

Farmers' Satisfaction Level with Zero Tillage Technology

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Abstract

Zero tillage showed lesser population of Phalaris minor and more population of chenopodium album and rumex species compared to conventional tillage. The incidence of termites, powdery mildew and karnal bunt was either less or same in zero tillage fields whereas the incidence of pink stem borer was more under zero tillage. Farmers were able to get at par slightly higher yield under zero tillage. Farmers adopted zero tillage because of more yield, cost saving and less phalaris minor infestation and they were satisfied with this technology. Due to non availability of machine and less yield, some of the farmers discontinued zero tillage. The technology has to be adopted in both rice and wheat crops to reap full benefits of the technology, as the farmers follow rice-wheat crop rotation in the Indo-Gangetic plains. The farmers were satisfied with zero tillage due to saving in time, money, advantage of technology to women, status enjoyed, timeliness of sowing and yield, about role of institutes and SAUs in transferring of technology. This paper presents an analysis of major impact, dissemination and adoption of this new technology.

Wheat is generally grown after intensive cultivation involving 6 to 17 tractor passes with various implements in different parts of the country (Sharma *et al.*, 2005). This practice is called as conventional tillage. To prepare the field for seeding, the farmers use disk plough called harrow, cultivator (having tynes) and then plank it with a heavy wooden log to break the soil clots. The farmers pulverize the soil before seeding wheat crop to the extent that if a mud pot is dropped from a height of 6 feet and if it does not break, such a field is considered to be good for seeding. In the years ahead there will be a steep increase in the energy demand for agriculture due to mechanisation. Therefore, a need was felt to optimise energy usage by improving tillage practices and developing efficient machines for growing crops. During the past few years, research efforts were focussed to reduce the cost of cultivation, increasing productivity and maintaining, rather improving the soil health. Initially, the farmers used higher seed rate and fertilizers in wheat

crop but later on similar package of practices were used in zero tillage as in conventional.

Zero tillage technology is a seeding mechanism in one go with a narrow/knife type line drill. The technology is mainly adopted by the farmers in wheat crop. Due to the efforts made by different development departments, the adoption of zero tillage has spread from 120 ha (1997) to 1200 ha (1998) to 12,000 ha (1999) (Hobbs *et al* 2000) to 3.2 million ha in 2006 (RWC website). The present study was conducted to assess the satisfaction level with zero tillage technology.

Methodology

The experiments were conducted for three successive years at four permanent sites, each having an area of about one hectare in Darar, Kurali, Barota and Newal villages of district Karnal, Haryana, India. The soils at all the sites were loam, sandy loam to clay loam with pH in the range of 8.0 to 8.5. The fields were

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under rice-wheat cropping system for the last three decades. In all the experiments wheat cultivar PBW 343 was sown using a seed rate of 100 kg/ha. Recommended dose of herbicides (Clodinafop @ 60 g/ha, Sulfosulfuron @ 25 g/ha, Metsulfuron @ 4 g/ha) were applied to control weeds. The row to row spacing was maintained at 20 cm. During the two consecutive years i.e. 2004-05 & 2005-06, slightly early wheat sowing (25 October to 31 October) was done under zero tillage and conventional tillage in an area of one acre each to evaluate the effect of tillage on weeds. An untreated control plot of 50 x 50 cm was left at three places in each tillage option during these two consecutive years. From these places weed density and fresh weight were recorded at 120 days after sowing. Sowing of wheat was done from 1st November to 22nd November under timely sown conditions, however, the sowing date at a particular location was same for all the treatments. The qualitative data for pests was recorded under various tillage practices. The influence of tillage system on pest situation was observed in the fields across the locations. The visual observations and qualitative data were also collected.

A field survey was conducted to know the adopters' perception about zero tillage technology. The term adopter is operationalised as a farmer who had used zero tillage on any part of his cropping area. One hundred zero tillage adopters from Gonder, Bhaini Khurd, Kacchwa, Pundrak, Jundla, Sultanpur, Gorgarh, Bastali, Brass, Dabri, Pakhana, Shonkra, Manjura, Janeshro, Hathlana, Northa, Jalmana villages of Karnal district were selected for the purpose. The responses were recorded in a pre designed interview schedule.

Results and Discussion

Pest situation in zero tillage vis-à-vis conventional tillage

The incidence of powdery mildew was observed on Variety PBW 343 in most of the wheat fields. Other pests like foliar aphids were observed but their incidence was below the damaging level. Pink Stem borer was noticed in zero tillage plot at Kurali, but the incidence did not last for more than two weeks in December. Yellow and brown rusts were observed but level of incidence was low. The grains were almost free from Karnal Bunt, black point and black discoloration in both the systems. The percentage of disease incidence in grains was not worth recording (Singh and Kumar, 2005).

The influence of the tillage was observed on pink stem borer (*Sesamia* spp), termite, powdery mildew and Karnal bunt diseases. The influence on other pests was not significant. The termite damage was reasonably low in zero tillage plots which can be attributed to either frequent irrigations or the hard soil conditions. Similarly, the powdery mildew was also less in zero tillage compared to conventional tillage which can be attributed to slightly higher bulk density and comparatively higher moisture retained in zero tillage due to increase in micro porosity and decrease of macro porosity. The stem borer incidence was sporadic with high intensities in few fields and when the temperature goes up in first fortnight of December the incidence was in general and or more in zero tillage compared to conventional tillage. Similarly, the post harvest disease data suggests that the Karnal bunt incidence was also low in zero tillage plots. Thus there is need to thoroughly see the influence of tillage on

Table 1: Pest situation in zero tillage vis-à-vis conventional tillage

Location	Pink Stem borer	Termite	Powdery mildew	Karnal bunt
Kurali	More	Less	No change	Less
Darar	More	No change	Less	Less
Barota	No change	Less	No change	Less
Newal	No change	No change	No change	Less

pest dynamics involving people across disciplines and with proper statistical plans so that definitive conclusions can be drawn (Table 1).

Weed dynamics

The intensity of *Phalaris minor* was less by 30-40% in zero tillage as compared to conventional tillage, whereas the intensity of broad leaf weeds increased due to zero tillage practice. (Singh *et al* 2002). There was no definite trend of broad leaf weeds, *Malwa parviflora* and *Rumex retroflex* were found to increase in the rice wheat system in general and particularly under ZT at one location (Yadav *et al.*, 2002).

The problem of *Phalaris minor* was less in the zero tillage fields as compared to conventional (Table 2). The lower population of P.minor in zero tillage was due to lesser soil disturbance as compared to conventional system, therefore, zero tillage system can be an important strategy for effective management of this troublesome wheat weed. These findings are well supported by Singh *et al.* (2002). Earlier, it has been reported that under zero tillage farming, if good rotations and weed management strategies are in place, a reduction in total weed numbers may occur. However, a different weed spectrum could emerge (Collins and Patabendige, 1999).

Table 2: Effect of tillage options on *Phalaris minor* (no/m²)

Village	Zero tillage	Conventional
Kurali	30.3	38
Darar	15	27.7
Barota	29	71
Newal	35.7	59
Mean	27.5	49

The data in the Table 3 indicates that broad leaf weeds particularly *Chenopodium album* and *Rumex Species* were slightly more in zero tillage fields than conventional. A new weed *Malva parviflora* has

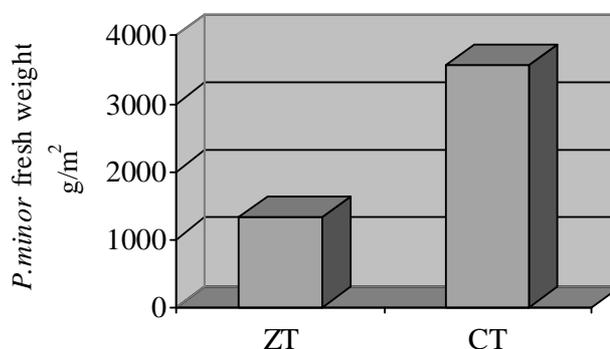
emerged in some of the zero tillage fields. The findings are in line with Singh *et al.* (2002) and Yadav *et al* (2002).

Table 3: Effect of Tillage Options on Broad Leaf Weeds (no./m²)

Village	Weeds	Zero tillage	Conventional
Kurali	<i>C. album</i>	11.7	3.3
	<i>Rumex Species</i>	7.3	2.3
Darar	<i>C. album</i>	13.3	12.0
	<i>Rumex Species</i>	11.3	7.7
Barota	<i>C. album</i>	1.3	1.0
	<i>Rumex Species</i>	14.0	5.7
Newal	<i>C. album</i>	5.7	7.3
	<i>Rumex Species</i>	9.0	6.0
Mean	<i>C. album</i>	8.0	5.9
	<i>Rumex Species</i>	10.4	5.4

The fresh weight of *Phalaris minor* was only one-third under zero tillage compared to conventional tillage (Fig.1).

Figure: 1. Effect of tillage on *P.minor*



Wheat Productivity and Economic Parameters

The results have shown that similar grain yields were recorded in both the zero and conventional tillage, but the net return was higher in zero tillage (Rs 10, 187/ha) compared to conventional (Rs 7202/ha). The per unit cost of wheat production was less under zero tillage (Rs 4773/ton) compared to conventional (Rs 5332/ton) (Table 4).

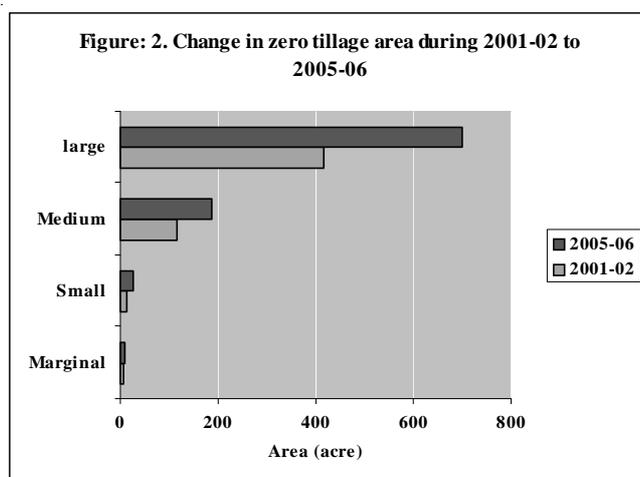
Table 4: Effect of tillage options on wheat productivity and economic parameters

Parameters	Tillage technologies	
	Zero tillage	Conventional
Yield (t/ha)	5.25	5.24
Cost of Cultivation (Rs/ha)	25058	27943
Net Return (Rs/ha)	10187	7202

The main saving under zero tillage was on land preparation apart from the indirect advantages such as low depreciation of machinery, labour savings, time saving and comparatively lower water requirement.

Change in area under zero tillage technology

A survey of the 100 farmers was conducted during 2001-02 and it was again repeated with the same set of respondents (97) in 2005-06. All the zero tillage adopters have increased their area under this technology over a period of time, irrespective of their size of holding (Figure. 2) due to higher net return.



Residue management

The rice residue management is one of the major problems in adoption of zero tillage. The farmers face problem in seeding wheat crop in full crop residues, which compel them to fully or partially burn the rice residues. Majority of the farmers (53%) partially burn the rice residue followed by removal (33.33%) and full burning (14%) (Table 5). All the small and marginal

farmers removed the rice residues for fodder purpose. However, the large and medium farmers preferred to burn rice residues, partially or fully. Burning of rice residue has posed a challenge to the researchers to protect the environment from air pollution. New initiatives in the form of rotary disc drill and happy seeder have been taken to tackle these issues.

Attitude towards zero tillage technology

The farmers had favorable attitude towards zero tillage technology. They were convinced that this technology is profitable, no special skill required to adopt and the crop does not turn yellow after the first irrigation. The farmers who adopted this technology feel like playing an advisor's role as a disseminator of the technology. They want that the government should promote Zero Tillage Technology (ZTT) as it saves diesel, money and water not only in first irrigation but subsequent irrigations also. However, studies have shown that there is less saving of water in zero tillage (Annual Report, DWR, Karnal 2003-04).

Knowledge about Zero Tillage Technology

The farmers had fairly good knowledge about zero tillage technology. They were aware of ideal moisture condition required for zero tillage sowing, height of stubbles, utility in different kinds of soils, emergence of wheat, seed placement, crop vigour, weed infestation, input saving etc. They knew that the crop vigour is better, less *Phalaris minor* and labour and fuel saving in zero tillage compared to conventional. The farmers still have some misconceptions about adoption of zero tillage technology for a longer period and efforts are needed to educate them. The development officials should come forward for this purpose.

Satisfaction with zero tillage technology

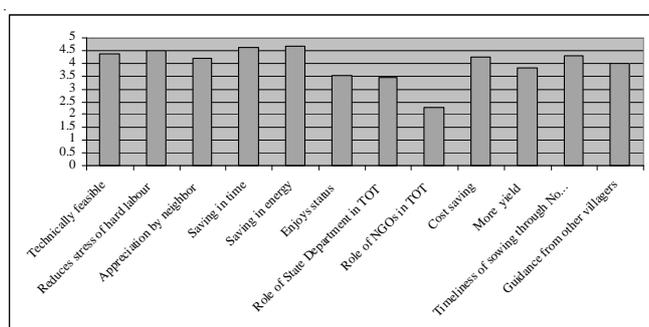
Farmers exhibited satisfaction due to adoption of zero tillage technology. They were satisfied with saving in time, money, advantage of technology to women, status enjoyed, timeliness of sowing and yield, about role of institutes and SAUs in transferring of technology. They had little satisfaction about role of NGOs in technology transfer.

Table 5: Residue management

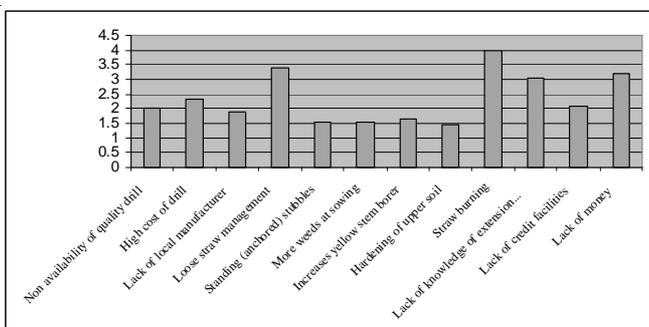
Categories	Removed	Full burning	Partial burning	Total
Marginal (<1 ha)	6 (100)	-	-	6
Small (1-2 ha)	8 (100)	-	-	8
Medium (2-4ha)	8 (22.22)	4 (11.11)	24 (66.67)	36
Large (>4 ha)	11 (22.0)	10 (20.00)	29 (58.00)	50
Overall	33 (33.00)	14 (14.0)	53 (53.0)	100

Figure in parenthesis indicate percentage

Level of satisfaction after adoption of ZT technology



Constraints in adoption of ZT technology



Constraints in adoption of zero tillage technology

Farmers viewed no technical constraints seriously, however, there were few extension constraints like lack of adequate manpower with the state department of agriculture and input agencies to disseminate the technology. The farmers also mentioned lack of money to purchase new machines and inputs. Lack of appropriate loose straw management, high cost of drill, lack of money to buy machines and inputs, inadequate extension facilities were the serious

constraints perceived by them.

Conclusion

Zero and conventional tillage produced similar grain yield. The problem of *Phalaris minor* was less in zero tillage compared to conventional. The population of broad leaf weeds was less in conventional tillage. The termite damage and incidence of powdery mildew was reasonably low in zero tillage compared to conventional. The farmers had favourable attitude towards zero tillage technology and possessed fairly good knowledge about it. Farmers were satisfied with zero tillage technology, particularly, saving in time, money and yield. Lack of money to purchase new machines and inputs were the constraints perceived by the farmers in adoption of zero tillage technology.

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Alternate Energy Sources for Enhancing Energy Efficiency and Self Sufficiency of Agricultural Farms

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Abstract

The study conducted on energy consumption pattern in the major crops viz. sugarcane, paddy and wheat in Peric region of Uttaranchal reveals that to sum up output/input ratio was better in case of tractor operated farms in sugarcane. It was almost equal in all the three farms for paddy crop. If we calculate these values with out straw (in case of mechanical farm) it is only 60% of the bullock operated or mixed farms. In case of wheat output/input ratio was highest in case of bullock operated farm (8.1) followed by mixed farming (7.9) and tractor operated farm (7.4). This value for tractor operated farm is just half if we don't include the energy output of straw which in burnt in the field.

Perhaps most importantly, the global community must address the issue of the cost of advanced, clean energy technology. Trade barriers, capacity building, tariff reform and other issues can be overcome. However, if we refuse to recognize that advanced clean energy technology will cost more and make energy prices rise for the end-user, we're refusing to address the real issues - namely, who will pay the incremental cost of advanced technology, and will it be the economically deprived end-user in a developing country? The move toward sustainability will also have an impact on the 1.5 billion people without access to commercial energy and the 1.5 billion with inadequate access. hopefully, no one believes that sustainability means denying the benefits of modern society to those who are unserved or underserved today. We must find ways to work toward ending economic and energy poverty for hundreds of millions of people around the globe. This calls for new approaches that continue to allow economic development while addressing both local environmental issues and global issues such as climate change. Similarly, the need to improve alternative energy education has been raised and discussed by many people (Charter, 1996; Hasnain et al., 1998). It was in the above context,

the study was conducted to assess the energy efficiency and energy self sufficiency at the agricultural farm in Indian context.

Methodology

The study was conducted in three selected villages of Rudrapur and Gadarpur blocks of Udham Singh Nagar District of Uttar Pradesh. These blocks were purposely selected because all the three kinds of villages representing three different farming situations i.e. non-commercial farming, mixed farming, and commercial farming are available in these blocks. For each selected villages 50 farmers were randomly selected making a total of 150 respondents. Two villages namely Shantipuri (2 and 3) and Matkota from Rurapur block and Majra Anand Singh from Gadarpur block were selected for study. These villages were selected in consultation with block officials and Pantnagar University officials.

Basic data regarding the selected villages and the block was collected from the block headquarters. On the basis of the literature reviewed and objectives decided, the interview schedule was prepared and modified twice in consultation with the experts. The schedule was pilot tested in neighbouring villages of

Pantnagar University. The purpose of pilot testing was to make sure that the questions are appropriate in the schedule. The necessary modifications were incorporated and final schedule was prepared. The basic data regarding land holdings, family size, type of soil, cropping pattern, available energy sources, including human, animal, bio-mass, power sources and agricultural tools and implements were collected from individual farmers with the help of structured schedule.

Detailed data were collected on energy consumption in different farm operation. Realizing the magnitude of the work, the data were collected for only three important crops of the area, i.e. Paddy, Sugarcane, and Wheat. The farmers were contacted at their farm in *rabi* as well as *kharif* seasons.

The number of human and animal hours, fuel or electricity consumed, type and time of machinery and implement used was recorded for each operation. Quantity of input in terms of seeds, fertilizers, FYM, pesticides and insecticides used for each crop was recorded separately. Output in terms of crop yield and agricultural waste were also recorded for each crop.

Generally, different energy sources are used for different farm operations, which are measured in different units. For the sake of uniformity Mega Jules (MJ) was adopted as a common unit of energy. Human and animal hours, seed, fertilizers, FYM, pesticides, fuel and electricity consumed on each farm was converted into energy by taking suitable energy equivalents (Maheshwari, 1984).

Result and Discussion

Land to man ratio

Table 1 clearly indicates that land to man ratio

Table 1: Land to man ratio

Land holding	Average holding	Average family	Land to man ratio
At present	6.08	8.10	0.75
5 years back	6.62	8.28	0.79
10 years back	6.71	7.28	0.92
15 years back	6.58	6.28	1.04

is continuously reducing with the passes of time and in turn the pressure on land is increasing. In 1981 the per capita land availability was 1.04 acres, it come down to 0.92 in 1986, 0.79 in 1991, 0.79 in the year 1996.

Land use pattern

The information collected on land use pattern is western Tarai area of UP (Table 2) showed that majority of the farmers are small and medium. Very few were the large farmers. The average land holding was about 2 ha. The crop intensity of the area ranged from 125 to 249% with an average of 185%. Farmers generally grow wheat, sugarcane and mustard and lentil in *rabi* season, The area under wheat was about 45% followed by sugarcane 41%. The area under mustard was around 8%. Farmer grow fodder crop in about 3.7% area. Other crops grown are pea, oat, etc on small scale.

Table 2: Area under different crops

(Net sown area in *rabi* season: 205 acre)

Crops	Area	Percentage
Wheat	92.65	45
Sugarcane	85.00	41
Mustard	18.00	8
Fodder	7.25	3.7
Net sown area in <i>kharif</i> season:		
Paddy	107	53
Sugarcane	82	41
Fodder	8.5	4
Net sown are in zayad season : 6.5 acre		
Maize	2.5	30

In *kharif* season paddy is cultivated in about 53% of the net sown area followed by sugarcane about

41% and fodder crops in 4.1% area. In zayad season few farmers grow maize, vegetables and fodder crops in small portion of their land holding.

Energy consumption pattern

For the purpose of analysis, farms were categorized into three categories viz., bullock operated, (those who own bullocks and perform operation with bullocks), bullock and tractors operated i.e. mixed farms (who perform farm operation with bullock and hired tractors) and tractor operated farms (those perform majority of farm operations by tractors). On the basis of data collected, it was found that 18.5 per cent farms came under bullock operated category. 63 percent farms under mixed farming category and remaining 18.5 percent were under tractor operated category.

(i) Sugarcane

Total energy consumption per ha in sugarcane (Table 3) production was 59231 MJ for bullock operated farm, 60615 MJ for mixed farms and 62396

MJ for tractor operated farms. The highest energy consumption was for seed of sugarcane. It was more than 50% (35000 MJ) of the total energy consumption in sugarcane production. Fertilizer and transportation were second highest energy consuming inputs/operations. Both these operations consumed about 25% (12.5% each) of total energy consumed in sugarcane production. Irrigation was another important operation which consumed about 5% of total energy.

The energy output/input ratio ranges from 5.37 to 6.45, the highest being for the mechanized farm. This indicated that the increased energy input also yields higher profit to the farmers.

(ii) Paddy

Total energy consumption per hectare in paddy was 14843 MJ for bullock operated farms 16190 MJ for mixed farms and 17445 MJ for tractor operated farms (Table 4). In paddy, energy utilization was highest for the fertilizer application for all the categories of farms

Table 3: Energy consumption in sugarcane under different farming situations (MJ)

S.No.	Farm operation	Bullock operated farm	Mixed farm	Tractor operated farm
1.	Land preparation	1600	1800	2000
2.	Sowing	500	590	680
3.	Bund making	30	30	45
4.	Inter-culture	650	700	800
5.	Irrigation	2871	2965	3161
6.	Fertilizer	8440	9000	9500
7.	Pesticide	220	300	380
8.	Harvesting and bunding	1120	1230	1330
9.	Transportation	8800	9000	9500
10.	Seed	35000	35000	35000
	Total	59231	60615	62396
Output				
	Sugarcane	238500	278250	302100
	Sugarcane tops	79500	92750	100700
	Total output	318000	371000	402800
	Energy input	59231	60615	62396
	Output/input ratio	5.37	5.23	6.45
	Yield q/ha	450	525	570

Table 4: Energy consumption in paddy under different farming situations (MJ)

S.No.	Farm operation	Energy input (MJ)/ha		
		Bullock	Mixed	Tractor
1.	Land preparation	1540	1750	1810
2.	Nursery raising	440	530	600
3.	Bund making	38	40	45
4.	Irrigation	3100	3315	3550
5.	Weeding	430	440	460
6.	Fertilizer	8200	8870	9600
7.	Pesticide	140	180	200
8.	Harvesting and threshing	560	640	720
9.	Transportation	215	245	280
10.	Seed	180	180	180
	Total	14843	16190	17445
Output				
	Yield q/ha	40	44	48
	Paddy grain	58800	64680	70560
	Straw	50000	55000	60000
	Total output	108800	119680	130560
	Input	14843	16190	17445
	Output/input ratio	7.33	7.39	7.48
	Without straw			4.40

and it was about 50% of the total energy consumed in paddy production. Second highest consumption of energy was in irrigation (ranged from 3100 to 3550 MJ) which is lower than normal energy consumption in irrigation operation due to the use of artisan wells in the locality. Yield was 40, 44 and 48 q/ha in respect to bullock operated, mixed and tractor operated farms respectively. Energy output/input ratio ranges from 7.33 to 7.48 highest being for the tractor operated farms. However the difference between highest and lowest is negligible. In case of tractor operated farms, straw is not available with farmers while harvesting the crop mechanically as it is burnt in the fields. Under this situation the output/input ratio for tractor operated farm is only 4.4 which is far below the bullock operated and mixed farms.

(iii) Wheat

In case of wheat maximum energy consumption

was in case of fertilizers (6500 MJ, 7200 MJ and 8300 MJ for bullock operated, mixed farm and tractor operated farms respectively) (Table 5). It was followed by irrigation (2600 MJ, 2800 MJ and 29.50 MJ for bullock operated, mixed farm and tractor operated farm respectively). Energy input on seed was same for all the three type of farmers with 1871.5 MJ energy. In tractor operated farm harvesting is done mechanically, hence no energy in threshing. However, energy requirement for transportation in case of tractor operated farms has been included in the head harvesting itself. Total energy input for these farms in wheat crop is (14051.5 MJ, 15701.5 MJ and 17731.5 MJ for bullock operated, mixed farm and tractor operated farms respectively).

The average yield of these farms were 42 q/ha in case of bullock operated, 45 q/ha mixed farms and 47 q/ha in case of tractor operated farms. The energy output and input ratio was highest in case of bullock

Table 5: Energy consumption in wheat under different farming situations

S.No.	Farm operation	Energy input (MJ)/ha		
		Bullock	Mixed	Tractor
1.	Land preparation	1500	1800	2400
2.	Sowing	350	750	750
3.	Bund making	30	30	60
4.	Interculture operations (use of weedicide)	50	50	500
5.	Irrigation	2600	2800	2950
6.	Fertilizer/manures	6500	7200	8300
7.	Harvesting	250	250	900
8.	Transportation	200	200	-
9.	Threshing	700	750	-
10.	Seed	1871.5	1871.5	1871.5
	Total	14051.5	15701.5	17731.5
Output				
	Wheat grain	61750	67620	70560
	Straw	52500	57500	60000
	Total output	114240	125120	130560
	Input	14051.5	15701.5	17731.5
	Output/input ratio	8.1	7.9	7.4
	Without straw	-	-	3.79
	Yield q/ha	42	45	47

operated (8.1) closely followed by mixed farms (7.9) and lowest in case of tractor operated farms (7.4). Further in case of tractor operated farms the straw is not available to the farmers as it is burnt in the field after harvesting mechanically. Under the situation output/input ratio of tractor operated farms is only 3.79 which is almost half of the bullock operated and mixed farms.

There is a basic difference between the input of energy in organized industry on one hand and agricultural on the other. Increased energy inputs in mechanization increase both the rate and total productivity within a given area and time. Further often quality of life is also improved by mechanization. In contrast, agriculture is life and land oriented. The time spent on crop production and nature and sequence of operations required are the same whether or not mechanization is introduced. Hence the rate of production per unit land is not changed as long as timely inputs are given for various operations.

Hence these energy inputs can well be through animal and other renewable sources and not necessarily in the form of commercial energy sources specially in case of small and marginal farmers. Thus high energy only helps to increase the per capita productivity and reducing the drudgery but in many cases it is not economical either in terms of quality or quantity produced. That the productivity in non-mechanical small land holdings would also be high has been substantiated by many studies.

Conclusion

Considering that the commercial sources of energy which are used in mechanized farms are not adequately available, not everlasting, costlier imported and have adverse impact on the environment, there is a need to develop alternate system for different regions (decentralized energy planning) utilizing local materials (inputs) and renewable energy sources so that energy

self sufficiency of the farmers can be enhanced. Site specific energy planning in agriculture will very much depend on the size of land holding, economic status of the farmer, in addition to factors like agro-climatic conditions, crop pattern etc. Selection of suitable technology and optimization will not only depend on material and energy resources and technology but also on socio-economic, cultural, environmental ecological political aspects.

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Agroforestry: Farmers Preferences for Trees

R.P. Dwivedi, Aashutosh, Avaneesh Kumar and S.K. Dhyani

Abstract

Present investigation reveals the farmers' preferences for trees in agroforestry and relationship between age, land holding of the farmers with trees preferences. The total numbers of trees available with the respondent farmers are 2950 trees. Out of which 880 trees are planted. On an average every farmers has 46.83 trees. The average numbers of planted and natural trees are 4.67 and 35.08 respectively. Shisham is the first preference of the farmers. Teak, Neem are the second and third choice respectively. It was found that the respondent of age group 21-40 years (young), Shisham is the first preference, while Sagon, Neem and Subabul are second, third and fourth choice, respectively. For respondent between 41-60 age group, (middle age) the choice of MPTS is more or less similar to young respondents. The older respondent (61-80 years) preferred Shisham, Sagon, Siris and Butea as their preferences in descending order. The overall preference of MPTS in relation to age was found as Shisham-first, Sagon-second, Neem-third and the Sirisis as fourth choice. The marginal farmers preferred trees in descending order as Shisham, Sagon, Subabul and Eucalyptus. For small farmers the preferences are as Shisham-first, Neem- second, Eucalyptus- third and Teak-fourth. For older farmers the preferences are as Shisham-first, Teak-second, Eucalyptus-third and Neem as fourth choice. The overall preference for MPTS reported as Shisham-first, Teak-second, Eucalyptus-third and Neem as fourth choice. It is found that there is positive correlation (0.95) between holding size of the farmers and the availability of trees at their field. It indicates that higher holding size promote more number of trees with farmers.

Agroforestry encompasses land use systems where woody perennials are intentionally grown on the same piece of land with agricultural crops and/or animals either in form of special arrangement of temporal sequence. A good deal of work has been done on the subject during last one-and- half decade. Agroforestry is an age-old land use that has been practiced for thousand of years by farmers the word over. Agroforestry is a land use that involves deliberate retention, introduction or mixture of trees or other woody perennials in crop/ animal production fields to benefit from the resultant ecological and economic interactions (Nair, 1985).

Bundelkhand region of India comprises seven

district of Uttar Pradesh (Jhansi, Jaloun, Lalitpur, Banda, Hamirpur, Mahoba and Chitrakutdam Karvi) and six districts of Madhya Pradesh (Datia, Tikamgarh, Panna, Sagar and Damoh) including Lahar and Bhandar subdivision of Bhind and Gwalior districts respectively.

Land of Bundelkhand region is undulating, poor in fertility status, shallow depth with poor water holding capacity. Irrigation facilities are limited and are primarily through open wells having poor water discharge capacity on the basis of colour, texture, depth etc. The soil of this region can be classified in two major group i.e. Red soil (includes rakkar and parwa) and black soil (includes mar and kabar) it has been reported that 56% areas of Bundelkhand region of U.P. is under red soil group. The

dwindling forest cover in the region resulted in shortage of fodder and fuel wood and therefore, animal dung, the valuable source of well rotten farm yard manure, is diverted for making dung cakes to be used for fuel purpose, in the region, though there is in abundant area under natural grass land with the grasses, trees, bushes, etc, but the practice of 'Anna Pratha' (to keep animals let loose) left these grasses with grasses and trees due to over grazing. The available trees are heavily lopped in proportion to their age and size resulting in the death of the trees. As a result of prevailing climatic condition, large area of the region is under rained agriculture. The socio-economic status of the farming community is very poor in this region.

The rural poor are commonly considered as the primary beneficiaries of agroforestry. Consequently agroforestry technologies are expected to be especially relevant and applicable to small-scale-land owners. Therefore, social acceptability is a much more important measure of success for agroforestry technologies than for commercially oriented, high input agricultural and forestry technologies. In agroforestry, farmers preferences about trees is prerequisite for designing the agroforestry program for the concerned region. Though a lot of research information has been generated in cultivation of different tree species, little has been done with respect to knowing farmers preferences about tree species under agroforestry. Further, the need for conducting research on these items was emphasized by Shah (1979). Therefore the present study was undertaken with the twin objectives i.e. (i) To study the preferences of the farmers about trees and (ii) To find out relationship, if any, of age and land holding size of the farmers with trees preferences.

Methodology

Study area

Two villages namely Shekhar and Nayakhera in Babina block of Jhansi District of Bundelkhand Region were selected purposefully for the present investigation. The distance of the study area is 38 km from district

headquarter (Jhansi).

Sample and data collection

The sample for the present study comprised 189 farmers of two villages namely Shekhar and Nayakhera in Babina block of Jhansi district. The total respondents (n=189) were categorized according to holding size into three category i.e. marginal farmers (holding up to 2.5 acre), small farmers (holding > 5acre) and medium and large farmers (holding > 5 acre). In this way there were 63 farmers in every category. The data were collected by individual personal interviews with the farmers. This was done with the help of a specially constructed interview schedule.

Results and Discussion

Background information about the respondents

The average age of respondent was 46.67 years. The majority of the farmers (47.61%) were the young age group, 42.86 percent respondent were in middle age group, while 9.53 percent sample farmers were old. It is revealed that 77.78 per cent respondents were illiterate, 13.23 percent respondents had only primary education. About 5 percent farmers had middle level education. Only 3.18 % respondents had high school and intermediate education.

The majority of the farmers (58.79%) had family size 6-10, members, about one-fourth respondents' family size was 11-15 members, while 23.80 percent farmers had family size up to five members. On an average, every respondent had family size of 7.30 members. The average land holding of the respondent was 4.25 acre. On an average, every farmer had 4.17 acre irrigated land. Only 3.18 percent farmers had unirrigated land, which was on an average 2.5 acre with per farmer.

Available trees at farmers' field

The total numbers of trees available with sample respondents are 2950. Out of which 880 trees were planted. On an average, every farmers had 46.83 trees. The average numbers of planted trees were 4.67 and

the average numbers of natural trees available were 35.08 trees per farmer.

It was found that there was positive correlation (0.95) between holding size of the farmers and the availability of trees at their field. It indicated that there were high correlation between holding size of the farmers and the availability of trees at their farm.

Daily working hours of respondents

The average working hours of men was 7.95 hrs. For women, it was 7.08 hrs. and for children 6.31 hrs. It was interesting to note that the working hours of man and women were more or less similar. The average daily working hours of men, women and children were 17.71 hrs. It was revealed that normal 8 hrs working was not sufficient in case of agroforestry, and the respondents devoted more than 18 hrs of working.

Farmers' preferences for trees

The respondents were asked to list and priorities the MPTS which they want to plant? It was revealed from Table 1 that Shisham (*Dalbergia sissoo*) was the first preference the farmers. Teak (*Tectona grandis*), Neem (*Azadirachta indica*) was the second and third choice respectively. In Bundelkhand region Mahua (*Madhuca latifolia*), Dhak (*Butea monosperm*) and Babul (*Acacia nilotica*) were the common MPTS

Table 1: Farmers' preferences for trees

Tree Species	Preference for trees				Rank total
	I	II	III	IV	
Shisham (<i>Dalbergia sissoo</i>)	39	11	5	2	201
Neem (<i>Azadirachta indica</i>)	6	2	8	17	63
Mahua (<i>Madhuca latifolia</i>)	1	2	0	1	11
Dhak (<i>Butea monosperm</i>)	1	1	0	0	7
Babul (<i>Acacia nilotica</i>)	0	3	7	4	27
Subabul (<i>Leucaena leucocephala</i>)	2	8	7	3	49
Eucalyptus spp	1	8	6	4	44
Teak (<i>Tectona grandis</i>)	10	0	11	5	64

available everywhere But the respondents had not given much emphasis for these MPTS. Therefore, research work on Shisham, Teak and Neem is needed to be concentrated in the Bundelkhand region.

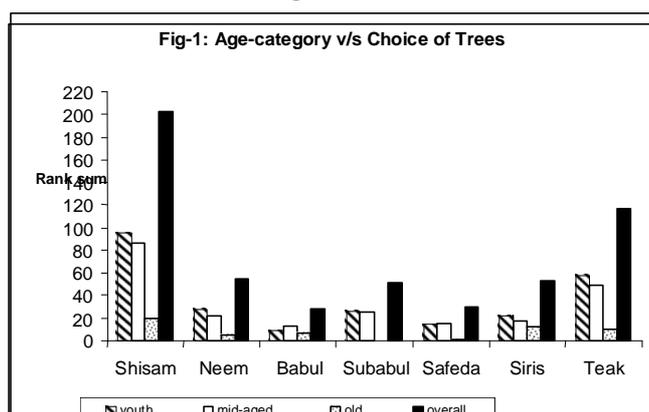
Relationship of age of the respondents with preference of trees

It was thought worthwhile to see the relationship between age and preference of trees. The preference was collected on the basis of ranking of weightage score (Sabarathnam 1988). It was found that for the respondent of age group 21-40 yrs, Shisham was the first preference, while Teak, Neem and Subabul were, second, third and fourth choice, respectively. For respondent between 41-60 age group, the Shisham was first, and Teak, Subabul and Neem were second, third and fourth choice respectively. The older respondent 61-80 preferred Shisham, Sagon, Siris and Butea as their preference. The overall preference of MPTS in relation to age compiled and presented in Table 2. It was observed that the first choice as Shisham (weightage score 202), the second choice was Sagon (weightage score 117), the third choice was neem (weightage score 55) and the fourth choice was Siris (weightage score 52). On the basis of above data, this might be suggested that for Bundelkhand region, research work on Shisham, Sagon, Neem and Siris would be desired. The various problem related to these species might be taken in

Table 2: Age of the respondents and trees preference

MPTs	Age (21-40) (Youth)				Rank Sub total	Age (41-60) (Middle)				Rank Sub total	Age (61-80) (Old)				Rank Sub total	Overall Rank Sum
	I	II	III	IV		I	II	III	IV		I	II	III	IV		
Shisam	19	4	2	1	95	16	6	2	1	87	4	1	-	1	20	202
Neem	1	2	5	7	27	3	-	1	8	22	1	-	1	-	6	55
Mahua	-	1	-	1	4	-	1	-	-	3	-	-	-	-	-	7
Butea	-	1	-	-	3	1	-	-	-	4	-	-	-	1	1	8
Babul	-	1	2	2	9	-	2	3	1	13	-	1	2	-	7	29
Subab-ul	-	6	3	2	26	-	6	3	1	25	-	-	-	-	-	51
Safeda	1	2	3	2	14	1	2	4	1	15	-	-	-	1	1	30
Siris	-	3	4	5	22	-	3	5	2	18	-	2	3	-	12	52
Teak	7	6	5	2	58	2	10	5	1	49	1	2	-	-	10	117

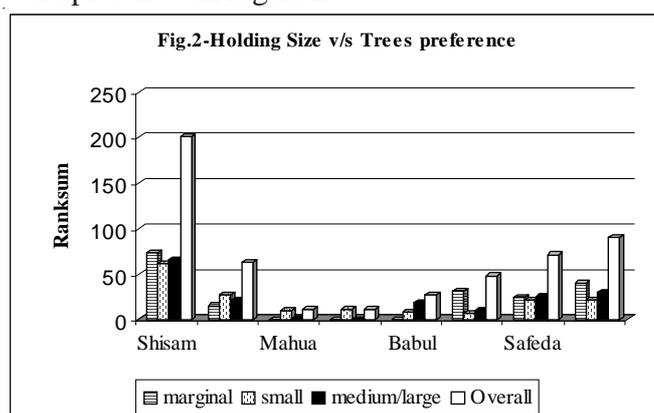
consideration to initiate agroforestry programmed in the Bundelkhand region. It was revealed from Figure 1 that the overall preferences for MPTS are as Shisham, Teak and Neem in descending order.



Relationship of land holding size with preference of trees

The holding size of the farmers was developed into three-category up to 2.5 acre, between 2.5-5 acre and above 5 acre. There were 63 (33.33%) respondents in every category. The responses obtained for preference of trees were ranked and score was given. The results were presented in Table 3. Those who had up to 2.5 acre land preferred MPTS in ascending order as Shisham (73), Sagon(40), Subabul (31) and Eucalyptus (24). However, those farmer with a holding size between 2.5-

5 acre, expressed their willingness as first for Shisham, second for Neem, third for Eucalyptus, fourth for Teak. The farmers had more than 5 acre land choose Shisham as first choice, Teak as second choice, Eucalyptus as third choice and Neem as fourth choice. The overall preference for MPTS reported as Shisham score (201), Teak (91), Eucalyptus (71) and Neem (63) as their preference according order. Research workers in agroforestry are suggested to consider these preference of farmers while planning the farmers related development project. The overall preference of farmers were presented in Figure 2.



The researches in extension education had shown that there are several constraints with verifying degree of seriousness in increasing agricultural production, which were confronted not only by the

Table 3: Relationship between holding size of land and trees preference

	Marginal farmers				Rank Sub total	Small farmers				Rank Sub total	Medium and big farmers				Rank Sub total	Overall Rank Sum
	I	II	III	IV		I	II	III	IV		I	II	III	IV		
MPTs																
Shisam	14	5	1	-	73	11	5	1	1	62	14	1	3	1	66	201
Neem	2	-	1	5	15	3	-	4	7	27	1	2	3	5	21	63
Mahua	-	-	-	-	-	1	2	-	-	10	-	-	-	1	1	11
Butea	-	-	-	-	-	2	1	-	-	11	-	-	-	-	-	11
Babul	-	-	-	-	-	-	1	3	-	9	-	2	4	4	18	27
Subab-UI	1	5	5	2	31	1	1	-	-	7	-	1	3	1	10	48
Safeda	1	4	3	2	24	-	6	1	2	22	-	3	3	-	25	71
Teak	3	6	5	-	40	3	-	4	1	21	4	8	2	2	30	91

farmers but also by the scientists and extension agents. On one hand, these constraints adversely affect the adoption of recommended agroforestry technologies by the farmers while on the other hand, block the flow of agroforestry technology from research stations to extension agents (line departments in case of India) and obviously to farmers.

Timely and inadequate supply of inputs like improved seeds, fertilizers, irrigation facilities, insecticides and pesticides played a key role in the transfer of new technology. Other constraints, namely, high cost involved in purchase of inputs, financial problems, adulteration of inputs were also important in this context at the farmers level. This suggested that all the inputs should be arranged timely and in sufficient quantity nearest to the farmers approach. Agroforestry loan at cheaper rate of interest should be sanctioned to purchase these inputs at the subsidised rates to the farmers.

Proper training was also a constraints in transfer of agroforestry technology. It was also observed during data collection that some farmers had passive attitude towards technology. They did not take any interest in adopting advance technology. Hence, the extension workers of line department should motivate farmers to change their outlook towards scientific training.

Complexity of the technology was the most important constraint in this category followed by risky

nature of technology and cost involved in adopting the technology. There were few farmers who adopt the technology immediately after its release. The technology like measures of tree protection requires more knowledge, skill and intensive training. Hence, the scientists should generate simple and cheaper technology so that the farmers can adopt it easily with less financial burden. Some incentives might also be provided to them for popularising the technology. Therefore, it was suggested that the technology should be simple, cheaper, profitable, less risky and easily available.

Conclusion

Shisham was the first preference the farmers. Teak, Neem were the second and third choice respectively. It is found that for the respondent of age group 21-40 years (young), Shisham were the first preference, while Sagon, Neem and Subabul were second, third and fourth choice, respectively. For respondent between 41-60 age group, (middle age) the choice of MPTS was more or less similar to young respondents. The older respondent (61-80 years) preferred Shisham, Sagon, Siris and Butea as their preferences in descending order. The overall preference of MPTS in relation to age was found as Shisham-first, Sagon-second, Neem-third and the Sirisis as fourth choice.

The marginal farmers preferred MPTS in

descending order as Shisham, Sagon, Subabul and Eucalyptus. For small farmers the preferences were as Shisham-first, Neem- second, Eucalyptus- third and Teak-fourth. For older farmers the preferences were as Shisham-first, Teak-second, Eucalyptus-third and Neem as fourth choice. The overall preference for MPTS reported as Shisham-first, Teak-second, Eucalyptus-third and Neem as fourth choice. It was found that there was positive correlation (0.95) between holding size of the farmers and the availability of trees at their field. It indicated that higher holding size promoted more number of trees with farmers.

The various problems reported were as: Difficulties during ploughing due to roots and canopy of the trees. Effect of shade affected the crop production. According to farmers, there was reduction in crop yield due to less growth of under storey crops. Due to high wind velocity and typhoon the trees and their branches fall down which created hindrances in intercultural operations. *Anna Pratha (stray animals)* of animals do create obstacles during new plantation. Lack of interest by state government employees towards agroforestry could also be seen.

Socio-economic, psychological and personal characteristics of the farmers, to a certain extent, were responsible for the dissemination of agroforestry technologies. The manipulation of such factors might, therefore, help to increase the extent of dissemination. These findings suggested that future agroforestry efforts needed to be focussed on managing and developing locally important trees, fully involving local people, both men and women, and incorporating their knowledge in this process.

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Extent of Adoption about Improved Cultivation Practices of Cumin Production Technology and Source of Information Preferred by Respondents in Jalore District of Rajasthan

M.S. Chandawat¹, M.S. Chouhan² and H. P. Singh³

Abstract

Cumin is one of the important and ancient spices. India is the world's largest producer and consumer of the cumin. It is almost exclusively cultivated in Rajasthan and Gujarat. In year 2007, 167200 tonnes cumin seed was produced in India. It is used as powder, medicinal, beverages, cumin sips, organic cumin, oil and oleoresin, besides manifold medicinal uses. The present investigation was undertaken in Sanchore Panchayat Samiti of Jalore district of Rajasthan with the specific objectives to study the adoption level of improved cultivation practices of cumin production technology among respondents and find out the adoption gap. The farmers had medium to low adoption level of improved cultivation practices of cumin production technology. The highest adoption gap was found in practice of seed treatment (97.67%) followed by plant protection measures and use of high yielding varieties. There was highly significant difference between extent of knowledge and level of adoption about the improved cultivation practices of cumin production technology among respondents. On the basis of occupation, education, land holding, social participation, type of house and farm powers, the respondents in the present study were having middle socio-economic status.

India has been known from time immemorial as the "Home of Spices" producing almost all spices and condiments known to the world. Cumin is the dried fruit of a small herbaceous plant and was quite popular even during biblical times as an efficient digestive and as a food flavor for a ceremonial feast. In the developing spice growing countries like India, the spices are being almost exclusively used in house hold sector as natural food flavorings but in industrially advanced countries of the west where processed foods are consumed in large quantities, the spices are used in industrial sector. This sector prefers to use the spices extractives essential oils and oleoresins because of certain advantages.

Generally, there is a time lag between origin of a new ideas and its adoption. Improved agricultural cultivation practices of cumin production technology are not recognized by the farmers as an essential element. They mainly practice the traditional and subsistence farming. There is a great need for the adoption of improved agricultural practices of cumin crop by the farmers so that production and income can be raised. Several programme to transfer the new technologies in the agriculture are in operation throughout the country but the new technology has not yet reached the grass root level, where it can be put into practice. Present study is the offshoot of above facts.

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Methodology

This study was conducted in purposively selected Jalore district of Rajasthan as the district Jalore has large area under cumin crop and also leads in its production. A multistage sampling design was adopted to select sample for data collection for the present study. For this purpose, four villages namely Arnay, Sarnau, Jhontra and Sinwara from Sanchole panchayat samiti of Jalore district of Rajasthan state were sample. Further, 25 farmers were selected randomly from each village. Thus the sample size consisted of 100 respondents. Data were collected from the selected respondents with the help of a structured schedule. In case of measurement of adoption, nine practices of cumin production technology viz., use of high yielding varieties, field preparation, seed treatment, fertilizer application, irrigation, weed control, plant protection measures and harvesting & storage of cumin seed were included. Each selected practice was further divided into several questions for studying the existing level of knowledge about cumin production technology. One score was assigned to each of correct answer and zero score was assigned to incorrect answer. Thus the possible maximum score obtainable was 58.

Result and Discussion

Socio economic status of the cumin growing respondents

Based on the data presented in the Table 1, it is concluded that most of the respondents (47%) were in the middle age group. There was higher proportion of upper caste respondents (59%). Most of them found agriculture as a family occupation with higher percentage of illiteracy and small land holding. Majority of the respondents had joint family. As far as social participation was concerned a few number of the respondents were having active social participation. Majority of the respondents had semi *pacca* house followed by *pacca* house and *kachcha* house respectively. The majority of respondents were having one pair of bullock as animal power, a large number of respondents were having

partially mechanized farming and they were partially equipped with farm implements.

Extent of adoption by the respondents

The adoption level of respondents about the cumin production technology was measured. The majority of the farmers (60%) had medium level of adoption while 24 % respondents had low level of adoption and 16 % farmers had high level of adoption.

Table 2: Distribution of respondents according to their level of adoption

Sr. No.	Category	No. of respondents
1.	Low	24
2.	Medium	60
3.	High	16
Total		100

Adoption and adoption gap among the respondents

The level of adoption regarding improved cultivation practices of cumin production technology were measured under nine (9) improved practices which are given in Table 3.

In individual practices-wise level of adoption of farmers pertaining to improved cultivation practices of cumin production technology was worked out. For this, mean score and mean per cent scores were calculated and gap in adoption of each practices was calculated. It is evident from the Table 3 that overall mean per cent score of respondents were 48.80 per cent and adoption gap was 51.20 per cent.

The data in Table 3 reveal that the farmers possessed highest level of adoption about irrigation practices with mean per cent score of 81.25 because most of the farmers were knowing the requirement of the irrigation to the cumin crop and also they were aware about the time of the irrigation. This was followed by field preparation practices with mean per cent score

Table 1: Distribution of respondents on the basis of different indicators of socio-economic status

Sr.No.	Characteristics	Frequency	Per cent	
1.	Age	Young(18-35)	34	34
		Middle(36-55)	47	47
		Old age(56 & above)	19	19
2.	Caste:	Schedule Caste	14	14
		Schedule Tribe Caste	12	12
		Backward Caste	15	15
		Upper Caste	59	59
3.	Occupation	Farm Labour	4	4
		Caste occupation	4	4
		Agriculture	90	90
		Business	2	2
4.	Education	Illiterate	49	49
		Primary	31	31
		Middle	13	13
		Secondary & above	7	7
5.	Type of family	Nuclear	32	32
		Joint	68	68
6.	Social participation	Passive participation	83	83
		Active participation	17	17
7.	Type of house	Kachcha house	31	31
		Semi pacca house	36	36
		Pacca house	33	33
8.	Land holding	Big farmer	44	44
		Small farmer	52	52
		Marginal farmer	4	4
9.	Farm power	Small animal power holder	57	57
		Large animal power holder	37	37
		Non-animal power holder	6	6
10.	Mechanical power	Fully mechanical	7	7
		Partially mechanical	74	74
		Un mechanical	19	19
11.	Farm implements	Fully equipped	5	5
		Partially equipped	84	84
		Un equipped	11	11

Table 3: Adoption and adoption gap among the respondents

Sr. No.	Improved practices	Mean score	Adoption (in MPS)	Adoption gap (in MPS)	Rank
1.	Use of high yielding varieties	1.00(3)	33.33	66.67	VIII
2.	Field preparation	3.17(4)	79.25	20.75	II
3.	Seed Treatment	0.07(3)	2.33	97.67	IX
4.	Sowing practices	6.27(15)	40.18	59.82	VI
5.	Fertilizer Application	7.31(15)	48.73	51.27	IV
6.	Irrigation	3.25(4)	81.25	18.75	I
7.	Weed Control	3.31(9)	36.78	63.22	VII
8.	Plant protection measures	1.00(3)	33.33	66.67	III
9.	Harvesting & storage	4.65(6)	77.50	22.50	V
Total		(58)	48.80	51.20	

Figures in parenthesis indicate maximum possible score in respective practices.

(MPS) 79.25. The level of adoption about harvesting and storage practices of cumin crop was kept on third with the mean per cent score of 77.50 and adoption gap 22.50 per cent. Adoption regarding use of high yielding varieties, sowing practices, fertilizer application, weed management and plant protection measures, the mean per cent scores were 33.33, 40.48, 48.73, 36.78 and 33.33 respectively and adoption gap were 66.67, 59.82, 51.27, 63.22 and 66.67 respectively.

The farmers minimum adoption level was about seed treatment which (2.33%) and adoption gap was 97.67 %. It was because knowledge of seed treatment was low and as it is a technical job hence it requires skill to perform. So, majority of farmers did not adopt the seed treatment practices.

Table 4: Variation in adoption level of farmers of different village

Sr. No.	Source of variance	d. f.	S. S.	MPS	'F' value
1.	Between the villages	3	16.04	5.3467	0.7146 NS
2.	With in the villages(Error)	96	718.72	7.4867	
		99	734.76		

NS : Not significant at 1 % level

Variation in knowledge level of farmers of different villages

The data in the Table 4 depicts that the calculated value of 'F' is not significant at 1 % level of significance. This indicates that there was no significant difference in the level of adoption possessed by the farmers of different villages regarding improved cultivation practices of cumin production technology.

Comparison between extent of knowledge and level of adoption about improved cultivation practices of cumin production technology among respondents

The value contained in Table 4 shows that calculated 'Z' value is greater than its tabulated value at 1 % level of significance in case of over all adoption

Table 4: Comparison between extent of knowledge & level of adoption among respondents:

Sr. No.	Improved practices	Knowledge MPS	Adoption MPS	'Z' value
1.	Use of high yielding varieties	87.40	33.33	50.006**
2.	Field preparation	82.71	79.25	24.538**
3.	Seed Treatment	56.50	2.33	17.434**
4.	Sowing practices	69.33	40.18	1.419 NS
5.	Fertilizer Application	70.25	48.73	5.862**
6.	Irrigation	85.00	81.25	10.102**
7.	Weed Control	73.83	36.78	10.35**
8.	Plant protection measures	91.25	33.33	51.186**
9.	Harvesting & storage	92.67	77.50	17.288**
Overall		78.80	48.80	29.784**

** Significant at 1 % level of significance, NS: Not significant
Table value of 'Z' at 1 % level of significance is 2.58.

about improved cultivation practices of cumin production technology. This lead to conclusion that there was significant difference between knowledge and adoption of improved cultivation practices of cumin production technology among the respondents.

In all the practices, except sowing practices, the calculated value of 'Z' is greater than its tabulated value at 1 % level of significance. It means that there was highly significant difference between the knowledge and adoption of improved cultivation practices of cumin production technology among the respondents.

In case of sowing practices, the calculated value of 'Z' is less than its tabulated value at 1 % level of significance. It means that there was no significant difference between knowledge and adoption of sowing practices of cumin production technology.

Conclusion

Findings revealed that majority (47%) of the cumin growers were in middle age group of 35-55 years. There was higher proportion of upper caste of respondents (59%) who were engaged in cumin crop cultivation. Most of the respondents had agriculture as an occupation and had small land holding. The respondents were having higher percentage of literacy. Majority of respondents were having one pair of bullock as animal power, some of the respondents were partially mechanized farming. Regarding farm implements, they were partially equipped. It is summarized on the basis of occupation, education, land holding, type of house and farm powers, the respondents of the present study were having middle socio-economic status.

Estimation and Interpolation of Grain Yield and Treatment Response under Long-Term Experiments

Anil Kumar¹, Sanjeev Panwar², Vipin Kumar Choudhary³, Sanat Kumar⁴ and Pankaj Kumar⁵

Abstract

A long-term experiment was initiated Under All India Co-ordinated Research Project on Cropping Systems during 1977-2003 to study the long range effect of a crop sequence with high yielding varieties at graded fertilizer levels on yield stability and soil fertility. Under this broad objective a study was undertaken to predict and estimate the grain yield based upon best fitted linear/nonlinear models. For all the nineteen treatments, linear/nonlinear models was being fitted to obtain the estimated yield as well as predicted yield for further three years. This paper presents linear/nonlinear models for the estimation of grain yield over time and discusses the results of applying these models to grain yield values under RWCS from LTE.

The rice-wheat rotation is the prominent agricultural production systems of the world, occupying 24 million hectares of productive land in the Indo-Gangetic Plains (IGP) in South Asia and China. In south Asia, the rice-wheat cropping system (RWCS) occupies about 13.5 million hectares (10 million in India, 2.2 million in Pakistan, 0.8 million in Bangladesh and 0.5 million in Nepal), extending across the Indo-Gangetic floodplain into the Himalayan foothills (Ladha *et al.*, 2000). In India RWCS now occupies 12.33 million hectares (m ha) of which about 10 m ha is in the Indo Gangetic Plains, where it covers 75% of the total rice area and 63% of total wheat area (Parsad *et al.*, 2004). In long-term experiments changes over time are the primary performance index even though the average performance over years (time) remains as an important measure of productivity. The change over time in either crop

productivity or environmental tracts or both is a critical parameter. Hence, an increasing productivity trend is an important feature of a desirable technology. In addition, though the initial productivity may be high but there may be built up of pests or depletion of soil nutrients resulting from continuous application of same treatment or treatment combinations with the prearranged technology. Therefore, long-term experiments provide useful information for sustainability of crop yields as well as management of soil fertility. Monitoring long-term changes in crop yield, identifying the factors associated with such changes and estimation of grain yield are essential to maintain and/or improve crop productivity. Long term experiments (LTE) provide these opportunities. Trends over time in annual crop yields potentially provide measures of the likely long-term sustainability of cropping systems. However, where large annual variability in the growth environment is responsible for most of the large

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year to year yield differences, (M.J. Jones *et al.*, 2000) appropriate analytical techniques must be developed to distinguish real long-term trends from the 'background noise'.

Methodology

Under All India Co-ordinated Research Project on Cropping Systems an experiment "Long range effect of continuous cropping and manuring on soil fertility and yield stability" was initiated during 1977 with the objective to study the long range effect of a crop sequence with high yielding varieties at graded fertilizer levels on yield stability and soil fertility. Being a compulsory experiment this was conducted at all the cropping systems research centres with the major prevailing cereal based cropping systems like rice-rice, rice-wheat, maize-wheat, sorghum-wheat and pearl millet - wheat.

Rice-wheat sequence at Masodha centre was selected for the present study. Eighteen fertility combinations, comprising three levels of N (40, 80 and 120 kg/ha) and P (0, 40 and 80 kg/ha) and two levels of K (0 and 40 kg/ha) were evaluated in a 3² x 2 partially confounded factorial design in three replications with one control (N₀P₀K₀) in each replication.

Different models were fitted using the curve expert package to calculate the missing yield. Best fitted model was taken to interpolate the missing value and also to predict the yield for to three years after the completion of the experiment. Homogeneity of variance of each year was tested using the Bartlett's test. Whenever the variances were found homogeneous, pooled analysis was carried out to study the overall variability in treatment responses for each season.

Grain yield for rice and wheat crops for a period from 1977 to 2003 has been estimated using curve expert package. Different linear/non-linear models viz. 3rd degree polynomial fit, MMF, logistic, linear fit, quadratic fit, rational function, exponential fit, etc. have been fitted to all the 19 treatments.

Since data for the year 1980 for both kharif (maize) and rabi (wheat) seasons were missing, best-fitted models for each treatment were used to interpolate the missing yield. Grain yield for further three years i.e. 2004, 2005 and 2006 to all the nineteen treatments were also obtained by using best-fitted models.

Following linear/nonlinear models have been fitted to interpolate and estimate the grain yield.

1. Modified Exponential Curve

$$U_t = a + bc^t$$

2. Gompertz Curve

$$U_t = ab^{ct}$$

3. Logistic Curve

$$U_t = k/[1 + \exp(a+bt)], b < 0$$

4. 3rd degree Polynomial Fit

$$U_t = a + bx + cx^2 + dx^3$$

5. Sinusoidal Fit

$$U_t = a + b \cdot \cos(cx + d)$$

6. Quadratic Fit

$$U_t = a + bx + cx^2$$

7. Rational Function

$$U_t = (a + bx)/(1 + cx + dx^2)$$

8. Linear Fit

$$U_t = a + bx$$

9. User-Defined Model

$$U_t = a + b \cdot x$$

10. Modified Power

$$U_t = a \cdot b^2x$$

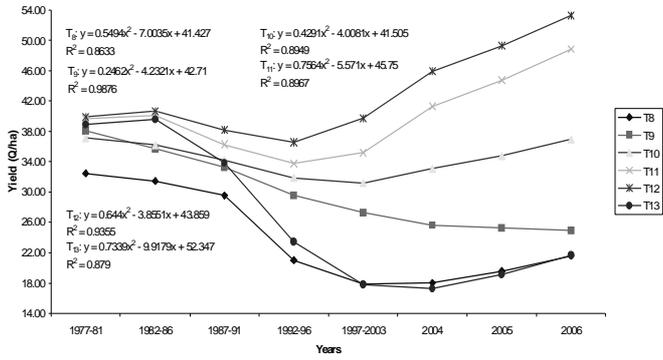
Where U_t represents the time series grain yield value at time (year) t and a, b, c are constants to be determined.

Results and Discussion

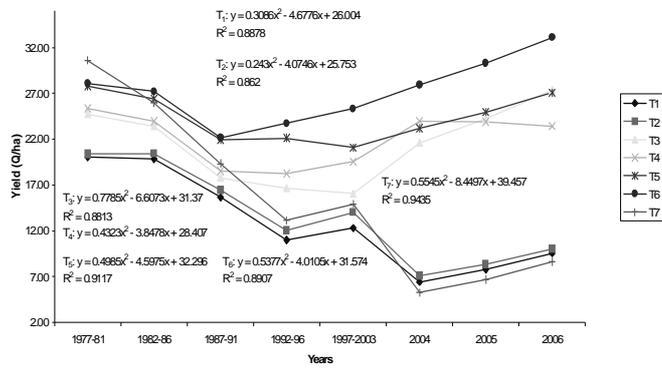
Yield trend for rice and wheat crops for a period from 1977 to 2003 has been analyzed using curve expert package. Different non-linear models like 3rd degree polynomial fit, MMF, logistic, linear fit, rational function, exponential fit, etc. have been fitted to all the 19 treatments.

Since data for the year 1980 for both kharif (rice) and rabi (wheat) seasons were missing, best-fitted models for each treatment were used to interpolate the missing

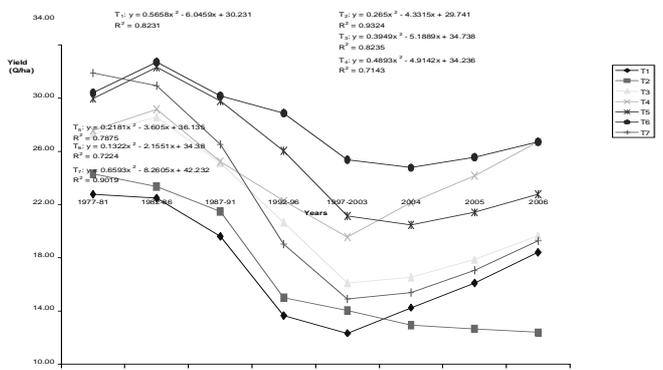
Treatment Response During Kharif Season at Masodha Centre



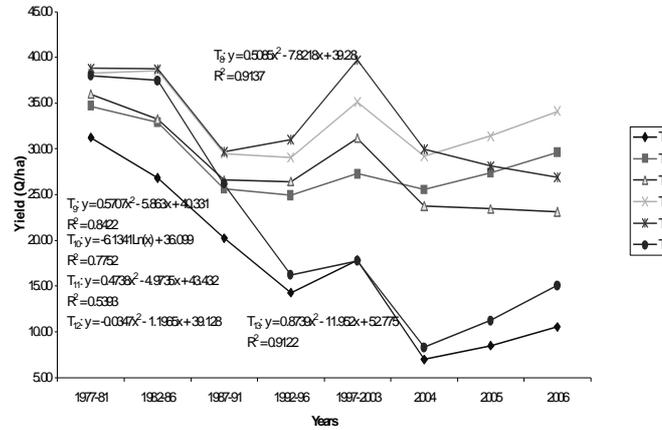
Treatment Response During Rabi Season at Masodha Centre



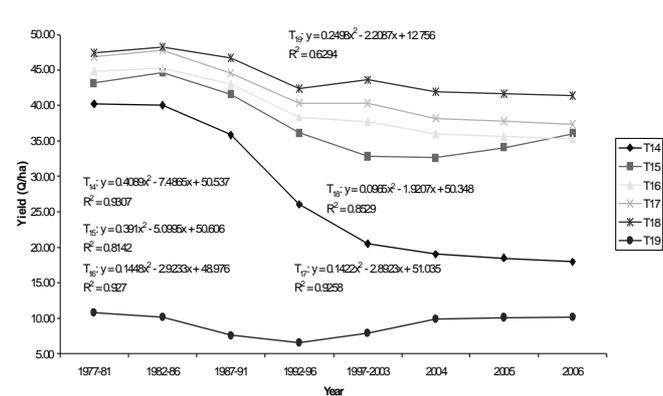
Treatment Response During Kharif Season at Masodha Centre



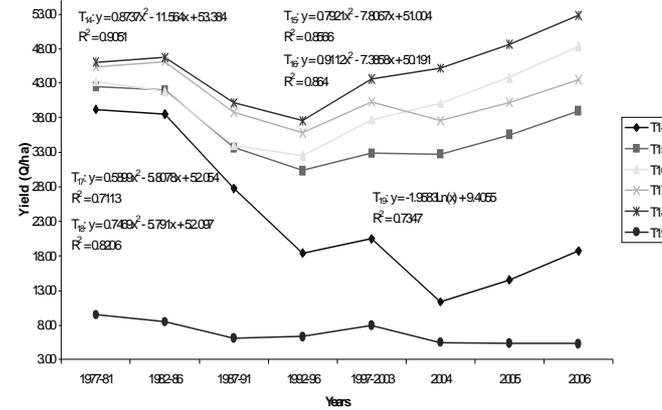
Treatment Response During Rabi Season at Masodha Centre



Treatment Response During Kharif Season at Masodha Centre



Treatment Response During Rabi Season at Masodha Centre



yield. The yield for further three years i.e. 2004, 2005 and 2006 were also obtained by using best-fitted models. It has been observed that in overall 3rd degree polynomial fit ($U_t = a+bx+cx^2+dx^3$) found to be fitted best followed by sinusoidal fit ($U_t = a+b*\cos(cx+d)$). Results for the treatments giving higher and sustainable yields are as follows:

In *kharif* season under treatment T₁₇ (120:80:0) both linear fit and user-defined models yielded similar results for missing and predicted yield and missing yield by both the models was interpolated as 47.64 q/ha, whereas modified power model interpolated as 47.66 q/ha, whereas yield for years 2003, 2004 and 2005 were predicted by both models as 38.17 q/ha, 37.78 q/ha and 37.38 q/ha respectively whereas modified power model as 38.48 q/ha, 38.14 q/ha and 37.80 q/ha for years 2003, 2004 and 2005 respectively. Under treatment T₁₈ (12:80:40) both linear fit and user-defined models yielded similar results for missing and predicted yield.

Missing yield by both the models was interpolated as 48.08 q/ha, whereas exponential fit model interpolated as 48.09 q/ha, whereas yield for years 2003, 2004 and 2005 were predicted by both models as 41.91 q/ha, 41.91 q/ha and 41.91 q/ha respectively. Where as exponential fit model as 42.05 q/ha, 41.81 q/ha and 41.57 q/ha for years 2003, 2004 and 2005 respectively.

In rabi (wheat) season under treatment T₁₇ (120:80:0), missing yield by 3rd degree polynomial fit, linear fit and quadratic fit models were interpolated as 41.11 q/ha, 40.93 q/ha and 39.38 q/ha respectively,

whereas yield for years 2004, 2005 and 2006 were predicted by 3rd degree polynomial fit model as 37.57 q/ha, 40.21 q/ha and 43.50 q/ha respectively. Whereas linear fit model predicted as 34.21 q/ha, 33.93 q/ha and 33.64 q/ha and quadratic fit model predicted as 27.09 q/ha, 25.32 q/ha and 23.45 q/ha for years 2004, 2005 and 2006 respectively.

For treatment T₁₈ (NPK: 120: 80: 40), missing yield by 3rd degree polynomial fit, linear fit and quadratic fit models were interpolated as 41.59 q/ha, 40.92 q/ha and 39.76 q/ha respectively, whereas yield for years 2004, 2005 and 2006 were predicted by 3rd degree polynomial fit model as 45.16 q/ha, 48.64 q/ha and 52.82 q/ha respectively. Whereas linear fit model predicted as 39.42 q/ha, 39.36 q/ha and 39.29 q/ha and quadratic fit model predicted as 34.16 q/ha, 33.00 q/ha and 31.76 q/ha for years 2004, 2005 and 2006 respectively.

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Gender Analysis of Time Utilization Pattern of Farm Families

Monika Wason¹ and Mridula Seth²

Abstract

Farm families display mixed pattern of gender linked role performance . Family members specialize in specific domain and allocate their time accordingly The study was conducted in Karnal district in the state of Haryana. Stratified Random Sampling Technique was used for selection of the sample. Size of land holding was considered as an important variable in the study. Farm family was treated as a system, looking at the farm and home as inseparable parts. It was revealed that farm families display mixed pattern of gender linked role performance. Family members specialize in specific domain and allocate their time accordingly. Farmwomen contribute maximum number of hours in work. The total time spent by farm women on work during 'slack season' ranges between 12-16 hours. During 'peak season', total time contribution by them ranged between 16-18 hours. The paper discuss in detail the Sequential time utilisation pattern of farm women. .To improve the position of women workforce, it is necessary to make their contribution recognized by the society. This will help women to bargain to protect their own interest and contribute to national development.

Most agricultural households display mixed patterns of responsibility and control, combining production cycles for which one sex is primarily responsible with those where responsibility is shared or interlaced. Developing gender desegregated data and gender analysis are key activities which can help bridge gender inequalities. Gender analysis provides a basis for robust analysis of the differences between women's and men's lives, and this removes the possibility of analysis being based on incorrect assumptions and stereotypes.

Gender analysis is a method for making visible the role of or domain of men and women as they intersect in homestead and farmstead activities. It answers the question "who does what?" so that technology developed can be appropriately structured to take into account the activities, resources and preferences of the actual users whether male or female. It helps to identify or distinguish the actual 'doers' of tasks and the appropriate

cooperators for specific operations of enterprises (Paris, 1992).

Systems vary not only in the tasks they assign by gender, but also in the flexibility with which the task can be shifted. Children may take over tasks of parents as they mature, sons replacing mothers in fieldwork or milking. Seasonal shifts in the labour devoted to different kinds of production are often linked to the agricultural cycle. During peak seasons, every able-bodied person may be drawn into agricultural work while other tasks are put aside. Sometimes, this means that everyone goes into the fields. In some systems, women work to process the harvest and prepare meals for field workers.

Generally, women bear a disproportionately large share of family's work burden. They bear triple burden of child rearing, farmstead activities and household responsibilities. Women work long hours in virtually all parts of the third world. According to the

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findings of a study carried out in 31 countries (Human Development report, UNDP, 1995), women work longer hours than men, on an average women put in 13 percent more time than men in developing countries and 6 percent more time than men in developed countries. Another finding of this study relates to the total burden of work. Women carry out 53 percent and men 47 percent of work in developing countries and the figures are 51 percent and 49 percent for developed economies.

Time is a very valuable and limited resource. Skill to manage this resource determines the quality of life of the family members. Farm families have to perform diversified homestead and farmstead activities. Involvement of various members in specific activities is based on several factors like gender specific cultural roles, skills, age etc.

Methodology

The study was carried out in Karnal district in the state of Haryana. Three villages namely Phusgarh, Taprana and Sheikhpura were selected purposively.

Stratified Random Sampling Technique was used for selection of the sample. Size of land holding was considered as an important variable in this study. Samples were taken from families having different sizes of land holding i.e. land holding less than 2 ha (Group I), land holding 2-4 ha (Group II) and land holding 4 ha and above (Group III).

An equal number of 45 families were selected from each of the three groups at random making a total sample of 135 families. Survey method was used primarily for the purpose of data collection. The data were collected by interviewing married women of the household, using prestructured interview schedule.

The statistical measures used to summarize data include simple means, frequency distribution, percentages and Chi-Square test.

Results and Discussion

Sample profile of the sample respondents

The table on socio economic profile of sample

farm families reveals some interesting features. Dominant castes were Jat (40.7%) & Roar (48.1%) whereas only 6.7 per cent families were Brahmins. Other castes i.e. Bania, Jhimar, Gardi and Harijans comprised only 4 per cent had small size of land holdings

While all the selected families had agriculture and dairy as their main occupation, some were engaged in subsidiary occupation i.e. Service (8.9%), Business (10.4%) and Poultry (9.6%). Table 1 reveals that majority (71.9%) of the selected adult females were illiterate and only 5.9 percent had education up to higher secondary and above.

Regarding annual income, it was found that majority (i.e. 68.9%) of families having annual income below Rs 10,000/- belonged to small size of land holding. None of the families from large size of land holding reported an annual income less than Rs. 10,000/-. Similarly, only 17.8 per cent and 13.3 per cent of small size land holding families had an annual income of Rs. 10,000/- to 50,000, and more than Rs. 50,000/- annum. In comparison, medium and large size of land holding families reported higher proportion in the higher income category.

In the study it was found that as the size of land holding increased, the number of joint families also increased whereas number of nuclear families decreased with increased size of land holding. Most (58.5%) of the sample families on an average had 5-10 members.

Time allocation

In this study, the time allocation pattern of farm family members was studied. Table Nos. 2 and 3 reveal average time spent in work during peak and slack season by farm family members. As is evident from the table, during 'slack season' female members spent maximum number of hours on work followed by adult male, female children and male children respectively. During 'peak season' also, time contribution in work was maximum for female members. This is followed by adult male members.

Table 1: Socio economic profile of the selected farm families**(N=135)**

S.No.	Particulars	Size of land holding			Total
		Small (<2 ha)	Medium (2-4 ha)	Large (>4 ha)	
1.	Caste				
	Jat	18(40.0)	17(37.8)	20(44.4)	55(40.7)
	Roar	17(37.8)	25(55.6)	23(51.1)	65(48.1)
	Brahmin	4(8.9)	3(6.7)	2(4.4)	9(6.7)
	Other castes	6(13.3)	0(-)	0(-)	6(4.4)
2.	Occupation Main				
	Agriculture + Dairy Subsidiary	45(100)	45(100)	45(100)	135(100)
	Service	2(4.4)	5(11.1)	5(11.1)	12(8.9)
	Business	4(8.9)	4(8.9)	6(13.3)	14(10.4)
	Poultry	2(4.4)	3(6.7)	2(4.4)	7(5.2)
3.	Education (Adult Female)				
	Illiterate	33(73.3)	31(68.9)	33(73.3)	97(71.9)
	Primary	10(22.2)	11(24.4)	9(20.0)	30(22.2)
	Higher Secondary & Above	2(4.4)	3(6.7)	3(6.7)	8(5.9)
4.	Income (annual)				
	< Rs 10,000/	31(68.9)	10(22.2)	0(-)	41(30.4)
	Rs 10,000-50,000/-	8(17.8)	22(48.9)	22(48.9)	52(38.5)
	Rs 50,000/-	6(13.3)	13(28.9)	23(51.1)	42(31.1)
7.	Type of Family				
	Joint	20(44.4)	28(62.2)	31(68.9)	79(58.5)
	Nuclear	25(55.6)	17(37.8)	14(31.1)	56(41.5)
8.	Size of family				
	<5 Members	11(24.4)	14(31.1)	4(8.9)	29(21.5)
	5-10 Members	31(68.6)	20(44.4)	28(62.2)	79(58.5)
	>10 Members	3(6.7)	11(24.4)	13(28.9)	27(20.0)

Figures in parentheses indicate percentages

In the case of children, from small size of land holding, during 'peak season', girl's time contribution in work was more than boy's. In medium and large size of land holding families, boy's time contribution was more than girl's time contribution. Work time was found to be more during 'peak season' for all the family members.

'Household Work' accounted for major

proportion of time spent by female members during 'slack season' from all the three categories of land holding families. During 'peak season', time devoted to 'household work' was reduced by 4-6 hrs. In all the selected families, time devoted to 'household work' during 'peak season' was around six hours. This may be the minimum time in which they could adjust all the 'household activities'.

Table 3 further shows that the total time spent

by farm women in work from all the three categories of land holding families during 'slack season' ranges between 12-16 hours, with minimum time contribution by females from small size of land holding families and maximum from large size of land holding families. It could also be noted that during slack season, farm women from large size of land holding families devote more time to homestead activities and this is the reason for their maximum time contribution in work. During 'peak season', total time contribution by them ranged between 16-18 hours. Agarwal (1985) reported that participation of women on farms decreased with increasing farm size. However, in the present investigation, it was found that farmwomen's time contribution to farm work was almost equal for medium and large size of land holding families.

Most of the studies on time allocation pattern of farm women (Gandhi, 1986; Laxmi Devi, 1984; and Bhatnagar, 1982) reported that farm women spent 8-9 hours on farm work during 'peak season' and 2-3 hrs (Bhatnagar, 1982) during 'slack season'. However, in the present study, farm women's time contribution in farm work during peak season was found to be on higher side i.e., 10-11 hours/day. Sangwan (1986) found that in Haryana women spent 14 hours/day on work during

'peak season' and during 'slack season' their work time contribution is 12.2 hours per day.

In this study, total time expenditure on 'farm work' was found to be highest in the case of male members (during peak and slack season). It was found that during slack season also, male members devoted some time to household work. Adult male members from small size of land holding families devoted 1.5 hrs. (Avg.) on 'household work' whereas families with large and medium size of land holding families reported that male members devoted 0.5 hrs (Avg.) on household work. During 'peak season', none of the families from medium and large size of land holdings reported adult male participation in 'household work'. It was further observed that total time spent in a day by male members on 'farm work' increased with increased size of land holding. This trend was found to exist both, during peak and slack season.

It was also found that adult male members on an average spent 6.4 hours on 'farm work' during slack season. However, on further probing it was found that on the farm, they indulged in many activities like 'sleeping', 'gambling' etc. which actually reduced their working time. In the case of adult female members, (who

Table 2: Average time Spent hours/day in farmstead and homestead activities by male and female members according to size of land holding

(N = 270)

Gender	Size of land holding	Peak season		Slack season		Total	
		Farm(hrs)	Household(hrs)	Farm(hrs)	Household(hrs)	Peak(hrs)	Slack(hrs)
I Female (n=135)	Small	10.5	6.2	2.3	10.0	16.7	12.3
	Medium	11.3	6.3	3.2	12.1	17.6	15.3
	Large	11.2	6.2	3.0	13.1	17.4	16.1
	Total	11.0	6.2	2.8	11.7	17.2	14.6
II Male (n=135)	Small	14.2	0.5	5.0	1.5	14.7	5.5
	Medium	16.2	0	7.1	0.5	16.2	7.6
	Large	16.5	0	7.0	0.5	16.5	7.5
	Total	15.6	0.2	6.4	0.8	15.8	6.9

Table 3: Average time spent hours/day in farmstead and homestead activities by male and female children according to size of land holding

(N = 156)

Gender	Size of land holding	Peak season		Slack season		Total	
		Farm(hrs)	Household(hrs)	Farm(hrs)	Household(hrs)	Peak(hrs)	Slack(hrs)
I Female (n=65)	Small	5.2	2.1	1.2	4.1	7.3	5.3
	Medium	4.0	3.5	0.5	3.5	7.5	4.0
	Large	2.1	6.1	0.5	4.0	8.2	4.5
	Total	3.8	3.9	2.2	3.9	7.7	4.6
II Male (n=91)	Small	6.0	0.5	2.0	0.5	6.5	2.5
	Medium	8.0	0.2	1.5	0.5	8.2	2.0
	Large	8.1	0	2.0	0.5	10.1	2.5
	Total	7.4	2.3	5.5	1.5	8.3	2.3

on an average spent 14.6 hours in slack season and 17.2 hours in peak season on work), it was found that they carry out a number of activities simultaneously.

Similar time allocation pattern was found in the case of children also. While girls devoted more time to 'household work', time contribution by boys was reported to be more in 'farm work'. It was also found that during 'peak season', girls devoted more time to 'household work' than during 'slack season'. This may be due to the reason that female children take up additional work in household as adult female members are engaged in 'farm work'.

Female children participation in farm work decreased with increased size of land holding (Both during peak and slack season). Their time allocation to 'household work' increased with increased size of land holding during 'peak season'.

Interestingly, time allocation, by male children for 'household work' was more than adult male members although; it was less than female children. Their time contribution to 'household work' during 'peak season' was slightly higher (2.3 hrs.) than 'slack season' (1.5 hrs.). On the other hand, their contribution to 'farm work' also increased during "peak season". During 'peak season', time contribution of male children in 'farm work'

increased with increased size of land holding, whereas time contribution in 'household work' decreased with increased size of land holding. For 'slack season', no such trend could be observed from the table.

On the whole, the system was found to be flexible. There were shifts in assignment of tasks and an increased allocation of time to homestead and farmstead activities was found during 'peak season' by all the family members. Above findings also clearly show that farm women bear maximum share of family's work burden.

Sequential time utilization pattern

It is evident from table 4 that adult female members bear disproportionately large share of family's work burden. They bear dual burden of farm work and household responsibilities. The day for them start in early hours of the morning, even before sunrise and they are the last to retire to bed at night. The table gives a broad outline of sequential time utilization pattern of adult female members during peak and slack season. It is clear from the table that they perform a number of activities in the household and on the farms. Their day starts early in the morning and by 6:00 a.m. They complete the work of Milking, Churning milk, Fodder cutting, Fetching water and Preparation for cooking. During 'peak season', the number of activities, which they have to complete

Table 4: Farm women's sequential time utilization pattern during peak and slack season

Time	Slack season	Peak season
Before 6:00 A.M.	<ul style="list-style-type: none"> - Milking - Churning milk - Fodder cutting - Fetching water - Preparation for cooking 	<ul style="list-style-type: none"> - Milking - Churning milk - Fodder cutting and giving feed to animals - Fetching water - Washing clothing - Brooming and mopping - Bathing children - Cooking
6:00-9:00 A.M.	<ul style="list-style-type: none"> - Cooking Food - Serving food - Sending children to school - Washing utensils - Brooming and mopping - Rearranging household articles 	<ul style="list-style-type: none"> - Serving food - Sending children to school - Washing utensils - Farm work (Harvesting/Transplanting/Threshing)
9:00-12:00 A.M.	<ul style="list-style-type: none"> - Bathing children (other childcare activities) - Washing clothing - Bathing animals - Making <i>upla</i> - <i>Papad, Achar</i> making (occasional) 	<ul style="list-style-type: none"> Farm work(Harvesting, Transplanting, Threshing)/ cooking food for labourers and carrying to the fields,)
12:00-3:00 P.M.	<ul style="list-style-type: none"> - Carrying meals to the fields - Farm work (weeding, irrigation, hoeing, harvesting vegetables) - Fetching fuel wood - Shopping (occasional) - Leisure time (knitting, embroidery etc.) 	<ul style="list-style-type: none"> Farm work(Harvesting/Transplanting /Threshing)
3:00-6:00 P.M.	<ul style="list-style-type: none"> - Bathing animals (Summers) - Cutting fodder and giving feed to animals - Cleaning cattle shed - Making <i>upla</i> (occasional) - Preparation for cooking 	<ul style="list-style-type: none"> Farm work(Harvesting/Transplanting /Threshing)
6:00-9:00	<ul style="list-style-type: none"> - Entertaining guest (occasional) - Cooking - Serving food - Washing utensils 	<ul style="list-style-type: none"> - Bathing animals - Cutting fodder and giving feed to animals - Cleaning cattle shed - Cooking food
After 9:00 P.M	<ul style="list-style-type: none"> - Winding up kitchen - Setting curd 	<ul style="list-style-type: none"> - Serving food - Washing utensils - Winding up cooking area. Preparation for cooking - Setting curd

before 6:00 a.m., increase. Between 6-9 a.m., they go to the fields and start working. During 'peak season' of work in the farm, they adjust the activities in such a way that they are able to look after farm and household work simultaneously. They make adjustments by excluding certain activities from daily routine eg, *Upla* making, Fetching fuel wood etc. They also manage time by shifting certain activities to evenings eg. Bathing animals, Cutting fodder. Cleaning cattle shed, Rearranging household articles.

They bathe animals only once in a day during 'peak season' which is generally done twice during "slack season". There is no time to rest during 'peak season' and they also do not perform the activities of '*papad and achar* making'. During season of harvesting, they have to cook food for labourers and carry it to the fields. Particularly adult female members of large size of land holding families reported this as a major activity.

The table further shows that during slack season, they get sometime to rest in the afternoon. During observations, it was found that during this period also they are engaged in the activities of 'knitting/embroidery etc. Occasionally they perform the activities of '*papad and achar* making', 'shopping' and 'entertaining guests' also. During 'slack season', only few activities are performed after 9 p.m. During peak season they have to perform additional activities including food preparation for the next day.

The above findings clearly show that women's work contribution is very high both on farm and in the household. They usually have such a tight time schedule of work that little time is left for themselves and for care of children.

Conclusion

The investigation was designed to appraise the homestead and farmstead work of farm family members on the basis of gender. In this study, farm family was treated as a system, looking at the farm and home as inseparable parts. On the basis of findings, it can be concluded that farm families display mixed pattern of

gender linked role performance. Family members specialize in specific domain and allocate their time accordingly. The system was found to be flexible. There were shifts in assignment of tasks. An increased allocation of time to homestead and farmstead activities was found during peak season by all the family members. Gender specific activity pattern was evident among children also. It was observed that female children contribute major portion of their work time in homestead activities. Farmwomen contribute maximum number of hours in work followed by male members, female children and male children respectively.

Above conclusion imply that there is a strong need for intervention in order to improve the conditions of female members of the farm families. To improve the position of women workforce, it is necessary to improve their production potential by treating them as an important economic actors, not as dependent members of the family. Constraints to their productivity can be released only by making their contribution recognized by the society. This will help women to bargain to protect their own interest and contribute to national development.

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Development of Test to Measure the Knowledge Level of Dairy Farmwomen

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Abstract

A test was developed to measure the knowledge level of dairy farmwomen of Himachal Pradesh. A preliminary test of thirty knowledge items was initially administered to 48 farm women who were involved in dairy farming for item analysis. Finally, sixteen knowledge items were included in the final format of the knowledge test based on the difficulty index (20 to 90), discrimination index (0.19) and point-biserial correlation coefficient (0.238). This final knowledge test was administered to 72 farmwomen who were involved in dairy farming for assessing the reliability of the test. The reliability of the knowledge test was measured with the help of split-half method and Kuder-Richardson Formula 20 and reliability coefficients were found to be 0.82 and 0.81, respectively, which indicates that this knowledge test is quite reliable.

It is well known fact that rural women play a very significant role not only in agriculture but also in performing various animal husbandry practices. They are also involved in taking crucial decisions related to agriculture and animal husbandry. Their involvement can be observed in managing farms, maintenance of dairy animals, milk production, processing, etc. depending upon the situational, personal and socio-economic characteristics of the family to which they belong. Dairy is one of the most important farming enterprises that support the agricultural development in India by providing employment opportunity to 70 million rural households, particularly to the small and marginal farmers as well as landless labourers. Thus, it helps in providing them a regular income. Today India is having largest livestock population in the world with an annual milk production of 101 million tonnes and rank first in terms of milk production (Tiwari and Sharma, 2009). In India,

per capita milk availability during 2005 was 240 grams per day however, the per capita milk availability in Himachal Pradesh during 2003-04 was recorded as 337 grams per day which is higher than the national average (Anonymous, 2007).

Since, rural women play a very important role in animal husbandry and participate actively in various operations. This sector has great potential for bringing about socio-economic transformation among the farm women in rural areas. The income generating commercial farm activities like dairy farming involve greater use of technology. Therefore, it is essential to equip the farmwomen with the needed knowledge in dairy enterprise as their participation in this enterprise is also quite high. In order to bring improvement in the cognitive domain of dairy farmwomen's behaviour about dairy farming, it is essential to find out their existing knowledge level related to improved dairy farming practices. In the

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present context, the knowledge was operationalised as the understood information about the recommended practices of dairy farming possessed by dairy farmwoman. For assessing the knowledge level of dairy farmwomen systematically, there is a need to have a standardised tool (test). Keeping this in view, the present study was undertaken to develop a test for measuring the knowledge level of farmwomen about scientific practices of dairy farming.

Methodology

For the development of test for assessing the knowledge level of dairy farmwomen, the procedure followed by Sharmah and Sithalakshmi (2001) with slight deviation was used.

i) Collection of items

A list of 40 knowledge items that reflect various aspects of dairy farming practices were collected for construction of the test. These items were collected through package of practices of Animal Husbandry of CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur as well as other relevant literature besides the concerned scientists of the university.

ii) Preliminary selection of items

This list of 40 knowledge items was given to the concerned scientists of the CSK HPKV, Palampur to check the suitability of each question (knowledge) for its inclusion in the preliminary test. They were also asked to add, delete, or modify any item, if they felt so. Finally, keeping in view the opinion of these scientists, 30 items were retained for item analysis.

iii) Item analysis

The preliminary test containing 30 knowledge items (Table 1) was administered to 48 dairy farmwomen of Sundernagar development block of Mandi district (HP). For this purpose, the score of one was assigned to the correct response and zero to each incorrect response. Thus, the range of obtainable score was 0-30.

iv) Final selection of items

Three objectives criteria namely difficulty index, discrimination index and point biserial correlation were considered for the final selection of items in the knowledge test.

(a) Difficulty index (P)

The difficulty index indicates the extent to which an item is difficult. An item should not be so easy that all persons can pass it, nor should be so difficult that none can pass it. The item difficulty index was worked out in this study as the percentage of respondents answering an item correctly. The difficulty index was calculated by the following formula.

$$P = \frac{NC}{N} \times 100$$

Where,

P = Difficulty index

NC = Number of respondents who answered correctly

N = Total number of respondents

The items with P values ranging from 20 to 90 were considered for the selection in the final knowledge test.

(b) Discrimination index (DI)

The second criterion applied for item selection was the discrimination index. The function of item discrimination index is to find out whether an item really discriminates a well informed respondent from a poorly informed respondent. In order to work out the discrimination index among the respondents for each question, the total score of the 48 respondents for the 30 knowledge items were ranked. The scores obtained were arranged in descending order of total scores and the respondents were divided into six equal groups – G1, G2, G3, G4, G5, and G6 with 8 respondents in each group. The middle two groups namely G3 and G4 were eliminated and the four terminal groups; i.e., high score groups (G1 & G2) and low score groups (G5 &

Table 1: Difficulty index, discrimination index and point-biserial correlation coefficient of knowledge items related to scientific dairy farming practices

S. No.	Knowledge Items	Difficulty Index (P)	Discrimination Index (DI)	Point-biserial correlation coefficient (r_{pbi})
*1.	What is the age of crossbred cow at first calving?	87.50	0.28	0.461
*2.	What is the length of gestation period in crossbred cow?	66.67	0.19	0.300
3.	At what age crossbred heifer attains puberty?	50.00	0.00	0.007
*4.	At what stage of pregnancy, milking should be stopped in a cow/buffalo?	41.67	0.19	0.249
*5.	What is the length of gestation period in buffalo?	85.42	0.56	0.535
*6.	What is the duration of heat in crossbred cow/buffalo?	87.50	0.47	0.624
*7.	Whether newborn calf of cow/buffalo should be fed colostrum?	87.50	0.28	0.277
8.	What is the appropriate age of cow/buffalo coming in heat for the first time?	54.17	0.19	0.198
9.	After how many months of artificial insemination in the cow/buffalo, one can examine the pregnancy?	97.92	0.09	0.021
*10.	Normally how much time is taken by a cow/buffalo to expel placenta after calving?	85.42	0.38	0.326
11.	What is the appropriate age of the cow calf for disbudding/dehorning?	91.67	0.00	0.067
12.	What is the appropriate age of the buffalo calf for disbudding/dehorning?	2.08	0.09	0.209
13.	When the newborn calf should be allowed for sucking its mother?	72.92	0.38	0.177
*14.	How much mineral mixture should be fed daily to a cow/buffalo of a particular age and production level?	50.00	0.38	0.249
*15.	What is the ratio of berseem and wheat straw fed to milch animal?	60.42	0.38	0.238
16.	What is the daily requirement of balanced feed in cow?	66.67	0.28	0.143
*17.	What is balanced feed?	79.17	0.56	0.371
18.	Is feeding of mineral mixture and salt essential to animals?	89.58	0.09	0.158
19.	What are the important sign of worm trouble in calf?	60.62	0.09	0.114
20.	Which chemical is used for the control of ticks in animals?	27.08	0.19	0.020
*21.	What is the name of disease that affect the foot and mouth of animals?	87.50	0.28	0.379
*22.	Which chemical is applied against the sucking lice in animals?	58.33	0.56	0.256
23.	Before and after the milking, udders should be washed with	4.17	0.19	0.308
24.	What is measured by lactometer?	50.00	0.09	0.088
*25.	Which housing system of cattle costs less, saves labour, and provides comfort to animal?	68.75	0.75	0.531

*26. How many times cattle are watered in a day to produce more milk?	33.33	0.28	0.271
27. Normally, when balanced ration is fed to animals?	54.17	0.38	0.211
*28. What is the most important visible symptom of mastitis in animal?	89.58	0.19	0.489
*29. What is the most important visible symptom of haematuria disease in animal?	60.42	0.84	0.417
30. What is the most important visible symptom of Haemorrhagic Septicaemia in animal?	93.75	0.09	0.343

*Item selected in the final knowledge test

G6) were retained for further analysis. The following formula was used to calculate the discrimination index of each item.

$$DI = \frac{(S1 + S2) - (S5 + S6)}{N / 3}$$

Where,

DI=Discrimination index

S1, S2, S5, and S6 are the frequencies for correct answers in the group G1, G2, G5, and G6, respectively.

N= Total number of respondents in the sample selected for item analysis.

In the present study, the item with DI value equal to or more than 0.19 was considered for final selection for inclusion in the knowledge test.

(c) Point-biserial correlation (r_{pbi})

For establishing internal consistency of the each item, point biserial correlation coefficient (r_{pbi}) was estimated. It was worked by the following formula suggested by Guilford and Fruchter (1978)

$$r_{pbi} = \frac{\bar{X}_p - \bar{X}_q}{S_t} \times \sqrt{pq}$$

Where,

r_{pbi} = Point-biserial correlation coefficient
 \bar{X}_p = Mean score on continuous variable of successful group on dichotomous variable

\bar{X}_q = Mean score on continuous variable of unsuccessful group on dichotomous variable
 S_t = Standard deviation on continuous variable for total groups
 p = Proportion of respondents who answered correctly on dichotomous variable
 q = 1-p or the second group

The item with r_{pbi} value equal to or more than 0.238 was considered for the selection in the final knowledge test.

Finally, 16 items were selected in the knowledge test by considering the objective criteria as stated above.

Reliability of the test

The reliability of the knowledge test was determined by the following two methods:

i) Split-half method

The final knowledge test was administered to a new sample of 70 dairy farmwomen of Gopalpur and Sundernagar development blocks of the Mandi district. Thereafter, the test is divided into two equal halves. The reliability of the test was calculated by the Spearman-Brown formula (Guilford and Fruchter 1978). The reliability coefficient of the test was found to be 0.82, which was found to be highly significant.

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

Where, r_{tt} = reliability coefficient of the test
 r_{hh} = the correlation between two halves of the test

ii) The kuder-richardson method

The Kuder-Richardson method was also used to estimate the reliability of the knowledge test by using their formula known as Kuder-Richardson Formula 20 (Guilford and Fruchter 1978). The reliability coefficient of the test was found to be 0.81, which was also found to be highly significant.

$$r_{tt} = \left(\frac{n}{n-1} \right) \left(\frac{s_t^2 - \sum pq}{s_t^2} \right)$$

Where,

- r_{tt} = reliability coefficient of the test
 n = number of items in the test
 p = proportion of respondents who answered a test item correctly
 q = 1-p
 s_t^2 = variance of the test

Both these reliability coefficients provide an estimate of the internal consistency of the test and thus the dependability of the test scores. On the basis of reliability coefficients determined by these two methods indicate that this knowledge test is quite reliable.

Content validity

The knowledge items in the preliminary test were representing entire universe of the relevant behavioural aspects of the dairy farmwomen with respect to knowledge about dairy farming as these were collected from the animal husbandry package of the practices. The care was taken to include items which must cover every major practice of the dairy farming and the same

was validated by the concerned scientist of the university. The items in the final knowledge test are also covering every major practice of dairy farming. Therefore, it is assumed that the scores obtained by administering this test measured knowledge of the respondents as intended.

Scoring procedure of the test

While administering the knowledge test, a respondent will be awarded one score for each correct response and zero for incorrect response. The sum of all the scores on each item was the total knowledge score of the individual respondent about the dairy farming.

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Traditional potato storage in North Eastern Region of India

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Abstract

Study was conducted among 120 potato farmers sampled from Assam (80) and Meghalaya (40) states in north-eastern region. Findings showed that all the farmers did sun drying and sorting of cut and diseased tubers before storage. Storing the potato in heap on top of 3-4 inch thick layer of soil (63%) and in the corner of home (75%) were most frequently used short term storage method followed by the farmers of Assam and Meghalaya respectively. Similarly for long term storage, many traditional methods were documented. The maximum price advantages was observed for medium size tuber due to indigenous short term storage.

Potato is also an important crop in the North Eastern region of India comprising of Arunachal Pradesh, Assam, Meghalaya, Manipur, Mizoram, Nagaland and Tripura and it is grown on about 9.3% area in the region round the year in all the seasons. In the hilly areas like Meghalaya, it is grown as summer and autumn crop while in plains area as in Assam, potato is grown as winter crop. The region is constrained by several factors like lack of quality seeds of suitable varieties, rain fed situation, non adoption of recommended package of practices by growers, heavy infestation of diseases and pests in addition to lack of infrastructural facilities like cold storage.

Storage is an important aspect in potato production and utilization cycle. Semi perishable nature of the potato crop coupled with poor prices during harvesting in the region and the need to store potato for seed as well as home consumption have led to heavy dependence of farmers on traditional storage structures for storage of potatoes. These traditional storage structures in their region are utilized for short as well as long term storage needs. Many innovative indigenous methods and structures for potato storage have been evolved by the farmers that are unique to their cultural

context. These traditional storage structures have been developed by the potato growers in the region with years of experimentations and observations from the available local resource base that is suitable for the given environmental conditions. Different type of traditional storages structures are utilized by the farmers simultaneously to meet different purposes viz., seed , table or for sale at later stage .

In an attempt to document the indigenous the pre storage practices and indigenous potato storage being practiced in the north eastern region of the country, the present study was formulated.

Methodology

The study was conducted in two major potato growing states of the North eastern region of India, i.e., Assam and Meghalaya. Barpeta and Nagaon districts were the two major potato districts selected from Assam state whereas, East Khasi hills district was selected from the state of Meghalaya for the present study. Further, two potato growing circle/ blocks from each of the selected district were selected for conducting the study. Random selection of two villages from each of the selected block/circle was done and 10 potato farmers

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were selected randomly from each of the village. Thus the total sample size for the present study was 120. The data for the present study was collected using personal interview schedule.

Findings and Discussions

Post harvest handling of potato in North Eastern states of India

Post harvest handling practices are important aspect to minimize the storage losses of any agricultural produce more so in case of semi perishable products like potato. Drying before storage, sorting of cut and diseased tubers, grading and sorting in storage intermittently were the pre storage practices reported to be carried out in the selected states.

Drying and sorting of cut and diseased tubers before storage was observed to be performed by 100 percent of the selected potato farmers of Assam as well as Meghalaya state (Table 1). Grading of potato was observed to be practiced by all the sampled farmers from Meghalaya while in Assam about 87 percent farmers were following grading. Sorting of diseased tuber intermittently in storage was observed to be followed by 45 percent of the farmers in Meghalaya while only 7 percent were following it in Assam state.

Farmers in the region perceive that that sorting deteriorates the quality of the seed as well as table potato and thus hampers the shelf life of potato in storage. This could be the reason for lesser percent of farmers reporting following of the practice.

Indigenous short term potato storage methods adopted by farmers in North Eastern India

Short term potato storage in the study refers to the storage done for 2-3 months by the farmers. The short term storing of potato was observed to be practiced by potato farmers of the region as a marketing strategy for maximization of the return from potato crop. This storage helped the farmers to skip the sale at harvesting period when the potato market prices are the lowest.

Potato in Assam state is cultivated as a winter crop and is harvested during the months of January to March. The fresh harvest is either sold immediately or is stored for few weeks to allow prices to rise in the market after harvest, depending upon the economic need, the market price or availability of the storage place with the farm family. The temperature in the post harvest period in the plains of Assam rises and this makes the storage of potato for a long time difficult for the farmers in the traditional country stores. Therefore, farmers store produce for short term from a few days to 2 – 3 months only. In Meghalaya state, potato is grown in two seasons viz., under long day summer season as well as in the autumn season. The prevailing cool climatic conditions after potato harvest in Meghalaya favors long duration storage of potato that allows staggered harvesting and sale of potato.

Potato storage type and size was observed to vary depending upon the purpose of storage that is whether the potatoes are stored for seed or consumption

Table 1: Post harvest practices followed by farmers in North eastern states

Sl	Practices	Assam(n=80)	Meghalaya (n=40)	Total (N=120)
1	Sun drying before storage	80(100.00)	40(100.00)	120(100.00)
2	Sorting of cut and diseased tubers	80(100.00)	40(100.00)	120(100.00)
3	Grading potatoes	70(87.50)	40(100.00)	110(91.67)
4	Sorting in storage intermittently	06(07.50)	18(45.00)	24(20.00)

* Figures in parenthesis indicate percentage

purpose. Further, it was observed that potatoes stored for seed and table purposes were used interchangeably, depending upon the need of the same.

A perusal of Table 2 clearly indicates a distinct pattern in the potato storage practiced in the two states. Majority of the farmers from Assam stored potato in heaps in comparatively dark rooms on top of 3-4 inch thick layer of dry sand (62.50%) and also stored potato in heaps of 1.5 feet high in the corner of the house (57.50%). Potato storage structures in Assam are usually made of bamboo with thatch roof with no windows for sun light to enter. Storage of potato on 3-4 inch layer of dry sand was practiced to save the crop from rats and moisture. Use of false ceiling made of bamboo in kitchen as storage space for potato was done with the reason that the freshly harvested potatoes would dry faster in kitchen.

For short term storage in Meghalaya state, *in situ* storage (80%) and storage in heaps in corner of the dark corner of the house (75%) were the most commonly used storage methods. Storage of potato in heaps was found to be practiced by farmers of both the states of North Eastern India, however, the height of the heap was found restricted to 1.5 feet in Assam State. Khatana *et al.* (1997) also reported use of heap method of storage in Karnataka state.

In line with the finding of the present study, in Ujjain, Dewas, Indore and Shajapur districts of Malwa

region of Uttar Pradesh, India, Dahiya *et al.* (1997) reported that most farmers used traditional on farm storage for shorter periods in order to sell a part of their producers to processors at remunerative prices. Storage of potato in heaps of average height of 1.8 meters was found popular in districts.

Indigenous long term storage methods adopted by farmers in north eastern region of India

In situ storage (in the ground storage), wherein the produce was allowed to be stored in the field after maturity and was not harvested. It is basically delayed harvesting. In the Meghalaya state, due to heavy rainfall in the months following the harvesting time (August-September), grass grows on the potato beds that provide cover or shade to the potato beds. Harvesting of the potato stored in this method was reported to be done when the market price rises after the harvest period.

Farmers perceived that the rottage of potato tubers under *in-situ* storage method is less in comparison to potato stored in country stores because of the low soil temperature inside the bed. The reason for the utilization of distinct storage methods in the two states included for the study could be the difference in the climatic conditions in the post harvest period in the states.

In accordance with the finding of the study, Karnic (1996) observed that in Karnataka, heap method for field storage of potato for 15-30 days and pit method of storage for 45-60 days was practiced by farmers.

Table 2: Indigenous short term storage methods adopted by the farmers

Sl.	Storage method	Assam (n=80)	Meghalaya (n=40)	Total (N=120)
1	In heaps on top of 3-4 inch thick layer of dry sand	50 (62.50)	-	50
2	In heaps of 1.5 feet high in the corner of the house	46 (57.50)	-	46
3	On false ceiling made of bamboo in the kitchen	30 (37.50)	-	30
4	On wooden planks in pucca store	23 (28.75)	-	23
5	In heaps in corner of the store	-	30 (75.00)	30
6	In situ storage	-	32 (80.00)	32
7	In space below the houses	-	11 (27.50)	11

Table 3: Indigenous long term storage methods adopted by the farmers

Sl.	Storage method	Assam (n=80)	Meghalaya(n=40)
1	In 3-4 inch layers on platform made in the store	-	19(47.50)
2	In bamboo baskets in the store	-	20 (50.00)
3	Wooden storage structures	-	13(32.50)
4	In gunny bags in store	-	05(12.50)
5	Underground storage pits	-	08(20.00)
6	In heaps in store	-	06(15.00)

Long term storage of potato in the study refers to the storage of potato for more than three months. Long term potato storage was observed to be done in the north eastern states for use as seed for the consecutive year, consumption as well as a profit maximization strategy. A perusal of Table 3 indicate that in Assam state, long term storage of potato was not practiced while in Meghalaya state, a total of six storage methods/ structures were observed. Majority of the sampled farmers from Meghalaya were observed storing potatoes in bamboo baskets in store (50%) and in 3-4 inch layer on wooden platforms made in the country store (47.50%). About 32 percent of the farmers were observed using wooden storage structures for storage of potato. Storage in underground pits, in heaps in country stores and in gunny bags was also practiced by 20.00, 15.00 and 12.50 percent of the sampled respondents, respectively. Rhoades *et al.* (1988) also reported use of wooden platforms for storage of potato for home consumption in Peru. Use of underground pits for storage of seed potato was also reported to be popular in hills of Uttar Pradesh state (present day Uttaranchal state) by Khatana *et al.* (1997a) and in Karnataka by Khatana *et al.* (1997b). in line with the findings of the present study, use of large underground pits with capacity of 30t was also reported to be popular in Malwa region of Madhya Pradesh for potato storage for 4-6 months (Dahiya *et al.*, 1997).

The method of potato storage on different platforms in the country store was observed to be the most popular method of potato seed storage in the

sampled area in Meghalaya. In this method, platforms of bamboo or wooden planks are made and are supported at one side by wall of the store and with bamboo on the other. Seed as well as table potato is stored on these platforms in thin layers. Farmers perceived that this method of storage structures helps in better space utilization and also minimizes rottage of stored potatoes.

Bamboo baskets locally known as “*polo*” were observed to be frequently used for the potato storage in Meghalaya state. Different sizes of *polo* were used by farmers ranging with the capacity of 10-12 kgs to one-quintal. Farmers prefer smaller baskets for storing seed potato as farmers perceive that it allows proper aeration, which is turn cause less rottage. Being a very economical storage structure, the method was observed to be very popular among the tribal farmers.

In the under ground storage pit method of storage, underground circular pits were dug on elevated areas and wherein seed potatoes are usually kept. The tubers were then covered with a layer of soil, followed by a layer of paddy straw on the top. Selection of site for such storage structures was carried out keeping in view the appropriate slope gradient and soil types to avoid rottage.

Absence of long term potato storage in the state of Assam could be explained on the basis of the prevailing climatic conditions in post harvest seasons. The temperature after the potato harvesting season that lead rottage of the stored potato, thus farmers were

Table 4: Price advantage in short term storage in Assam and Meghalaya states of North Eastern in Rs /quintal

State	Price for small sized table potato			Price for medium sized table potato			Price for large sized table potato			Price for extra large sized table potato		
	At the time of harvest	Price after 45-60 DAH	Difference (gain in %)	At the time of harvest	Price after 45-60 DAH	Difference (gain in %)	At the time of harvest	Price after 45-60 DAH	Difference (gain in %)	At the time of harvest	Price after 45-60 DAH	Difference (gain in %)
Assam	-	-	-	296.55	366.67	153.12 (71.70%)	354.74	479.34	124.61 (35.13%)	-	-	-
Meghalaya	150	300	150(100%)	350	700	350 (100%)	575	800	225 (39%)	750	850	100 (13%)

forced to sell their produce. Farmers in the state were thus dependent on the potato traders operating in local markets for meeting the seed requirement in the next crop season.

Price advantage due to short term indigenous storage in north eastern states

It was observed that short term storage of potatoes was done for only medium and large sized potatoes by the farmers in Assam state. Small size potatoes were observed to be immediately disposed off after harvesting. As high as 71.70 and 35.13 percent of the price advantage was observed due to 45-60 days of storage of medium and large size potatoes, respectively in Assam (Table 4). Large sized potatoes were stored at the most for 45-60 days in Assam in the country stores.

In Meghalaya state, potato farmers received 100 percent price advantage due to storage of small and medium sized potatoes for 45-75 days. However, in case of large and extra large sized tubers, farmers were observed getting a price advantage of 39 and 13 percent, respectively due to storage for the same period. It could be seen that price advantage remained 10 percent for small and medium sized tuber after storage for 45-75 days while for further increase in size of the potato from large to extra large, the price advantage reduced from 39-13 percent after storage for the same period

Conclusions

From the results presented in the above paragraphs it could be concluded that, majority of the potato farmers in the North Eastern Region of the country primarily depended on traditional country stores for their short and long term storage needs. Storage in heaps, bamboo basket and wooden platforms were documented to be the most commonly utilized potato storage methods in North eastern states. Keeping in mind the importance of these traditional storage methods and structures for the potato production in the region, suitable research intervention aimed at refining the storage structures needs to be taken up so as to minimize the storage losses and thereby augment the farm income and returns of farmers.

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Vegetable Cropping System in Hot Arid Region of Western Rajasthan : An Assessment

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Abstract

The present study was conducted in Bikaner district of Western Rajasthan. It was found that 40.60 per cent farmers grow different kind of vegetables during different seasons of the year. At present, the vegetables grown by the arid farmers on small scale (0.10 ha) to large scale (3.0 ha) in different cropping systems during difference seasons/conditions are; mateera (Citrullus lanatus), snapmelon, kachri (Cucumis callosus), brinjal, bottle gourd, ridge gourd, cluster bean, round melon, Indian aloe, okra, tomato, chilli, cauliflower, cabbage, spinach, fenugreek (leaves), coriander (green), carrot, radish, pea, green onion, mustard leaves, sangari (pods) of khejri (Prosopis cineraria), moringa pods, etc. The major vegetable cropping system practiced by the farmers in Bikaner district are sole cropping system, inter-cropping system, mixed cropping system and perennial plantation.

The arid region of India covers nearly 12 per cent area of the total geographical area of the country. The hot arid regions are spread over the states of Rajasthan, Gujarat, Andhra Pradesh, Punjab, Haryana, Karnataka and Maharashtra, which are characterized by hostile agro-climate and fragile eco-system (Anon., 1998-99). Despite the various bio-physical constraints, the hot arid areas like Bikaner district of western Rajasthan offers very good opportunities for cultivation of vegetables like, *mateera, snapmelon, kachari, brinjal, bottle gourds, round melon, Indian aloe* and others to a considerable extent. The crop production is a very risky occupation in hot arid regions of Western Rajasthan due to frequent drought and famine. Therefore, the farmers of this region grow vegetable crops mainly in mixed cropping system with peal millet, clusterbean, mothbean, groundnut, sesamum, cowpea, greengram, etc. in different combinations. The recent advancement in the field of arid horticulture have motivated the farmers to adopt new production technologies and cropping system

of these crops in arid regions. There is lack of authentic information about recent vegetable cropping system followed by the farmers in hot arid region like in Bikaner district of Western Rajasthan. Hence, there is need to explore the present status of arid vegetable cropping system followed by the farmers so that they can be guided for adopting suitable cropping system of arid vegetable crops to increase productivity, production and income/profit from these vegetables.

Thus, in view of above facts, the present study was conducted to evaluate the vegetable cropping systems followed by the farmers in hot arid region of Bikaner district of Rajasthan.

Methodology

The present study was conducted in Bikaner district of western Rajasthan. The district consists of eight revenue Tehsils. Out of these, one Tehsils namely: Lunkarnsar was selected purposively (as per need of the study) for the present study. A list of all the villages

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falling under this Tehsil was prepared with help of secondary data available at headquarters of the selected Tehsil. On the basis of population size, such listed villages were grouped into two categories viz., small and large villages. Further, 10 villages were selected randomly amongst each categories (i.e. small and large village) of above villages of the Tehsil. Thus, a total of 20 villages (10 small and 10 large village) from the Lunkarnsar Tehsil were selected for this study. In each selected village with the help of key persons/local leaders a comprehensive list of vegetable growers of each village was prepared. Further, six vegetable growers (farmers) were selected randomly from all villages. Thus, a total of 120 vegetable growers (farmers) were selected from the Lunkarnsar Tehsil of Bikaner district for the present study. The selected vegetable growers were personally contacted

and interviewed using semi-structured interview schedule and data were recorded. The data so collected were coded, decoded, processed, analysed and arranged in tabular forms by using statistical tools like frequencies, percentage, area in hectares, etc. to draw inferences and conclusion of the study.

Result and Discussion

The results of the present study reveal that over all 40.60 per cent farmers grow different kind of vegetables in hot arid environment of Bikaner district during different season of the year. At present, the vegetables grown by the arid farmers on small scale (0.10 ha) to large scale (3.0 ha) in different cropping systems in different seasons and conditions are; *mateera* (*Citrullus lanatus*), snapmelon, *kachari* (*cucumis*

Table 1: Vegetable cropping system followed by the farmers during *kharif* season

Season	Condition	Cropping systems	Vegetable crops grown	Area (ha)	Percentage of growers out of total vegetable growers (40.60%)
<i>Kharif</i>	Irrigated	Sole cropping	a) <i>Mateera</i> , snapmelon, <i>kachari</i> , clusterbean (veg.)	0.3-1.5	24.80
			b) Bottle gourds, ridge gourds, round melon	0.1-0.3	16.80
			c) Brinjal, India aloe, tomato, okra, chilli	0.1-0.5	17.50
		Inter cropping	a) Cluster bean (veg.), <i>mateera</i> , snapmelon, <i>kachari</i> , round melon, ridge gourd, Indian aloe in <i>ber</i> , <i>aonla</i> , citrus, kinnow orchards	0.2-0.6	18.50
	Rainfed	Mixed cropping	a) <i>Mateera</i> , snapmelon, <i>kachari</i> , round melon with pearl millet, ground nut, sesamum, moth bean, cluster bean and cowpea in various combinations	0.5-3.0	49.50
		Perennial plantation	a) <i>Sangari</i> (pods) of <i>khejri</i> (<i>Prosopis cineraria</i>)	5-26 plant/ha	69.75
			b) Moringa pods	1-6 plants	12.00

callosus), brinjal, bottle gourd, ridge gourds, clusterbean, round melon, Indian aloe, okra, tomato, chilli, cauliflowers, cabbage, spinach, fenugreed (leaves), coriander (green), carrot, radish, pea, green onion, mustard leaves, sangari (pods) of khejri (*Prosopis cineraria*), moringa pods, etc. The major vegetable cropping system practiced by the vegetable growers (farmers) in Bikaner district are sole cropping system, inter-cropping system, mixed cropping system and perennial plantation. Mishra *et. al.* (2003) also reported more or less similar findings in their study.

The data in Table-1, reveals that out of total 40.60 per cent vegetable growers, 24.80 per cent vegetable farmers grow *mateera*, snapmelon, *kachari*, cluster bean (veg.) and 16.80 per cent grow bottle gourd, ridge gourds, round melon, as sole crops on area ranging from 0.3-1.5 ha and 0.1-0.3 ha respectively during *Khharif* season in irrigated conditions. In same conditions,

out of total vegetable growers, 17.50 per cent vegetable growers grow brinjal, Indian aloe, tomato, okra, chilli etc. as sole crops, on area ranging from 0.1-0.5 ha and 18.50 per cent vegetable growers grow clusterbean (vegetable), *mateera*, snapmelon, *kachari*, roundmelon, ridge gourd, Indian aloe, etc. as an inter-crops in *ber*, *aonla*, citrus/kinnow orchards, area ranging from 0.2-0.6 ha. Chundawat (1993) also reported the similar kind of findings in through his study on inter-cropping in orchards.

In rainfed conditions (*Khharif*) farmers adopt mixed cropping system in which *mateera*, snapmelon, *kachari*, roundmelons, bottle gourds, ridge gourds, etc. are grown with pearl millet, groundnut, sesameum, *mothbean*, clusterbean cowpea, etc. in various combinations. Such type of cropping system is practiced by more than 49.0 per cent vegetable growers, area ranging from 0.5-3.0 ha. Mixed cropping system is the

Table 2: Vegetable cropping system followed by farmers during *Rabi* and summer season

Season	Condition	Cropping systems	Vegetable crops grown	Area (ha)	Percentage of growers out of total vegetable growers (27.25%)
Rabi	Irrigated	Sole cropping	Brinjal, cauliflower/ cabbage, spinach, fenugreedk (leaves), coriander (leaves) carrot/ radish/ pea/ green onion	0.1-0.4	31.45
		Inter cropping	Bottle gourd, mustard (leaves) cauliflower/ cabbage, chilli fenugreek, etc. in <i>ber/aonla</i> , citrus/ kinnow orchards	0.1-0.3	24.50
Zaid (Summer)	Irrigated	Sole cropping	Mateera, snapmelon/ <i>kachari</i> , bottle gourd/ ridge gourd/ round melon/tar kakadi, brinjal, cluster bean (vege.), okra, tomato, etc.	0.1-0.8	25.80
		Inter cropping	Mateera/ snapmelon/ <i>kachari</i> , bottle gourd/ ridge gourd/ round melon, etc. in <i>ber</i> , <i>aonla</i> , citrus/ kinnow orchards	0.1-0.3	14.25
			Other vegetables	Less than 0.1 ha	04.00

most dominant system of vegetable growing in arid areas of the Bikaner district which is practiced by majority of the farmers covering highest area (upto 3.0 ha).

Under rainfed condition, plantation of perennial *khejri* (*Prosopis cineraria*) plant is a very important source of vegetable in arid regions. The *khejri* tree produces the sangari (pods) for vegetable and loom (leaves) as a nutritious fodder for the farm animals. During the study it was also observed that there were 5-26 perennial plants of *khejri* per hectare on more than 68.74 vegetable grower's fields which are used as a major source of vegetable (*sangari*) and fodder for farm animals. These *khejri* plants are either grow naturally or grown by the farmers themselves. Same kind of information has been reported in vision-2020 (Anon., 1997).

The Table 2, reveal that during *Rabi* season and irrigated conditions, the farmers grow the vegetable crops as sole crop as well as inter-crops. The brinjal, cauliflower/cabbage, spinach, fenugreek (leaves), coriander (leaves), carrot, radish, pea, green onion, etc are grown by 31.45 per cent farmers (out of total vegetable growers e.i. 27.25 %) on a small scale (0.1-0.4 ha) as sole crops during *Rabi* season. In case of inter-cropping system, bottle gourds, mustard leaves, cauliflowers/ cabbage, chilli, fenugreek, etc. are grown in *ber*, *aonla*, citrus/kinnow orchards by 24.50 per cent farmers on a small scale (0.1-0.3 ha). These findings are on the line as reported by Chadha (2002).

Some of the farmers who have irrigation facilities grow some vegetables during Zaid (Summer) season also. It was found that out of total vegetable grew, 25.80 per cent farmers grew *mateera*, snapmelon/ *kachari*, bottle gourds/ ridge gourds/ round melons/ kakadi, brinjal, cluster bean (vegetable), okra, tomato, etc. as sole crops on area ranging 0.1-0.8 ha during Zaid (Summer) season. Some of the farmers also grew the above cucurbits in *ber*, *aonla* and citrus/ kinnow orchards during zaid season as inter-crops.

It was also observed that the majority of the farmers of locale of the study, grow local/Deshi varieties of the above all mentioned vegetables. However, a few farmers grow hybrid/improved varieties of *mateera* (AHW-19, AHW-65), snapmelon (AHS-10, AHS-82) and *kachari* (AHK-119, AHK-200).

Conclusion

It is concluded that more than one third population of farmers of the study area grow various arid vegetables like - *mateera*, snapmelon, *kachari*, brinjal, bottle gourd, ridge gourd, round melon, Indian aloe, spinach, fenugreek, cauliflower, clusterbean, chilli, etc. in different season of the year. These vegetables are grown by farmers using different cropping systems viz. : sole cropping system, inter cropping system and mixed cropping system where the mixed cropping system is the most dominant system of arid vegetable production in the region. The majority the farmers grow Deshi/local varieties of the above arid vegetable crops. However, some of the farmers grow improved varieties of *mateera*, snapmelon, *kachari*, bottle gourds, cluster bean (veg.) etc. The farmers are very eager to grow and increase the area under arid vegetables crops but they are not acquainted with improved technologies and package of practices of these vegetable crops. Hence, the farmers should be motivated and the improved technologies of arid vegetable production should be provided to them.

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Problems Perceived by Scheduled Caste Women in Haryana

Shalini Asrani and Sushma Kaushik

Abstract

Data were collected from 300 Scheduled caste women to find out problems faced/ perceived by them. Findings revealed that some socio cultural problems still exist in few villages. Most frequently perceived problems were economic in nature followed by educational problems. These problems were obstacles in the upliftment of SC families.

Out of roughly 3000 'Castes' estimated to exist in India, as many as 779 have been designated, as per Article 341 of the Constitution of India, as Schedule Castes who occupy the lowest rank in the ritual hierarchy of Indian society and constitute bulk of agricultural labourers with minuscule land holdings. Schedule Castes included in the communities who were untouchable and suffered from many social restrictions. The 'Untouchable' in Hindu Society was a person who worked what was seen as unhealthy & polluting which society considered disgusting and even dangerous. Of late, the Indians have become more flexible in their caste system. In general the urban people in India are less strict about the caste system than the rural.

Presently about sixteen percent of India's population is Scheduled Caste (SCs). The population of Haryana, as per 2001 Census, is 21,144,564, of which, 19.3 per cent are Scheduled Castes (SCs). A majority of the SC population (78.5 per cent) of the state is residing in rural areas. Literature reveals that despite abolishing untouchability, prejudice against SCs and STs persists in some form or the other - be it overt, covert or subtle in expression (Census of India, 2001). Therefore present study was conducted to assess the problems faced/perceived by rural SC women.

Methodology

From Hisar District of Haryana state, six villages having predominately large number of Scheduled Caste

population were selected randomly. From each selected village, fifty SC women were selected randomly, thus making a total sample of 300 women. The data were collected personally through pre-structured & pretested interview schedule. For measuring general problems faced by them, an inventory was developed after consulting literature and experts. A list of various problems as per literature was prepared and categorized into socio cultural, educational, economic and communicational problems. Socio cultural problems further were divided into two viz untouchability and atrocities against scheduled caste families. As per the occurrence/ perceived occurrence of problems they were divided into three categories i.e. Always (more than 67%), sometimes (33-66%) and seldom (less than 33%)

Results and Discussion

General problems perceived by Scheduled Caste women

Table 1 depicts general problems of SC women. Regarding untouchability, Table 1 reveals that more than 80 per cent respondents seldom face the problem of untouchability except inter caste marriages where 94.3 per cent respondents stated that they were 'always' facing problems in 'inter caste marriages with higher class'. Fourteen per cent reported that they were some times not allowed for public places. Similarly untouchability was observed 'sometime' in temples (13.3%), water resources (10.7%), marriages (8.3%),

Table 1: General problems perceived by scheduled caste women/families**(N=300)**

S.No.	General problems of SC women	Always	Some times	Seldom
A.	Socio-cultural problems			
1.	Untouchability- Do you agree with the view that untouchability occur in the village.	6 (2.0)	41(14.0)	253(84.0)
	Not allowed for public places- Wells/water resource	6(2.0)	32 (10.7)	262 (87.3)
	Temples	5 (1.7)	40 (13.3)	255 (85.0)
	Marriages	5 (1.7)	25 (8.3)	270 (90.0)
	Social functions	4 (1.3)	18 (6.0)	278(92.7)
	Festivals	4 (1.3)	15 (5.0)	281 (93.7)
	Inter caste marriages with higher caste	280 (93.3)	15 (5.0)	5(1.7)
2.	Atrocities- Do you feel or face atrocities in any case in the village			
	Beat at public places	0(00.0)	0(00.0)	300(100.0)
	Burn houses	0(00.0)	0(00.0)	300(100.0)
	Forced out of the village	0(00.0)	0(00.0)	300(100.0)
	Voting not allowed/ forced to vote a particular candidate	0(00.0)	36 (12.0)	264 (88.0)
	Rape/ bad behavior with women	0(00.0)	0(00.0)	300(100.0)
B.	Educational problems			
	Lack of educational institutions	17 (5.0)	140 (47.0)	143 (48.0)
	Financial/time scarcity for higher education	232 (77.3)	45 (15.0)	23 (7.6)
	School not providing the facilities provided under governmental schemes	13 (4.3)	262 (87.3)	25 (8.3)
	Unequal treatment in school	0(00.0)	12 (4.0)	288 (96.0)
	Poor environment for girl student in school	0(00.0)	15 (5.0)	285 (95.0)
	No reservation benefits	7 (2.3)	20 (6.6)	273 (91.0)
C.	Economic problems			
	Lack of knowledge regarding income generating activities	197 (66.0)	33 (11.0)	70(23.0)
	Lack of job opportunities	213 (71.0)	37 (12.0)	50(17.0)
	Lack of awareness about reservation in jobs	215 (71.7)	42 (14.0)	43(14.3)
	Lack of finance for economic activities	254 (84.7)	43(14.3)	3(1.0)
	Lack of knowledge regarding provision of bank loans to SC women	248 (82.7)	42 (14.0)	10(3.3)
	Barrier in availing loans by rules and Bank officials	216 (72.0)	38 (12.7)	46(15.3)
	High rate of interest on bank loan make difficult to avail bank loan	228 (76.0)	27(9.0)	45(15.0)
	Less wages	235 (78.3)	28(9.3)	37(12.3)
	No land rights	213 (71.0)	40(13.3)	47(15.7)
D.	Communicational problems			
	Centralized communication	72(24.0)	140(46.7)	88 (29.3)
	Lack of involvement in village decisions	76(25.3)	104 (34.7)	120(40.0)
	Lack of modern means of communication	41 (14.0)	79 (26.0)	180 (60.0)
	Lack of awareness about various govt. schemes	36 (12.0)	224 (74.7)	40 (13.3)
	Extension agents/Govt. officials do not reach them	225 (75.0)	41 (13.7)	34 (11.3)

Figures in parentheses indicate percentage

social functions (6%) and festivals (5%). Less than 2 per cent respondents, however, reported that they 'always' faced untouchability in various respects.

Regarding atrocities almost all the respondents reported that they seldom faced atrocities like 'beat at public places', 'burn houses', 'forced out of the village' 'rape/bad behavior with women'. However 12 per cent reported that sometime they are not allowed to vote or forced to vote for particular candidate.

Regarding educational facilities, majority of respondents did not face the problems such as lack of educational institution (48%), unequal treatment in schools (96%), poor environment for girl students in school (95%) and reservation benefits (91%). However, 77.3 per cent respondents always had the problem of financial scarcity for higher education and 87.3 per cent respondents 'sometimes' reported that schools were not providing the benefits under government schemes.

Some of the economic problems were 'always' faced by majority of respondents such as 'lack of finance for any economic activities' (84.7%), 'lack of knowledge regarding provision of bank loans to SC women' (82.7%), 'less wages' (78.3%), 'high rate of interest on bank loan make difficult to avail unable to bank loan' (76%), 'barrier in availing loans by rules and bank officials' (72%), 'lack of awareness about reservation in jobs' (71.7%), 'lack of job opportunities' & 'no land rights' (71%, each) and 'lack of knowledge regarding income generating activities' (66%).

Majority of respondents (75%) 'always' faced the communicational problem such as 'extension agents/ Govt. officials do not reach them'. Sometimes they faced 'lack of awareness about various government schemes' (74.7%), 'centralized communication' (46.7%), 'lack of involvement in village decisions' (34.7%). However, 60 per cent respondents seldom faced the problem of 'lack of modern means of communication'.

Table 2: Extent of problems faced by schedule caste women

S. No.	General problems of SC women	Village-wise respondent (N=300)					Total	
		Ludas	Shahp	Mang	Balaw	Gabip		Khark
A.	Socio-cultural problems							
	High	0(0.00)	0(0.00)	0(0.00)	6 (12.0)	0(0.00)	0(0.00)	6 (2.0)
	Medium	0(0.00)	0(0.00)	0(0.00)	41 (82.0)	0(0.00)	0(0.00)	41 (13.7)
	Low	50 (100.0)	50 (100.0)	50(100.0)	3 (6.0)	50 (100.0)	50 (100.0)	253 (84.3)
B.	Educational problems							
	High	8 (16.0)	5 (10.0)	0(0.00)	3 (6.0)	1 (2.0)	0(0.00)	17 (5.6)
	Medium	39 (78.0)	37 (74.0)	4 (8.0)	30 (60.0)	22 (44.0)	8 (16.0)	140 (46.6)
	Low	3 (6.0)	8 (16.0)	46 (92.0)	17 (34.0)	27 (54.0)	42 (84.0)	143 (47.6)
C.	Economic problems							
	High	45 (90.0)	42 (84.0)	36 (72.0)	46 (92.0)	42 (84.0)	43 (86.0)	254 (84.7)
	Medium	5 (10.0)	8 (16.0)	13 (26.0)	4 (8.0)	6 (12.0)	7 (14.0)	43 (14.3)
	Low	0(0.00)	0(0.00)	1 (2.0)	0(0.00)	2 (4.0)	0(0.00)	3 (1.0)
D.	Communicational problems							
	High	10 (20.0)	8 (16.0)	4 (8.0)	20 (40.0)	12 (24.0)	15 (30.0)	69 (23.3)
	Medium	40 (80.0)	33 (66.0)	18 (36.0)	30 (60.0)	35 (70.0)	34 (68.0)	190 (63.0)
	Low	0(0.00)	9 (18.0)	28 (56.0)	0(0.00)	3 (6.0)	1 (2.0)	41 (13.7)

Extent of problems faced by schedule caste women

The total incidences of all the problems of each category were combined together and divided into three categories of high, medium and low. Table 2 depicts village wise overall extent of problems faced by schedule caste women. Regarding socio cultural problems, it was clear that majority of respondents (84.3%) in total had low problems followed by medium (13.7%) and high (2%) problems. Table further shows that only in Balawas village 82 per cent respondents reported medium and few (12%) faced high socio cultural problems.

Regarding educational problems, majority of respondents in Mangali (92%), Kharkhara (84%), Gabipur (54%) and in total (47.6%) had low problems while majority in Ludas (78%), Shahpur (74%) and Balawas (60%) faced medium educational problems.

Table further reveals that more than 80 per cent respondent faced high economic problems in all the villages like Balawas (92%), Ludas (90%), Kharkhara (86%), Shahpur, Gabipur (84%, each) except in Mangali where 72 per cent respondents faced high and 26 per cent faced medium economic problems.

Regarding communication problems, table further reveals that majority of respondents in all the villages (63%) faced medium communication problems

except in Mangali village where majority (86%) faced low communicational problems.

Conclusion

The findings of the present study reveal that SC families in Hisar district faced/ perceived very less socio-cultural and communicational problems. This may be because of the positive discrimination policy of the state that several schemes have been targeted for their welfare which might have raised their status. Further their sufficient number (about 40%) in the village might have made them powerful as they had their own panchayat representative, their own temple and so on. However, despite all this positive discrimination policy and changing attitudes, SC communities who were low in the caste hierarchy remain low in the social order even today. The major problems perceived by respondents were economic. Hence, more income generating activities should be introduced among SC women/families for increasing their family income much more efforts are need to be done in order to help them stand on equal footing.

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Ergonomic Assessment of Physical Strain Among Farm Women

Deepali Chauhan and Rekha Dayal

Abstract

Carrying and harvesting were the two farm activities of which ergonomics assessment of physical strain among farm women was carried out. Physical stress was assessed on five point scale of stress rating and by calculating average heart rate, total cardiac cost of work, physical cost of work and energy expenditure of the farm women. On the basis major findings, it can be said that carrying is more strenuous activity as compared to harvesting.

Ergonomic deals with man-machine relationship. This relationship has to be very close for better work efficiency, maximum body comfort and good health.. Man as a source of energy is not economical because efficiency of man as energy converter is very low, lying in the range of 20 to 30 per cent. Women constitute 50 per cent of the agricultural work force in India.

Triple burden of child rearing, farm work and house hold duties fallen on women increases their physical strain. Hence, there is a great need of farm mechanization and automation based on women's body anatomy for relieving the drudgery of farm women caused due to farm work. Physiological cost of work is an essential basis for evaluation and regulation of use of human beings as a source of mechanical power. Heart rate is an important parameters used as a indicator of Physiological cost of work.

Methodology

Present study was undertaken at student's farm of Chandra Shekhar Azad (CSA) University purposively. Study was limited to two farm activities i.e. carrying and harvesting and for this purpose 15 physically fit farm women were chosen for experimental study. Assessment of physical fitness of farm women was done through BMI Garrow (1981). Heart rate of farm women's were assessed through stethoscope and stop watch. Heart

rate were taken in three conditions-resting, working and recovery. Heart beats were taken four times in each condition for accuracy. For complete cycle of work the heart beats in all three conditions were taken in three phases. Stress level of both the activities was assessed with the help five point scale (Varghese, 1996) of very severe (5), severe (4), moderate (3), light (2) and very light (1).

1. Onward : From the place they all were assembled for he attendance.
2. At the work : While working at work place.
3. Back ward : From work place to place where they were assembled.

Average heart rate, total cardiac cost of work, energy expenditure and physical cost of work were measured through formula developed Varghese *et al.* (1994) mentioned below:

- Cardiac cost of work (CCW) = AHR x duration of work
Where, AHR = Average working heart rate– Average resting heart rate.
- Total cardiac cost of work (TCCW) = CCW + CCR
Where, CCR = Average recovery heart rate x duration of recovery of heart rate.
- Energy expenditure (kg/min) = 0.159 x average

$$\text{Physical cost of work (PCW)} = \frac{\text{heart rate (beats/min.)} - 8.72}{\text{Total cardiac cost of work}} \times \text{Total time of work}$$

Arithmetic mean, standard deviation, paired test and correlation coefficient were used as statistical measures to draw meaningful conditions.

Results and Discussion

1. Subjective comparison of farm activities on the basis of stress rating

Table 1 reveals that forty eight per cent of farm women felt severe body pain after performing harvesting operation while fifty four per cent of farm women felt severe body pain after carrying operation. Results of table suggest that harvesting and carrying operation are very strenuous activities.

2. Assessment of physical strain during three phases of farm activities

Onward journey

Findings contained in Table 2 reveals that during onward journey mean value of average heart rate was 5.15 in harvesting and 6.08 in carrying whereas standard deviation of average heart rate (AHR) during onward journey was 1.33 in harvesting and 1.94 in carrying. From the Table (2) it is also clear that mean value and standard deviation of total cardiac cost of work (TCCW) of all farm women were 36.60 and 10.49 in harvesting, 38.73 and 12.91 in carrying. Further, mean value and standard deviation of physical cost of work (PCW) were 3.05 and 0.85 for harvesting and 4.23 and 1.08 for

carrying, respectively. Except that, the mean value and standard deviation of energy expenditure (EE) of all farm women were 3.85 and 0.35 for harvesting and 4.12 and 0.42 for carrying.

At the work

From the Table 2 it is clear that mean value and standard deviation of average heart rate (AHR) were 39.8 and 6.68 during harvesting, 42.22 and 7.99 during carrying respectively whereas the mean value and standard deviation of total cardiac cost of work (TCCW) were 264.93 and 43.18 during harvesting, 286.1 and 54.44 were during carrying, respectively. From the Table (2) it also obvious that mean value and standard deviation of physical cost of work (PCW) were 3.05 and 0.87 during harvesting whereas 3.22 and 1.08 during carrying, respectively. Further, Table 2 reveals that the mean value and standard deviation of energy expenditure (EE) were 4.95 and 1.00 during harvesting while 5.20 and 0.62 during carrying, respectively.

Backward journey

It is obvious from the Table 2 that the mean value and standard deviation of average heart rate (AHR) were 7.89 and 1.46, respectively after harvesting. On the other hand the mean value and standard deviation of average heart rate (AHR) were 5.93 and 2.03, respectively after carrying.

Table 2 shows that mean value and standard deviation of total cardiac cost of work (TCCW) were 52.0 and 24.41 after harvesting whereas 34.07 and 12.32 carrying, respectively. It is also reveals that the mean value and standard deviation of physical cost of

Table 1 : Distribution of the farm women on the basis of stress rating given by them to different activities N=15

S.No.	Activity	Stress rating				
		Very Severe	Severe	Moderate	Low	Very Low
1.	Harvesting	22 (44%)	22 (48%)	4 (8%)	-	-
2.	Carrying	23(46%)	27(54%)	-	-	-

Table 2: Mean value and standard deviation of different parameters of physical strains in different farm activities during three phases of work

P. of Phy. Strain	AHR		TCCW		PCW		EE	
	Harvesting Posture	Carrying Stooping	Harvesting Stooping	Carrying Walking	Harvesting Stooping	Carrying Walking	Harvesting Stooping	Carrying Walking
On Ward Journey								
Mean	5.15	6.08	36.60	38.73	3.05	3.23	3.85	4.12
S.D.	1.33	1.94	10.49	12.91	0.87	1.08	0.34	0.42
During Work								
Mean	39.80	42.22	264.90	286.10	3.05	3.23	3.85	4.12
S.D.	6.66	7.99	43.18	54.44	0.87	1.08	0.34	0.42
Backward Journey								
Mean	7.898	5.93	52.00	34.07	4.33	2.84	4.95	5.20
S.D.	1.46	2.03	24.41	12.32	2.03	1.03	1.00	0.62

Keys: AHR (Average heart rate), TCCW (Total cardiac cost of work), PCW (Physical cost of work), EE (Energy expenditure)

work (PCW) were 4.33 and 2.03 after harvesting while 2.84 and 1.03 after carrying. From the Table 2, it is also clear that mean value and standard deviation of energy expenditure (EE) were 4.95 and 1.00 after harvesting while 5.20 and 0.62 after carrying. Evans *et al.* (1983) also reported that heart rate increased and the exhaustion was linearly related to the load. Average heart rate was greater for every load when the load was carried rather than simple held because electro myographic activity in the forearm flexor muscles increased when the load was carried. A comparative study on shoveling with a conventional and two handled (levered) shovel was conducted by Bridger *et al.* (1997). Findings showed that total energy expenditure was almost similar under both conditions (120 ± 20 and 125 ± 25 kcal conventional versus two handled spade). Average heart rate was 4 per cent higher when the 2 handled shovel was used ($P < 0.05$) to shovel 1815 kg sand.

3. 't' values of the parameters of physical strain caused due to farm operations among farm women during three phases of farm activities

Onward journey

Table 3 Reveals that 't' value of AHR, PCW

and EE were non significant during onward journey of carrying and harvesting.

It mean during onward journey of carrying and harvesting, AHR, PCW and EE were almost same due to the similar posture adopted during both work and similar distance were traveled from the place where they were assembled to place of farm activities.

At the work

Table 3 implies that 't' value of AHR (2.07) and EE (2.046) were non significant between carrying and harvesting whereas 't' value of PCW (3.840*) was significant between carrying and harvesting at 5 per cent level of significance.

Backward journey

It is obvious that 't' values of AHR, PCW and EE, were also non significant among carrying and harvesting after work.

4. Correlation values of different parameters of physical strain between harvesting and carrying

Table 4a shows that all the correlation value of

Table 3: ‘t’ value of AHR, PCW and EE during different stages of carrying and harvesting

Farm activities	Onward Journey			At the work			Backward Journey		
	AHR	PCW	EE	AHR	PCW	EE	AHR	PCW	EE
Carrying vs harvesting	2.030	1.214	1.807	2.027	3.084*	2.046	1.046	1.477	1.533

AHR, T.C.C.W and EE among four farm activities were non significant during onward journey

It means that the farm women whose average heart rate (AHR), physical cost work (PCW) and energy expenditure (EE) high in one farm activity, might not be high in other farm activities during onward journey.

Table 4b reveals that correlation value (0.8162**) of average heart rate(AHR) between carrying and harvesting was significant at 1 per cent level, correlation value (0.7832**) of physical(PCW) between carrying and harvesting was significant at 1 per cent level whereas correlation value (0.9780**) of energy expenditure (EE) was significant at 1 per cent at level.

Table 4b: Correlation value of different parameters of physical strain during the work

	AHR Harvesting	PCW Harvesting	EE Harvesting
Carrying	0.8162*	0.7832*	0.9780*

Keys : * Significant at 5 per cent level, ** Significant at 1 per cent at level.

It means the high value of average heart rate(AHR), physical cost of work (PCW) and energy expenditue (EE) during one farm activity associated with other farm activities. Thus, it is clear that the farm women whose average heart rate (AHR), physical cost of work (PCW) and energy expenditure (EE) were high in one activity must also be high in other farm activities during work.

From the Table 4c it is clear that correlation value of physical strain due to average heart rate(AHR), physical cost work(PCW) and energy expenditure (EE) were negatively or some were positively non significant. It means that the farm women whose AHR, P.C.W. and EE were high in one activity be or might not be significantly low in other activities.

Table 4c: Correlation value of different parameters of physical strain during backward journey

	AHR Harvesting	PCW Harvesting	EE Harvesting
Carrying	-0.4971	-0.3027	0.4375

Table 4a: Correlation values of different parameters during onward journey

	AHR		PCW		EE	
	Harvesting	Carrying	Harvesting	Carrying	Harvesting	Carrying
Harvesting	1		1		1	
Carrying	0.4375	1	0.3499	1	0.4460	1

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Development Programmes for Rural Women : Differential Perceptions of Programme Functionaries and Beneficiaries

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Abstract

For mainstreaming the gender issues, there are large number of programs for welfare of rural women. The present study was conducted in Haryana and Delhi to find the differential perception of programme functionaries and beneficiaries. It is envisaged that the findings will have effect on planning and implementation of successful programmes. The perception of programme functionaries and beneficiaries were assessed for their training needs, aspirations, their work load, benefits, constraints and their suggestions for improvement of developmental programme.

It is a well known fact that the socio-economic status of women particularly in rural areas is low. The development of rural women in India has been at the center stage of the country's development planning since independence. We have a large number of well-conceptualized and formulated programmes for poor rural women. The challenge lies in converting these concerns into reality. The key to programming lies in recognizing the socio-psychological make up, work profile and preferences of the stake holders and then adopting a flexible approach that permits the programs to be adapted to suit their specific needs. In realising this objective the two core partners, beneficiaries as well as programme functionaries play pivotal role since they are at the core of the implementation process and function at grassroot level. Their perceptions about their own jobs and the programmes have great effect on the successful implementation of the programmes. Therefore, the present study was conducted to identify perception of beneficiaries and programme functionaries regarding training needs, aspirations, their workload, benefits and constraints of selected developmental programmes.

Methodology

Study was conducted purposively in identified villages of District Hisar and Gurgaon in Haryana and Najafgarh block, in Delhi. Four selected programmes for farm women were being implemented in these villages. Rural women beneficiaries of low socio-economic status i.e., landless, small and marginal landholdings and functionaries of each of the four selected programmes viz. Women in Agriculture (WIA), Development of Women and Children in Rural Areas (DWCRA), Integrated Child Development Services (ICDS) and YWCA's programme for rural women constituted the population for the present study. Rural women beneficiaries were selected on random basis from the selected villages of Hisar, Gurgaon and Najafgarh totaling 120. Along with this sample 40 programme functionaries of all four programmes were selected purposively.

An assessment of needs was done for the respondents using participatory approach. Several meetings were held in the sample villages of Gurgaon, and Hissar district of Haryana with selected farm women

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to identify their needs followed by participatory interview with each of the selected sample of 120 rural women beneficiaries and 40 programme functionaries. Data were collected from the selected respondents using semi structured interview schedule. The data was analysed using frequencies, percentages and rank order.

Results and Discussion

Training needs

Assessment is the foundation on which effectiveness of development programmes depends. The training needs of rural women as perceived by the beneficiaries as well as functionaries of the selected programmes are given in Table 1 and 2.

Table 1: Training needs of beneficiaries in various areas

(N=120)

S.No.	Training Area	Frequency	%
1.	Animal Husbandry	49	40.8
2.	Food Preservation	39	32.5
3.	Sewing	39	32.5
4.	Vegetable nursery	36	30.0
5.	Wheat production technology	27	22.5
6.	Fodder crops	26	21.6
7.	Cotton production technology	25	20.8
8.	Embroidery	16	13.3
9.	Bee keeping	13	10.8
10.	Plant Protection	12	10.0
11.	Mushroom cultivation	11	9.6

It is evident from Table 1 that most of the rural women needed training in Animal Husbandry (40.83%). Next in demand were trainings in the area of food preservation (32.50%), sewing (32.50%) and vegetable nurseries (30.00%). These areas were followed by need for trainings in wheat production (30.60%), fodder crops (22.50%) and cotton (20.83%). The needs expressed by women were thus also suggestive of the nature of programme proposed. If programmes are focused more on agriculture and allied activities women would want

more of these to improve their skills. Sundraswamy and Shankaramurthy (1990) have also suggested that there is need for training the rural women regarding such technologies so that they can perform these activities with more confidence. One may infer that since women were not approached for enhancing skills in agriculture and the need is not recognised they also did not expect training on agriculture and therefore the gap between their knowledge about agriculture may also widen.

Table 2: Programme functionaries perception of training needs of rural women

(N=120)

S.No.	Training Area	Frequency	%
1.	Food preservation	35	87.50
2.	Sewing, knitting and handicrafts	33	82.50
3.	Animal husbandry	23	57.50
4.	Vegetable Nursery	21	52.50
5.	Income-generating activities (bread, doll and candle making, <i>Papad</i> and <i>Bari</i> making)	18	45.00
6.	Mushroom cultivation	13	32.50
7.	Bee keeping	12	30.00
8.	Plant protection	10	25.00
9.	Cotton	8	20.00
10.	Wheat	5	12.50

According to the Table 2, it is evident that 87.50 percent of the program functionaries found 'food preservation' to be an important area for imparting training to rural women. This was followed by 'sewing, knitting and handicraft' as important areas felt by 82.50 percent of the functionaries. This is in line with the traditional thinking that these areas are the two main interests of rural women.

Further, it was observed that 57.50 percent and 52.50 percent of the program functionaries perceived 'Animal Husbandry' and 'Vegetable Nursery' to be the next two important areas for training. 'Animal Husbandry' was perceived to be important by the rural women also. In fact this is one area where there is a lot of involvement

and participation of rural women and programs designed in this direction will be relevant for the rural women both in terms of needs and utility. Akhtar *et al.*, (1995) have also opined that productivity of economic activities such as livestock raising and kitchen gardening is very low due to lack of technical knowledge. They suggested that rural poor women need to be trained in improved techniques so that they could raise their income levels. 45 percent of the program functionaries expressed that 'income generating activities' was also an area where programs need to be directed. Here again there is a lot of scope for programs/trainings in entrepreneurship development which are carefully designed keeping in mind the specific need – based sub areas which match with the background of the rural women. Trainings in the area of agriculture (for cotton & wheat, in sub areas like plant protection) were also perceived to be relevant for rural women by the program functionaries.

Aspirations

Aspirations and needs leads one to realize her/his goals in life. An understanding of aspirations is essential to plan relevant programmes for rural women. The major aspirations of women are to see their children educated and well settled in life (rank I) and to lead a happy family life (rank II). Rural women's aspirations are hence primarily family centred followed by aspirations like having enough money (rank III) and taking up jobs (rank IV). It may be concluded that if women are empowered economically, they will utilise their resources for the betterment of their families. thereby it may lead to overall development of the society at large. Very few women aspire to set up their own business (rank VI).

The main aspiration of the program functionaries was 'to lead a happy family life' followed by 'to become a senior program officer' and 'to get recognition'. 'To lead a happy family life' – the main aspiration of program functionaries reveals the importance of family for a women. There are very few women extension development functionaries in our country (According to FAO only 0.56 per cent of the extension workers are women) and women functionaries certainly play an

important role in reaching rural women. Our policies can be supportive for these women functionaries in a number of ways like for example, provision of day care centres and cresches near their work place. This has assumed even greater importance in view of the emergence of more and more nuclear families in place of joint families. There is need for gender sensitization programmes at all the levels.

It is worth noting that some of the program functionaries also wanted 'to do good social service'. The development sector does require functionaries who work with this spirit for the cause of rural women.

Work load

Statistics world-wide reveals the heavy participation of women in agriculture, animal husbandry, home stead and outside home areas. It is important to study the respondents perception of their work load. This understanding helps in the planning and implementation of the programmes.

The perception of respondents about their daily work load revealed that while the majority of the beneficiaries (52.50%) perceived their work load to be heavy, 20.00 percent found it to be 'too much'. This is really the picture of the overburdened rural women in our villages. When these women were asked about the work which they liked least and would like to reduce (if it was possible), 59.16 percent reported agriculture and animal husbandry work as least liked. They would be much relieved if it were possible to reduce some of the activities in these areas. This may be possible by changes in the division of labour within the family coupled with drudgery reducing appropriate technologies for rural women. However, this change would require changes in attitude and a different socialization right from childhood along with gender sensitization.

Similarly, majority of the functionaries (57.50%) found their work load to be 'moderately heavy'. 17.50 percent perceived it to be 'very heavy' while 20 percent of them found it 'moderately light'. This shows that the program functionaries were busy with their official duties.

At times programme functionaries are burdened with miscellaneous responsibilities which affect the time they devote to rural women. It is essential to realize and restructure the job role and responsibilities and thereby ensure accountability.

Benefits of programs as perceived by respondents

It is important to analyze the perceptions of rural women beneficiaries and functionaries of development programmes and then gain an understanding of whether they are in line with their objectives

Table 3: Benefits of programs as perceived by rural women (N=120)

S.No.	Benefits	Frequency	%
1.	Economic benefit	49	40.83
2.	Benefit to village/ society	30	25.0
3.	Better confidence	26	21.6
4.	Better nutrition for children	21	17.5
5.	Improved status	7	5.8

Table 3 depicts the benefits of the programs as perceived by the rural women. Most significant benefit of the program perceived by the women (40.85%) was economic benefit. The program for Women in Agriculture included stipends and DWCRA involved a revolving fund to a group of women. Other benefits perceived were benefits to village / society (25%) and better confidence (21.66%). Surprisingly in case of the ICDS program the only benefit seen was in terms of better nutrition to children and no direct benefit to the rural women, even though their objective is to target the rural women also especially the pregnant and lactating mothers.

The data in Table 4 reveals that 92.50 percent of the program functionaries felt the benefit of the development programs was ‘improved standard of living’ for rural women. 62.50 percent of the functionaries felt ‘economic benefits’ as the outcome of the programs. While 47.50 percent of them felt ‘better nutrition and

health for children and mothers as the benefits resulting from the developmental programs. Furthermore ‘improved status’, ‘more confidence’ and ‘empowerment of rural women were also felt to be the benefits accruing from these schemes. The perception of benefits seem to be somewhat in line with the objectives of the programmes Haddad (1999) has also found that the programmes that aim to increase women’s income can increase their status within the household.

Table 4: Benefits of the development programmes as perceived by the functionaries. (N=40)

S. No.	Benefits of the programmes	Frequency	%
1.	Improved standard of living	37	92.50
2.	Economic benefit	25	62.50
3.	Better nutrition and health for children and mothers	19	47.50
4.	Improved status	10	25.00
5.	More confidence	8	20.00
6.	Empowerment of rural women	6	15.00

Constraints faced by respondents

Several factors play a role in enhancing or curbing people’s participation in a development programme. In case of the four identified programmes too farm women were asked to state obstacles that came in their way of participation in the programme. Table 5 & 6 give the perceptions of rural women beneficiaries and functionaries regarding the active participation in the programmes. These constraints needs to be addressed in order to improve the effectiveness of the development programmes.

Table 5 depicts the constraints faced by the beneficiaries of the different programs. Irrespective of the type of program, women by and large, have very busy work schedules (36.66%) and find lack of family cooperation (30.83%) to be a major constraint. Some of the women under WIA scheme faced problems of

insufficient training and problems with functionaries. The women under DWCRA and ICDS felt that women in general were not involved in the programs. Only a selected and favoured few women were given opportunity. Problems with program functionaries were also expressed by women to be a major constraint. The major constraints of busy work schedules need to be dealt with drudgery reducing technological interventions. 'Lack of family co-operation' calls for gender sensitization awareness campaigns.

Table 5: Constraints faced by rural women beneficiaries

(N=120)

S.No.	Constraints	Frequency	%
1.	Busy work schedule	44	36.6
2.	Problems with functionaries	41	34.1
3.	Family co-operation lacking	37	30.8
4.	Small children	33	27.5
5.	Opportunity provided not to all women	32	26.6
6.	Anganwadi workers cheating an ration	23	19.1
7.	No training for women	21	17.5
8.	Trainings not sufficient	12	10.0
9.	Lack of company	9	7.5
10.	Attraction of higher wages	4	3.3

It is evident from Table 6 that one of the major constraints, faced by 70.00 percent of the program functionaries was 'lack of family cooperation'. This is in line with the problems expressed by working women in general as quoted in a number of studies. This problem seems to be stemming from our 'socialization, where women with multiple roles – within and outside the family are still regarded as solely responsible for household and child rearing activities in addition to their jobs outside home. 'Division of labour' within the family members is rarely observed in the homes. Another constraint faced by the program functionaries was related to 'commuting' to their work place. Inadequate transport facilities may

be one of the causes for this combined with 'less mobility' of the women when moving to and fro from home to work place. 'Low motivation of rural women' was also felt as a constraint. The causes for the low motivation need to be explored and probed further since motivation is indeed very important for the mobilization and empowerment of women. Other job-related constraints were related to 'problems with senior colleagues' 'busy work schedule'. Team spirit is indeed important in management of programs and 'senior colleagues' relationships' have to be improved to increase effectiveness. 'Corruption' and 'cheating' is another constraint faced by respondents. This is related to moral issues, values and society in general. 'Coping with politics of caste,' etc., is another constraint felt by the women functionaries. This calls for sensitization and changes in attitudes which can be achieved by special training interventions.

Table 6: Constraints faced by the program functionaries

(N=40)

S.No.	Constraints	Frequency	%
1.	Lack of family co-operation	28	70.00
2.	Commuting problems	25	62.50
3.	Heavy Burden of work	24	60.00
4.	Low motivation of rural women	19	47.50
5.	Problems with senior colleagues	18	45.00
6.	Cheating on supplies, ration etc	16	40.00
7.	Inadequate funds	15	37.50
8.	Coping with village politics of caste, status etc.	14	35.00

Suggestions for improvement of programmes

Table 7 and 8 give the suggestions of rural women beneficiaries and functionaries of the selected programmes. These suggestions may be considered by policy makers and implementing agencies in order to make development programmes more relevant and effective.

Table 7: Suggestions of beneficiaries for improvement of programmes (N=120)

S.No.	Suggestions	Frequency	%
1.	Better infrastructure and input supply	49	40.8
2.	More women should get opportunity	32	26.6
3.	More training in animal husbandry	31	25.8
4.	More training in agriculture	23	19.1
5.	Better supply of food to children	18	15.0
6.	Timely release of budget	17	14.1
7.	Sewing Centre in village	15	12.5
8.	Adult learning Centre	15	12.5
9.	More frequent visits by functionaries	13	10.8
10.	Home Science training should be included	11	9.1
11.	More of skill trainings	10	8.3
12.	Stipend should be paid immediately	6	5.0

Table 8: Suggestions by functionaries for improving the effectiveness of programmes (N=40)

S.No.	Suggestions	Frequency	%
1.	Day care centres to look after small children	18	45.00
2.	Better transport facilities	17	42.50
3.	Better monitoring of funds and supplies	22	55.00
4.	Training for staff	16	40.00
5.	Better facilities in training centres	21	52.50
6.	Better co-operation from senior colleagues	15	37.50

According to Table 7, 40.33 percent of the rural women suggest better infrastructure and input supply for improvement of the programmes while 26.66 percent (mainly under ICDS) suggest greater opportunity for women to participation in the program. Majority of the women under WIA scheme suggested more trainings in the field of agriculture (56.66%) and animal husbandry

(50%). 30 percent of these women also suggested timely release of budget.

To improve programme implementation 55.00 percent of the respondents suggested 'better monitoring of funds and supplies while 52.00 percent felt that 'better facilities in training centres' will improve the delivery and effectiveness of programs. According to 45.00 percent of the respondents 'day care centres to look after small children were important facilities which should be provided to women staff to enable them to carry out their duties and this support they feel will have positive effect on the program. Along with this 'better transport facilities' will also contribute to overall effectiveness along with human resource development and 'training for staff'. This was suggested by 40 percent of the respondents. This is an important area which can be easily implemented (Table 8). Capacity building interventions need to be planned and implemented.

Conclusion

Hence, the comparative analysis of the perceptions of the rural women beneficiaries and functionaries of the selective development programmes gives an insight into some of the major issues to be considered at policy making and implementation levels in order to improve women's participation and hence lead to more relevant and effective development programmes for rural women.

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Unique Handloom Products of Garo Tribe of Meghalaya

Anshu Sharma

Abstract

Meghalaya is a tiny state carved out from the state of Assam. In the present investigation status of traditional cottage level handloom units of West Garo Hills districts of Meghalaya was observed critically in terms of infrastructure, economic standard, work and skill level of workers, condition of tools and equipments used in the unit, various motifs and colours combinations etc. it was concluded that weavers of Garo Hills are making very good handloom products. But these products are unexplored out of Garo hills, so that there is a need to explore and revive these handloom products out of Garo hills. They were several traditional weaving culture using indigenous looms and traditional designs. Now, there is a need to revive this weaving culture by using latest and fast looms and new designs to compete in today's world of fashion.

Meghalaya is a picturesque but tiny state in the northeastern region of India. Carved out of the former state of Assam, Meghalaya is one of the seven sister states of the north-eastern region. Meghalaya has seven districts. They are: East Garo Hills, West Garo Hills, South Garo Hills, East Khasi Hills, West Khasi Hills, Ri- Bhoi and Jaintia Hills. Three districts of Garo Hills are predominantly inhabited by Garos, belonging to the Bodo family of Tibetan- Burman race, migrated from Tibet. Music, craft and costume of Meghalaya provide a glimpse of rich cultural heritage of the state. Weaving is one of the most important vocations in the economic life of the Garos. (<http://www.magadhtours.com/meghalaya.html>).

In this area, crafts are not practiced as hobby, nor are they as commercial venture, they are very much as an integral part of the life of the people. Garos are most skilled weavers of the region. Probably, every family earns their livelihood through weaving. Spinning and weaving in Meghalaya is the exclusive monopoly of women. It is the women who are real clothier of the state. Many of the tribes have taboo which prohibits weaving by a man.

Handloom enjoys exclusive position in our textiles and clothing exports. Over the years its importance has been increasing despite large scale mechanization. Handloom products are aesthetic. Due to manual operations, several combinations are possible with intricate designs. Handloom products are unique and each piece is different from others. (<http://northeastindiatravel.com/meghalaya/shopping.html>).

Methodology

Unlike the handloom products of other states like Patola of Gujrat, Ikat of Orrisa, Bandhani of Rajasthan handloom the textile products of Meghalaya are not known outside the state. In order to preserve and revive the traditional weaving craft of Meghalaya information on weaving craft was collected from 100 cottage level textile units from West Garo Hill district in 2007 who were involved in the weaving activity. Units were selected by circular random sampling method. A combination of interview and observation technique was used to collect the information regarding handloom products of traditional cottage level textile units. Workers of traditional units were interviewed.

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Collected data were divided under following major headings:

1. Loom used for weaving traditional handloom products
2. Raw material used for handloom products
3. Motifs and designs used in handloom products
4. Most preferred colour combinations of the handloom products
5. Various handloom products of Garos

Results and Discussion

The handloom used for weaving traditional handloom products

a. Back strap or Loin loom

The loom used in Meghalaya, is simple back strap one with a continuous horizontal warp consisting of six sticks serving the function of warp beam, lease rod, heald stick, beating sword and extra warp beam.

For setting the loom, first the warp beam is securely fastened to the wall of the house or any other suitable form supporting in a horizontal position. On this are slipped two loops of bark string the loops length is adjusted from an already woven piece of cloth and set at a distance apart equal to a little more than the breadth of the piece of the cloth to be woven. The lower bar or cloth beam is notched at either end so that the weaving belt can be attached to it. This belt is worn by the operator in the small of her back. By it, as she sits on a low bench in front of the loom with her feet pressing on a firm support, she can keep the necessary tension on the warp. The women keeps the necessary strain by sitting with the belt (*Aphi*) in the small of her back, attached to a bar from which the warp (*Kotong*) runs to the beam, itself firmly attached either to the well of the house or to stakes fixed in the ground. The heddle, lease rod, and bar above the lease rod, round which the warp is twisted once. The shuttle is shot enough through by hand, and the woof beaten up with wax or with a very fine white powder, found on the underside of the leaves of a species of wild plantation.

The patterns in cloth are obtained by the necessary combination of different coloured threads in the warp and weft. It takes nearly 10 hours for an expert weaver to complete the plain strip or in other words, 30 hours are required to weave a complete cloth.



Loin loom

b. The Throw Shuttle Loom

The throw shuttle loom is the most common and traditional loom used by all communities in hills of Meghalaya.



Throw shuttle loom

A crude type throw shuttle loom has been found among Garos. Four wooden posts required for the loom are fixed firmly on the ground. The beam and wrap are set to the frame just above the ground level. The weaver sits on the floor by stretching her legs towards the wrap-beam to operate the treadles, but no weaving belt is used as in case of loin loom. This loom is not found comfortable compared to contemporary throw shuttle loom. However, being a traditional loom, it is highly valued by the Garos and they still use it. Deep cultural significance is attached to this loom and its inheritance passes to her youngest daughter.

The accessories required for the existing throw shuttle loom are very simple and can easily be made out of indigenous materials, mostly bamboo and wood. As such, it is easily accessible to the rural folk of Meghalaya.

The frame on which the loom is suspended consists of stout posts which are driven into the ground forming a rectangle. The posts are joined by the top by cross beams. The other parts of the loom are the wrap and cloth beams, reed, treadles, temple, shuttle, etc.

c. The fly shuttle loom

The fly shuttle loom is the most popular handloom in the country except in North eastern region of India. This loom is the most popular and widely disturbed loom in India. This is an improved type of loom, which increases three to four times the production of the weavers. It has all the advantages of the throw shuttle, except for, weaving intricate extra weft patterns. The whole loom rests on four vertical posts called 'Makhong'. In this loom, the sley carries a race board and two shuttle boxes, one on either side, with a picker propelled by means of strings. This is the major difference between the fly shuttle pit loom and the throw shuttle pit loom. From the opposite end of the weaver starts the warp beam connected to the posterior two vertical posts then the warp passes over to another bar called phira, connected to the upper position of the posterior posts. Then it moves to the weaver passing through the healts and the comb finally over to one beam in front of the weaver, called phira, which supports the cloth to be made.

Raw materials used in handloom products

At present most preferred raw material for weaving in Garo hills is Acrylic. Previously it was cotton but now a day's people consider acrylic cheaper as compared to cotton, easier to handle and care has good strength; bright colours are available and good colourfastness. Other fibers used are cotton, silk (Eri), wool, polyester etc.

Cotton was the major raw material used in the indigenous handloom weaving for production of different textiles items because in olden days cotton was grown as a household crop and spun into yarn especially among the tribal of Garo hills. The prices for various raw materials are as follows:

Table 1: Price of raw materials used in handloom products in Garo hills

S.No.	Name of the fiber	Rate (Rs./kg)
1	Cotton	500 to 600
2	Silk	850 to 1000
3	Wool	250 to 350
4	Acrylic	220 to 250
5	Polyester	235 to 270

Motifs and Designs used in handloom products

For decoration purpose in all handloom products they do extra yarn figuring which is known as loom embroidery in local language. For extra yarn figuring acrylic, modacrylic, cotton embroidery thread etc are used. Most commonly used thread brands for extra yarn figuring are rolex, bonalipath, dolli, anchor etc. Other than extra yarn figuring weavers use beads for decoration and designing. Bead work is common in jackets and head gear (kotip).

Most preferred motifs are naturalistic and geometrical motifs. Some of the common motifs used in traditional textiles of Garo hills are as follows:

a. Flower, leaf and plant Motifs

Big and small flowers are most commonly used motifs especially in dakmanda and chunni. Flowers from the simplest and smallest configuration to those with well-defined petals are found in the textiles of Meghalaya. The floral design is called 'bibal', used mainly in dakmanda for beautification of the fabrics. The commonly used flower is rose. Other than this various types of flowers and flower bunches motifs are used for designing.

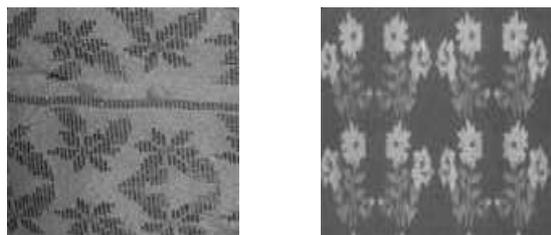


Plate 1: Naturalistic designs used in Garo handloom products

b. Human figure (stylized design)

Human figures in traditional costumes and jewellery are another important motif. This motif is mostly used in vest coat and bags. Mostly male human figure in hunting position carrying sword which is locally termed as '*Milan Sepi*', drum, shield etc. is used for designing the traditional handloom products.

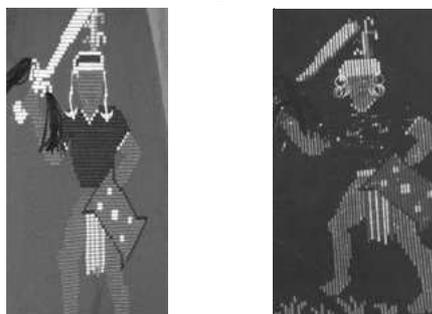


Plate 2: Stylized (human figure) design used in Garo handloom products

c. Geometrical Designs: Diamond motif locally known as *Macron* is most common motif used in Garo handloom products. Diamond motif is commonly used Dakmandas. In traditional dakmandas nine inches wide diamond motif border is essential. Mostly three rows of diamond motifs with small gaps are used in boarder design and top most is widest.



Plate 3: Geometrical designs used in Garo handloom products

Other geometrical design used by Garo people are horizontal stripes also known as '*Saltong*'. These are mainly used in *Dakmanda* and *Daksari*.

Most preferred colour combinations of the handloom products

Colours which are used in handloom products are white, green, yellow, red, maroon, black, blue, purple, magenta etc. But most preferred colour for dakmanda is blue.

Handloom products of Garos

The principal handloom products still are the *Dakmanda* and *Daksaria*. These are famous for their texture and their variegated colourful designs. Besides these, the artisans also produce other articles like *gamchas*, bed covers etc. Women do weaving in their spare time and use back-strap or loin-loom, the only exception being the Garos who also use frame-loom. Endi silk-weaving, famous for its feel and sturdiness, is carried out by the local women.

a. Dakmanda

Dakmanda is a costume of the Garos in Meghalaya. This dress is weaved by the Garos and worn by the Garo women. It resembles the 'mundu' or 'lungi' used in south India. It is a long unstitched cloth tied around the waist extending up to the knee. Dakmanda is hand woven and has a six to ten inch border with a motif or floral designs. (<http://www.india9.com/i9show/Dakmanda-52367.htm>)

This is a typical costume of Garo female community. Dakmanda is a one piece of garment worn by female at lower part of the body i.e. at waist region which goes down up to ankle. Earlier Dakmanda was wrapped around the waist and it hanged upto lower part of the thigh. The size of the dakmanda cloth is about 90 inches in length and 115 inches breadth. It is a double dyed designed cloth. Dakmandas are found to be costly. Dakmandas are woven on ordinary throw shuttle loom by female only. This beautiful costume of Garo female is woven by using colourful cotton and acrylic yarns. Mostly

the designs used in Dakmanda are found to be of geometrical motifs in the border region of the attire in a long stripe form which runs horizontal to the floor. Above the geometrical designs other floral motifs like rose, lotus, joba flowers etc. were embellished during the weaving process by extra weft technique.



Plate 4: Dakmada and top

b. Daksari

Daksari is another dress which is wrapped around and looks like the *mekhla* (dress worn by the Assamese women). This is also, one of the traditional attire of Garo female community. *Daksari* is a one piece lower garment wrapped around the waist and hang up to ankles. This is simple attire with out any design on it. Thin stripes were found in the lower part of the daksari, which is horizontal to the floor. This seems to be like designs which were designed during warping process only. The colours mostly used in base were found to be of bright colours like red, green, blue, yellow etc. Garo female used cotton yarn for weaving daksari. Now with the modernization they use other types of yarns like acrylic, wool, silk etc.

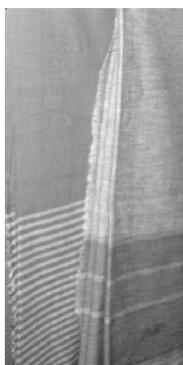


Plate 5: Daksari

c. Gandu mahal

This is a one piece garment worn by male only. The breadth of the fabric is very less, just 6 inch and length is hardly six ft. long. This typical costume of Garo male is wrapped around the waist, which cover the hip and hang up to upper part of thigh. Gando is woven on ordinary loom with cotton yarn only. Horizontal lines clearly observed in the traditional costume of Garo male which made during the weaving process by using different colours of cotton yarn.



Plate 6: Gondu mahal

d. Kotip

This is a headgear worn by male which is an important part of their costumes. Kotip made up of fabric which was decorated with different designs and beads, coloured glasses, elephant teeth were attached etc.



Plate 7: Kotip (head gear)

Kotips are mostly made up of red colour as base upon which decoration is done It is one of the head gear used by both male and female. Now Garo people hardly found to wear this headgear. This is a piece of cloth which seems to be like band, stitched according to the size of the head with a facility to tie the band with a small

size yarn. Over the body of the Kotip (head band) it is decorated with precious stone, beads etc. of several colours. However, the Kotip have been found to be used only during festive occasions. Earlier, it was worn by every body among Garo community. Its importance is decreasing day by day with advent of new modern culture.

e. Vest coat

These are male costumes worn during the festive occasion. These are made up bark of a tree, which was used by Garo male in early days. Now a days acrylic and cotton yarns are used to weave these vest coats. Mostly stylized designs like traditional warrior, daniel shield, drum etc. are depicted on these jackets. Most preferred colour for the vest coat is red. Other colours which are used in vest coat are blue, black, purple etc. These vest coat as are also decorated with elephant teeth beads, plastic beads etc. Normally row of beads are attached at bottom of vest coat or in a geometrical shape in hanging position in a straight line.



Plate 8: Vest coat

f. Hand bag (*Jalonga*)

Jalonga is a local name of Garo hills which originated from Assam. *Jalonga* is a hand bag. Hand bag is made by weaving in an ordinary hand loom by women only. This bag consists of long strap of 5 inches to 10 inches breadth and length and is 1 mt to 1.5 mt. long which is used to hang on shoulder and falls up to thigh and sometimes more than that too. This hand bag is decorated with beautiful designs during weaving

process only. The weavers made designs by extra weft techniques. The designs mostly used in bag are geometrical, floral and stylized designs only. Sometimes, animal or other objects are also found to be used for designing the bags. The yarns used for weaving bag are cotton only and the colours mostly used are black, red, blue, green etc. Weavers mostly prefer dark colours as base.

g. *Chunni*

This is a newly incorporate textile item used by females. It is a rectangular piece of fabric decorated with different types of floral, geometrical motifs etc.



Plate 9: Chunni, dakmanda and top

The colour used for weaving the chunni usually matches with the base colour of dakmanda, daksari or top used for wearing. Mostly used colours are blue, red, green, white etc. Earlier the women folk never used the chunni, now it's become an essential part of their adornment

h. Mobile cover, Purses and File holders

Presently, Garos are making various handloom products according to fashion and demand out of traditional woven fabrics. Some of the items are mobile cover, purse, file cover etc. They are using beads, embroidery etc for decoration purpose. These items are having good demand in the market.



Plate 10: Mobile cover and purse

Conclusion

It could be concluded that Garos are very rich

in weaving culture. They are making very good handloom products. But these products are unexplored. So, there is need to explore and revive these handloom products out of Garo hills. They are following traditional weaving culture by using traditional looms and traditional designs. There is a need to revive this weaving culture by using latest and fast looms and new designs to compete in today's world of fashion.

References

<http://www.magadhtours.com/meghalaya.html>

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Uses of Communication Sources among Tribal Pig Farmers in Dakshin Dinajpur Districts of West Bengal

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Abstract

The study was conducted in purposively selected Dakshin Dinajpur district in West Bengal where the rural populations were mainly Santals and Oraon tribes engaged in pig farming. Data were collected through personal interview method using the interview schedule administered on randomly selected 120 pig farmers from purposively selected 2 blocks (60 from each blocks). The study blocks were selected on the basis of nearness and remoteness of villages from urban contact. A pilot study was carried out in the two selected blocks before data collection. Findings of the study show that the age of farmers were more than 41 years, mainly female, married, Hindu and engaged as labour. They were mainly illiterate with low family education status. Most of the families were nuclear and family size was found upto 5 members with mainly kutcha house. Monthly income from pig farming was found to be low (upto Rs. 500), monthly family income was medium (Rs. 2500-5000) and majority of the farmers were without any land holding. Among the different sources of information used, it was found that personal localite sources were largely utilized by the tribal pig farmers in both near and far away areas from the urban contact. Mass media and personal cosmopolite sources were used in very less extent but it was found to little more in areas near to the urban contact than area far away in urban contact.

Communication is one of the main components for dissemination of knowledge or new technology. Information gap has been recognized as one of the important constraints in the overall agricultural development of the country. Studies in India and elsewhere have pointed the need for an 'Effective Communication Strategy' to enable research results to reach the farmer's fields without much time lag. Haldar *et al.* (1996) reported that educational, communicational and marketing were some problems of pig farmers with some severe problems such as economic and management problems.

In tribal situation today, the effectiveness of the sophisticated media can at best be very limited because majority of the tribal farmers are socially backward, economically poor, psychologically traditional and a majority of them are illiterates. In such a situation, greater stress should inevitably be placed on the fostering of less sophisticated media like informal, interpersonal channels of communication to reach the isolated tribal farmers. Extension workers use various channels to send the developmental messages. Hence, the pattern of source utilization is likely to be different from tribal farmers to non-tribal farmers because of their culture and personality.

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Methodology

The study was conducted in purposively selected Dakshin Dinajpur district in West Bengal where the tribal populations were mainly Santals and Oraon tribes engaged in pig farming. The data were collected through personal interview method using the interview schedule administered on randomly selected 120 pig farmers from purposively selected from 2 blocks (60 from each block). The study block was selected on the basis of nearness and remoteness of villages from urban contact. A pilot study was carried out in the two selected blocks before data collection. A draft of interview schedule for the purpose of data collection was developed by incorporating the tools and techniques of measurement of different variables. It was then modified and utilized for data collection. In the pre-testing, care was taken not to include pig farmers who were selected as sample for final data collection. The data thus generated were computed and analyzed by frequency and percentage analysis.

Result and Discussion

Scio-economic characteristics of pig farmers

The data (Table 1) show that the highest numbers of farmers engaged in pig farming are between age group 41-50 years (36.67%) for the farmers who resides far away from the urban areas, where as highest were found among farmers between 51-60 years (35%) who resides nearby the urban areas. Kannan *et al.* (2006) reported that the farmers who belonged to the age group of 31 to 50 years took up pig farming. None below the age of 30 years were engaged in pig rearing. In both the areas, it was found that the majority of the respondents were female but in areas near the urban contact, percentage of females was found to be more than far away areas. This may be due to the fact that the more number of male goes for daily labour in construction works in town. Majority of the respondents were Hindu (93.35) followed by Christian. No Muslims were found engaged in pig farming. This may be due to the fact that pig farming is not culturally compatible with their belief and values.

The respondents were mostly married in both cases. Labour (46.67% in far away and 58.33% in near to urban contact) was the found to be the main occupation followed by crop cultivation in both cases. Among the different level of education, most of them are found to be illiterate (53.33% in far away and 38.33% in near to urban contact) followed by and Primary education in both cases. Family Educational Status was found to be of low (78.33% in far away and 58.33% in near to urban contact). Most of the families were nuclear and family size was found to upto 6 members in both cases. The findings of the study are in line with the finding of Kumar *et al.* (2004) and Nsoso *et al.* (2006). The respondents were having kutcha house (56.67% in far away and 63.33% in near to urban contact) followed by hut and pucca house. Monthly income in pig farming were found to be low (upto Rs. 500) in 63.33% and 46.67% of the respondents who were far and nearby the urban contact respectively followed by medium (Rs.500-1000) among 30% in far away and 41.67% in near to the urban area respondents. Monthly family income were found to be medium (Rs. 2500-5000) among 60% of the respondents who were far away from urban areas and 46.67% who were near to the urban area followed by high (more than Rs. 5000) among 25% in far away and 33.33% in near to the urban area respondents. Majority of the farmers were without any land holding, i.e., 63.33% of the respondents who were far away from urban areas and 68.33% who were near to the urban area areas followed by land upto 1 hectares of land holding.

Sources of information used by the tribal pig farmers

Mass media sources: The sources of information like radio, television, newspaper, educational film, information material, demonstration and exhibition or mela are used. From Table 2 and 3, it revealed that the utility of mass media was very much limited among the tribal pig farmers. It also showed that uses of mass media sources were more among farmers near the urban contacts. Radio was found to be used often by 5% and sometimes by

Table 1: Socio-economic characteristics of pig farmers

S. No	Variables	Categories	Remoteness (n=60)		Nearness (n=60)	
			f	%	f	%
1.	Age	Upto 30 years	04	06.67	07	11.67
		31- 40 years	15	25.00	12	20.00
		41- 50 years	22	36.67	15	25.00
		51- 60 years	18	30.00	21	35.00
		61 & above	01	01.67	05	08.33
2.	Gender	Male	21	35.00	16	26.67
		Female	39	65.00	44	73.33
3.	Religion	Hindu	52	86.67	56	93.35
		Muslim	00	00.00	00	00.00
		Christian	08	13.33	04	6.67
		Others	00	00.00	00	00.00
4.	Marital Status	Single	05	08.33	03	05.00
		Married	36	60.00	46	76.67
		Divorced	00	00.00	00	00.00
		Widow/Widower	19	31.67	11	18.33
5.	Occupation	Labour	28	46.67	35	58.33
		Independent	04	06.67	03	05.00
		Cultivation	21	35.00	16	26.67
		Business	02	03.33	06	10.00
		Service	05	08.33	00	00.00
		Illiterate	32	53.33	23	38.33
6.	Education of respondent	Can read only	00	00.00	00	00.00
		Can read & write	00	00.00	00	00.00
		Primary	14	23.33	21	35.00
		Middle School	09	15.00	12	20.00
		High School	05	08.33	04	06.67
		Graduate	00	00.00	00	00.00
		Low	47	78.33	35	58.33
7.	Family Educational Status	Medium	10	16.67	17	28.33
		High	03	05.00	08	13.33
		Nuclear Family	39	65.00	47	78.33
8.	Family type	Joint Family	21	35.00	13	21.67
		Upto 6 member	14	23.33	19	31.67
9.	Family size	Above 6 member	46	76.67	41	68.33
		No house	00	00.00	00	00.00
10.	House type	Hut	19	31.67	06	10.00
		Kutch house	34	56.67	38	63.33
		Mixed house	00	00.00	06	10.00
		Pucca house	07	11.67	10	16.67
		Low	31	63.33	28	46.67
11.	Monthly income for Pig farming	Medium	18	30.00	5	41.67
		High	11	18.33	07	11.67
		Low	09	15.00	12	20.00
12.	Monthly family income	Medium	36	60.00	28	23.33
		High	15	25.00	20	16.67
		No Land	38	63.33	41	68.33
13.	Land Holding	Upto one hec.	14	23.33	12	20.00
		Upto two hec.	08	13.33	05	08.33
		Above two hec.	00	00.00	02	03.33

15% of the respondents near the urban contact where as it was often used by 3.33% and sometimes by 10% of the respondents far away from the urban contact. Television was found to be used often by 8.33% and sometimes by 23.33% by the respondents residing near the urban contact where as sometimes used by the 8.33% respondents residing far away from urban contact. Newspaper as a sources of information was sometimes used by 11.67% of the respondents by residing near the urban contact where as sometimes used by the 5% respondents residing far away from urban contact. Information material was sometimes used by 8.33% of the respondents by residing near the urban contact where as respondents residing far away from urban contact was not utilising it as a sources of information. Education

film, demonstration, exhibition or mela was not found to be as a source of information for the respondents in both the areas. The reasons for a majority of respondents not utilizing the mass media as a source of information is poverty, illiteracy, unaware of receiving messages from such sources etc. These findings are in line with the findings of Tiwari (2000).

Personal cosmopolite sources

From Table 2 & 3, it revealed that Block Livestock Development Officer (BLDO) was sometimes used as a source of information by 8.33% of the respondents in both residing near and far away from the urban contact. Veterinary officer (VO) was often used by 3.33% and sometimes by 6.67% in nearby urban

Table 2: Degree of use of communication sources by the respondents

(N= 60)

S.N.	Sources	Most often		Often		Sometimes		Never	
		f	%	f	%	f	%	f	%
Mass media sources									
1	Radio	---	---	3	5.00	9	15.00	48	80.00
2	Television	---	---	5	8.33	14	23.33	41	68.33
3	Newspaper	---	---	---	---	7	11.67	53	88.33
4	Educational film	---	---	---	---	---	---	60	100
5	Information material	---	---	---	---	5	8.33	55	91.67
6	Demonstration	---	---	---	---	---	---	60	100
7	Exhibition/mela	---	---	---	---	---	---	60	100
Personal cosmopolite sources									
8	BLDO	---	---	---	---	5	8.33	55	91.67
9	VO	---	---	2	3.33	4	6.67	54	90.00
10	LDA	---	---	4	6.67	7	11.67	49	81.67
11	Panchayat personnel	---	---	2	3.33	10	16.67	48	80.00
12	Cooperative personnel	---	---	---	---	5	8.33	55	91.67
13	Bank personnel	---	---	---	---	4	6.67	56	93.33
14	Voluntary agency	---	---	2	3.33	6	10.00	52	86.67
Personal localite sources									
15	Family member	8	13.33	26	43.33	14	23.33	12	20.00
16	Friends	11	18.33	13	21.67	16	26.67	20	33.33
17	Relatives	6	10.00	12	20.00	29	48.33	13	21.67
18	Neighbours/other farmers	18	30.00	17	28.33	23	38.33	2	3.33
19	Local leaders	4	6.67	5	8.33	9	15.00	42	70.00
20	Tribal farm leaders	7	11.67	18	30.00	22	36.67	13	21.67

Table 3: Degree of use of communication sources by the respondents

(N= 60)

S.N.	Sources	Most often		Often		Sometimes		Never	
		f	%	f	%	f	%	f	%
1	Radio	---	---	2	3.33	6	10.00	52	86.67
2	Television	---	---	---	---	5	8.33	55	91.67
3	Newspaper	---	---	---	---	3	5.00	57	95.00
4	Educational Film	---	---	---	---	---	---	60	100
5	Information material	---	---	---	---	---	---	60	100
6	Demonstration	---	---	---	---	---	---	60	100
7	Exhibition / Mela	---	---	---	---	---	---	60	100
Personal cosmopolite sources									
8	BLDO	---	---	---	---	5	8.33	55	91.67
9	VO	---	---	2	3.33	7	11.67	51	85.00
10	LDA	---	---	---	---	12	20.00	48	80.00
11	Panchayat personnel	---	---	2	3.33	8	13.33	50	83.33
12	Cooperative personnel	---	---	3	5.00	11	18.33	46	76.67
13	Bank personnel	---	---	---	---	2	3.33	58	96.67
14	Voluntary agency	---	---	---	---	3	5.00	57	95.00
Personal localite sources									
15	Family member	12	20.00	18	30.00	23	38.33	7	11.67
16	Friends	9	15.00	21	35.00	26	43.33	4	6.67
17	Relatives	11	18.33	14	23.33	24	40.00	11	18.33
18	Neighbours/ Other farmers	25	41.67	19	31.67	16	26.67	00	00
19	Local leaders	7	11.67	12	20.00	18	30.00	23	38.33
20	Tribal farm leaders	16	26.67	23	38.33	15	25.00	6	10.00

contact where as often by 3.33% and sometimes by 11.67% in far away from urban contact. Livestock Development Assistant (LDA) was often used by 6.67% and sometimes by 11.67% of the respondents in nearby urban contact where as sometimes by 20% in far away from urban contact. Panchayat personnel were often used by 3.33% and sometimes by 16.67% of the respondents in nearby urban contact where as often by 3.33% and sometimes by 13.33% of the respondents in far away from urban contact.

Cooperative personnel were sometimes used as information sources by 8.33% of the respondents in nearby urban contact where as often by 5% and sometimes by 18.33% of the respondents in far away from urban contact. Bank personnel were sometimes

used as information sources by 6.67% and 18.33% of the respondents in near and far away from urban contact respectively. Voluntary agency were often used as used as information sources by 3.33% and sometimes by 10% of the respondents in nearby urban contact where as sometimes by 5% of the respondents in far away from urban contact.

Personal localite sources

From Table 2 & 3, it revealed that family members were most often used as information sources by 13.33% and 20%, often by 43.33% and 30%, sometimes by 23.33% and 38.33% of the respondents in near and far away from urban contact respectively. Friends were most often used as information sources by 18.33% and 15%, often by 21.67% and 35%,

sometimes by 26.67% and 43.33% of the respondents in near and far away from urban contact respectively. Relatives were most often used as information sources by 10% and 18.33%, often by 20% and 23.33%, sometimes by 48.33% and 40% of the respondents in near and far away from urban contact respectively. Neighbours or other farmers were most often used as information sources by 30% and 41.67%, often by 28.33% and 31.67%, sometimes by 38.33% and 26.67% of the respondents in near and far away from urban contact respectively. Local leaders were most often used as information sources by 6.67% and 11.67%, often by 8.33% and 20%, sometimes by 15% and 30% of the respondents in near and far away from urban contact respectively. Tribal farm leaders were most often used as information sources by 11.67% and 26.67%, often by 30% and 38.33%, sometimes by 36.67% and 25% of the respondents in near and far away from urban contact respectively. Kulkarni (1985) reported that the neighbours and tribal leaders were found to be most utilized and trustworthy for seeking farm information and the less used and low credibility sources were demonstration, radio, newspaper and magazines etc.

Conclusion

Study conducted on the tribal pig farmers on the basis of nearness and remoteness to the urban contact did not show much difference in the uses of communication sources in the study area. Still today, the major sources of communication for tribal pig farmers are localite sources. New advanced communication tools using electronic media are being increasingly used for disseminating information about scientific animal husbandry technology. Unfortunately, this information does not usually reach the majority of potentially interested farmers living in developing countries, especially those dwelling in rural and remote areas and in tribal farmer. The major sources of information in tribal

farmers are still today the localite sources of communications. To increase production in the study area, the extension delivery system particularly the communication and input delivery components must be strengthened. This will enable extension and related organisations to be continual contacts with the tribal farmers and together they can fashion out appropriate communication patterns, upgrade knowledge, attitude and practices.

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Job Satisfaction among *Pranibandhus* of Purba Medinipur District of West Bengal

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Abstract

The study was undertaken in the purposively selected Purba Medinipur district of West Bengal. The study covered a total sample size of 100 Pranibandhus from all the four sub-divisions of the district. It was found that 61 percent of the Pranibandhus were moderately satisfied with their job followed by 21 percent less satisfied and 18 percent highly satisfied. In case of correlation analysis, it was found that behaviour of the superior and knowledge about reward and punishment were significantly related. It is also found that, behaviour of the superior, knowledge about reward and punishment and number of the dependent were the significant contributor to the job satisfaction.

Over the last one and half decade, the globalized market forces and competition from local and international competitors have increasingly compelled the public and private systems to seek strategic cooperation and partnership to compliment their business, social and development goals. In this changed scenario, what will be the future of veterinary services of the nation where, it is totally controlled by public funded and it is suffering from poor performance, inefficient and untrained persons and some times lack of proper trained staff. Under such situation, how the millions of resource-poor farmers could be provided with basic and essential services. In view of these, the Govt. of West Bengal appointed the educated and unemployed persons as *Pranibandhu* for the purpose of doing Artificial Insemination (A.I.) and other basic veterinary services, in the villages, round the clock, against nominal fees to be paid by the livestock-owners. These *Pranibandhu* are the field-level stakeholders of “Public Private Partnership (PPP)” of *Paschim Banga Go-Sampad Bikas Sanstha* for implementing artificial

insemination in an extensive way for breed up-gradation through out the West Bengal. Already, about 2231 such *Pranibandhus* are working in the Gram Panchayat area. Success of any organization depends mainly on the efficiency, role performance and job satisfaction of the stakeholders which affects job performance, employee turnover and absenteeism. As these *Pranibandhus* are new entrants in the veterinary and A. I. sector, we need to assess whether they are satisfied with their job. A study was, therefore, conducted to determine the level of job satisfaction among such *Pranibandhus* (PB).

Methodology

The study was undertaken in the purposively selected district of Purba Medinipur of West Bengal. All the 4 sub-divisions of the district, namely Tamluk, Contai, Haldia and Egra, were selected for the present study. In all 25 *Pranibandhus* from each sub-division were selected, randomly, to determine their level of job satisfaction. Thus, the total sample-size was included 100 PBs.

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Job satisfaction was operationalised for this study as the extent to which a person was pleased or satisfied with the job content and environment of his/her work and work condition. A list of thirteen variables were taken as independent variable such as: age, education, experience, monthly income, number of dependent, cattle population of locality, number of hours spent in desk work per week, availability of resources, timeliness of availability of resources, behaviour of superior, self perception of job responsibility and knowledge about reward and punishment. Data were collected personally, with the help of an interview – schedule, and collected data were subjected to descriptive (frequency, mean, percentage) and inferential (correlation, regression, multiple regression, ‘t’ test, ‘F’ test) statistics to draw meaningful conclusion.

Results and Discussion

Objective of this research work was to find out the level of job satisfaction of PBs. This was determined by scoring the responses of the PBs on a five-point summated rating scale for 18 items. The distribution of respondents based on their job satisfaction score into three categories viz., less satisfied, moderately satisfied and highly satisfied has been presented in Table 1.

Table 1: Distribution of respondents based on their level of job satisfaction (N=100)

Category	Score	Frequency	%	Mean
Less satisfied	<51.25	21	21	
Moderately satisfied	51.25-59.88	61	61	55.07
Highly satisfied	>59.88	18	18	

It was evident from the Table 1 that 61 percent of PBs identified themselves as moderately satisfied. There were 21 percent respondents who were less satisfied with their job and, only 18 percent were found to be highly satisfied.

Relational Analysis for Job Satisfaction

In this section, it is attempted to discuss the extent of relationship between the dependent variable (i.e., job satisfaction of the *Pranibandhus*) and other independent variables. During the initial stages the relationship between independent and dependent variable were computed by the zero-order correlation. Then, the data were subjected to multiple regression analysis. The findings have been presented and discussed under following sub-heads:

Correlation coefficients between independent variables and job satisfaction

The correlation coefficients between various independent variables and job satisfaction have been shown in the Table 2.

Table 2: Correlation coefficients between independent variables and job satisfaction (N=100)

S. No.	Variables	Correlation coefficient ‘r’ values
1.	Age	0.088
2.	Education	-0.094
3.	Marital status	-0.127
4.	Experience as PB	0.071
5.	Self-perception about job responsibility	0.144
6.	Cattle population on the area	0.054
7.	Availability of resources	-0.202*
8.	Timeliness of availability of resources	-0.016
9.	Number of hours spent per week in desk work	0.004
10.	Monthly income	0.002
11.	Number of dependent	-0.455**
12.	Behaviour of the superior	0.672**
13.	Knowledge about reward and punishment	0.398**

*Significant at 5% level of significance; **Significant at 1 % level of significance

It is evident from the above table that knowledge about reward and punishment and behavior of the superior had positive and significant relationship (at 1 percent level of significance) with the job satisfaction, whereas, number of dependent had a negative and significant relationship at same level of significance; although but availability of resources had same (negative) relationship at 5 percent level of significance with job satisfaction.

The above discussion implies that the PBs having higher knowledge about reward and punishment and good behavior of his/her superior have higher level satisfaction from their job. On the other hand, increase in, the number of dependent and availability of resources were found to be the cause of low level of satisfaction.

Multiple regression analysis: independent variables vs. job satisfaction

In order to determine the combined effect of all the selected independent variables in explaining the variation in job satisfaction, multiple linear regression was carried out. The computed co-efficient of determination (R^2) value and partial regression coefficient (b) values with their corresponding 't' values have been presented in Table 3. The ' R^2 ' and 'b' values were tested statistically for their significance.

The R^2 value of 0.648 indicated that all the selected 13 independent variables put together explained about 64.8 percent variation in job satisfaction of the *Pranibandhus*, and the rest 35.2 percent variance might be due to other variables which were not included in the study. The respective 'F' value was found to be significant at 1 percent level of significance. Thus, the result implied that all the independent variables would account for a significant amount of variation in the job satisfaction of PBs.

The partial regression coefficients (b) as presented in Table 3 indicate that independent variables, viz., availability of resources, number of dependent, behaviour of the superior as well as knowledge about reward and punishment were positively significant as evident from their significant 't' values. Therefore, these four variables could be perceived as important ones to predict the job satisfaction among PBs.

Table 3: Multiple regression analysis: Independent variables vs. job satisfaction (N=100)

S. No.	Variables	Regression coefficients (b) values	"t" Values
1.	Age	-0.005	0.055
2.	Education	0.042	0.497
3.	Marital status	-0.114	1.648
4.	Experience as PB	0.019	0.259
5.	Self-perception about job responsibility	0.096	1.466
6.	Cattle population on the area	0.066	1.016
7.	Availability of resources	-0.330	3.049**
8.	Timeliness of availability of resources	0.183	1.791
9.	Number of hours spent per week in desk work	-0.075	1.104
10.	Monthly income	-0.032	0.440
11.	Number of dependent	-0.228	3.114**
12.	Behaviour of the superior	0.495	6.987**
13.	Knowledge about reward and punishment	0.299	4.217**
		$R^2 = 0.648$	
		F stat = 12.175**	

**Significant at 1% level of significance

Conclusion

The findings of this study revealed that majority of the respondents were moderately satisfied with their job. Knowledge about reward and punishment and behaviour of the superior, number of dependent and availability of resources had a significant effect on satisfaction level of PBs. Therefore, senior officials should be responsible towards their sub-ordinates, which would certainly improve the level of satisfaction among PBs, and ultimate out-put of this attempt could help to accelerate self-sufficiency in terms of milk production at the field level, thereby helping the cause of dairy development in our country, in general, and the state of west Bengal, in particular.

Capacity Building for Efficiency Enhancement of Self Help Groups

Kiranjot Sidhu

Abstract

Self-help groups are seen as instruments for a variety of goals including empowering women, developing leadership abilities among poor people, increasing school enrolments, and improving nutrition and the use of birth control. Financial intermediation is generally seen more as an entry point to these other goals, rather than as a primary objective. A study was designed to appraise the was planned the profile of the self help groups and to study the effect of capacity building on the parameters of efficiency enhancement. The effect of the capacity building exercises was evident from the mean pre and post evaluation score in terms of engagement, interpersonal attraction, relationship and cooperation among SHG members and group cohesiveness. Hence, it is important to educate the members regarding the importance interpersonal relationships and group cohesiveness in achieving the goals of the self help group for enhancing the effectiveness of the group and increasing its efficiency.

A Self-Help Group (SHG) is a registered or unregistered group of micro entrepreneurs having homogenous social and economic backgrounds, voluntarily coming together to save regular small sums of money, mutually agreeing to contribute to a common fund and to meet their emergency needs on the basis of mutual help. A self-help group (SHG) is a village-based financial intermediary usually composed of between 10-15 local women. The group members use collective wisdom and peer pressure to ensure proper end-use of credit and timely repayment. This system closely relate to solidarity lending, widely used by microfinance institutions. Self-help groups are seen as instruments for a variety of goals including empowering women, developing leadership abilities among poor people, increasing school enrolments, and improving nutrition and the use of birth control. Financial intermediation is generally seen more as an entry point to these other goals, rather than as a primary objective. An economically poor individual gains strength as part of a

group. Sud(2003) reported that SHG's help to build confidence in poor through community action, frequent interactions in meetings and collective decision making. Although there has been considerable recent interest in micro-credit programs, rigorous evidence on the impact of capacity building on members of self-help groups is virtually non-existent. Keeping this in view the study was planned with the following objectives:

- 1 To study the profile of the self help groups
- 2 To enhance the efficiency of the members of the self help group through capacity building exercises.
- 3 To study the effect of capacity building on the parameters of efficiency enhancement

Methodology

Five self help groups formed under the AICRP on Home Science were selected for undertaking the capacity building exercises. These were in five different villages. The capacity building exercises were conducted during their monthly meetings.

Some of the following the methods were selected for bringing about the improvements in the selected aspects:

- 1 Motivational lectures
- 2 Informative interaction/ discussion / activities for improvement

The capacity building exercises were undertaken for enhancement of efficiency through development of communication skill, leadership, group dynamics and decision making skills in members of the self help groups. The group leader and the members were oriented regarding the group dynamics, inter personal relationship and communication skills.

The variables (factors) for the capacity building and for analysis of the data were :

- Engagement and interpersonal attraction
- Cooperation and relationship
- Cohesiveness

To study these variables, an interview schedule was developed. The response was elicited using personal

interview method. The data was collected both before and after the capacity building exercise.

The results have been analyzed using pre and post responses. The response was recorded on three point scale and was assigned the score of 1, 2 and 3. Hence, the score ranged between 1 to 3 mean scores have been used to present the data.

Results and Discussion

Profile of the self help groups

The study of the group profile indicated that all the groups were more than one year old. The groups had less than 15 members who met on monthly basis. Chatterjee (2002) reported an average of 15-20 members in SHG's formed in Kannauj district of Uttar Pradesh. Three of the groups were linked with different institutions like banks, block development office and the State Horticultural department for various purposes.

Engagement and interpersonal attraction

Five aspects were studied in particular which represented the engagement and interpersonal attraction

Table 1: The characteristics of the selected self help groups

Characteristics		No of SHG					Total
		I	II	III	IV	V	
Duration of Group	More than 6 months	-	-	-	-	-	
	More than 1 year	1	1	1	1	1	5
Size of Group	Small (upto 10 members)			1	1		2
	Medium (11 – 15 members)	1	1			1	3
	Large (More than 15 members)	-	-	-	-	-	-
Frequency of convening the meeting	Weekly	-	-	-	-	-	-
	Fortnightly	-	-	-	-	-	-
	Monthly	1	1	1	1	1	5
Linkages	Banks	1	1	-	-	1	3
	NGOs	-	-	-	-	-	-
	Block Office	-	-	-	-	-	3
	State Horticultural department	1	1	-	-	1	3
Leader of Group	President	1	1	1	1	1	5
	Secretary	-	-	-	-	-	-

among the members. The scores as shown in Table 2 shows an increase in mean score of all the aspects. The maximum increase was found in the aspect of communication within the members(+1.1) and least in continuous flow of communication and communication from members to leaders (+1.0).

Table 2: Mean score according to engagement and interpersonal attraction among SHG members (n=56)

Factors	Mean score		
	Pre score	Post score	Increase+/ decrease-
Communication among members	1.4	3.0	+ 1.6
Communication from leader to members	1.8	2.9	+ 1.1
Communication from members to leader	1.4	2.4	+ 1.0
Free flow of communication	1.2	2.2	+ 1.0
Opinion sharing	1.2	2.4	+1.2

Before the intervention, opinion sharing was at the lowest ebb and communication from leader to members at the highest. However, after the intervention, communication among members scored the highest mean value. In depth, analysis shows that the communication from leader to members is more than from members to leaders. However, a free flow of communication is reported among the members especially during the monthly meetings. The members of the groups are active and responsible. The free floating communication takes place especially during the meetings. Majority share their opinions with other members. The highest mean score of 3.0 indicates a positive trend of verbal communication among members and lowest of 1.9 for members taking turns in talking points towards a need for firm leadership skills. Sud (2003) reported that SHG’s help to build confidence in poor through community action, frequent interactions in meetings and collective decision making.

Cooperation and relationship

The data on overall working conditions and

relationships (Table 3) in the five groups reveal the effect of the interventions as the majority of the members as the regular participation increased in the meetings (+1.4). They did not attend the meetings in case of some personal reason especially like visit outside the village. The contributions also were made more regularly and on the same pattern as decided at the initial stages of group formation. The members became more considerate of each other’s problems which were obvious from the fact that the lending mechanism followed a harmonized pattern keeping in view the priority of need among the group members. The personal approach of working on their own for the betterment of the group also got a boost (+ 1.4). The working relationships were found to be more harmonious. The high mean score of all the components after the intervention proved that it helped to increase the cooperation among the members. Puhazhendi and Satayasai (2001) attributed increase in confidence, communication skills and enhanced status within the family in post SHG situation.

Table 3: Distribution of members and mean score according to relationship and cooperation among SHG members (n=56)

Factors	Mean score		
	Pre score	Post score	Increase+/ decrease-
Group members attendance	1.0	2.4	+ 1.4
Contribution by different members	1.0	2.3	+ 1.3
Working on own	0.8	2.2	+ 1.4
Considering of other members problems	1.2	2.3	+ 1.1
Relationship among members	1.8	2.3	+ 0.5

Cohesiveness

The overall data shows that on most of the aspects used to measure the group cohesiveness the groups had a high mean score even before the intervention (Table 4). The areas of concern were mainly behavior in the group, contribution to the group and

conflicts resolving. In all these aspects, the gains were found after the intervention.

Table 4: Distribution of members and mean score according to group cohesiveness (n=56)

Factors	Mean score		
	Pre score	Post score	Increase+/ decrease-
Status in the group	1.6	2.7	+ 1.1
Behavior in the group	1.0	2.3	+ 1.3
Expectations from the group	1.8	2.1	+0.3
Contribution to the group	1.0	1.7	+ 0.7
Information regarding other members	2.0	2.3	+0.3
Conflicts resolving	1.4	2.3	+0.9
Freedom of speech	2.2	2.4	+0.2
Trust of other members	2.0	2.3	+0.3
Acceptance within the group	2.0	2.4	+0.4

The members reported an increase in their status (+ 1.1) within the group after the intervention which can be attributed to their better behavior (+ 1.3) and increased contribution in imparting skill, knowledge, support and help to the fellow members (+ 0.7) The conflicts were resolved more effectively which was evident from an increase mean score from 1.4 to 2.3 The members became more aware of each other and the conflicts and frictions were resolved over meetings. Majority of the members felt free to speak their mind without hesitation and were trusted and felt that they were accepted within the group. Selvi and Krishnan (2004) found that majority of the group members worked towards collective thinking.

Table 5: Mean Score of group dynamics

Factors of group dynamics	Mean Score	
Engagement and interpersonal attraction	1.4	2.6
Relationships and cooperation	1.16	2.3
Cohesiveness	1.67	2.8

Group dynamics

The overall impact in terms of the three attributes that the group dynamics was positively effected by the interventions. The maximum impact was found in cohesiveness followed by engagement and interpersonal relationship and cooperation (Table 5).

Conclusions

The SHG’s have become a regular component of Indian Financial System since 1996. Self-help group is a group of 10-20 people from a homogeneous class having common problems, they voluntarily thrift on regular basis , make small interest bearing loansto members and then gradually build discipline in all of them (NABARD 2004). To instill this discipline, it is necessary to motivate the members to enhance the attributes required for any group and group activity to survive. The capacity building interventions like Motivational lecturesand informative. Interaction/ discussion/ activities brought about positive impact on the group dynamics. Hence, it can be concluded that groups after formation should be regularly capacitated , This helps in bringing positive changes in the group dynamics which is essential for efficiency enhancement of the groups leading to empowerment of the memmbers.

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Mortality Problem of *Kikar* (*Acacia nilotica* (Linn.))- A Case Study in Faridabad District

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Abstract

Acacia nilotica (Linn) is a moderate sized evergreen tree with a thin spreading crown and feathery foliage. It is a species of southern Tropical dry deciduous forests and Southern Tropical thorn forests. Farmers adopt this tree for plantation in the agricultural land, wasteland and on field boundaries especially in Haryana, Rajasthan, Punjab and Uttar Pardesh. In last decade, large scale mortality of kikar trees had been observed in most parts of Haryana is causing panic amongst the farmers, foresters, scientists and policymakers because not only the individual get very attractive return for the mature tree planted 15-30 years back but it is also an integral part of agroecosystems in plains of North-western India. A total of 68 trees were found dead in the whole district along roadside/canal side/railway line (49), scattered over farmers field (15) and on bunds (4). Average mortality of kikar was 6.8% in the Faridabad district. The mortality varies from location to location and was 8.5, 7.5, 7.0, 6.0, and 5.0 % in Faridabad, Ballabgarh, Palwal, Hodal and Hasanpur blocks, respectively. Both biotic and abiotic factors were found responsible for the mortality of *Acacia nilotica*.

The maintenance of tree cover is vital both for ecological balance and for economic sustainability of food production system. *Acacia nilotica* (Linn) is a moderate sized evergreen tree with a thin spreading crown and feathery foliage. It is a species of southern Tropical dry deciduous forests and Southern Tropical thorn forests. It is essentially a tree of semiarid areas restricted below 450 m elevation. In its natural zone of occurrence, the absolute maximum shade temperature varies from about 40°C to 47.5°C and the absolute minimum shade temperature, varies from 1.1°C to 15°C (Anon. 1983). *Kikar* has been widely accepted in afforestation programme in India in stabilization of sand dunes and amelioration of wasteland. Farmers in its zone of occurrence, also adopt this tree for plantation in the agricultural land, wasteland and on field boundaries

especially in Haryana, Rajasthan, Punjab and Uttar Pardesh. Besides in Haryana the tree is grown on public highways, canals, and drainage and block forests due to its significance in catering to the bonafide needs of local population with ecological restoration. In the last decade, large scale mortality in *kikar* trees had been observed in most parts of Haryana is causing panic amongst the farmers, foresters, scientists and policymakers because not only the individual get very attractive return for the mature tree planted 15-30 years back but it is also an integral part of agroecosystems in plains of north-western India. The present study is, therefore, an attempt to document information on extent of drying problem of kikar in semiarid region of Haryana. The present study was carried out in Faridabad district. Faridabad is situated at 27° 52' -28° 23' N latitude and 77° 06' -77° 32' E longitude in Southern

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Haryana. The district falls under semi-arid climatic zone with extreme of temperature (4-46°C) in summer and winter. The soils of the district are light in texture particularly sandy loam and loam. Salt affected lands (approx. 5,000 ha) and water logged area (approx. 3,000 ha) are found in Ballabgarh and Palwal subdivision. The average underground water level is 7.25 m.

Methodology

A study was conducted to record the mortality status of kikar in the Faridabad district. Tree stands on private, community and government owned/natural stands, canal, road and railway line side were selected for the survey. Of the total, 30 locations in five blocks namely Faridabad, Hasanpur, Ballabgarh, Palwal and Hadal were surveyed. Linear counting and quadrat methods were adopted for assessing the status of mortality in strip and block plantation, respectively. In marked areas, total number of trees and dead trees were counted to assess the present status of mortality. The percent mortality of tree was calculated, by dividing dead trees by total growing stock multiplied by 100. The data was collected with the help of well structured questionnaire developed by the Department of Agro-forestry, CCS, HAU, Hisar.

Results and Discussion

During the study, a total of 68 trees were found dead in the whole Faridabad district. The detail of dead plants along roadside/canal side/railway line (49), scattered over farmers field (15) and on bunds (4) was presented in Table 1. The dying trees of kikar exhibited various symptoms including reduction in leaf size, change in foliage colour and dieing back of branches from top to downward. The results showed that mortality was highest in road side/canal side/railway line side followed by in block plantation and on bunds. Roadside/canal side/railway line side plantation were mostly found affected with termite which may cause root injury in adult trees that may also serve as infection court for secondary fungal infection. This may be attributed to stress due to

water logging, drought caused soil compaction, air pollution, accumulation of salts in feeding root zone, presence of impervious layer of CaCO₃, fungal pathogen (Kaushik and Bangarwa 2002).

Table 1: Farmers perception an mortality of Kikar tree

S. No.	Particularly	Response
1.	Number of <i>kikar</i> trees found dead in Area	68
2.	Number of dead trees on road/canal/railway line side, bund or block plantation	Road/Canal/railway line side plantation=49 Bunds =4 Block plantation=15
3.	Approximate age of dead trees	5-20 years.
4.	Duration taken to complete the mortality process	2-3 years
5.	Do the crops are cultivated in the plantation area/ farmer's field	Yes
6.	Do the farmers practice deep ploughing near the <i>kikar</i> plants	Yes
7.	Soil texture of the planted area	Light-Medium.
8.	Depth of underground canker layer	2-4m.
9.	Depth of underground water table	>1.4m.
10.	Any discoloration of roots	Yes (in < 30 per cent)
11.	Any insect infection noticed on dead plants	Termite attack = 40

The results in Table 2 revealed that average mortality of kikar was 6.8% in the Faridabad district. The mortality varies from location to location and was 8.5, 7.5, 7.0, 6.0, and 5.0 % in Faridabad, Ballabgarh, Palwal, Hodal and Hasanpur block, respectively. This may be attributed to either abiotic or biotic factor or both which acted as predisposing factor including the favourable conditions for the growth of insects-pest and

Table 2: Blockwise Mortality of *Acacia nilotica* Trees in Faridabad District

Name of block	No. of trees sampled	No. of dead trees			Total mortality	% mortality
		Strip plantation	Block plantation	Bund plantation		
Faridabad	200	12	05	0	17	8.5
Ballabgarh	200	10	03	2	15	7.5
Hasanpur	200	09	01	0	10	5.0
Palwal	200	11	02	1	14	7.0
Hodal	200	07	04	1	12	6.0
Total / Average	1000	49	15	4	68	6.8

fungal component causing the mortality of kikar. The results are in consistent with the findings of Luna *et al.* (2006).

Conclusions

The study revealed that average mortality of kikar was 6.8% in district Faridabad, Haryana. The mortality varies from location to location (5.0-8.5%). Both biotic and abiotic factors were found responsible for the mortality of *Acacia nilotica*. Kikar is now planted all over India as well as the neighboring countries like Nepal, Pakistan, Afganistan, Myanmar and other tropical and subtropical countries in Africa. Therefore sharing of research data and exchange of genetic material for drought, water logging and salt tolerant and insect pest resistant should be exchanged for testing the performance

and mortality problem in different agroclimatic zones. A detailed survey of kikar mortality in different agroclimatic zones should be carried out by various institutions located in different zones for evaluation of the damage caused by different factors.

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Empirical Assessment of Farmers' Satisfaction: A Case Study of Pradeshik Cooperative Dairy Federation (PCDF)

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Abstract

To assess the dairy farmers' satisfaction with Dairy Cooperative Societies (DCSs), a research study was conducted in PCDF, Uttar Pradesh. With the help of semi-structured interview schedule, data were collected from 80 member farmers of 8 selected DCSs in PCDF. The findings obtained under the present study gave clear indication of the fact that majority of member farmers had modest participation in different activities of the dairy cooperative societies. The average herd size among the respondents of the study area was 7 dairy animals per household, which is quite encouraging, also holds the impression that dairying is an important component of households' income generating activities. The good quantity of milk produced and sold by member farmers to the societies indicated the commercial viability of dairy farming in the area. About one third of the respondents were happy with the functioning of societies, however, for more than half of the member farmers the performance of the societies was not disappointing. Dissatisfaction of small farmers reported in the study also depict the prevalence of mismanagement in dairy cooperative societies to some extent. Organisational participation, market potential and economic motivation were found to have strong influence on the satisfaction level of farmers in positive direction. However, constraints negatively contributed towards farmers' satisfaction with the functioning of DCSs.

Uttar Pradesh is the largest milk producing state contributing 18 percent to the national milk production. The state is also equipped with vast network of infrastructure and organizations working in the dairy sector. The nodal agency of dairy development in the state is Pradeshik Cooperative Dairy Federation (PCDF), which was established in the year 1962 for achieving multiple objectives of increasing milk production, processing and marketing of milk/milk products and development of infrastructure to promote dairy industry within the state. There were 13,240 village

level milk producers' co-operatives societies under PCDF in the State with a membership of 608.59 thousand farmers (2004-05). Average milk collections in these cooperatives were 986.61 thousand kilograms/day that was about 4 percent of all India collection under the umbrella of dairy cooperative societies. Liquid milk marketing in the state is about 3 percent of total milk marketed in India. These statistics are clear indication of wide scale network of milk procurement and marketing in Uttar Pradesh. The PCDF is fulfilling the dual role of increasing income level of rural milk

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producers by providing them convenient marketing facilities at their doors and making available good quality milk and milk products to consumers particularly of the urban areas at a reasonable price through its vast network of dairy cooperative societies and milk unions. Since beginning this organization has also played important role in providing the technical services like A. I., health services and production inputs to the dairy farmers through the various dairy development programmes. In recent years, the efficiency in procurement and marketing is reported to be dismal and at the same time the federation perceived growing challenges of competitiveness in the areas of production and marketing. The farmers' satisfaction with dairy cooperatives is of utmost importance especially when we talk about relevance and utility of services extended by cooperatives in present context. The effort was, therefore, made to assess the level of farmers' satisfaction with DCSs and the characteristics of farmers influencing their satisfaction with DCSs.

Methodology

The study was conducted in purposively selected organization i.e. PCDF, Uttar Pradesh. Out of 31 milk unions under PCDF, 4 milk unions were selected by stratified proportionate random sampling procedure. On the basis of Agro-Climatic Zones in U. P. (Ghosh, 1991) the milk unions were classified into western, central and eastern regions under which there were 15, 9 and 7 unions, out of which 2 (Bulandshahr and Meerut), 1 (Lucknow) and 1 (Barabanki) were selected, respectively from the above three regions. Two Dairy Cooperative Societies (DCSs) from each selected milk union and 10 member farmers from each DCS were selected randomly, thus making a total of 8 DCSs and 80 member farmers in the sample. The data was collected with the help of interview schedule. The satisfaction of farmers with DCSs was measured with the help of Bhanja Scale (1981) with some modification. The farmer members were categorized into low, medium and highly satisfied category on the basis of mean and standard deviation calculated for the scores obtained by them. In order to

find out relationship between selected independent and dependent variable, Pearson product moment correlation and multiple regression analysis were carried out.

Results and Discussion

Characteristics profile of member farmers

The results on socio-personal and economic profile of member dairy farmers are presented in Table 1.

Age and education

The average age of member dairy farmers was about 40 years and majority (70%) of them were belonging to middle age group having age between 31 to 50 years. A small percentage of respondents (18.75%) were young below 31 years of age, followed by 9.00 percent respondents in old age (>50 years) group. As evident from Table 1 that highest percentage (42.50%) of the respondents were having formal education upto matriculation, followed by 25.00, 12.50, 10.00, 6.25 and 3.75 percents having middle, primary, no formal schooling, graduate or above and intermediate level education, respectively.

Organisational participation

The largest percentage of respondents i.e. 46.25 percent was found to have medium level of Organisational participation (Table 1). However, a good percentage of respondents (31.25%) had low level of Organisational participation. At the same time, small percentage (22.50%) of the respondents had high level of Organisational participation. The findings obtained under the present study are clear indication of the fact that majority of member farmers were modest in participating in different activities of the dairy cooperative societies. In most of the cases, it was found that farmers attend the societies' meeting as passive observer and they hardly raise any questions or extend his opinion for improvement in day to day functioning of societies (Singh, 1992). The findings are in line with the those of Singh (1992), Ram Chand (1980), Saha (2001), Das (2003). However, the situation in the study area can be said to

Table 1: Distribution of dairy farmers members based on socio-personal and economic variables (n=80)

S.No.	Variables	Category	Frequency	Percentage
1	Age (years)	Young (<31)	15	18.75
		Middle (31-50)	56	70.00
		Old (> 50)	9	11.25
2	Education	No formal schooling	8	10.00
		Primary	10	12.50
		Middle	20	25.00
		Matriculation	34	42.50
		Intermediate	3	3.75
		Graduate and above	5	6.25
		3	Organisational Participation	Low (<4.91)
Medium (4.91-7.32)	37	46.25		
High (> 7.32)	18	22.50		
4	Herd size	Small (upto 5)	13	16.25
		Medium (6-9)	58	72.50
		Large (above 9)	9	11.25
5	Milk production (liters/ day)	Low (<8.00)	10	12.50
		Medium (8.00-19.00)	56	70.00
		High (>19.00)	14	17.50
6	Milk consumption(liters/day)	Low (<1.48)	13	16.25
		Medium (1.48-3.65)	50	62.50
		High (>3.65)	17	21.25
7	Milk sale (liters/ day)	Low (< 5)	10	12.50
		Medium (5 - 10)	29	36.25
		High (> 10)	41	51.25
8	Market potential	Low (upto 5)	13	16.25
		Medium (6 - 8)	51	63.75
		High (> 8)	16	20.00
9	Economic motivation	Low (upto 4)	16	20.00
		Medium (5 - 6)	45	56.25
		High (> 6)	19	23.75

be dismal when compared with the findings of Sah (2005) who reported outward attitude of dairy entrepreneurs towards many social organizations and majority of the respondents were actively participating in affairs of organizations in which they were members. The lower or modest participation of farmers are undesirable factor for the success of any cooperatives, because these situations do not adhered with the principles of

cooperative i.e. for the people; of the people; and by the people. Under such situation, awareness and educational programmes must be planned and implemented in true spirit of cooperatives.

Herd size

The majority of the respondents (72.50%) had medium herd size of 6-9 animals, followed by 16.25

and 11.25 percents of respondents having large (more than 9) and small herd size (upto 5). However, the average herd size among the respondents of the study area was 7 dairy animals per household, which is quite encouraging, also holds the impression that dairying is an important component of households' income generating activities. At the same time dairy animals are part and parcel of rural life and rearing of animals is also considered as sustenance farm activity.

Milk production, consumption and sale

The average milk production in the study area was 13.48 litres per day per household. Table 1 revealed that majority of the respondents i.e. 70.00 percent had medium level of milk production between 8.00 to 19.00 liters/day, followed by 17.50 and 12.50 percent respondents who had high and low level of milk production, respectively. The perusal of findings gave enough confidence about the commercial viability of the dairy cooperatives in the study area.

The largest percentage i.e. 62.50 percent of the respondents were consuming medium quantity of milk i.e. 1.48 – 3.65 litres/ day followed by 21.25 and 16.25 percent of the respondents were in high and low level of milk consumption respectively. The average quantity of milk consumption was 2.57 litres/ day per household. On the basis of average milk consumption per household of 8 members (as reported in this study) the per capita milk availability stands at about more than 300 ml per day, which is above the national per capita milk availability of 225 gms/day. This situation is quite satisfactory and encouraging for all those who are concerned with nutritional food security to the rural people.

Table 1 revealed that largest percentage i.e. 51.25 percent of the respondents were selling more than 10 litres/ day to the societies followed by 36.25 percent under medium level of milk sale (5 to 10 litres/ day). However, a small percentage (12.50%) of respondents had low level of milk sale to the societies i.e. less than 5 litres of milk/day. However, the average quantity of milk

sold to the dairy cooperative society was 10.83 litres/ day per household. The present findings also depict the fact that large amount of milk is marketed by the dairy farmers in the study area, which is necessary for viability of milk marketing network. It also indicates that farmers may be earning substantial portion of his income from milk sale and they may possess faith in DCSs, which are providing readymade market for selling milk to dairy farmers

Market potential

The Table 1 revealed that majority of the respondents (63.75%) perceived modest level of market potential in terms of milk purchase, price of milk, mode of payment etc by the society followed by 20.00 and 16.25 percents of respondents who perceived high and low level of market potential, respectively. However mean score calculated for the respondents of the study area was 7.15. Reasonably good proposition of member farmers (20%) were satisfied with the marketing of milk done by the DSCs and they had good faith in societies with regard to purchase of milk, payments and price paid by the societies to the member farmers.

Economic motivation

The Table 1 revealed that majority of the respondents (56.25%) had medium level of economic motivation, followed by 23.75 and 20.00 percents of respondents having high and low level of economic motivation, respectively. However, mean score calculated for the respondents of the study area was 5.63 against maximum possible score of 9. So, at large dairy farmers hold average level of economic motivation by virtue of which they might not be excelling in generating profit from his dairy enterprise, at the same time they are at threshold of converting dairy enterprise into economically sound business unit. This shows the potentiality of DCSs in the dairying, which can be exploited by well planned and systematically executed dairy development programme among the farmers of the study area.

Level of satisfaction among member dairy farmers

As revealed from Table 2, majority of farmers (51.25%) were moderately satisfied with the performance of dairy cooperative societies in which they were members. A good percentage of member farmers i.e. 22.50 percent felt high satisfaction with the societies, whereas 15.00 and 11.25 percents of the respondents felt low and very high level of satisfaction, respectively with the functioning of dairy cooperative societies. The mean percentage score of satisfaction was 59.86. On the basis of results, it is clear that about one third of the respondents were happy with the functioning of societies. However, for more than half of the member farmers, the performance of the societies was not disappointing. These observations narrate the correct weighing and testing of milk sample, maintenance of correct accounts and satisfaction of farmers with the facilities provided by the societies. At the same time dissatisfaction of small numbers of farmers also depict the prevalence of mismanagement in dairy cooperative societies up to some extent. Comprehensive consideration of findings reflects satisfaction of member farmers with the functioning of dairy cooperative societies to a greater extent.

Table 2: Distribution of farmers as per perceived level of satisfaction

(n=80)

S. No.	Category	Frequ-ency	Perce-ntage	Mean percentage score
1.	Low (< 16.00)	12	15.00	
2.	Moderate (16.00– 22.00)	41	51.25	59.86
3.	High (22.00 – 30.00)	18	22.50	
4.	Very High (>30.00)	9	11.25	

Relational analysis between satisfaction and other traits of member dairy farmers

It is evident from Table 3 that the traits of the respondents i.e. organisational participation, market potential and economic motivation had positive and

significant relationship with satisfaction of respondents with the society whereas constraints was found to have negative and significant relationship with the satisfaction level of farmers with the functioning of dairy cooperative societies. However, age, education, milk production, mlik consumption and milk sale were non-significantly correlated with satisfaction of respondents.

However, age and milk production had positive influence on satisfaction but was not significant. Other variables viz., education, Milk consumption and milk sale, found to have negative and non-significant contribution on satisfaction of respondents. The R² value was 0.8019 and indicates that all the independent variables taken together in consideration could explain a variation of 80.19 percent in the satisfaction of the respondents with the society.

Table 3: Relationship between satisfaction and other traits of the dairy farmers

S. No.	Variables	'r' value	'b' value
1	Age	0.1209	0.0038
2	Education	-0.0525	-0.1868
3	Organisational participation	0.7184**	0.7747**
4	Milk production	0.0497	0.0688
5	Milk consumption	-0.0261	-0.1681
6	Milk sale	0.0124	-0.0466
7	Market Potential	0.6479**	0.3557**
8	Economic motivation	0.6135**	0.3370**
9	Constraints	-0.7344**	-0.1541**

** Significant at 0.01 level of probability

Conclusion

More the farmers were motivated towards economic accomplishment, they utilized the services of societies to a greater extent for their economic benefit. Once they utilizes services of societies with some monetary dividend their satisfaction level with societies are bound to increase. The enhanced level of market potential with cooperative societies provides opportunity to members for readily available market to sale milk at comparatively higher prices with certain level of credibility in payments. This particular attributes gave

rise to satisfaction level of member farmers with the performance of dairy cooperative societies. At the same time the active participation of member farmers in different affairs of cooperative societies inculcate the sense of belongingness within them and they feel happy becoming more satisfied with the societies. Constraints serve as impediments for member farmers in getting accrued benefit of several provisions within the cooperatives and the members develop the hostile or non-cooperative attitude towards societies. The emergence of such feelings degrades the satisfaction level of farmers with the functioning of cooperative societies.

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Dissemination of Development Information in Print and Electronic Media

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Abstract

This paper is an outcome of research carried on dissemination of developmental information in print and electronic media. The information needs were high pertaining issues on women in agriculture day, national energy conservation day, world food day, world water day, nutrition week, national science day, world health day, world disabled day, international women day, breast feeding week and world consumer right day. High need disposition was shown by majority of the respondents on all the above aspects of developmental information. However, the respondents expressed low level of utility perception on many of these aspects. The other aspects accounting towards these results were adequacy, timeliness, relevancy, understandability, usefulness, effectiveness credibility, appropriateness, format, language and speed of presentation for visual forms of media.

People use a variety of media such as newspapers, radio, television, computer and internet etc. The new technological development in information and communication technologies (ICTs) such as satellite radio and television broadcasting, caballing, long-distance telephony, computers and telecommunications have dramatically expanded options for the users.

Recent developments in media forms and information inflow have created a situation of information explosion. The world has witnessed a virtual explosion in the advancements made in several areas of technology especially those relating to computer, compression and communications, which have a direct bearing on society.

Effect of these media forms have not only affected urban sector but also the rural section of the population. To have an understanding of some of such issues, the present study was undertaken.

Methodology

Relevant developmental information like important days and events being celebrated by the

governmental national and international organizations/agencies/departments/units for dissemination for knowledge and skill development were included. The information on these issues was gathered and compiled from different sources and an inventory was prepared. The inventory so developed was provided to 60 experts in their areas. The judge's judgement was obtained for relevancy and importance of the events to the end users. On the basis of the judge's judgement, events were listed score wise in ascending order. Events with higher scores (15 events) were selected finally for the purpose of the study. The study was undertaken in three purposively selected districts of Haryana. Multi-stage sampling technique was adopted to select the respondents for the study. Out of selected districts from three literacy zones, one city (district headquarter) was selected along with one village and city. Thus, in all 180 respondents constituted sample for the present study. The data were collected by use of the structured pretested interview schedule and subjected to statistical analysis for drawing inferences.

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Results and Discussion

The findings have been presented under various sections:

Profile of the respondents

Majority of the respondents (67.8%) were in the age group of 21 to 40 years had postgraduate (42.8%) to graduate degree (32.8%) and medium family educational status (51.7%). More than half of the respondents came from nuclear families (57.8%) having medium family size (58.9%) and hailed from high caste (68.9%). More than half of the respondents (50.6%) were employed, had monthly family income of Rs.10,000-20,000 (44.4%) and had low social participation (51.2%) as indicated in Table 1.

Media ownership profile of respondents

Data presented in the Table 2 indicates that as high as 97.8 per cent of the respondents subscribed newspaper followed by those who had television sets (9.67%). More than eighty percent of the respondents (83.30%) had radio sets and more than half subscribed to magazines (51.10%). About one-third (37.80%) of the respondents had computers. The mean score for media ownership was found to be 2.14 with standard deviation 0.57. It indicates that on an average the media ownership among the respondents was of medium level.

Mass media exposure

The distribution of the respondents according to mass media exposure (Table 2) revealed that majority of the respondents (55.00%) had high exposure to mass media. Those who had medium level exposure to mass media were 31.10 percent followed by 13.90 percent who had low mass media exposure. The mean scores for mass media exposure were found to be 2.41 with standard deviation 0.72. It indicates that majority of the respondents had high mass media exposure.

Preference of the respondents for print and electronic media

The data regarding respondent's media

preference (Table 3) showed that majority of the respondents (69.40%) preferred newspaper to retrieve developmental information (Istrank). Radio received IIIrd rank by 59.40 percent of the respondents. Regarding television, majority of the respondents (65.60%) gave IInd rank. As regard website, majority of the respondents (64.40%) gave IVth rank.

Usefulness of print and electronic media for the respondents

It is evident from Table 4 that majority of the respondents reported the newspaper as the most useful source for developmental information (51.10%) followed by useful (48.90%).

The result regarding radio showed that majority of the respondents (57.30%) found radio as a useful source for developmental information. One-fifth of the respondents (20.00%) found it most useful source for getting developmental information. However, more than one fifth of the respondents (22.70%) found it not useful.

Regarding television, about half of the respondents (54.50%) found television as most useful source. Very few respondents found it not useful source for obtaining developmental information.

About two-fifth of the respondents (38.40%) found the Internet as not useful source for getting developmental information. However, almost equal percentage of respondents (31.10%) reported Internet as useful and most useful (30.65%) source of developmental information.

Table 4: Distribution of the respondents according to usefulness of media N=180

Media	Usefulness		
	Most useful	Useful	Not useful
Newspaper	92(51.1)	88(48.9)	0(0.0)
Radio	36(20.0)	103(57.3)	41(22.7)
Television	98(54.5)	78(43.3)	4(2.2)
Website	55(30.5)	56(31.1)	69(38.4)

Table 1: Profile information of the respondents**N=180**

S.No.	Variable	Categories	Frequency	Percentage	Mean	S.D.
1.	Age	Upto 20	23	12.78	31.33	9.88
		21-40	122	67.78		
		Above 40	35	19.44		
2.	Education	Upto 10+2	44	24.4	2.18	0.80
		Graduate	59	32.8		
		Post graduate	77	42.8		
3.	Family education	Low	56	31.1	1.86	0.68
		Medium	93	51.7		
		High	31	17.2		
4.	Family type	Nuclear	104	57.8	1.42	0.49
		Joint	76	42.2		
5.	Family size	Small (upto 3)	14	7.8	2.25	0.59
		Medium (3 to 5)	106	58.9		
		Large (above 5)	60	33.3		
6.	Respondent's employment status	Employed	91	50.6	1.51	0.51
		Unemployed	89	49.4		
7.	Caste	Low	14	7.8	2.61	0.63
		Medium	42	23.3		
		High	124	68.9		
8.	Social participation	Member of no organization	92	51.2	2.29	1.45
		Member of one organization	15	8.3		
		Member of more than one-organization	8	4.4		
		Office holding	59	32.8		
		Post holder	6	3.3		
9.	Family income (monthly in Rs.)	Upto 10,000	63	35.0	1.85	0.73
		10,000-20,000	80	44.4		

Figures in parentheses indicate percentage

Table 2: Mass media ownership and exposure

S.No.	Variable	Categories	Frequency	Percentage	Mean	S.D.
1.	Mass media ownership	Newspaper	176	97.8	2.14	0.57
		Magazines	92	51.1		
		Radio	150	83.3		
		Television	174	96.7		
		Computer	68	37.8		
2.	Mass media exposure	Low	25	13.9	2.41	0.72
		Medium	56	31.1		
		High	99	55.0		

Table 3: Preference of the respondents for print and electronic media

N=180

Preference (rank) Media	I	II	III	IV
Newspaper	125(69.4)	48(26.7)	7(3.9)	0(0.0)
Radio	1(0.6)	8(4.4)	107(59.4)	64(35.6)
Television	46(25.5)	118(65.6)	16(8.9)	0(0.0)
Website	8(4.4)	6(3.3)	50(27.8)	116(64.4)

Need disposition of the respondents about developmental information

Data in Table 5 show that the maximum number of the respondents (67.20%) had medium level need disposition followed by low (21.10%) and high (11.70%) for Republic Day. Almost similar findings were obtained in case of Independence Day, where the corresponding figures were 61.10 per cent, 25.60 per cent and 13.30 per cent.

In case of National Science Day and World Health Day majority of the respondents (79.40%) had high need disposition level followed by more than one-fifth of the respondents (20.60%) who had medium score on the variable. Almost similar results were found in case of World Water Day (78.90%), World Food Day (80.00%) and World Disabled Day (80.00%).

Regarding International Women Day, about

three-fourth of the respondents (72.20%) had high need disposition level followed by medium (27.80%). Almost similar results were found for World Consumer Right Day (71.10%) and Breast Feeding Week (72.80%).

About sixty per cent (59.40%) of the respondents had high need disposition level regarding World Environment Day followed by medium (40.00%) and only 0.60 per cent respondents had low need disposition level. More than three-fourth of the respondents (77.20%) had high need disposition level regarding Nutrition Week following by medium (22.80%) need disposition level. Almost similar results were obtained for Women in Agriculture Day (75.50%) and National Energy Conservation Day (76.10%).

In case of International Literacy Day more than fifty per cent (51.10%) of the respondents had high need disposition level followed by medium (47.20%). Only 1.70 per cent respondents had low need disposition level.

Table 5: Distribution of respondents according to level of need disposition and utility perception**N=180**

S.No.	Events	Category	Level of need disposition Number (%)	Level of utility perception Number (%)
1.	Republic Day (26 January)	Low	38 (21.1)	1 (0.6)
		Medium	121 (67.2)	37 (20.6)
		High	21 (11.7)	142 (78.9)
2.	National Science Day (28 February)	Low	0 (0.0)	168 (93.3)
		Medium	37 (20.6)	12 (6.7)
		High	143 (79.4)	0 (0.0)
3.	International Women's Day (8 March)	Low	0 (0.0)	116 (64.4)
		Medium	50 (27.8)	53 (29.6)
		High	130 (72.2)	11 (6.1)
4.	World Consumer Right Day (15 March)	Low	0 (0.0)	119 (66.1)
		Medium	52 (28.9)	55 (30.6)
		High	128 (71.1)	6 (3.3)
5.	World Water Day (22 Mach)	Low	0 (0.0)	169 (93.9)
		Medium	38 (21.1)	11 (6.1)
		High	142 (78.9)	0 (0.0)
6.	World Health Day (7 April)	Low	0 (0.0)	165 (91.7)
		Medium	37 (20.6)	15 (8.3)
		High	143 (79.4)	0 (0.0)
7.	World Environment Day (5 June)	Low	1 (0.6)	93 (51.7)
		Medium	72 (40.0)	69 (38.3)
		High	107 (59.4)	18 (10.0)
8.	Breast-Feeding Week (1-7 August)	Low	0 (0.0)	134 (74.5)
		Medium	49 (27.2)	31 (17.2)
		High	131 (72.8)	15 (8.3)
9.	Independence Day (15 August)	Low	46 (25.6)	3 (1.7)
		Medium	110 (61.1)	31 (17.2)
		High	24 (13.3)	146 (81.1)
10.	Nutrition Week (1-7 September)	Low	0 (0.0)	160 (88.9)
		Medium	41 (22.8)	20 (11.1)
		High	139 (77.2)	0 (0.0)
11.	International Literacy Day (8 September)	Low	3 (1.7)	81 (45.0)
		Medium	85 (47.2)	65 (36.1)
		High	92 (51.1)	34 (18.9)
12.	World Food Day (16 October)	Low	0 (0.0)	172 (95.6)
		Medium	36 (20.0)	7 (3.9)
		High	144 (80.0)	1 (0.6)
13.	World Disabled Day (3 December)	Low	0 (0.0)	176 (97.8)
		Medium	35 (19.4)	4 (2.2)
		High	145 (80.6)	0 (0.0)
14.	Women in Agriculture Day (4 December)	Low	1 (0.6)	175 (97.2)
		Medium	43 (23.9)	5 (2.8)
		High	136 (75.5)	0 (0.0)
15.	National Energy Conservation Day (14 Dec.)	Low	1 (0.6)	180 (100.0)
		Medium	42 (23.3)	0 (0.0)
		High	137 (76.1)	0 (0.0)
Total		Low		93 (51.67)
		Medium		75 (41.66)
		High		12 (6.67)

Utility perception of the respondents for developmental information

Data in Table 5 reveals that the majority of the respondents expressed high utility perception of Republic Day (78.90%) information followed by medium (20.60%) and low (0.50%). Almost similar results were obtained regarding Independence Day where the corresponding figures were 81.10 per cent, 17.20 per cent and 1.70 per cent respectively.

Majority of the respondents (93.30%) expressed low utility perception of the information pertaining to National Science Day followed by medium (6.70%). Almost similar results were found with regards to developmental information pertaining to World Water Day (95.60%) and World Health Day (91.70%), Women in Agriculture Day (97.20%), World Food Day (95.60%) and World Disabled Day (97.80%).

The results regarding utility perception of developmental information on International Women Day, majority of the respondents (64.40%) had low utility perception followed by medium (29.50%) and high (6.10%). Almost similar findings were obtained in case of World Consumer Right Day, where the corresponding figures were 64.40 per cent, 29.50 per cent and 6.10 per cent respectively.

About three-fourth of the respondents (74.40%) had low utility perception scores for Breast Feeding Week followed by medium (17.20%) and high (8.30%). Regarding Nutrition Week, huge majority of the respondents (88.90%) had low utility perception of the developmental information. In case of International Literacy Day, a sizeable number of the respondents

(45.00%) had low utility perception score followed by medium (36.10%) and high (18.90%). All the respondents had low utility perception regarding National Energy Conservation Day.

Based on the over all scores of the respondents regarding utility perception showed that more than half of the respondents had low utility perception scores (51.70%) followed by those who had medium utility perception scores (41.60%). Only few of the respondents showed high utility perception of the developmental information on various events selected under the study (6.70%).

Conclusion

It can be concluded from the results that majority of the respondents were of 21-40 years of age, postgraduates having medium family education status, coming from nuclear families with medium family size and belonged to high castes. More than half of the respondents were employed and had monthly income of Rs. 10,000-20,000 with low social participation. As regard communication variable majority had high mass media ownership and mass media exposure. Majority of the respondents gave first preference to newspaper followed by television, radio and website. Newspaper was found to be the most useful and appropriate source of information. The high need disposition of the respondents for the developmental information on almost all the events and low utility perception of majority of the respondents demand potential strategy to be designed in terms of code, content and treatment of the information presented in various media forms. This is most needed for effective dissemination of developmental information through different media forms.

Information Seeking Behaviour of Dairy Farmers in Nagpur District of Maharashtra

M.P. Nande¹, S.H. Gawande², A.M. Patil¹ and N.V. Khode¹

Abstract

An attempt was made to ascertain the information seeking behaviour of dairy farmers purposively selected Nagpur District of Maharashtra. Two blocks namely Nagpur and Kalameshwar were selected randomly and from each block ten villages were selected purposively having high milk production level. Total two hundred respondents having at least two dairy animals were selected for assessing the information seeking behaviour of dairy farmers regarding Animal Husbandry and Dairy Production Practices. Majority of respondents utilized informal information sources followed by formal and mass media. Education, social participation, attitude, cosmopolitaness and extension contact were important factors that influence information seeking behaviour of dairy farmers. There should be proper assessment of information sources by dairy farmers, planners and administrator for improving utilization of these sources for improved animal husbandry and dairy production technology.

Communication has been a preferential area of investigation in the discipline of extension education in India. The way to prevent irregular information to dairy farmers is to provide them information through different communication sources about recent animal husbandry and dairy production technology and assure that these sources penetrate the whole mass of desired population. Different socio-psychological makeup of the people having different perception towards various communication sources determine their adoption behaviour. Thus, success or failure of communication sources depends on natures of sources, recipient perception of its intent and other related factors. Understanding a cross-section of the dairy farmers in their various groups or categories with respect to their communication behaviour is fundamental pre-requisite to evolve effective communication model. Therefore, communication of innovations to dairy farmers is a key to increase milk production. It is also essential to know

how farmers get information from extension personal and researchers, what sources or channels they use for getting information, how they evaluate the received information and after getting information to what extent the farmers act upon. Keeping the above facts in view and importance of communications, the study conducted in Nagpur district of Maharashtra with an objective to study information seeking behavior of dairy farmers.

Methodology

The present study was conducted in Nagpur district of Maharashtra. Two blocks were purposively selected because of large milk production. Ten villages from each block were selected on the basis of number of dairy animals. From each village ten respondents were selected those having at least two dairy animals, thus total two hundred respondents were selected for the study. Data were collected from the sample of respondents through well structured pretested interview schedule.

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The information sources were assessed in specific manner under three different categories *i.e.* formal sources, informal sources and mass media. The responses of respondents were obtained on three point continuum *i.e.* frequently, occasionally and never. The weightage 2, 1, and 0 were assigned respectively. The score of the entire communication items were summed up to obtain the total information seeking behaviour score of individual dairy farmer.

Results and Discussion

The data pertaining to information seeking behaviour of dairy farmers presented in Table 1 revealed that highest number of the respondents *i.e.* 73.50 percent were in medium category with respect of their level of information seeking behaviour, followed by high level category, which was comprised of 13.50 percent respondents and 13.00 percent respondent were found low in seeking in animal husbandry and dairy production information. Findings are in line with those reported by Shinde (1993) and Tawde (1999).

Table 1: Distribution of dairy farmers according to their information seeking behaviour

Information seeking behaviour	Number of respondents	Percentage (%)
Low	26	13.00
Medium	147	73.50
High	27	13.50

Utilization of different information sources by dairy farmers is presented in Table 2 sources shows that among the five formal sources of information, dairy farmers seek maximum information from Livestock Supervisor (LSS) (mean score of 1.21 out of 2) followed by Livestock Development Officer (LDO) (mean score, 0.91 out of 2). These finding suggested that dairy farmers had full confidence and faith in LSS and LDO. These officials might be were easily approachable. Similar results were also reported by Nataraju and Channegowda (1997) and Singh and Dalal (2006).

Extension officer (mean score = 0.31), Block Development Officer (mean score = 0.22) and University Scientist (mean score = 0.20) were less preferred source of information for dairy farmers.

Seven informal sources of information *i.e.* progressive dairy farmers, village leaders, other dairy farmers, relatives, neighbours, friends and NGO were identified. Among seven Informal sources, dairy farmers mostly sought information from friends (mean score 1.30 out of 2) and ranked first among available information sources. This was followed by neighbours (mean score = 0.82) which were consulted mostly in case of any difficulty regarding animal husbandry and dairy production practices. Other dairy farmers (mean score = 0.745), relatives (mean score = 0.71), progressive dairy farmers (mean score = 0.655) and village leader (mean score = 0.41) were at III, IV, V, and VI rank respectively among informal sources. These findings are similar to those of Roy (2004) and Sawant (1979).

With regards to mass media it was observed that dairy farmers received information mostly through Television programmes (mean score = 1.005) because of the readily availability of television among dairy farmers. Newspaper was given second rank (mean score = 0.915). It may be because of easy availability in the study locale and high level of formal education among dairy farmers. Radio programme was third ranged (mean score = 0.53). Poster (mean score = 0.34), leaflet/folder (mean score = 0.34), books/magazines (mean score = 0.255) were ranked at IV, V and VI respectively. Internet (mean score = 0.035) was used least by dairy farmers. These findings got support from those by Swarnkar (1999) and Sawant (1979).

It could be observed from Table 3 that the socio-personal variables namely education, social participation, attitude towards information seeking behaviour, cosmopolitaness and extension contact were positively and significantly related to information seeking behaviour of dairy farmers. It implies that formal education, social participation, favorable attitude towards utilization of information and more close contact with

Table 2. Utilization of different information sources by dairy farmers

(N=200)

S. No.	Type of sources	Frequently	Occasionally	Never	Total score	Mean score	Rank order
Formal Sources							
1.	Livestock Development Officer (LDO)	40	102	58	182	0.91	II
2.	University Scientist	14	12	174	40	0.20	VI
3.	Extension Officer	03	57	140	63	0.315	III
4.	Block Development Officer(BDO)	01	42	157	44	0.22	IV
5.	Livestock Supervisor (LSS)	62	118	20	242	1.21	I
Informal sources							
1.	Progressive Dairy Farmers	29	73	98	131	0.655	V
2.	Village Leaders	17	48	135	82	0.41	VI
3.	Other Dairy Farmers	24	101	75	149	0.745	III
4.	Relatives	34	74	92	142	0.71	IV
5.	Neighbours	30	104	66	164	0.82	II
6.	Friends	85	90	25	260	1.30	I
7.	NGO	06	31	163	43	0.215	VII
Mass media							
1.	Television	40	121	31	201	1.005	I
2.	Radio	12	82	106	106	0.53	III
3.	Newspaper	46	91	63	183	0.915	II
4.	Book / Maxine	04	43	153	51	0.255	VI
5.	Leaflets / Folder	02	60	138	64	0.32	V
6.	Poster	03	62	135	68	0.34	IV
7.	Internet	01	05	194	07	0.035	VII

Table 3: Correlation coefficient (r) between characteristics and information seeking behaviour of dairy farmers

S.No.	Variables	'r' Values
1	Age	- 0.2750**
2	Education	0.2956**
3	Annual income	0.1207 ^{NS}
4	Land holding	0.0568 ^{NS}
5	Dairy herd size	0.0808 ^{NS}
6	Social participation	0.3537**
7	Economic motivation	0.1266 ^{NS}
8	Attitude	0.5349**
9	Cosmopolitaness	0.2899**
10	Extension contacts	0.6168**

** Significant at 0.01 level of probability

^{NS} indicates Non significant

extension personal influence information seeking behaviour of dairy farmers. Age of the respondents had negative and significant relationship with information seeking behaviour which reflects that as the age advances, the need for seeking information decreases.

Conclusion

The gap between knowledge production and knowledge utilization can be narrowed by the efficient use of information sources. Frequency of information seeking behaviour was much higher in informal sources then formal sources and mass media sources regarding animal husbandry and dairy production practices. Since variables like education, social participation, socioeconomic status, attitude, cosmopolitaness and

extension contacts have positive influence thus the planners, administrators may give a serious thought which would help in increasing information seeking behaviour of dairy farmers in future.

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Editorial

System Perspective towards Sustainable Agriculture

Agriculture has always been INDIA'S most important economic sector. The 1970s saw a huge increase in India's wheat production that heralded the Green Revolution in the country. The increase in post-independence agricultural production has been brought about by bringing additional area under cultivation, extension of irrigation facilities, use of better seeds, better techniques, water management, and plant protection.

At the current point of time, Indian agriculture has changed dramatically, especially 90s onward. Although green revolution has brought many positive effects and increased the agricultural production and productivity, there have also been significant costs. Prominent among these are topsoil depletion, groundwater contamination, the decline of family farms, continued neglect of the living and working conditions for farm laborers, increasing costs of production, and the disintegration of economic and social conditions in rural communities.

To aggravate the situation further, rural populace are constantly seeking the alternative income generating options to meet the challenges of life standards. The problem of labour, shrinking holding size, inadequacy of technological availability, dominance of middle men, uncertain market dynamics, changing climate, changing dynamics of insect pest and diseases, the static state of affair in the department of agriculture and related line departments and host of other impeding factors are discouraging the Indian farmers from making the Indian agriculture moving forward. The consequences are discernible in the form of regressing growth rate of agriculture as compared to industrial and service sector.

The above challenges charge the extension professionals to introspect and critically analyze the prevailing models of agricultural development. Sustainability rests on the principle that we must meet the needs of the present without compromising the ability of future generations to meet their own needs. A *systems perspective* is essential to understand sustainability. The system is envisioned in its broadest sense, from the individual farm, to the local ecosystem, and to communities affected by this farming system both locally and globally. An emphasis on the system allows a larger and more thorough view of the consequences of farming practices on both human communities and the environment. A systems approach gives us the tools to explore the interconnections between farming and other aspects of our environment. A systems approach also implies *interdisciplinary efforts in research and education*. This requires not only the input of researchers from various disciplines, but also farmers, consumers, policymakers and others.

The Society for Community Mobilization for Sustainable Development (MOBILIZATION) offer the opportunity to the extension professionals, scientists, development partners, administrators and alike to share their experiences of cases investigated, action intervened and potential implications emanated thereupon through the research journal at hand. I am happy that the current issue of the journal envelops the 20 research papers from the wide areas like crop husbandry, livestock rearing, resource conservation, etc from cross the diverse agro-ecological situation of the country. I hope that these papers will be useful and worthy.

I appreciate the efforts made by the members, editorial team- Dr. Premlata Singh, Dr. Shantanu Kumar Dubey, Dr. Rupasi Tiwari and Dr. Nishi Sharma for their efforts to bring out this issue. I am also thankful to Sh. Anand Vijay Dubey for providing on line support in compiling the papers. My thanks are also due to Ms. Reema Chaurisia for providing editorial assistance.

(J.P. SHARMA)
Chief Editor

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