. Majority of the learners were highly active in online courses and found moderately authentic assessment of online courses. Maximum number of learners found management and support systems moderately appropriate. Majority of the learners found moderately developed technical infrastructure in online courses. Majority of learners also reported that the overall instruction effectiveness of online courses as fairly effective. All variables were positively correlated with instructional effectiveness. Though most of the instructional effectiveness aspects were effective but management and support system and technical infrastructure were less appropriate and less developed were also in good numbers that indicated both two aspects were not working as per expectation of learners. There is an urgent need which would provide frequent feedback about the quality of the course content, support system and interaction with the counsellor and users can receive timely and user friendly responses to technical questions.

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# A Resilience Scale to Measure Farmers' Disenchantment towards Agriculture in National Calamity Hit Region of India: An Innovative Tool

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#### ABSTRACT

Agriculture in present scenario is facing numerous challenges, among that one of the alarming trend shows that farmers in our country want to quit agriculture in mass extent. In this direction, the research was designed with the objective of developing a scale to measure resilience in relation to farmers' profession (RFP-Scale) to know why farmers want to quit farming or what motivates them to sustain agriculture despite of numerous hardships. Therefore, the present study made an attempt to quantify the exact level of resilience of the farmers' towards their profession. The process started with selection of 51 statements and finally 33 statements indicating the positive or negative resilience level were retained for scale development. The statements were edited in the light of the informal criteria suggested by Edwards. In order to find out the discriminating index for each item, 't' value was calculated using the formula given by Edwards. The scale so developed finally consisted of 19 statements (9 positive and 10 negative) whose't' values were found to be significant at one percent level of significance. The scale so developed can be used world-wide by research scholars, policy makers, governmental organizations, NGOs, scientists and civil societies to know the farmers' quitting tendencies towards agriculture with suitable time and location specific modifications.

Keywords: Bihar, Calamity, Disenchantment, Haryana, Quit Farming, Resilience

# **INTRODUCTION**

India is the land of agriculture and it is the main source of livelihood among the farming community from the pre-historic time and still approximately 50 percent of our population is directly dependent on agriculture (Census of India, 2011). But, the recent trends in agriculture and allied sectors are showing some depressing pictures. The share of agriculture and allied sectors in India's GDP has declined to 13.7 percent in 2012-13 from 51.9 percent in 1950-51 (PTI 2013). The reason given to this decline by ex-minister of State for Agriculture, in a written reply to the Rajya Sabha was due to shift from traditional agrarian economy to industry and service sectors (PTI 2013). There is some fact in the statement, but we can't ignore the fact that the living condition of majority of farmers in our country is pitiable to such an extent that a large number of farmers in India want to quit farming. Today India's primary sector is getting setback in the form of farmers' apathy/antipathy towards agriculture. As per the 59<sup>th</sup> Round of NSSO (NSSO 2003), 40 percent of the farmers wish to quit farming. Centre for studies of developing societies (CSDS Lokniti, 2014) survey revealed that 76 percent of farmers would prefer to do other work while 60 percent wanted their children to migrate to and settle in a city. On an average, that's about 2,035 farmers losing 'Main Cultivator' status every single day from the last 20 years (Census of India, 2011) and in a time of jobless growth, they've had few places to go beyond the lowest, menial ends of the service sector.

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There are several "distress hotspots" in India, where farmers are committing suicide or want to quit farming (The National Commission on Farmers, 2007). The commission had suggested that special attention should be paid to such areas to reduce risk. It has been recorded that distressed hotspots are those where farmers had faced crop failure due to several reasons including natural calamities. Those distressed hotspots have been identified in the country like: Kosi region of Bihar where farmers are quitting farming and becoming laborer due to concurrent flood and drought in the region; southern Punjab's Sangrur and Bhatinda district, Bundelkhand region in Uttar Pradesh, Vidharba region in Maharashtra etc.

Therefore, it is essential to find suitable tool which can measure the reasons of their disinterest in agriculture in the past few decades. So, a scale was devised to measure the quitting tendencies of the farmers in one of the 'distress hotspots' of India i.e. the Kosi region (Lal et al., 2015). The Kosi flood, which affected Bihar in 2008, was declared as "National Calamity" by ex-Prime Minister of India, Dr. Manmohan Singh and so far, it is the single calamity in the history of India to be officially declared as a 'National Calamity' (SAARC, 2008). The region was selected for the study because 'true resilience' can precisely be measured in 'post-traumatic condition' (Lal et al., 2014). Resilience level is inversely proportional to the quitting tendency (Seligman, father of positive psychology, 2011). So, resilience in relation to farmers' profession scale (RFP-Scale) was constructed to know the reason, why farmers want to quit farming. Lesser the score in resilience scale more will be the quitting tendency and vice versa. So, scale is capable of measuring both the extreme of the continuum based on scores of the individual in the scale. One of the highly cherished resilience scales was constructed to measure resiliency level in students and United States Army (Seligman, 2011). It is rightly said that a 'true resilience' can precisely be measured in 'post-traumatic condition'. So, 6 years (2008-2014) was adequate time for the respondents to bounce back after the calamity. It must be taken into consideration that no single 'resilience scale' can be used 'as such' to measure the resiliency level of farmers countrywide due to time and location specific constraints (Lal et al., 2014). So, the RFP-Scale can be used by future researchers with suitable modifications in the other distressed hotspots of India.

#### MATERIALS AND METHODS

The word resilience has Latin origin in 1620-30; Latin resili (ens), present participle of resilire to spring back, rebound (see resilient) + -ence. Resilience is a dynamic process in which the individual displays positive adaptive skills despite experiencing significant traumatic adversity; it is a measure of the ability to cope with stress. Assets and resources within the individual, their life, and environment facilitate this capacity for adaptation and "bouncing back" in the face of adversity (Windle *et al.*, 2011).

Resilience in this study was operationalized as the degree to which farmers bounced back in relation to their profession after the national calamity. The method of summated rating suggested by Likert (1932) was followed in the development of scale. The following steps were considered for measuring resilience of the farmers in relation to their profession.

**Collection of statements:** The first step in the construction of resilience scale was to collect statements pertaining to the resilience in relation to profession. Utmost care was taken to include equal number of positive and negative statements in the list to reduce the effects of social desirability and positive response bias. A tentative list of 51 statements pertaining to "Resilient in relation to farmers' profession" were collected by reviewing relevant literature and through consultation with extension experts, agricultural scientists, rural journalists, livelihood experts and doctors in order to incorporate the psychological parameters for RFP-Scale.

Editing the statements: These statements were edited as per the 14 informal criteria enunciated by Likert (1932) and Edwards (1969). Out of 51 statements, 33 statements were retained after editing. These statements were found to be non-ambiguous and non-factual.

**Response to raw statements**: The proforma containing raw statements on three point continuums i.e. Agree (A), Undecided (UD), Disagree (DA) were mailed by post, e-mail and also handed over personally to 75 judges. These judges were experts in the field of Extension Education, Psychology, Rural Journalism

from various Agricultural and Veterinary Universities, KVKs, Medical Colleges, Media houses and Research Institutes. The judges were requested to examine each statement and rate them on three point continuum indicating the suitability of statements. The judges were requested to make necessary modifications and additions or deletions, if they desired so.

Item analysis: Statement analysis is an important step while constructing valid and reliable scale. The judges were asked to indicate their degree of response with each statement on three point continuums ranging from Agree (A), Undecided (UD) and Disagree (DA) with scoring of 3, 2, and 1; for positive statement and the scoring pattern was reversed i.e. 1, 2, and 3 for negative statement. The total individual judges' score was calculated by summing up the score of each statement given by individual judge.

**Calculation of 't' values**: Based upon the total individual scores, the judges score were arranged in descending order. The top 25 percent of judges with their total individual scores were considered as high group and bottom 25 percent as the low group so that these two groups provided criterion groups in terms of evaluating the individual statements. The 't' values were worked out in order to discriminate the responses of high and low groups for the individual statements by using the under mentioned formula (Edwards, 1969). Thus, out of 60 judges to whom the statements were administered for the item analysis, 15 judges with highest and 15 judges with lowest scores were used as criterion groups to evaluate individual statement.

$$t = \frac{\overline{X}_{H} - \overline{X}_{L}}{\sqrt{\frac{\sum_{i=1}^{n} (X_{H} - \overline{X}_{H})^{2} + \sum_{i=1}^{n} (X_{L} - \overline{X}_{L})^{2}}{n(n-1)}}$$

Where,  $\sum (X_H - \bar{X}_H)^2 = \sum X_H^2 - \frac{(\sum X_H)^2}{n}$ 

- $\overline{X}_{H}$  = The mean score on a given statement for the high group
- $\overline{X}_L$  = The mean score on a given statement for the low group
- $\Sigma X_{H}^{2}$  = Sum of squares of the individual score on a given statement for high group

- $\Sigma X_{L}^{2}$  = Sum of squares of the individual score on a given statement for low group
- $\Sigma X_{H}$  = Summation of scores on given statement for high group
- $\Sigma X_{L}$  = Summation of scores on given statement for low group
- n = Number of subject in low and high group
- t = The extent to which a given statement differentiate between the high and low group.
  Σ = Summation

**Reliability of the scale**: A scale is reliable when it gives consistently the same results when applied to the same sample. The final set of the 19 statements which represent the Resilience *in relation to* Farmers' Profession, was administered on three point continuum to a fresh group of 30 farmers of non sample area, who faced the vagaries of 16<sup>th</sup> June 2013 flood in Lapra and Odhri Villages of Jagadhri Block of Yamunanagar district of Haryana. The designed resilience scale for the study was pre-tested for its reliability by using the split half method. Reliability was calculated by using the Formula of (Spearman, 1910; Brown, 1910). The coefficient of correlation between odd and even scores was 0.89 which was found to be significant at 1 percent level, thereby testifying the reliability of the scale.

$$r_{SB} = \frac{2r_{hh}}{1+r_{hh}}$$

where,  $r_{hh}$  = Pearson correlation between odd and even

$$\mathbf{r}_{\rm SB} = \frac{2 * 0.8054}{1 + 0.8054} = \frac{1.6108}{1.8054} = 0.89$$

SPSS Version 20 (Statistical Package for the Social Sciences) was used for calculating Cronbach's alpha and Guttman Split-Half Coefficient. The RFP-Scale has good internal consistency - Cronbach's alpha for the present study was 0.894 and Guttman Split-Half Coefficient value was 0.892. It shows that scale is reliable.

Validity of scale: Validity can be defined as the property that ensures the obtained test score as valid, if and only if it measured what it intended to measure. A scale is said to be valid if it stands for one's reasoning. The content validity of the scale was tested. The content

validity is the representative or sampling adequacy of the content, the substance, the matter and the topics of a measuring instrument. This method was used in the present scale to determine the content validity of the scale. As the content of the resilience covered the entire universe of farmers' profession through literature and expert opinion, it was assumed that present scale satisfied the content validity. As the scale value difference for almost all the statements included had a very high discriminating value, it seemed reasonable to accept the scale as valid measure of the desired dimension. The calculation of t for evaluating the difference in the mean response to resilience statement by a high group and a low group. The 't' value is a measure of the extent to which a given statement differentiates between the high score and low score groups. The 't' value equal to or greater than 2.467 ( $n_1+n_2-2$  df at 1% level of significance i.e. at 28 degree of freedom) indicating the average response of high and low groups to a statement differs significantly. Thus 19 statements on "Resilient *in relation to* farmers' profession" (9 positive and 10 negative) with significant discriminating values were retained in the final scale (Table 1).

## **RESULTS AND DISCUSSION**

**Ex: Statement-1:** Other farmers take advice from me regarding farming activities.

The final scale consisting of 19 (9 positive and 10 negative) statements can be administered to the national calamity affected farmers on a 3 point continuum viz.,

Response		Η	igh gro	up		Low group		up		
Categories	X	$\mathbf{X}^2$	f	fX	$\mathbf{f}\mathbf{X}^2$	X	$\mathbf{X}^2$	f	fX	$\mathbf{f}\mathbf{X}^2$
Agree (A)	3	9	12	36	108	3	9	0	0	0
Undecided	2	4	02	04	8	2	4	13	26	52
Disagree (DA)	1	1	01	01	1	1	1	2	2	2
Sums			15	41	117			15	28	54
			n <sub>H</sub>	$\sum X_{\rm H}$	$\sum X_{\rm H}^{2}$			n <sub>L</sub>	$\sum X_{L}$	$\sum X_L^2$
$\bar{X}_{H} = \frac{41}{15} = 2.73$ $\bar{X}_{L} = \frac{28}{15} = 1.86$										
$\sum (X_{H} - \bar{X}_{H})^{2} = \sum X_{H}^{2} - \frac{(\sum X_{H})^{2}}{n} \qquad \qquad \sum (X_{L} - \bar{X}_{L})^{2} = \sum X_{L}^{2} - \frac{(\sum X_{L})^{2}}{n}$										
$\sum (X_H - \bar{X}_H)^2 = 117 - \frac{(41)^2}{15} = 4.93 \qquad \sum (X_L - \bar{X}_L)^2 = 54 - \frac{(28)}{15}$						$\frac{(3)^2}{5} = 1.$	73			

$$t = \frac{X_H - X_L}{\sqrt{\frac{\sum_{i=1}^n (X_H - \overline{X}_H)^2 + \sum_{i=1}^n (X_L - \overline{X}_L)^2}{n(n-1)}}}$$

$$t = \frac{2.73 - 1.86}{\sqrt{\frac{(4.93 + 1.73)}{15(15 - 1)}}} = 4.86$$

S.No.	Statements to measure Resilience in relation to farmers' profession	't' Values
1	Other farmers take advice from me regarding farming activities.	4.86**
2	If I don't get subsidies, I report the issue to concerned authority/file a Right to information (RTI).	3.68**
3*	If my crop is damaged/my livestock is dead due to natural calamity, then I feel totally distressed.	0.64
4*	I simply give my land due to government rules like: Special economic zones (SEZ)/any other pressure, even if, I am not willing.	6.33**
5	I have pre-planned measures to protect my important resources (livestock, other accessories), if flood warning/natural calamity is alarmed.	2.89**
6*	Only resourceful farmers can sustain in the national calamity like 'Kosi flood'.	1.42
7	I enjoy working together with other farmers, while mutually sharing the knowledge.	8.99**
8*	Agriculture is the most vulnerable occupation in the natural calamity.	1.28
9	If market systems are disrupted due to natural calamity, I will be less vulnerable to food insecurity than other consumers.	5.12**
10	I try to pay back the 'agricultural loan' within the stipulated time.	4.01**
11	If severe flood/drought hits prior to harvest, I have enough food stock for at least few months.	1.58
12	I think varieties suitable to climate change will help me to counter natural vagaries.	3.99**
13	I am driven by the force of hunger to adopt such agricultural innovations that suit me.	1.45
14*	Instead of long-term and sustainable benefits I prefer short term immediate benefits.	7.84**
15*	I rarely tried to expand my farm/livestock number in a profitable way.	5.39**
16*	I don't prefer to take risk in my profession even when chances of success are relatively high.	0.93
17*	I don't care for market information (provided by Govt. or private) to sell my farm produces.	7.11**
18*	Farm insurance isn't an important measure for occupational security.	5.26**
19*	I don't have any backup plan for labour crisis during the peak season.	0.89
20*	Following more than one livelihood option will give me extra burden.	3.69**
21*	The future is extremely uncertain for the farmers to make long term plans in the perennial flood prone area.	1.00
22*	As a farmer, I am not enjoying good reputation in the society.	0.47
23*	I am not able to meet the requirement of my family through my profession.	2.12
24	If I don't get remunerative price in the local market, I try to sell my commodity in other nearby profitable markets.	7.42**
25*	I am easily influenced by others' profession and starts thinking that my own occupation is inferior to it.	4.99**
26*	My lack of knowledge about modern farming practices is one of the reasons for my apathy towards agriculture.	1.99
27*	Farmers' rights as given by Protection of plant variety and farmers right act (PPVFRA) wouldn't help to protect our rights.	2.32
28	I use pesticides/chemical fertilizers as the last resort, because I know it is harmful for my health, soil & environment.	2.91**
29	I can work with someone having different opinions than mine in places like cooperatives/clubs etc.	2.32
30	I introduced many desirable changes in my farming/Livelihood pattern after the calamity.	3.41**
31	I am willing to purchase such varieties (resistant/tolerant) even if it performs somewhat less than existing variety in normal condition.	1.69
32*	I may have to sell my farm land, livestock etc. if natural calamity hampers my crop production in the coming years.	8.47**
33*	I am thinking to quit agriculture due to various problems associated with this occupation.	9.26**

Table 1: Resilience in relation to Farmers' Profession Statements Analysis and their respective 't' Values

\*Indicates negative statements; \*\*Significant at 1% level of significance

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Agree (A), Undecided (UD) and Disagree (DA) with a weightage of 3, 2 and 1 for positive statements and reverse scoring system for negative statements. The overall possible maximum and minimum score ranges between 57 to 19 (Table 2). The respondents will be categorized into five groups namely 'In need (those farmers who are more or less disenchanted with agriculture and they require thorough help and counselling to continue the profession), Fragile (Fragile farmers are those who are weak enough and can succumb in a single blow like another calamity or poor remuneration of their produce), Vulnerable (are those

farmers who are exposed to the possibility of being harmed, if market force, climate or other factors are not favourable and can succumb by few blows), Coping (those farmers struggle to adverse situation and have ability to emerge out) and Resilient (those farmers have positive adaptive skills to adversity and have ability to bounce back to their previous condition and many times better than previous one)' after getting the response of the farmers' in 3 point continuum scale by using cumulative square root of frequency method. The scale so developed will be administered to 160 farmers those who were affected by the 'national calamity'.

Table 2: The final Resilience in relation to Farmers' Profession Scale (RFP-Scale) comprising 19 statements for n=160 respondents affected by the calamity

S.No.	Statements	A	UD	DA
1	Other farmers take advice from me regarding farming activities.			
2*	I simply give my land due to government rules like: SEZ/any other pressure, even if, I am not willing.			
3	If I don't get subsidies, I report the issue to concerned authority/ file an RTI.			
4*	I think varieties suitable to climate change will not help me to counter natural vagaries.			
5	I enjoy working together with other farmers, while mutually sharing the knowledge.			
6*	Instead of long-term and sustainable benefits I prefer short term immediate benefits.			
7	I try to pay back the 'agricultural loan' within the stipulated time.			
8*	I rarely tried to expand my farm/livestock number in a profitable way.			
9	I have pre-planned measures to protect my important resources (livestock, other accessories), if flood warning/natural calamity is alarmed again.			
10*	I don't take care for market information (provided by Govt. or private) to sell my farm produces.			
11	If market systems are disrupted due to natural calamity, I will be less vulnerable to food insecurity than other consumers.			
12*	Farm insurance isn't an important measure for occupational security.			
13	If I don't get remunerative price in the local market, I try to sell my commodity in other nearby profitable markets.			
14*	Following more than one livelihood option will give me extra burden.			
15	I introduced many desirable changes in my farming/Livelihood pattern after the calamity.			
16*	I am easily influenced by others' profession and starts thinking that my own occupation is inferior to it.			
17	I use pesticides/chemical fertilizers as the last resort, because I know it is harmful for my health, soil & environment.			
18*	I may have to sell my farm land, livestock etc. if natural calamity hampers my crop production in the coming years.			
19*	I am thinking to quit agriculture due to various problems associated with this occupation.			

*Note:* Almost equal number of positive (+) and negative (-) worded statements were taken alternately to reduce the effects of social desirability and positive response bias. **A=**Agree, **UD** =Undecided, **DA** =Disagree Asterisks (\*) mark statements are reverse coded/negative statements.

## CONCLUSION

The human resilience is very complex entities, and the factors and the forces that could influence their make up at any given time can be so many and so varied that prediction of individual resilience level in a given situation, or under a given circumstances, becomes extremely difficult. However resilience can be measured by suitable scale as well as built by proper guideline and training (Seligman, 2011). So, resiliency level of Indian farmers should be measured and built simultaneously in order to prevent them from 'quitting Agriculture' (Lal et al., 2014). Moreover it has been seen in India that farmers usually hesitate to share their opinion (psychological factor/ qualitative variables) as well as value of their assets (physical factor/ quantitative variables) due to several reasons associated to it. In addition, it has also been seen that farmers are disenchanted by their profession i.e. farming but still very optimistic about their life. So, to measure the overall resiliency level (psychological factor) of the farmers "Resilient in relation to farmers' life" Scale (Lal et al., 2014) should be used along with Resilience in relation to Farmers' Profession Scale (RFP-Scale). In order to get the more precise result about the farmers' true condition, Livelihood Security Index (physical factor) should be used along with both the resilience scale (Lal et al., 2015). So, in its first attempt a scale to measure the resilience of farmers in relation to their profession has been presented in this paper. The resilience scale constructed in the present study can be used by future researchers with suitable modifications in the other distressed hotspots of India to measure the resiliency level of farmers in relation to their Profession to know why they want to quit farming.

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# Yield Gap Analysis of Potato Through Front Line Demonstration

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### ABSTRACT

Potato is a very popular and important cash crop in district Ghazipur but due to improper adoption of improved technology its productivity is far below the average productivity of the state. Through survey, farmers meeting, group discussions with the farmers and field diagnostic visit the yield gap was brought out due to unavailability of HYVs quality potato tubers and imbalanced use of N:P:K fertilizers, particularly lower dose of potassium (40-50 kg/ha) and nitrogen (100-120 kg/ha) and higher dose (100-120 kg/ha) of phosphorus, was considered. Existing farmers practice was taken as a control for comparison and recommended packages includes use of new released HYVs of potato Kufri Chipsona-02 & 03 along with balance application of N:P:K fertilizer. The yield performance of both control and demonstration plot were recorded, and their yield gap, technology gap, extension gap and technology index were analyzed. Considering the scope of improvement in productivity through the recommended technologies, 32 front line demonstrations were conducted by Krishi Vigyan Kendra, Ghazipur, Uttar Pradesh during 2008-13 in three different villages at farmer's field. The average five years data revealed that an average yield of demonstration plot was 339 q/ha over local check 268.7 q/ha and 26.3 percent increase over control. The results showed that an average technology gap was recorded 10.9 q/ha. Average extension gap was recorded 70.36 g/ha and average technology index was recorded 3.0%. The yield gap analysis emphasizes the need to educate the farmers through various extension means for adoption of improved agricultural technologies to revert the trend of wide extension gap.

Keyword: Extension gap, Front Line Demonstration, Potato, Technological gap, Technological index

#### **INTRODUCTION**

Vegetable cultivation has become highly commercialized. But still there is a wide gap between current production and potential productivity. India is the second largest annual producer of potato after China in the world. Potato is a very popular and important cash crop in India and it produced 45.34 million tones from 1.99 million hectares with average productivity of 22.80 tones/ha during 2012-13 (NHB, 2013). Uttar Pradesh is the largest potato producing state in the country and accounts for 32% of total production. The state produces 14.43 million tones of potato from an area of 0.60 million hectares with productivity of 23.9 tones/ha during 2012-2013 (NHB 2013). This rapid growth under production (10.63 million tones in 2008-09 to 14.43 million tones in 2012-2013) of potato in Uttar Pradesh was possible through

dissemination of the latest technology under real farming conditions. The country's urgent requirement is to enhance the production of nutritious food in a sustainable manner and improve the farm family income in order to ensure household food security, nutritional security and economic security. Current share of potato to agricultural GDP is 2.86% from 1.32% cultivable area. On the contrary, the two principal food crops, rice and wheat, contribute 18.25% and 8.22% of agricultural GDP, respectively from 31.19 and 20.56% cultivable area, respectively (FAOSTAT). It indicated that contribution of potato in agricultural GDP from unit area of cultivable land is about 3.7 times higher than rice and 5.4 times higher than wheat. Potato cultivation has become highly commercialized in Uttar Pradesh, but still there is a wide gap between current production and potential productivity.

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Potato is a predominant Rabi crop of Ghazipur district of Uttar Pradesh. But the fact that the average productivity of potato in Ghazipur district (207.2q/ha) is substantially lower in comparison to other district i.e. Mathura (301.81q/ha), Manipur (271.37q/ha), Agra (263.77q/ha), Farrukhabad (262.97q/ha) and Etawah (235.49q/ha) in 2010-11 (Source: State Horticulture Mission, Government of Uttar Pradesh). There is ample scope for further improvement of production and productivity of potato for raising the income level of the farming community of the district.

The yield gap analysis is a potent research technique that has been introduced in the 1970s. Developed by the International Rice Research Institute (IRRI), it is extensively used to measure and analyze determinants of the yield gaps. It is also observed that, even though the production level has increased to a great extent in the recent past; still there exists a wide gap between the actual yield obtained by the growers and the production level actually possible with the existing modern technology. In the present investigation, Yield loss is due to unavailability of HYVs quality potato tubers and imbalanced use of N:P:K fertilizers have been assessed under real farming condition . To combat the causes of yield erosion and lower economic returns, dissemination of recommended technology through front line demonstration was successfully attempted.

#### MATERIALS AND METHODS

Thirty two Front line demonstrations on Potato were conducted at farmers' field in district Ghazipur (Uttar Pradesh) to assess its performance during Rabi seasons of the year 2008-09, 2009-10, 2010-11, 2011-12 and 2012-13. FLD on potato was purposively conducted in Karanda and Sadar blocks of Ghazipur district in Uttar Pradesh. Two villages were selected randomly from each block. The soil of the district is generally sandy loam in texture. The area under each demonstration was 0.2 ha. Regular visits by KVK scientists to FLD plots were made so as to ensure timely application of critical inputs and to solve other crop related problems. The extension activities like field days and Kisan goshtis were also organized at the demonstration sites as to provide opportunities for other farmers of the area.

Through survey, farmers meeting, group discussions with the farmers and field diagnostic visit

during the cropping period, low yield of potato was conceived due to unavailability of HYVs quality potato tubers and imbalanced use of N:P:K fertilizers, particularly lower dose of potassium (40-50 kg/ha) and nitrogen (100-120 kg/ha) and higher dose (100-120 kg/ ha) of phosphorus. To manage assessed problem, improved and recommended technologies were followed as intervention during the course of front line demonstrations programme. In case of recommended practice, use of new released HYVs of potato Kufri Chipsona-02 & 03 along with balanced use of fertilizer i.e. N:P:K:: 180:80:110 kg/ha. To ensure the benefits of recommended technologies, feedbacks from the farmers were collected so that further research and extension activities were improved.

Yield gap refers to the difference between the potential yield and actual farm yield. Potential yield refers to that which is obtained in the experiment station. The yield is considered to be the absolute maximum production of the crop possible in the given environment, which is attained by the best available methods and with the maximum inputs in trials on the experiment station in a given season. Demonstration yield is the yield obtained on the demonstration plots on the farmers' fields in the study area. The conditions on demonstration plots closely approximate the conditions on the cultivators' fields with respect to infrastructural facilities and environmental conditions. Actual yield refers to the yield realized by the farmers on their farms under their management practices. The data output were collected both in FLDs as well as control plots and finally the extension gap, technology gap, technology index (%) were worked out (Samui et al., 2000) as given below:

Technology gap = Potential yield - Demonstration yield

Extension gap = Demonstration yield - Farmers yield

Technology index (%) = - X 100 Potential yield

## **RESULTS AND DISCUSSION**

**Performance of FLD Potato:** The performance of high yielding varieties of potato for the year 2008-13 in during rabi season was analyzed (Table 1). Data revealed that under demonstration plots, potato yield

Year	Area under demo.	Variety	No. of demo.	Averag (q/	Average yield (q/ha)		Techno- logy	Exte- nsion	Techno- logy
	(in ha)			Demo	FP	check over	(q/ha) Gap	(q/ha) Gap	(%) Index
2008-09	1.0	Kufri Chipsona-02	10	335	265	26.41	15	70	4.2
2009-10	1.0	Kufri Chipsona-02	10	345	285	21.05	5	60	1.4
2010-11	0.5	Kufri Chipsona-03	02	324	260	24.61	26	64	7.2
2011-12	1.0	Kufri Chipsona-03	05	345	272	26.80	5	73	1.4
2012-13	1.0	Kufri Chipsona-03	05	346.5	261.7	32.40	3.5	84.8	1.0
MEAN	-	-	32	339	268.7	26.3	10.9	70.36	3.04

Table 1: Productivity, Technology Gap, Extension Gap and Technology Index (%) in potato crop.

Demo: Demonstration plot with recommended practice; FP: Farmers practice

was found substantially higher than that under farmer's practice during all the year. Under different locations, the potato yield in demonstration plots ranged between 324 to 346.5 q/ha, which was 21 to 32.4 percent higher over farmers practice (local check). On an overall basis, 26.3 percent increase in yield was recorded. These results are in conformity with the findings of Tomar *et al.* (2003), Jethi R. (2008) & Mishra *et al.* (2009) in Front Line Demonstrations on potato and Dayanand *et al.* (2012) in other crop.

Analysis of Yield gap: The technology gap, the difference between potential yield and yield of demonstration plots, were 15, 5, 26, 5 and 3.5 q/ha during 2008-09, 2009-10, 2010-11, 2011-12 and 2012-13, respectively. On an average technology gap under 5 years FLD programme was 10.9 q/ha. The technology gap observed may be attributed to dissimilarity in the soil fertility status, agriculture practices and local climatic situation. Extension gap of 70, 60, 64, 73 and 84.8 q/ ha was observed during 2008-09, 2009-10, 2010-11, 2011-12 and 2012-13, respectively. Average extension gap was observed 70.36q/ha, which emphasized the need to educate the farmers through various extension means like FLD, for adoption of improved agricultural technologies, to revert the trend of wide extension gap. The technology index showed the feasibility of the evolved technology at the farmers' fields. The lower the value of technology index, the more is feasibility of technology. Fluctuation in technology index (ranging between 1.0-7.2%) during the study period may be attributed to the dissimilarity in soil fertility status, weather conditions, insect-pests and diseases reported by Mishra et al. (2007), Saini et al. (2013) and Singh et al. (2013). On an average technology index was observed 3.04 percent during the 5 years of FLD, which shows the efficacy good performance of technical interventions. There are adoption gaps in the demonstrated plots vs. farmers' practice and with the very clear results in front of the farmers between these plots, they automatically leads toward adoption of the technology. Some feedbacks were also recorded by interviewing the farmers. These are given below:

- Non-availability of HYVs quality potato tubers in the market.
- ✤ Lack of awareness about balance dose of fertilizers.

#### CONCLUSION

Front line demonstration program was effective in changing attitude, skill and knowledge of improved recommended practices of potato cultivation including adoption. This also improved the relationship between farmers and scientists and built confidence between them. The study of yield gap analysis of potato through Front Line Demonstration revealed that the losses made in terms of yield q/ha could be increased by 21 to 32.40 percent. The technology gap which shows the gap in the demonstration yield over potential yield were ranged between 3.5 to 26 q/ha and can be attributed to dissimilarity of the soil fertility and local climatic situation. Extension gap ranged between 60 and 84.8 q/ha, which emphasized the need to educate the farmers through various means like training, FLDs etc. Technology index show the feasibility of the technology demonstrated which show the good performance of intervention point made to reduce the yield gap in potato.

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# Training Needs and Constraints of Extension Officers in Transfer of Agriculture Technology

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## ABSTRACT

The present investigation was conducted with 42 extension officers (12 Agriculture Extension Officers and 30 Junior Agriculture Extension Officers) to find out their personal characteristics, training needs and constraints in carrying out the assigned field extension work of transfer of agriculture technology. Study reveals that majority of the extension officers were graduates in agriculture sciences besides more than 1/4<sup>th</sup> of them were possessing post graduate degrees in agriculture. It has also been found that majority of them were moderately experienced among both the categories i.e. AEOs and JAEOs. An equal proportion of both the categories of respondents were highly experienced and least experienced. With respect to training needs, high-tech floriculture cultivation, integrated pest management, water management, organic farming, integrated farming systems, natural resource management and crop husbandry were the major areas in which the extension officers reported the need for training. Besides, poor marketing facilities in the area, difficult terrain and poor connectivity in hilly areas, unorganized farming community, lack of interest in farming due to uneconomic holdings and poor financial condition of the farmers were the prime constraints encountered by the agriculture extension officers for carrying extension activities effectively.

Keywords: AEOs, Constraints, JAEOs, Marketing, Technology, Training

#### **INTRODUCTION**

Extension officers constitute a prime link between farmers and technological innovations generated from the research stations. In other words, they serve as technical guides for the farmers. In the present times, the technologies are being generated at such a faster rate that they become obsolete even after very short period of time. Under such conditions, extension officers must be kept updated through regular training programmes so that they can become proficient in latest technologies while working with the farmers. So it becomes essential to identify the training need areas of agriculture officers engaged in extension work for planning and formulating effective training strategies.

In the modern age, training has been considered as one of the important inputs in all the aspects of developmental programmes. It is an important tool for human resource development and effective transfer of technology. Training means to educate a person so as to be proficient in doing a job with time efficiency. It is a crucial requirement for agriculture development in view of the emergence of new trends. The stock of knowledge is rapidly increasing which makes it essential to continuously update knowledge through frequent training programmes. It has become a survival strategy in order to remain in competition.

Extension officers, the agents of change, need to be updated in newly emerging technologies for different target groups and area. At the same time, they must also be trained in communication as well as training and managerial skills to be able to manage the process of participatory technological innovation and dissemination. It will require reversal of attitudes to treat indigenous knowledge and experience of farmers with respect and encourage with their active participation in search of technological solutions. In the state of Jammu and Kashmir, 80% of population is dependent on agriculture and more than 70% of the geographical area is hilly terrain. As such well equipped, trained, and updated extension officers are required for effectively disseminating the available and emerging technologies. Agriculture Extension Officers (AEOs) and Junior Agriculture Extension Officers (JAEOs) are the extension functionaries who are directly in contact with farmers and are responsible for disseminating the knowledge of latest technologies to the farmers.

Training has been acclaimed as an effective tool in developing favourable attitude, skill, confidence, job competence (Chavda, 2008). As such extension officers need continuous training and updating in the latest technologies. Keeping in perspective the importance of agriculture in the economy of the state and role of the extension officers in bringing about the latest technological know-how from the research institutes to the farmers field the present study was undertaken with the following specific objectives:

- a) To study the personal attributes of extension officers working in the department of agriculture.
- b) To assess the training needs of extension officers
- c) To study the constraints encountered by the extension officers in carrying out effective extension work for transfer of agriculture technology.

# MATERIALS AND MEHODS

The present investigation was carried out in the purposively selected Kathua District of Jammu and Kashmir State. The agriculture department in the district is headed by the Chief Agriculture Officer who is responsible for agriculture development in the district. He has District Agriculture Officers, Sub-Divisional Agriculture Officers, Agriculture Extension Officers and Junior Agriculture Extension Officers. Kathua district comprises of three agriculture Sub Divisions viz.; Hiranagar, Billawar and Basholi headed by Sub Divisional Agriculture Officers. For the purpose of present investigation, 4 Agriculture Extension Officers and 10 Junior Agriculture Extension Officers were randomly selected from each subdivision thereby constituting a sample of 12 Agriculture Extension Officers and 30 Junior Agriculture Extension Officers. Thus total study sample consisted of 42 extension officers. Data on a pre-tested interview schedule was collected through personal interview technique by the researchers. The data so collected was subjected to varied statistical measures to arrive at the specific conclusions.

## **RESULTS AND DISCUSSION**

**Distribution of extension officers on the basis of their professional education qualifications:** Data presented in Table 1 reveal that majority of extension officers (78.57%) were graduates in agriculture. Besides, more than 1/4<sup>th</sup> (27.43%) of them were possessing post graduate degrees in agriculture in addition to graduation. A further glance at Table 1 reveals that 66.67% of the AEOs and 83.34% of the JAEOs were agriculture graduates. Besides 33.34% of the AEOs and 16.64% of JAEOs were holding post graduate degrees in addition to graduation.

It implies that comparatively more proportion of JAEOs were graduates than AEOs. In addition to it comparatively more proportion of AEOs were Post Graduates than JAEOs.

**Distribution of extension officers on the basis of their length of service:** For the purpose of more clarification, three categories of respondents were framed on the bases of calculated mean and standard deviation of the length of service of the respondents. The three categories were highly experienced (>22.91 score), moderately experienced (22.91-15.75 score) and least experienced (>15.75 score). A perusal of data incorporated in Table 2 reveals that majority of the respondents (66.67%) were moderately experienced among both the categories of respondents i.e. AEOs and JAEOs. Besides, an equal proportion of both the

Table 1: Distribution of the respondents on the basis of their professional educational qualifications

Professional qualification	AEO		JA	EO	Total		
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	
B.Sc. (Agriculture)	8	66.67	25	83.34	33	78.57	
M.Sc. (Agriculture)	4	33.34	05	16.64	09	27.43	
Total	12	100.00	30	100.00	42	100.00	

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categories of respondents (16.67%) were highly experienced and least experienced.

Further, Table 2 reveals that exactly  $1/4^{th}$  of AEOs were highly experienced whereas 8.83% of them were least experienced. Besides, exactly  $1/5^{th}$  of JAEOs were Least Experienced whereas only 13.33% of them were highly experienced.

**Distribution of extension officers on the basis of their age:** For stratification three categories of respondents were formulated on the basis of calculated Mean and Standard Deviation of the age scores of the respondents i.e. High (>47.23), Medium (47.23-39.43) and Low age group (<39.43 score). Data incorporated in Table 3 depicts that more than 3/4<sup>th</sup> of the respondents (76.19%) were in the medium age group. This was followed by 14.28% in the high and 9.53% in the low age groups. In case of AEOs, majority of them were in medium age group (76.66%) followed by 13.34% in the high and 10% in the low age group.

Likewise in case of JAEOs, exactly  $3/4^{th}$  of them (75%) were in the medium age group followed by 16.66% in the high and only 8.34% in the low age group.

*Training Needs of Agriculture Extension Officers:* Training Needs of Agriculture Extension Officers were calculated using Mean Percent Score (MPS) and Ranks. A perusal of data incorporated in Table 4 reveals that high-tech floriculture cultivation was the priority field for providing training to the agricultural extension officers with calculated MPS 85.56 and thus was ranked I<sup>st</sup> in the hierarchy. It was followed by Integrated Pest Management (MPS 85.28), water management (MPS – 84.45), organic farming (MPS 82.50) and Integrated Nutrient Management (MPS – 79.45) and were ranked II<sup>nd</sup>, III<sup>rd</sup>, IV<sup>th</sup> and V<sup>th</sup> respectively by the extension officers. Likewise, Post Harvest Technology of the agricultural crops was perceived by 79.92% of the Agriculture Extension Officers of the area for which training need was felt and was placed at VI<sup>th</sup> rank. It was followed by protected cultivation, Integrated Farming Systems, Natural Resource Management and Crop Husbandry with calculated MPS 76.97, 74.72, 72.78 and 71.95 respectively and were assigned VII<sup>th</sup>, VIII<sup>th</sup>, IX<sup>th</sup> and X<sup>th</sup> ranks respectively.

Seed production and processing technology was perceived by 71.94% of the respondents as the area in which training need was felt and was placed at XIth rank accordingly. 71.12% of Agriculture Extension Officers observed the need for proper training on apiculture and was placed at XII<sup>th</sup> rank in the hierarchy of the training needs of extension officers. Likewise, Integrated Cropping Systems (MPS 69.72), agriculture finance, marketing and export (MPS 66.67) and mushroom cultivation technology (MPS 63.05) were the areas in which least training need was felt by the Agriculture Extension Officers and were placed at XIIIth, XIVth and XV<sup>th</sup> ranks respectively. The findings are in confirmation with those of Kumar et al. (2008) who reported knowledge of insect pest diseases, application of agro chemicals, post harvest technology, soil and water management etc as the major areas of training needs of the respondents. Findings are also supported by those

Table 2: Distribution of the respondents on the basis of their length of service

Category of services duration	AEO		JA	EO	Total		
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	
Highly experienced (>22.91)	3	25.00	4	13.33	7	16.67	
Moderately experienced (22.91-15.75)	8	66.67	20	66.67	28	66.66	
Least experienced (<15.75)	1	8.33	6	20.00	7	16.67	
Total	12	100.00	30	100.00	42	100.00	

Table 3: Distribution o	extension	officers on	the ba	asis of	their age
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Age group	AEO		JA	EO	Total		
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	
High (>47.23)	4	13.34	2	16.66	6	14.28	
Medium (47.23- 39.43)	23	76.66	9	75.00	32	76.19	
Low (<39.43)	3	10.00	1	8.34	4	9.53	
Total	30	100.00	12	100.00	42	100.00	

of Yadav et al. (2011) who reported medium to high level of training needs of the extension officers.

To find out the correlation between the training needs of AEOs and JAEOs, Rank Order Correlation Coefficient (r) was calculated. The value of Rank Order Correlation Coefficient came to be 0.70 which was found non-significant at 5% level which indicates that there was a significant difference between training needs of AEOs and JAEOs. These findings are however in contradiction with those of Kumar *et al.* (2008) who reported no significant difference between the different categories of respondents with regard to their training needs.

Constraints encountered by Agriculture Extension Officers in carrying out effective extension work for transfer of agriculture technology: Data presented in table 5 reveal that poor marketing facilities in the area was the principal constraint encountered by 88.09% of the Agriculture Extension Officers in the transfer of agriculture technology to the farming community and was accordingly ranked first. Difficult terrain and poor connectivity in hilly areas was the constraint of II<sup>nd</sup> rank faced by 83.34% of the Extension Officer working in the field. It was followed by unorganized farming community (MPS 79.36), lack of interest in farming due to uneconomic holding (MPS 76.19) and poor financial condition of the farmers which were placed at III<sup>rd</sup>, IV<sup>th</sup> and  $V^{\rm th}$  rank respectively in the hierarchy of constraints encountered by Agriculture Extension Officers.

Illiteracy among the Farming Community was also found to constrain 67.46% of the Agriculture Extension Officers and was found to be the constraint of VI<sup>th</sup> order followed by non availability of modern teaching aids in the field (MPS 65.07) and lack of cooperation by allied departments (57.14) and which were placed at VII<sup>th</sup> and VIII<sup>th</sup> rank respectively.

The least perceived constraints were non availability of allowances for visiting hilly and far flung areas (MPS 47.61) and psychological hindrances (MPS 46.82) which got IX<sup>th</sup> and X<sup>th</sup> ranks respectively. The findings are supported by those of Medhin and Teklehaimanot (2013), who also reported lack of marking infrastructure as the prime constraint encountered by the respondents. Similarly, Shukla *et al.* (2013) also reported financial and resource constraints as the major factors impeding the respondents.

To find out correlation between the degree of constraints encountered by both the categories of respondents, Rank order correlation coefficient was calculated whose value came to be 0.90 which was significant at 5% level which lead to the conclusion that there was significant relationship between the degree of constraints encountered by AEOs and JAEOs.

Table 4: Training needs of agriculture extension officers in transfer of agriculture technology

S.No.	Major areas of training needs	AI	EO	JA	EO	Total		
		MPS	Rank	MPS	Rank	MPS	Rank	
1.	Crop husbandry	69.45	XV	74.45	IX	71.95	Х	
2.	Water management	85.56	II	83.34	III	84.45	III	
3.	Integrated pest management	90.00	Ι	80.56	IV	85.28	II	
4.	Integrated nutrient management	81.12	IV	77.78	VI	79.45	V	
5.	Seed production and processing technology	80.00	V	63.89	XIII	71.94	XI	
6.	Natural resource management	73.34	XI	72.23	Х	72.78	IX	
7.	Agriculture finance, marketing and export	72.23	XII	61.12	XIV	66.67	XIV	
8.	Integrated cropping system	70.00	XIII	69.45	XI	69.72	XIII	
9.	Organic farming	78.89	VII	86.12	II	82.50	IV	
10.	Integrated farming system	74.45	Х	75.00	VIII	74.72	VIII	
11.	High-tech floriculture	82.23	III	88.89	Ι	85.56	Ι	
12.	Protected cultivation	77.78	VIII	76.16	VII	76.97	VII	
13.	Post harvest technology	78.90	VI	80.55	V	79.92	VI	
14.	Mushroom cultivation technology	67.78	XIV	58.33	XV	63.05	XV	
15.	Apiculture	75.56	IX	66.67	VII	71.12	XII	

MPS = Mean Percent Score;  $r_{e} = 0.70$ 

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S.No.	Constraints		AEO		JAEO		al
		MPS	Rank	MPS	Rank	MPS	Rank
1.	Poor financial condition of the farmers	69.42	VI	78.82	III	71.42	V
2.	Illiteracy among the farming community	69.47	V	65.45	VI	67.46	VI
3.	Difficult terrain and poor connectivity in hilly areas	81.12	II	85.56	II	83.34	II
4.	Un organized farming community	80.86	III	77.86	V	79.36	III
5.	Psychological hindrances	45.26	IX	48.38	Х	46.82	Х
6.	Lack of interest in farming due to uneconomic holding	74.12	IV	78.26	IV	76.19	IV
7.	Poor marketing facilities available in the area	88.41	Ι	87.77	Ι	88.09	Ι
8.	Non availability of modern teaching aids in the field	66.02	VII	64.12	VII	65.07	VII
9.	Lack of cooperation by allied departments	52.86	VIII	61.42	VIII	57.14	VIII
10.	Non availability of the allowances for visiting hilly	43.03	Х	52.19	IX	47.61	IX
	and far-flung areas						

Table 5: Constraints encountered by the agriculture extension officers transfer of agriculture technology

MPS = Mean Percent Score;  $r_s = 0.90$ 

# CONCLUSION

It can be concluded from above findings that majority of extension officers were graduates in agriculture besides more than 1/4th of them were possessing post graduate degrees. It has also been found that majority of the respondents were moderately experienced and an equal proportion of both the categories of respondents were highly experienced and least experienced. High-tech floriculture cultivation was the priority field for providing training to the agricultural extension functionaries followed by integrated pest management, water management, organic farming, integrated nutrient management, post harvest technology of the agricultural crops, protected cultivation, integrated farming systems, natural resource management and crop husbandry. No significant relationship between the training needs of both the categories of the respondents was found. As regards constraints, poor marketing facilities in the area was the principal constraint encountered by the respondents followed difficult terrain and poor connectivity in hilly areas, unorganized farming community, lack of interest in farming due to uneconomic holding and poor financial condition of the farmers were the prime constraints encountered by the agriculture extension officers. It is recommended on the basis of above findings that extension officers be provided training in the deficient areas in which they perceive it difficult to work. Besides, the field level constraints of the officers needed to be properly addressed for improving their efficacy in the transfer of agriculture technology.

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# Economic Evaluation of Technology for Promoting Pulses Production in Poonch district of Jammu & Kashmir

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#### ABSTRACT

Keeping in view the importance of pulses in farming, KVK Poonch conducted demonstrations on improved agricultural technologies of pulse crops at farmers' fields during the year 2009-10 and 2010-11. The yield of pulses in demonstration plots did not reach the potential level; still recorded high for all the pulses under study as compared to the traditional plots of periphery. The economic parameters in terms of economic returns from pulses were calculated and compared with the corresponding traditional plots. All the three pulse crops namely Moong, Mash and Lentil recorded higher B:C ratios (4.88, 7.06 and 5.87 respectively) in demonstrated plots as compared to the plots where farmers were using traditional practices (4.09, 5.34 and 5.34 respectively). To narrow down the gap between the yields of different varieties, location specific recommendations appear to be necessary.

Keywords: B:C ratio, Front line demonstration, Pulses

#### **INTRODUCTION**

Pulses have been cultivated since time immemorial in the rain-fed conditions which are characterised by poor soil fertility and moisture stress environments. Pulses are grown in an area of 73.33 million ha with a production of 61.34 million tons in World. India is the largest producer and consumer of pulses in the world accounting for about 22 percent of the world production, 33 percent of the world total area under pulses and 27 percent of the global consumption (Dutta and Kapadia, 2011). About 90% of the global pigeonpea, 65% of chickpea and 37% of lentil area falls in India, corresponding to 93%, 68% and 32% of the global production, respectively (FAOSTAT 2012). Next to India, Niger, Nigeria, Brazil, China, Myanmar, and Canada are the leading countries in area under pulses. The leading producers next to India are China, Canada, Brazil, Nigeria, Myanmar and USA. While the world average yield of pulses stood at 836 kg/ha and countries like USA, Canada and China attained yields of 1,908 kg/ ha, 1,804 kg/ha and 1,752 kg/ha respectively, the yield in India at 622 kg/ha was far below the world average as also of other leading producing countries (Banerjee

and Palke, 2010). Pulses in India are grown as rainfed crop on 23 m ha with a very low mean yield of 565 kg per hectare. Despite of producing 12-14 million tonnes of pulses annually (28% of global value), the gap between demand and supply continues to be widening, as the demand for pulses in India is estimated at 18.29 million tonnes in 2009-10, while the production has been stagnant at around 13.6 million tonnes (Sundaram, 2010). Studies on demand and supply projections of pulse crops for the year 2020, have predicted that the domestic supply would be 9 per cent short of domestic demand under most optimistic scenario, and about 26 per cent under the pessimistic scenario (Reddy and Reddy, 2010). Economic analysis of lentil and chickpea cultivation in Uttarakhand suggests that pulses can be profitably cultivated in rice fallows in the post rainy season (Bourai and Kumar, 2012). Pulses production has remained largely unattractive to our farmers due to low productivity, lack of adequate government support and a poor procurement policy. The Government has been taking several initiatives to step up production of pulses. India achieved a record output in pulses production at 18.1 MT in 2010-11 (Reddy et al., 2013) with an all-time high production achieved in chickpea

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(8.25 MT), moong (1.82MT) and urad (1.74 MT). In addition to production focused approach, efforts need to be made to make pulses more profitable by augmenting producer's share in consumer's price which is very low due to processing and other marketing costs. Innovative marketing channels with higher participation of farmers like processing of dal at village level need to be evolved (Shalendra, 2011). In the recent years, the share of *kharif* pulses is decreasing in total pulses production. There is a need to focus on kharif pulse crops to evolve varieties that sustain uncertain environments (Reddy et al., 2013). One of the essential factors to further increase the productivity of pulses is the provision of high quality seed to the farmers. Front Line Demonstrations along with effective and proven technologies at district level can help in increasing productivity of pulses. The present study was planned to estimate the economics of Front Line Demonstrations on pulses conducted in Poonch district of Jammu & Kashmir.

Pulses have not generally been cultivated on commercial basis by the farmers in the Intermediate hill zone of Jammu and Kashmir including Poonch district. They are either cultivated on wasteland patches or on the bunds around the main crop. This is the reason that the productivity of pulses is quite low which further makes their cultivation un-attractive to the farmers. The yield of pulses can be increased by demonstrating their cultivation technologies at the farmers' fields under the supervision of scientists. Frontline demonstration (FLD) is one of the most powerful tools of extension in this regard. The present paper evaluates the economics of pulses production under frontline demonstrations and compares it with that of the economics of their production under traditional methods.

### MATERIALS AND METHODS

Poonch district of Jammu and Kashmir (India) is located on the southern slopes of Pir Panjal range and lies between 33° 25' to 34°10' north latitude and 73° 58' to 74° 35' east longitude. It is bounded by Pakistan Occupied Kashmir (POK) on its west and northwestern side and north by Baramulla and Budgam district of Kashmir valley Poonch district is classified into three agro-climatic zones namely: Sub-Tropical (up to 800 m) Intermediate lower (between 800 to 1500 m) and Intermediate higher (above 1500 m). Almost 86 percent of cultivated area of the district is rainfed and the majority of the area which comes under Intermediate higher (above 1500 m) zone remains fallow during Rabi season due to snowfall. Pulses constitute five percent of the total cropped area of the district in kharif season and only two percent during Rabi season as shown in Figure 1 (Anonymous, 2009).



Figure 1: Crop wise area of district Poonch

In the baseline survey conducted by Krishi Vigyan Kendra in the district Poonch during 2007-08, it was found that farmers were growing local varieties of pulses and were not following proper management practices. The problems and constraints faced by the farmers in the cultivation of pulses were identified and Front Line demonstrations were planned accordingly. Krishi Vigyan Kendra Poonch conducted Front Line Demonstrations to demonstrate improved technologies. In each Front Line Demonstration, the improved variety suitable to local condition was selected and the recommended package of practices was adopted at right times.

The present investigation was carried out for pulses, with the objectives to identify the yield gaps between farmer's practices and front line demonstrations and to work out the input cost and monetary returns under front line demonstrations and farmers (traditional) methods. The present study was conducted in the adopted villages of the operational area of Krishi Vigyan Kendra Poonch for two years (2009-10 to 2010-11). Three types of pulses viz; Moong, Mash and Lentil were given to the farmers under Front Line Demonstrations scheme of KVK Poonch in 2009-10 and 2010-11. The detail of area and number of demonstrations conducted under different pulses is given in Table 1.
Crop	Particulars	Traditional	Front Line	200	)9-10	2010-11		Total	
		Practices	Demonstrations	Area	No. of	Area	No. of	Area	No. of
				(ha)	farms	(ha)	farms	(ha)	farms
Moong									
-	- Variety	- Mixed/local	- SML-818/ SML-668						
	- Sowing	- On the bunds	- Line sowing in beds	02	19	02	25	04	44
	- Nutrient Management	- 00:00:00	- 16:40:00						
	(N:P:K)								
Mash									
	- Variety	- Mixed/local	- Uttara						
	- Sowing	- On the bunds	- Line sowing in beds	02	17	02	26	04	43
	- Nutrient Management	- 00:00:00	- 16:40:00						
	(N:P:K)								
Lentil									
	- Variety	- Mixed/local	- L-699/L-4076	02	24	04	41	06	65
	- Sowing	- On the bunds	- Line sowing in beds						
	- Nutrient Management	- 00:00:00	- 15:40:00						
	(N:P:K)								

Table 1: Particulars showing the detail of pulses growing under front line demonstrations and traditional practices

In every demonstration, an improved variety and recommended dose of chemical fertilizers was used as per the scientific package of practices recommended by the research wing of Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu, J&K (Anonymous 2007a and Anonymous 2007b). The main differences between the practices under demonstrations and traditional farming of pulses are given in Table 1. The data on the production cost and monetary returns were collected from front line demonstrations plots for working out the economic feasibility of improved and scientific cultivation of pulses. Besides, the data from traditional farms was also collected where farmers were using their own practices.

### **RESULTS AND DISCUSSION**

During the period under study it was observed that all the three pulses under Front Line Demonstrations yield more compared to traditional plots in the periphery (Table 2). Moong in demonstration plots recorded an average yield of 5.38 q/ha in 2009-10, an increase of 30.90%, compared to an average of 4.11 q/ha in farmers' traditional plots in the periphery. Similarly in 2010-11, the demonstration plots recorded an increase of 58.90% yield (7.50 q/ha) for Moong compared to the traditional plots (4.72 q/ha). Mash recorded an average yield of 7.25 q/ha and 5.10 q/ha in demonstration plots in 2009-10 and 2010-11 respectively, compared to 6.00q/ha and 3.64 q/ha in the farmers' traditional plots. The percent increase in the yield of Mash in demonstration plots recorded to be 20.83 and 40.10 in 2009-10 and 2010-11 respectively. Similarly, Lentil recorded an average yield of 10.03 q/ ha and 7.50q/ha in demonstration plots in 2009-10 and 2010-11 respectively, compared to 6.72 q/ha and 6.20 q/ha in the farmers' traditional plots with the mean percent increase of 20.90 over locations and year (Table 2). The yield improvement in demonstration plots over traditional plots is mainly due to the adoption of improved practices in the former case, as provided in the Package of Practices for *Kharif and Rabi* crops of SKUAST-Jammu. The year wise fluctuation in yield was observed mainly on the account of variations in soil moisture availability due to untimely rainfall as well as the change in the location of trials.

The yield of Front Line Demonstration trials and potential yield of the crop was compared to estimate the yield gaps which were further categorised into technology and extension gaps (Hiremath et al., 2009). The technology gap shows the gap in the demonstration yield over potential yield. Of the three pulses under study, the technology gap was highest in Moong (10.76 q/ha), followed by Mash (9.24 q/ha) and lentil (8.63 q/ha) which may be attributed to dissimilarity in soil fertility status and weather condition. Further the highest extension gap of 3.05 q/ha was recorded in Mash followed by Moong (1.37 q/ha) and lentil (1.18 q/ha), which emphasised the need to educate the farmers through various extension means for the adoption of improved cultivation practices for pulses. The technology index shows the feasibility of the variety at the farmer's field. The lower the value of technology index more is the feasibility. The value of technology index among the three pulse crops was found to be least in case of Mash i.e. 51.31%, followed by Lentil i.e. 53.91% and Moong i.e. 67.25% (Table 2).

The year wise economics of pulses production under front line demonstrations was estimated for 2009-10 and 2010-11 and the results have been presented in Table 3. The economic analysis of the data over two years revealed that Moong recorded a gross return of Rs. 34,250/ha), net return (Rs. 27,500/ha) and B:C. ratio (4.88) compared to traditional plots from where the farmers obtained gross return of Rs. 25,340, net return of Rs. 19,440 and B:C ratio of 4.09. Similarly, mash recorded higher gross return (Rs. 57,605/ha), net return (Rs. 50,030/ha) and B:C ratio (7.06) in demonstrated plots compared to traditional plots from where the farmers obtained gross return of Rs. 37,680/ ha, net return of Rs. 31,330/ha and B:C ratio of 5.34. In case of lentil too, demonstrated plots yield higher gross return (Rs. 28,500/ha), net return (Rs. 24,000/ha) and B:C ratio (5.87) compared to traditional plots from where gross return of Rs. 20,950/ha, net return of Rs. 17,350/ha and 5.34 B:C ratio was obtained (Table 3). There is a big gap between research station technology and farmers' technology, which has resulted in low yields. Yield gap I, which is the gap between research station and on-farm trial yields, is highest in the South Zone (30%) and lowest (17%) in the Northwest Zone. Yield gap II, which is the gap between on-farm trials and zone average yields, is large in all zones, ranging from 64% in the Northeast Zone to 148% in the Central Zone. Wider yield gap-II is an indication that there is a large gap between on-farm demonstration yield and zone average yield, which can be bridged by wider adoption of existing technology by farmers. The existing technology has the potential of doubling production at national level without increasing area under chickpea if farmers adopt the recommended package of practices (Reddy *et al.*, 2007).

### CONCLUSION

Pulses constitute an essential part of cropping system on farms all over the country. To enhance the production and profitability of pulses, better quality and high yielding varieties have been provided to farmers under different central government schemes. Front Line Demonstrations on pulses were conducted by Krishi Vigyan Kendra in Poonch district during the years 2009-10 and 2010-11. The economic evaluation of these demonstrations was conducted in order to estimate the

Table 2.	Productivity	of nulses	wield game	and technology	index (	Mean over	locations an	d vear)
Table 2:	Froductivity	or purses,	yield gaps	and technology	muex (	wiean over	locations an	u year)

Crop	No. of	Area		Yield (q/ha)		Percent	Technology	Extension	Technology
	Demon-	(ha)	Potential	Demonstration	Traditional	increase	gap	gap	index
	strations			Plots	Plots	over local	(q/ha)	(q/ha)	(%)
Moong	44	04	16	5.24	3.87	35.22	10.76	1.37	67.25
Mash	43	04	18	8.76	5.72	53.23	9.24	3.05	51.31
Lentil	65	06	16	7.37	6.10	20.90	8.63	1.18	53.91

Table 5. Economics of Pulses production (Mean over locations)	Tabl	le 3	3.	Economics	of	Pulses	production	(Mean	over	locations	)
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Particulars					Y	ear and o	crop			
			2009-10			2010-11			Overall	
		Moong	Mash	Lentil	Moong	Mash	Lentil	Moong	Mash	Lentil
Yield (q/ha)	Demo. Plots	5.38	7.50	7.25	5.10	10.03	7.50	5.24	8.77	7.38
	Traditional Plots	4.11	4.72	6.00	3.64	6.72	6.20	3.88	5.72	6.10
Cost of cultivation	Demo. Plots	5000	6150	4200	8500	9000	4800	6750	7575	4500
(Rs./ha)	Traditional Plots	4600	5500	3500	7200	7200	3700	5900	6350	3600
Additional cost of cultivation over local (Rs./h		a) 1600	650	700	1300	1800	1100	1450	1225	900
Gross returns	Demo. Plots	32800	45000	29000	35700	70,210	28000	34250	57605	28500
(Rs./ha)	Traditional Plots	27200	28320	23000	23480	47040	18900	25340	37680	20950
Net Returns	Demo. Plots	27800	38850	24800	27200	61210	23200	27500	50030	24000
(Rs./ha)	Traditional Plots	22600	22820	19500	16280	39840	15200	19440	31330	17350
Additional Net Returns over local (Rs./ha)		5200	16030	5300	10920	21370	8000	8060	18700	6650
Incremental B:C	Demo. Plots	6.56	7.31	6.90	3.20	6.80	4.83	4.88	7.06	5.87
Ratio	Traditional Plots	5.91	5.14	6.57	2.26	5.53	4.10	4.09	5.34	5.34

gross return, net return and B.C ratio. Alternatively, the same indicators were estimated on yield of pulses from neighbouring farmers' fields to compare the returns with demonstrated plots. The yield of pulses in demonstration plots did not reach the potential level but showed higher returns compared to the neighbouring farms. Economic analysis of front line demonstrations on three pulse crops namely Moong, Mash and Lentil revealed that pulses can yield handsome returns if grown under scientific and recommended practices.

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### Extent of People's Participation in the Process of Implementation of Integrated Watershed Management Programme (IWMP)

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### ABSTRACT

The study was conducted in Haryana state in Bhiwani and Yamunanagar district were selected purposively, because of one from South Haryana and the other from North Haryana. Bhiwani and Yamunanagar Integrated Watershed Management Programme (IWMP) were selected purposively. Bhaganwala, Sawad villages were selected randomly from Bhiwani and Dhanaura, Salapur villages were selected randomly from Yamunanagar as the watershed villages. The specific objective of present study were "To study the extent of people's participation in the process of implementation of Integrated Watershed Management Programme (IWMP)". The study revealed that Majority of the respondents had medium level of participation at all the stages of Integrated Watershed Management Programme. people's participation was assessed maximum in resource analysis and planning stage followed by other stages of Integrated Watershed Management Programme.

Keywords: Integrated Watershed Management Programme (IWMP), People's Participation

### **INTRODUCTION**

The future of mankind depends to a great extent on the capacity of the earth to produce adequate food, fibre, fuel and fodder and to absorb usefully the wastes of various kinds to keep the environment clean. This capacity of the mother earth is materially influenced by the wisdom and foresight of the man to utilize basic life supporting systems of land and water resources. Since, agriculture and allied activities like forestry, animal husbandry, fisheries etc. are the largest users of land and water resources, developmental endeavours in these areas are bound to have profound impact on the primary survival system. In the developmental process, it is essential to integrate short-term production objectives to feed the growing human and livestock population with long term objectives of upgrading and conserving the land and water resource base (Oswal, 1999). Access to adequate information is very essential to increase agricultural productivity (Sharma et al., 2012).

Rajgopalan (1991) stated that diversity has existed in the nature of the projects falling within the gamut of the terms "watershed development". Even there are certain major differences between the national and state sponsored programmes in respect of size of the watershed, cost of development, administration, people's participation and emphasis on treatment of non-aerable lands.

Chandel (2003) stated that a watershed is an area having common drainage. The rain water falling in the area coming within the ridge line can be harvested and made to flow out of the area through common drainage point. Thus, the watershed area encompasses both arable and non-arable land. India has achieved selfsufficiency in the production of food grains, but still we are not in a position to meet the standard dietary requirement of the increasing population. By 2020, the demand for food grains would be 250 million tonnes. Hence, the dependence on agriculture in the country would continue to increase, posing a severe threat to the limited natural resources, particularly in the rainfed regions. Considering the present scenario of production in irrigated areas, a major part of the additional requirement of production has to come from rainfed agriculture. This calls for up-scaling of productivity

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from the current one to two tonnes per ha in the rainfed agro ecosystem. In this context, soil and rainwater management on watershed basis constitutes the key to agricultural development of rainfed areas. Conservation of land and water not only controls land degradation but also can lead to sustained productivity.

### MATERIALS AND METHODS

The study was conducted in Bhiwani and Yamunanagar districts of Haryana state were purposively selected, because of one from South Haryana and the other from North Haryana. Bhiwani and Yamunanagar Integrated Watershed Management Programme (IWMP) were selected purposively. Bhaganwala, Sawad villages were selected randomly from Bhiwani and Dhanaura, Salapur villages were selected randomly from Yamunanagar as the watershed villages. From each selected village, 20 farmers were selected randomly. Total 80 farmers from watershed villages were selected for present study. Each of the selected respondents was interviewed personally. Interview for data collection with the help of interview schedule was generally conducted at the farmers' houses and occasionally also at their farms when they were free to talk to the researcher. The researcher had to make repeated visits to the study area with a view to develop sufficient rapport with the farmer. The responses to each question were marked in the interview schedule itself and then respondent-wise tabulation sheet was prepared. Keeping in view the nature of data, objective of the study, applicability of the tests were used for analysis and interpretation of data. Computer facilities were availed to work out mean, coefficient of correlation etc. The correlation coefficient between the

dependent and independent variables were calculated with the help of Pearson's formula of correlation coefficient.

### **RESULTS AND DISCUSSION**

People's participation in process of implementation of Integrated Watershed Management Programmes is crucial for their successful and cost effective implementation. Therefore, this section deals with extent of people's participation at various stages of Integrated Watershed Management Programme. The results so obtained have been presented in Tables 1, 2 and 3.

The data presented in Table 1 reveal that majority (48.75%) of the respondents had medium level of participation followed by low (28.75%) and high (22.50%) level of participation at resource analysis and planning stage.

During the execution stage, majority (56.25%) of the respondents had medium level of participation followed by low (27.50%) and high (16.25%) level of participation at this stage. Further perusal of the data pertaining to people's participation at progress evaluation and reconsideration stage in Table 1, it was observed that majority (47.50%) of the respondents had medium level of participation at this stage. It was followed by high (30.00%) and low (22.50%) level of participation.

Analysis of overall people's participation reveals that quite a large (51.25%) number of respondents had medium level of participation followed by high

Project stage	Category	Frequency	Per cent
Resource analysis and planning stage	Low (up to 11)	23	28.75
	Medium (12 to14)	39	48.75
	High (above 14)	18	22.50
Executive stage	Low(up to 3)	22	27.50
	Medium (4 to 5)	45	56.25
	High (above 5)	13	16.25
Progress Evaluation and Reconsideration stage	Low (up to 3)	18	22.50
	Medium (4-5)	38	47.50
	High (above 5)	24	30.00
Overall	Low (up to 20)	13	16.25
	Medium (21-30)	41	51.25
	High (above 30)	26	32.50

Table 1: Extent of people's participation at various stages of Integrated Watershed Management Programme, in different categories (n = 80)

Project stage	Mean participation	Maximum possible	Percent
	score	score	score
Resource analysis and planning stage	14.82	22	67.36
Executive stage	3.57	6	59.50
Progress Evaluation and Reconsideration stage	2.45	5	49.00
Overall	21.06	35	60.17

Table 2: Extent of people's participation at various stages of Integrated Watershed Management Programme, in mean participation score (n=80)

(32.50%) and low (16.25%) level of people's participation in Integrated Watershed Management Programme. The results of the study are in conformity with the findings of Padmaiah *et al.* (2001) and Singh *et al.* (2001) who also reported medium level of participation. The data presented in Table 2 show that people's participation was assessed maximum (67.36%) in resource analysis and planning stage followed by execution stage (59.50%) and progress evaluation and reconsideration stage (49.00%). The overall people's participation was to the extent of 60.17 per cent. The results of the study get support from the findings of Singh (1991), Padmaiah *et al.* (2001) and Nagabhushanam (2003).

Table 3: Relationship between respondent's personal variables and their extent of participation in implementation of Integrated Watershed Management Programme (n=80)

Variables	People's participation
	correlation coefficient (r)
Age	0.095
Education	0.214*
Family Education	0.219*
Socio-economic status (SES)	0.232*
Landholding	0.174
Mass media exposure	0.305*
Extension contacts	0.194
Scienticism	0.188
Risk orientation	0.226*
Economic motivation	0.194

\* Significant at 5% level of significance.

The data presented in Table 3 depict that out of ten independent variables, five variables, namely, education (0.214), family education (0.219), socioeconomic status (0.232), mass media exposure (0.305) and risk orientation (0.226) were found to have positive and significant correlation with their extent participation of implementation of Integrated Watershed Management Programme. These findings are in line with the findings of Singh *et al.* (2001) who found that people having high educational level and high exposure to information sources had high extent of participation in social forestry programme.

### CONCLUISION

The data pertaining to the people's participation revealed that majority of the respondents had medium level of participation at resource analysis and planning stage, execution stages and progress evaluation and reconsideration stages of Integrated Watershed Management Programme. However, people's participation was assessed maximum at resource analysis and planning stage followed by execution stages of Integrated Watershed Management Programme.Overall it is encouraging that about 84 per cent of farmers participating enthusiastic in the programme, middle to high level. The study found out that all the independent variables of both the categories of respondents of this study (except age) exhibited positive correlation with dependent variables. Most of them showed positive and significant correlation with dependent variables, with the independent variables on the dependent variables cropping intensity, productivity, adoption and people's participation.

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# Traditional Folk Media of Kumaon: A Study of Nature, Theme and Extent of Use

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### ABSTRACT

Traditional folk media term speaks of those performing arts which are cultural symbols of people. They are direct, face to face and linked with emotions and values of people. The traditional folk media carry various themes. Different folk media have different nature and their extent of use by the people varies. The present study was conducted in Dwarahat block of Almora district of Uttarakhand to find out the nature, theme and extent of use of different folk media.

Keywords: Nature, Theme and extent of use, Traditional folk media

### **INTRODUCTION**

Traditional Folk Media is a term used to denote People's Performances. It describes folk dance, rural drama and musical variety of the village people. This term speaks of those performing arts which are cultural symbols of people. There is a tremendous wealth and variety in traditional folk media in India. Conventionally, the traditional folk performances are usually carrying theme of morality. The rural drama with its stock characters has also carried across modern messages, without in any way hurting the community's traditional culture. During the past few years they have slowly acquired a functional dimension without losing their cultural roots.

Soon after achieving freedom the National Government started a full-fledged Song and Drama Division in 1954, with the objective of training and utilizing the service of traditional folk performances to inform the rural masses about the planning and development programmes of the country. Flexibility is the most important factor which determines the viability of a folk medium for rural communication. Flexibility of a folk medium might reveal itself either in its form or theme or in both. The traditional folk media have been used for moral, religious, social, political and even for occupational purposes. The traditional folk media embody the people belief, their social concepts and perception of their relationship, their social ethics, their philosophy of life and their life pattern. Traditional folk media like folk songs, drama etc. are highly structured and deeply rooted in the socio-cultural mores of the society. Proverbs, riddles, folk tales, myths and folk songs have played (conventions) an important role in development of society. Indigenous Communication Channels are available in many forms and structure. According to Meena and Singh (2010) traditional folk media have a remarkable impact on the rural society because of their acceptable idioms, functional significance and entertainment component. However, study conducted by Raina et al. (2011) revealed that traditional media were the last among all sources of information for flower growers.

During past numerous studies have been conducted on modern media but a very little has been done to study every detail of traditional folk media. The traditional folk media has its roots in the culture of people. Keeping this background in mind the present study was planned with the following specific objectives. (1) To study the nature of traditional folk media, (2) To study the theme of traditional folk media and (3) To study the extent of use of traditional folk media.

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### MATERIALS AND METHODS

The prerequisite of present study was the researcher's familiarity with local language, culture, beliefs and attitudes of the people. Therefore, Dwarahat block of Almora district of Uttarakhand was purposively selected, as the researcher was well acquainted with the local language, area, its culture and traditions. In Dwarahat Block there were 115 gram panchayats (205 revenue villages), out of which twenty villages were selected randomly for the collection of data. A list of the farmers of each village was prepared. From each list, five old aged male and female were selected randomly as respondents. Total one hundred respondents were taken as sample. It clearly indicates that there were two categories of respondents male and female. Therefore fifty per cent male and fifty per cent female were selected as respondents. The criteria of selection were with the purpose that old age people possess detail knowledge about traditional folk media. Furthermore, there are some of the traditional folk media which are performed exclusively by the female. Therefore, male and female respondents were selected. Interview schedule consisting of structured as well as open-ended questions were developed in Hindi for data collection. Data was collected using the personal interview technique. A brief account of operationalization of variables and their measurements have been given below.

*Nature of Traditional Folk Media:* They are very specific in nature. The nature of traditional knowledge is such that more of it is transmitted orally than written down. Depending on the nature and extent of flexibility the traditional folk media reveal themselves into three categories.

- 1. Rigid Media
- 2. Semi-Rigid or Semi-flexible Media
- 3. Non-Rigid or Totally flexible Media.

**Themes of Traditional folk media:** Folk media command an immense variety of forms and themes to suit the communication requirements of the masses. The folk media is so flexible that new themes can be accommodated in them. Folk media themes were studied in terms of following categories.

S.No.	Theme(s) categories	
1.	Entertainment	
2.	Social Development	
3.	Agriculture	
4.	Religious	
5.	Ritual and ceremonial	

*Extent of use of Traditional folk media:* Traditional folk media as collected were studied with regard to the extent of use by the respondents. To measure the extent of use, the respondents were asked to state the extent of use of traditional folk media on a three point continuum viz very much used, somewhat used and not at all used.

### **RESULT AND DISCUSSION**

**Nature of Traditional folk media:** Traditional folk media are mostly used during religious or festive occasions. They are very specific in nature. The nature of traditional knowledge is such that more of it is transmitted orally than written down. Folk media are often used for personal as well as group information sharing and discussion and draw their popularity from their entertaining nature. Depending on the nature and extent of flexibility the traditional folk media reveal them selves in three categories (Guha, 2006 and Ranganath, 1990).

**1. Rigid Media:** Rigid media are those that reject a new massage summarily. These are ritualistic or intensely religious in form and theme. There content is hard-core and unchangeable. Songs based on religious scriptures or those in praise of Gods and Goddesses.

**2. Semi-Rigid Media:** Semi-rigid media are those that provide limited scope for the new message. While dealing with a classical theme, the medium would have in-built characters or situations which hold out flexibility. The rural drama with its gesture, the Katha-Kirtan and the temple based, traditional rod-puppets are examples of this category.

**3.** Non-Rigid Media: Non-rigid media are those that absorb new messages without any reservation to reflect them effectively in the field.

Nature of the traditional folk media was studied and findings have been presented in the Table 1.

Nature	Traditional Folk Media
Rigid (ritual) Media	Fairs, Festivals, Proverbs/Saying, Idioms, Jagar (Folk song), Sanskar Song (Folk Song), Sarankar Dance (Folk dance), Motifs (Aipan)
Semi-Rigid or Semi-flexible (traditional) Media	Ramleela (Threatre), Jhoda (Folk Dance), Hudkiya-Baul (Folk Song), Holi songs (Folk Song), Sound-Signal and Sarrogates
Non-Rigid or Totally flexible (folk) Media	Some songs of Holi and Jhoda

Table 1: Nature of Traditional folk media

It can be seen from Table 1 that under Rigid Media category, a number of folk media comes like Fairs, Festivals, Proverbs/Saying, Idioms, Jagar (Folk song), Sanskar Song (Folk Song), Sarankar Dance (Folk dance) and Motifs (Aipan) etc. Fairs, festivals and Jagar etc. are religious in nature and related to the God and Goddessess. One can not change these folk media. Proverbs, Idioms, Sanskar Song (Folk Song), Sarankar Dance (Folk dance) etc. are fixed, as these are passed on from one person to another. Motifs are also comes uder this category, because these are ocassion specific.

Under Semi-Rigid or Semi-flexible media, Ramleela (Threatre), Jhoda (Folk Dance), Hudkiya-Baul (Folk Song), Holi songs (Folk Song), Sound-Signal and Sarrogates etc. comes. As Ramleela, is sacred in nature. There are fixed set of Dohas and Chaupai in Ramleela, coordinator of the Ramleela can add or delete the scenes or Doha/Chaupais, according to the condition. Jhoda is participatory and semi-flexible in nature, involving all possible community groups and contemporary in nature. In Hudkiya-Baul (Folk Song) and Holi songs (Folk Song), some songs are compulsory and after performing these songs, singer(s) can sing any song(s) according to the need or demand. Sound-Signal and Sarrogates are also under semi-rigid media, because these can be done according to the choice of the person. Some songs of Holi and Jhoda fall under nonrogid category of the media, because a person can add, any thing in these songs in between of the performance. These songs are humorous and contemporary in nature. These songs are also rhythmic and catchy in nature.

**Themes of Traditional folk media:** Folk media command an immense variety of forms and themes to suit the communication requirements of the masses. Themes ranging from myths to current issues can easily find expression through these forms. The folk media is so flexible that new themes can be accommodated in them. On the basis of collected and documented data of the present study and on the basis of researcher's own analysis, the themes of the folk media have been presented in Table 2. It can be seen from the Table 2 that Folk song has all the themes viz. entertainment, social development, religious and ritual & ceremonial themes. So it is clear that some folk songs can be altered on the basis of the requirement of the situation.

Folk dances have entertainment, social development and religious themes. Proverbs have entertainment, social development, agriculture and

Folk Media		Themes of Trad	itional folk me	edia	
	Entertainment	Social Development	Agriculture	Religious	Ritual and ceremonial
Folk Song	Entertainment	Social Development	Agriculture	Religious	Ritual and ceremonial
Folk Dance	Entertainment	Social Development		Religious	
Proverb	Entertainment	Social Develop	Agriculture	Religious	
Idiom	Entertainment				
Riddle	Entertainment		Agriculture		
Threatre (Ramleela)	Entertainment	Social Development		Religious	Ritual and ceremonial
Festival	Entertainment		Agriculture	Religious	Ritual and ceremonial
Traditional Fair	Entertainment	Social Development		Religious	Ritual and ceremonial
Sound-signal & surrogates				Religious	Ritual and ceremonial

Table 2: Themes of Traditional folk media

religious themes. Idioms were only for the entertainment purpose. The themes of riddles were entertainment and agriculture. The themes of Ramleela (theatre) were entertainment, social development, religious and Ritual & ceremonial. The themes of festivals were entertainment, Religious, agriculture and ritual & ceremonila. The themes of Traditional Fair were entertainment, social development, religious and ritual & ceremonial and Sound-signal & surrogates have only religious and ritual & ceremonial themes.

It can be concluded from Table 2 that most of the Traditional folk media meant for the entertainment, followed by religious themes, social development, ritual & ceremonial themes and agriculture theme. For disseminating agricultural messages development workers can use folk song, riddle, festivals and proverbs.

*Extent of use of Traditional folk media:* Traditional folk media as collected were studied with regard to the extent of use by the respondents. The findings have been presented in Table 3.

**Folk songs:** Table 3 reveals that majority of female (62%) used folk songs upto very much extent but majority of male respondents (52%) used folk song upto somewhat extent. However, folk song was not at all used by 12% of female and 15% of male respondents.

**Folk dance:** It is evident from Table 3 that majority of the female respondents (51%) and male respondents (49%) used folk dance upto some what extent. It was used upto very much extent by 39% of male and 32% of female respondents. However, 10% of female and 12% of male did not use folk dances at all.

**Proverbs:** Proverbs were used upto very much extent by the majority of female (66%) and male (57%) respondents. forty three per cent of male and 34% of female used proverbs upto some extent. It can be also said that hilly people are using these proverbs in their daily life.

*Idioms:* Table 3 reveals that 87 per cent of female and 77 per cent of male used idioms upto very much extent. Only 23% of male and 13% of female respondents used idioms upto some what extent. Idioms are also used by hilly people in their daily life.

**Riddles:** Riddles were not at all used by majority of the male respondents (56%) and female respondents (49%). Only 09% of male and 07% of female were using riddle upto very much extent. Now a days riddles are not in use, riddles are near to the extinction from the hilly society.

**Theatre:** Table 3 reveals that majority of male respondents (63%) and female respondents (59%) used theatre upto very much extent. It was used upto some what extent by 37% of female and 29% of male respondents. However, 04% of the females and 08% of the males reported that they did not use at all the theatre.

**Festivals:** It is evident from Table 3 that majority of the female respondents (93%) and male respondents (71%) used festivals upto very much extent. It was used upto some what extent by 07% of female and 23% of male respondents. However, only six percent of the male did not use it at all. It can be also concluded that women are more concern to celebrate the festivals of the area.

Traditional folk media	Extent of use of traditional folk media							
	Very much used (%)		Somewh	at used (%)	Not at all used (%)			
	Male	Female	Male	Female	Male	Female		
Folk Song	33	62	52	26	15	12		
Folk Dance	39	32	49	51	12	10		
Proverb	57	66	43	34	-	-		
Idiom	77	87	23	13	-	-		
Riddle	09	07	35	44	56	49		
Threatre	63	59	29	37	08	04		
Festival	71	93	23	07	06	-		
Traditional Fair	81	77	16	21	03	02		
Motifs (Aipan)	-	89	-	11	-	-		
Sound-signal & surrogates	17	51	59	31	24	18		

Table 3: Extent of use of Traditional folk media

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**Traditional fair:** It is clear from Table 3 that majority of the male (81%) and female (77%) respondents used traditional fairs upto very much extent. Traditional fairs were used upto somewhat extent by 21% of female and 16% of the male. Only, 02% of the female and 03% of male did not use it at all.

**Motifs:** It can be seen from Table 3 that motifs were used by only female. Majority of female respondents (84%) used motifs upto very much extent whereas, 11% female used motifs upto some what extent. Motifs or traditional designs were mainly made by the female only. Women were more concern to decorate their home and surroundings by making the motifs and traditional design.

**Sound-signal and surrogates:** It is evident from Table 3 that majority of female (51%) used sound-signal and surrogates upto very much extent but majority of male respondents (59%) used sound-signal and surrogates upto somewhat extent. However, 24% of the male and 18% of the female did not use it at all.

### CONCLUSION

On the whole it can be said that Uttarakhand is rich in terms of traditional folk media. Majority of the traditional folk media were either used upto very much extent or somewhat extent by the respondents. Nature wise these media falls under rigid, semi-rigid and nonrigid categories. Semi-rigid and non-rigid media can be used by development agencies for communicating development messages. Most of the traditional folk media are meant for the entertainment. However, these media also cover themes like social development and agriculture. Development workers may use different folk media for disseminating agriculture and other development messages among the people of Kumaon.

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### Impact of KVK Training Programme on Socio-Economic Status and Knowledge of Farmers in Khargone District of Madhya Pradesh

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### ABSTRACT

One of the main ways to development of human resource is training. It improves the knowledge of the trainees about the improved farm practices, because knowledge is the cognitive component of the individual's mind and plays an important role in covert as well as overt behaviour and individuals with a greater knowledge of the technical nature of improved practices would lead to a high adoption. The study was conducted under KVK, Khargone. The data were collected through personal interview method using structured schedule. The ex-post facto research design was employed in the present investigation. The entire data were transformed into normal scores. Study that the majority (71.20 per cent) of the on-campus trainees had high level of knowledge followed by medium level of knowledge (25.60 per cent) and low level of knowledge (3.20 per cent), whereas in case of off-campus trainees 78.40 per cent respondents had medium level of knowledge, 12 per cent had high level of knowledge followed by 9.60 per cent had low level of knowledge. Hence, it may be concluded that on-campus trainees had high level of knowledge that on-campus trainees about KVK training programmes.

Keywords: Training Programme, Socio-Economic, Knowledge, Farmers

### **INTRODUCTION**

Human resource is the most precious resource for any country. It is basically the development of human resources that brings about socioeconomic or political cultural transformation of any society. One of the main ways to development of human resource is training. It improves the knowledge of the trainees about the improved farm practices, because knowledge is the cognitive component of the individual's mind and plays an important role in covert as well as overt behaviour and individuals with a greater knowledge of the technical nature of improved practices would lead to a high adoption. In order to ameliorate the poor socioeconomic conditions of the farmers, farm women and rural youths in rural India by raising the level of farm productivity, income and employment with application of agricultural innovation generated at the research station, an innovative extension education institutions i.e. Krishi Vigyan Kendra (KVKs) was introduced by Indian Council of Agricultural Research (Dubey et al., 2008).

### MATERIAL AND METHODS

The study was conducted under KVK, Khargone. For purposes of the study the total respondents were 250, consisting of 125 on-campus trainees and 125 offcampus trainees were selected. The data were collected through personal interview method using structured schedule. The ex-post facto research design was employed in the present investigation. The entire data were transformed into normal scores. The level of knowledge was categorized as low, medium, and high on the basis of scores obtained.

### **RESULT AND DISCUSSION**

*Socio-Economic Status (SES) of Respondents:* The Socio- economic status score of the respondents were computed and their distribution is given in Table 1. The

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Category (SES scale)	On campus Trainees		Off campus Trainees	
	Frequency	Percent	Frequency	Percent
Low (Up to 40)	46	36.80	67	53.60
Medium (>40 up to 80)	57	45.60	52	41.60
High (Above 80)	22	17.60	06	4.80
Total	125	100	125	100

Table 1: Categorization of trainees according to their Socio-economic status score

'Z' value (0.05)= 5.16

Table 2: Distribution of respondents according to their knowledge about KVK training programmes

Category (Level of Knowledge)	On campus Trainees		Off campus Trainees	
	Frequency	Percent	Frequency	Percent
Low (Up to 8)	04	3.20	12	9.60
Medium ( $> 8$ up to 16)	32	25.60	98	78.40
High (Above 16)	89	71.20	15	12.00

'Z' value (0.05)= 11.84

result reveals that the majority of the on-campus trainees (45.60 percent) had medium socioeconomic status followed by low socioeconomic status (36.80 percent) and only 17.60 percent had higher level of socioeconomic status, whereas, in case of off-campus trainees 53.60 percent had low socioeconomic status followed by 41.60 per cent medium level and only 4.80 per cent had high level of socio economic status. Thus, it can be concluded that the on-campus trainees had a higher socioeconomic status than the off-campus trainees. The calculated value of 'Z' was found to be 5.16 which was greater than the table value of 'Z'. It is thus concluded that there was significant difference between trainees on and off-campus regarding their socioeconomic status. This finding was conformity with the finding of Kumari Maya et al. (2009).

**Knowledge of the on campus and Off campus Trainees about KVK Training Programmes:** Knowledge of the trainees about KVK training programmes was determined by a set of twenty five questions. Respondents were categorized on the basis of their knowledge level which is presented in Table 2. Data from the table reveals that the majority (71.20 per cent) of the on-campus trainees had high level of knowledge followed by medium level of knowledge (25.60 per cent) and low level of knowledge (3.20 per cent), whereas in case of off-campus trainees 78.40 per cent respondents had medium level of knowledge, 12 per cent had high level of knowledge followed by 9.60 per cent had low level of knowledge. Hence, it may be concluded that on-campus trainees had high level of knowledge than the off-campus trainees about KVK training programmes.

The calculated value of 'Z' was found to be 11.84, which was greater than the table value of 'Z'. This indicates that, there was a significant difference between the trainees of on and off-campus with regard to their knowledge about KVK training programme. These finding tally with those of Murthy and Veerbhadraih (1999), Latoria *et al.* (2001), Dubey *et al.* (2008), Singh *et al.* (2009) and Ajrawat *et al.* (2012).

### CONCLUSION

It is evident from the findings that KVK is able to bring about significant changes in the socio-economic status as well as the level of knowledge among different categories of trainees. Training and guidance given to farmers have played prime role in influencing technological changes, besides management orientation. Therefore, there is need to give due importance for the above factors with suitable changes by the staff to promote successfully functioning of KVK training programmes.

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### Tele-Consultancies to Livestock Owners through Kisan Call Centre: An Impact Analysis

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### ABSTRACT

Indian Veterinary Research Institute in one of the nodal centre (level II) of the Kisan Call Centre (KCC) network to provide solutions to queries raised by livestock owners. A study was, therefore, conducted to assess the impact of KCC on livestock owners and constrained faced in implementing the solutions provided. The study revealed that KCC was used once, twice or thrice by 44.7, 20.3 and 13.4 per cent livestock owners, whereas 21.6 per cent used it more frequently, indicating practical utility of the facility. Majority of respondents were cattle and buffalo owners. Livestock owners sought advice about infectious diseases, reproduction/breeding, non-infectious diseases, management, vaccination and extension related queries. Major constraints revealed by livestock owners were busy phone lines to seek clarification, unavailability of alternative and cheap veterinary help from neighborhood and inability to comprehend and write down the prescription. Among livestock owners following the advice received from KCC, 97.1% expressed overall satisfaction from the advice provided through the KCC. It can be concluded from the study that though the immediate advantage of KCC to livestock owners is apparent, facility needs fine-tuning to make it more efficient at village level.

Keywords: Tele-Consultancies, Livestock, Kisan Call Centre

### **INTRODUCTION**

With the vast majority of livestock owners spread at far flung rural areas, it becomes a major hurdle to transfer technical know-how related to animal welfare. With the developments in the field of Information and Communication Technology (ICT) in India, this task has been made easy. A logical outcome was concept of Kisan Call Centres (KCC) to leverage the ICT for overcoming the constraints of distance, time and manpower in disseminating latest technologies and knowhow to livestock owners. Even though best possible solutions to the problems queried by a caller are provided, it is felt that caller would be constrained to implement the solutions in toto. Keeping this in view, a study was conducted to assess the impact of KCC on livestock owners and constraints in implementing the solutions provided to them.

### MATERIALS AND METHODS

The study was carried out at the level-II node of the KCC, Agricultural Technology Information Centre (ATIC), Indian Veterinary Research Institute (IVRI), Izatnagar. The period of study was 15th July 2009 to 14th July 2010. Multi Media and other extension tools were used widely to popularize the phone numbers (1800 180 1551 and 0581 2311111, for KCC and IVRI-Help-Line, respectively) among livestock owners of the region. Before providing detailed response to the query of the livestock owner, his address and phone number was recorded in the KCC registers. In addition, description of the animal, detailed history and symptoms of the disease, followed by, response provided to the caller were also recorded. A questionnaire was prepared to assess the problems faced by the caller in implementing the solution/treatment received, constraints faced in their accessibility to the system and level of satisfaction

in improving animal husbandry enterprise. From a total of 688 callers, 26 callers not possessing any livestock, were queried about extension related activities of the institute, kisan mela or auction of animals etc. They were, thus, not included in this study. Remaining 662 livestock owners having received solutions related to either managemental practices or medication were called back to get the response of the questionnaire put to them. Among these, 62 callers could not be contacted due to various reasons viz., mobile/phone not reachable, switched off, wrong number provided by the caller or call from public telephone number, etc. Thus, 600 livestock owners accessible over telephone were called back again on day 3rd, 7th and 15th after first inquiry and a detailed response based on a questionnaire prepared was recorded. The collected data was tabulated and analyzed by using appropriate statistical tools (Snedecor and Cochran, 1994).

### **RESULTS AND DISCUSSION**

During the period, a total of 688 livestock owners from Uttar Pradesh (UP) and Uttarakhand (UKD), used the services of KCC (608 and 80 livestock owners, respectively from UP and UKD). Majority of calls were received from Eastern and Central zones of UP (42, 30, 20 and 8% from East, Central, North and West zones of UP, respectively). This is in accordance with earlier report of Indian Council of Agricultural Research (Singh *et al.*, 2009), mentioning that people from Eastern and Middle zones of UP are more dependent on livestock for their livelihood. Fewer calls (55 and 45 per cent from Kumaun and Garwal region, respectively) from UKD might be due to remoteness of villages or low accessibility to telephonic facility.

The results showed that majority of the respondents (44.7%) had used KCC once till the period of data collection and 20.3% and 13.4% of them had used it twice and thrice, respectively. Others (21.6%) were more frequent users of KCC, indicating the practical utility of the KCC to livestock owners, comparatively easy accessibility and therefore enthusiasm to use the service. Majority of respondents were cattle and buffalo owners (36.1 and 52.0 per cent respectively, Table 1), pointing to a clear preference of livestock owners to opt for dairy animals for their milk requirement/regular income/market demand or other reasons. This point is further emphasized by the fact that majority of dairy animals (214 and 316 cattle and buffaloes, respectively) were female crossbreds. In agreement, Tiwari et al. (2010) reported majority of information seekers through KCC were buffalo and cattle owners. Less number of pure bred animals among rural livestock owners, revealed from this study, is a cause for concern. Even though pure bred animals are adept at local agro-climate conditions, low milk yield and non availability of pure-bred animal might be the principal reasons for thin population of pure bred animals.

A cursory look at the data (Table 2) revealed that livestock owners sought advice about infectious diseases, reproduction/breeding, non-infectious diseases, management, vaccination and extension related queries (35.6, 27.6, 16.3, 15.7, 1.02 and 3.8 per cent, respectively). Majority of queries were about infectious diseases (mastitis, pyrexia, respiratory diseases, urinary problems, eye/ear infections, parasitic diseases, specific diseases like Foot and Mouth Disease, Surra, Red water

Livestock owned	Pure bred	Cross bred/non	Adult male	Adult female	Young ones	Total (%)
by callers		descript			_	
Buffalo	42	316	7	332	19	358 (52)
Cattle	34	214	3	220	25	248 (36.1)
Goats	10	22	4	24	4	32 (4.7)
Pig	9	-	-	7	2	9 (1.3)
Poultry	9	-	-	9	-	9 (1.3)
Dog	3	-	2	-	1	3 (0.4)
Rabbit	2	-	2	-	-	2 (0.29)
Horse	1	-	1	-	-	1 (0.15)
Gen Queries*	-	-	-	-	-	26 (3.8)
Total	110	552	19	592	51	688

Table 1: Based on livestock owned, distribution of callers to KCC, Level-II

\*Callers not having animals.

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Livestock/	Infectious	Reproductive	Non-infect.	Management	Vaccination	Total
diseases	diseases (n=245)	problems (n=190)	diseases (n=112)	(n=108)	(n=7)	
Buffalo	142	138	36	42	-	358
Cattle	87	46	67	44	4	248
Goat	10	6	4	12	-	32
Pig	1	-	4	4	-	9
Poultry	5	-	-	4	-	9
Dog	-	-	-	-	3	3
Rabbit	-	-	-	2	-	2
Horse	-	-	1	-	-	1
Total	245	190	112	108	7	662

Table 2: Disease-wise distribution of queries to KCC, level-II

or other infectious diseases), reproductive problems (prolapse of uterus, anestrous, repeat breeder syndrome, gynecological complications and male infertility), noninfectious diseases (gastrointestinal diseases like diarrhoea, bloat, impaction, skin ailments and surgical problems) and management related (agalactia, nutritional deficiency like milk fever or Pica, accidents, neonatal care, dog bite, toxicity and general managemental practices). Our results are in accordance with Sharma et al. (2009, 2010) reporting that major problems in livestock farms are occurrence of infectious diseases and gastrointestinal disorders leading to low productivity, milk yield and often death of animals. Queries about extension activities of the institute were related to kisan mela, auctioning of animals and ongoing/schedule of training programs (3.8%). It is evident (Table 2) that rural livestock owners were more concerned with health and reproductive management of their animals which is directly related to economic gains or loss from animal husbandry practices.

Among all the infectious diseases, majority of calls were made to seek advice about mastitis and pyrexia (29.6 and 23.9 vs. 25.3 and 22.9 per cent in buffaloes and cattle, respectively). It was evident that mastitis is a major infectious disease affecting milk yield in dairy animals. Internal parasitic infestation was more prevalent in cattle as compared to buffaloes (21.8 vs. 8.5 per cent, respectively). Pre and post partum prolapse of genetalia was major reproductive complication in buffaloes as compared to cattle (37.7 and 8.6 per cent, respectively). Similar findings have been reported by Agarwal and Tomer (2003). However, repeat breeding syndrome was found to be a major complication in cattle than buffalo (63.1 vs. 13 per cent, respectively). Higher incidence of repeat breeding syndrome in dairy animals was also reported by Tiwari et al. (2007). Gynecological complications and anestrous were other reproductive complications in buffaloes and cattle (27.5 and 20.1 vs. 15.2 and 13 per cent in buffaloes and cattle, respectively). Two goat owners were concerned with male infertility in their bucks. Our findings are in agreement with other workers (Kunjuru et al. 1987; Das, 2001 and Singh et al., 2003) reporting that ignorance and lack of knowledge among the buffalo owners about the animal health and reproductive care are the major cause of low productivity. In queries related to non-infectious diseases, need for surgical interventions were restricted to cattle and buffaloes (20.9 vs. 11.1 per cent, respectively), where as gastrointestinal diseases (diarrhea, bloat and impaction) were more common in cattle than buffaloes (70 vs. 58.3 per cent in cattle and buffaloes, respectively). Thus, this study revealed a clear need for regular de-worming to exploit the production potential of dairy animals at village level. Gastro-intestinal complications were also a cause of concern for 4 pig owners. Enthusiasm of livestock owners to gain maximum yield was also reflected by the fact that 36.4 and 31 per cent of cattle and buffalo owners, respectively inquired about the agalactia and low yield in their animals. Low milk yield of cattle and buffaloes was reported by many other researchers (Singh and Jain, 1988 and Mandape et al., 1999) as one of the major problems of the small-holder animal production system. Low yield of dairy animals could be attributed to mineral and other nutrient deficiency, as 36.4 and 28.6 per cent of cattle and buffaloes owners inquired about milk fever in their lactating animals. Low survival of buffalo calves as compared to cattle calf was underpinned by the fact that 23.8 and 6.8 per cent of buffalo and cattle owners, respectively sought advice about neonatal care to prevent calf mortality. Queries related to vaccination of animals were restricted to cattle and dog owners (4 and 3 calls, respectively).

All the livestock owners were provided with solutions which were classified as falling under medication (80.4%), advice (15.8%) or general information related (3.8%). Present study revealed that majority of the KCC users (91.8%) did implement the advice received from KCC. Major reasons for not following advice received from KCC facility (8.2% callers) cited busy phone lines to seek clarification, unavailability of medicines prescribed, high cost of medication, insufficient information from the experts, availability of alternative and cheap veterinary help from neighborhood and inability to comprehend and write down the prescription as primary reasons. Among livestock owners following the advice received from KCC, 97.1% expressed overall satisfaction from the advice provided through the KCC. In agreement, Gowda and Wasnik (2009) reported similar level of satisfaction from the advice received through the KCC. The livestock owner's willingness to follow the advice improved progressively with their subsequent calls. Majority of livestock owners unsatisfied with advice received from KCC (1.6%) cited impracticability of advice provided as principle reason, whereas non availability of a para-veterinary staff to administer the prescribed medication and incomplete recovery of sick animals as other reasons for their unsatisfaction. However, majority of the livestock owners (98.3%) confirmed their willingness to call the KCC again to improve their livelihood as well as expressed their desire to recommend KCC to their friends and relatives.

### CONCLUSION

Results of the impact study of KCC, Level-II at IVRI revealed that it is an effective tool to the livestock owners in solving their problems at the doorstep and such facilities should be promoted. The major hurdle that emerged in effective use of KCC by the livestock owners was that the telephone lines were busy due to which they were not able to use the KCC facility. Urgent attention needs to be drawn towards improving the technical efficiency of KCC, so that telephone lines are clear and livestock owner can use the facility at his will. It is envisaged that with increasing tele-density in rural India, practical utility of KCC and its usage among livestock owners will increase manifold.

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### Measuring the Effect of Nimin-coated Urea Application on Yield and Nitrogen Use Efficiency (NUE) in Rice

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### ABSTRACT

Urea fertilizer is subjected to substantial loss while applied in the rice field. For solving this problem, nimincoated urea is being used as slow release N-fertilizer on rice crop. The experiment was conducted at farmer's field on sandy clay loam soil with low N status. In this experiment five treatments were taken up viz. Control (without N); Urea @ 60 kg N ha<sup>-1</sup>; Urea @ 80 kg N ha<sup>-1</sup>; Nimin coated Urea @ 60 kg N ha<sup>-1</sup>; Nimin coated Urea @ 80 kg N ha<sup>-1</sup>. The test crop used in the experiment was rice (cv. Lalat). Application of ninim coated urea had significant effect over granular urea on yield and attributing characters such as no. of tillers per hill and no. of grains per panicle. The highest grain yield of rice (40.7 q ha<sup>-1</sup>) was recorded under the treatment No. 5 (Nimin coated urea applied @ 80 kg N ha<sup>-1</sup>) with a yield increase of 20 per cent over granular urea having same rate of applied urea. The highest total N uptake was observed under the same treatment. The apparent N recovery by rice crop was the highest (61%) under the treatment which received nimin coated urea @ 60 kg N ha<sup>-1</sup>. Hence nimin coated urea was found substantially use efficiency of urea N fertilizer on rice crop.

Keywords: Apparent N recovery, Nimin, Urea

### **INTRODUCTION**

Rice contributes 30-76% of total daily calorie intake. Therefore, boosting rice production and making rice available to consumers at affordable prices is always at the top of the political agenda for national governments for economic growth, social security, and political stability of the continent. Recent food inflation further alerted Asian countries to keep rice development strategy and policy as a top priority in order to sustain food security (Singh et al., 2011). By maintaining good uses of practices, it is possible to increase rice yield by 50-70% (De, 2010). Among the various N fertilizers in crop production, urea holds the largest share. The use efficiency of applied N hardly exceeds 35 per cent even with the best agronomic practices in rice crop (Bhattacharya et al., 2006, Prasad and De Datta, 1979, 1987). Urea fertilizer is subjected to substantial loss while applied in rice field. Under the rice ecosystem different types of losses urea occurs, which include leaching as nitrate along with percolating water,

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volatization of urea in the form of ammonia gas gentrification in form of elemental nitrogen and nitrous oxide, immobilization by bacterial assimilation into biomass and fixation of ammonium by soil clay fractions. Application of nimin coated urea reduces loss of N fertilizer through leaching and gentrification and increases the yield of crops. Hence there was the need for research to improve the use efficiency of urea fertilizer.

### MATERIALS AND METHODS

A field experiment was conducted at farmer's field at Baibali village of Kandhamal district of Odisha in the Kharif season of 2010 to study the effect of nimin coated urea application on yield and nitrogen use efficiency by rice crop. The soils of the experimental plot was sandy clay loam with pH 5.4, organic carbon was 4.5 g kg<sup>-1</sup> soil, available N was 238.7 kg ha<sup>-1</sup>available P was 13.3 kg ha<sup>-1</sup>and available K was 208.4 kg ha<sup>-1</sup>. Rice cv. Lalat was taken as the test crop. There was five treatments taken in the experiment such as (1) Control (without N), (2) Urea @ 60 kg N ha<sup>-1</sup>, (3) Urea @ 80 kg N ha<sup>-1</sup>, (4) Nimin coated Urea @ 60 kg N ha<sup>-1</sup>, and (5) Nimin coated Urea @ 80 kg N ha<sup>-1</sup>. Urea was applied in three equal splits at 15 days after transplanting (DAT), 30 DAT and 45 DAT. Twenty five-days-old seedlings of rice were transplanted in rows 20 cm apart with a spacing of 10 cm between hills. The nimin was mixed with urea @ 10 ml. per kg Urea. Necessary cultural and plant protection measures were followed uniformly in all the treated plots. The biometric observations were taken at 60 DAT and after harvest the yield was recorded. Nitrogen use efficiency was computed as under apparent fertilizer-N-recovery (ANR).

ANR (%) = N uptake in the fertilizer plot (kg/ha) – N uptake in the control plot (kg/ha) / Fertilizer N applied (kg/ha) x 100

### **RESULTS AND DISCUSSION**

Grain yield of rice in control was 20.2q/ha and the yield increased significantly in all treatments over control indicating N application has significant effect in increasing yield of rice (Table 1). Yield of rice increases to 31.7 q/ha by application of Urea applied @ 60 kg N/ha which was about 57% increase over control (without N). When the dose of urea increased to 80 kg/ ha there was further increase in grain yield of rice but the increase was not significant rather at par with 60 kg N/ha indicating that by increasing the dose from 60 to 80 kg N/ha corresponding increase in yield was not significant. Highest yield of 40.7 q/ha was obtained when nimin coated urea was applied at a dose of 80 kg N/ha with highest response of 102% over control. But rice grain yield at this dose was at par with yield at nimin coated urea @ 60 kg/ha. Also it was found that nimin coated urea at a dose of 60 kg N/ha produced significantly higher yield over granular urea applied either at a dose of 60 kg or 80 kg/ha with highest Apparent N recovery of 61.0% (Table 1). Similarly straw yield of rice varied from a lowest of 25.2 q/ha in control to a highest of 48.6 q/ha by application of nimin coated urea @ 80 kg N/ha. Similar effects were observed in case of straw yield as was in grain yield.

Higher levels of N application significantly increased the total N uptake by rice crop. The highest total N uptake of 70.5 kg ha<sup>-1</sup> was recorded in the treatment which received 80 kg N ha<sup>-1</sup> coated with nimin where as the lowest total N uptake (27.1 kg ha<sup>-1</sup>) was obtained from the control treatment (Table 2). The apparent Nitrogen recovery was observed highest 61.0 per cent from the treatment which received 60 kg N ha<sup>-1</sup> urea coated with nimin. But the treatment which received highest N (80 kg ha<sup>-1</sup>) through nimin coated urea gave the apparent nitorgen recovery of 54.3% Vyas *et al.* (1981) reported as enhancement of N recovery by

Treatments	Grain yield	% increase	Straw yield	% increase
	(qha-1)	over control	(qha-1)	over control
T_Control (-N)	20.2	56.9	35.5	40.9
$T_2$ -Urea @ 60 kg N ha <sup>-1</sup>	31.7	67.8	38.9	54.3
$T_{3}$ -Urea @ 60 kg N ha <sup>-1</sup>	33.9	67.8	38.9	54.3
T <sub>4</sub> -Nimin coated Urea @ 60 kg N ha <sup>-1</sup>	38.2	89.1	45.8	81.7
T <sub>5</sub> -Nimin coated Urea @ 80 kg N ha <sup>-1</sup>	40.7	101.5	48.6	92.8
C.D. (P = 0.05)	2.97		3.52	

Table 1: Effect of different doses of urea with or without nimin on grain and straw yield of rice

Table 2: Effect of different doses of urea with or without nimin on total N uptake (kg ha<sup>-1</sup>) and Apparent Nitrogen Recovery (%) by rice

Treatments	Total N uptake (kg ha-1)	Apparent N recovery (%)
T <sub>-1</sub> – Control (- N)	27.1	-
$T_{2}^{-}$ – Urea @ 60 kg N ha <sup>-1</sup>	50.6	39.1
$T_{3}$ – Urea @ 80 kg N ha <sup>-1</sup>	59.7	40.7
T <sub>4</sub> – Nimin coated Urea @ 60 kg N ha <sup>-1</sup>	63.7	61.0
T <sub>-5</sub> – Nimin coated Urea @ 80 kg N ha <sup>-1</sup>	70.5	54.3
C.D. $(P = 0.05)$		

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25-30% as compared to uncoated urea. Hence rice responds well to N doses @ 60 kg ha<sup>-1</sup> supplied through nimin coated urea than 80 kg N ha<sup>-1</sup>. Thus nimin coated urea fertilizer application was found to improve the use efficiency of nitrogen by rice crop as well as yield and yield attributing characters of rice crop. Hence Nimin coated urea at a dose of 60 kg N/ha may be recommended as best treatment for rice over granular urea as well as over nimin coated urea at a higher dose of 80 kg N/ha both in efficiency as well as economic point of view.

### **CONCLUSION** – is missing

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### Assessment of Extent of Entrepreneurial Success Among the Protected Agriculture Entrepreneurs

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### ABSTRACT

The study was conducted to assess the extent of entrepreneurial success among the protected agriculture entrepreneurs in flowers and vegetables production in Pune district of Maharashtra. For measuring the extent of entrepreneurial success special index was developed with relevant twelve components. The results revealed that majority of entrepreneurs had moderate success in their enterprise. While 15% of the respondents were high on the entrepreneurial success scale specially developed for the study. Some of the factors contributing to the extent of success of entrepreneurs were: net income per year, mass media exposure, degree of market expansion, risk orientation and economic motivation.

Keyword: Entrepreneurial success index, Protected agriculture entrepreneurs, Exotic vegetables cultivation

### **INTRODUCTION**

### MATERIALS AND METHODS

India has always been an agri-oriented country, with a surplus in food grain production due to the wide adaptation of new emerging technologies and methods in production. The economic growth and high-income elasticity for fruits, flowers, and vegetables has resulted in their greater demand. Analyzing this future need, the enterprising farmers and corporate houses have ventured into hi-tech horticulture enterprises namely the protected cultivation. The protected cultivation of flowers, vegetables and fruits is a widely practiced technology of temperate region and has made its entry into other parts of the world. The entrepreneurship in protected cultivation in has started in very recent. Entrepreneurship is the dynamic process of creating incremental wealth. The wealth is created by individuals who take the major risks in terms of equity, time and career commitment of providing value to some product or service (Kuratko and Richard, 2001). Maharashtra state enjoys lot of advantage in relation to market, technical knowhow, and better transport system. But still it appears that the area under protected cultivation is increasing at very slow rate. So the present study was conducted to investigate the extent of entrepreneurial success among the entrepreneurs.

The state of Maharashtra was selected purposively for the study, because protected cultivation technology is practiced on a large extent. In Maharashtra Pune district was purposively selected as it has greater advantage in relation to nearness to market, availability of technical knowhow by institutions like Horticulture Training Centre at Talegoan, good and fast transport facilities, and Pune is a major flower producing district in Maharashtra. Considering this facts this three tahsil were purposively selected for the study. From this three tahsil sixty respondents were selected randomly making a total sample size of sixty. The sample included protected agriculture entrepreneurs, who have launched their own enterprises of greenhouses and started cultivating, trading and exporting flowers and vegetables For measuring entrepreneurial success, an index was developed using profitability, expansion, sustainability and social components. For the said purpose of ascertaining entrepreneurial success an Entrepreneurial Success Index (ESI) developed under which four components twelve parameters were considered due to their importance in determining the success or failure of the enterprise. Each of the parameters was given the

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score accordingly constituting the total score of 140. And the score and data was analyzed with independent variable of entrepreneurial success to ascertain their significance over it using statistical tools. The statistical design included adoption of correlation analysis for studying various parameters contributing to the success of Protected Cultivation entrepreneurs.

### **RESULTS AND DISCUSSION**

*Entrepreneurial Success:* The entrepreneurial success score is a cumulative total of the obtained scores of the respondent expressed as a percentage over total obtainable score on entrepreneurial success index.

Table 1: Distribution of respondents on Entrepreneurial Success Index (ESI)

No	. Entrepreneurial success index	x N	N=60	
	Mean	Ę	59.95	
	Standard Deviation	1	1.70	
	Range	31.43 - 86.43		
	Categories	Frequ-	Percen-	
		encies	tage	
1.	Very low ( <mean-2sd)< td=""><td>3</td><td>5.0</td></mean-2sd)<>	3	5.0	
2.	Low ( <mean-1sd)< td=""><td>4</td><td>6.7</td></mean-1sd)<>	4	6.7	
3.	Moderate (Between Mean+1SD)	43	71.6	
4.	High (>Mean+1SD)	9	15.0	
5.	Very high (>Mean+2SD)	1	1.7	

It was found that, the mean score per cent of entrepreneurial success of Protected Cultivation entrepreneurs was 59.95, which is just above fifty per cent .This indicates that the degree of success achieved by the entrepreneurs was just above average. The standard deviation was at 11.70, which indicated that there was very wide variation among the respondents on their entrepreneurial success scores. A cursory look at the frequencies revealed that they fell into a normal distribution although skewed towards the higher end of success. About 15 per cent of respondents had achieved a high degree of success, about 71.6 per cent of them could get moderate success. Only 6.7 per cent got low level of success Thus it can be concluded that the Protected Cultivation entrepreneurs were successful in their enterprises at moderate (Jain, 2008; Choudhary, 2006).

### **Correlation analysis between entrepreneurial success and selected independent variables:** To find out the relationship between socio-economic and

psychological variables of entrepreneurs and entrepreneurial success by multiple correlation coefficient was worked out and presented in Table 2.

The results indicated in Table 2 shows that the entrepreneurial success protected cultivation entrepreneurs was found to be positively and significantly correlated with their education, social participation, and experience in flower cultivation, extension agency Some of the variables like caste, family size land holding, risk orientation, economic motivation, were having positive correlation but were found to be non-significant.

Table 2	: Correlation	analysis	between	entrepreneurial
success	and selected	independ	lent varia	bles

Socio-personal-economic	Correlation coefficients (r)
Variables	of adoption behavior of
ir	nproved cultivation practices
Age	-0.194
Education	0.306**
Caste	0.142
Family size	0.058
Social participation	0.271*
Land holding	0.212
Annual family income	0.117
Experience in protected	0.248*
cultivation cuccultivation	
Risk orientation	1.000**
Economic motivation	0.153
Extension contact	0.227*
Mass media exposure	0.552**

\*\*Significant at 0.01 level of probability; \*Significant at 0.05 level of probability

Age protected cultivators was however, having negative correlation with entrepreneurial behaviour. It shows that if entrepreneur are young age then chances of success are high (Sudhakar, 2007 and Veenita, 2009). Educational status was found to be positive and significant at 0.01 level of probability. It shows that education an important factor in determining entrepreneurial orientation (Patel, 2004).

Risk orientation of entrepreneurs was also showing positive relationship with entrepreneurial orientation. Because farmer could be entrepreneur when he would like to take risk (Solanky and Soni, 2004). Mass media exposure was also a important factor determining the entrepreneur orientation as it showed positive and significant relationship with enterprise success. The reason could be higher exposure to information sources leading to more knowledge related to various activities and functions necessary for protected cultivation technology.

*Components of entrepreneurial success index:* Measurement of entrepreneurial success was done by evaluating the twelve parameters. The results of each of the parameters are given in the Table 3.

Table 3: Scores of entrepreneurs on Entrepreneurial Success Index (ESI) (n=60)

Parameters	Scores	Freq-	Perce-
		uency	ntage
Gross returns gained			
Up to 20 percent	2	6	10
21-60 percent	7	9	15
61 -80 percent	10	7	11.7
81 -100 percent	13	18	30.0
101 -120 percent	16	10	16.7
121 -160 percent	25	10	16.7
161% and above of the investment	30	0	0
Net income (Lakhs per annum)			
Rs. 5,00,000 and less than	2	18	30.0
Rs. 5,00,001 to 10,00,000	4	33	55.0
Rs. 10,00,001-20,00,000	8	3	5
Rs. 20,00,001 and above	10	6	10
Percentage reinvestment of profit			
Upto 10 percent	1	20	33.3
11-20 percent	3	15	25
21 -30 percent	5	15	25
31 -40 percent	7	3	5
41-50 percent	9	2	3
51 percent and above	10	5	8
Employment			
Upto 3 people	2	15	25
4-6 people	4	8	13
7-10 people	6	11	18.3
11-15 people	8	17	28.3
More than 16 people	10	9	15
Growth in numbers of units		-	
No growth	0	3	5.0
Growth up to 1	2	25	41.7
Growth up to 2	4	13	21.7
Growth up to 3	6	13	21.7
Growth up to 3 and above	10	6	10
Degree of diversification			
Least diversified	2	6	10.0
Somewhat less diversified	4	16	26.7
Moderately diversified	6	23	38.3
Highly diversified	8	8	13.3
Very highly diversified	10	7	11.7

Table	3	cont	•

Parameters	Scores	Freq-	Perce-
		uency	ntage
Degree of expansion of market			
Still with local market	0	3	5.0
Moved to city market	4	10	16.7
Moved to national market	6	36	60.0
Moved to international market	8	10	16.7
Well established to international market	10	1	1.7
Degree of Adaptability			
Adapted very well to the demands	10	36	60
of the market			
Adapted well to some situations only	y 7	19	31.7
Could not foresee the impending	3	5	8.3
crisis and unable to adjust well			
Degree of sustainability			
I am enjoying this experience of	10	34	56.7
running the enterprise			
I feel quite comfortable with	7	18	30.0
sustaining the enterprise			
I am able to survive the crisis and	5	5	8.3
now growing slowly			
I may not be able to continue for	3	3	5.0
long in this enterprise			
Degree of satisfaction			
Dissatisfied	3	3	5
So-So (Neutral)	5	7	11.7
Satisfied	7	29	48.3
Highly satisfied	10	21	35.0
Prestige earned			
Moderate name earned	2	7	11.7
Earned a good name in sales	4	6	10.0
Became quite popular in the vicinity	6	8	13.3
Much sought after by every farmer	8	31	51.7
for apt advice			
Won awards and enjoyed good press	<b>i</b> 10	8	13.3
coverage in local and national dailies			
Occupational leadership			
Rarely	2	1	1.7
Occasionally	4	9	15.0
Often	6	19	31.7
Very often	8	29	48.3
Always	10	2	3.7

**Gross return gain:** From the data it can be inferred that majority of the entrepreneurs had gained gross return 100% and below. While about 32% of respondents were above 100%. These result may be due to majority of respondents had newly entered the enterprise. More over the distribution of respondents according to gross return gained in normally distributed.

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**Net income:** From the Table 3 it can be concluded more than half (50 per cent)of the respondents in the group earning Rs. 5,00,001 to 10,00,000.The level of income can be considered as middle as this group is in middle order of the different groups. And 15% of the respondents were earning above Rs. 10,00,001 .This indicate that very less number of farmer where operating large area protected cultivation structure. Also the number of farmers engaged in export of flowers and vegetables are less (Veenita, 2009).

**Percent reinvestment of profit:** Reinvestment could be in by investing in establishing new protected cultivation unites or building cold storage unites. About 50% of the protected agriculture entrepreneurs reinvested 11to 30% of the earned profit in to the enterprise. And very few that is 16% of the respondents invested 31% and more of earned profit into the enterprise. It was due to high cost involved in the establishment of cool storage unit, refrigerated van and automated irrigation systems the respondents were reluctant to invest more money in the enterprise. But reinvestment done in erecting new protected cultivation structure was high as compare to other options of investment.

**Employment level:** The results revealed that 28.3% of the respondents employed 11 to 15 people in their enterprise. And more than 16 people were given employment by 15 percent of respondents. This shows that protected cultivation is highly labour intensive venture. In the group of employment generation up to 10 respondents were 46.3% this shows that the family labour was contributing immense in the enterprises.

**Growth in number of protected cultivation units:** The results indicate that majority of the respondents had expanded the enterprise in terms of increase in the number of unites and only 5%. of respondent had not attained any growth in, the reason behind this is that they had just stated the enterprise.

**Degree of diversification:** It can be interfered from data in Table 3 that the distribution of respondent was found to be distributed to all the statement. Majority of the respondent 38.3% showed moderate level of diversification. And 25% respondent marked high to very high level of diversification. It was also observed that the respondents having higher degree of diversification had high degree of risk taking ability and had higher chances for their success in their enterprise.

*Market expansion:* The result for market expansion indicated that maximum respondents had moved to national market, this is a positive trend and is due to availability of road, transport and infrastructural established by the Floriculture Park. It was also found that 18.4% of the respondents were found to be moved to international market for export and earning higher returns.

**Degree of adaptability:** It was found that majority (60 per cent) of the respondents were well adapted to their enterprise and were enjoying running their enterprise. While 31.7% of the respondents adapted well to some situations only. The overall results indicate that major portion of the respondents in the study area were high on adaptability parameters.

**Degree of sustainability:** The results from the Table 3 indicate that majority (56.7 per cent) of the respondent were enjoying their enterprise and 30% of them were feeling quit comfortable with their enterprise. While very less of the entrepreneurs were not able to adjust to the current crisis and were feeling that they may be not able to continue this enterprise. The major reason for such response was that after a crisis such cyclone, earthquakes or fire cost involved in reestablishing the protected structure was high. So the entrepreneurs having only farming as only source of income were not able to cope with the crisis.

**Degree of satisfaction:** The result from the Table 3 shows that 48.3% of the respondents were satisfied with taking this enterprise. 35.0% of them were highly satisfied with their taking protected cultivation enterprise. While only 11.7% response was neural indicating that they were the new beginners in this enterprise. And only 5% responded in a negative sense. It can be concluded that majority of the respondent were satisfied with only small percent dissatisfied (Sharma, 2008).

**Prestige earned:** The result reveal in table 6.11 that 51.7% of the respondents were sought by other farmers for advice related to protected cultivation. 13.3% of the respondents responded that they won awards and enjoyed good press coverage in local and national dailies. And only 21.7% of the respondents earned good

to moderate name in the society. It can be concluded that by taking/practicing this enterprise majority of the respondents earned prestige in the society.

**Occupational leadership:** It was found that 48.3% of the respondents were visited very often by the fellow farmers. 31.7% of the respondents were visited often. Thus it can be concluded that majority of the respondents enjoyed high degree of occupational leadership in the society

### CONCLUSION

The results revealed that the extent of entrepreneurial success among the entrepreneurs was found to be moderate to high level. The entrepreneurs engaged in protected cultivation showed high degree of correlation with age, education, special training received, experience in protected cultivation and communication variables. It can also be concluded that majority entrepreneurs high on ESI were highly satisfied with and enjoying the enterprise. Many of entrepreneurs were recognized by society through encouragements and awards. The results also reveal that high cost involved in the initial investment of protected cultivation was a major factor hindering in establishing the protected cultivation enterprise.

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### Analytical Study of Home Science Trainings among Farm Women in Rajasthan

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### ABSTRACT

The study assessed the importance, adequacy and needs of home science trainings. A structured questionnaire was used to elicit information from 240 trainees. The respondents had good perception of the trainers and the training programme organization and administration. They felt that the working with solar cooker was most important and home decoration was considered least important item of training in decreasing order of their importance. The respondents reported that in items under 'Home Science', training exposure in home decoration was reported the most adequate and working with solar cooker was found to be least adequate in decreasing order of their adequacy. Regarding items under 'Home Science', the training was most needed in working with solar cooker and home decoration was least needed item of training as perceived by farm women. It was recommended that there is a need for proper training needs analysis before training activities are carried out and there is a need for re-training of the centre's staff in areas of adult training to make the centre's training more effective.

Keywords: Adequacy, Home science, Importance, Trainings

### **INTRODUCTION**

Training can be regarded as an age-long concept which performs the therapeutic function of shaping knowledge, skill and attitude that are required for effective performance of duties and or assignment (Adisa and Okunade, 2005). The training of people engaged in agricultural and community development programs aim at communicating information, knowledge and skills, replacing old attitudes by new ones, exchanging opinion and experiences, removing doubts and difficulties (Raab, 1991). Training according to Halim and Ali (1988) is carried out so as to be fitted, qualified and proficient. The purpose is to impact knowledge and skills to an individual so that he can perform some desirable tasks. Okwu and Ejembi (2005) refer to farmers' training as 'an intensive learning activity for a group of selected farmers, assisted by competent trainers to understand and practice the skills required in the adoption of technology at a place where appropriate facilities exist and at a time and duration considered suitable by farmers. The need for training

Training provides whatever additional specific items of knowledge, skill or attitude the trainees need to perform up to that standard. Training is conducted whenever an individual engages in an activity that results in the ability to exercise a skill that he does not previously have. The training generally involves four basic components- 1. Acquiring knowledge of the skill; 2. Observing a model perform the skill; 3. Practicing the skill; and 4. Reinforcing the newly acquired behavior.

Meenambigai and Seetharaman (2003) asserted that training is the most singular factor affecting individuals' attitude, productivity, improvement, minimization of risks and quality of job performance in any endeavour. In Rajasthan, every year, tremendous amount of time, energy and money is spent on various training activities. Most of the attempts of KVKs are limited only to the

subsumes a deficit situation in the knowledge and skill level of the practicing farmers as well as the availability of appropriate applicable information, the utilization of which will correct the problem situation (Okwu and Ejembi, 2005).

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farmers, thus the farm women have by and large remained out of the purview, whereas, it is an established fact that the farm women, in addition to their family and domestic responsibilities, do contribute in the farming operations, right from sowing to the storage of the farm products. It is unfortunate that the participation of the farm women in agriculture has not received due recognition, hence, the lack of consideration towards developing their technical competence. In fact, a farm woman is the key person in the family and her technical development may serve a real asset in affecting rapid transfer of technology, thereby, increasing the agricultural production. This may immediately help in providing the much needed nutritional security to the nation's teaming population. With these considerations, the present investigation was undertaken with the following specific objectives:- 1. To determine the priorities of the items of training imparted to the farmwomen at KVKs. 2. To study the extent of adequacy of the selected items of training. 3. To determine the future training needs of the farmwomen.

### MATERIAL AND METHODS

The study was conducted in III-A agro-Climatic Zone of Rajasthan. Two KVKs, one run by NGO and one run by SKRAU, Bikaner were selected for the study. Eight villages from each of the KVK were selected randomly. From each village, a sample of 15 farmwomen was drawn following the procedure of simple random sampling. Thus, a sample of 240 farmwomen in all was drawn. A well structured interview schedule was used to collect information from the farm women. The farm women were asked to rank the items of training keeping a view their importance on the three point continuum. i.e. most important, important & less important for them in their work. Statistical techniques like frequency counts, mean, weighted mean scores, percentages and correlation were used to analyze the data.

### **RESULTS AND DISCUSSION**

**Importance of training:** The importance of items of training was identified on the basis of responses of the farmwomen under study. In the interview schedule there were items of training about different home science activities. There were five items of the farm women training which were evaluated for their importance and the results obtained are presented in Table 1.

From the Table 1 it can be understood that the Relative importance of different subject matter item of training as perceived by the farm women in Home Science.' Five item viz. 'Working with Solar Cooker', 'Smokeless Chullah', 'Preservation', 'Knitting, Embroidery and Weaving' and 'Home Decoration' were selected and their relative importance was observed in terms of most important, important and least important. All the item of training were assigned rank as per their relative importance by calculating the mean score values. It is evaluated from the above table that 34.89 per cent farm women felt training for all the five items most important while 26.14 per cent farm women desired training important and it was 38.61 per cent farm women reported the training least important. It is revealed from above table that Working with Solar Cooker' the item of training was noticed most important by maximum number of farm women i.e. 52.22 per cent. It was 'Preservation' the item of training reported most important by lowest number of farm women i.e. 25.23 per cent. It was 'Preservation' the item of training preferred important by maximum percentage of farm women i.e. 31.34 per cent while it was 'Home Decoration' the item of training observed important by

Table 1: Relative importance of different training items as perceived by farm women

Item of training	Percentage of farm women			Means score	Rank
	MI	Ι	LI		
Working with solar cooker	52.22	27.78	30.00	2.12	1
Smokeless chullah	40.53	28.31	31.16	2.09	2
Preservation	25.23	31.34	43.43	1.82	4
Knitting, embroidery and weaving	36.67	27.78	35.56	2.01	3
Home decoration	30.23	16.84	52.93	1.77	5
Overall	34.89	26.41	38.61	1.96	

lowest number of farm women i.e. 16.84 per cent. Highest number of farm women i.e. 52.93 per cent observed the 'Home Decoration' the item of training as least important while 'Smokeless Chullah' and 'Working with Solar Cooker' were items of training reported least important by lowest number of farm women i.e. 31.16 and 30.00 per cent. A close look at the mean score values reveals that 'Working with Solar Cooker' was given top priority by the respondents followed by 'Smokeless Chullah' 'Knitting Embroidery and Weaving', 'Preservation' and the last rank was given to 'Home Decoration.'

The researcher while talking with the respondents as well as by obsersvation found that the results are quite expected as solar cooker is becoming popular nowadays as cost of fuel is increasing regularly and solar cooker does not need any fuel. Thus, the farm women grasped 'Working with Solar Cooker' the item of training as most important while the 'Home Decoration' the item of training was perceived as rank the least important because farm women were well aware about the theme and they have the basic knowledge of 'Home Decoration', so, they have given least importance to this item of training.

Adequacy of training: Adequacy of training was operationalized in terms of exposure of farm women to different activities of KVK for gaining knowledge of improved technology. Farm women were asked as to how they thought in terms of adequacy of these activities to acquire required know how to carry their day to day farm operation. The items of adequacy were the same as were in importance section and the farm women were asked to rank these items in terms of adequacy keeping in mind their exposure on three point continuum i.e. most adequate, adequate and less adequate for farm women in their work. There were five items under this head and the results are shown in Table 2. The Table 2 shows the 'Relative adequacy of different subject matter item of training as perceived by the farm women in Home Science.' Five item viz. 'Working with Solar Cooker', 'Smokeless Chullah', 'Preservation', 'Knitting, Embroidery and Weaving' and 'Home Decoration' were selected and their relative adequacy was observed in terms of most adequate, adequate and least adequate. Mean score was calculated and all the item of training were assigned rank as per their relative adequacy. It is explained from the above table that 27.05 per cent farm women felt training for all the five items most adequate while 45.41 per cent farm women desired training adequate and it was 27.54 per cent farm women reported the training least adequate.

It is clear from the above table that 'Home Decoration' the item of training was informed most adequate by maximum number of farm women i.e. 62.53 per cent. It was 'Working with Solar Cooker' the item of training reported most adequate by lowest number of farm women i.e. 8.70 per cent. It was 'Smokeless Chullah' the item of training preferred adequate by maximum percentage of farm women i.e. 71.61 per cent while it was 'Working with Solar Cooker' the item of training observed adequate by lowest number of farm women i.e. 26.85 per cent. Highest number of farm women i.e. 64.44 per cent grasped the 'Working with Solar Cooker' the item of training as least adequate while 'Preservation' the item of training seen least adequate by lowest number of farm women i.e. 4.01 per cent. A close look at the mean score values shows that 'Home Decoration' was given top priority by the respondents followed by 'Preservation', 'Smokeless Chullah', 'Knitting Embroidery and Weaving' and the last rank was given to 'Working with Solar Cooker.'

It is understood from the table and the ranks

Table 2: Relative adequacy of different training items as perceived by farm women

Item of training	Percentage of farm women			Means score	Rank
	MI	Ι	LI		
Working with solar cooker	8.70	26.85	64.44	1.44	5
Smokeless chullah	16.11	71.61	12.28	2.03	3
Preservation	27.22	68.77	4.01	2.23	2
Knitting, embroidery and weaving	20.73	27.51	51.76	1.68	4
Home decoration	62.53	32.29	5.18	2.57	1
Overall	27.05	45.41	27.54	1.99	

Item of training	Percentage of farm women			Means score	Rank
	MI	Ι	LI		
Working with solar Cooker	59.11	26.78	14.11	2.45	1
Smokeless chullah	30.93	39.02	30.05	2.01	2
Preservation	9.11	23.78	67.11	1.42	4
Knitting, embroidery and weaving	20.53	21.27	58.20	1.62	3
Home decoration	8.04	14.59	77.37	1.31	5
Overall	25.54	25.09	49.37	1.76	

Table 3: Relative need for different training items as perceived by farm women

provided to the items of training that the farm women has given priority to the article of training in which they are already perfect or they are well aware of. As it can be seen from the table that 'Home Decoration' the item of training, was given top priority because the farm women are well aware about home decoration practices which is very personal in nature and the item of training i.e. 'Working with Solar Cooker' was provided with the last rank becuase they are not efficient in using or working with the solar cooker.

*Future training needs of the farm women under KVKs:* Under this area there were five items of the farm women training the results obtained are presented in Table 3.

The Table 3 shows the 'Relative need for different subject matter item of training as perceived by the farm women in Home Science.' Five item viz. 'Working with Solar Cooker', 'Smokeless Chullah', 'Preservation', 'Knitting, Embroidery and Weaving' and 'Home Decoration' were selected their relative need was observed in terms of most needed, needed and least needed. Mean score was calculated and all the item of training were assigned rank as per their relative need. It can be explained from the above table that 25.54 per cent farm women felt training for all the five items most needed while 25.09 per cent farm women desired training needed and it was 49.37 per cent farm women reported the training least needed.

It is apparent from the above table that 'Working with solar cooker' the item of training was observed most needed by maximum number of farm women i.e. 59.11 per cent. It was 'Preservation' and 'Home Decoration' the items of training reported most needed by lowest number of farm women i.e. 9.11 and 8.04 per cent respectively. It was 'Smokeless Chullah' the item of training preferred needed by maximum percentage of farm women i.e. 39.02 per cent while it was 'Home Decoration' the item of training observed needed by lowest number of farm women i.e. 14.59 percent. Highest number of farm women i.e. 67.11 per cent observed the 'Preservation' the item of training as least needed while 'Working with Solar Cooker' the item of training realized least needed by lowest number of farm women i.e. 14.11 per cent.

A close look at the mean score values reveals that 'Working with Solar Cooker' was given top priority by the respondents followed by 'Smokeless Chullah', 'Knitting Embroidery and Weaving', 'Preservation' and the last rank was given to 'Home Decoration.' The result found so might be due to the fact that the cost of fuel is very high which an average farm family could not easily afford. There are no fuel charges in the solar cooker so they want to adopt it. But for its operation which was complex and required a great skill on the part of the operator, the farm women required training. The home decoration was quite easy and varies from person to person according to the choice and taste of the respondents so not much training was needed in it and, moreover, they are already familiar with home decoration.

### CONCLUSION

Out of five items of training under 'Home Science' working with solar cooker was most important while smokeless chullah, knitting embroidery and weaving & preservation were considered important and home decoration was considered least important item of training in decreasing order of their importance. The similar results were given by Sushil Kumar *et al.* (2000) who found that farm women gave importance to various training areas in agriculture and allied fields. Out of five items under 'Home Science', training exposure in home decoration was reported the most adequate while preservation, smokeless chullah, knitting embroidery and weaving were adequate while working with solar cooker was found to be least adequate in decreasing order of their adequacy. The study finds support from the findings of Narinder et al (2001) who recommended that farm women should be made aware of various aspects of mushroom cultivation in which they lack knowledge by laying more stress on these aspects during training programmes. Out of five items under 'Home Science', the training was most needed in working with solar cooker and smokeless chullah, knitting, embroidery and weaving, preservation were important while home decoration was least needed item of training as perceived by farm women. It can also be concluded that before the commencement of any training camp, the felt needs of the farmwomen of the area must be identified and the course contents should be modified and revised accordingly. Items of training in which farmwomen have not been adequately exposed by KVKs, should be given top priority in the future training programmes. Since farmwomen were in need and receptive of training, high priority should be given for training exposure in the latest technologies for the farmwomen under KVKs.

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### Contextualizing Community Mobilization: Reviewing its Need and Importance in Health Milieu

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### ABSTRACT

In India, women form half of the total population. Despite efforts to achieve the millennium development goals of achieving gender equality and women empowerment, there are adverse disparities seen amongst the entire population especially between men and women which seems convincing enough to evolve strategies to counter these disparities spread across economic and social domains. The paper reviews the issues and health challenges faced by Indian women and talks about the importance of community mobilization in context to health especially for Indian Women.

Keywords: Community, Empowerment, Gender equality, Health

### **INTRODUCTION**

The definition given by the World Health Organization describes health as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. Health can be said to be subjective if one focuses on how an individual experiences his/ her situation. However health can also be often defined socially depending upon the social environment an individual operates in and performs his/her societal role. Health programmes and interventions have generally emphasized on four factors that influence health directly – biological factors, environmental factors which include both physical and psychosocial factors, lifestyles factors and lastly factors related to the health care delivery systems (WHO Report, 2010).

India accounts for a substantial proportion of the global burden of disease, with 18% of deaths and 20% of disability-adjusted life-years (DALYs). Although the burden of chronic disease accounts for 53% of deaths (44% of DALYs), 36% of deaths (42% of DALYs) are attributable to communicable diseases, maternal and peri-natal disorders, and nutritional deficiencies, which suggests a protracted epidemiological transition. A fifth of maternal deaths and a quarter of child deaths in the

world occur in India. Life expectancy at birth is 63 years for boys and 66 years for girls, and the mortality rate for children younger than 5 years is 69 per 1000 live births in India-higher than the average for southeast Asia (63 per 1000 live births) (UNICEF, 2009). These data often easily mask the inequalities in health existing within Indian subcontinent. There are substantial geographical inequalities in health outcomes across the country with life expectancy ranging from as low as being 56 in Madhya Pradesh and as high as 74 in Kerala. Going by the estimates given by The World Health Organization (WHO) there are 536,000 maternal deaths occurring globally each year out of which 136,000 take place in India. 1990 estimates reveal as many as 25% disability - adjusted life years lost due to maternal deaths alone (WHO, 2009). Despite launching programmes like Safe Motherhood initiated by the Government of India at the national level, there is only a little evidence that supports the slightest decline in the maternal mortality rates for over past 20 years. With a population of over 1 billion and decadal growth of 21%, the maternal mortality ratio (MMR) was 301 (maternal deaths per 100,000 live births) in 2003 (Reddy et al., 2005). There had been variations seen across states, with large North region contributing to disproportionately higher ratios.

States like Uttar Pradesh and Rajasthan, for example, have high rates of fertility and maternal mortality while Kerala and Tamil Nadu have rates comparable with middle-income countries. Geographical vastness and socio-cultural diversity across India are the two main factors that have contributed to this variation. The status of women is generally low in India, except in the southern and eastern states. Female literacy is only 54%, and women lack the empowerment to take decisions, including decision to use reproductive health services. There exist cross cutting inequalities among women belonging to different caste, class and religion. Since some of these inequalities result from the unfair distribution of the primary social determinants of goods, power and resources, it becomes imperative to take into account and critically analyze the factors that result in these discrepancies and disparities (Vora et al., 2009). Even the regional estimates of maternal mortality based on small sample sizes, or estimates from the NFHS data, indicate that the maternal mortality is much higher than that projected from the vital registration system (Hill et al., 2007).

### **Reasons for High Maternal Mortality**

Hemorrhage (both ante and post partum), toxemia (Hypertension during pregnancy), anemia, obstructed labor, puerperal sepsis (infections after delivery) and unsafe abortion have been identified as six main causes that lead to maternal deaths. Of these, hemorrhage accounts for one third of all the deaths followed by puerperal sepsis and obstructed labour both of which together account for a quarter. Besides these, anemia has remained a single contributing factor accounting for 19% of all the deaths. Most of these deaths are preventable with good ante natal care, timely identification and referral of pregnant women with complications of pregnancy and timely provision of emergency obstetric care (Gupta, 1995).

Researches done by M. Dasgupta, senior fellow from Harvard University provides clear evidence of the negative consequences of low levels of female education and autonomy in developing countries like India as major barriers to improving child survival rates and reducing fertility. There have been several other studies highlighting the fact that, women have less power and autonomy than men at any given stage in the life cycle. The data from her research done in South east Asia especially in India clearly illustrates that a woman's status in her family whether in young or older ages makes a critical difference to health and other demographic outcomes. In developing countries like India, where apart from gender inequalities women experience double powerlessness where they have lower autonomy as married youth and have comparatively higher autonomy in their older ages has resulted in adverse health effects on child and mother. North India shows a clear cut pattern of variation in a woman's status and experienced autonomy over her life (Gupta, 1995; Bang et al., 1989). Their status is low in early childhood, rises during adolescence, drops sharply upon marriage, and remaining low during the early reproductive years, rising slightly during the older reproductive years when a woman becomes mother-inlaw and grandmother. Census 1991 data about the age specific death rates in India faithfully had reflected the shifting status. Female mortality is higher than male mortality in childhood, becomes similar during adolescence, and rises again during the peak reproductive years, after which it remains lower than the male mortality rates over the remaining life span (Gupta, 1995). In Bangladesh, for example, females experience 22 percent higher post-neonatal mortality than boys (the post-neonatal period is the second through eleventh month of life), while in Punjab the level is nearly double that of boys. In an interesting hypothesis tested analysis revealed that children born in the home of the mother's -in-laws have double the infant mortality rates than those born in their mother'sparental homes (Gupta & Sara, 1994). It was shown that the place of birth is an objective measure of testing mother's autonomy at the time of birth. Since in her parents' home, a woman is accorded with the same status and freedom she had before marriage she is in a better position to take care of her child simply because she is in able to ask for help if she feels that she is having difficulties during labor. However on the contrary at her husband's home, she is much more constrained and her decision to take help and seek an institutional delivery is often superseded by mother in-law or by others superior to her in the family (Dyson and Mick, 1983).

Not only this, the cross-over between the malefemale ratio in neonatal and postnatal mortality is clearly indicative of the differential care of boys and girls. As

already known during the neonatal period biological factors are the primary cause of death, and the higher the higher male mortality is consonant with their being biologically weaker than females. However, after the first month of life, environmental and care related factors become more important determinants of survival with the substantial gender gap in survival indicating that girls receive less care than boys. Increasing evidence suggests that this sex differential in child mortality is not the result of unconscious neglect of girls. It is higher parity girls-those born into families that already have a girl-who bear the brunt of the excess mortality (Das Gupta, 1995). This has been confirmed by studies done in Bangladesh (Muhuri and Preston, 1991) and elsewhere in Punjab (Pebley and Amin, 1991). Excess female mortality appears to be a part of the explicit strategy parents use to obtain their desired family size and sex composition. Woman is often left handicapped in coping with the stresses caused by childbearing. She lacks the autonomy to reduce stress through improved nutrition and health care or through a lighter workload. This aggravates problems of reproductive health for mother and child. During the peak reproductive year's female mortality in India is substantially higher than male mortality. Given the availability of health services in India, which is high by developing-country standards (Government of India, 1987:303), it is astonishing to find that the vast majority of deliveries are carried out at home by traditional midwives. A woman is likely to be taken to a clinic or have a doctor called only if she has serious complications, by which time it may be too late. Females lack autonomy to decide the most essential decision of their lifetime - the time and place of birth of their child. Maternal mortality is just one small part of the totality of reproductive health problems that Indian women face. A review of the studies done in Maharashtra by M. Dasgupta found that over 90 percent of the rural women examined suffered from one or more gynecological diseases and it was found that only a fraction of these women had received treatment for them (Bang et al., 1989). Lack of interest among other members of the household, and even among health personnel, tends to create such a situation in which a woman feels that her reproductive health problems must be borne silently as "women's problems." That a high proportion of births are still attended by poorly trained women leads to widespread

reproductive health problems, including prolapsed uterus and pelvic inflammation, which in turn increases complications of subsequent deliveries and at times results in raising infant mortality.

The potential ramifications of gender inequality are strongly influenced by patterns of household formation and inheritance. The northern Indian joint family system makes for strong intergenerational bonds and de-emphasizes the conjugal bond. Young wives are therefore subordinate both to men and to older women in the household. This double marginalization handicaps young women in caring for themselves and for their children, as layers of people can intervene between their perceptions of need and their actual decisions. This has adverse effects on both - child survival and women's own reproductive health (Gupta, 1995).

## Community participation & mobilization: need and importance in context of health communication

For years communicating health and health issues has remained responsibility of the state and has been more or less mediated by societal norms and culture. Primary health care has been ratified as the health policy of WHO member states in 1978 (Walsh and Warren, 1979). Participation in health care was a key principle in the Alma-Ata Declaration. In developing countries, antenatal, delivery, and postnatal experiences for women usually take place in communities rather than health facilities. Strategies to improve maternal and child health should therefore involve the community as a complement to any facility-based component. The fourth article of the Declaration stated that, "people have the right and duty to participate individually and collectively in the planning and implementation of their health care", and the seventh article stated that primary health care "requires and promotes maximum community and individual self-reliance and participation in the planning, organization, operation and control of primary health care". But is community participation an essential prerequisite for better health outcomes. After the Alma-Ata declaration had been made, arguments for selective rather than comprehensive primary health care dominated health system debates both across and within countries. Policy makers in favor of selective primary health care argued that community interventions such as oral rehydration solution, immunization, or vitamin A capsules could be targeted effectively at poor, albeit passive, recipients with immediate benefit. The role of community participation was felt important in supporting the provision of local health services and in delivering such interventions at scale, but the various pilot programmes showing longterm benefits from more comprehensive community mobilization had been much less successful when governments tried to take them to scale (Walsh and Warren, 1979).

Taking cognizance of the fact that there has been lack of progress with the Millennium Development Goals (MDG) and primary health care in many poor countries, has encouraged those in favour of comprehensive primary health care to question whether the failure to address community care and participation effectively within health programmes is a major reason for poor sustainability and ineffective scaling-up of selective interventions of proven efficacy. This was even reiterated in the review done by WHO Integrated Management of Childhood Illness strategy through questions as to whether or not the delivery systems that rely solely on government health facilities must be expanded to include the full range of potential channels in settings where strong community-based approaches are available (Bryce et al., 2005). A crucial policy question arises how interventions planned to mobilize marginalized communities can be up-scaled?

The closely related concepts of participation, mobilization, and empowerment require definition. Participation has been used to indicate active or passive community involvement. In the past, mobilization consisted of communities responding to directions given by professionals to improve their health. This process usually took the form of mass campaigns for immunizations where communities were passively involved as the setting where the interventions were implemented or the target of the specific intervention. More recently, health and development workers have begun to act as facilitators focusing on the process of health improvements as well as the outcomes. In this approach the facilitators support local communities to become actively involved-to participate-in both activities and decisions that affect their own health, either as a resource that can provide assets to address a health problem or an agent of change that uses its own

supportive and developmental capacities to address its needs. In this paper we try and discuss the more recent form of community mobilization, which can be defined as "a capacity-building process through which community individuals, groups, or organizations plan, carry out, and evaluate activities on a participatory and sustained basis to improve their health and other needs, either on their own initiative or stimulated by others" (Howard-Grabman and Snetro, 2003).

Health programmes today have started identifying empowerment rather than participation as an objective. Empowerment has been defined as the process and outcome of those without power gaining information, skills, and confidence and thus control over decisions about their own lives, and can take place on an individual, organizational, as well as at a community level. Community mobilization, by definition, is a way to support this empowerment process and reach this empowerment outcome (Rifkin and Pridmore, 2001).

Most studies of community mobilization interventions have investigated the effectiveness of specific interventions targeted at a passive recipient community- the old style of community mobilization (for example, breastfeeding promotion, diarrhea prevention and treatment, growth promotion (Bhandari et al., 2004; Coutinho, Lira et al., 2005; Morrow and Matin, 2003), promotion of complementary feeding after 6 months of age (Dewey and Adu-Afarwuah, 2008), treatment of severe acute malnutrition (Ashworth, 2006) and pneumonia prevention and treatment (Hadi, 2003). There are however very few studies that investigated the effectiveness of community mobilization interventions, either on their own or in combined packages with other interventions, where the community provides the resources and is itself an active agent of change. In Ethiopia a cluster randomised controlled trial (cRCT) showed that mobilising women's groups to effectively recognise and treat malaria at home led to a 40% reduction in under-5 mortality (Kidane and Morrow, 2000). For newborn care, the SEARCH Project in India showed the value of a complex homebased newborn care package (which included community delivery of injectable antibiotics, health promotion, training of traditional birth attendants, and physician visits) within a programme where communities had been mobilised over an extended period (Byrce et al., 2005).
Literature on prevention campaigns documents important contributions in understanding individuallevel behavior change (Dutta-Bergman, 2009; Community Intervention Trial for Smoking Cessation, 1995; Hornik, 2002; Luepker et al., 1994). Meta-analysis done by Snyder (2002) has demonstrated that health campaigns reach small and short-term effects when strategically planned. In addition to the small and shortterm effects of campaigns, a review by Viswanath and Finnegan (2002) has also pointed out inequality in terms of the benefits that these campaigns can provide to the low socioeconomic status groups, which face the greatest threats of ill health, as compared to higher socioeconomic groups. A substantive body of evidence on knowledge gap theory has pointed out to the fact that often the vulnerable at-risk populations are mostly left behind and these campaigns continue to benefit the health rich, thus contributing to the existing gaps between the rich and the poor (Finnegan and Viswanath, 1997; Freimuth, 1990; Viswanath and Finnegan, 1995). Health, particularly in marginalised groups, is indirectly but powerfully affected by the social environment in which personal behaviours are embedded. Risk factors (such as isolation, lack of social support, low self-esteem) and risk conditions (such as poverty, discrimination and steep power hierarchies) can impair control or capacity and the respectful relationships that enable good maternal and child health. Community mobilization initiatives have reported to improve the socio-environmental causes of ill health have addressed a range of concerns including alcohol related violence, breast cancer treatment, and safety in public environments.( Rosato et al., 2008; Laverack, 1999; Bang et al., 2002; Klawiter, 2004; Gee, 2008). The impetus to address these causes of ill-health results in the formation of a community of interest. This community can then start a process of capacity buildingcommunity empowerment-toward gaining more control over the decisions for resource allocation such as the award of a grant or to decision making such as the development of policy or legislation etc. The key to the success of community empowerment is the moment when the whole community gets engaged in the problem posing, problem-solving process and recognises that they can collectively change their circumstances.

The various factors that can affect the pace and efficiency of mobilization and subsequent change expected are the types of variations in the decisions about the goal, decisions about who will take the task to constitute the community, who will facilitate and support the process, the social and political context, the duration of external or donor support (if any).

#### Up-scaling community mobilization strategies

Researches need to be conducted to understand as to what extent peoples' involvement can actually increase resources to support health care, whether participation can create a genuine social learning partnership between people and professionals, whether community mobilisation can really change a commitment to social justice and democracy, and whether community mobilisation can actually accelerate progress at scale toward achievement of Millenium Development goal of decreasing infant mortality and maternal mortality rates even in resource-poor settings. Scale-up of health interventions might involve increasing coverage by geographical expansion, adding technical interventions to an existing programme, advocacy to change policies, and strengthening capacity with more resources, new alliances, and technical skills (Uvin and Miller, 1996) and governments should partner with civil society organizations in order to scale-up any community mobilization intervention. Several approaches have been used including: government directed and implemented programmes; partnerships between government and non-governmental organisations; so called living universities and centres of learning; dissemination of methods and results through manuals, training packages, internet, radio, video, TV, and university classes; and organic spread from community to community through word-of-mouth or direct observation. These approaches have succeeded in massive scale-up of community mobilisation interventions in countries such as Bangladesh, China, Cuba, Sri Lanka, and Tanzania (Coe, 2001; Rosato et al., 2008). Case studies, trials, and large-scale programmes have shown that, when given the opportunity, communities can develop effective strategies to address their needs and reduce mortality and morbidity. The solutions need not be up-scaled, instead it is the process to support communities to develop their own solution needs to be scaled up the. To summarize

we can say that there is ample evidence supporting that community mobilization is an effective method for promoting participation and empowering communities among a wide range of health related and other nonhealth benefits and future studies are needed to fully unlock the potential that community mobilization approaches can have to improve health and reduce mortality.

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## An Exploratory study on selected household food storage practices of women in Punjab

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#### ABSTRACT

The present study was conducted to know and compare selected household food safety practices of rural and urban women. A sample of 240 women (120 rural + 120 urban) who were performing major household activities was selected from three different regions of Punjab. Data were collected with the help of specially prepared interview schedule. The study findings revealed that urban women were practicing healthier storage practices as compare to rural women. Significant difference was also observed in these refrigerator storage practices. To prolong storage life of wheat and maize grains, more than fifty percent of rural women used celphos tablets. So there is need to educate the rural women regarding different household food storage practices through different strategies of education. Consumer awareness programme for general public should be strengthened.

Keywords: Household food storage practices, Respondents

#### **INTRODUCTION**

In every home food storage is to ensure the safety and high quality. Proper storage extends the shelf life of food, which depends upon the food type and storage conditions. Women as a homemaker play major role in storing the food. So it is considered necessary that they should be conscious and convinced with the improved storage practices of food items at household level. keeping this in mind study has been planned with the following objectives.

#### **OBJECTIVES**

- To explore existing household food storage practices of rural and urban women.
- To compare existing household food storage practices of rural and urban women.
- To study the reasons for not practicing household food safety storage practices by women.

#### MATERIAL AND METHODS

The study was conducted in three regions i.e. Malwa,

Majha and Doaba of Punjab state. Three districts i.e. one from each region were selected randomly. Total three villages and three urban localities were randomly selected from each selected district. Major household storage practices were identified with the help of relevant literature, Subject Matter Specialist and experts from different department of PAU, Ludhiana and members of advisory committee. Data were collected through interview schedule. To compare the household storage practices between rural and urban women respondents mean score of each practice was calculated by assigning score "1" and "0" to practicing and non practicing food storage practice respectively. The data were analyzed by using appropriate statistical methods such as frequency, percentage, mean score and Z- test.

#### **RESULTS AND DISCUSSION:**

The results of the study have been discussed under the following headings:

#### Household Food Safety Storage practices

1. Storage Practices of Different Food Items

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- 2. Practices of Using Different Material for Grain Storage
- 3. Storage practices of Food Items in Refrigerator
- 4. Comparison of storing practices of rural and urban respondents

#### Storage practices of different food items

**Storage practices of cereals:** To keep the grains and cereals insect-free, they are stored in airtight container. Data in Table depicted that majority of rural (65%) and urban (59%) women were storing their cereals in steel bins. All respondents were practicing healthy practices for storing their cereals in recommended containers.

**Storage practices of grains:** Only rural respondents were storing grains. Majority of them (62 per cent) were storing in aluminium drums followed by gunny bags (32 per cent). Seven per cent were using steel bin for grain storage. Storage in gunny bags was preferred due to its less cost (47%) and convince for storage (53%).

Table 1: Distribution of respondents according to their storage practices of different food items (n=240)

Food Items	Rural	Urban
	f(%)	f(%)
Wheat		
Airtight good plastic container	-	26(21)
Steel bins	78(65)	71(59)
Aluminium drums	42(35)	23(20)
Grains		
Steel bins	8(7)	-
Aluminum drums	74(62)	-
Gunny bags	38(32)	-
Reasons of using gunny	n <sub>1</sub> =38(32)	-
bags for storage		
Cost effective	18(47)	-
It is convient method	20(53)	-
Pulses		
Airtight good plastic container	-	69(57)
Steel bins	75(62)	51(45)
Polyethene bags	45(37)	-
Reasons for using polythene	n <sub>1</sub> =45(37)	-
bags for storage		
Cost effective	11 (24)	-
Easy to store	34(76)	-
Spices		
Airtight good plastic container	38 (32)	77(64)
Steel bins	84 (68)	43(36)

**Storage practices of pulses:** Majority of rural (62 per cent) women was storing their pulses in steel bins, where as majority from urban (57%) respondents were using airtight good plastic containers. Storage of pulses as such in polythene bags was preferred by only 37 per cent of rural respondents. Major reason for storage in polythene bags was its less cost and easy to store.

*Storage practices of spices:* Steel bins were used for storing spices by 68 per cent of rural respondents and followed by 36 urban respondents. Thirty two per cent of rural respondents were storing spices in airtight good plastic containers.

## Practices of using different material for grain storage

It is clear from Table 2 that only rural respondents were storing maize (72%) and wheat (58%) by using celphos tablets. Most of them used celphos to prolong storage time of maize and wheat. Other rural and urban respondents were storing maize and wheat with safe material i.e. dry neem leaves and match sticks. Similar study is reported by Singh (1999). He analyzed the samples of rice grains and observed that rice grains were contaminated with pesticides. Study findings also in line with observations of Uplap *et al* (2010) who supported that farm women in Maharashtra expressed need for

Table	2:	Distril	oution	of	respond	lents	accor	ding	to
materia	al u	sed for	storage	e of	different	food	grains	(n=24	<b>10)</b>

Food Grains	Rural	Urban
	(n <sub>1</sub> =120)	$(n_2 = 120)$
	f (%)	f (%)
Wheat		
Dry neem leaves	37(31)	24(20)
Match sticks	14(12)	18(15)
Celphos tablets	69(58)	-
Reasons for using celphos tablets	n <sub>1</sub> =69(58)	$n_2 = 0$
Prolonging storage time	42(61)	-
Protect from insects	27(39)	-
Maize		
Dry neem leaves	34(28)	-
Celphos tablets	86(72)	-
Reasons for using celphos tablets	n <sub>1</sub> =86(72)	$n_2 = 0$
Prolonging storage time	42(49)	-
Don't know the adverse effects	44(51)	-
Rice		
Dry neem leaves	34(28)	12(10)
Haldi with mustard oil	52(43)	24(20)

scientific storage. Similar findings were conducted by Dhaliwal & Singh (2009) farmers on Training food grain storage practices of farmers in Punjab that there are some practices like use of neem leaves to control the insect pest infestation, to which all the experts agree.

Rice was stored by all respondents with recommended materials with dry *neem* leaves (rural 28% and urban 10%) and haldi with mustard oil (rural 43% and urban 20%). The findings are supported by Suresh and Hedge (2001), Sanadhya *et al.* (2002) and Singh (2008) also observed that the farmers were using the neem spray for controlling the insects on their crops.

#### Storage practices of food items in refrigerator

Today refrigerator become basic necessity of every home in rural as well as in urban areas. We mostly store food items in refrigerator. Each food item requires different temperature and recommended container for storage in refrigerator. In this regard data were recorded in Table 3 that how women were storing following food items in refrigerator.

**Storage practices of green leafy vegetables:** Data shown in Table 3 revealed that 60 per cen*t* urban and 55 per cent of rural respondents were storing vegetables in vegetables tray of refrigerator but 45 per cent rural and 40 per cent of urban women were keeping vegetables as such along with polyethene bags in refrigerator. Out of which 67 per cent rural and 37 per cent of urban women expressed reasons of storing in polyethene was that it is easy to store and whereas urban (63%) and rural (33%) respondents had notion that polyethene bags maintain the freshness of vegetables.

Storage practices of roots and tubers: All rural and urban respondents stored roots and tubers in recommended vegetable tray of refrigerator. But out of which 45 per cent rural and 26 per cent of urban respondents were storing as such in polyethene bags and majority of them had explained the reasons of using polyethene bags that it is easy to store in polyethene bags and remaining respondents expressed that polyethene bags maintain the freshness of vegetables.

Storage practices of beans and peas: All 57 per cent rural and 69 per cent urban respondents stored the beans & peas as per recommendations of storing beans and peas, but storing beans and peas as such in polyethene bag were practicing by 51 per cent rural and 37 per cent of urban respondents respectively.

Storage practices of dough, cooked pulses and milk: Majority of them (above than 65 per cent) preferred polyethene bags for storage due to their convenience. Storage practices of dough, cooked pulses and vegetables and milk. All respondents were storing dough, cooked pulses and vegetables and milk according to recommended storage containers and temperature.

**Storage practices of raw meat:** Only 18 per cent of rural respondents were storing meat as such in polyethene bags in recommended place of refrigerator .Their reason for storage in polyethene bags was explained that it is very easy to store in polyethene bags (Table). The findings are supported by Mitakakis *et al.* (2004) that food-handling and storage practices of people in Melbourne (Australia) were risk factors for illness.

**Storage practices of drinking water:** Reuse of plastic bottles of cold drinks and water is not recommended practice. But data in Table 3 depicted that 82 per cent rural and 36 per cent of urban respondents were reusing plastic bottles for storing drinking water in refrigerator, whereas 57 per cent urban and 18 per cent of rural kept water in glassware bottles. Large majority of urban (84%) and rural (74%) respondents used reused bottles due to cost effective and easy to use. Remaining 25 per cent rural and 16 per cent of urban did not know the adverse effects of reused plastic on health.

# Comparison of storing practices of rural and urban respondents

Data in Table revealed that high mean scores of refrigerator storage practices of urban respondents for roots and tubers, beans and peas and drinking water indicated that urban women were practicing above said healthy refrigerator storage practices as compare to rural women. Significant difference was also observed in these refrigerator storage practices. For refrigerator storage of green leafy vegetables, dough, cooked dals and vegetables and milk, non-significant difference was found between rural and urban respondents.

It is evident from Table that storage practices of cereals and spices got equal mean scores in rural and urban

Storage Practices	Rural ( $n_1 = 120$ ) f (%)	Urban ( $n_2=120$ ) f (%)
Green leafy vegetables	. (/0)	- (/0)
Vegetable tray of refrigerator	66(55)	72(60)
As such in polyethene bags and stored in vegetable tray of refrigerator	54(45)	48(40)
Reasons of storage polyethene bags	n = 54(45)	n = 48(40)
Easy to store in polythene bags	36(67)	18(37)
To maintain the freshness of vegetables	18(33)	30(63)
Roots and Tubers	10(33)	50(05)
Vegetable tray of refrigerator	66(55)	89(74)
Middle shelf of refrigerator	-	-
As such in polyethene bags and stored in vegetable tray of refrigerator	54(45)	31(26)
Reasons of storage polyethene bags	n = 54(45)	n = 31(26)
Fasy to store in polythene bags	36(67)	18(58)
To maintain the freshness of vegetables	18(33)	12(30)
Beans and Peas	10(55)	12(37)
Airtight polythese container and bottom shelf of refrigerator	5 (4)	14(12)
Vegetable tray of refrigerator	5 ( <del>1</del> ) 64 (53)	69(57)
As such in polythene bag and stored in middle	51 (43)	37(31)
Reasons of storage polyethene bags and middle shelf of refrigerator	n = 51(43)	n = 37(31)
Easy to store in polyethene bass	33 (65)	$n_2 = 37(31)$ 26(70)
To maintain the freshness of vegetables	18(35)	20(70) 11(30)
Dough	10(55)	11(50)
Airtight good plastic container and topmost shalf of refrigerator		38 (32)
In steel container and termost shelf of refrigerator	- 1 <b>2</b> 0 (100)	38 (32) 82 (68)
Cooked Pulses and vegetables	120 (100)	62 (06)
Airtight good plastic container and middle shelf of refrigerator		38 (32)
In steel container and middle shelf of refrigerator	- 1 <b>2</b> 0 (100)	38 (32) 82 (68)
Milk	120 (100)	62 (06)
In steel container and middle shelf of refrigerator	34(28)	46(38)
In heavy aluminium container and middle shelf of refrigerator	86(71)	74(61)
Raw Meat		
As such in polythene bags and stored in freezer	-	-
As such in polythene bags and stored chill tray of refrigerator	-	22(18)
Reasons of storage polyethene bags and stored chill tray of refrigerator	-	n_=21(18)
Easy to store	-	21(100)
Drinking water		
Reused plastic bottles	98(82)	43(36)
Good grade of plastic bottles	22(18)	68(57)
Glassware bottles	-	9(7)
Reasons for reusing plastic bottles	n,=98(82)	n_=43(36)
Cost effective and easy to use	73(74)	36(84)
Don't know the adverse effects	25(25)	7(16)

Table 3:Distribution of respondents according to their storage practices of food items in refrigerator (n=240)

Table 4: Compa	rison between rura	l and urban responde	ents in relation to	their storage prac	tices $(n=240)$
rubic n compa		i una aroun reoponae	into in renation to	men otorage prae	1000 (II = 10)

Food Safety Storage Practices	Rural mean	Urban mean	Z Value
	score	score	
Refrigerator storage practices green leafy vegetables			
Vegetable tray of refrigerator	0.55	0.60	1.56
As such in polythene bags and stored in vegetable tray of refrigerator			
Roots & Tubers			
Vegetable tray of refrigerator	0.55	0.74	5.93**
As such in polythene bags and stored in vegetable tray of refrigerator			
Beans & Peas			
Airtight plastic container and bottom shelf of refrigerator			
Vegetable tray of refrigerator	0.57	0.69	3.75**
As such in polythene bags and stored in middle			
Dough			
Airtight plastic container and topmost shelf of refrigerator	1	1	-
In steel container and topmost shelf of refrigerator			
Cooked Pulses and vegetables			
Airtight plastic container and middle shelf of refrigerator	1	1	-
In steel container and middle shelf of refrigerator			
Milk			
In steel container and middle shelf of refrigerator	1	1	-
In heavy aluminum container and middle shelf of refrigerator			
Drinking water			
Reused plastic bottles			
High grade plastic bottles	0.18	0.64	11.25**
Glassware bottles			
Storage practices of different food items			
Cereals			
Airtight plastic container			
Steel bins	1	1	-
Aluminum drums			
Pulses			
Airtight plastic container			
Steel bins	0.62	1	11.7**
Polyethene bags			
Spices			
Airtight plastic container	1	1	-
Steel bins			
Material used for storage of different food grains			
Wheat	o <b>/ o</b>	0.05	
Dry neem leaves	0.42	0.35	2.34**
Match sticks			
Celphos tablets			
Kice	0 = 1	0.00	10 1100
Dry neem leaves	0.71	0.30	12.66**
Haldı with mustard oil	0 =1	o <b></b>	
Average mean score	0.71	0.77	

\*\*Significant at 1% level

area. Significant difference was found only between rural and urban respondents for storage pulses. Findings are in line with study of Uplap *et al.* (2010) that majority of farm women expressed training need for scientific storage structure. Table shows that there was significant difference between rural and urban respondents for storing rice with materials like *neem* leaves and haldi with mustard oil.

#### CONCLUSION

Eighty two percent rural and thirty six percent of urban respondents were using reused plastic bottles for storing drinking water in refrigerator. So there is need to popularize adverse effect of reused plastic bottles on health among rural and urban people. To prolong storage life of wheat and maize grains, more than fifty percent of rural women used celphos tablets. There is need to create awareness regarding safe methods for storage grains at household level.

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### Impact Assessment of Frontline Demonstration on Pigeon pea

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#### ABSTRACT

The study was carried out in district Baghpat of western U.P. by conducting front line demonstrations of pigeon pea in different locations of farmers field to promote the cultivation and adoption of improved package of practice. The seeds of improved varieties and balanced fertilizers were the part of technological package supplied to the demonstration plot as against control. All the demonstrations were conducted by following participatory approach. Results revealed that improved varieties and balanced fertilization increased yield to the tune of 15.44% and 10.41%, respectively while both the factors in combination were responsible for 25.81% increase in yield. In demonstration plots C:B ratio was also higher as compared to control ones. It was concluded that while selecting the inputs during the scarcity or adequacy of inputs improved varieties must be given priority as they alone foster higher amount of increase in yield.

Keywords: Assessment, Demonstration, Frontline, Impact, Pigeon pea

#### **INTRODUCTION**

India is largest producer of pulses with a share of 25% in world's total pulse production. During 2007-2008, India produced 14.56 mt of pulses from an area of 23.63 mha. With an average productivity of 625 kg/ha. The share of pigeon pea in total pulse production of India is 21% (The Hindu survey, 2009). During 1977-78 to 2007-08 the up and down trend in area and production of pulses in the country has also been recorded. The contribution of pulses to the total food production of India has reduced to the tune of 7.0% as against 17.0% at the time of independence.

One of the major factor felt over the years for low productivity of pulses in general and Pigeon pea in particular is lack of information of innovation to the ultimate user of the technology *i. e.* farming community. However, existing production and protection technologies have excellent potential to increase the productivity of pulses in general and pigeon pea in particular if fully exploited. Keeping in view front line demonstrations of pigeon pea were conducted at various locations of farmers field of district Baghpat during 2007-08 and 2008-09 to show the production potential and contribution of different factors in increasing the productivity of crop.

#### MATERIALS AND METHODS

Demonstration is an old age method of extension and is still equally effective as earlier to show the genetic potentiality and economic viability of technology. A total number of 28 demonstrations were conducted in 7 different villages viz. Mukari, Badagaon, Daula, Shikhera, Hamidabad, Pilana and Nanglabahlolpur of district Baghpat (U.P.) as a part of routine work of K.V.K., Baghpat. Improved varieties and balanced fertilizers were the main components of technological package provided to the farmers. All the demonstrations were carried out in close supervision of scientists with participation of farmers as described by Singh et.al. (2006) The production data obtained by representative random sampling cutting from four different locations of each demonstration and control plot as well were analyzed as follows to work out the contribution of different factors in increasing the yield.

A= Yield of control plot

B= Yield of demonstration plot with improved variety

C= Yield of demonstration with balancer fertilizers D= Yield of demonstration plot with improved variety and balanced fertilizers

 $A^1$  = Yield increased due to improved variety (D-C)

 $B^1$  = Yield increased due to balanced fertilizers (D-B)

 $C^1$  = Yield increased due to composite factors (D-A)

#### **RESULTS AND DISCUSSION**

The production data obtained from demonstration as well as control plots are presented in Table 1 seems quite satisfactory. The highest increase in yield was observed in village Shikheda (32.61) followed by Badagaon (29.06), Mukari (27.97), Hamidabad (24.86) and Pilana (24.52) but least was in Nanglabahlolpur (13.11). On an average a 24.86% yield increase was obtained in demonstration plots as against control plots which shows a wide gap between achieved and achievable production that are in conformity with the results obtained by Vishwadhar et.al. (2003). Merely 2.59% increase in cost of cultivation was recorded in demonstration plot due to adoption of improved package of practices while in village Shikheda and Hamidabad it was lower by -4.79% and -8.15%, respectively than control. It may be attributed to imbalance use of fertilizers and other inputs. Maximum gross return in terms of money was seen in village Daula (24.52) with an average of 25.81% in demonstration plots. As far as monetary net return was concerned it was highest in village Shikheda (77.69%) followed by Hamidabad (70.55%) and Pilana (70.05%) against an average of 54.15%. In all the villages, a higher C:B ratio was noticed with an average of 1:2.26 as against control plots having average ratio of 1:1.84. It was drawn that adoption of improved package of practices increased monetary as well as physical out put needs to be persuaded to farmers to adopt them for enhancing the productivity of pigeon pea as Dixit et.al. (1998) highlighted that adoption of improved production practices needs persuasion on the part of extension agencies and willingness of farmers.

In the demonstration trials the contribution of different factors in increasing the yield was also estimated (Table 2). It was found that improved varieties alone were responsible for higher yield in all the villages except Hamidabad where balanced fertilization increased 15.67% yield alone. The overall

Name of	No.		Demo	onstratior	n plot			0	control pl	ot		% ii	ncrease ov	ver contro	l
village	$\mathbf{of}$	Avg.	Cost of	Gross	Net	B:C	Avg.	Cost of	Gross	Net	B:C	Yield	Cost of	Gross	Net
	dem	yield ( (q/h)	cultivation (Rs/h)	n return (Rs/h)	return (Rs/h)		yield (q/h)	cultivatior (Rs/h)	n return (Rs/h)	return (Rs/h)			cultiva- tion	return	return
Mukari	13	21.5	28700	64500	35800	1:2.24	16.18	27500	50400	22900	1:1.83	27.97	4.36	27.97	55.33
Babadaon	02	22.2	32050	66600	34550	$1{:}2.07$	17.20	29000	51600	22600	1:1.77	29.06	10.51	29.06	52.87
Daula	04	20.75	31200	62250	31050	1:1.99	17.50	28000	52500	24500	1:1.87	18.57	11.42	18.57	26.73
Shikheda	04	22.77	26800	68310	41510	1:2.54	17.17	28150	51510	23360	1:1.82	32.61	-4.79	32.61	77.69
Hamidabad	02	23.10	27600	69300	41700	1:2.51	18.50	30050	55500	24450	1:1.84	24.86	-8.15	24.86	70.55
Pilana	02	24.55	30200	73650	43450	1:2.43	18.25	29200	54750	25550	1:1.87	24.52	3.42	34.52	70.05
Nanglabahlolpur	01	20.36	28600	61080	32480	1:2.13	18.00	28200	54000	25800	1:1.91	13.11	1.41	13.11	25.89
Mean	28	21.92	29050	65760	36710	$1{:}2{.}26$	17.25	28100	51750	23650	1:1.84	24.38	2.59	25.81	54.15

Table 2: Comparati	ive stateme	ent of factor p	roductivity a	of Pigeon pea						
Village	No. of	Yield of	Yield of	Yield of	Increase	Increase	Increase	% increase	% increase	% increase
	Demo.	control plot	demo.	demo. plot	in yield	in yield	in yield	in yield	in yield	in yield
		(d/h)	plots with	with Impro.	due to	due to	of demo.	due to	due to	over
			improved	Var. &	improved	balanced	plots over	Impro.	balanced	control
			varieties	balanced	variety	fertilizers	control	Var.	fertilizers	
			(d/h)	fertilizers	(d/h)	(u/b)	(q/þ)			
				(d/h)						
Mukari	13	16.80	19.85	21.50	3.05	1.65	4.70	18.48	9.82	27.97
Babadaon	02	17.20	20.20	22.20	3.00	2.00	5.00	17.44	11.62	29.06
Daula	04	17.50	20.50	20.75	3.00	0.25	3.25	17.14	1.42	18.57
Shikheda	04	17.17	20.04	22.77	2.87	2.73	5.60	16.71	15.89	32.61
Hamidabad	02	18.50	20.20	23.10	1.70	2.90	4.60	9.18	15.67	24.86
Pilana	02	18.25	21.90	24.55	3.65	2.65	6.30	20.00	14.52	34.52
Nanglabahlolpur	01	18.00	19.65	20.36	1.65	0.71	2.36	9.16	3.94	13.11
	28	17.63	20.33	22.17	2.70	1.84	4.54	15.44	10.41	25.81

average increment in yield due to improved varieties was 15.44% as compared to balanced fertilizers that contributed 10.41% in upliftment of yield. Actually improved varieties comprises of two technologies i.e. seed and seed treating material as most of the agencies are now a days providing treated seeds to the buyers resulting in good response. The present findings are in accordance with Kumar and Prajapati (2010) who reported that seed and seed treatment are the key components of technological packages in case of pigeon pea and ensured supply of these can minimize the technological gap to a reasonable extent. When both the factors including improved varieties and balanced fertilizers were combined the yield recorded was much higher (25.81) against factors adopted in separate way. Prajapati and Kumar Surendar (2012) were also reported that front line demonstration play a vital role in minimizing the technological gap through supply of critical input with updating of technological aspects. Thus it was advocated that full package of practices are needed to gain maximum production as also reported by Singh et al. (2003) that genetic potentiality of high yielding varieties is linked with optimum utilization of other production factors like fertility management and it could be achieved through using complete package of crop production. But in case of deficiency of inputs at least improved varieties should be made available. It was also noticed by Kumar and Prajapati (2011) that close and regular monitoring of the scientist and extension worker help to the target group in knowledge updating.

#### CONCLUSION

In spite of harsh efforts made over the years to boost up the productivity of pulses particularly in western UP it is still not gaining momentum. Hence, sugarcane is the predominant crop of the area and other crops like pigeon pea are not being much attention. Farmers generally grow these crops in small area by using their own old untreated seeds with imbalance or no use of fertilizers for their own consumption. Study highlighted that adoption of improved package of practices like seeds of improved varieties and balanced fertilizers can fetch the gap between production potential and production obtained. One thing more which has been concluded from the study is that, in case of paucity or making choice of inputs priority must be given to improved varieties

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# Mobile Activism on Violence against Women amongst Youth in Delhi and NCR

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#### ABSTRACT

Wireless Communication and mobile phones have emerged as a powerful tool for social engagement. Mobile phones are increasingly playing a vital role in shaping activism, raising awareness, and ultimately giving citizens a voice setting grounds for activism and citizen journalism. Several issues are being discussed worldwide through mobile applications such as WeChat, BlackBerry Messenger and WhatsApp; and through blogs, social networking websites, and accessed using mobile phones worldwide for cause-related fundraising, lobbying, volunteering, and community building, with an aim to generate people's movements and collective actions disseminating relevant messages across to masses. A worldwide prevalent issue, violence faced by women in various forms, especially in Asian countries, has a profound effect on a woman's life affecting their participation in different walks of life including workforce, society and political participation; retarding their status in their native society. The paper highlights the interaction of youth in Delhi and National Capital Region (NCR) with mobile technologies and their applications in activism on violence against women (VAW) assessed through personal interviews. The study found that mobile phone is an effective agent in galvanizing different forms of online and offline actions concentrating on eliminating VAW worldwide.

Keywords: Mobile phones, Activism, Violence against Women in India (VAW), Youth

#### **INTRODUCTION**

In the last decade the world has witnessed the fastest technology adoption in human history (Eagle, 2010). The International Telecommunication Union (ITU) estimates nearly seven billion mobile subscriptions worldwide, equivalent to more than 95% of the world population (International Telecommunication Union, April 2014). Of the total global mobile subscription approximately 5.4 billion mobile subscriptions (78% of global subscriptions) were from the developing nations, compared with nearly five billion in 2013, according to the ITU. Mobile penetration in the developing world now is 90%; with potential for further elevation and the mobile penetration in some developed countries has exceeded beyond 100% of the total population (ITU, 2014). India is the second-largest mobile phone user with over 900 million users in the world. It accounted for over 10% of the world's online population in 2011 (Press Information Bureau, Government of India, 2011) having more than 160 million Internet users, of which 86 million access Internet using their mobile devices (Press Information Bureau, Government of India, 2011). Thus, mobile phones have become increasingly omnipresent around the world (Vincent, 2006); enhancing autonomy of individuals, enabling them to set up their own connections, bypassing the mass media and the channels of communication controlled by institutions and organizations (Castells *et al.*, 2009).

The present scenario, where the world is midst of a technological revolution, people around the globe have become increasingly interested in the extension of digital technologies like computers and mobile phones and bring in a positive social and political change in the society (Eagle, 2010). Mobile phones facilitate its emergence by virtue of three important factors: mobility, personalization and multimodality (Miard, 2012). Mobility adds a spontaneity factor to potential mobilization, personalization is given through the

typically person-to-person and social type of contact and multimodal - it can transmit voice, images, and sounds, making it a tool for live transmission of events to be shared on the network with the implications that follow from such 'broadcasting' (Castells et al., 2009). These aspects potentially turn mobile phones into indispensable tactical and organizational tools for any group or organization to mobilize people around a common cause. Although most mobile phone activity remains within, and relates to, the circle of family, friends, and business associates, it is at times being used more strategically for mass mobilization (Miard, 2012). The short message service (SMS) has turned into an organizing tool for spontaneous protests, and mobile phones are used to document and report human rights violations. SMS uprising in Africa; the Black Dot campaign initiated against the infamous December 16, 2013 Delhi rape incident; Text messages informing thousands of people about anti-government protests in Spain following the Madrid bombings; are some of the recent examples.

Since the beginning of the history, there has been a debate over the status of women in the Indian society (Johnson & Johnson, 2001; Modi, 2014). The traditional Indian family structure sanctions the domination of women through the socialization and conditioning of the children from an early age through adulthood, instilling in them cultural norms, values, traditions and religious practices in sync with social acceptance nourishing patriarchal dominance amongst males and inferiority amongst females made to be practiced all through their lives (Bhasin, 2006). Indian Constitution awards equal rights to both men and women in the form of Equality before law (Article 14), independent political participation, right to inheritance and property. There have been several other legislations enacted to facilitate women's empowerment in the country. Activists and feminists are fighting for gender equality and empowerment to encourage independence among women through aspects of education, legislation, economic and socio-political autonomy, to subsequently bring women into mainstream (Kishor and Gupta, 2009; Shah, 2010). The Census of India 2011 reports growing instances of females excelling in education, yet Indian traditions, customs, and social practices place greater value on sons (Bhasin, 2006).

The financial and professional autonomy acquired as a result of education and empowerment often destabilizes the traditional dynamic of authoritative male and submissive female. The natural tendency of such women to assert their rights as equal partners is deeply threatening to men from the patriarchal community; they perceive equality between the sexes as a threat to their masculinity (Papp, 2010). Cultural and social norms are highly influential in shaping individual behavior, including the use of violence. The phenomenon of violence against women (VAW), both physical and psychological, is a prevalent and welldocumented social problem in India and around the world across all cultural, economic and social strata (Sudhir & Hajarimayum, 2005; Vir, 2006; Papp, 2010). In order to put an end to VAW, new media technologies are increasingly being used all across the globe taking the shape of internet based social movements, blogs and websites along with offline activities taken up by independent women activists and civil society organization. There has been a lot being discussed about internet activism and social media movement in scholarly articles worldwide. Similarly, exploring the application of mobile technology, another form of new media, as facilitator of public awareness, mass-mobilization and activist activities focusing on eliminating VAW can be considered appropriate due to factors like easy access, user-friendliness, mobility and reach; that make mobile phones the most essential in inter-personal communication both in developed and enveloping nations. The present paper attempts to examine the prospects of mobile technology for building public awareness, sensitizing and mobilizing people on issues of VAW in India and worldwide.

#### **RESEARCH QUESTIONS AND OBJECTIVES**

A study was conducted to find answers to the following research questions: 1. What are the practices of mobile phone usage amongst the youth in Delhi and NCR?, 2. What are the perceptions of the youth about the application of mobile technologies for public awareness, mass-mobilization and activism on VAW in India? and 3. What is the role of mobile technology in eliminating VAW in India?

The objectives of the study were:

1. To study the youths' perspectives about the application of mobile technologies for public

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awareness, mass mobilization and activism with reference to VAWin India

2. To examine mobile phone technologies as an effective medium for activism on VAW in India

#### MATERIALS AND METHODS

The paper examines the application of mobile technology as a tool for people's mobilization and social change. The study is descriptive in nature using a The research design focused on the descriptive research design and methodology, examining the application and utility of mobile technology for social causes and exploring in detail, the phenomenon of mobile activism on VAW in India.

The study was conducted in two phases. In the first phase, an understanding of the issues of violence faced by women and their subordinate status in the Indian society was established through document review and analysis using secondary sources of information. In the second phase of the study, a questionnaire was designed for young adult mobile phone users (YAMU) to study selected aspects of mobile phone usage amongst youth such as mobile phone usage pattern, participation in social campaigning activity using mobile phones and users' perspective about appropriateness of mobile phones for public awareness, mass-mobilization and activism with reference to VAW. The questionnaire cum survey was developed keeping in mind the objectives of the study; it was divided into three sections; Background information of the participants, Mobile usage; and Mobile phone for activism.

The population of Delhi, the Indian capital, constitutes a diverse group of people belonging to different cultures, religions, following different set of values and traditions. Therefore, the study was conducted in Delhi and National Capital Region (NCR) and including Gurgaon and Faridabad from the state of Haryana; Noida and Ghaziabad from the state of Uttar Pradesh. One hundred and fifty individuals in the age group of 20-30 years, having mobile phones were approached; of which about 82 responded back. These 82 potential subjects were oriented to the purpose and the relevance of the study and fifty of them voluntarily agreed to be part of the study and were subsequently included in the sample of YAMU, using the purposive sampling technique. The YAMU were selected on the basis of two aspects: the subject had to be in the age group of 20-30 years and the subject should be individuals having working knowledge of technologies used in the study - the computers and the mobile phones. Finally, a total of fifty youths with equal ratio of men and women in the age group of 20-30 years, using mobile phones for various purposes - knowledge, work, entertainment, and social interaction were selected from Delhi and NCR.

#### **RESULTS AND DISCUSSION**

Profile of the Subjects: The results showed that majority of the youths were in the age group of 20-30 years, having of equal number of both sexes with a mean age of 25 years. The study reflected the perceptions of the young educated, middle income Indians, that mobile phones can be effective in spreading awareness about the issues of VAW and mobilizing the masses on the issue and subsequently bringing in an intended offline activity supporting or protesting about the issue of interest, for example, protests against exploitation and harassment of women; marches to support an initiative that can strengthen and empower women. The selected sample of youth represented the literate populace in Delhi and NCR having 48% post-graduates; 42% graduates and remaining under-graduates enrolled in the UG Courses in various educational institutions in Delhi and NCR. The total sample of the youth consisted of 72% employed individuals and 28% were students.

Mobile Phone Usage Patterns of Youth in Delhi and NCR: An overwhelming majority (95%) of youths used smart phones; having features like emailing, organizer, multimedia, 3G and Wi-Fi compatibility through their mobile network provider. Nearly 94% used wireless connections by means of Wi-Fi on their mobile phones. All the subjects used mobile for emailing; both personal and professional (Figure 1). In addition to emailing, all the subjects engaged in chats and instant messaging using mobile phone applications like WhatsApp, Nimbuzz, WeChat BlackBerry Messenger, in order to stay connected with their online friends. Content sharing in the form of music, images and videos on the mobile is another activity that almost all the YAMU engaged in, followed by entertainment and recreation through music, mobile radio and gaming engaging 98% youth. Banking has evolved and has become easier and user-friendly with add-on facilities like mobile and



Figure 1: Different Activities for which the Youth use their Mobile Phones

internet banking, give the customers access to their account through their mobile phones and computers with internet connections. About 62% of youth said that they made use of mobile banking for balance enquiries and transactions. Online shopping is an activity that engaged approximately 47% youth shop for using their mobile phones. About 56% youth said that they pay house bills (including electricity, cooking gas, water and telephone) and find it convenient and hassle free.

Booking tickets online (also known as e-ticketing) for travel (both railways and airways), movies, restaurants has become a trend among youth, a little more than 65% youths agreed to be using mobile phones for ticketing. Blogging and Social Networking is another set of activities that the YAMU engage in, 63% youth wrote blogs on random subjects such as their experiences on topics such as beauty, health, food, travel and commented on trending social issues through their mobile phones; and 98% access social networking websites through mobile phones. On enquiring the use of mobile phones for activism, nearly 87% of the subjects used their mobile phones for discussion about current social issues. The use of mobile for activism, called mobile activism, focusing on VAW in India, is quite relevant to and in synchronization with the area of exploration for this research study.

Awareness about Mobile Campaigns on VAW in India: When the YAMU were probed about their awareness of any mobile phone campaign on the issue of VAW in India, 84% acknowledged their awareness and 16% reported not knowing about any mobile campaign on VAW in India (Figure 2).



Figure 2: Awareness of the Youth about existing Mobile Campaigns on VAW

Levels of Participation of the Youth in Campaigning Activities on VAW: The YAMU were questioned about whether they had received a message on their mobile phone asking them to support and/or participate in a campaign on eliminating VAW, 77% forwarded the message to at least five people from their contact list, 21% forwarded the messages to more than five people from their contact list and the remaining ignored such messages (Figure 3).



Figure 3: Levels of Participation of Youth in Campaigning Activities using Mobile Phones

Perception of the youth about the use of mobile phones for creating Awareness, Sensitizing and Mobilizing Individuals and Groups: About the role of mobile phones in eliminating VAW, 72% youths felt that mobile phones can create awareness through text messaging, instant messengers like *WhatsApp, WeChat* and others; 97% strongly believed mobile phones can sensitize and mobilize masses and 98% felt mobile phone can initiate offline movement on VAW (Figure 4). The study findings throw a positive light on the engagement of youth with mobile phones for social causes which are meaningful to them.

#### CONCLUSION

Mobile technology has penetrated the world to an extent that today it has changed the way people communicate with each other. Rapid advancements in mobile technology has worked towards improving the user experience by enhancing features that makes mobile phones user friendly and simple to use, facilitating a host of activities including activism and citizen journalism through simple calling and text messaging capability. The study reinforces the effectiveness of mobile phones as facilitators in awareness building and initiating social movements on VAW in India using mobile phones as perceived by youth in Delhi and NCR.

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Figure 4: Perceptions of the Youth of the use of Mobile Phone for a social issue specifically on VAW

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## Impact of Heterosis on Yield Components and Quality Enhancement in Tomato Production (*Lycopersicon esculentum* L.)

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#### ABSTRACT

An experiment on impact of heterosis on yield components and quality characters was studied using line x tester analysis of 50  $F_1$  hybrids of tomato derived from the crosses between 10 lines and 5 testers was conducted at the Research Farm of the Department of Vegetable Science, CCS Haryana Agricultural University, Hisar during 2012-13 and 2013-14. In this study, among crosses, the best cross combinations in favourable direction were observed for EC 620383 x Punjab Chhuhara. The line, Punjab Varkha Bahar-2 and cross EC 620533 x Arka Vikas recorded significantly maximum heterosis for number of fruits per truss. The cross BBWR-11-1 x Palam Pink recorded higher number of fruits per plant and the cross EC 620391 x Punjab Chhuhara, the line Punjab Varkha Bahar-2 and tester Arka Meghali recorded the maximum total fruit yield per plant compared to standard checks. The highest TSS was noted in line EC 620445 tester Hisar Meghali had more TSS than the check variety Hisar Arun. Among crosses, the cross EC 620534 x Arka Vikas recorded the highest TSS manifesting higher heterosis for TSS.

Keywords: Heterosis, Yield components, Traits, Tomato

#### **INTRODUCTION**

Tomato (Lycopersicon esculentum L.), is a member of Solanaceae family, commonly grown as an annual plant all over the world. It is gaining popularity among the consumers because of its higher content of vitamin C lycopene, TSS and other essential nutrients (Shukla, 2006). It has commercial value in extraction of tomatine, a steroidal hormone, which is used as a substitute of diosgenin. Its increasing consumption makes it a high value crop for generating income to the farmers. Tomato can be exploited for hybrid seed production because of its easiness in crossing, fruit containing large number of seeds, easiness in growing under varied climatic conditions and possessing high degree of heterosis for growth and yield earliness. The choice of parents for hybridization needs to be based upon complete genetic information, the knowledge of heterosis and their combinations for the improvement of characters under consideration. Utilization of heterosis is one of important means by which the yield and quality can be increased. In vision of the above

information, the efforts were made to develop  $F_1$  hybrids for high yield and related traits.

#### MATERIALS AND METHODS

The investigated material comprising 15 genotypes (10 lines, 5 testers and standard check) were sown in nursery during 2012. The crosses were made in a line x tester fashion, and the  $F_1$  seed was extracted during 2013. During 2013 Fifty F<sub>1</sub> crosses along with 15 parents and two standard checks were sown in the nursery. Experiment carried out in Randomized Block Design with three replications. Spacing of 75 cm x 45 cm was adopted for seedling transplanting comprising 14 plants in each treatment. All the recommended package of practices adopted to raise the crop successfully. Standard procedure of hand emasculation and pollination were used to made crosses. The resulted F<sub>4</sub>s evaluated along with their parents for various yield and quality traits. Observations were recorded on number of fruits per truss, total number of fruits per plant, total fruit yield per plant and total soluble solids. The mean

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values were subjected to statistical analysis and heterosis was determined as increase or decrease of  $F_1$  hybrids over standard check variety Hisar Arun.

#### **RESULTS AND DISCUSSION**

The mean performance of parents, crosses and the percent of heterosis estimated over standard check variety Hisar Arun is presented in Table 1 to 4.

Number of fruits per truss: Range for all lines, testers and crosses varied significantly from 1.33 to 6.33 for total number of fruits per truss (Table 1). Among the lines, Punjab Varkha Bahar-2 showed the highest number of fruits per truss (5.00) followed by BBWR-10-3-17 (4.33) and EC 620534 (4.00). Among the testers, Hisar Lalit showed the maximum number of fruits per truss (5.33) followed by Arka Meghali (4.33) and Punjab Chhuhara (3.66). On the other hand, the crosses showed a wide range of variability, where the highest number of fruits per truss was produced in cross EC 620533 x Arka Vikas (6.33), which was closely followed by the cross EC 620445 x Arka Vikas (5.66), EC 620445 x Arka Meghali (5.66) and EC 620533 x Punjab Chhuhara (5.66). Out of fifty crosses, twentythree of the crosses surpassed the check Hisar Arun. The number of fruits per truss was reported least in cross EC 620534 x Hisar Lalit (1.33) followed by EC 620380 x Punjab Chhuhara (2.00) and EC 620534 x Palam Pink (2.33). Variable results of the present study for number of fruits per truss are in line with the earlier findings of (Kanthaswamy, 1989; Bhatt, 2001).

Total number of fruits per plant: The total number of fruits per plant (Table 2) varied from 15.66 (EC 620534 x Punjab Chhuhara) to 30.66 (BBWR-11-1 x Palam Pink). The maximum number of fruits was produced by the line EC 620391 (30.00) closely followed by BBWR-11-1 (28.33) and EC 620533 (25.00) and the least number of fruits was recorded in line EC 620534 (17.00). Among the testers, Arka Vikas (24.33) followed by Arka Meghali (23.33) yielded the maximum number of fruits per plant and the least number of fruits per plant was noticed for Palam Pink (16.66). On the other hand, the crosses showed a wide range of variability, where the highest number of fruits per plant was produced by the cross BBWR-11-1 x Palam Pink (30.66) closely followed by the cross EC 620380 x Hisar Lalit (30.00), BBWR-10-3-18 x Palam Pink (29.33) and EC 620534 x Arka Vikas (22.00). The less number of crosses outnumbered the check Hisar Arun. The number of fruits per plant was reported least in cross EC 620534 x Punjab Chhuhara (15.66). Variable results of the present study for number of fruits per plant are in line with the earlier findings of (Kumar, 1995; Rao, 2007; Kumari, 2011).

Total fruit yield per plant (kg): High fruit yield per plant is the ultimate goal of any breeding programme, so requires higher consideration. The total fruit yield per plant after the final picking ranged from 0.123 to 0.886 (Table 3). The line Punjab Varkha Bahar-2 (0.920) and tester Arka Meghali (0.863) recorded the maximum total fruit yield per plant. Among crosses, the maximum total yield per plant was recorded in cross EC 620391 x Punjab Chhuhara (0.886) followed by EC 620383 x Arka Vikas (0.841), BBWR-10-3-17 x Punjab Chhuhara (0.820) and EC 620383 x Punjab Chhuhara (0.742). None of the crosses out yielded the standard check variety Hisar Arun. None of the testers gave fruit yield more than the check Hisar Arun, while only two lines EC 620445 (0.940) and Punjab Varkha Bahar-2 (0.920) recorded yield higher than check variety Hisar Arun. Similar results were also reported by (Kumar, 1995; Agarwal, 2014).

**Total soluble solids (%):** The total soluble solids of fruits ranged from 3.66 to 7.41% (Table 4). The highest TSS was noted in line EC 620445 (7.88%), tester Hisar Meghali (6.32%) had more TSS than the check variety Hisar Arun. Among crosses, the cross EC 620534 x Arka Vikas (7.41%) recorded the highest TSS. The lowest TSS in case of hybrids was noted in cross EC 620380 x Palam Pink (3.66%). The TSS to acidity ratio of fruits is important in maintaining balanced taste for fresh table use as well as for processing. In the present study, higher TSS content was in conformity with the earlier results of (Singh, 2008; Kumari, 2011; Droka, 2012; Agarwal, 2014).

#### **CONCLUSION**

The results show that there was considerable heterosis for almost all the 4 characters studied. It also indicated the possibility of increasing yield by exploiting heterosis. The presence of high heterosis indicated genetic diversity between parents. Therefore, with increased diversity among genotypes, higher level of heterosis is

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Testers	Lines	EC	EC	EC	EC	EC	EC	BBWR-	BBWR-	BBWR-	Punjab
		620380	620383	620391	620445	620533	620534	10-3-17	10-3-18	11-1	Varkha
											Bahar-2
	Mean	3.33	3.67	2.67	3.67	2.33	4.00	4.33	2.33	4.33	5.00
Palam Pink	2.66	2.33	5.66	5.66	3.33	3.00	2.33	3.33	4.66	5.66	3.00
Punjab Chhuhara	3.66	2.00	4.66	5.00	4.33	5.66	3.66	5.33	4.66	2.66	4.66
Arka Vikas	2.33	3.66	3.66	3.66	5.66	6.33	4.66	4.66	5.66	3.00	2.66
Arka Meghali	4.33	5.66	3.33	4.66	5.66	4.66	2.33	5.66	2.33	5.66	3.33
Hisar Lalit	5.33	4.66	5.33	4.33	4.33	4.00	1.33	5.66	5.33	5.66	4.00

Table 1: Mean performance of parents, crosses for number of fruits per truss in a line x tester set of tomato

Mean values for standard hybrids: Hisar Arun = 3.33 SE(d) = 0.45, C.D at 5% level of significance = 0.89, CV = 13.43

Table 2: Mean performance of parents, crosses for total number of fruits per plant in a line x tester set of tomato

Testers	Lines	EC	EC	EC	EC	EC	EC	BBWR-	BBWR-	BBWR-	Punjab
		620380	620383	620391	620445	620533	620534	10-3-17	10-3-18	11-1	Varkha
											Bahar-2
	Mean	24.33	23.33	30.00	18.67	25.00	17.00	20.33	19.67	28.33	18.67
Palam Pink	16.66	19.33	24.00	29.66	22.33	25.66	20.66	20.66	29.33	30.66	25.33
Punjab Chhuhara	19.00	19.00	24.33	16.66	25.66	19.33	15.66	27.00	17.00	25.00	27.00
Arka Vikas	24.33	18.66	24.66	24.33	20.33	29.00	22.00	28.33	24.00	27.66	24.00
Arka Meghali	23.33	16.66	19.00	29.00	20.33	19.33	25.66	21.33	18.33	27.00	27.33
Hisar Lalit	18.33	30.00	26.33	20.00	17.66	17.66	25.00	26.66	21.00	27.00	25.00

Mean values for standard hybrids: Hisar Arun = 14.7 SE(d) = 1.75, C.D at 5% level of significance = 3.48, CV = 9.37

Table 3: Mean performance of parents, crosses for total fruit yield per plant (kg) in a line x tester set of tomato

Testers	Lines	EC	EC	EC	EC	EC	EC	BBWR-	BBWR-	BBWR-	Puniah
	Lines	620380	620383	620391	620445	620533	620534	10-3-17	10-3-18	11-1	Varkha
											Bahar-2
	Mean	0.82	0.83	0.80	0.94	0.70	0.91	0.62	0.57	0.72	0.92
Palam Pink	0.57	0.73	0.36	0.47	0.21	0.21	0.30	0.38	0.68	0.43	0.37
Punjab Chhuhara	0.59	0.48	0.74	0.88	0.32	0.33	0.33	0.82	0.78	0.70	0.50
Arka Vikas	0.74	0.57	0.84	0.75	0.39	0.52	0.28	0.45	0.34	0.41	0.65
Arka Meghali	0.86	0.37	0.26	0.70	0.53	0.70	0.23	0.26	0.43	0.44	0.35
Hisar Lalit	0.84	0.12	0.72	0.39	0.65	0.37	0.69	0.58	0.34	0.73	0.36

Mean values for standard hybrids: (i) Hisar Arun = 0.84 SE(d) = 0.04, C.D at 5% level of significance = 0.07, CV = 8.73

Table 4: Mean performance of parents, crosses for total soluble solids content (%) of fruits of parents and hybrids in a line x tester of tomato

Testers	Lines	EC	EC	EC	EC	EC	EC	BBWR-	BBWR-	BBWR-	Punjab
		620380	620383	620391	620445	620533	620534	10-3-17	10-3-18	11-1	Varkha
											Bahar-2
	Mean	4.05	7.25	5.16	7.88	6.24	5.44	4.29	5.33	5.57	4.91
Palam Pink	3.21	3.66	4.20	6.60	6.40	5.10	4.60	3.73	6.57	4.43	6.23
Punjab Chhuhara	4.06	5.66	6.53	7.76	5.83	6.43	7.18	6.53	7.10	7.53	4.26
Arka Vikas	5.02	6.53	4.56	7.86	6.53	4.50	7.41	7.36	6.26	4.16	5.86
Arka Meghali	6.32	6.10	5.26	5.43	6.44	5.53	6.46	7.43	7.13	5.46	4.83
Hisar Lalit	5.14	7.26	7.16	4.70	6.15	5.76	5.63	3.83	7.13	4.43	5.53

Mean values for standard hybrids: Hisar Arun = 5.1 SE(d) = 0.10, C.D at 5% level of significance = 0.21, CV = 2.29

expected in  $F_1$  hybrid. Farzane *et al.* (2012) reported that heterosis in yield was attributed to increase in number of fruits per truss. The highest number of fruits per truss was produced in cross EC 620533 x Arka Vikas (6.33), highest number of fruits per plant was produced by the cross BBWR-11-1 x Palam Pink (30.66), the maximum total yield per plant was recorded in cross EC 620391 x Punjab Chhuhara (0.886) in the present investigation was in quite agreement with the reports of (Singh 2012; Gill 1976; Jamwal 1984; Farzane 2012; Agarwal 2014; and Pandey; 2006; Singh 2014) So, it could be concluded that higher percent of heterosis responsible to number of fruits per plant the cross combination manifested the higher heterosis over better parent for yield per plant.

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## Awareness of Rural Women of Punjab Regarding Indoor Air Pollution Causing Practices

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#### ABSTRACT

The present study was conducted to find out the awareness of women regarding indoor air pollution causing practices in three regions of Punjab i.e. Majha, Malwa and Doaba. For this purpose, 240 rural women of district Gurdaspur, Hoshiarpur and Ludhiana were selected. Data were collected through interview schedule. The study findings revealed that above than ninety six percent of women were aware that cigarette smoke inside home and more improper disposal of desilted material from severs can lead to indoor air pollution. About ninety per cent of women were not aware about spray paint method of painting is more dangerous and pollute air; furniture polishes contain toxins which pollute air and hair sprays create environment pollution. Sixty seven percent of respondents had medium level of awareness. Education, mass media exposure and family education, family income was significantly correlated with awareness level of women. So women were aware about the pollutants which directly produce toxin and pollute air but they were not aware about indirect pollutants that cause air pollution. There is need to create the awareness among rural women through different interventions.

Keywords: Environmentally safe and pollution causing air pollution practices, Rural women, Level of awareness

#### **INTRODUCTION**

Indoor air pollution is a concern in the developed countries, where energy efficiency improvements sometimes make houses relatively airtight, reducing ventilation and raising pollutant levels. Indoor air problems can be subtle and do not always produce easily recognized impacts on health. Different conditions are responsible for indoor air pollution in the rural and the urban areas. In the developing countries, it is the rural areas that face the greatest threat from indoor pollution, where some 3.5 billion people continue to rely on traditional fuels such as firewood, charcoal, and cow dung for cooking and heating. Concentrations of indoor pollutants in households that burn traditional fuels are alarming. Burning such fuels produces large amount of smoke and other air pollutants in the confined space of the home, resulting in high exposure. Women and children are the most

vulnerable groups as they spend more time indoors and are exposed to the smoke. Exposure of indoor air pollution has increased due to a variety of reasons, including the construction of more tightly sealed buildings, reduced ventilation, the use of synthetic materials for building and furnishing and the use of chemical products, pesticides and household care products. The management of indoor household pollution involves knowledge of emerging pollutants from various household operations and the awareness level of rural women about the consequences of these pollutants. So, the present study was planned with the following objectives:

- To identify the indoor air pollution causing practices.
- To study the awareness of rural women regarding indoor air pollution causing practices.

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- To study the level of awareness of rural women regarding indoor air pollution.
- To study the relationship between socio-personal profile and level of awareness.

#### MATERIALS AND METHODS

The study was conducted in three regions i.e. Malwa, Majha and Doaba of Punjab state. Three districts i.e. one from each region were selected randomly. Further total six blocks two from each district were selected one near to the city and other far from the city. A sample of 240 rural women was drawn randomly from 12 villages of selected blocks. Major indoor air pollution causing practices were identified with the help of relevant literature. Experts from different department of PAU, Ludhiana & Environmental Pollution Control Board. Data were collected through interview schedule.

#### **RESULTS AND DISCUSSION**

Data in Table 1 depicted that large majority of respondents (above 96 per cent) were aware that cigarette smoke inside home pollute air and more dangerous for passive smokers and improper disposal of desilted material from severs can leads to air, water and soil pollution. Eighty eight per cent respondents were aware that burning of waste products in open air pollutes air, automobiles including tractors create air pollution and burning of plastic in open air produce toxic gases. It was found that about fifty per cent respondents were aware about the pollutant emerging from flea powder, insecticides spray and synthetic paint. Majority of respondents were not aware about spray paint method of painting is more dangerous and pollute air; furniture polishes contain toxins which pollute air and hair sprays create environment pollution. Women were aware about the pollutants which directly produce toxin and pollute air but they were not aware about indirect pollutant that cause air pollution. The above findings are supported by the findings of Osagbemi et al. (2010) they also reported that 65 per cent of respondents were aware about use of mosquito coils/ repellents pollute air and Dhillon (2001) conducted the study on awareness of farmers regarding agricultural pollution. He reported that majority of farmers had medium level of awareness regarding agriculture pollution.

Table 1: Distribution of respondents according to their awareness regarding indoor air pollution practices (n=240)

Indoor air pollution causing practices		Awareness		
	Awaref (%)	Not awaref (%)	score	
Use of fossil fuels ignitions pollute air	176 (73.33)	64 (26.67)	0.73	
Improper burning of cow dung cake create pollution	182 (75.83)	58 (24.17)	0.75	
Gases released and residues from <i>jantar</i> burning are harmful for environment	94 (39.17)	146 (60.83)	0.39	
Oil fumes released during process of frying with hydrogenated oils pollute the air	208 (86.67)	32 (13.33)	0.87	
Spray of pesticides on vegetables in household kitchen gardens pollute air and soil	208 (86.67)	32 (13.33)	0.87	
Flea powder used for killing the house flies is harmful for environment	109(45.42)	131(54.58)	0.45	
Use of mosquito coils/ repellents pollute air	175(72.92)	65(27.08)	0.73	
Synthetic paints create air pollution	98 (40.83)	142 (59.17)	0.41	
Spray paint method of painting is more dangerous than brush paint method for air pollution	19 (7.92)	221 (92.08)	0.079	
Furniture polishes contain toxins which pollute air	23 (9.58)	217 (90.41)	0.095	
Varnishes are harmful for environment	58 (24.17)	182 (75.83)	0.24	
Insecticide sprays in household pollute air	127 (52.92)	113 (47.08)	0.52	
LPG geysers produce high CO, which can be fatal	148(61.67)	92(38.33)	0.61	
Hair removal creams pollute environment	29 (12.08)	211 (87.92)	0.12	
Body sprays create indoor air pollution	39 (16.25)	201 (83.75)	0.16	
Hair sprays create environment pollution	26 (10.83)	214 (89.17)	0.11	
Burning of waste products in open air pollutes air	212 (88.33)	28 (11.67)	0.88	
Burning of plastic in open air produce toxic gases	211 (87.92)	29 (12.08)	0.88	
Burning of incense sticks create air pollution	93 (38.75)	147 (61.25)	0.38	
Cigarette smoke inside home pollute air and more dangerous for passive smokers	233 (97.08)	7 (2.92)	0.97	
Automobiles including tractors create air pollution	211 (87.92)	29 (12.08)	0.88	
Diesel stored inside households produces harmful fumes	71 (29.58)	169 (70.42)	0.29	
Improper and long-term storage of fertilizers pollutes air	85 (35.42)	155 (64.58)	0.35	
Improper disposal of desilted material from severs can leads to air, water and soil pollution	232 (96.67)	8 (3.33)	0.96	

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The level of awareness was measured by assigning the one score to aware and zero to not aware response categories. Total scores of respondents were divided into three levels i.e. low, medium and high. Twenty per cent respondents had low level of awareness. Sixty seven per cent had medium level of awareness and only 12.9 per cent had high level of awareness (Table 2).

Table 2: Distribution of respondents according to their Level of awareness regarding indoor air pollution causing practices (n=240)

Level of awareness	Frequency	Percentage
Low (0-8)	48	20.00
Medium (9-16)	161	67.08
High (16-24)	31	12.91

Table 3: Relationship of various socio-personal characteristics with level of awareness (n=240)

Socio-personal characteristics	r-value	
Age	-0.317*	
Education	0.609*	
Respondents income	-0.033NS	
Extension contacts	0.106NS	
Mass media	0.650*	
Family education	0.353*	
Family income	0.305*	

5%\* level of significant, NS=non significant

Data given in Table 3 revealed that education, mass media exposure and family education, family income were positively and significantly correlated with awareness where as respondent's income, extension contacts had no significant effect on awareness. But age was negatively and significant correlated with level of awareness.

#### CONCLUSION

Majority of respondents were not aware about spray paint method of painting is more dangerous and pollutes air; furniture polishes contain toxins which pollute air and hair sprays create environment pollution. Women were aware about the pollutants which directly produce indoor air pollution but they were not aware about indirect pollutants that cause indoor air pollution. Women had a medium level of awareness regarding indoor air pollution causing practices. Education, mass media exposure and family education and family income were positively and significantly correlated with awareness. So it is suggested that special attention should be paid by mass media planners to include more programmes and articles regarding indoor air pollution causing practices. There is need to create the awareness among rural women through different interventions.

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## Livelihood Diversification of Fishers in the Vicinity of Rudrasagar lake, Tripura

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#### ABSTRACT

Rudrasagar Lake is declared as National Lake No. 13 and also it is declared as an International Lake numbered 1572 as a Ramsar site. However, the lake at present is under threat from a variety of human induced changes to their hydrology. In this study, we have selected 140 fishers by simple random sampling method in the vicinity of the lake, who are believed to be vulnerable as the resource base on which their livelihood depends (i.e. the Rudrasagar lake) is in peril. Drawing on livelihood research of the fishers, this paper presents evidence that fisheries contribute the principle parts (more than 50%) of household's net income among 44.28 per cent of the sampled households. Around 48.57 per cent of the fishers practiced crop production. More than 60 per cent of the households participated in different non-farm income activities. Majority of the fishers' households (48.57%) had three sources of income followed by 19.29 per cent of fishers were engaged in two sources of income activities. Average diversification index in the study area was 0.44. Majority of the diversifiers (67.15%) had medium level of diversification index as against only 18.57 per cent of diversifiers were having high level of diversification index It is found that for a vast majority of the rural population, livelihood diversification is distress driven. Variables such as age, economic motivation, fishing assets, material possession, credit orientation, information management behaviour, number of livestocks, extent to human capital, extent to financial capital, extent to physical capital, were closely and positively related to degree of livelihood diversification. The study discovered evidence of emerging transformations and features of change that are likely to become more pronounced in the area over time. These include diversification of livelihoods and occupational multiplicity as more people seek alternative sources of livelihoods through smallholder farm intensification, non-farm and business activities.

Keywords: Livelihood diversification, Fishers, Rudrasagar lake, Non farm income

#### **INTRODUCTION**

Floodplain wetlands are important fishery resources and contribute significantly to the Indian Inland fisheries (Chandra, 2012). It play vital role in ensuring fish production and livelihood security of the fishers depends on that. Rudrasagar Lake is a low land deep and extensive lake/wetland in the Tripura. It is declared as National Lake No. 13 and also it is declared as an International Lake numbered 1572 as a Ramsar site. The lake situated between latitude 23°29' N and longitude 90°01' E, with water depth varies from 2 to 9 m. This lake has the perennial connection with one of the major rivers (Gomati) of the state facilitating the natural breeding ground of the valuable indigenous endemic fishes. Altogether, 1996 fishermen families belonging to 15 fishermen villages are earning their livelihood through fishing in this lake. However, the lake at present is under threat from a variety of human induced changes to their hydrology. The analysis of livelihoods of the vulnerable poor who depend on dwindling natural resource base in an underdeveloped state like Tripura is even more complex. In this study, we selected the fishers in the vicinity of the lake, who were believed to be vulnerable as the resource base on which their livelihood depends (i.e. the Rudrasagar lake) is in peril. Therefore, we undertake the study to analyse the livelihood study of fishers in the vicinity of Rudrasagar lake, Tripura.

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Diversification is the single most important source of poverty reduction for small farmers in South and South East Asia (FAO and World Bank, 2001). Sustainable development has become an important policy goal for most nations because of the increasing evidence that failure to account for social and environmental harm erodes the capital base for future development. Moreover, governments have accepted the responsibility for promoting the sustainability of development, in response to the Agenda 21 programme following the 1992 United Nations Conference on Environment and Development (UNCED, 1992). Sustainable livelihoods have been increasingly recognized as an important element of sustainable development during the past decade. In this context, the role of livelihood diversification has come under increasing scrutiny because of their powerful and pervasive impacts. Livelihood diversification has been embraced by a number of development agencies, with UNDP the first to do so fully and the Department for International Development (DFID) adopting it as central to its strategy for meeting the goals set out in its 1997 White Paper 'Eliminating World Poverty. The contribution made by livelihood diversification to rural livelihoods is a significant one which has often been ignored by policy makers who have chosen to focus their activities on agriculture (Ellis, 1998).

Livelihood diversification (LD) is a key strategy by which people in many parts of the world try to make ends meet and improve their well-being. Livelihood diversification refers to a continuous adaptive process whereby households add new activities, maintain existing ones or drop others, thereby maintaining diverse and changing livelihood portfolios. There is nothing new about Livelihood Diversification itself, as even, several hundred years ago, rural people diversified to some extent to earn extra benefit from specialised skills. Although the forms of diversification it takes are in continuous evolution. There is, however, greater recognition today of the importance of Livelihood Diversification for assuring the incomes and food security of households (Saha and Bahal, 2012). The literature on livelihood diversification, which crosses several related fields and disciplinary approaches, is characterised by many terms and definitions. For the purposes of this paper, the definition of livelihood diversification chosen by Ellis is used:

Rural livelihood diversification is defined as the process by which rural households construct an increasingly diverse portfolio of activities and assets in order to survive and to improve their standard of living. (Ellis, 2000). People diversify by adopting a range of activities. Thus income sources may include 'farm income', 'non-farm income' (non-agricultural income sources, such as non-farm wages and business income), and 'off-farm income' (wages of exchange labour on other farms – i.e. within agriculture, including payment in kind) (Ellis, 2000). The aim of the present paper is to study the nature and extent of livelihood diversification and variables determining the livelihood diversification activities.

#### MATERIALS AND METHODS

The ex post facto research design is resorted in the study under cross sectional approach. From 15 fishers villages, which are mainly dependent on fishing in Rudrasagar Lake, 7 villages were randomly selected by using simple random sampling method. Then twenty fishers were selected randomly from each village. Thus, altogether 140 fishes were included for the study. Both secondary and primary data were used for the study. A semi-structured questionnaire was developed based upon the information acquired during the explorative research phase, and pre-tested and adapted prior to the survey. The interview schedule was composed of open and closed questions and involved rating and ranking procedures also. Data were analysed with the suitable statistical tools. Diversification index was measured with the help of Simpson index of diversity. The Simpson index of diversity is defined as:

$$SID = 1 - \sum_{i} P_i^2$$

Where, Pi as the proportion of income coming from source i. The value of SID always falls between 0 and 1. If there is just one source of income, Pi=1, so SID=0. As the number of sources increases, the shares (Pi) decline, as does the sum of the squared shares, so that SID approaches to 1. If there are k sources of income, then SID falls between zero and 1-1/k. Accordingly, households with most diversified incomes will have the largest SID, and the less diversified incomes are associated with the smallest SID. For least diversified households (i.e., those depending on a single income source) SID takes on its minimum value of 0. The upper limit for SID is 1, depends on the number of income sources available and their relative shares. The higher the number of income sources as well as more evenly distributed the income shares, the higher the value of SID. The Simpson Index of Diversity is affected both by the number of income sources as well as by the distribution of income between the different sources (balance). The more uniformly distributed is the income from each source, the SID approaches to 1.

#### **RESULTS AND DISCUSSION**

**Distribution of sampled households as per share of fisheries to total Income:** It is clearly visible from the Table 1 that majority of the fishers (44.28%) earned more than 50 per cent of their earning from fish related activities. On the other hand, 9.28 per cent of the respondents earned one tenth or less share from fisheries out of total income. It has been found that many fishers diverting from fishing in serious earning point of view.

Table 1: Distribution of Sampled Households as perShare of Fisheries to Total Income

Share of Fisheries to Total	Freq-	Perce-
Income	uency	ntage
More than half	62	44.28
Between one half and one quarter	43	30.72
Less than one quarter but more	22	15.72
than one tenth		
One tenth or less	13	09.28
Total	140	100

Sources of income in the Study Area: Further, in this study, an attempt has been made to analyze the income distribution of sampled fishers' households. The income sources of the households were grouped into seven distinct categories according to the intensive study of the area and after consultation with several experts. The income sources are fisheries, crops, livestocks, forestry, non-farm, wages and others includes remittance etc. The different economic activities carried out by the sampled households are presented in Figure 1. Virtually all rural households in the study area (100 per cent of the sample) have some income from fish related activities as the sample population was fishers. Fisheries contribute the principle parts (more than 50 %) of household's net income among 44.28 per cent of the sampled households as stated before. More than 60 per cent of the households participated in different nonfarm income activities, which also a very important source of total income. Livestock production is also carried out by almost all rural households (60.71%), but its contribution towards total net income of the households was reportedly somewhat lower.



Figure 1: Different Sources of Income among Fishers' Households

The main reason behind that the households generally kept unproductive local breeds. Their businesses outlook from the livestock sources were also very lower. Around 48.57 per cent of the fishers practiced crop production. The major crops were reportedly paddy and vegetables. More than 60 per cent of the households participated in different non-farm income activities, which also a very important source of total income. The contribution of income from forestry was lower among the fishers in the study area. A large number of fishers' households engaged in wages income and income from other sources such as remittance, gifts and assistance from the government etc. The poor fishers mainly adopt the different offfarm income sources (wages) to keep themselves above destitution. In this connection, Saha (2006) reported that poor farmers generally adopt the non-farm income as their secondary or tertiary income sources as a part of a 'coping' strategy.

**Percent distribution of households by number of income sources:** A person or household with a diverse livelihood relies on several different economic activities. A 'diverse livelihood' is the opposite of a specialized livelihood based on a single, full-time activity. Diversification is the incorporation of new activities into

the economic portfolio. The number of income sources of different households were studied to measure the diversification in this regard and presented in Figure-2. The Figure brings out very clearly that majority of the fishers' households (48.57%) had three sources of income followed by 19.29 per cent of fishers were engaged in two sources of income activities. On the other hand, only 8.57 per cent of the fishers' households were having only one source of income. The households with one source of income mainly derived their livelihood from fisheries only, they didn't diversify their livelihood. Only 2.86 per cent fishes' households had more than five income sources to smoothen the livelihood out comes. The multi occupational approach particularly in diverse risk prone areas as well as in the context of poor economical condition was more desirable from the view point of avoiding unexpected shocks and uncertainty. Ersado (2003) reported similar types of findings in his study regarding livelihood in Zimbabwe. In the context of poor economical condition. Saha (2006) reported that multi occupational approach particularly in rain-fed areas is more desirable from the view point of avoiding unexpected shocks and uncertainty.



Figure 2: Percent Distribution of Households by Number of Income Sources

*Extent of livelihood diversification (Simpson index of diversity):* The number of sources of income is a measure of diversification used by different researchers in the past. However, the number of income sources as a measure of diversification may be criticized on several grounds. First, a household with more economically active adults, all things being equal, will be more likely to have more income sources. This may reflect household labour supply decisions as much as a desire for diversification. Second, it may be argued that there is discrepancy when comparing households

receiving different shares of their income from similar activities. For instance, a household obtaining 99 per cent of its income from farming and 1 per cent from wage labour has the same number of source of income as a household with 50 per cent of its income from farming and 50 per cent from wage labour. But, according to research target, and the actual diversification concept the household with 50 per cent of its income from farming and 50 per cent from nonfarming sources has a more diversified income than another household obtaining more than 90 per cent of its income from farming and the rest from non-farming sources. This leads to a second measure of diversification. The definition of diversification relates to the number of source of income and the balance among them. The Simpson index of diversity is widely used to measure the diversity. Hill (1973) used Simpson index to measure diversity. Joshi et al. (2003) also adapt the Simpson index to compare crop diversification in several South Asian countries. Saha (2010) used Simpson index to measure livelihood diversification among farmers in West Bengal. Here, it is used to measure livelihood diversity of fishers. The distribution of extent of diversification among different diversifiers is given in Table 2.

Table 2: Category of Fishers as per Diversification Index(Simpson index of diversity)

Diversific	ation index	Frequency	Percentage
Low	(<0.35)	20	14.28
Medium	(0.35 - 0.67)	94	67.15
High	(>0.67)	26	18.57
Total		140	100

Average Diversification Index in the study area was 0.44.

It is clear from Table 2 that the majority of the diversifiers (67.15%) had medium level of Diversification Index as against only 18.57 per cent of diversifiers were under high level of Diversification Index. Diversification makes smooth flow of income to the household by reducing both predictable and unpredictable fluctuations. Predictable seasonal fluctuations in income can be enhanced by combining enterprises and activities that generate returns during different times of the year. Unpredictable fluctuations are those which create an unexpected loss in income, may be reduced by a diversified portfolio of economic activities

Determinants of degree of livelihood diversification: This section examines the effect of different household characteristics on degree of livelihood diversification among fishers' households in the study area. The hypothesis was that the share of income from different sources is influenced by the characteristics of the household. The linear model was used in which the income share was a function of household characteristics. The result of the linear regression is presented in the Table 3 The 'F' value was computed at 0.01 level of significance. A perusal of the Table 3 revealed that the variables such as age, economic motivation, fishing assets, material possession, credit orientation, information management behaviour, number of livestocks, extent to human capital, extent to financial capital, extent to physical capital, were closely and positively related to degree of livelihood diversification. On the other hand, dependency ratio was negatively associated with degree of diversification. This suggests that families with low dependency ratio are better able to generate income from temporary work and can involve themselves to non-farm activities in the locality, or outside the state. The result is very logical in the sense that higher the dependency ratio, less likely it is for the household to diversify their livelihood. A household with more number of children and the aged is likely not going to have sufficient labor reserve and capital to invest in different activities. Davis et al. (2004), Saha (2010) also found the similar observation. In this connection, Singh et al. (2005) attributed that decreased dependency leads to an overall improvement in welfare and economic well-being of the people on account of higher per capita share in income.

High material status in case of diversifiers highlights that higher material status encourages diversification. Therefore, it may be logical to hypothesize that high material status is the cause as well as effect of diversification. Higher information management behavior enables the fishers to know productive avenues of different activities and necessary facilities available in this regard. The capital base such as cash, credit/debt, savings, and other economic assets, including basic infrastructure and production equipment and technologies are essential for the pursuit of any livelihood strategy. Sound availability of financial capital helps the diversifiers to invest in other sector, expand

Table	3:	Dete	rmiı	nants	of	Degree	of	Liveli	ihood
Diversi	fica	tion	(Sim	oson i	inde	x of dive	rsit	y)	

Variables	Coefficient	Standard	't'
		error	statistic
Age	0.086	0.037	1.42*
Caste	0.024	0.031	0.55
Dependency Ratio	-0.089	0.025	-2.65**
Risk orientation	0.019	0.021	0.89
Economic motivation	0.125	0.045	2.31*
Aspiration	0.023	0.028	0.95
Annual Income	0.058	0.028	0.820
Annual savings	0.021	0.028	0.34
Monthly per capita	-0.007	0.022	-0.48
consumption expenditure			
Fishing assets	0.112	0.032	1.81*
Material possession	0.027	0.059	2.29*
Credit orienation	0.012	0.028	2.23*
Training for fishing	0.053	0.034	0.57
Average daily fish catch	0.061	0.011	1.01
Land Cultivated	0.071	0.055	1.30
Number of Livestock	0.020	0.019	3.19**
Information management	0.024	0.019	2.48*
behaviour			
Awareness on conservatio	n 0.009	0.025	0.35
Extent to Human capital	0.057	0.022	2.35*
Extent to Natural Capital	0.002	0.020	0.32
Extent to Financial Capita	1 0.068	0.037	2.89**
Extent to Physical capital	0.087	0.048	2.70*

\*Significant at 0.05 level of probability; \*\*Significant at 0.01 level of probability; F=5.89\*\*, R<sup>2</sup>=0.61

their activities and smooth functioning of business. Poor availability of financial capital, on the other hand, compels the diversifiers to seek loan from local money lenders at higher rate of interest, to resort to distress sale, to produce at small scale and to manage inputs haphazardly. The ability to realize a financial surplus may be the result of having access to a combination of abundant and productive natural capital, infrastructure such as product and capital markets, and human capital such as education and access to information. Number of livestock is an important driver of livelihood diversification. Valdivia and Gilles (2001) concluded that water, land, livestock, crops and knowledge all play significant roles in the livelihoods of most of the world's rural households. Efforts are required to convince the farmers about the advantages of integrating livestock as one of the component enterprise for higher marketing support will further spearhead the sustainable livelihood system. Fishing assets are one of the important determinants of livelihood diversification of fishers as identified in the study. As fishing effort increased, individual catches and incomes began to increase. Within the small-scale sector, incomes of fishers vary widely. One reason for this variation is the difference in technology used in fishing combined with other enterprises with business outlook. The livelihood profile showed that poverty was comparatively higher among households with smaller number of fishing assets, with only one earner, with more dependency ratio, and depending entirely on seasonal fishing activities and off farm income. All households with these characteristics may not be poor at present but when all these characteristics exist together the chance of being poor are extremely high. Subsequent analysis of the survey data indicate that the difference in household income is accounted for mainly by employment in fishing and related activities. The study has not provided any evidence to show that poverty in the community is the result of depletion of fisheries resources. The two may be associated, but it is beyond the scope of this limited study to establish the nature of association between them.

#### CONCLUSION

It is also evident from the study that after degradation of the wetlands, land remains a fundamental livelihood asset at the area presently. Access to secure, safe and fertile land is regarded crucial for both food security and source of income for the local community. It is, however, a challenge especially for policy makers on how to seek for suitable alternative accommodation of the multiple resource use and addressing trade-offs thereof. The study discovered evidence of emerging transformations and features of change that are likely to become more pronounced in the area over time. These include diversification of livelihoods and occupational multiplicity, culture of modernity as more people seek alternative sources of livelihoods through smallholder farm intensification, non-farm and business activities.

Since, economic motivation, fishing assets, material possession, credit orientation, information management behaviour, number of livestocks, extent to human capital, extent to financial capital, extent to physical capital, were closely and positively related to degree of livelihood diversification. The rural financial systems need to be revamped. Provision of technical support and developing linkages to mainstream financial institutions is necessary to initiate an entrepreneurial culture. Higher information management behavior enables the fishers to know productive avenues of different activities and necessary facilities available in this regard. The capital base such as cash, credit/debt, savings, and other economic assets, including basic infrastructure and production equipment and technologies are essential for the pursuit of any livelihood strategy. Sound availability of financial capital helps the diversifiers to invest in other sector, expand their activities and smooth functioning of business. Education is an effective means of achieving success in the livelihood diversification strategies, as it relaxes the entry barriers to different remunerative nonfarm activities. Targeting of behavioural change by the means of non-formal education and micro-entrepreneurship development training towards poor households in the rural areas will have a substantial reward on their ability to diversify livelihood options. Development of rural infrastructure is of utmost importance and efforts should be made to make remunerative non-farm opportunities accessible to the rural households. Policymakers need to devise different livelihood strategy for different groups and gender of society. They must be governed with 'one size does not fit all' philosophy.

The results of the study have profound implications in redefining research and extension strategies towards a livelihood approach to rural development. Understanding the livelihood diversification of fishers with a multi-dimensional approach was attempted in the paper and the Livelihood Diversification Index developed for the purpose would be useful too for the researchers and policy markers to assess and compare the livelihood security of different rural communities in the country. Key recommendations of the program included: setting up partnerships between local and national governments (community based fisheries comanagement), making use of local knowledge in natural resource management, stimulating income diversification towards non-fishing activities, encouraging the use of more selective and environmentally friendly fishing methods, stimulating the development of microenterprises and offering microfinance support.

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## Credit Utilization Pattern of Members of Women SHGs and their Involvement in Decision Making in Udaipur, Rajasthan

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#### ABSTRACT

Women are vital part of the Indian Economy, constituting one-third of the national labour force and a major contributor to the survival of the family, especially in rural areas. Despite progress in several key indicators, women generally have no control over land and other productive assets, which largely excludes them from access to institutional credit and renders them dependent on high-cost informal sources of credit to secure capital for consumption and/or production purpose. To address to this pressing problem, the concept of Self Help Groups (SHG) gained momentum in the last few decades and many SHGs have emerged in India. Therefore, this study attempted to explore the involvement of women members on these aspects. The study was conducted in the villages of Udaipur district of Rajasthan with one government and one non-government organization having maximum number of SHGs formed under them. Total 20 SHGs (10 from each type of organisation) were studied. The results highlighted that majority of the respondents from both GO and NGO (91.11 and 87.77%, respectively) availed credit from the groups for purchase of agricultural inputs, entrepreneurial activities, purchase of household items and animals and very few respondents (8.88 and 12.22 per cent) from GO and NGO, respectively did not avail credit from the group as they were satisfied by monthly savings and did not feel the need to take credit. Cent per cent members from both GO and NGO had involvement 'to a great extent' in decisions related to credit requirement. The utilization of credit for entrepreneurial activity was low. Thus, there is an urgent need to ponder on these aspects so that the credit could be utilized to increase the participation of women into productive ventures, thereby increasing their sources of income and making women economically self dependent.

Keywords: Credit utilization, SHGs, Rural women

#### **INTRODUCTION**

Credit provision is one of the principal components of rural development, which helps to attain rapid and sustainable growth. There is no doubt about the crucial roles of credit in economic development (Sllase and Teklehaimanot, 2013). "Access to credit" for under privileged groups (rural and urban poor, women, tribal, youth) has always been a major concern in the development field. Despite the existence of formal financial institutions, the issue has not been resolved. In many developing countries, policy makers and planners have conceived and formulated variety of programmes to provide easy access to credit, especially micro-credit. India has taken the initiative by evolving specific micro-credit programmes to cater to the needs of the poor populations (rural/tribal/urban slum). Since micro-credit provides self-employment opportunities and awareness for self-reliance to people, it has undoubtedly become a very useful tool for economic development, especially at the grassroots level. Over the last few decades, efforts have been made to increase the credit flow to the poor through several micro-credit initiatives. However, very little is known about the credit flow to the poor through these initiatives. Amongst these, the creation of women's self-help groups (SHGs) has been the most prominent and widespread programme in action. These programmes attempt to mobilize savings through group formation, followed by a focus on making the groups able to manage themselves. Non-government organizations (NGOs) have successfully supported thousands of such SHGs all over the country. Most of these groups are satisfying their consumption needs through management of their savings, and a few women have taken up microenterprises/business with financial support from their SHGs.

#### MATERIAL AND METHODS

The present research was conducted in purposively selected villages of Udaipur district, Rajasthan as maximum number of NGOs are working in this region and have formed SHGs. Groups have also been formed by government organizations (GO) in this area. Two organizations, one Government [District Women Development Agency] and one Non-Government [Indian Farm Forestry Development Cooperative Ltd.] having maximum number of SHGs formed under them, were taken up for study purposely.

The selection of women SHGs from these organizations was purposive on the basis of maximum number of years of standing. In all, 20 SHGs (10 from GO and 10 from NGO) were taken up. From each group, 8 members and one group leader were drawn on random basis. The respondents constituted of 10 group leaders and 80 women members from each GO and NGO. Thus, the sample size constituted of a total of 180 respondents (20 group leaders and 160 members). Interview schedule was used for data collection which was standardized with the help of experts and pre-tested. Reliability and validity of the tool was tested using applicable scientific methods. Data was collected with the help of personal interview. Besides, available literature i.e. benchmark survey report, quarterly and annual reports of the identified organizations, were also referred to. The data was analysed using distribution statistics.

#### **RESULTS AND DISCUSSION**

**Credit facilities availed from group:** It is apparent from Table 1 that majority of the respondents from both GO (91.11 per cent) and NGO (87.77 per cent) had availed credit from the group. It indicates that the SHG helps to meet out the credit demands of respondents. Moreover, it is one of the important motivating factors for women to become a member of SHG. There were a very few respondents (8.88 and 12.22 per cent) from GO and NGO, respectively, who did not avail this facility. Further, when these respondents were asked the reasons for not taking up credit, the major reasons reported were that they did not feel the need for credit (8.88 and 12.22 per cent), and were satisfied with monthly saving (8.88 and 12.22 per cent).

Purpose of availing credit from SHG: Information pertaining to this aspect is presented in Table 2. It was observed that the credit needs of rural women are basically diversified and mostly they need credit for consumption purpose rather than production. From the data presented in Table 2 it is apparent that the women from government SHG took loans mainly for purchase of agricultural inputs (28.88 per cent), entrepreneurial activity (28.88 per cent), purchase of household items (22.22 per cent) and purchase of animals (21.11 per cent). On the other hand, the loans were basically taken for purchase of animals (48.88 per cent) and for entrepreneurial activity (31.11 per cent) by women members of NGO. Valentina (2014) also brought to light the fact that in India there is a skewed rise in the number of SHGs formed and government programmes schemed in favour of women but the ground realities

Table 1: Distribution	of respondents of	on the basi	s of availing	and not	availing the	credit facilities	from	the group
(n=180)								

Aspect	Beneficiaries		
	GO (n=90) F (%)	NGO (n=90) F (%)	
Credit Availed from Group			
Yes	82 (91.11)	79 (87.77)	
No	8 (8.88)	11 (12.22)	
Reasons for not availing credit facilities			
Did not feel the need	8 (8.88)	8 (8.88)	
Satisfied with monthly savings	8 (8.88)	11 (12.22)	
Did not take up entrepreneurial activity	3 (3.33)	7 (7.77)	

Table 2: Purpose of availing credit facilities by the members (n=180)

Purpose of Availing Credit	Beneficiaries		
	GO (n=90) F*(%)	NGO(n=90) F*(%)	
Marriage	12 (13.33)	0 (0.00)	
Medical treatment of family members	10 (11.11)	11 (12.22)	
Construction and repair of house	6 (6.66)	2 (2.22)	
Purchase of household items	20 (22.22)	5 (5.55)	
Purchase of agricultural inputs	26 (28.88)	15 (16.66)	
Purchase of land	0 (0.00)	12 (13.33)	
Purchase of animals	19 (21.11)	44 (48.88)	
Education of children	5 (5.55)	4 (4.44)	
At the time of birth/death in family	7 (7.77)	0 (0.00)	
For entrepreneurial activity	26 (28.88)	28 (31.11)	
Deepening of well, construction of manger, wage payment	2 (2.22)	3 (3.33)	
To clear old debts	17 (18.88)	4 (4.44)	

\* Multiple response

are that they are not successful in establishing and organising their enterprises and their income levels remain paltry sums.

Extent of involvement of members of SHG in decision making: Decision making as an important indicator of empowerment has greatly been emphasized by various scholars (Srinath and Thangamani, 1993; Chamberlin, 1999;, Singh and Sharma, 1999; Singh and Jhamtani, 1999). In the present study, the extent of involvement of members of SHG in decision making with regard to credit requirement was assessed. The responses of the members of SHG in credit requirement were recorded in three categories i.e. 'to a great extent', 'to some extent' and 'no involvement' and accordingly the members were distributed. It was found that the sense of belonging to a group and having some money on her name had added to the confidence of women members. Women feel more confident and assertive when decisions on matters related to the way to spend her saving comes. Having been motivated to start enterprise has also been on her will since the SHG have opened new avenues to her and the exposure she has got has helped her become a chooser.

The Table 3 presents extent of involvement of members of SHG in decision making with respect to credit requirement. It indicates an encouraging picture that clearly portrays that when it came to decisions on credit requirement, all the members of GO (100.00 per cent) and NGO (100.00 per cent) were involved in the decision making to a great extent. It is imperative to note that the SHG women members had savings in their name. Due to these savings, it gave them a sense of ownership on this money. Therefore, the exemplification of which was visible by the cent per cent responses of women members on decision making with regard to credit requirement.

Table 3: Extent of involvement of members of SHG in decision making with respect to credit requirement (n=180)

Type of SHG	Exten member	t of involvem s in decision	ent of making
	To a great extent F (%)	To some extent F (%)	Not at all F (%)
GO (n=90) NGO (n=90)	90 (100.00) 90 (100.00)	$\begin{array}{c} 0 \ (0.00) \\ 0 \ (0.00) \end{array}$	$\begin{array}{c} 0 \ (0.00) \\ 0 \ (0.00) \end{array}$

#### CONCLUSION

The SHGs have opened up doors for rural women to avail credit from their groups without cumbersome formalities and collateral. Majority of the women respondents from both government and non government SHGs took loans from their groups. There were very few respondents who did not avail credit. This clearly highlights the importance of SHGs in fulfilling the credit demands of the rural women. The loans were basically utilized by nearly one fourth of the respondents in both the groups for purchase of agriculture inputs, entrepreneurial activity, purchase of household items and animals, etc. The utilization of credit for entrepreneurial activity was low. Thus, there
is an urgent need to ponder on these aspects so that the credit could be utilized to increase the participation of women into productive ventures, thereby increasing their sources of income and making women economically self dependent. The rural women need to be educated, trained, supported and promoted in the functioning of SHGs, banks transactions and all aspects of entrepreneurial activities so that women can run these activities on sustainable basis as they have easy access to credit facilities through the SHGs.

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# Constraints Faced in Utilization of Agricultural Technology Information Centre (ATIC) Facilities by Farm Families

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## ABSTRACT

The objective of the present study was to find out the constraints faced by farm families in utilizing the Agricultural Technology Information Centre (ATIC) facilities. The sample consisted of randomly selected 95 respondents including 80 farmers and 15 farm women from 8 villages of two panchayat samities of Udham Singh Nagar district of Uttarakhand state who were regularly in contact with the ATIC functionaries for last 5 years. Personal interview technique was used for collecting data from the respondents. Frequency distribution and percentage were used for analysis of data. The outcome of the study divulges that non availability of visual aids such as pamphlet, leaflets, folders etc. related to agriculture (76.84%), unavailability of plant materials and other products like poultry, processed products, livestock species, tools and equipment at the centre (72.63%), low quality of seeds (60.00%), less number of visits of ATIC functionaries to the field (58.94%) and distant location of testing laboratories (55.78%), non availability of need based literature (53.68%) and high cost of publications (49.47%) were some of the major constraints expressed by the respondents while utilizing the ATIC facilities.

Keywords: Agricultural Technology Information Centre, Farm Families

#### **INTRODUCTION**

Agricultural Technology Information Centre (ATIC) is a new and innovative transfer of technology mechanism that has been conceived and put into practice since 1998-99 under National Agricultural Technology Project (NATP) sponsored by World Bank and implemented through 40 ICAR Institutes and State Agricultural Universities (SAUs) located in various parts of the country. The Centre provides information on agriculture technologies in addition to providing other inputs like seeds, plant materials, etc. including advisory services through single window system. The ATIC is intended to provide formal management mechanism between the scientists and technology users. The Subject Matter Specialists of the University Consultancy Cell housed at ATIC building provide technical support to the farmers and others who visit ATIC. Thus, ATIC is functioning as a repository of agricultural information. But as per the critical analysis of research studies in this field, it was found that the approach has not been able to reach majority of the farmers who are spread across the whole country. Besides this, there is a lack of awareness among the farming community with regard to this approach. The success of any development effort depends on the effective participation of beneficiaries in the development programme and constraints are the speed breakers which slow down the accessibility of individual towards achieving them. Hence, an attempt has therefore been made to identify all possible constraints faced by the farm families in utilizing the ATIC facilities.

# MATERIALS AND METHODS

The present study was conducted in Udham Singh Nagar district of Uttarakhand where the ATIC (located at GBPUAT, Pantnagar) has been in operation since 2001. Of seven panchayat samities, two namely *Rudrapur* and *Gadarpur* were selected on random basis. From each panchayat samiti, one village from each direction (North, East, West, and South) which was within a

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radius of 50 km from the ATIC was selected on random basis. Thus, total eight villages were taken from selected panchayat samities. The total sample of the study consisted of 95 respondents including 80 farmers and 15 farm women who were regularly in contact with the ATIC functionaries for last 5 years. Personal interview technique was used for collecting data from the respondents. The data collected from the respondents was scored, tabulated and analyzed by using suitable statistical tools such as frequency distribution, percentage and mean per cent score.

### **RESULTS AND DISCUSSION**

Background information of the respondents: More than 40 per cent respondents belonged to the age group of 46-60 years and 28.42 per cent were between 31-45 years of age. More than half of the respondents were under reserve caste categories which included SC/ST (38.94%) and OBC (11.57%). Regarding education, 34.73 per cent respondents were educated upto graduation level and nearly one fourth of them had education upto higher secondary level. Agriculture was the main occupation of all the respondents. However, majority of them were also involved in some subsidiary occupation along with agriculture. Majority of the respondents (61.05%) were from joint family having 5-8 members. More than 40 per cent of them had land holding of 5.1-10.0 acres while more than one third respondents had land holding between 2.6-5.0 acres. With regard to annual income, 33.68 per cent respondents had estimated annual income between Rs 1.6-2.5 lakhs whereas, more than one fourth of the respondents (28.42) had annual income between 1.0-1.5 lakhs.

**Constraints faced by the farm families:** Responses of the respondents regarding constraints faced by them were recorded, analyzed and discussed under the three main components of ATIC viz. research products, diagnostic services and information and technical guidance.

**Constraints related to research products:** Data in Table 1 show the constraints faced by the beneficiaries while purchasing research products from ATIC. Non availability of plant materials at the centre was the major constraint as revealed by 72.63 per cent respondents and it was followed by low quality of seeds (60.00%) and

Table	1: C	Constraints	faced	by	the	respon	dents	while
purcha	using	research	produc	ts f	rom	ATIC (	(n=95)	1

Constraints	f*	%
Non-availability of plant materials at the centre	69	72.63
Low quality of seeds	57	60.00
Unavailability of products at the centre	55	57.89
(poultry, livestock species, processed		
products, tools and equipment etc.)		
Unavailability of seeds in sufficient quantity	47	49.47
Lack of timely availability of seeds	45	47.36
High cost of seeds and other products	32	33.68
Problem in getting seeds of needed variety	27	28.42

\*Multiple responses

unavailability of other products viz. poultry, livestock, processed products, tools and equipment etc. at the centre (57.89%). Similarly, nearly half of the respondents (47.36-49.47%) experienced the problem of getting required quantity of seeds in time. Problem in getting seeds of needed variety and high cost of seeds and other products were the other constraints revealed by nearly one third of the respondents.

The findings are in line with the findings of Deshmukh *et al.* (2007) who reported that unavailability of seeds in due time, costly seeds, lack of information regarding latest agricultural technologies and seed varieties released, their cost and place of sale were some of the problems experienced by more than half of the farmers while purchasing agricultural inputs from Marathwada Agricultural University (MAU), Maharashtra.

When the ATIC functionaries were asked for the reason behind all these constraints, they revealed that due to inadequate infrastructure facilities, it is very difficult for them to keep plant materials and other products like poultry, livestock species, processed products, tools and equipment at the centre. Further, they reported that the seeds were produced at research stations and supplied by other units of the university and due to inadequate transportation facility at the centre, some time it happens that there was delay in getting seeds. Regarding the impurities in seeds, the ATIC functionaries stated that sometimes the seeds were not processed properly at the seed processing unit of the university due to which they get low quality seeds.

*Constraints related to diagnostic services:* With regard to the second component of ATIC viz.

diagnostic services, data in Table 2 depict that more than half (55.78%) of the respondents experienced difficulty in availing the testing and diagnostic facility of the centre as these laboratories were located far away from the centre. More than one third of the respondents (33.68-36.84%) stated that due to inadequate and improper services of soil and water testing, high cost of testing and unavailability of concerned scientists for diagnostic services, they were compelled to move to the other place for testing.

Table 2: Constraints faced by respondents while using diagnostic services from ATIC (n=95)

Constraints	f*	%
Testing laboratories are far away from the centre	53	55.78
Unavailability of concerned scientists for	35	36.84
diagnostic services		
Inadequate and improper services of soil and	32	33.68
water testing		
High cost of testing	32	33.68
N-3 ( ]. •. ] .		

\*Multiple responses

The findings are in conformity with the findings of Raju and Reddy (2003) who reported that lack of advisory services, non availability of needed inputs and facilities, limited contact with scientists and irregularities in field visits by the concerned authorities were some of the constraints experienced by farmers due to which they were not getting the solution of their problems in time.

Constraints related to information services: Under the third main component of ATIC i.e. 'dissemination of information', Table 3 shows that majority of the respondents (76.84%) reported non availability of visual aids such as pamphlets, leaflets, folders etc. related to agriculture as the major constraint while obtaining information from ATIC. The reason behind not providing the visual aids from ATIC was that due to lack of technical staff, the ATIC functionaries were not able to prepare or develop the aids at the centre. Other constraints reported were non-availability of need based literature (53.68%) and high cost of publications (49.47%). Besides this, irregularities in arrival of magazines and difficulty in getting membership of farm magazines i.e. kisan bharti, Indian farmers digest etc. were revealed by 38.94 and 23.15 per cent respondents, respectively as the main obstacles in utilizing the farm literature or the publications of the centre.

When the ATIC scientists were asked for the reason behind this, they reported that due to irregular payments, incorrect and incomplete information filled by the farmers in membership form regarding their basic details like residential address, phone number, customer number (*grahak sankhya*), there was delay or irregularity in delivery of the publications to the farmers.

Table 3: Constraints faced by respondents while obtaining information from ATIC (n=95)

Constraints	f*	%
Non availability of visual aids such as pamphlets,	73	76.84
leaflets, folders etc. related to agriculture		
Non-availability of need based literature	51	53.68
High cost of publications	47	49.47
Irregularities in arrival of magazines	37	38.94
Difficulty in getting membership of farm	22	23.15
magazines		

\*Multiple responses

**Constraints related to technical guidance:** With regard to technical guidance data presented in Table 4 depict that lack of appropriate technical guidance or needed assistance by the ATIC scientists was considered as the most important constraint experienced by 62.10 per cent respondents. Similarly, 58.94 per cent respondents reported that the visit of ATIC functionaries to the field was very limited. The ATIC scientists expressed that due to lack of transportation facility at the centre, they were unable to visit the field regularly.

More than one third of the respondents (34.73%) experienced that the frontline demonstrations organized by the scientists were limited in number and hence only limited number of beneficiaries were benefitted or made aware of the latest varieties released by the university. Besides this, 30.52 per cent respondents reported that many a times they faced difficulty in getting technical guidance due to unavailability of concerned scientist at the centre. When the complaint was discussed with the ATIC manager, he stated that apart from duty in ATIC, the scientist were also involved in teaching and research activities in the colleges. Hence, probably when the farmers visited the centre the concerned scientist might not be available.

With regard to helpline service, nearly one fourth of the respondents (23.15%) experienced problem in

Table 4: Constraints faced by respondents while seeking
technical guidance from ATIC (n=95)

Constraints	f*	%
Lack of appropriate technical guidance	59	62.10
Less number of visits of ATIC functionaries	56	58.94
to the field		
Less number of frontline demonstration	33	34.73
Non availability of personnel at the time	29	30.52
of visit to ATIC		
Telephone of the centre (helpline) always	27	28.42
remains busy		
Timings of helpline service is too short	22	23.15
*Multiple responses		

seeking technical advice due to the short timings of helpline service i.e. from 9.30 a.m. - 1.00 p.m. Similarly, they also complaint that the telephone line of the

helpline service always remains busy.

The other constraints perceived by the respondents in utilizing ATIC facilities were lack of awareness about ATIC (42.10%) and dissatisfaction with the behavior and technical guidance provided by the scientists (20.00%). According to them, sometimes the ATIC scientists do not give proper response to them and were not in a position to satisfy their queries. When the scientists were asked for this, they expressed that most of the time the farmers came to the centre with incomplete information or either they don't bring the sample or were not able to explain their problem clearly. In such circumstances, it becomes very difficult for them to understand the problem and give the satisfactory answer of their queries.

### CONCLUSION

Thus, based on the findings it could be concluded that the farmers/ farm women were facing several constraints in effective utilization of various facilities of the ATIC. These constraints had limited the farm families' accessibility towards achieving the optimum benefits of the ATIC. Hence, an effort should be made by the ATIC functionaries or the programme implementers to take corrective measures as per the feedback given by the farm families and make necessary modifications in functioning of the centre. This will be helpful in reducing the constraints and increasing the effectiveness of the centre.

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# Importance of Different Subject Matter Items of Training in Soil Management as Perceived by Farmers and KVK Trainers

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### ABSTRACT

The first Krishi Vigyan Kendra (KVK) was established in Pondicherry in 1974, based on Dr. Mohan Singh Mehta Committee Report, which is an innovative science-based institution. This was established mainly to impart vocational skill training to the farmers and field-level extension workers, which was a great demand by the farmers. The prime goal of KVK was to impart training as per needs and requirements in agriculture and allied enterprises to the farmers, farm women, and farm youths including school drop-outs in the rural areas. The present study was conducted in Rajasthan state, where nine KVKs were selected for the purpose of this study. There were 10 subject matter items of training for farmers and KVK trainers, for which that responses were collected on three point continuum viz. Most Important, Important and Less Important. The results revealed that 81.48 percent farmers and 64.44 percent KVK trainers considered the "Soil reclamation" as the most important item of training. The 72.59 percent farmers considered the "Techniques of field preparation" as the less important, whereas the 51.11 percent KVK trainers considered "Land leveling methods" as less important. "Soil reclamation" was given top priority by both the farmers (2.76) and the KVK trainers (2.53). There was a significant agreement among the ranks assigned by the farmers and KVK trainers in perceiving the importance of the 10 items of training under "Soil management".

Keywords: Land leveling methods, Soil management, Techniques of field preparation

# **INTRODUCTION**

The Indian Council of Agricultural Research (ICAR) has over the years evolved an effective and well-tested frontline extension system, which is exemplary and admired all over the world. It started with establishment of first Krishi Vigyan. Kendra (KVK) in Pondicherry in 1974 based on Dr. Mohan Singh Mehta Committee Report and subsequent increase of KVKs in different parts of the country. Krishi Vigyan Kendra (Farm Science Centers), an innovative science-based institution was established mainly to impart vocational skill training to the farmers and field-level extension workers, which was a great demand by the farmers. The KVKs under ICAR have evolved over the time for meeting the expectations and emerging challenges being faced by the Indian farming community. As of now, ICAR has established a total of 630 KVKs in the country under different host organizations (Paroda, 2014).

The farmers require not only knowledge and understanding of the intricacy of technologies, but also progressively more and more skills in various complex agricultural operations for adoption on their farms (Anonymous, 1986). The effectiveness of the KVK was further enhanced by adding the activities related to onfarm testing and front-line demonstrations on major agricultural technologies in order to make the training of farmers location specific, need- based and resourceoriented. The training programmes of KVKs were designed to impart the latest knowledge to the farmers through work experience by applying the principles of 'Teaching by Doing' and 'Learning by Doing'. The prime goal of KVK was to impart training as per needs

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and requirements in agriculture and allied enterprises to the farmers, farm women, and farm youths including school drop-outs in the rural areas. No formal certificate or diploma was awarded, irrespective of the duration of the courses to avoid the rush for jobs instead of self employment.

KVKs provided training not only in agriculture and allied vocations but also in other income generating activities that supplemented the income of farm families. The methods employed in training may be formal, non-formal or a combination of both, depending upon the needs of the farming community and the importance accorded by them to different subject matter items of training. Soil management is an important subject area as well as the key concern for most of KVKs.

Keeping in mind, the above facts and importance of the trainings organized by KVK in different subject matter items, the study entitled "Importance of Different Subject Matter Items of Training in Soil Management as perceived by Farmers and KVK Trainers" was undertaken.

# MATERIALS AND METHODS

This study was conducted in Rajasthan state, where 42 KVKs are in function. Out of these nine were established before 1990, which were selected for the purpose of this study. Three villages from each of the selected KVK were selected randomly. From each selected village a sample of 10 farmers i.e. 270 farmers in all were drawn

by following the procedure of simple random sampling (Lundberg, 1975). Besides that a sample of 5 KVK trainers from each KVK i.e. 45 KVK trainers in total were also taken randomly from these selected KVKs. Hence 270 farmers and 45 KVK trainers were selected as the respondents for the study purpose. The importance of different subject matter items of training in soil management was measured by using a schedule developed by the investigator in light of the suggestions of the experts. The data were collected by personally interviewing the selected farmers and KVK trainers; and classified, tabulated and statistically analyzed, which led to the following findings.

# **RESULTS AND DISCUSSIONS**

There were 10 subject matter items of training for farmers and KVK trainers, for which they have to provide the responses on three point continuum namely most important, important and less important.

The data in Table 1 revealed that about 81.48 percent farmers and 64.44 percent KVK trainers considered the "Soil reclamation" as the most important item of training. The 72.59 percent farmers considered the "Techniques of field preparation" as the less important, whereas the 51.11 percent KVK trainers considered "Land leveling methods" as less important. It may be concluded from these data that "Soil reclamation" emerged out as the most subject matter item of farmer's training and the "Techniques of field preparation" as felt less important by the majority of the farmers and KVK trainers. These results are having similarity with

Table 1: Relative importance of different subject matter items of training in Soil Management as perceived by farmers and KVK trainers

Items of training	Percenta	uge of farmers	(n=270)	Percentage of KVK Trainers (n=45)		
	Most	Important	Less	Most	Important	Less
	important		important	important		important
Soil sampling	81.85	10.37	7.778	55.56	31.11	13.33
Soil Reclamation	81.48	12.96	5.556	64.44	24.44	11.11
Land Leveling Methods	16.67	25.19	58.52	20	26.67	51.11
Techniques of Field Preparation	13.33	14.07	72.59	24.44	35.56	40.00
Contour Bunding	48.52	27.78	24.07	51.11	37.78	11.11
Mulching	43.33	22.96	33.70	35.56	53.33	11.11
Terracing	39.63	40.00	20.37	44.44	42.22	15.56
Sand Dune Stabilization	17.41	18.89	63.70	35.56	24.44	40.00
Development of Shelter belts	28.89	29.26	41.85	40	35.56	24.44
Development of wind breaks	34.07	13.70	52.22	6.667	64.44	28.89
Overall	40.52	21.52	38.04	37.78	37.56	24.67

Items of training	Percentage of farmers (N=270)Percentage of KVK trainers (N=45)		e of KVK	Total respondents (N=315)		
-			trainers (N=45)			
	Mean	Rank	Mean	Rank	Pooled	Pooled
	score		score		mean score	rank
Soil sampling	2.74	2	2.42	2	2.580	II
Soil Reclamation	2.76	1	2.53	1	2.645	II
Land Leveling Methods	1.58	8	1.69	10	1.635	IX
Techniques of Field Preparation	1.41	10	1.84	8	1.625	Х
Contour Bunding	2.24	3	2.41	3	2.325	III
Mulching	2.10	5	2.24	5	2.170	V
Terracing	2.19	4	2.28	4	2.235	IV
Sand Dune Stabilization	1.54	9	1.96	7	1.750	VIII
Development of Shelter belts	1.87	6	2.16	6	2.015	VI
Development of wind breaks	1.82	7	1.78	9	1.800	VII
Overall	2.03		2.13		2.078	

Table 2: Comparison of importance of different subject matter items of training in Soil Management as perceived by farmers and KVK trainers

r = 0.9030 (Significant at 0.01 level of probability with 8 degree of freedom)

the findings of Khan (1994 and 1997), Lal and Panwar (1994) and Archana, and Sailaja, (2013).

From Table 2, it was further observed from the ranks assigned by the farmers and KVK trainers, that "Soil reclamation" was given top priority by both the farmers (2.76) and the KVK trainers (2.53). Similarly the "Soil sampling", "Contour bunding", "Terracing", "Mulching" and "Development of shelter belts" were ranked second, third, fourth and fifth respectively by both the categories of the respondents. It seems that both the farmers and KVK trainers considered these subject matter items equally important. However, the "Techniques of field preparation" was placed last in order of importance by farmers (1.41), whereas the KVK trainers gave last priority to "Land leveling methods" (1.69). Looking to the pooled mean scores, "Soil reclamation" (2.645) was ranked first in order of importance followed by "Soil sampling" (2.580), "Contour bunding" (2.325), "Terracing" (2.235), "Mulching" (2.170), "Development of shelter belts" (2.015), "Development of wind breaks" (1.800), "Sand dune stabilization" (1.750), "Land leveling methods" (1.635) and "Techniques of field preparation" (1.625). These results are having similarity with the findings of Nanda and Tantray (1990), Malik and Sharma (1993), Nainawat (2000), and Senthilkumar (2014).

The computed  $r_s$  value was 0.9030, which was statistically significant at 0.01 level of probability. Hence

the null hypothesis was rejected and the alternate hypothesis was accepted, which means that there was a significant agreement among the ranks assigned by the farmers and KVK trainers in perceiving the importance of the 10 items of training under "Soil management".

The result found so might be due to the fact that in most parts of Rajasthan, salinity problem is there. In the command areas of Banswara, Bikaner etc the soil is becoming saline contiously due to poor drainage. Also in the arid areas the problem is acute due to high evaporation from the soil. The soil is saline and not found suitable for cultivation purpose. Hence the farmers perceived "soil reclamation" as the most important area of training. The agreement between the farmers and KVK trainers might be due to the reason that both the farmers and the KVK trainers were well aware of these problems and also felt that these items must be included in the syllabus.

# CONCLUSION

Out of 10 items in the area of "Soil management" the Soil reclamation was the most important item for training, whereas the "Soil sampling", "Contour bunding", "Terracing", "Mulching" and "Development of shelters belts" were important and "Development of wind breaks", "Sand dune stabilization", "Land leveling methods" and "Techniques of field preparation" were the least important items of farmer's training in decreasing order of their importance.

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# Adoption Behavior of Banana Growers in Burhanpur District

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# ABSTRACT

The study was conducted in Burhanpur district of M.P. because the potential numbers of banana growers are available and an investigator is familiar with the area and the people. Under Burhanpur block 120 respondents were selected randomly from four villages, 30 respondents were selected from each selected village. The data were collected through personal interview method by the researcher herself with the help of pre-structured scheduled designed with the objective of evaluating the level of knowledge of banana growers and ascertain the extent of technology adoption gap in banana cultivation. The data collected was subjected to suitable technique of analysis by regression. The study revealed that there were 56% respondents belonged to medium socio economic characteristics, 24% were found to be high and 20% respondents were of having low socio economic characteristics. The maximum percentages (i.e. 57.50%) of the farmers were having medium level of knowledge followed by low and high level of knowledge (i.e. 34.17% & 8.33%). The majority (56%) of the farmers were having partial gap in adoption technology followed by full gap (20%) and no gap (24%) in adoption technology.

Keywords: Risk orientation, Knowledge level and Technological gap

#### **INTRODUCTION**

Fruits and vegetables are rich source of vitamins, minerals, proteins and carbohydrates which are essential in human nutrition. Hence, these are referred as protective foods and assume great importance as nutritional security of the people. Horticultural crops also play a unique role in India's economy for the prosperity by improving the income of the rural people. India with more than 28.20 million tonnes of fruits and 66.00 million tonnes of vegetables is the second largest producer of fruits and vegetables in the world next only to Brazil and China. However, per capita consumption of fruits and vegetables in India is only around 46 g and 130 g against a minimum of about 92 g and 300 g respectively recommended by Indian Council of Medical Research and National Institute of Nutrition (Hyderabad). With the present level of population, the annual requirement of fruits and vegetables will be in the order of 32.58 million tonnes and 83 million tonnes, respectively. Horticulture provides higher unit productivity and offers great scope for value addition and this sector is taking inroads throughout the length

The progress in agriculture depends on willingness and ability of farmers to use the new technology and required inputs. In this context, it is essential to understand the multidimensional behavior of the farmers for adoption of improved farming practices. Despite of various efforts made by extension functionaries, still there is gap in production. It is seen that productivity levels of crop is very low. In order to increase the crop yields, the level of adoption of

and breadth of the state. Madhya Pradesh is a progressive state in the field of modern horticulture in the country. The diverse agro-ecological conditions prevailing in Madhya Pradesh has made it possible to grow different types of horticultural crops such as fruits, vegetables, flowers, spices, plantation crops, root and tuber crops, medicinal and aromatic crops etc. Banana occupies an important place among the various fruit crops. It is an important fruit crop of Burhanpur district, M.P. occupying over 21000 hectares, out of which Burhanpur alone occupies 16000 hectares. The vividity with respect to agro-climatic setting in the state can be a boon for planned horticultural development.

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improved farm practices has to be enhanced. Knowledge of the recommended technologies is a prerequisite for adoption process. Poor average yield of banana might be due to ignorance about the improved technology and poor socio-economic conditions of the growers. Hence it was felt necessary to examine the technological gap with a view to explore the reasons behind this. In view of the above facts the present investigation was undertaken with the following specific objectives as under:

- 1. To identify the personal and socio economic profiles of banana growers.
- 2. To evaluate the level of knowledge of banana growers.
- 3. To ascertain the extent of technological gap in banana cultivation.
- 4. To find out the association between socio economic profile and extent of technological gap.
- 5. To identify the constraints faced by banana growers and make the suggestions for greater adoption of banana technology.

The findings of the study will give a clear picture of the existing technological gap in various components of banana cultivation and various constraints responsible for technological gap. Therefore, findings of this study will help extension specialists to adopt an appropriate method to accelerate diffusion and integration of the technical know-how and communication strategy for banana cultivation. This study will also help in identifying the factors accountable for different rate of change in the aforesaid dependent variables so, that the extension agencies may take care of these independent variables, which are amenable for manipulation. The findings of this study will provide feedback in many ways to the scientist; planners and extension functionaries engaged information of plans, programmes and their implementation for increasing banana production.

Thus, the results of present study are likely to set wheel of research extension and adoption of the most appropriate banana production technology in motion. The findings of this study are based on the ability of the farmers to recall and the verbal opinions expressed by them. Hence, the objectivity of this study is limited to their ability to recall and also on their honesty in furnishing the required information. This study suffers from the lack of time, money and other resources. Therefore, it was not possible to take larger area, more variables and large sample from different regions to make study more comprehensive.

## MATERIALS AND METHODS

The study was conducted in Burhanpur district of M.P. under Burhanpur block 120 respondents were selected randomly from four villages, 30 respondents were selected from each selected village. The data were collected through personal interview method with the help of pre-structured scheduled designed with the objective of evaluating the level of knowledge of banana growers and ascertain the extent of technology adoption gap in banana cultivation. The data collected was subjected to suitable technique of analysis by regression.

The under mentioned independent and dependent variables were finally selected for detailed investigation in the present study.

Variables	Measurement procedure
Independent variable	28
Age	Chronological age
Caste	Modified G. Trivedi Scale (1963)
Education	Modified G. Trivedi Scale (1963)
Occupation	Modified G. Trivedi Scale (1963)
Monthly income	Modified G. Trivedi Scale (1963)
Type of Family	Family type possessed by the respondents
Size of Family	Family type possessed by the respondents
Type of House	House type possessed by the respondents
Size of Land Holding	Land possessed by the respondents in
_	hectares
Knowledge level	Schedule was prepared
Dependent variable	
Technological Gap	Potentiality – Extent
Technological	Schedule was prepared = x100
Gap index	Potentiality

### **RESULTS AND DISCUSSION**

The present section deals with identification of personal and socio economic profiles of banana growers' comparison between socio economic profile and extent of technological gap.

**Personal profile of Banana Growers:** The Table 1 shows that middle age respondents were 45% followed by aged 30% the least number was observed in case of young age group 25%. The possible reason for this would be that "middle aged" respondents were mostly

involved agricultural enterprises while old and young aged respondents had negligible role in agriculture enterprises. This might be due to the fact that old and young age people might have engaged in other occupation and middle age respondents might be counseling and guiding the family members. The finding also confirmation with the finding of Singh and Sharma (1990) found that age was an insignificant impact on technology adoption where Das et al. (1998) found that age did not play any significant role in explaining the technological gap in gram production. The distribution of the respondents on the basis of their sex, out of 120 respondents, 60% of the respondents were found to be in a male category and 40% of the respondents were found to be in a female category. The possible reason for this would be that, most of the female members of the family were also give their contribution in field. The data indicates that 80% of the respondents were Hindu and 20% of the respondents were Muslims. The possible reason for this is that Hindu category includes most of the castes. From the above data its clearly seen that 70.84% of the respondents were general, 20.83% OBC and 08.33% of the respondents were ST/SC. The possible reason for this would be that in that area most of the people belonged to upper caste and those some backward caste were migrated from other places.

*Socio-Economic profile of Banana Growers:* Table 2 indicates that there were 56% respondents whose

Table 1: Distribution of the respondents with respect to their Personal Profile (N = 120)

Categories	Frequency	Percentage
Distribution of the respond	dents with resp	ect to their age
Young (20-35 years)	30	25.00
Middle (30-50 years)	54	45.00
Old (51 years & above)	36	30.00
Distribution of the respond	dents with resp	ect to their sex
Male	72	60.00
Female	48	40.00
Distribution of the respo	ndents with re	espect to their
religion		
Hindu	96	8.0.00
Muslim	24	20.00
Others	00	00.00
Distribution of the respo	ndents with re	espect to their
caste		
General	85	70.84
OBC	25	20.83
SC/ST	10	08.33

socio-economic condition was medium 24% were with high and 20% respondents were with low socio economic conditions. So, it can be concluded that the majority of the respondents were with medium socio economic conditions.

Table 2: Distribution of the farmers with respect to their socio-economic profile (N=120)

Categories	Frequency	Percentage
Low (14-18)	20	24.00
Medium (19-23)	76	56.00
High (24-28)	24	20.00
Total	120	100.00

*Level of Knowledge of Banana Growers:* Table 3 indicates that the maximum percentage i.e. 57.50% of the farmers had medium level of knowledge followed by low (34.17%) and high (8.33%) level of information, low mass media exposure, less contact with change agents and have very less social participation. The results are in conformity with the findings of Bennur (2011).

Table 3: Distribution of the respondents with respect to their level of knowledge (N=120)

Categories	Frequency	Percentage
Low (01-10)	41	34.17
Medium (11-20)	69	57.50
High (21-30)	10	08.33
Total	120	100.00

**Extent of Technology Adoption Gap of Banana Growers:** It can be seen from the Table 4 that the maximum percentage i.e. 56% of the farmers had partial gap in adoption technology followed by full gap and no gap in adoption technology i.e. 20% and 24%, respectively. The reason for this is that they have less source of information, low mass media exposure, less contact with change agents and have very less social participation. This finding is in conformity with results reported by Balamurgan *et al.* (1997), Venkatesh *et al.* (2007), Hanumanaikar (1995) and Sudhakar (2002), that

Table 4: Distribution of the respondents with respect to extent of technology adoption gap (N=120)

Categories	Frequency	Percentage
No gap (41-60)	20	24.00
Partial gap (21-40)	76	56.00
Full gap (01-20)	24	20.00
Total	120	100.00



most of the farmers were having medium adoption level.

It is observed from the Table 5 that a very low percentage of the improved banana cultivation technology is possessed by the farmers that is 44.45% meaning that gap in the technology of the total respondents in relation to the overall improved cultivation technology is to the tune of 55.55%.

Table 5: Extent of technological gap in variouscomponents of banana cultivation

Components	Techno-	Techno-	Rank
	logy	logical	
	adoption	gap	
	(%)	(%)	
Pre sowing Technology	47.35	52.65	VII
Seed and Seed Treatment	43.46	56.54	V
Fertilizer Management	23.26	76.74	Ι
Crop Management Technique	42.79	57.21	IV
Irrigation Management	46.45	53.55	VI
Plant Protection Technique	24.83	73.17	II
Post Harvest Management	41.93	58.07	III
Mean	44.45	55.55	

The table further reveals that the maximum technology adoption gap was 76.74% in the area of fertilizer management, which is the most critical input for the growth of a plant followed by plant protection technique in which the technology adoption gap was 73.17%. Other areas of banana cultivation technology adoption gap such as in post gravest management was 58.07%, crop management technique 57.21%, seed and seed treatment 56.54%, irrigation management 53.55% and pre-sowing technology 52.65%, respectively. Hence, it may be concluded that a vast technology adoption gap is in the area of fertilizer management and plant protection technique due to lack of knowledge in these areas. There was significant association between socio economic profile and technology adoption gap in banana cultivation. Similar trends have been reported by Krishnamurthy *et al.* (2009).

### CONCLUSION

According to the findings it was concluded that majority of the respondents having medium socio economic characteristics followed by high socio economic characteristics and low socio economic characteristics. Maximum numbers of respondents have medium level of knowledge followed by low level of knowledge and high level of knowledge. Large number of farmers have partial gap in adoption technology followed by full gap in adoption technology and no gap in adoption technology. It was also found that there was significant association between socio economic profile and extent of technological gap. Proper pre-showing, irrigation and weed management technology can be adopted when the farmers were properly educated. Therefore, due attention should be given to bridge technology adoption gap in this respect. It is recommended to that the extension agencies operating in the area should provide necessary information for this package of technology. Mass media communication can play a very important role in providing required information of this technology by making the farmers aware of the same.

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# Analysis of Personal, Social and Behavioural Traits Facilitating the Success of Innovative Farmers

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#### ABSTRACT

Today we need innovative approach in agriculture extension that recognises farmers' knowledge and wisdom and uses it in dissemination of technology. In this context, studies of successful, progressive, and innovative farmers can form important content to agricultural extension system. Therefore study was conducted in different agro climatic zones of Karnataka. Innovative cases of 72 progressive farmers were studied. Data were collected by personally interviewing farmers and participant observations. It was observed that, most of the innovative farmers had moderate to high level on behavioural traits like achievement motivation, innovation proneness, risk orientation etc. Study found that 30 per cent of innovative farmers were graduates, 33 per cent of them had land holding more than ten hectare and 12.5 per cent had occupied distinctive post in social participation.

Keywords: Behavioural traits, Innovative farmers, Socio-personal profile

## **INTRODUCTION**

Problems of food security, poverty, hunger and malnutrition are major concern of India and the world. Hitherto adopted approaches in agriculture and extension lacked ground touch, neglected need and wisdom of the farmers and rural community. Therefore we need innovative approaches in agriculture extension which recognises inherent talent, creative intelligence, accumulated wisdom and valuable experiences of the farmers. Traditionally in extension science, role of the farmers was perceived as passive recipient of the knowledge and were placed at the end of the pipeline in research, extension and farmers linkages. Generation of knowledge was considered as the monopoly of the researchers. However, farmer's role can not be linked to only as knowledge users but also knowledge generators (Roling, 1988).

It has always been observed that driven by creativity, necessity, and opportunity, informal experimentation and innovation in agriculture have taken place. Farmers are a rich source of indigenous knowledge and practice and they experiment, adopt and innovate continuously (Rhoades, 1985; Chambers, 1986; Gupta, 1987). This knowledge and expertise of farmers has been undermined by the researchers and policy makers resulting in little convergence between informal innovations of the farmers and formal research and development systems.

However, there is increased realisation that farmers have valuable knowledge, wisdom and experience to bring to the process of agricultural research, and as the end users of technology, they should be active participants in all stages of this process. This has led to a gradual shift away from the linear transfer of technology model, towards 'innovation systems' approaches, which view innovation as an interactive process involving a range of actors with different knowledge and skills. At the same time, the understanding of innovation has broadened from a sole focus on technologies, to include socio-economic, cultural and institutional changes - with the

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understanding that the technical aspects of innovation are also social (FAO, 2012).

Researchers over a period of time have proved that farmers especially the resource poor farmers continuously experiment adapt and innovate. The contributions made by Rhoades (1985), Chambers (1986) and Gupta (1996) in documenting farmers' innovations are notable with this regard. Rhoades (1985) used historical and contemporary evidence to show how farmers always have been innovators and how they still are. He is of the view that there have been fewer publications and discussions on farmer originated technologies right since the 1950's and 1960's. Green revolution has helped in achieving food self sufficiency, however role and participation of small and marginal farmers went unnoticed making agriculture more unsustainable due to pests and diseases, soil fertility depletion, yield gaps etc. At this juncture some scholars emphasized the need to focus on developing technologies to make agriculture more sustainable and for this the need for participatory research and involving the farmer as a partner in technology development evolved.

In India, Honey Bee Network works for identification and documentation of innovations at grass root level. It has already collected more than five thousand innovative practices predominantly from dry regions to prove that disadvantaged people may lack financial and economic resources, but are very rich in knowledge resources. In majority of the cases basic research linking cause and effect had been done successfully by the people (Gupta, 1996). Several such cases of innovative farmers have made greater impact on sustainability and profitability of Indian agriculture which need to be documented and analyzed.

# MATERIALS AND METHODS

Case study methodology was used to reflect upon each step taken by the farmers towards the achievement of the ultimate success. The study was conducted in ten agro-climatic zones of Karnataka by dividing them into four strata having similar conditions of rainfall, soil conditions and cropping pattern. The database of awardees and achiever farmers from the State Department of Agriculture, Directorate of Extension of the UAS Bangalore, Directorate of Extension of UAS Dharwad, NGO's like American Spring and Pressing Works Pvt ltd (ASPEE) foundation, and other private agencies was pooled together and from these 72 most unique cases of Innovative practices or ideas were selected. A semi structured interview schedule was prepared and data were collected by personal interview of the farmers and participant observations by staying with them. For measurement of the behavioural traits, statements related to selected traits were prepared, farmers response on each statement was sought on five point scale. Based on mean and standard deviation, respondents were divided into three categories of low, moderate and high.

# **RESULTS AND DISCUSSION**

# Behavioural traits facilitating the success of innovative farmers

**Communication skill:** Communication skill helps innovative farmers in conveying message clearly and effectively to other fellow farmers and to increase their assertiveness. In study it was found that 73.61 per cent farmers had moderate level of communication skill while 13.89 per cent had high level communication skill (Table 1 and Figure 1). Very low number of innovative farmers (12.5%) had low level of communication skill.

**Economic Motivation:** It refers to the values or attitudes which attach greater importance to profit maximization as the ends and means. While studying innovative farmers it was found that 68. 06 per cent farmers had moderate level of economic motivation. About 18.06 per cent farmers had low level of economic motivation while 13.89 per cent had high level of economic motivation. This shows that earning more money was not the sole motto of the innovative farmers. Chauhan *et al.* (2003) in their study of progressive poultry farmers also found moderate degree of economic motivation among farmers.

**Innovation proneness:** Innovation proneness of the farmers is the interest and desire of the farmers to seek changes in farming techniques and ready to introduce such changes into his operations when practical and feasible. In study it was observed that 58.33 per cent farmers had moderate level of innovation proneness (Table 1, Figure 1). About 19.44 per cent farmers had high level of innovation proneness. Bhaggyalakshmi *et al.* (2003), in their study on women entrepreneurs also

S.1	No.	Variables	Frequency	Percentage
1.	Comm	unication skill	(Mean=15.29	9, SD=4.83)
		Low	9	12.50
		Moderate	53	73.61
		High	10	13.89
2.	Econo	mic motivation	(Mean=21.49	), SD= 4.19)
		Low	13	18.06
		Moderate	49	68.06
		High	10	13.89
3.	Innova	tion proneness	(Mean= 27.68	8, SD= 5.12)
		Low	16	22.22
		Moderate	42	58.33
		High	14	19.44
4.	Plannii	ng orientation	(Mean= 20.2	5, SD= 3.95)
		Low	7	9.72
		Moderate	54	75.00
		High	11	15.28
5.	Risk of	rientation	(Mean=22.90	0, SD=2.21)
		Low	9	12.50
		Moderate	52	72.22
		High	11	15.28
6.	Scienti	fic orientation	(Mean=15.29	), SD= 4.83)
		Low	8	11.11
		Moderate	48	66.67
		High	16	22.22
7.	Value	orientation	(Mean= 17.83	3, SD= 4.10)
		Low	9	12.50
		Moderate	48	66.67
		High	15	20.83
8.	Market	ing orientation	(Mean=23.57	7, SD= 3,22)
		Low	9	12.50
		Moderate	42	58.33
		High	21	29.17
9.	Achiev	ement motivation	(Mean=19.53	3, SD= 2,73)
		Low	10	13.89
		Moderate	54	75.00
		High	8	11.11
10.	. Orien	tation towards com	petition(Mean=22	.79, SD= 2.59)
		Low	11	15.28
		Moderate	51	70.83
		High	10	13.89
11.	. Ration	nality in decision ma	aking(Mean=19.1	3, SD=16.50)
		Low	12	16.67
		Moderate	48	66.67
		High	12	16.67

Table 1:	Behavioural	traits	facilitating	the	success	of
innovati	ve farmers					

found that women entrepreneurs showed moderate degree of innovation proneness.

**Planning orientation:** It is tendency of farmer to plan their activities well in advance and execute it effectively. Study of innovative farmers showed that about 75 per cent of the farmers had moderate level of planning orientation (Table 1 and Figure 1). About 9.72 per cent farmers had low level while 15 per cent farmers had high level of planning orientation. Patil (2011) observed that planning orientation is important component of management orientation and found that most of progressive grape growers had moderate level of planning orientation.

**Risk orientation:** It is the degree to which the farmer is oriented towards risk and uncertainty in facing problems in farming. Study found that 72 per cent farmers had moderate level of risk orientation (Table 1 and Figure 1). About 12.50 per cent farmers had low level of risk orientation while 15.28 had high level of risk orientation. The above finding of majority in moderate risk orientation was found Landes (1949), Singh (1968), McClelland (1961) in their studies on entrepreneurs, as entrepreneurs had shown moderate degree of risk taking.

*Scientific orientation:* It shows ability of farmers to see and understand things critically based on rational and scientific principles. Innovative farmers showed more scientific orientation as 66.67 per cent farmers had moderate level of scientific orientation while 22.22 per cent farmers had high level of scientific orientation. Pursuit of scientific orientation helps these innovative farmers to understand natural laws and principles and make innovations based on scientific rationale.

**Value orientation:** It deals with the principles of right and wrong that are accepted by farmers and society. It was found that 20. 83 per cent innovative farmers had high level of value orientation (Table 1, Figure 1). 66.67 per cent farmers had moderate level of value orientation while only 12.50 had low level of value orientation. Moderate to high level of value orientation shows their consideration for society and societal values. Juma (1987), emphasized that the evolution of innovative process can be better understood if it is based on distinctive epistemology which is unique to the peoples culture and values under study.



Figure 1: Behavioural traits facilitating the success of innovative farmers

*Marketing orientation:* It refers to a business approach or philosophy that focuses on identifying and meeting the stated or hidden needs or wants of customers. About 29.17 per cent innovative farmers had high level of market orientation, showing farmers orientation towards production based on demand of the market. About 58.33 per cent farmers showed moderate level of marketing orientation while 12.50 had showed low level of market orientation (Table 1, Figure 1).

Achievement Motivation: It refers to desire for excellence to attain a sense of personal accomplishment. Study found that about 75 per cent of the innovative farmers were had moderate level of achievement motivation. About 13.89 per cent farmers had low level of achievement motivation while 11.11 had high level of achievement motivation (Table 1, Figure 1). The importance of achievement motivation in entrepreneurial development and innovative behaviour is also supported by the studies of McClelland (1961) on entrepreneurs.

**Orientation towards competition:** It was found that 70.83 per cent farmers had moderate level of orientation towards competition. More moderate orientation

towards competition shows that rather than vying with the fellow farmers, they continue to work towards excellence and innovations. About 15.28 had low orientation towards competition while 13.89 had high competition orientation.

**Rationality in Decision making :** It is the degree of weighing the available alternatives in terms of their desirability and their likelihoods and choosing the most appropriate one for achieving maximum profit from farming. Study found that 66.67 farmers showed moderate level of rationality in decision making, While 16.67 per cent of farmers showed high and same percentage farmers showed low level of rationality in decision making (Table 1, Figure 1). Moderate level of rationality in decision making was also found by Chandrapaul (1998) and Suresh (2004) in their studies on farmer entrepreneurs.

# Personal socioeconomic profile of innovative farmers

Age: It was observed that average age of innovative farmers was 47.78 years with standard deviation of 12.61. Most of the farmers (63.89 %) belonged to middle age category (36 to 50 years), while 13 per cent



Figure 2: Distribution of respondents based on age

each belonged to young and old category of age (Table 2, Figure 2). About 81 per cent farmers belonged to middle and old age with mean of 47.78 years, indicates that over the years these farmers have accumulates knowledge and wisdom through their experimentation, experience and interaction with various social and environmental factors. Dash *et al.* (2014) in their study on women entrepreneurs found similar results.

**Education:** In education profile of innovative farmers, it has been found that about 31 per cent of the respondents had completed their graduation, which reflects important role played by education to motivate these farmers for experiments and innovations. This shows high congruence between education and innovativeness of the farmers. About 19.72 per cent

respondents had completed their higher secondary education while 16.90 per cent had completed middle school. One notable thing we could observe that none of the respondent was illiterate (Table 2, Figure 3).

**Farming experience:** From Table 2 and Figure 4 it is evident that most of the members had moderate level of experience (66.67 %) in farming with mean score of 22.96 years. About 16.67 per cent of respondents belonged to both low and high category. Mean score of farming experience (22.96 years) shows importance of accumulated knowledge and wisdom of farmers to become innovative and progressive.

Land holding: Looking at Figure 5, it is evident that most of the members (34.72 %) had medium type of



Figure 4: Distribution of respondents based on farming experience (No. of years)



Figure 3: Distribution of respondents based on Education level

Table 2: Personal socioeconomic profile of innovative farmers

S.No.	Variables	Frequency	Percentage
1. Age		(Mean=47.7	8, SD=12.61)
	Young (Up to 35)	13	18.06
	Middle (36 to 50)	46	63.89
	Old (More than 51)	13	18.06
2. Educ	ation		
	Illiterate	0	0.00
	Can read only	4	5.63
	Can read and write	12	16.90
	Primary School (1-5 <sup>th</sup> )	07	9.86
	Middle School (5 <sup>th</sup> -10 <sup>th</sup> )	12	16.90
	Higher Secondary (11th -12th)	14	19.72
	Graduate and above	22	30.99
3. Farm	ing experience	(Mean=22.9	06, SD=9.05)
	Low	12	16.67
	Moderate	48	66.67
	High	12	16.67
4. Land	Holding		
	Marginal land holding (0.1-1 ha)	3	4.17
	Small land holding (1.1-2 ha)	12	16.67
	Semi medium (2.1-4 ha)	8	11.11
	Medium land holding (4.1-10 ha)	25	34.72
	Large land holding (more than ten hector)	24	33.33
5. Social	Participation		
	Member not in any organization	9	12.50
	Member in one organization	27	37.50
	Member in more than one organization	23	31.94
	Office holder	4	5.56
	Distinctive feature (MLA, Panchayat President, etc.)	9	12.50
6. Mass	media exposure	Mean=7.9	3, SD=3.05
	Low	10	13.89
	Moderate	45	62.50
	High	17	23.61
	Total	72	100

land holding (4.1-10 ha), while 33.33 per cent farmers had large land holding of more than 10 hectare (Table 2). About 20.86 per cent farmers were belonged to small and marginal category. Thus it is clearly evident that innovative and progressive farmers had more land in their possession. This is one of the important reasons that these farmers can take risk of new innovations and experiments as failure of one crop/enterprise doesn't affect their income to a significant extent. Gour *et al.* (2014) in their study on horticulture farmers also reorted the similar findings.

*Social participation:* Social participation of members in terms of membership and office bearers shows that about 37.50 per cent farmers had membership in only

one organisation, 31.94 had membership in more than one organisation (Figure 6, Table 2). Noteworthy thing here is that about 12.50 per cent farmers held distinctive and prestigious post like MLA or head of the village. 5.56 per cent were office bearers in organisations like credit cooperative society. This high level of social participation depicts higher social status of the innovative farmers.

*Mass media exposure:* Exposure to mass media like Television, Radio and newspaper shows cosmopoliteness of farmers. In mass media exposure, it has been found that 62.5 per cent farmers had moderate degree of social exposure (Figure 7, Table 2). About 23.61 per cent had high degree of mass media



Figure 5: Distribution of respondents based on Land holdings



Figure 6: Distribution of respondents based on Social participation

exposure while 13.89 per cent had low level of mass media exposure. It shows that progressive farmers had high mass media exposure which helped them to get updates about new innovations, market information and general knowledge.

# CONCLUSION

Study found that most of the members had moderate to high of level of behavioural traits that facilitate success of innovative farmers viz. Innovation



Figure 7: Distribution of respondents based on Mass media exposure

proneness, achievement motivation, risk orientation etc. In personal socio profile it was found that average age of innovative farmers was 47.78 years. Thirty per cent of the farmers had graduation or above level of education. About 33 per cent respondents had land holding more than 10 hectares. Among studied farmers 12.5 per cent held distinctive post like MLA or heads of the panchayat.

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# Assessing the Level of Participation and Acceptance of Watershed Practices in Panchkula District

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### ABSTRACT

In a watershed development programme, people's participation is very important for the successful adoption of the practices recommended by the experts in the region. The present study was conducted in Panchkula district of Haryana with an objective to find out the level of participation and adoption of recommended practices in watershed development programme. A total of 26 recommended practices pertaining to watershed development were identified. Data were collected from 240 farmers of eight villages by personal interview with the help of structured interviewed schedule and a group discussion. Analyzed data shows that regarding participation, majority of the respondents participated at a moderate level in different stages of watershed development programmes. The participation was 70 percent in planning stage, whereas in implementation stage and maintenance stage it was 60.83 percent and 60.41 percent respectively. Major factors behind the high level of participation in programme were high rate of literacy among respondents and frequent contact with extension agencies. Apropos adoption, the study revealed that majority of respondents adopted crop varieties for rain-fed conditions (82.92 percent) followed by intercropping and peripheral bunding (81.25 percent), cover cropping (71.25 percent), plantation of trees and grasses on deep gully slopes (62.08 percent) gully plug (61.67 percent), check dam (57.50 percent), bamboo plantation in gully bed (41.67 percent), grasses waterway (41.25 percent). However, they did not show much interest for watershed technology like contour farming, well recharge, contour ploughing and contour trenching. The study indicates that there is need for making the concentrated efforts for convincing the farmers in the region for adopting the better practices advocated by the watershed experts so that the productivity of the farming system could be increased and sustained.

Keywords: Watershed, Participation pattern, Adoption, Constraints

#### **INTRODUCTION**

Watershed management in the broader sense is informed by an undertaking to maintain the equilibrium between elements of the natural eco-system or vegetation, land or water on the one hand and human activities on the other hand. Water and land are the most vital natural resources of the nation and these are under tremendous stress due to ever increasing biotic pressure. Watershed management is a holistic approach, which aims at optimizing the use of land, water and vegetation in an area, to alleviate drought, moderate floods, prevent soil erosion, improve water availability and increase fuel, fodder and agricultural production on sustained basis. It is aimed at conservation of natural resources and maintaining the ecology of the area by using the simple soil and water conservation techniques. In other words, watershed management is overall development of particular region including water conservation, maintaining soil fertility, pasture land, agriculture, horticulture, forestry and allied aspects. In Haryana, a part of Shivalik which forms foothills of Himalayan range also lies in the districts Panchkula, Ambala and Yamuna Nagar. This region along with a belt between hills and Indo-Gangetic plains has been identified as one of the eight most degraded rainfed agro-ecosystems of the country. This area, 1.92 lakh hectares, forms part of five watersheds namely Sirsa, Ghaggar, Dangri,

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Markanda and Yamuna. This is further divided into sixteen sub-watersheds and one hundred sixty two micro watersheds. This area was taken up for development under Integrated Watershed Development Project (Hills) in the year 1990. It lasted up to March, 1999. Thereafter, it continues as Phase-II. Looking to the need of the farmers for watershed resources, a study was conducted to assess the level of participation & its determinants about recommended practices.

Natural resources viz., soil and water need to be conserved, developed and utilized efficiently due to ever depleting ground water which is the only feasible solution for conserving fresh water. There is a greater need to develop dry land areas on watershed basis. Conceptually watershed is defined as "a geographical area that drains to a common point". Watershed management is a holistic approach, which aims at optimizing the use of land, water and vegetation in an area, to alleviate drought, moderate floods, prevent soil erosion, improve water availability and increase fuel, fodder and agricultural production on sustained basis. Watershed management in the broader sense is informed by an undertaking to maintain the equilibrium of the between elements natural eco-system or vegetation, land or water on the one hand and human activities on the other hand. Watershed development is aimed at conservation of natural resources and maintaining the ecology of the area by using the simple soil and water conservation techniques.

In eighties, several International Agencies (e.g. World Bank, Indo-British programme, later DANIDA and Indo-German Programme), several voluntary agencies (e.g. AghaKhan, MYRADA, BAIF) enterprising individuals (e.g. Salunke and Anna Hazare) and some governmental institutions (NARS) started integrating crop, soil and water components for working on an area or community basis in the country. Based on the experiences gained during the early eighties, the Ministry of Agriculture, Govt. of India, launched a programme in the year 1986 known as National Watershed Development Programme for Rainfed Areas (NWDPRA), in 99 blocks of 16 states, covering 3000-5000 ha in each block. Under this scheme, identified micro watershed are taken up for intensive development through group of respondents with a set of technologies. Therefore, a study was conducted to assess the adoption behavior of farmers towards technologies under watershed development programme.

# MATERIALS AND METHODS

The present study was conducted in Raipurani block of Panchkula district of Haryana state, because of the fact that maximum area of the district was covered under watershed development programme. A total of eight villages were purposively selected for the study. A list of village wise beneficiaries was obtained from district head office and 10 percent from each village were selected randomly. Thus, a total of 240 farmers (beneficiaries) constituted the sample of the study. Keeping in view objective of the study, data were collected using structured interview schedule prepared for the purpose. Statistical tool such as frequency, percentage and correlation were employed to analyze the data.

#### **RESULTS AND DISCUSSION**

The data presented in Table 1 shows that almost all the respondents adopted the various watershed technology is the percentage for adoption of watershed technologies as derived from the responses of the respondents reveals that majority of the respondents adopted recommended crop varieties for rain-fed conditions (82.92 per cent), followed by, intercropping and peripheral bunding (81.25 per cent), cover cropping (71.25 per cent), plantation of trees and grasses on deep gully slops (62.08 per cent) gully plug (61.67 per cent), Check dam (57.5 per cent), Bamboo plantation in gully bed (41.67 per cent), Grasses waterway (41.25 per cent), Terracing (40.42 per cent), Farm pond (27.92 per cent), Green mannuring (13.33 per cent), Drip irrigation and Geo-jute application for level slide control (10.83 per cent) and Mulching (5.83 per cent) respectively. However, they did not show much interest for watershed technology like Contour farming well recharge, Contour ploughing and Contour trenching.

Adoption Level of the watershed technology: It is evident from Table 2, that majority of the respondents (70.41 per cent) were medium level adopters. 10.00 per cent of them were high level adopters as regards watershed development. The percentage of low adopters was 19.58 percent only.

**Relationship of variables with adoption behavior towards watershed development programme:** Data depicted in Table 3 reveals that independent variables age and value orientation were negatively and

Technology	Frequency	Percentage
Contour farming	0	0.00
Inter-cropping	195	81.25
Cover cropping	171	71.25
Mulching	14	5.83
Green manuring	32	13.33
Grasses waterway	99	41.25
Well recharge	0	0.00
Summer ploughing	222	92.50
Peripheral bunding	195	81.25
Contour ploughing	0	0.00
Land leveling	172	71.67
Terracing	97	40.42
Check dam	138	57.50
Gully plug	148	61.67
Contour trenching	0	0.00
Farm pond	67	27.92
Drip irrigation	26	10.83
Bamboo plantation in gully beds	s 100	41.67
Plantation of trees and grasses	149	62.08
on deep gully slopes		
Geo-jute application for land	26	10.83
slide control		
Recommended crop varieties	199	82.92
for rain fed conditions		

Table 1: Distribution of respondents based on the basis of their adoption of watershed technologies (N=240\*)

\*Multiple response

Table 2: Distribution of respondents based on their Adoption Level (n = 240)

Categories	Frequency	Percentage	
Low (<7.87)	47	19.58	
Medium (7.87-14.05)	169	70.41	
High (>14.05)	24	10.00	

significantly related with dependent variable adoption behavior towards watershed development programme with the correlation coefficient r = -0.484, and -0.319. It shows that there are close association between age and value orientation with adoption behavior of respondents toward watershed development programme. The table further shows that caste, education status, source of irrigation, land holding, housing pattern, material possession, mass media exposure, caste, annual income, risk orientation, economic motivation and scientific orientation of respondents were found to be positively and significantly correlated with adoption behavior of

 Table 3: Relationship between independent variables

 with adoption behavior towards watershed development

 programme

Independent variables	'r' values	
Age	-0.484**	
Education status	0.437**	
Source of Irrigation	0.192**	
Land holding	0.477**	
Family size	0.035*	
Housing pattern	0.575**	
Material possession	0.300**	
Social participation	-0.036*	
Mass media exposure	0.607**	
Annual income	0.231**	
Risk orientation	0.471**	
Economic motivation	0.265**	
Value orientation	-0.319**	
Scientific orientation	0.590**	

\*\*Significant at the 0.01 level of probability; \*Significant at the 0.05 level of probability

respondents towards watershed development programme with correlation coefficient values at r =0.319, 0.437, 0.192, 0.477, 0.575, 0.300, 0.607, 0.231, 0.471, 0.265, and 0.590 respectively. It shows that there is close relationship between all above independent variables and adoption behavior of respondents toward watershed development programme.

The data presented in Table 4 revealed that these variables would account for a significant amount of variation in the adoption behavior of watershed practices. The 't' test of significance indicated that the regression ( $\beta$ -values) are found to be significant for source of irrigation, mass media exposure, economic motivation and scientific orientation. The remaining variables under this study do not affect the adoption behavior level of respondents in watershed development programme.

The involvement of beneficiaries in the planning, implementation, maintenance and overall participation of watershed development programme is presented in Table 5. Majority (70.00%) of the respondents had moderate level of participation in planning stage of the watershed development programme, whereas 30 percent respondents had lower level of participation and none of them contributed had higher level of participation in planning stage of the watershed development programme.

Variables	Std. Error	β values	't' values	
Age	0.034	-0.342	-3.134	
Education	0.121	-0.154	-1.767	
Source of Irrigation	0.146	0.060	1.177**	
Land holding	0.430	0.049	0.452	
Material possession	0.198	-0.553	-6.366	
Mass media exposure	0.054	0.858	5.521**	
Social participation	0.044	0.000	-0.012	
Annual income	0.105	-0.038	-0.893	
Economic motivation	0.288	0.119	2.134**	
Value orientation	0.278	-1.008	-13.873	
Scientific orientation	0.109	0.485	7.582**	

Table 4: Multiple regressions with selected independent variables related to adoption behavior of respondents in watershed development programme

 $R^2 = 0.484$ , F value = 88.375; \*\*Significant at the 0.01 level of probability; \*Significant at the 0.05 level of probability

Around 61 percent of the beneficiaries had moderate level of participation in implementation of various watershed activities. About 20 percent beneficiaries had less participation and 18.75 percent had more participation level at implementation stage. The guidelines recommended by ministry of rural development regarding National Watershed Development Project for Rainfed Area (NWDPRA) clearly laid down parameters for involving people to the extent of having total control over planning and implementation of activities. However, the outcome of this study is indicative of the fact that the guidelines are not being followed properly.

Majority of farmers (60.42%) participated at moderate level in watershed development programme in maintenance stage followed by 20.83 percent low participation level and 18.75 percent at high level of participation. The moderate level of participation at different stages is attributed to the fact that the farmers acquired various roles and responsibilities monitored in the implementation of watershed have sufficient stake in various activities being implementation in the watershed area.

A maximum of 51.25 percent of the beneficiaries participated moderately followed by 30.00 per cent less participation and 18.75 percent were having more participation level at different stages of watershed development programme. This might be due to initial awareness of the programme and efforts of implementing agencies, official's interaction with beneficiaries through appropriate way like group discussions and to clear their doubt and create sufficient participation in watershed development programme.

An analysis of planning stage indicates that a majority of the beneficiaries were under moderate stage. When we move on to implementation stage there was obvious change in people's participation, and they started observing watershed development programme and began participating in the programme. A number of respondents moved from less participation to moderate and moderate to more participation. Similar trends were observed during maintenance stage which is highly encouraging.

The data in Table 6, reveals that age, family size and value orientation of the watershed beneficiaries were negatively and significantly correlated with their participation in the watershed development programme with the correlation coefficient at r = 0.558, -0.236 and -0.191 respectively.

Further education status, source of irrigation, land holding, family size, housing pattern, material possession, mass media exposure, social participation, annual income, risk orientation, economic motivation and scientific orientation among respondents were positively and significantly related with their participation in the watershed development programme with the correlation coefficient value at r = 0.534, 0.541,0.383, 0.640, 0.712, 0.635, 0.764, 0.195, 0.806, 0.210 and 0.796 respectively. It shows that the level of participation pattern of respondents was increased with the increase in their caste status, education level, source of irrigation, land holding, housing pattern, material

Independent variables	'r' values
Age	-0.558**
Education status	0.541**
Source of irrigation	0.383**
Land holding	0.640**
Family size	-0.236**
Housing pattern	0.712**
Material Possession	0.635**
Social participation	0.027**
Mass media exposure	0.764**
Annual income	0.195**
Risk orientation	0.806**
Economic motivation	0.210**
Value orientation	-0.191**
Scientific orientation	0.796**

 
 Table 6: Relationship between dependent variables and independent variables with people participation pattern

\*\*Significant at the 0.01 level of probability

possession, mass media exposure, annual income, risk orientation, economic motivation and scientific orientation. It indicates that respondents with higher caste status, high level of education, good source irrigation, large land holdings, better housing pattern, better material possession, good mass media exposure, good annual income, risk orientation, economic motivation and scientific orientation participated more in watershed development programme.

# CONCLUSION

The study revealed that majority of the farmers did not show much interest for watershed technologies like contour farming, well recharge, contour ploughing and contour trenching. Level of adoption behavior towards watershed technology is very low. It can be therefore concluded that caste, education status, land holding, housing pattern, material possession, mass media exposure, annual income, risk orientation, economic motivation and scientific-orientation of respondents, have definite role to play in affecting level of adoption of watershed technology, which indicates, that the utilization of these parameters in making sound strategies of development plan might be highly effective

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# Factors Affecting Accessibility, Use and Performance of Quality Seeds in Andhra Pradesh and Bihar: Farmers' Experiences

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## ABSTRACT

Farmers face several challenges in procuring and using quality seeds from different sources. Accessibility to quality seed has become a serious issue for farmers in the context of shifts in Indian seed policy towards privatization of seed sector. In this context, it was envisaged to study the extent of farmers' accessibility to quality seed from formal and informal seed sector. The study was undertaken in Samastipur and Vaishali districts of Bihar and Warangal and Anantapur districts of Andhra Pradesh (AP) covering 240 farmer households using a pre-tested semi-structured scale and interview schedule. Ten parameters were included to measure the extent of farmers' accessibility to quality seed. The study found that there was no statistically significant difference (p>0.05) between the farmers of AP and Bihar with respect to variables such as proximity to seed source, physical and genetic purity of seed purchased from formal sources and farm saved seed. It indicated that the major source of purchased seeds in both the states was dealer/retailer at nearby tehsil/mandal/town headquarters. The physical and genetic purity of certified/quality seeds purchased from market in both the states was moderate whereas quality of farm saved seeds in both the states was very high. The difference between farmers of AP and Bihar was statistically significant with respect to variables such as timeliness in availability of seeds, availability in adequate quantities, credibility of source of seed and price of seeds (p < 0.01); crop performance, and documentation and record keeping (p < 0.05). Farmers in AP had significantly higher access to timely availability of seeds in adequate quantities from credible sources. The prices of purchased seeds were significantly higher in AP when compared to Bihar. The difference between expected yield and actual yield realized by farmers by using purchased seeds in Bihar was higher when compared to the farmers in AP. The number of farmers who practiced record keeping was significantly higher in AP when compared to Bihar. Farmers of AP fared comparatively better than their counterparts in Bihar with respect to overall accessibility to quality seeds. However, overall accessibility to quality seed in both the states was found to be medium for majority of the farmers. The low physical and genetic purity of purchased seed and consequent lower yields was a cause of concern in both the states and requires the attention of central and state governments in addressing the gaps in infrastructure and skilled manpower in public sector seed system. The experiences of farmers in the study area indicated that increase in Seed Replacement Rate (as evident from purchase of new seeds every season from market) in itself is not an indicator of use of quality seed and high crop productivity. There are risks associated with purchasing new seeds every year from market under weak quality control regime such as crop failure on account of spurious seeds. Hence, extent of crop failure by using purchased seed (against use of farm saved seed) and difference between expected yield and actual yield realized by the farmer are to be estimated as externalities of increasing SRR. Hence, combination of parameters such as Variety Replacement Rate (VRR), SRR and use of farm saved seeds seems to be the better and scientific indicator of farmers' accessibility to quality seed and increasing crop productivity.

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There is a strong need to create awareness among the farmers regarding record keeping of seed transactions. This is crucial for farmers in settling economic and legal issues related to compensation, insurance and other consumer rights. Informal seed sector needs to be strengthened as an alternative to the formal seed sector to protect the farmers from indulging in distress purchase of spurious seeds from the open/unregulated market. The Seeds Bill 2004, which is pending in the Parliament to be passed into an act, needs to address the problems of farmers by suitable amendments related to compensation mechanism, regulation of seed sale prices and incentivizing informal seed sector.

Keywords: Certified/quality seed, Compensation, Farm-saved seed, Quality control, Seed Replacement rate, Variety replacement rate

#### **INTRODUCTION**

Seed is the most crucial among all inputs in agriculture and all other inputs play a supporting role in harnessing the genetic potential already inherent in the seed and thereby achieving higher crop yields. As the first input in the cropping process, high-quality seed coupled with high genetic yield potential results in higher productivity and crop production. The Royal Commission of Agriculture (Established in 1928) was the first body to recognize the necessity of the high quality seed. In seeking to promote the agriculture, Royal Commission placed emphasis on the production and distribution of the quality seed (National Commission on Farmers, 2006). The quality of seed and plant material significantly affects productivity, which in turn affects the cost of production and competitiveness in the market (Chand, 2002). Before the green revolution period, farm-saved seed (saved, exchanged or purchased from fellow farmers) was the main source of seed for farmers. However, over a period of time, there has been a gradual shift from using farm saved seeds to purchasing high yielding varieties (HYVs) and hybrids from sources outside of their farm and community. During the green revolution period, seeds of HYVs of rice and wheat and hybrids of pearl millet, maize and sorghum were bred, multiplied and distributed by public sector institutions at affordable prices to the farmers. The farming community and the nation as a whole were benefitted by these HYVs. The success of Indian green revolution was centered on production, distribution and use of high yielding varieties. The frontline agricultural extension programmes in the country were initiated to popularize and disseminate the improved varieties among the farming community. The success of agricultural extension initiatives right from National Demonstrations Programme (1964) through Seed Village Programme (since 1970's) to IARI-Post OfficeFarmer-Linkage Programme (operational since 2009) has revolved around use of quality seeds for sowing. These programmes have proved that quality seed could act as wonderful intervention point for extension professionals in reaching farmers and to take up further extension education objectives of overall rural development.

Later on, various other stakeholders entered the seed industry as a result of policy reforms in seed sector in particular and Indian economy in general. These policy shifts aimed at liberalization, privatization and globalization of Indian industries including seed industry. For instance, New Policy on Seed Development (NPSD) 1988, allowed for multinational and domestic private seed companies for import of seeds and technologies as well as investment in seed research and development. The analysis of Indian seed policy also suggests that laws and policies thereafter have encouraged private sector participation, benefitted private seed companies and provided better market access to foreign seed companies (Dastagiri, 2008). As a result of effects of all these policies, the seed replacement rate of various crops has increased (SeedNet India Portal, 2012). Manjunatha et al. (2013a) reported that the certified/quality seed production in the country by formal seed sector till 1960's was almost negligible and it increased to 58 lakh quintals by 1991-92. From 1991 to 2011, the certified/quality seed production has more than quadrupled to reach 277 lakh quintals. During the last decade (2001-2011) the seed production has tripled with a robust Compound Annual Growth Rate (CAGR) of almost 11-15% p.a. The mean SRR was higher in crops where hybrids were available such as sorghum, pearl millet, sunflower and cotton. Increasing Varietal Replacement Rate (VRR) is as important as Seed Replacement Rate (SRR). However, the information on VRR for various crops in different

parts of India is not available in the literature to gain meaningful insights.

At the same time, the dependence of farmers on market for seeds has increased. Except in case of few self-pollinated crops where public sector organizations are serving farmers with good quality seeds, farmers are completely dependent on private seed companies (PSCs) for various other field crops, vegetable crops, etc. for quality seed. PSCs have acquired great control over the seed market through exclusive ownership and marketing rights over their hybrids and proprietary technologies. However, the majority of the farmers are unable to avail the costly services and products of private agricultural enterprises. The role of public seed sector has suffered over the last few decades due to lack of investment in infrastructure and skilled manpower in handling seed production, certification, testing, quality control and distribution. Within the formal sector, the composition of the seed industry, by volume of turnover, has reportedly reached a ratio of 60:40 between the private and public sectors (Govindan, 2003; Sangar et al., 2011). Anandajayasekeram et al. (2008) emphasized the need for a pluralistic extension system, consisting of services from the public sector, nongovernmental sector and the private sector. The main reason of developing a pluralistic service is a need to find a suitable 'mix' of public and private funding and delivery mechanisms for extension, which will achieve differing agricultural goals and serve diverse target populations.

Accessibility to quality seed has become a crisis for farmers in every season. The farmers face several problems in acquiring quality seed and incur heavy losses in farming when the seeds purchased turn out to be spurious seeds of low genetic purity. Therefore timely availability, quality assurance, price control, compensation in case of crop failure (on account of spurious seeds) and incentivizing informal seed sector are the key issues that need attention both at policy making and farmers' level. Farmers' rights over seed are implicit for the farmers, irrespective of their awareness and knowledge on laws that protect and uphold these rights, such as Protection of Plant Varieties and Farmers' Right Act (PPVFRA), 2001. Manjunatha et al. (2013b) reported that the PPVFR Act 2001 was formulated for protection of plant varieties in India by integrating the rights of breeders, farmers and village communities. However, hybrids developed by private seed companies accounted for 90 percent of new varieties which received PVP certificates (Certificates of Registration or Breeder Rights). This illustrates that technological barrier to realization of farmers' rights is more profound in India than the legal barrier as in case of developed countries. It also highlights the chasm in de jure and de facto of protecting and upholding farmers' rights in India. Farmers' rights have no meaning in case of hybrids since technical barriers limit farmers from saving and reusing these seeds. This is a threat against farmers' rights in the context wherein Indian seed sector is getting privatized and private seed companies (PSCs) are interested in developing hybrids and their exclusive ownership and marketing rights.

Gajbhiye et al. (2014) reported that Seed Replacement Rates (SRR) in key crops like rice and wheat are reported extremely low in most parts of India because of many factors like lack of awareness of the potential of new varieties; lack of proper seed storage infrastructure to maintain good quality; poor linkages amongst government, private sector and farmers to provide seeds in a timely manner and a lack of a policy environment that will support faster adoption of new varieties. Some of the concerns that need to be addressed in this sector include the farmers' preferences towards old but popular varieties, accessibility of seed markets by the farmers, bridging the gap between demand and supply, better targeting of subsidies on seeds, improved storage infrastructure, the policy environment and stronger extension systems to increase farmers' accessibility and adoption of improved seed varieties. In spite of several agencies serving the seed demand of farmers, they are still in the need of reliable and dependable sources of seed supply. Farmers need to know about the options for seed supply, the quality of the seed provided, and the characteristics of the varieties that are available. Seed enterprises require information on farmers' requirements and on the potential partners in seed provision. The elements of seed provision are variety development, provision of source seed, multiplication, conditioning and distribution of commercial seed, seed quality control and variety promotion.

In this context, it was of very immense importance to explore the problems that farmers face in acquiring quality seed for sowing. Since farmers are the primary stakeholders of farming and they are involved in production, collection, saving, bartering, purchasing of seeds from market and using them, this study was aimed at measuring the extent of farmers' accessibility to quality seed. The study gains further importance in the present context wherein new Seeds Bill 2004 (amended and redrafted as Seeds Bill, 2010) is under the process of enactment in the Parliament. Various contentious issues in the Seeds Bill 2004 have to be resolved before it is passed in the Parliament. Therefore, identifying farmers' difficulties in accessing quality seeds and addressing such issues in the Seeds Bill would be of paramount importance. This research article has following specific objectives:

- 1. To estimate the extent of accessibility to quality seed for sowing by farmers.
- 2. To suggest suitable measures to address the constraints faced by farmers in accessibility to quality seed.

# MATERIALS AND METHODS

**Research design:** An *ex-post facto* and survey research design were adopted for the study.

Locale of the study, sample and sampling procedure: Two states namely Andhra Pradesh (AP) and Bihar were selected purposively for the study based on the criteria of high and low Seed Replacement Rate (SRR) respectively for various crops. Two districts from each state namely, Warangal and Anantapur districts in AP and Samastipur and Vaishali districts in Bihar were selected purposively based on the criteria of maximum area under seed production and maximum number of stakeholders associated with seed industry. In each district, one tehsil/mandal was randomly selected and further two villages in each tehsil/mandal were randomly selected. Thirty farmer households from each village were randomly selected for personal interview. Thus, farmer households were selected using multi-stage stratified random sampling. Total sample size for the study was 240 farmer households. One person in each household (head of the household in majority of the cases) is interviewed and he/she is considered to represent the household. In the following sections, the term 'farmer' is used interchangeably with the term 'farm household'. (*Note:* Presently, Warangal district is part of newly carved out Telangana state. Hyderabad, earlier the capital city of AP is presently the capital of Telangana state).

**Data collection and analysis tools:** The study is based on primary data collected by interviewing 240 farmer respondents about their perception/opinion on various parameters of accessibility to quality seed using pretested semi-structured scale and interview schedule. Focused group discussions with farmers were also conducted to validate the primary data. Both quantitative and qualitative data were collected.

Accessibility to quality seed is defined as the extent of access that a farmer has to the quality seed in terms of its timely availability, availability in adequate quantities, of good quality seed at affordable/reasonable prices from a reliable and credible source with assured crop production and returns. Ten parameters were included to measure the farmers' accessibility of quality seed, viz., (i) timeliness in availability, (ii) physical availability in desired quantities, (iii) proximity of seed source, (iv) seed source credibility, (v) price of seeds, (vi) use of improved cultivar, (vii) physical and genetic purity of purchased seed, (viii) physical and genetic purity of farm saved seed, (ix) crop performance and (x) records keeping and documentation. Each parameter was measured using a five-point rating scale of appropriate levels. Each of the parameters were estimated separately for the farmers of AP and Bihar and then compared to understand the variation in two states on farmers' accessibility to quality seed. Finally, the composite scores were calculated for each of the respondent farmer. Based on these composite scores, the farmers were categorized into five levels of accessibility to quality seed such as very low, low, medium, high and very high levels of accessibility. The 't-test' was employed for each of the ten parameters and composite scores at 0.01 and 0.05 level of probability to test if there was any statistically significant difference between the farmers of AP and Bihar.

# **RESULTS AND DISCUSSION**

The perception of farmers on each of the ten parameters of accessibility to quality seed is discussed below in detail. The term *'farm-saved seeds'* in this article refers to seeds (used for sowing) either saved by the farmer on his own farm, exchanged or purchased from other farmers or farmers' organizations. The term '*purchased seed*' is seed other than farm-saved seed. The 'purchased seed' refers to certified/quality seeds produced by formal seed sector (including both public and private seed organizations/companies) purchased by farmers directly from the concerned organization / company or through dealers/retailers.

i) Timeliness in availability of seeds: Seed is a biological entity and has to be stored in ambient temperature and humidity conditions to preserve and prolong its genetic potential. Since farmers have become dependent on sources outside their farm and farming community for quality seeds for majority of the crops, farmers run around the markets (both public and private seed sector included) to purchase seeds just before the sowing season (in irrigated conditions) or immediately after the rains (in case of dry land conditions). There would be a great rush in the market and only few farmers would be successful in acquiring quality seed from authentic sources in time. Hence, timely availability of quality seed in itself is one of the critical factors that affect crop productivity. Farmers' perception of timely availability of quality seed was measured on a five-point rating scale of seed being available 'well in advance', 'available before one week of sowing', 'available before three days of soming', 'late (soming delayed by one week)' and 'very late (sowing delayed by 15 days)' and were given scores of 5, 4, 3, 2, and 1 respectively. The perception of farmers on the timely availability of seeds is presented in Table 1.

The study showed that higher per cent of farmers had access to timely availability of seeds in AP when compared to Bihar. This could be attributed to the fact that many private seed companies and public agricultural research institutions have their base in AP. Moreover, AP has become a hub for seed production in the country for many crops because of favourable climatic conditions in many parts of the state along with favourable policy environment for private seed companies. Availability of seed in adequate quantities for 63 percent farmers in AP was high at the time of sowing whereas it was moderate for 65 percent farmers in Bihar, leading to late sowing by 3 days to one week. Farmers in Bihar reported that seeds supplied by Agriculture Department under subsidy scheme were always delayed by at least one week. In many cases, the seeds of required variety were not available. For instance, 90 percent farmers in Anantapur district in AP preferred TMV-2 variety of groundnut. Though availability of certified/quality seeds of various crops in the market has increased over the decades, quality assurance is still an issue. Timely availability is the greatest issue when it comes to government subsidised seed programmes (CSA, 2005).

*ii)* Availability of seeds in adequate quantities: Along with timeliness, availability of seeds of desired varieties in adequate quantities to meet the requirement of sowing is also an important factor that affects the productivity and income of the farmers. Availability of seeds in adequate quantities was measured using a fivepoint rating scale of seed being available in *'adequate'* quantity, in *'adequate quantity but have to be procured early'*, in *'moderate'* quantity, in quantities that were *'scarce'* and *'very scarce'*, and were given scores of 5, 4, 3, 2, and 1 respectively. The perception of farmers on the availability of seeds in adequate quantity required by them is presented in Table 2.

The study indicated that only 18 percent of farmers in AP and only 5 per cent in Bihar could have access to seed in adequate quantities whereas 65 percent farmers in AP and 62 percent in Bihar felt that they have to make extra efforts to acquire seeds of desired variety well in advance. Thirteen percent of the farmers

Table 1: Distribution of farmers' perception on timeliness in availability of seeds

Timely Availability	Andhra Pradesh (n=120)		Biha	Bihar (n=120)	
Categories	f	%	f	%	
Well in advance (at least before 15 days)	20	17	10	8	
Available before 1 week of sowing	76	63	20	17	
Available before 3 days of sowing	12	10	78	65	
Late	6	5	8	7	
Very late	6	5	4	3	
Total	120	100	120	100	

Availability in quantities	Andhra Pradesh (n=120)		Bihar	Bihar (n=120)	
Categories	f	0/0	f	%	
Adequate	22	18	6	5	
Adequate but have to be procured early	78	65	74	62	
Moderate	10	8	20	17	
Scarce	10	8	4	3	
Very scarce	0	0	16	13	
Total	120	100	120	100	

Table 2: Distribution of farmers' perception on availability of adequate quantity of seed

in Bihar opined that good quality seeds of desired varieties were very scarce and rarely did they purchase such good quality seeds from the market or other sources. This highlights the fact that though seeds may be available in the market but procuring quality seeds of desired varieties in required quantities is a challenge for the famers.

The farmers in Bihar complained that seeds of some crops such as wheat, paddy, maize, etc., were available in plenty since many stakeholders (public, private and farmers themselves) were involved in seed production of these crops, but seeds were always in shortage for some groups of crops like pulses, oil seeds and forage crops. The shortage of seeds in some groups of crops and complete dependence on market for some other groups of crops highlights the lack of planning and coordination among various seed producing organizations in the formal seed sector. Farmers and farmers' organizations expressed that the answer to this problem lied in strengthening the informal seed production and distribution systems.

Shashikant *et al.* (2011) in their study conducted in Gulbarga district in Karnataka state of India reported that inadequate availability of labour, fertilizers and quality seeds as one of the important constraints faced by farmers in production of red gram. Dipak Nath and Biswas (2011) reported that non-availability of quality seeds was one of the major constraints in production of vegetable crops in Tripura state in North-eastern India, considered as one of the potential states to increase vegetable production. Gajbhiye *et al.* (2014) in their study conducted in Patiala district of Punjab state in India reported that NGO and private seed companies fared better than government organizations in timely distribution of seeds to farmers.

iii) Proximity to seed source: The proximity of seed

source affects the procurement of quality seed by the farmers, especially the marginal and small farmers. If the quality seed is not available in the nearby towns, large and entrepreneurial farmers travel to distant cities where they are available and procure it since they can afford travel and shipment charges. But in such cases, marginal and small farmers either purchase locally, which may be of substandard quality, or they change the crop in extreme conditions of unavailability. Hence, farmer's proximity to seed source also affects accessibility to quality seed. Farmer's perception of proximity to seed source is measured on a five-point rating scale of seed being available 'locally in the village' or 'in nearby block/tehsil/town', or 'in district headquarters', or 'in select cities or towns' or 'in cities quite far away from one's residence' and were given scores of 5, 4, 3, 2, and 1 respectively. The perception of farmers on the proximity of source of seeds is given in Table 3.

The seed retailers and dealers at tehsil/mandal headquarters were the main source of seed for 73 percent farmers in Bihar and 70 percent farmers in AP. It indicated that private seed companies have developed strong marketing network to reach farmers in all villages. Farmers in AP purchased hybrid seeds of cotton, sunflower, pearl millet, sorghum, castor, hybrid paddy and vegetables every year. In Bihar, farmers purchased seeds of maize, hybrid rice, mustard, flowers and vegetables every year. However, some entrepreneurial farmers in AP went to faraway places to procure high quality seeds. For instance, few farmers from Anantapur and nearby districts went to Jodhpur city in Rajasthan state to purchase the quality seeds of cluster bean. Traditionally, cluster bean was part mixed cropping in arid farming systems in Anantapur and nearby districts (Bellary in Karnataka). The area under this crop had reduced significantly on account of change in cropping pattern towards rice (irrigated conditions),

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Proximity to seed source	Andhra Pra	desh (n=120)	Bihar (n=120)		
Categories	f	0/0	f	0/0	
Locality /village	14	12	12	10	
Nearby tehsil/mandal/town	84	70	88	73	
District Head Quarters	16	13	20	17	
Select cities/towns	4	3	0	0	
Cities far away	2	2	0	0	
Total	120	100	120	100	

Table 3: Distribution of farmers' perception on proximity to seed source

cotton and other commercial crops. However, area under cluster bean crop has been increasing since last few years owing to increase in its market price in domestic and international market.

The study highlighted that for procuring of seeds of regular crops (which are already part of the existing cropping system of the region) proximity was not a major issue, but for a new crop (either completely new to the region or the crop is grown in the region after a gap of several years because of sudden increase in market prices of its produce), it may be necessary to go to faraway places to procure quality seeds.

*iv) Credibility of source of seeds:* The farmers accord various degrees of credibility to various sources of seed based on their experiences over a period of time. Sources of seed might be public, private, NGO/CBO, fellow farmer or his own farm-saved seed. For each crop, the farmer has a preference for certain source of seed over others because of high genetic and physical purity of seed and productivity. Farmer's perception of credibility of source of quality seeds is measured using a five-point rating scale of the source of seed being *'highly credible', 'credible', 'moderately credible', 'less credible'* and *'least credible'* and were given scores of 5, 4, 3, 2, and 1 respectively. The farmers' perception on the credibility of source of seeds is presented in Table 4.

The study showed that 62 percent of farmers in AP reported that their source of seed was credible whereas only 12 percent of farmers in Bihar reported so. In addition, 22 percent of farmers in AP opined that their source of seed was highly credible whereas only 8 percent of farmers in Bihar reported so. In case of Bihar, fifty percent of farmers procured seeds form moderately credible sources, whereas 25 percent of farmers procured seeds from less credible sources and 5 percent of farmers from least credible sources like open markets in unpackaged (farmers call it "loose" seeds) form. Hence it is evident that farmers in Bihar were purchasing seeds from dealers/retailers and other sources even though they were not sure of the credibility of source. Though farmers preferred to purchase seeds from highly credible sources, they were forced to purchase from less/least credible sources because of lack of options. For instance, in case of Bihar, the farmers in the study area accorded high degree of credibility (in terms of physical and genetic purity and yield) to wheat seed produced by IARI regional station, Pusa but because of limited quantities of seed produced by this institute, all farmers in the region could not procure these seeds. Hence, they opted for other sources which they consider credible such as seeds produced by Rajendra Agricultural University (RAU) or the seeds of Tarai Development Corporation

Credibility of source of seeds	Andhra Pra	desh (n=120)	Bihar (n=120)		
Categories	f	0/0	f	0⁄0	
Highly credible	26	22	10	8	
Credible	74	62	14	12	
Moderately credible	12	10	60	50	
Less credible	8	7	30	25	
Least credible	0	0	6	5	
Total	120	100	120	100	

Table 4: Distribution of farmers' perception on credibility of source of seeds

(TDC). Even the seeds of RAU and TDC were not available to all the farmers because of limited production. Finally, majority of the farmers have the only option of purchasing seeds from either National Seeds Corporation (NSC) or Bihar State Seeds Corporation (BSSC). Farmers in the study region accorded very low credibility to NSC and BSSC for wheat seeds; yet they were forced to purchase from these sources because of lack of options. The major reasons attributed to low quality seeds supplied by BSSC were very poor infrastructure and severe shortage of skilled manpower to oversee seed production, certification, testing, quality control and distribution.

v) Price of seeds: The ability to purchase quality seeds by a farmer is directly affected by the price of seeds. The prices of seeds of HYVs developed by public sector agencies have always been affordable to farmers. The prices of hybrid seeds and proprietary technologies such as Bt. cotton seeds were always higher when compared to Open Pollinated Varieties because of inclusion of royalty/trait fee component. Moreover, farmers have to purchase hybrid seeds each season since he cannot save these seeds. The prices of Bt. cotton seeds in the initial years of its release were so high that Government of AP had to intervene and regulate the price of seeds by fixing MRP. Hence, price of seed is an important component determining the farmers' accessibility to quality seeds. Farmer's perception of price of seeds was measured using a five-point rating scale of the seed being 'affordable', 'moderately expensive', 'costly', very costly', and 'too costly to be beyond one's reach' and were given scores of 5, 4, 3, 2, and 1 respectively. The perception of farmers on the price of seeds is presented in Table 5.

The study showed that 73 percent of farmers in Bihar found the price of seeds to be moderate, whereas 63 percent of farmers in AP found the seeds to be costly. Further, 20 percent of the farmers in AP found the seeds to be very costly and another 7 percent felt that the prices of seeds were beyond their reach. The reason was being that most of the farmers in AP used HYVs and hybrids of PSCs which were costly. Further, the Bt. cotton crop was widely grown in AP. The Bt. cotton seeds are costlier than non-Bt. cotton hybrids because of high royalty/trait fee. Farmers in AP added that black marketing of Bt. cotton seeds also led to artificial increase in price of seeds. Bt. cotton seeds of few PSCs were very popular among farmers because of perceived high genetic and physical purity. However, artificial shortage conditions were created in the market and the seeds of these companies were available only in black markets at prices equivalent to two to three times the MRP. The price fixed by Government of AP for the crop years 2011-12 and 2012-13 was Rs. 930/for Bt-II seeds for a packet of 450gms. However, the farmers in AP reported that Bt. cotton seeds of few companies were available in prices in the range of Rs. 2000 to 3000/- per packet of 450gms in the black market. It is to be noted here that the price of Bt. cotton seeds are regulated in all the major Bt. cotton growing states in India. Mishra (2006) reported that the state government of Andhra Pradesh was the first to implement price restrictions. Its 2006 directive capped prices for biotech cotton seeds at less than one-half the prevailing market price. Today, price caps have spread to important cotton-growing states throughout the country including Maharashtra, Gujarat, Tamil Nadu, Karnataka, Madhya Pradesh, and West Bengal.

In case of Bihar, the seeds for principal crops such as wheat and rice were procured from public organizations such as regional station of IARI at Pusa, RAU, TDC or the NSC. Though there was a great degree of variation in quality of theses seeds, the prices were moderate to the farmers. However, the seeds of

Table	5:	Distrib	ution o	of	farmers'	perception	on	price	of seeds	

Price of seeds	Andhra Pra	Bihar (n=120)		
Categories	f	0/0	f	%
Affordable	6	5	10	8
Moderately expensive	6	5	88	73
Costly	76	63	18	15
Very costly	24	20	4	3
Too costly	8	7	0	0
Total	120	100	120	100

maize and vegetable crops developed by private seed companies were costly and were sold to farmers through the network of dealers/retailers.

Gajbhiye et al. (2014) reported that farmers' perception with regard to quality of seeds supplied was very high for NGOs, high for PSCs and moderate for government organizations. However, the cost of seeds supplied by PSCs was highest followed by NGO and least for government organizations. Gurjar and Padaria (2013) in their study conducted in Ganganagar and Hanumangarh districts of Rajasthan in India reported that the share of seed cost to total input costs was about 25 per cent in case of Bt. cotton, whereas it was less than 4 per cent in the case of non Bt. cotton. However, the savings in pesticide costs compensated the higher seed cost for Bt. cotton. Manjunatha et al. (2015) in their study involving farmers and other stakeholders related to seed industry have reported that regulation of sale price and trait fee of seeds are the most contentious issues in the Seeds Bill 2004. Further, these authors have recommended for regulation of seed sale price in case of crops having royalty component (hybrids and proprietary technologies such as Bt cotton) under monopoly or monopolistic seed market conditions. The regulation of price in case of Bt cotton seeds was scientific since the seed market of Bt cotton was monopolistic and there was a huge component of royalty in seed sale price until government intervention.

vi) Cultivation of improved cultivar of seeds: The HYVs and hybrids give better yield performances compared to old and traditional varieties. Only few progressive and entrepreneurial famers keep watch of the latest released varieties and they go to the extent of procuring seeds from the organization headquarters that released the new variety or hybrid. However, majority of the farmers purchase and use the seeds of popular varieties which would be ruling for years in the

region. Sometimes, for the lack of availability of seeds, farmers continue to grow old varieties. Some farmers also grow traditional varieties even though they yield less. The worst situation was the condition wherein farmer neither has his farm saved seed (wherein the source of seed is credible) nor he gets the good quality seed in the market. Some farmers face this kind of situation whenever there is a shortage of good quality seed in the market during the sowing season. In such conditions, farmers were forced to purchase seeds from unauthenticated sources such as open markets and his crop yields are sacrificed. Farmer's perception of use of quality seed of improved cultivar was measured using a five-point scale of 'latest HYVs/hybrids (released in last 5 years)', popular variety (best varieties still in seed production chain)', 'good variety but old' 'very old variety (variety released 15 years ago)' and 'non-descript variety' and they were given scores of 5, 4, 3, 2, and 1 respectively. The perception of farmers on cultivation of improved cultivar of seeds is presented in Table 6.

The study showed that in case of principal crops (such as wheat in Bihar and groundnut in AP) majority of farmers both in AP and Bihar (67 and 62 percent respectively) cultivated 'popular varieties' which were ruling for many years in the region. Relatively higher percentage of farmers in Bihar was cultivating recently released varieties/hybrids when compared to the farmers of AP. The reason was that there was more diversity in terms of number of crops grown in Bihar when compared to AP. Therefore, farmers growing maize and vegetables in Bihar always preferred latest hybrids of PSCs. The distribution of respondents in both the states appeared to be similar in terms of their perception of use of quality seeds of improved cultivars.

vii) Physical and genetic purity of seeds purchased from market (formal sources): Though farmers purchase the seeds of HYVs and hybrids, sometimes

Use of improved cultivar	Andhra Pra	desh (n=120)	Bihar (n=120)		
Categories	f	0/0	f	%	
Latest HYVs/hybrids	16	13	20	17	
Popular variety	80	67	74	62	
Good variety but old	14	12	12	10	
Very old variety	6	5	10	8	
Non-descript variety	4	3	4	3	
Total	120	100	120	100	

Table 6: Distribution of farmers' perception on cultivation of improved cultivars
they fail to give expected yields even under congenial climatic and appropriate management conditions because of low genetic and physical purity. Therefore ensuring genetic and physical purity of seed is very important. Farmer's perception of purity of seeds purchased in the last five years was measured using a five-point rating scale of seeds being 'very pure', 'pure', 'moderately pure', 'less pure' and 'least pure' and were given scores of 5, 4, 3, 2, and 1 respectively. The opinion of farmers on the purity of seeds they purchased is presented in Table 7.

Seventy two percent farmers both in Bihar and AP expressed that physical purity of seed was satisfactory, whereas genetic purity (as expressed by more number of rogue/off-type plants and poor yield) was low. Only 20 percent of farmers in AP and 13 per cent of farmers in Bihar found their seeds to be of pure quality whereas only 7 percent of farmers in Bihar expressed that their seeds were very pure while none of the respondents in AP reported so. Eight percent of the farmers both in Bihar and AP opined that the seeds they procured was of less purity. The facts highlighted the extent to which it is difficult to procure quality seeds by the farmers because of shortage of such high quality seeds or the incredibility of the source of the seed. Farmers in Bihar shared that same variety performed in different ways depending on the source of the seed. For instance, the seed of a variety purchased from IARI regional station, Pusa and TDC performed extremely well, whereas same variety of seed procured from NSC or BSSC performed dismally because of admixtures and poor genetic purity. Farmers in Bihar expressed that misbranding of seeds was rampant especially in case of wheat seeds and there was no mechanism to ensure if the seeds were original or misbranded.

# viii) Crop performance (Actual yield realized against expected yield) of purchased seed: Farmers

reported that seeds procured from highly authenticated sources sometimes failed to give expected yields even under congenial climatic and appropriate management conditions. The germination percentage was very less and uneven; the crop stand would be poor; and the actual yield was very low than the expected yield. All these kinds of crop failures might be attributed to spurious seeds. Therefore, farmers were asked about their experiences in realizing actual crop yield against expected yield from the seeds they have purchased from the market and sown in the last five years. Farmer's perception of actual crop yield realized by using purchased seeds was measured using a five-point rating scale of seeds giving 'very good', 'good', 'moderate', 'poor' and 'very poor' crop performance and were given scores of 5, 4, 3, 2, and 1 respectively. The perception of farmers on the crop performance is presented in Table 8.

It was evident from the study that 62 percent of farmers in AP reported that yields they got were good, whereas only 22 percent of farmers in Bihar perceived so. Majority of the farmers in Bihar (62 percent) opined that their crop yields were moderate. However, 12 percent of farmers in AP and 14 percent of farmers in Bihar felt that the crop performed poorly or very poorly because of spurious seeds. Many cases of crop failure owing to spurious seed were reported by farmers of both Bihar and AP. Private Seed Companies, in some cases, replaced seeds but the season was delayed or lost. Farmers were never paid any compensation for the loss of crop.

In 2005, after establishment of large scale cotton seed failure in Warangal district, State government asked Mahyco to pay compensation. This company refused to pay and moved to AP high court on paying compensation saying state government is harassing them. AP High court orders also were in favour of Mahyco and till date the company has not paid the

Table 7: Distribution of farmers' perception on physical and genetic purity of seeds

Purity of seeds	Andhra Pradesh (n=120)		Bihar	(n=120)	
Categories	f	0/0	$\overline{f}$	%	
Very pure	0	0	8	7	
Pure	24	20	16	13	
Moderately pure	86	72	86	72	
Less Pure	10	8	10	8	
Least pure	0	0	0	0	
Total	120	100	120	100	

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Crop Performance	Andhra Pra	desh (n=120)	Bihar (n=120)	
Categories	f	%	f	0⁄0
Very good (>80% of EY <sup>@</sup> )	10	8	8	7
Good (60-80% of EY)	74	62	22	18
Moderate (40-60% of EY)	22	18	74	62
Poor (20-40% of EY)	6	5	14	12
Very poor (<20% of EY)	8	7	2	2
Total	120	100	120	100

Table 8: Distribution of farmers' perception on crop performance

Note: <sup>@</sup>EY = Expected Yield.

compensation (AP Farmers Unions and NGOs Coordination Committee, 2010).Honorable Chief Minister of Bihar, in his letter to the Union Agriculture Minister, Government of India, stated that the state exchequer faced an extra burden of Rs.61 crore as compensation to the farmers at the rate of Rs 10,000 per acre, because of non-formation of grain after maize farmers used hybrid seeds supplied by private companies in 61000 hectares in the rabi season of 2009-10. Yet, the private companies did not do anything to compensate to farmers (TOI, 2011).

ix) Quality of farm saved seeds: It is important to note that even in the present scenario, the formal seed sector (including both private and public sector seed organizations/companies) meets only 15-20% of the seed requirement of the farmers (MoA, 2012). Remaining 80-85% of seed requirement is being met by informal and farmer-to-farmer seed exchange mechanisms. Although the Indian seed market is one of the largest, it is almost exclusively supplied by locally produced seeds. For example, 50 and 60 per cent of the farmers in Bihar and Madhya Pradesh use farmsaved seeds, as against 28-30 percent in Punjab and Haryana (NSSO, 2005). More than 70 percent seed usage in India, particularly for food crops is through the farm-saved seed. Private seed industry is well built only for selective crops and public seed organizations also cater to a few kinds of seed only (Ayyappan and Kochhar 2010). Studies made by several researchers clearly indicate that with high-volume low-value seeds, such as wheat, groundnut, soybean and chickpea, 80 percent of the cropping area is sown with farm-saved seeds of old and obsolete varieties (Gadwal, 2003; Patil et al., 2004; Hanchinal, 2009). Farmers retain seed of major food crops (wheat, rice, sorghum, millet, corn, and pulses) and commercial crops for many years, and the largest volume of seed trade involves local exchanges of established self-pollinating varieties (Sangar, 2011). It is in this context that strengthening of informal seed supply systems have to be encouraged and incentivized.

The core component of informal/unorganized source of seed is farm saved seed. Hence, it is of vital importance to understand whether the farmers follow scientific practices in collecting, saving, storage, bartering and exchange of such farm saved seed. Farmer's perception on quality of farm saved seeds was measured using a five-point rating scale of such seeds possessing 'very good standards', 'good standards', 'minimum standards maintained', 'poor standards' and 'doubtful standards' and were given scores of 5, 4, 3, 2, and 1 respectively. The distribution of farmers' perception on quality of farm saved seeds is presented in Table 9.

The physical and genetic purity of farm saved seed was found to be of good and very good standards by 91 percent farmers in AP and 87 percent in Bihar. Farm saved seeds were used in case of potato, turmeric and green gram in Bihar and paddy, red gram, groundnut, turmeric, Bengal gram, black gram and foxtail millet in AP. It was worrying to note that majority of farmers in Bihar did not save seeds of wheat (self-pollinated crop, wherein seed can be saved and re-used for 3-4 years without significant reduction in yield) and instead purchased seeds every year from market. Only 5 percent of the farmers in Bihar reported that their farm saved seed were of poor quality. Farmers in Bihar expressed that the reasons for poor quality of farm saved seeds in few cases were lack of minimum appropriate storage conditions at households of some poor farmers and extreme weather conditions and not the negligence on the part of the farmers. Hence it is clearly established that farmers take all the precautionary measures in

Quality of Farm Saved Seeds	Andhra Pra	desh (n=120)	Bihar (n=120)	
Categories	f	0/0	f	%
Very good standards	28	23	22	18
Good standards	82	68	78	65
Minimum standards maintained	10	8	14	12
Poor standards	0	0	6	5
Doubtful standards	0	0	0	0
Total	120	100	120	100

Table 9: Distribution of farmers' perception on quality of farm saved seeds

selecting, saving, storage and exchange of seeds among themselves to maintain genetic and physical purity in case of crops where they use farm saved seeds.

Farming communities have developed over generations their own Indigenous Traditional Knowledge (ITKs) to store the grains and seeds from pest attack and to increase/retain its planting value and seed quality. Kumari et al. (2014) based on their study conducted in Darbhanga district of Bihar in India have reported various ITKs used by farmers for storage of grain and seed at their households. These ITKs include: (i) use of traditional, low-cost storage structures such as Kothi, Bokhari and Ghalia made of local resources; (ii) use of cow-dung, wheat straw, dried wood ash, dried neem leaf powder, neem seed kernel extract powder/ paste and sand in various forms; coating of seeds with edible/non-edible oils; and hanging of cotton bags containing seeds to the ceiling in the kitchen room thus exposing the bag to regular smoke to prevent pest attack; and (iii) use of lime and black pepper powder for rodent control. Farmer households in AP used similar grain and seed storage structures till a decade ago. In some households such storage structures (Gummi: large cylindrical basket made of bamboo coated both sides with mud and cow dung) were found but they were obsolete and no more used for storage purposes. However, farmers in AP also used dried wood ash, neem leaf powder, neem seed kernel extract, coating of seeds with oils, rice straw and sand in various forms for preventing pest attack during storage of grain and seed. The role of farm women was found to be higher in storage of seed and grains at households both in Bihar and AP.

**x)** Documentation and record keeping of seed transactions: Some farmers in India have the habit of keeping the records related to farming enterprise, whereas majority of the farmers do not do so. In this

study, record keeping habit of farmers with special reference to seed transactions was measured. The invoice as proof of seed purchase is very important because in case of seed failure, farmer cannot claim for compensation unless the invoice of seed purchased from a dealer/retailer is presented in the consumer court. Therefore, invoice of seed purchased is very important in ensuring the procurement of quality seeds and in availing compensation, insurance and other consumer rights whenever there is a crop failure due to spurious seeds. Farmer's perception of record keeping of seed transactions is measured using a fivepoint scale of maintaining records 'always', 'often', 'sometimes', 'rarely', and 'very rarely' and were given scores of 5, 4, 3, 2, and 1 respectively. The perception of farmers about the habit of record keeping related to seed transactions is presented in Table 10.

The study showed that 53 percent of farmers in AP often kept the records related to seed transactions, whereas only 7 percent of famers in Bihar did so. However, 27 percent of farmers in AP and 35 percent of famers in Bihar rarely and very rarely kept the records related to seed transactions. It was because either the farmers did not insist for the invoice of seeds or the dealer/retailer did not issue the invoice to the farmers. Sometimes, the farmers procured seeds from the open market where invoices are not at all issued. Sometimes, though the farmers get invoices for their purchases, they don't keep it safely at home till the end of the crop season. The issue of compensation to farmers in case of crop failure on account of spurious seeds has gained more significance in the present context wherein farmers are completely dependent on market for their seeds and more and more number of cases of crop failures is also reported.

The study highlighted that there is an urgent need to build awareness among farmers about the importance

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Documentation and record keeping	Andhra Pradesh (n=120)		Bihar	(n=120)	
Categories	f	%	f	0⁄0	
Always	0	0	8	7	
Often	64	53	8	7	
Sometimes	24	20	62	52	
Rarely	14	12	22	18	
Very rarely	18	15	20	17	
Total	120	100	120	100	

Table 10: Distribution of farmers' perception on documentation and record keeping

of record keeping in general and invoices of seed purchased in particular. The invoices are compulsorily needed for settling the economic and legal issues related to compensation, insurance and other consumer rights in case of seed failure.

xi) Composite scores of accessibility to quality seed: There were wide variations among the farmers of Bihar and AP on several parameters of accessibility to quality seed. A composite score for each farmer was calculated by clubbing the values of all the ten parameters selected for the study to measure the overall accessibility to quality seed. The composite scores were calculated for each farmer and they were grouped into five categories of accessibility to quality seed viz., very low, low, medium, high and very high. The distribution of farmers of Bihar and AP on composite scores of accessibility to quality seed is presented in Table 11.

The study revealed that nearly 70 percent of the farmers in both the states had moderate accessibility and less than 20 percent farmers in both AP and Bihar had high level of accessibility to quality seed. Nearly 15 percent farmers in both states experienced low and very low level of accessibility whereas none of the farmers in Bihar and AP had very high level of accessibility to quality seed.

The mean scores of farmers from AP and Bihar on all parameters of accessibility to quality seed were tested for their statistical significance using t-test and are presented in Table 12.

There was no statistically significant difference (p>0.05) between the farmers of AP and Bihar with respect to variables such as proximity to seed source, physical and genetic purity of purchased seed and farm saved seed. It indicated that physical and genetic purity of seeds purchased from market in both the states was moderate whereas quality of farm saved seeds in both the states was very good. The major source of purchased seeds in both the states was dealer/retailer at nearby tehsil/mandal/town headquarters. The difference was statistically significant with respect to variables such as timeliness in availability of seeds, availability in adequate quantities, credibility of source of seed, price of seeds (p<0.01); and crop performance, and documentation and record keeping (p < 0.05). The difference between expected yield and actual yield realized by farmers in Bihar was higher when compared to the farmers of AP. The number of farmers who practiced record keeping was significantly higher in AP when compared to Bihar. Farmers of AP had significantly higher access to timely availability of seeds in adequate quantities from credible sources. The prices of seeds were significantly higher in AP when compared to Bihar. There was also statistically significant difference (p<0.05) between the farmers of AP and Bihar with respect to composite scores on accessibility to

Table 11: Distribution of farmers on the overall scores of accessibility to quality seed

Overall accessibility to quality and	Andhra Dra	$\frac{1}{120}$	Bihar	(n-120)
Overall accessibility to quality seed	Allullia Fla	desii $(11-120)$	Dillar	(11-120)
Categories	f	%	f	%
Very Low (Below Mean-2SD)	4	3.3	2	1.7
Low (Between Mean-1SD & Mean-2SD)	18	15.0	10	18.3
Medium (Between Mean-1SD & Mean+1SD)	88	73.3	84	70.0
High (Between Mean+1SD & Mean+2SD)	10	18.3	24	20.0
Very High (Above Mean+2SD)	0	0.0	0	0.0
Total	120	100	120	100

Parameter	Mean value		Mean	't' value	Significance
	Andhra Pradesh	Bihar	Difference		
Timely availability of seed	3.82	3.20	0.62	3.813	**
Availability in adequate quantities	3.93	3.42	0.517	2.954	**
Proximity to seed source	3.87	3.93	-0.067	0.581	NS
Credibility of source of seed	3.98	2.93	1.050	6.633	**
Price of seed	2.82	3.87	-1.050	7.939	**
Documentation and record keeping	3.12	2.68	0.433	2.186	*
Cultivation of improved cultivars	3.82	3.80	0.017	0.102	NS
Physical and genetic purity of seed	3.12	3.18	0.067	0.604	NS
purchased from market					
Crop performance	3.60	3.17	0.433	2.707	*
Quality of farm saved seed	4.15	3.97	0.183	1.581	NS
<b>Composite score</b> (Overall accessibility to quality seed)	72.43	68.30	4.133	4.467	**

Table 12: Difference in mean values of scores of accessibility to quality seeds by farmers in AP and Bihar

Note: \*Significant at 5%; \*\*Significant at 1%; NS = Not significant.

quality seed. Farmers of AP fared comparatively better than their counterparts in Bihar with respect to overall accessibility to quality seeds as is evident from higher mean score. Gajhbiye (2014) reported that overall effectiveness of seed delivery systems (based on composite scores of four parameters namely availability, accessibility, quality and timeliness) to farmers in Patiala district of Punjab in India was highest for an NGO followed by Private Seed Companies and Government Agencies in that order. However, the scale of seed delivery system by NGO was small but that of government agencies and PSCs was very large.

The experiences of farmers in the study area indicated that increase in Seed Replacement Rate (as evident from purchase of new seeds every season from market) in itself is not an indicator of use of quality seed and high crop productivity. There are risks associated with purchasing new seeds every year (replacing seeds) from market under weak quality control regime such as crop failure on account of spurious seeds. Hence, extent of crop failure by using purchased seed (against use of farm saved seed) and difference in actual yield realized by farmer against expected yield are to be estimated as externalities of increasing SRR. Combination of parameters such as Variety Replacement Rate (VRR), SRR and use of farm saved seeds seems to be the better and scientific indicator of farmers' accessibility to quality seed and increasing crop productivity. Government's focus on increasing SRR without strict quality control in seed production,

distribution/sale and use is unscientific. The probability of crop failure on farmers' field owing to spurious seeds would be high with high SRR under weak seed quality control regime. Hence, strategy of increasing SRR to promote use of quality seeds and production in the country must be preceded by strict quality control of seeds meant for sale by formal sector.

## CONCLUSION

Farmers face several constraints in procuring quality seeds required for sowing and its use. The present study measured the extent of farmers' accessibility to quality seed using a scale consisting of ten parameters. The study found that there was no statistically significant difference (p>0.05) between the farmers of AP and Bihar with respect to variables such as proximity to seed source, physical and genetic purity of purchased seed and farm saved seed. It indicated that the major source of purchased seeds in both the states was dealer/retailer at nearby tehsil/mandal/town headquarters. The physical and genetic purity of seeds purchased from market in both the states was moderate whereas quality of farm saved seeds in both the states was very high. The difference was statistically significant with respect to variables such as timeliness in availability of seeds, availability in adequate quantities, credibility of source of seed and price of seeds (p<0.01); crop performance, and documentation and record keeping (p < 0.05). Farmers of AP had significantly higher access to timely availability of seeds in adequate quantities from credible

sources. The prices of seeds were significantly higher in AP when compared to Bihar. The difference between expected yield and actual yield realized by farmers in Bihar was higher when compared to the farmers of AP. The number of farmers who practiced record keeping was significantly higher in AP when compared to Bihar. There was also statistically significant difference (p<0.05) between the farmers of AP and Bihar with respect to composite scores on accessibility to quality seed. Farmers of AP fared comparatively better than their counterparts in Bihar with respect to overall accessibility to quality seeds. Great degree of variation existed in the states of Bihar and AP in terms of specific parameters of accessibility to quality seed to farmers. However, overall accessibility to quality seed in both the states was found to be medium for majority of the farmers indicating the gap and consequent potential in addressing the constraints. The low physical and genetic purity of purchased seed and consequent lower yields was a cause of concern in both the states and requires the attention of central and state governments in addressing the gaps in infrastructure and skilled manpower in public sector seed system. The experiences of farmers in the study area indicated that increase in SRR (as evident from purchase of new seeds every season from market) in itself is not an indicator of use of quality seed and high crop productivity. There are risks associated with purchasing new seeds every year from market under weal quality control regime such as crop failure on account of spurious seeds. Hence, extent of crop failure by using purchased seed (against use of farm saved seed) and difference between expected yield and actual yield realized by the farmer are to be estimated as externalities of increasing SRR. Hence, combination of parameters such as Variety Replacement Rate (VRR), SRR and use of farm saved seeds seems to be the better and scientific indicator of farmers' accessibility to quality seed and increasing crop productivity.

There is a strong need to create awareness among the farmers regarding record keeping of seed transactions. This is crucial for farmers in settling economic and legal issues related to compensation, insurance and other consumer rights. Informal seed sector (farmers' own farm saved seed) needs to be strengthened as an alternative to the formal seed sector to protect the farmers, especially the small and marginal farmers, from indulging in distress purchase of spurious seeds from the open market. The Seeds Bill 2004, which is pending in the Parliament to be passed into an act, needs to address the problems of farmers by incorporating suitable amendments related to compensation mechanism, regulation of seed sale prices and incentivizing informal seed sector.

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