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Distribution pattern of production and reproduction traits of exotic crossbred cows

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Abstract

Livestock Husbandry have enough potential in our country and is considered important component of Indian agricultural economy. Dairy industry plays an important role for the sustainable growth of Indian agricultural economics. Performance of Dairy cattle is the thus important aspect of the study. To have the high profit from the dairy industry, exotic crossbred dairy cows have been studied using statistical techniques involve certain logical patterns, methods of reasoning and critical thinking in decision making. To study the distribution patterns of production and reproduction traits in crossbred cattle maintained at Livestock Research Centre of G .B. Pant Univ. of Ag. & Tech, Pantnagar. A random sample of 154 exotic crossbred cows was made out of 397 cattle using simple random sampling without replacement method. Six traits of exotic crossbred cows were considered. (i) Age at first calving (AFC) It was observed that the mode was 47.28 months, Mean=47.28 while it ranged from 27.58 to 77.65 months. First four central moments, β_1 and β_2, the value of k for Pearson's type distribution was calculated (k= -0.0012508), which is approximately zero and β_1= 0.4999. Therefore, the probability distribution of X_1 variable is normal for which kolmogorov–Smirnov test for goodness of fit was applied. (ii) First lactation milk yield (FLMY), It was observed that the mode was 2292.86 kg, Mean= 2269.48, while it ranged from 267.2 to 5219.2 kg, Pearson's type distribution was calculated (k= -0.00000027055), which is approximately zero and β_1= 0.09287, β_2 = 6.855. Which indicates that the variable FLMY follows Pearson's Type VII distribution. (iii) First lactation length (FLL), the mode was 315.38 days, Mean=315.428, while it ranged from 65 to 448 days, Pearson's type distribution was calculated (k= 0.00009934), which is approximately zero and $\beta_1 \approx 0$. Therefore, the probability distribution of X_1 variable is normal and its normality is tested. (iv) First calving interval (FCI), It was observed that the mode was 401 days, Mean= 419.25, Pearson's type distribution was calculated ($k=-7.313x10^{-9}$), It follows Pearson's Type I distribution. The Normal fits to the traits namely 'AFC' and 'FLL'. Therefore the, statistical tests requiring the assumption of Normality can be applied for the statistical analysis of these traits to get valid information regarding dairy management. The type of probability distributions of traits 'FLMY' and 'FCI' are Pearson's type 'VII' and 'I' respectively. It is, therefore, suggested that for the statistical analysis of these traits of crossbreds belonging to Tarai region of Uttranchal and Uttar Pradesh only non-parametric test procedures (Siegel, 1956) can be applied. An attempt was made to fit Geometric Distribution for the discrete variables (v) 'Number of estrus per conception for first pregnancy, (NOECFP and (vi)'Number of services per conception for first pregnancy (NOSCFP), but do not fit to Geometric Distribution and It was found that the distributions is positively skewed and Platykurtic'.

Introduction

Using logical reasoning we draw conclusions based on data pertaining to the study of problems. Animal Scientists generally use parametric tests which are based on the fundamental assumption that the parent population is normal and are concerned with testing or estimating the means and variance of these population. However , if the form of the basic frequency function from which the samples are drawn is not normal, non-parametric tests can be applied . Proper attention should be paid for the application of statistical techniques to experimental data otherwise the resulting conclusion might be invalid. The present study thus, was undertaken for the proper applications of statistical techniques in the analysis of reproduction and production traits of crossbred cattle to draw conclusions which may be helpful in decision making regarding selection of dairy cattle for commercial and breeding herds.

Materials and Methods

Present investigation was carried out on data collected from the production and reproduction records of crossbred (Crosses of Rade Dane , Holstein Friesian , Jersy with Sahiwal, Hariana and Rathi) cattle maintained at the Livestock Research Centre (L.R.C.) of G.B. Pant University of Agriculture & Technology, Pantnagar, Distt.-U.S.Nagar (Uttranchal). A random sample of 154 crossbred cows was made out of 397 cattle using simple random sampling without replacement method. The distribution pattern of following 14

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production and reproduction traits were studied.

X_1 - Age at First Calving (AFC)
X_2 - First Lactation Milk Yield (FLMY)
X_3 - First Lactation Length (FLL)
X_4- First Calving Interval (FCI)
X_5– Number of Services Per Conception for First Pregnancy (NOSCFP)
X_6 – Number of Estrus Per Conception for First Pregnancy (NOECFP)

An attempt was made to fit appropriate continuous and discrete distribution pattern for the production and reproduction traits as random variables X_1, X_2, X_3, X_4, X_5 and X_6 .

Continuous Probability Distributions:

To get the idea about distribution patterns of the production and reproduction traits under study, frequency curves were plotted. Using frequency tables, first four central moments were also calculated and according to these moments Pearson's distributions were calculated.

(a) Pearson's Distributions:

The family of the frequency functions f(x) defined in the following form:

$df(x)/d(x) = (x-a)f(x) / \{b_0+b_1x+ b_2x^2\}$ are known as Pearson's distribution

Where,

$b_0 = - \{\mu_2(4\mu_2\mu_4-3\mu_3^2)\} / 2(5\mu_2\mu_4-9\mu_2^3-6\mu_3^2)$
$= - \{\sigma^2(4\beta_2-3\beta_1)\} / 2(5\beta_2-\beta_1-9)$
$b_1 = - \sigma[\sqrt{\{\beta_1(\beta_2+3)\}}] / 2(5\beta_2-6\beta_1-9)$
$b_2 = - (2\beta_2-3\beta_1-6) / 2(5\beta_2-6\beta_1-9)$

Where,

μ_r : r^{th} central moments (r = 2,3,4)
$\beta_1 = \mu_3^2/\mu_2^3$, $\beta_2 = \mu_4/\mu_2^2$

Type of Pearson's distribution was found on the basis of the quantity k obtained as follows:

$k = b_1^2/4\, b_0\, b_2$

The following are the main type of Pearson's distribution depending upon the value of k,

(i) $k< 0$ type I
(ii) $0 < k < 1$ type II
(iii) $k > 1$ type VI

(b) Normal Distribution:

A random variable x is said to have a normal distribution with parameters μ (called 'mean') and σ(called 'variance)

. If its probability density function is given by the probability law:

$f(x ;\mu , \sigma) = (1/\sigma\sqrt{2\Pi}) \text{ Exp } [-1/2\{(x-\mu)\sigma\}^2]$

where $-\infty < x < \infty$, $-\infty < \mu < \infty$, $\sigma > 0$

using above p.d.f. and with the help of Normal Tables, expected frequencies of various class intervals for the variables viz, AFC, FLL, FGP, FEPFC were calculated.

(c) Discrete Probability Distributions:

Fitting of following discrete probability distributions were tried but none of the 6 productive and reproductive traits were fitted to the following probability distributions like Geometric, Binomial and Poisson distribution.

Test of Goodness of Fit:

Goodness of fit of fitted distributions were tested by Kolmogorov-Simronv Test and χ^2 – test of goodness of fit.

(a) Kolmogorov-Simronv Test of Goodness of Fit:

Hypothesis to be tested:

H_0 : Specified distribution is fit for the data
H_1 : Specified distribution does not fit for the data

Test Statistic:

$$D = \text{Max}_{i=1}^{n} |F_{(x)}-S_{n(x)}|$$

Where $F_{(x)}$ the completely specified theoretical cumulative distribution function based on n observations for any observed x, $S_{n(x)}$ = k/n where k is the number of observations less than or equal to x.

Critical Region:

Reject H_0 at α% level of significance if the calculated value of D statistic exceeds the tabulated value $D\alpha$ for which tables are available.

However, for large n tabulated value of $D\alpha$ can be found by the following formula :

$D\alpha$ at 5% level of significance = $1.36/\sqrt{n}$
$D\alpha$ at 5% level of significance = $1.63/\sqrt{n}$

(b) χ^2 – Test of Goodness of Fit:

Hypothesis to be tested:

H_0: Specified distribution is fit for the data
H_1: Specified distribution does not fit for the data

Test Statistic $\chi^2_{cal} = \sum_{i=1}^{k} \{(o_i-e_i)^2/ e_i\}$

Where o_i and e_i is observed and expected frequencies of i^{th} class and k is number of classes.

Critical Region:

Reject H_0 at α% level of significance if $\chi^2_{cal} \geq \chi^2_{(k-1, a)}$

Results and discussion:

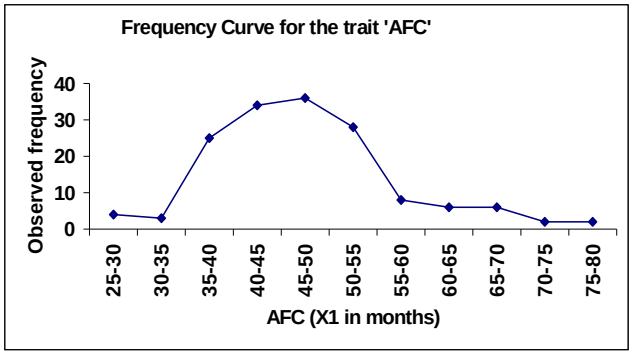
The distribution pattern of production and reproduction traits mentioned above as the variable X_1, X_2, X_3, X_4, X_5 and X_6 of crossbred dairy cows are presented and discussed here.

(a) AFC (X_1):

The frequency curve is plotted from the data obtained for the variable AFC (X_1). It was observed that the mode for the variable was 47.28 months while it ranged from 27.58 to 77.65 months. The shape of frequency curve is approximately normal. The values of mean, first four central moments and β_1 and β_2 are as follows:Mean=47.28, Variance=07.55, μ_3=579.0539 $\mu_4$28660.09, β_1= 0.4999, β_2= 3.73 Here the mean age at first calving comes out to be 47.28 months which is approximately similar as mean obtained age obtained by Arora and Sharma (1983) but lower than mean age obtained by Ulmek *et al*. (1992) and Morales *et al* (1989).

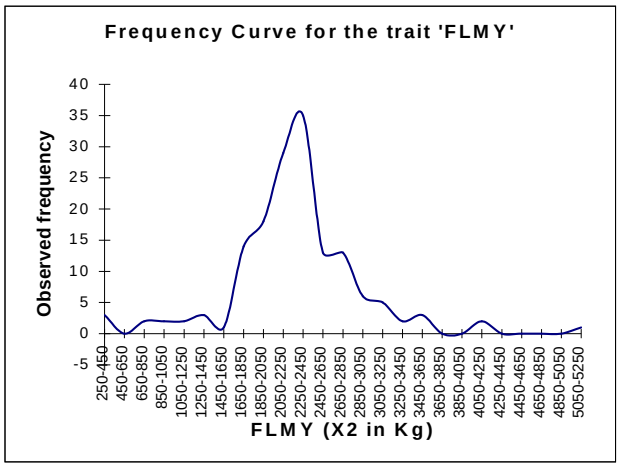
Using values of first four central moments, β_1 and β_2, the value of k for Pearson's type distribution was calculated (k= -0.0012508), which is approximately zero

and β_1= 0.4999. Therefore, the probability distribution of X_1 variable is normal for which kolmogorov –Smirnov test for goodness of fit was applied in which the D statistic D_{cal} = 0.0497 is less than D_a value at 5% and 1% level of significance.



(b) FLMY (X_2):

The frequency curve is plotted from the data obtained for the variable FLMY (X_2). It was observed that the mode for the variable was 2292.86 kg. while it ranged from 267.2 to 5219.2 kg. The values of mean, first four central moments,



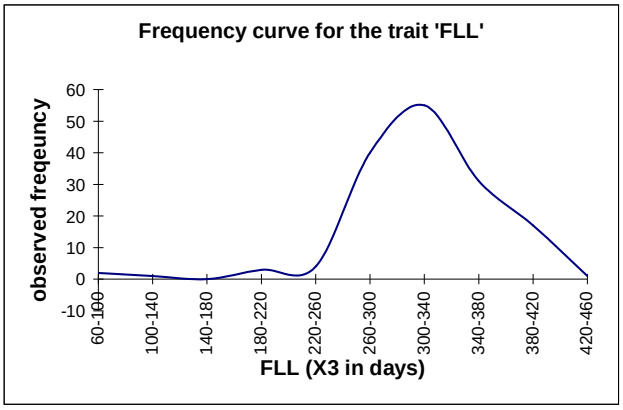
and β_1 and β_2 are as follows:

Mean= 2269.48, Variance = 416398.4, μ= 81884380.00 μ_4=1.188 X 10^{13}, β_1= 0.09287, β_2= 6.85

Here the mean of FLMY comes out to be 2269.74 kg which is lower than values reported by Jadhav *et al.* and Morales *et al.* (1989) and higher than the values observed by Singh *et al.* (1995) and Deshmukh *et al.*(1995) . Using values of first four central moments, β_1 and β_2, the value of k for Pearson's type distribution was calculated (k= -0.00000027055), which is approximately zero and β_1= 0.09287, β_2 = 6.855. Which indicates that the variable FLMY follows Pearson's Type VII distribution.

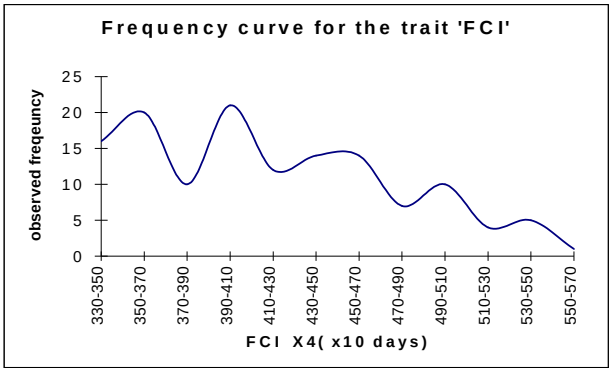
(c) FLL (X_3):

The frequency curve is plotted from the data obtained for the variable FLL (X_3). It was observed that the mode for the variable was 315.38 days while it ranged from 65 to 448 days. The shape of frequency curve is approximately normal. The values of mean, first four central moments and β_1 and β_2 are as follows:Mean=315.428, Variance =3186.782, μ_3=-179125.7 μ_4=70600910.00, β_1= 0.9914, β_2= 6.942



Here the mean of first lactation length comes out to be 315.428 days which is lower than values reported by Singh *et al.* (1995) and Pandey *et al* (1983) but higher than the values reporte by Deshmukh *et a.*(1995) . Using values of first four central moments, β_1 and β_2, the value of k for Pearson's type distribution was calculated (k= 0.00009934), which is approximately zero and β_1=0. Therefore, the probability distribution of X_1 variable is normal for which kolmogorov –Smirnov test for goodness of fit was applied in which the D statistic D_{cal} = 0.1116 is less than D_a value at 5% and level of significance.

(d) FCI (X_4):



The frequency curve is plotted from the data obtained for the variable FCI (X_4). It was observed that the mode for the variable was 401 days. The values of mean, first four central moments, and β_1 and β_2 are as follows:Mean= 419.25, Variance = 4850.35, μ_3= 2.24x10^4 μ_4=6.98x10^7, β_1= 21.397, β_2= 2.9703 Using values of first four central moments, β_1 and β_2, the value of k for Pearson's type distribution was calculated (k=-7.313x10^{-9}). Lies between -∞ and 0. Which indicates that the

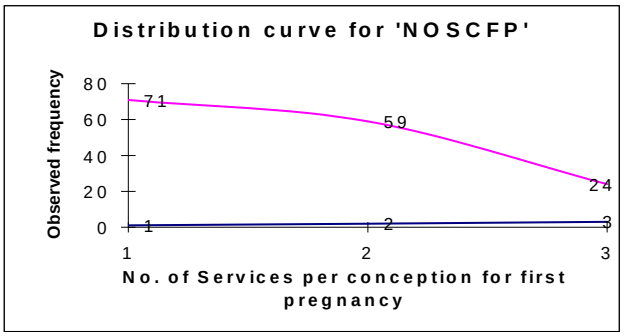
variable FCI follows Pearson's Type I distribution.
An attempt was made to fit Geometric Distribution for the discrete variables:

(e) Number of Services Per Conception for First Pregnancy (NOSCFP) (X_5):

From the frequency curve it was observed that the mode for the variable X_5 was 1 while it ranged from 1 to 3. The values of mean, first four central moments, and $\beta 1$, β_2,γ_1 & γ_2 are as follows:Mean= 1.694, Variance = 0.527, μ_3= 0.20275 , μ_4=0.56303, β_1= 1.385, β_2= 2.027 γ_1 = 1.1769, γ_2= -0.9728

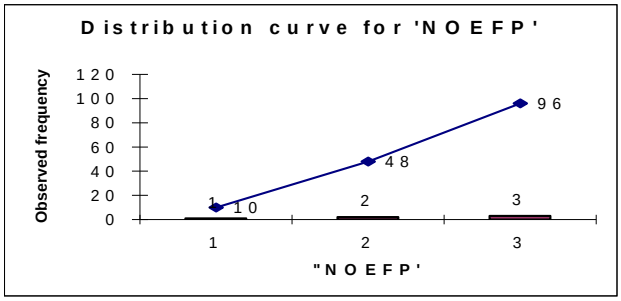
It is evident from the frequency table that maximum (46.1%) of cows became pregnant with first service , which is indicative of healthy reproductive system in heifers. On the basis of γ_1 & γ_2 values.

It was found that the distribution of 'Number of Services Per Conception for First Pregnancy' (NOSCFP) is positively skewed and Platykurtic.



(f) Number of Estrus Per Conception for First Pregnancy (NOECFP) (X_5):

From the frequency table it was observed that the mode of the variable 'Number of Estrus Per Conception for First Pregnancy' (NOECFP) (X_5) was 3 while the variable ranged from 1 to 3 The values of mean, first four central moments, and β_1, β_2, γ_1 & γ_2 are as follows:Mean= 2.6428, Variance = 0.25723, μ_3= 0.11569, μ_4=0.16183, β_1= 0.7864, β_2= 2.4458 γ_1 = 0.2804, γ_2= -0.5542 the data indicate that the maximum number (62.34%) of cows come in estrus for three times before conception. These data in light of information obtained from frequency table indicates that heifers are generally not breed on first two estruses but are bred on third estrus.



On the basis of g_1 & g_2 values, it was found that the distribution of 'Number of Estrus Per Conception for First Pregnancy' (NOECFP) is positively skewed and Platykurtic.

Summary and Conclusion:

Under the Continuous probability distributions of the production and reproduction traits of exotic crossbred dairy cows, The Normal fits to the traits namely 'age at first calving' and 'First lactation length'. Therefore the, statistical tests requiring the assumption of Normality can be applied for the statistical analysis of these traits to get valid information regarding dairy management. An attempt was also made to find the type of Pearson's family of distributions of the production and reproduction traits using first four central moments, coefficients of skewness and kurtosis. The type of probability distributions of traits 'First lactation milk yield' and 'First calving interval' are Pearson's type 'VII' and 'I' respectively. It is, therefore, suggested that for the statistical analysis of these traits of crossbreds belonging to Tarai region of Uttranchal and Uttar Pradesh only non-parametric test procedures (Siegel, 1956) can be applied.

Under the Discrete probability distributions of the production and reproduction traits of exotic crossbred dairy cows, It was found that the frequency distribution of the 'Number of Services Per Conception for First Pregnancy' and 'Number of Estrus Per Conception for First Pregnancy' are positively skewed and platykurtic.

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Understanding and prioritizing the problems in agriculture – A Case Study

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Abstract

A study was conducted through application of PRA techniques to assess the problems related to farming activities in a rural village of West Bengal. Results revealed that the low water availability to crops was the most severe problems stated by the farmers. The magnitudes values were calculated and value based index were determined to prioritize the most severe problem, which should be targeted for solving on priority. Screening and prioritization of field level options have been done with respect to four criteria as: crop productivity, water holding capacity, soil health and economic profit. It was found that 'soil & water conservation techniques' was the most feasible for the purpose of formulation of research strategies.

Introduction

Research stations/ development agencies are not generally geared to producing and implementing technologies applicable to very specific and quite different agro-climatic conditions (Crawford and Barclay, 1982). Non-involvement of farmers in problem identification has greatly contributed towards the inapplicability of most of the research and of the research findings. In this context, it is most essential to identify and sort out the problems belonging to different micro-farming situations/ production systems and then accordingly carries out the research and development works to solve the problems. If our research and development works are participatory and need-based, the adoption rate would be certainly satisfactory.

Furthermore, most of the research and extension programmes, if examined properly will be found not wholly relevant to farmers' needs (Cernea *et al.*, 1985). Classifying the problems and defining the needs of the farmers is an important step in progarmme planning. Participatory Rural Appraisal (PRA) offers a creative approach to lay the steps for visualizing the needs and problems of the rural farmers. PRA is a flexible, low-cost and time saving set or family of approaches and methods used to enable the rural people to collect and analyze information in terms of the past, present and future situations to understand about the rural people and the conditions existing in rural areas which would provide a thorough and comprehensive idea regarding problem, potential, resources and solutions to formulate realistic development programmes by the villagers themselves, and facilitated by PRA practitioners, feasible to achieve within a specific period of time by the villagers of a rural locality or to use the information and analyze by researchers to formulate need based research programmes to solve the problems of rural people (Sabarathnam, 1996). Identification of major problems in a representative technological zone is the first step in any research strategy (Kampen and Doherty, 1979).

Hence a study was conducted in a rural village (Islampur) at Birbhum district of West Bengal as a part of Field Experience Training of the author during 2002 to identify the problems related to agricultural activities and to help in emerging out the solutions and research strategies for the ill-fated problems faced by the rural masses.

Materials and Methods

The following specific steps were employed for quantification and prioritization of problems in agriculture:

1. Identification of Key Informants (KIs): Five (5) important persons were identified from the village as Key Informants (KIs) whom the average farmers in the village frequently contact for different purposes. They were asked individually to list out the problems faced by the farmers in agricultural activities.
2. Identification of the farmers: In continuation with these key informants another 30 farmers were selected for assessing the problems in agriculture activities through snowball sampling technique (Sabarathnam, 2002). They were asked to list out the problems actually they are facing and rank as per their economic importance.
3. Quantification of data: The problems based on the information obtained from the farmers were ranked, the data were quantified and the rank based quotient (RBQ) was calculated using the following formula:

$$RBQ = \frac{fi\,(n+1-i)}{N \times n} \times 100$$

Where,

fi = Frequency of respondents for the 'i' th rank problem; I = Particular rank; N = No. of respondents and n = No. of ranks

4. Calculation of Average yield loss percentage (AYLP): The damage/ losses due to each of the problem in ac-

tual field situation were estimated. Average yield loss percentage on each problem was calculated by taking the mean of the individual % loss perceived by each farmer respondent.

5. Assessment of magnitude of village problem: The magnitude of the problem associated with the village was estimated in terms of Village Magnitude Value (VMV) and Value Based Index (VBI) using the following formula:

VMV = RBQ × Average yield loss percentage (AYLP) × Area affected by the particular problem.

VBI = VMV × Total loss per annum due to particular problem

6. Problem-causal & solution tree: After identifying and ranking the problems, some of the farmers were interviewed again to get an idea about the possible causes of each of the problems. After discussing the identified problem at various levels and their possible causes the problem causal tree has been drawn for the most severe problem. Problem solution tree was also drawn by indicating the point of interventions in which area the research project can be formulated to mitigate the problem.

7. Screening & prioritizing field level options: After identifying the problems the next step is screening of options that examines the proposed solutions against the relative impact of each of them in terms of various criteria. Following steps have been used to prioritize options: i) Selected problem examined thoroughly for problem-causal analysis; identified intervention points, ii) Formulated research questions based on research hypotheses, iii) Identified research alternatives, iv) Generated criteria to evaluate options; checked relevancy and applicability of these criteria, found out indicators for these criteria measured by expertise and intuitions, and v) Evaluated options using analytical methods following Analytic Hierarchy Process (AHP) (Satty, 1980).

Results and Discussion

Background of the study area

Village Islampur comes under Bolpur sub-division of Birbhum district, situated nearly 7 km away from Tagore's Sriniketan. Soil is lateritic type with undulating topography. The average annual rainfall is about 892.1 mm, which is recorded mostly from South-West monsoon and spread over four months, i.e. from June to September. Very scanty rainfall or no rainfall is received during the other months, and dry spells occur during the summer months. The total geographical area of the village Islampur is 48.73 ha, out of which 36.02 ha. area is under cultivation and remaining 12.71 ha are being used for other purposes. Average land holding capacity of the village is 0.38 ha. and more than 95% of the villagers are engaged in agriculture.

The village has one river, eight ponds and one drainage channel. During *kharif* season, most of the farmers use the cultivated area for paddy cultivation (about 95% of total cultivated area of *kharif* season). In certain portion of highland where severe water scarcity prevails, people are cultivating black gram. In other parts of the year it remains dry. In *rabi* season, farmers used to provide supplemental irrigation to mustard, wheat, potato from the river or ponds. In the pre-*kharif* season, people are cultivating paddy, potato, and vegetables, adjacent to the riverbeds.

Problems identified by the respondents

All the farmers were not facing the same kind of problem and the severity of the problems also varied amongst the farmers as observed from differential ranking of the problems. Based on the rankings of the major problems faced by the farmers Rank Based Quotient (RBQ) value were calculated for all the ranks and presented in Table 1. The various problems identified and ranked revealed that 'low availability of water to crops' was the most severe problem in the area followed by 'non-availability of HYV seeds' and 'unremunerative price'.

Working out magnitude value of the village problem

To estimate the magnitude of the problems in agriculture, the village magnitude value (VMV) and value based index (VBI) were worked out to assess the severeness of the identified problems. Accordingly, preferential ranking (Theis and Grady, 1991) was done taking the highest value of VMV and VBI and presented in Table 1. It can be seen from the Table that on the basis of magnitude value 'low availability of water to crops' has scored the maximum in terms of RBQ (94.76%), VMV (90024.20) and VBI (21875880), hence it was spotted as the top most problem at the village.

Separation of researchable and non-researchable problems

Identified problems have been classified into two groups. Problems listed under first group can be addressed by different research options by research organizations. The other group consists of those problems that can be addressed through policy issues by government departments and developmental agencies. The list of problems under two groups are as follows:

Researchable problems

i. Low availability of water to crops
ii. Pests & disease incidence
iii. Pesticide inefficiency

Non-researchable problems

i. Non availability of HYV seeds
ii. Unremunerative price
iii. Lack of marketing facilities
iv. Non availability of credit

Preparing problem causal tree and problem

Based on the magnitude value, it was identified that 'low availability of water to crops' was the biggest

Table 1: Ranking of problems based on the magnitude of village problem

Sl. No	Problems	RBQ	Area affected (ha)	AYLP	VMV (%)	Total loss (Rs.,000)	VBI	Preferential Ranking
1	Low availability of water to crops	94.76	27.02	35.16	90024.20	243	21875880	I
2	Non availability of HYV seeds	73.63	23.55	21.92	38008.98	135	5131212.85	II
3	Pests & disease incidence	67.43	11.24	15.58	11808.29	95	1121787.33	IV
4	Unremunerative price	70.28	18.40	16.60	21466.32	73	1567041.59	III
5	Pesticide inefficiency	45.25	4.08	10.00	1846.20	32	59078.40	VII
6	Lack of marketing facilities	34.46	31.00	7.65	8172.19	31.5	257423.95	V
7	Non availability of credit	48.81	10.50	10.00	5125.05	25	128126.25	VI

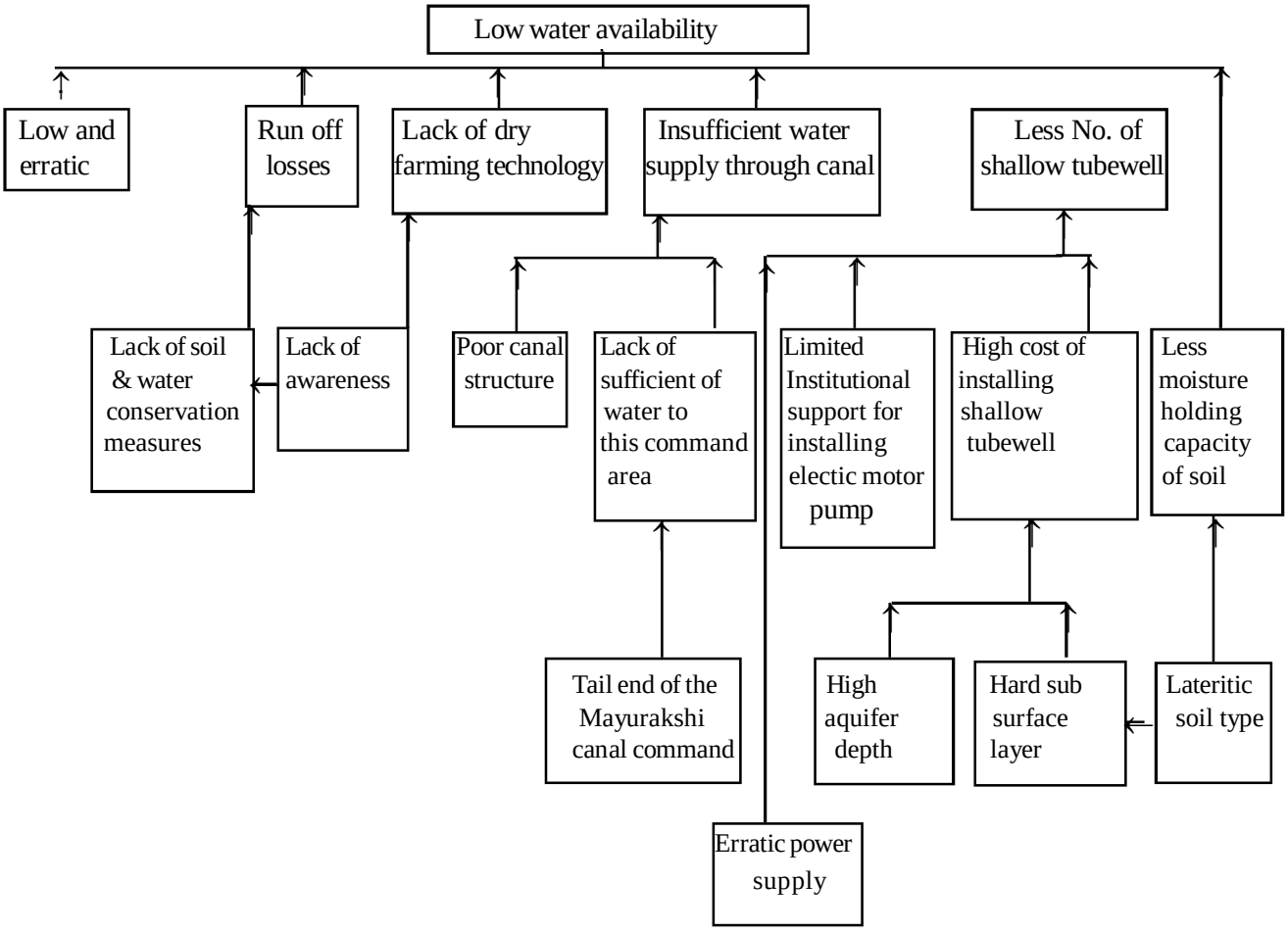


Fig. 1: Problem causal tree for 'low water availability to crops'

problem affecting the agriculture in Islampur village. After discussion with some prominent farmers the probable reasons of the said problem were identified. A problem causal tree (Fig. 1) was developed keeping in view the reasons cited by the farmers.

For each of the causes in the problem tree, interventions were given as shown in the problem solution tree (Fig. 2) by indicating the point of interventions in which area the research project can be formulated to mitigate the problem.

Prioritizing field level options

The Analytic Hierarchy Process (AHP), a multi-objective, multi-criteria decision making approach which employ a pair wise comparison procedure to arrive at a scale of preferences among a set of alternatives. It is necessary to break down a complex unstructured problem into the component parts into a hierarchic order. The goal, criteria, sub-criteria and options (projects) identified, judgements are made to compare all criteria in pairs with respect to goal and options (projects). Relative comparisons are based on the expertise and

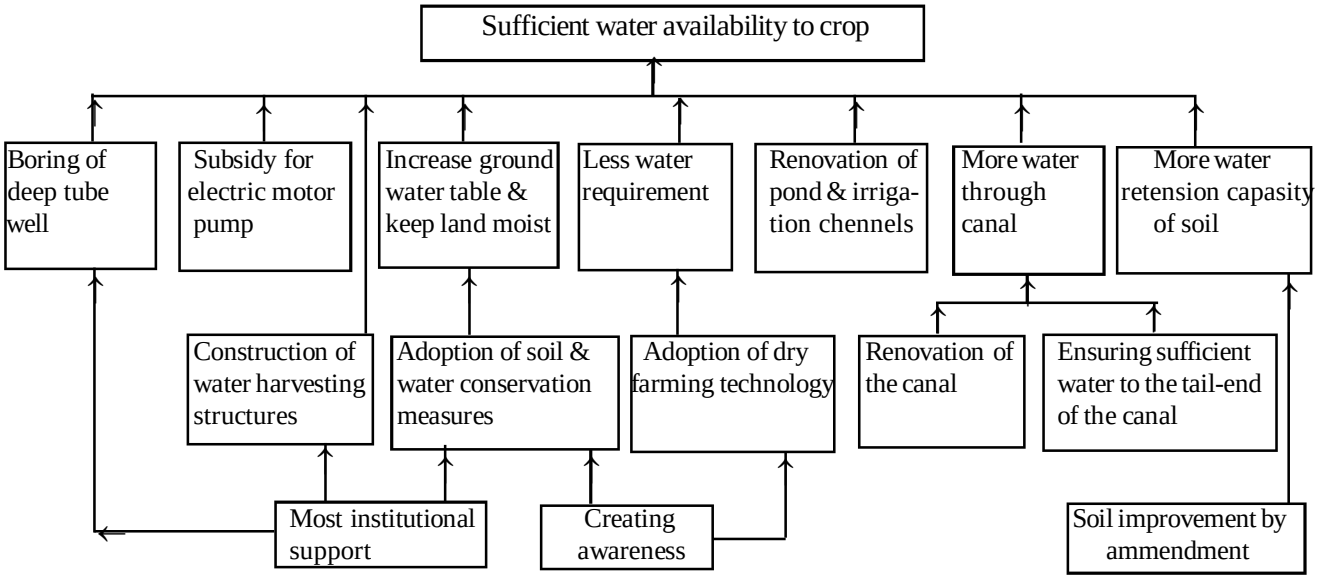
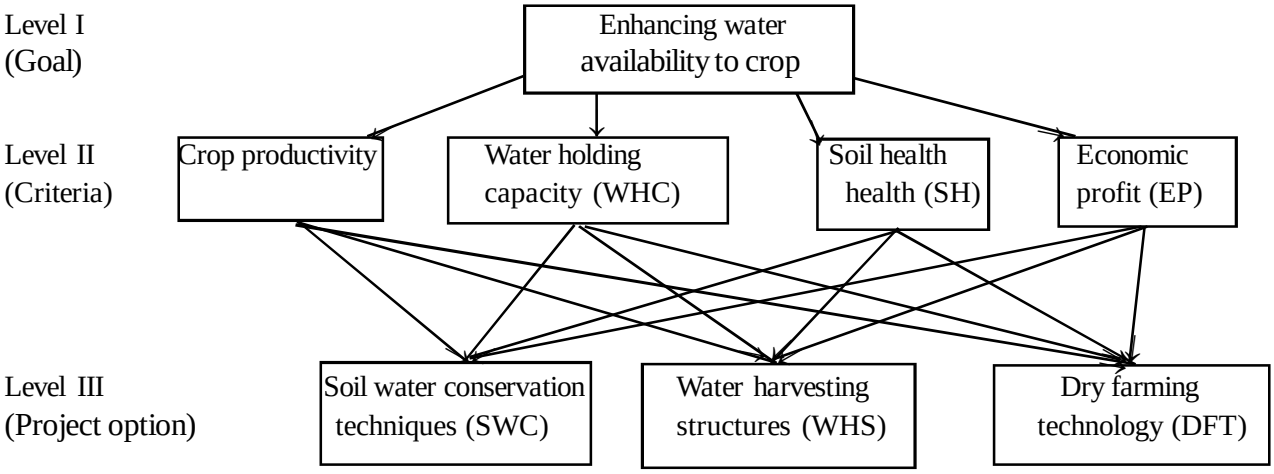


Fig. 2: Problem solution tree for low water availability to crop

Stem I: Decomposition of unstructured problem into hierachy level



intuitions. The following specific steps were employed for searching out the most feasible researchable option.

STEP II: Judgement matrix for pair wise comparison with respect to goal

	Prod	WHC	SH	EP	Eigen vector	Weight	Component of eigen value
Prod	1	2	3	2	1.861	0.416	1.751
WHC	1/2	1	3	2	1.316	0.294	1.312
SH	1/3	1/3	1	3	0.758	0.169	0.766
EP	1/2	1/2	1/3	1	0.537	0.120	0.531
				Total	4.472		4.360

Consistency index = 0.120
Consistency ratio = 0.133

STEP III: Judgement matrix for pair wise comparison with respect to criteria

1: Options with respect to Crop Productivity

	SWC	WHS	DFT	Eigen vector	Local priority	Component of Eigen value
SWC	1	3	2	1.817	0.528	1.609
WHS	1/3	1	1/3	0.480	0.139	0.425
DFT	1/2	3	1	1.144	0.332	1.013
	Total:			3.441		3.047

Consistency index=0.0235
Consistency ratio=0.0405

2: Options with respect to Water Holding Capacity

	SWC	WHS	DFT	Eigen vector	Local priority	Component of Eigen value
SWC	1	3	5	2.466	0.637	1.936
WHS	1/3	1	3	1.000	0.258	0.785
DFT	1/5	1/3	1	0.405	0.105	0.318
		Total:		3.871		3.039

Consistency index=0.0195
Consistency ratio=0.034

3: Options with respect to Soil Health

	SWC	WHS	DFT	Eigen vector	Local priority	Component of Eigen value
SWC	1	3	6	2.620	0.635	1.958
WHS	1/3	1	5	1.185	0.287	0.883
DFT	1/6	1/5	1	0.321	0.077	0.240
		Total:		4.126		3.081

Consistency index=0.0405
Consistency ratio=0.069

4: Options with respect to Economic Profit

	SWC	WHS	DFT	Eigen vector	Local priority	Component of Eigen value
SWC	1	3	3	2.080	0.584	1.832
WHS	1/3	1	1/3	0.481	0.135	0.423
DFT	1/3	3	1	1.000	0.281	0.881
		Total:		3.561		3.136

Consistency index=0.068
Consistency ratio=0.117

Step IV: Synthesis to obtain Global priority

Option (project)	Local priotities with respect to the criterion C_1(0.416)	C_1(0.416)	C_1(0.416)	C_1(0.416)	Global priority	Final ranking
SWC	0.528	0.637	0.584	0.635	0.5818	1
WHS	0.139	0.258	0.135	0.287	0.1909	3
DFT	0.332	0.105	0.281	0.077	0.2257	2

Thus, the project option "Soil Water Conservation Techniques" is most feasible and can be adopted for formulation of research project.

Conclusion

Though prioritization is essentially a centrally lead process but at field level prioritization of options for projects, the above-discussed procedure is best suited as it takes systems approach, ensuring the participation of key stakeholders. The issue regarding linkages between micro-level planning and broad based projects needs to be addressed at various levels. The major difficulty of priority setting comes from its forward-looking nature. Ex-ante evaluation is always tricky since there is substantial uncertainty involved.

On the basis of the above findings it can be concluded that the farmers of the village need help from local as well as state government departments, research organizations and other organizations to get rid of the curse of water scarcity and other related problems. Concerted and coherent approach needs to be adopted to chalk out the action plan for development of the area in integrated manner. Research projects can be taken up for mitigating the drought situation by carrying out investigation on various soil water conservation techniques. Training and exposure programmes can be organized on scientific farming practices and dry farming technologies. Existing ponds in the village needs to be renovated with scientific approaches so that runoff collected during monsoon might be useful for supplemental irrigation to the crops during lean season. Soil can be improved by amendments so that water holding capacity would be increased. Establishment of regulated market could help the farmers to get the inputs in time with reasonable price and to earn more remunerative price for their produce.

Acknowledgement

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Women entrepreneurs and their enterprises

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Abstract

The Government of India has defined women entrepreneurs based on women participation in equity and employment of a business. Accordingly, a woman entrepreneur is defined as "an enterprise owned and controlled by a woman having a minimum financial investment of 51 per cent of the capital and giving at least 51 per cent of the employment generated in the enterprises to women." The word enterprise is defined as a project or undertaking that is especially difficult, complicated or risky, readiness to engage in daring action, or take initiative, a unit of economic organization or activity especially; business organization and a systematic purposeful activity. In nutshell, women entrepreneurs are those women who think of an enterprise, initiate, organize and combine the factors of production, operate the various types of enterprises and undertake risks and handle economic uncertainty involved in running an enterprise. This paper presents findings on the types of enterprises those are being run, managed and operated by women. The analysis is based on primary and secondary data collected from one district of Agra division.

Introduction

The position and status of women in any society is an index of its civilization. In traditional societies, women were confined to the four walls of the house, performing only household activities. Our society is still male-dominated and women are not treated as equal partners both inside and out side of the four walls of the house. Women have been described as the embodiment of **'Shakti',** but in real life she is treated as abla i.e. weak and dependent on men. According to I.L.O report 1980, "Women are 50 per cent of the world's population, do two-third of the world's work hours, receive ten per cent of the world's income and own less than one per cent of the world's property. All because of an accident of birth. So in order to improve the status and position of women at home and in society at large, it is necessary to achieve economic independence for women. Women play a predominant role in our economy and there is a dire need to bring them into the main stream of economic development, in general, and industrial development in particular. However women are trying their level best to attain quality of opportunity in various ways, which are different over the time and among societies, they have steadily moved from the status of housewives to educated women, employed women and now women entrepreneurs. Entrepreneurship is a crucial factor in bringing about the socio- economic changes which envisages new opportunities, new techniques, new lines of productions and also co-ordinates various other activities. Entrepreneur is a person who is achievement oriented, self -confident, take initiative, is an opportunity seeker, information seeker, leader, goal setter, moderate risk taker, systematic planner, persuasive and problem solver, etc. On the basis of the above attributes, woman adopts one or more enterprises, which are suitable according to her entrepreneurial abilities.

Methodology

Agra division was selected as the locale for the present study by using purposive sampling.

Agra division comprises seven districts, out of which Agra district was selected randomly for the present study.

For the purpose of administration, Agra district is divided into two areas; Agra urban and Agra rural. Agra urban was selected randomly for the present study. According to the requirements and to have balanced distribution of the respondents, the investigator divided Agra City into four zones; North-East Zone, North-west Zone; South-East Zone and South- West Zone. Primary data were collected through survey method. Secondary data such as list of entrepreneurs were collected from concerned centers such as District Industry Center, Central Excise and Custom Department and Small Industrial service Institute (SISI) Agra in the year of 2002-2005. Apart from this, data regarding entrepreneurs were collected through word of mouth. The data procured from all the sources was categorized zone-wise. Based on the nature of data and relevant information, percentage was used as a statistical measure in the present study.

Data finding and analysis

Types of enterprises women venture in to in Agra Division

The women entrepreneurs of Agra division were explored to find out the types of enterprises they have taken up.

Table 1:Distribution of women entrepreneurs according to their enterprises

S.No.	Types of Enterprises	Entrepreneurs Frequency	Percentage
1	Beauty Parlour	154	30.4
2	Boutique	146	28.9
3	Handicraft (Decorative Items)	78	15.4
4	Readymade Garments	38	7.5
5	Leather Center	22	4.3
6	Computer Center	10	2.0
7	Deep-well Pumps	10	2.0
8	Tour-Operators	7	1.4
9	Photostat	7	1.4
10	Provisional Store	6	1.1
11	Dry Cleaning	5	1.0
12	Advertising Agency	5	1.0
13	Stationary Dealing	3	0.6
14	Property Dealing	3	0.6
15	Chemical Industries	2	0.4
16	Iron Works	2	0.4
17	Restaurants	2	0.4
18	T.V., Fridge, Shop	1	0.2
19	S.T.D.	1	0.2
20	Electric Decoration	1	0.2
21	Decorated Glassware	1	0.2
22	Printing Press	1	0.2
23	Marriage Hall	1	0.2
	Total	506	100.0

·Types of enterprises have been given in descending order according to the percentages.

Table 1. Clearly indicates the types of enterprise in which women were involved in Agra Division between 2002 – 2005. It was observed that most (30.4 per cent) of the women entrepreneurs had set up their beauty parlours, followed by boutiques (28.9 per cent), handicraft/ decorative items (15.4 per cent) and readymade garments shop by 7.5 per cent.

The reason for venturing into these enterprises was that the women are more and also possess required skills. So to make maximum use of their leisure times and to use their skills in the proper direction, along with it provision of employment, the women ventured into the above mentioned enterprises.

As observed from the above table, most of women entrepreneurs had set-up boutiques and beauty parlours. Further women entrepreneurs stated that women from Indian communities preferred to go such centers, which were being run by women. They felt comfort to give their measurements and to take beauty treatment from same gender instead of men.

Similar findings have been reported in some of earlier studies also. For example Jothi and Prasad (1993), Srivastava (1994) and Sharma et. al (2003) observed that women as entrepreneurs were engaged in various conventional enterprises such as tailoring, flour mills, readymade garments, Xerox units, stationary items, leather & leather goods, rubber and plastic products, processed foods/fruits/vegetables, wooden/steel furniture, electric appliances, sports goods, metal and engineering fabrication, dyeing and intermediaries, paint and varnish, chemicals and pharmaceutical, pickle/ chutney/murabbas making/dairy farming/embroidery/ crocheting, soap/detergent making ,making of decorative utility articles, papad/waria making and poultry farming etc. according to their capability and feasibility.

Table 2 depicts zone-wise distribution of types of enterprises in which women were engaged in Agra district between 2002-2005.

The enterprises run by different entrepreneurs in all four zones are beauty parlours (30.4per cent), boutiques (28.9per cent), decorative items/handicraft (15.4 per cent) and readymade garments (7.5 per cent).

It was seen that majority (32 per cent) of the entrepreneurs running their enterprises were found in south-east zone followed by twenty-six per cent entrepreneurs

in north-east zone.

In the north-east zone 33 per cent entrepreneurs had taken-up beauty parlours as their enterprises and 35.6 per cent had started their boutiques in north-west zone. In south-east zone, 42.3 per cent and fifty per cent entrepreneurs involved in making decorative items (Handicraft) and running readymade garments shop respectively.

As wholesome enterprises such as beauty parlours, boutiques, handicraft (decorative items) and readymade garments shops were found more rather than other enterprises in all four zones.

Reasons can be observed due to the changes in socio-economic status of the people residing in different zones of Agra district.

People who are residing in the North-East Zone are those who fled for shelter from Bangladesh to India at the time of partition. As they had left everything behind and they had to start from scrap and it has taken time to improve their status. So the people residing are not of very high status. They are just satisfying the demands of the locality in which their enterprise is located.

The people in the North-west zone belonged to higher socio-economic status. The women who were running their enterprise are those whose husbands were working in same or related line. So they did not have to do any extra efforts. They had started their enterprise only as hobby, as means, provision for additional pocket

Table 2 : Zone-wise Distribution of Enterprises Taken-up In Agra District.

S.No.	Types of Enterprises	Number of Entrepreneurs				Total
		South-West	South-East	North-West	North-East	
1	Beauty Parlour	27 (17.5)	40 (25.9)	36 (23.4)	51 (33.1)	154 (30.4)
2	Boutique	24 (16.4)	36 (24.7)	52 (35.6)	34 (23.3)	146 (28.9)
3	Handicraft (Decorative Items)	11 (14.1)	33 (42.3)	9 (11.5)	25 (32.1)	78 (15.4)
4	Readymade Garments	5 (13.2)	19 (50)	6 (15.8)	8 (21.1)	38 (7.5)
5	Leather Center	2 (9.1)	11 (50)	5 (22.7)	4 (18.2)	22 (4.3)
6	Computer Center	4 (40)	1 (10)	3 (30)	2 (20)	10 (2.0)
7	Deep-well Pumps	5 (50)	1 (10)	1 (10)	3 (30)	10 (2.0)
8	Tour-Operators	–	5 (71.4)	1 (14.3)	1 (14.3)	7 (1.4)
9	Photostat	–	2 (28.6)	4 (57.1)	1 (14.3)	7 (1.4)
10	Provisional Store	1 (16.7)	3 (50)	1 (16.7)	1 (16.7)	6 (1.1)
11	Dry Cleaning	1 (20)	2 (40)	1(20)	1 (20)	5 (1.0)
12	Advertising Agency	–	3 (60)	1(20)	1 (20)	5 (1.0)
13	Stationary Dealing	2 (66.7)	–	1 (33.3)	–	3 (0.6)
14	Property Dealing	–	–	1 (33.3)	2 (66.7)	3 (0.6)
15	Chemical Industries	1 (50)	1 (50)	–	–	2 (0.4)
16	Iron Works	1(50)	–	1 (50)	–	2 (0.4)
17	Restaurants	–	1 (50)	1 (50)	–	2 (0.4)
18	T.V., Fridge, Shop	–	–	1 (100)	–	1 (0.2)
19	S.T.D.	–	–	1 (100)	–	1 (0.2)
20	Electric Decoration	–	1 (100)	–	–	1 (0.2)
21	Decorated Glassware	–	1 (100)	–	–	1 (0.2)
22	Printing Press	–	1 (100)	–	–	1 (0.2)
23	Marriage Hall	–	1 (100)	–	–	1 (0.2)
	Total	84 (16.6)	162 (32.0)	126 (24.9)	134 (26.5)	506 (100)

money and as a means of socialization along with they were providing employment to others. The set-up of their enterprise was according to the high status of the customers visiting them.

The South -East zone is the hub of the tourists because all historical places and monuments are placed in this zone. This is also known as old Agra. Women in this area are running those enterprises, which cater to the needs of the tourists. Enterprises in this area included those enterprises, which were preparing and selling decorative traditional items which the tourists could carry home. They running boutiques and preparing types of dresses worn by the foreigner but having an Indian touch in material and designing, There outlete termed as Readymade garments shops. Where in the background the women were designing and preparing these article themselves.

Conclusion

As all of us know that every coin has two sides; head and tail. This is same in case of women. Women have always been spoken as weak and dependent. Seeing to above results it is not so. She is self-confident, self-reliant and an independent women. Analysis reveals that women prefer small enterprises such as beauty parlour, boutiques, preparation of decorative items and readymade garments' shop. These enterprises are less risk - oriented enterprises, which do not require huge capital amount to start, run, maintain and to sustain enterprises. It was found during the survey and by discussing with entrepreneurs that in the beginning they were hesitant to set -up their enterprise. They may or may not be successful .So they started their enterprises at home. After achieving success, which was motivation of them, they shifted their enterprises to central place where they could attract more customers. The setting of their enterprise has helped to improve their financial and social status as well as it has made them more independent, self- reliant and self - confident.

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Effect of various factors on the physical characteristics of yoghurt

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Abstract

Yoghurt samples were prepared from cow and buffalo milks using 3 levels of fat (4%, 5%, and 6%), 3 levels of SNF (10%, 11% and 12%), inoculate with starter culture having Streptococcus thermophilus (S) and Lactobacillus bulgaricus (L) bacteria in five ratios (1:1, 1:2, 1:3, 2:1 and 3:1) and incubated at 39^0 and 42^0 c temperature. The Yoghhurt samples thus prepared were analysed for their physical attributes. The best quality of yoghurt was achieved prepared with buffalo milk having overall score of 74.64 as compared to cow milk where the overall score was 73.84.The quality of yoghurt prepared from the milk having 6% fat and 12% SNF proved to be the best. The starter culture having a ratio of 1:3 (S & L) and incubation of 42 ^{0}C were recorded to be optimum for better quality yoghurt.

Introduction:

The word "Yoghurt" derived from the Turkish word '*Jughurt*'. It is a traditional food and beverage among Balkans of the Middle East. However, its popularity has now spread to Europe and many other parts of the world and its consumption has increased significantly during the past three decades. Yoghurt is a western fermented milk product, originated in Western Europe. It is similar to dahi prepared in our country. Now a day's yoghurt is gaining popularity in our country because it has higher concentration of anti cholesteremic milk factor than unfermented milk and has sharp characteristics of flavour and smooth texture also. The quality of product always depends on the quality of raw milk and culture used for its preparation. The quality of milk depends on the level of fat, SNF and extent of heat treatment.

Materials and Methods:

Cow and buffalo milks were standardized with three levels of fat viz., 4% (F_1), 5% (F_2), & 6 % (F_3) and SNF viz., 10% (S_1), 11% (S_2) & 12% (S_3). All the standardized milk samples were treated with *S. thermophilus* (S) and *L. bulgaricus* (L) in five levels of starter culture viz., Set_1 (SL1:1), Set_2(SL1:2), Set_3(SL1:3), Set_4(SL2:1) & Set_5(SL3:1) and incubated at 39 ^{0}C (T_1) and 42 ^{0}C (T_2) temperature, separately for the preparation of yoghurt. Yoghurt samples of each treatment were judged by a panel of three judges to find out the effect of above factors on physical attributes (flavour, body & texture, acidity, score and colour & appearance) of yoghurt. For physical parameters determination of yoghurt samples a scorecard developed by Nelson and Trout (1964) was taken into consideration.

Results and Discussion:

The flavour, body & texture, acidity, colour and appearance of cow milk yoghurt were 35.50, 24.50, 10.50 and 3.34 respectively and the respective values for buffalo milk yoghurt were 35.10, 24.10, 10.90 and 3.54 respectively (Table 1). The flavour score (35.50) of cow milk yoghurt was significantly ($P < 0.01$) higher than the flavour score (35.10) of buffalo milk yoghurt. Whereas the body & texture, acidity and colour & appearance score of buffalo milk yoghurt was significantly ($P < 0.01$) higher than the cow milk yoghurt. The overall score (74.64) of buffalo milk yoghurt was higher than the overall score (73.84) of cow milk yoghurt.

The flavour score of yoghurt increased significantly ($P < 0.01$) from 32.60 to 38.90 when temperature was increased from 39 ^{0}C to 42 ^{0}C. Similarly, body & texture increased from 23.90 to 24.10, acidity from 10.90 to 11.10 and colour & appearance from 3.40 to 3.55 when temperature was increased from 39 ^{0}C to 42 ^{0}C. The overall acceptability score was higher for yoghurt prepared at higher temperature than overall acceptability score of yoghurt prepared at lower temperature. Similarly, Dolejalek and Vokacova (1981) obtained the best quality yoghurt when the milk sample was incubated at 42^{0}C as compared to yoghurt prepared at lower temperature. This result is directly corroborated with the findings obtained in the present study.

The flavour score was significantly ($P < 0.01$), higher in yoghurt from cow milk as compared to the value observed in buffalo milk yoghurt at both incubation temperature. The best flavour was observed in cow milk yoghurt prepared at 42^0 C.

The flavour and body & texture scores of yoghurt samples prepared at both the temperatures increased ($P < 0.01$) with increasing concentration of fat in the milk. The maximum flavour and body & texture score were obtained in the samples prepared at 42^0 C in association with 6% fat in milk. The best flavour score have also been reported by Gono *et al.* (1988) in cow

Table 1: Score card of physical parameters of different yoghurt samples.

Factors		Physical attributes			
		Flavour	Body & texture	Acidity (score)	Colour & appearance
Sources of milk	Cow milk	35.50	24.80	10.50	3.34
	Buffalo milk	35.10	25.10	10.90	3.54
Temperature	39 ^{0}C	32.60	23.90	10.70	3.40
	42 ^{0}C	38.90	24.10	11.10	3.55
Fat	4 %	34.50	23.80	10.90	3.35
	5 %	36.10	24.50	11.10	3.80
	6 %	37.90	24.80	11.20	3.85
SNF	10 %	34.90	22.90	10.90	3.55
	11 %	36.10	24.10	11.10	3.70
	12 %	36.80	26.90	11.50	3.90
Starter culture	Set_1(SL1:1)	35.90	23.70	11.20	3.58
	Set_2(SL1:2)	36.70	24.10	11.35	3.56
	Set_3(SL1:3)	38.85	25.20	11.90	3.58
	Set_4(SL2:1)	34.80	24.90	10.10	3.60
	Set_5(SL3:1)	33.10	24.30	9.80	3.65

milk yoghurt prepared at 42 ^{0}C as compared to the samples obtained at 48 ^{0}C or 54^0 C.

Table 1.1: Critical differences for physical attributes affected by different factors

Factors	Physical attributes	CD	
		5 %	1 %
Sources of milk	Flavour	0.08	0.11
	Body & texture	0.07	0.10
	Acidity (score)	0.04	0.04
	Colour & appearance	0.03	0.03
Temperature	Flavour	0.08	0.11
	Body & texture	0.07	0.10
	Acidity (score)	0.04	0.04
	Colour & appearance	0.03	0.03
Fat	Flavour	0.12	0.16
	Body & texture	0.11	0.12
	Acidity (score)	0.06	0.07
	Colour & appearance	0.05	0.05
SNF	Flavour	0.12	0.16
	Body & texture	0.10	0.13
	Acidity (score)	0.06	0.08
	Colour & appearance	0.05	0.07
Starter culture	Flavour	0.15	0.18
	Body & texture	0.12	0.18
	Acidity (score)	0.09	0.11
	Colour & appearance	Not significant	

The flavour, body & texture quality of yoghurt significantly ($P < 0.01$) improved as the SNF content increased in the milk, irrespective of starter culture used. The maximum flavour and body & texture score was observed when the sample was prepared with the 12% SNF and 6% fat.

The flavour score increased significantly ($P < 0.01$) as the concentration of lactobacilli increased in the milk, but the values abruptly declined ($P < 0.01$) even from the normal (SL1:1) when the levels of streptococci increased in the culture.

The respective average scores of flavour, body & texture, acidity and colour & appearance were 34.50, 23.80, 10.90 and 3.35 in the samples prepared with 4.0% fat; 36.10, 24.50, 11.10 and 3.80 in the samples prepared with 5% fat and 37.90, 24.80, 11.20 and 3.85 in the samples prepared from milk containing 6.0% fat.

Flavour and textural quality of yoghurt improved significantly ($P < 0.01$) as the concentration of lactobacilli and fat increased in the milk whereas, the values dropped significantly ($P < 0.01$) as the proportions of streptococci increased in the culture.

The average score of flavour, body & texture, acidity and colour & appearance were 34.90, 22.90, 10.90 and 3.55 in yoghurt prepared from milk containing 10% SNF 36.10, 24.10, 11.10 and 3.70 in the sample prepared with 11.0% SNF in milk and 36.80, 26.90, 11.50 and 3.90 in the samples prepared with 12.0% SNF in milk. All the physical attributes increased significantly ($P < 0.01$) as the concentration of SNF increases in the milk. Yoghurt prepared from milk containing 12.0% SNF proved to be the best in respect of flavour, body & texture, acidity and colour & appearance of yoghurt.

All the physical attributes, except colour & appearance of yoghurt, significantly ($P<0.01$) increased as the levels of lactobacilli increased in the milk, but the same was not true when the proportions of S.

thermophilus enhanced in the culture. The values of these physical attributes decreased significantly ($P<0.01$) as the levels of streptococci increased in the culture and vice-versa. With increasing the levels of lactobacilli in M_1 & M_2, the flavour score of yoghurt also increased significantly ($P<0.01$). This trend reversed when the levels of streptococci was enhanced in the culture.

The flavour & texture quality of yoghurt prepared from cow and buffalo milk at 39 ^{0}C and 42 ^{0}C improved significantly ($P < 0.01$) as the concentration of SNF increased in the milk. The flavour score of yoghurt enhanced ($P < 0.01$) with increasing the concentration of lactobacilli, irrespective of temperature and type of milk used.

The flavour, body & texture, colour & appearance and acidity of yoghurt apparently increased with increasing levels of temperature, fat and SNF. The flavour score of yoghurt increased significantly ($P < 0.01$) as fat content and lactobacilli increased in the milk, irrespective of culture and temperature used. But, the flavour quality of yoghurt reduced significantly ($P < 0.01$) as the proportions of streptococci increased in the culture. The body & texture quality of yoghurt, prepared from cow and buffalo milk increased with increasing levels of SNF in milk, irrespective of the starter culture used.

The flavour score of cow and buffalo milk yoghurt prepared at both temperatures increased significantly ($P < 0.01$) with increase in the concentration of fat in milk, irrespective of starter culture used. The interaction effect of temperature, sources of milk, fat and starter culture on body & texture, acidity and colour & appearance of yoghurt were statistically not significant.

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Information source utilization pattern of farmers in respect to fertilizer use in paddy production

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Abstract

The study was conducted in Milkipur block of Faizabad district selected purposively on 100 respondents selected through proportionate random sampling technique on the basis of holding size possessed by the paddy growers. The respondents were contacted personally for data collection. The results of the study depicted that the maximum percentage of respondents were found in age group 37-62 years (60%), literate (73%) and belonged to backward caste (38%). Maximum joint families were observed having 5 to 12 members (55%) in their families. The land holding below 1 ha was observed with maximum farmers (68%). The maximum i.e. *38% and 37% respondents residing in pucca and mixed type houses, respectively and the agriculture was observed dominant as main occupation with 61%. The maximum (36%) respondents were found participated in one organization, while 33 per cent did not take participation at all in any organization. The maximum (42%) respondents were found earning the annual income of Rs. 20001 to 40000 and majority of respondents (67%) were observed in medium category (7 to 31 scores) of materials possession. The radio was main communication media (64%) with the paddy growers. Maximum respondents were found in medium levels of scientific orientation, economic motivation, risk orientation and value orientations with 53%, 44%, 72% and 51%, respectively.*

The fertilizers/seed stores under formal sources, family member under informal sources and radio under mass media were found most important source of information. The variables i.e. *age, family type, family size, occupation, scientific orientation and economic motivation had no influence on the information source utilization pattern of farmers in respect fertilizer use, while the variables like education, caste, holding size, social participation, income, overall material possession, communication media possession and risk orientation had direct influence on the information source utilization pattern of the farmers.*

Introduction

Today a number of communication media and channels are used for dissemination of improved agricultural informations and technologies to the farmers. While, communicating information through different media, it is necessary to take into account the preference of the farmers for a particular information medium. The farmers may come cross a number of information sources but they pursue only a few of them. The information sources credibility is decided by the degree of trust worthiness accorded to a source or communicator by the audience at a given point of time. Motion picture films, exhibition, newspaper releases, agriculture books, success stories of the farmers meetings, conference, radio broadcast, T.V. telecast and research releases from the agricultural research stations etc, are good source of information. Some time in the private industries of agriculture inputs are also a good source of information for farming sector. An effort in this direction has been made to study the information source utilization pattern of farmers in respect to fertilizer use in paddy production with following objectives:

i) To study the socio-economic profile of the respondents.
ii) To study the information sources utilization pattern of the respondents.
iii) To see the correlationship of independent variables with information source utilization pattern of farmers in respect to fertilizers use.

Methodology

The study was conducted in Milkipur block of district Faizabad selected purposively. A total of 100 respondents was selected through proportionate random sampling technique on the basis of holding size possessed by the paddy growers. The semi structured schedule was developed keeping in view the objectives and variables to be studied. The respondents were contacted personally for data collection. The analysis of data was done with the use of correlation coefficient to see the correlationship of independent variables with information

source utilization pattern of farmers in respect to fertilizer use and percentage, mean and standard deviation was also used for drawing the inferences.

Results and Discussion

Socio economic profile of the respondents:

Table-1A indicates that majority of the respondents (60 %) falls in the age category of 37-62 years of age followed by 21 % in 63 and above 19 % in upto 36 years of age category respectively. Thus, it may be stated that the maximum respondents were found in the age category of 37-62 years of age.

The Table-1B reveals that the literacy percentage of respondents was observed to be 73 per cent and remaining 27 per cent respondents were found illiterate. Further, the educational standard of literate respondents in descending order were found as 24.0%, 16%, 12%, 9%, 4%, 4%, 3 % and 1% to the levels of primary, junior, high school, intermediate, can sign, undergraduate, postgraduate and above and can read and write, respectively. It may be said that the literacy percentage is quite good.

The Table-1C indicates that the maximum 38 % respondents belonged to backward caste followed by general caste (36 %) and scheduled caste (26 %), respectively. It may be said that the backward caste and general caste, both are dominating castes at approximately equal levels.

The Table-1D indicates that 55 per cent respondents engaged in paddy cultivation were observed residing in single family system. Remaining 45 per cent respondents were observed in joint family system. Hence, it shows that single family system is dominantly prevailing in the study area.

It is evident from the Table-1E, that 59 per cent respondents families were observed such who had 5 to 12 members followed by 23 per cent families upto 4 members and 18 per cent respondents families were found having 13 and above members in their families. The average size of family was observed to be 8.74 members. The range between minimum and maximum number of family members was recorded from 2 to 24. The average number of family members might be due to dominantly of single family system in the area.

The Table-1F indicates that the maximum (68 %) respondents were found in the land holding category *i.e.* marginal farmers (below 1.0 ha) followed by 18 per cent in the category of small farmers (1.0 to 2.0 ha), 9 per cent in medium category (2.0 to 3.0 ha) and 5 per cent in large category (3.0 ha and above) of farmers, respectively. The average land holding of the respondents was found to be 0.977 ha. Hence, it may be concluded that mostly land holding has become marginalized in the study area.

It is apparent from the data given in Table 1G that 38 per cent respondents were found having their houses of pucca type, followed by 37 per cent, 23 per cent and 2 per cent were residing in mixed, kuccha and hut type of houses respectively. It may be concluded that the maximum respondents residing in pucca (38 %) and mixed (37 %) type of houses have their standard of living better.

It is clear form the Table-1H that in case of occupation, the agriculture was found as main occupation of majority of the farmers (61 per cent) followed by agriculture labour (16 per cent), service (15 per cent), business (4 per cent), caste based occupation (3 per cent) and agro-based enterprises (1 per cent) respectively. Thus, it may be concluded that the agriculture is dominant occupation of the respondents in the study area. Almost similar finding was observed by Yadav (2006).

A cursory glance over the data depicted in the Table-1I indicates that out of 100 respondents, 33 per cent did not take participation at all in any organization, while 36 per cent respondents participated in one organization, 21 per cent in two organizations and 10 per cents in more than two organizations, respectively. Thus, it may be stated that social participation of the respondents was considerably good.

It is obvious form the Table-1J that 42 per cent respondents were form those families whose annual income was found in the category of (Rs. 20001-40000) followed by other categories *viz.*, 20 per cent (Rs. upto 20000), 16 per cent (Rs 40,000 to 60000), 11 per cent (Rs. 80001 to 100000) 6 per cent (Rs 60001 to 80000) and 5% above to 100000. Thus, it may be conducted that the economic condition of the farmers was found considerable good almost similar finding was observed by Singh (2006).

The over all material possession was categorized into three main categories on the basis of scores as low (up to 6), medium (7 to 31) and high (32 and above). The data given in Table-1K revealed that highest number of respondents (67 %) were observed in the medium category (7 to 31 scores) of materials possession followed by high (22 %) and low (11 %) (32 and above) and (up to 6) categories, respectively. Thus, it can be concluded that the materials possession of respondents was appreciably better. The mean of scores for materials possession was observed to be 18.93 with a minimum 4 and maximum 57 scores. Hence it can be said that over all materials possession of the respondents were considerable very good.

It is clear from the Table1L that 5.3 per cent of the respondents were found having medium level followed by low (34 %) and high (13 %) levels of scientific orientation respectively. The mean of scores

for scientific orientation was observed to be 24.39 with a range of minimum 20 and maximum 28. Hence, it can be inferred that most of respondents (53 %) had medium level of scientific orientation.

Table 1: Socio economic profile of the farmers.

S. No. Categories	Respondents (%)
A. Age (year)	
1. Up to 36 years	19.00
2. 37-62 years	60.00
3. 63 and above	21.00
Mean = 49.63, S.D. = 13.61, Mini = 20, Maxi = 75	
B. Educational level	
a. Illiterate	27.00
b. Literate	73.00
1. Can sign	04.00
2. Can read and write	01.00
3. Primary	24.00
4. Junior	16.00
5. High school	12.00
6. Intermediate	09.00
7. Undergraduate	04.00
8. Postgraduate & above	03.00
C. Caste composition	
1. General caste	36.00
2. Back ward caste	38.00
3. Scheduled caste	26.00
D. Family type	
1. Single	55.00
2. Joint	45.00
E. Family size	
1. Up to 4 members	23.00
2. 5 to 12 members	59.00
3. 13 and above members	18.00
Mean = 8.74, S.D. = 4.25, Min. = 2 Max. = 24	
F. Land holding	
1. Marginal (below 1.0 ha)	68.00
2. Small (1.0 to 2.0 ha)	18.00
3. Medium (2.0 to 3.0 ha)	9.00
4. Large (3.0 ha and above)	5.00
Mean = 0.977, Min. = 0.10 Max. = 7.50	
G. Housing pattern	
1. Hut	02.00
2. Kuccha	23.00
3. Mixed	37.00
4. Pucca	38.00
H. Occupation	
1. Agril. labour	16.00
2. Agriculture	61.00
3. Service	15.00
4. Cast based occupation	3.00
5. Business	4.00
6. Agro-based enterprises	1.00
I. Social participation	
1. No participants	33.00
2. Member of one organization	36.00
3. Member of two organizations	21.00
4. Member of more than two organizations	10.00
J. Annual income of the family	
1. Upto 20,000	20.00
2. 20,001 to 40,000	42.00
3. 40,001 to 60,000	16.00
4. 60,001 to 80,000	6.00
5. 80,001 to 1,00,000	11.00
6. Above to 1,00,000	5.00
Mean = 45100, Min = 14000 Max = 200000	
K. Material possession	
1. Low (up to 6)	11.00
2. Medium (7 to 31)	67.00
3. High (32 and above)	22.00
Mean = 18.93, S.D. = 12.92 Min. = 4, Max = 57	
L. Scientific orientation	
1. Low (up to 23)	34.00
2. Medium (24 and 26)	53.00
3. High (27 and above)	13.00
Mean = 24.39, S.D. = 1.847, Range Min = 20, Max. = 28	
M. Economic motivation	
1. Low (up to 21)	21.00
2. Medium (22 and 23)	44.00
3. High (24 and above)	25.00
Mean = 22.57, S.D. = 1.603, Range- Min.-19, Max.- 27	
N. Risk orientation	
1. Low (upto 22)	14.00
2. Medium (23-26)	72.00
3. High (26 and above)	14.00
Mean= 23.99, S.D. = 1.586, Min. – 19, Max.- 27	
O. Value orientations	
1. Low (upto 35)	25.00
2. Medium (36-39)	51.00
3. High (40 and above)	24.00
Mean= 37.32, S.D. = 2.817, Min. – 30, Max.- 43	

It is clear from the Table-1M that the maximum number of respondents (44%) were found having medium level of economic motivation, 25 per cent and 21 per cent respondents were such who had high level and low level of economic motivation, respectively. The average mean of scores for economic motivation was observed to be 22.57 with a range of minimum 19 and maximum 27. Hence, it can be concluded that most of the respondents were having medium level of economic motivation. It can be said that the economic motivation of the respondents was found considerable good. Almost similar finding was observed by Mishra (2005).

It is apparent from Table-1N that 72 per cent of the respondents were found having medium level followed by 14% and 14% who had low and high levels of risk orientation, respectively. The mean of scores for risk orientation was observed to be 23.99 with a range

of minimum 19 and maximum 27. Hence, it can be concluded that the respondents have good interest to bear the risk to improved farm practices.

It could be seen from the Table-1O that the maximum 51 per cent respondents had medium level of value orientations while 25 per cent and 24 per cent respondents were found in the categories of low and high levels of value orientations respectively. The average of scores was observed to be 37.32. It can be said that much variation was not observed in the percentage of respondent having low and high levels of value orientations.

· Information source utilization pattern:

Table 2: Extent contact of the respondents with different information sources.

S. No. Sources	Mean score Value	Rank order
A. Formal sources		
1. B.D.O.	0.38	V
2. S.D.A.E.Os.	0.00	X
3. A.D.O.s	0.35	VI
4. V.D.O.s	0.98	III
5. Kishan Sahayak	0.75	IV
6. Cooperative societety	1.28	II
7. Agril. college	0.17	VIII
8. Mandi Samiti	0.29	VII
9. Fertilizer/seed stores	2.47	I
10.Agril scientists	0.10	IX
Average	0.67	
B. Informal sources		
1. Family members	5.86	I
2. Neighbours	5.80	II
3. Friends	2.56	IV
4. Relatives	1.92	V
5. Local leaders	3.02	III
Average	3.832	
C. Mass media exposure		
1. Radio	5.25	I
2. T.V.	4.24	II
3. News papers	2.92	IV
4. Agril. Books	0.11	IX
5. News bulletins	0.06	XI
6. Journals	0.04	XII
7. Magazines	0.41	VII
8. Circular letters	0.00	XIII
9. Posters	3.65	III
10.Farmers fair	1.36	V
11.Exhibitions	0.61	VI
12.Folders	0.23	VIII
13.Film shows	0.08	X
Average	1.458	
Overall average	1.989	

Information source utilization pattern

The data furnished in Table-2 pertains to extent of contact of respondents with different information sources as used by them for receiving general informations as well a about various practices of paddy crop production. Information sources were categorized in three categories namely formal sources, informal sources and mass media to find out the extent of contact of respondents. So far as contact with formal sources was concerned, Fertilizers/seed store, co-operative society, VDOs, Kisan Sahayak, BDOs, ADOs, Mandi samiti, Agril. college, Agril. scientists and SDAEOs, had got the rank orders I, II, II, IV, V, VI, VII, VIII, IX, and X respectively. The mean of scores for all the formal sources was found as 0.677.

Table 3: Correlation coefficient (r) between different variables and information source utilization pattern of farmers.

S. No. Variables	Correlation coefficient (r)
1. Age	0.109
2. Education	0.503**
3. Caste	0.290**
4. Family type	0.074
5. Family size	0.013
6. Housing pattern	0.199*
7. Holding size	0.342**
8. Occupation	0.175
9. Social participation	0.450**
10.Income	0.455**
11.Material possession	0.604**
12.Communication media possession	0.566**
13.Scientific orientation	0.146
14.Economic motivation	0.97
15.Risk orientation	0.327**
16.Value orientation	0.215*

* Significant at 0.05 per cent probability level = 0.1946
** Significant at 0.01 per cent probability level = 0.254

As far as contact with informal sources was concerned, family members, neighbours, local leaders, friends and relatives had got rank orders I, II, III, IV and V respectively. The mean of scores for informal information sources was found as 3.832.

Among the mass media sources, Radio, T.V., Poster, Newspapers, Farmers fair, Exhibition, Magazines, Folders, Agril. books, Film shows, News bulletins, Journals and Circular letters had got rank order I, II, III, IV, V, VI, VII, VIII, IX, X, XI, XII, and XIII, respectively. The mean of scores for mass media exposure was found as 1.458.

Hence, it can be concluded that informal sources of information seemed to be most important as generally utilized by most of the respondents. The formal and mass

media information sources were also utilized by the respondents with considerable extent. The overall mean of sources was found to be 1.989 which may be considered as fair contact with information sources.

Correlationship of independent variables with information source utilization pattern of farmers in respect to fertilizers use

It is evident form the value of correlation coefficient as reported in Table-3 that ten variables found having the significant relationship with the information sources utilization pattern of the farmers. The variable like education, caste, holding size social participation, income, material possession, communication media possession and risk orientation had significant and positive correlation with information source utilization pattern of farmers. It means that the value of above variables is increases the level of source information utilization of farmers also increases. The variable like housing pattern and value orientations had moderate significant and positive correlation with information source information pattern of farmers and the variable like age, family type, family size, occupation, scientific orientation and economic motivation had non-significant and positive correlation with formation source utilization pattern of farmers.

Therefore, is can be said that age, family type, family size, occupation, scientific orientation and economic motivation had no influence on the information source utilization pattern of farmers in respect fertilizer use, while the variables like education, caste, holding size, social participation, income, overall material possession, communication media possession and risk orientation had direct influence on the information source utilization pattern of the farmers. Almost similar finding was observed by Mulk (1979). Hence, it is imperative that while making the further communication strategy, the above factors need to be intervened so that a good communication can be have for development.

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Problems faced by the farmers in adoption of improved maize cultivation practices in hills

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Abstract

In the present context though it is a clear that hill farmers are adopting certain farm technologies but still these exist technological gap regarding hill farming. Since, most of the farmers are doing traditional farming, but at the same time they are facing a lot of problems. Such as land preparation, correct time of sowing, correct seed rate, method of sowing, problem in using of HYV, adoption of fertilizer, weed control/inter culture, plant protection practices etc, they want to over come from the problems.

Introduction

The rapid growth of population and technological revolution has created a serious concern to the existence of life on earth. Indiscriminate use of natural resources has also posed a serious threat to the environment. Rural people in general are dependent on locally needs, they most oftenly fed temped of feeling trees indiscriminately to meet their requirements in terms of food, fuel fodder etc. Under these prevailing conditions, agriculture is practiced in limited area in hill region it is the main stay of the hill people. Agriculture is practiced on subsistence level at hill and is mostly rain fed. No doubt the area as well as production of the total food grain in hill area were increasing day by day, but hill farmers were having many problems. While adopting the improved maize cultivation practices, due to poor communication network, transport, small/scattered land holding size, lack of marketing facilities. Therefore, keeping up the above views the present study were designed to study the specific technologies, which will be related to the hill farmers.

Materials and Methods

The investigation was carried out in Mandi district of Himachal Pradesh, after discussion with S.M.S. (Subject Matter Specialist), which was selected purposively in the first stage of sampling. While in the second stage, Dadour block was selected randomly, total five (5) villages namely – Nalsar, Bihura, Darbthu, Bora and Khuri were selected from this block based on proportionate random sampling. Out of the total farm families in these villages' approximately 90 farm families, which is constituted 20 per cent of the whole population were selected. The head of the family was interview with the help of pre-tested schedule developed for this purpose and analyzed by using by statistical methods such as percentage and rank.

Results and Discussion

The presented in the Table 1, shows that there are so many, problem that are faced by the farmers at the time of adoption of improved cultivation practices. In order to bridge the technological gap there is need for location specific communication research compassing all accepts of technologies of maize. Still large groups of small farmers do not the use the correct dose of fertilizer, some time they were using excessive seed rate, it is also great problem with maize grower. The problem are due to the seed cost of H.Y.V. seeds, plant protection measures, fertilizer doses, weedicide application etc; the major constraints, being faced by 94.94 per cent of the farmers in hill. And 83.33 per cent were using as fodder for mulch animals, due to the scarcity of fodder crop for their milch animals.

Also, 77.78 per cent farmers felt that it will take more time, lack of technical knowledge for adopting plant protection measures, fertilizer doses, weed control methods were another major problems. That's why instead of maize cultivation practices on hills are mostly go for traditional methods though, agriculture practice on hills are mostly rain fed. 72.22 per cent farmers were depending upon it; due to lack of irrigation facilities as another constraint and also, the farmers are not able to irrigate their field on appropriate time, while badly hamper the production of maize crop.

While, 66.67 per cent of the farmers were in the opinion-lack of the specific technology knowledge, method of sowing is quite expensive, lack of guidance for fertilizer application, inter culture control methods. Lack of technical knowledge for correct seed rate used, it is inferred due to poor extensive services by the district and taluka head quarters.

61.11 per cent of the farmers were feels risky of using H.Y.V. and lack of technical knowledge for method of sowing, whereas, 55.56% farmers were having the lack of guidance for plant protection measures, while, 50.00% were having scattered field, so its very difficult for them to adopt the method of sowing as well as land preparation.

Whereas, 44.44% of farmers were having the lack of guidance for adopting H.Y.V., spraying/duster practices for plant protection, due to low economic status the majority of small farmers having lack of correct fertilizer doses as well as seed rate.

Table 1: Problem faced by farmers in relation to adoption of improved maize cultivation practices

S. No.	Specific technology	Frequency (N=90)	Rank
A.	Problem in using of H.Y.V. seed		
1.	Costly	85(94.94)	I
2.	Lack of technical knowledge	60(66.67)	V
3.	Risky	55(61.11)	VI
4.	Lack of guidance	40(44.44)	IX
5.	Poor living standard	30(33.33)	X
6.	Lack of marketing facilities	15(16.67)	XIII
7.	Animal attack	10(11.11)	XVI
8.	Lack of subsidiary	5(5.56)	XIX
B.	Method of sowing		
1.	It will take more time	70(77.78)	III
2.	It is to much costly	60(66.67)	VI
3.	Lack of technical knowledge	55(61.11)	V
4.	Scattered field	45(50.00)	VIII
5.	Lack of labour	20(22.22)	XII
C.	Plant ptotection practices		
1.	It is costly	85(94.94)	I
2.	Lack of technical knwledge	70(77.78)	III
3.	Lack of guidence	50(61.11)	VIII
4.	Lack of spraying/duster's	40(44.44)	IX
5.	Low economic status	30(33.33)	X
6.	Scattered/small field	15(16.67)	XIII
7.	Lack of susidiary	9(10.00)	XVII
D.	Adoption of fertilizer		
1.	To much costly	85(94.94)	I
2.	Lack of technical knwledge	70(77.78)	III
3.	Lack of guidence	60(66.67)	V
4.	Low economic status	40(44.44)	IX
5.	Lack of susidiary	25(27.78)	XI
6.	Scattered/small field	15(16.67)	XIII
E.	Weed control/Interculture		
1.	It is costly	85(94.94)	I
2.	Lack of technical knwledge	70(77.78)	III
3.	Lack of interculture	60(66.67)	V
4.	Low economic status	30(33.33)	X
5.	Scattered/small field	15(16.67)	XIII
6.	Lack of susidiary	8(8.89)	XVIII
F.	Correct time of sowing		
1.	Depend on rainy season	65(72.22)	IV
2.	Lack of draft animal	20(22.22)	XII
3.	Lack of manual labour	10(11.11)	XVI
g.	Correct seed rate		
1.	It can be used as fodder	75(83.33)	II
2.	Lack of tecnical knowledge	60(66.67)	V
3.	Lack of guidance	40(40.44)	IX
4.	It is risky	15(16.67)	XIII
5.	Attack of animal	5(5.56)	XIX
H.	land preparation		
1.	Lack of technical knowledge	45(50.00)	VIII
2.	Availability of labour	15(16.67)	XVI
3.	Slope of land	13(14.44)	XIV
4.	Guidance	12(13.33)	XV
5.	Scattered /small field	5(5.56)	XIX

(Figures in parenthesis indicate percentage)

Also 33.33 per cent, which is one third of the total of farmers were having poor living standard. So it very difficult for them to adopt H.Y.V. recommended doses, adopting inter culture practices, 27.78% farmers were not getting any subsidiary on fertilizer for adopting the recommended doses. 22.22 per cent of farmers were having lack of manpower during sowing time. While, 16.67% farmers were facing the problems of marketing facilities, scattered farms for adopting plant protection measures, fertilizer doses, weed control/inter culture method, less availability of man power during land preparation, also farmers feel risky due to lack of communication/marketing network. Whereas, 14.44% of farmers were facing the problem due to sloppy land on hills, 13.33% were having lack of guidance of land preparation.

Also, 11.11% farmers were having the problem of animal attack due to the lack of proper fencing/ protection, problem of manual labour at the time of sowing. 10 per cent farmers were not getting any subsidiary on plant protection measures. 8.89 per cent were facing the transportation problem for getting fertilizers doses in time to their field. While the remaining 5.56% farmers were not getting any subsidiary on H.Y.V., knowledge of correct seed rate, due to animal attack and scattered field problem for land preparation.

The finding of the study reveals that there is wide gap between the demand and supply. Specially quality of seed on subsidiary basis, method of sowing, recommended dose of fertilizer, plant protection measures, using correct seed rate in time with land preparation and lack of adequate knowledge about improved technology to the farmers are the major reasons for poor productivity. Since most of the farmers are doing traditional farming of maize cultivation. So, the proper training and transfer of technology will help the hill farmers to overcome from this problem.

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Awareness and level of knowledge of rural women regarding the health care practices related to their children

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Abstract

The present study was conducted in district Agra of Uttar Pradesh. As the researcher belongs to this area, C.D. block, Bichpuri was selected randomly. The purpose of this study was conducted on the mother 160 house of four villages i.e. (a) Maghtai, (b) Sunari, (c) Dehtora and (d) Kalwari. A list of houses having children below 5 years was prepared. Survey method in each village was randomly selected.

Introduction

Awareness and adoption behavior of method regarding health care practice related to their children is a complex issue which is influenced by several socio-cultural and medical sectors operating together. These multiple factors are responsible for shaping mother behaviors in a given situation. A general survey of the problem reveals in the actual practice there are several stumbling blocks in actual implementation of desirable health behaviour, rigiding of attitude and resistance to change are some of the important factor influencing the change over from a potentially harmful to an appropriate health behavior. The following review of available literature address this issue in accordance with the objectives of the study.

Knowledge of appropriate health care practice is the logical first towards reaching the goal of a healthy and happy life. Studies conducted evaluated the knowledge of rural women regarding various health care practice reveal a missed picture while some studies have observed a fairly good knowledge of desirable health care practices among rural women, other have noted a woefully inadequate level of awareness among these mothers specially in issue related to breast feeding and immunization.

Although health is apparently the personal responsibility of the individual is significant influenced by various factors operative in the surrounding. Just as the knowledge of an innovation is an essential pre-requisite for its successful use. Similarly knowledge regarding health is also essential for its practice in day-to-day life. Hence it become extremely important to study the knowledge level of the individual as well various factors influencing that level, so that there characteristics can be considered while imparting knowledge to the needy.

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Materials and Methods

Agra district was selected for the purpose of the present study. As the researcher belongs to this area. Out of fifteen blocks in district Agra, one block i.e. C.D. block Bichpuri was selected randomly for the purpose of this study. C.D. block, Bichpuri consists of 39 villages out of which 4 villages were selected randomly namely (a) Maghtai, (b) Sunari, (c) Dehtora and (d) Kalwari. A list of houses having children below 5 years was prepared by survey method and in each village 40 houses were selected randomly.

Method used for statistical analysis

Statistical analysis	Purpose
1. Percentage	To study the distribution of both dependent and independent variable
2. Arithmetic mean	To study the central value
Standard deviation	To know the variability among the observations
3. T. test	To test the difference between two means
4. Coefficient correlation	To determine the relationship between the dependent and independent variables
5. T test for correlation coefficient	To test the level of significance of correlation coefficient

Results and Discussion

The important findings pertaining to the specific objectives setforth are discussed below in separate heads.

Mean knowledge scores regarding health care practices among respondents, has been presented in Table 1. Total mean knowledge score was 81.07 +11.59 = 92.66 mean knowledge regarding feeding practices was found to be highest (23.61$\pm$3.15) followed by pregnancy and family planning mean knowledge was

observed and in case of mal nutrition (0.69±1.48) was found.

Table 1: Mean knowledge scores regarding health care practice among the respondents

Health care practice	Knowledge scores of the respondents	
	Mean	S.D.
Pregnancy and family planning	13.81	3.86
Feeding	23.61	3.15
Immunization	10.05	2.16
Medical care	11.80	2.88
Diarrhoea	8.47	1.48
Mal nutrition	0.69	1.48
Hygiene	12.64	1.78
Total	81.07	11.9

The mean attitude score regarding various health care practices among the respondents have been presented in Table 2. Total mean attitude score in the study population was found to be 139.56±14.29 when individual health care practices were studied and highest score was observed for pregnancy and family planning (29.02±6.63) followed by feeding (23.44±4.70). once again the lowest score was observed for mal nutrition I.e. 6.24±0.91.

Table 2: Mean attitude scores regarding health care practice among the respondents

Health care practice	Attitude scores of the respondents	
	Mean	S.D.
Pregnancy and family planning	29.02	6.63
Feeding	23.44	4.70
Immunization	18.90	1.81
Medical care	19.34	5.02
Diarrhoea	16.70	4.67
Mal nutrition	6.29	0.91
A.R.I.	7.33	1.72
Hygiene	18.59	2.23
Total	139.56	14.29

The mean adoption scores of respondents regarding different health care practices have been presented in Table 3. The total mean adoption scores was found to be 43.34±10.82. it was highest in case of feeding (14.87±3.90) followed by hygiene (9.80±2.63). Lowest score was found in case of mal nutrition (0.16±0.55).

Table 2: Mean attitude scores regarding health care practice among the respondents

Health care practice	Attitude scores of the respondents	
	Mean	S.D.
Pregnancy and family planning	29.02	6.63
Feeding	23.44	4.70
Immunization	18.90	1.81
Medical care	19.34	5.02
Diarrhoea	16.70	4.67
Mal nutrition	6.29	0.91
A.R.I.	7.33	1.72
Hygiene	18.59	2.23
Total	139.56	14.29

Summary and conclusion

Several important conclusions emerge out of this study of awareness and adoption of child health care practices of rural women.

General awareness level of rural mothers regarding various child health care practices continues to remain deplorable despite remarkable change taking place in urban India.

General improvement in living standard could also play an important role in bringing about change in the attitude of people towards beneficial health care practices.

The first and the most important step towards correcting this distracting situation is to spread awareness about beneficial health care practices not only among the women themselves but also among the other member of the family and society. Only this general improvement in awareness levels can create an atmosphere where beneficial and modern child health care practices are accepted as the good standard and are thereafter incorporated in to the daily lives of the people. Creation of awareness gradually leads to a change in attitude of people in the adoption of useful practices by mother.

Even when these women are aware of the beneficial health care practices they are not able to actually adopt these changes in their real lives either because of financial constraints or because of social pressures.

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Socio-economic profile of chickpea growers in Unnao district

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Abstract

The study depicted that the maximum percentage of respondents were found in middle age group (66%) belonging to general caste (43%) and literate (85%). Joint families were observed maximum having 6 to 10 members (69%) in their families. The holding size below 1 ha was observed with majority of the farmers (54%). Pucca houses were 54 per cent. Agriculture was observed as main occupation (73%) and 23 25 per cent respondents earned the annual income in the range of Rs. 20,000 to 40,000. More than 50 per cent respondents were observed having no participation in any organization. Gram pradhan (0.65) and VDO (0.37) among formal, family members (0.99) and neighbors (0.89) among informal and in case of mass media, radio (0.94) and TV (0.68) were main sources of information. The scientific orientation (43%), economic motivation (51%) and risk orientation (63%) were observed of medium levels.

Introduction

The increasing population growth has result in sharp decline in the capita availability of the pulses from 60.7 gram/day (in 1951) to 36 gram per day (in 2000), while ICMR has recommended pulses intake of 50 gm/ capita/day. The fall in consumption of pulses is because of decrease in area due to replace meant of wheat, paddy and other crops under better assured irrigation facility. It is noteworty that decrease in area and production has made it beyond the reach of poor and middle men. Currently chickpea price/kg is Rs. 22-25 and processed pulses is Rs. 25-30. It shows that chickpea was poor mans meat has gone out of his reach due to poor purchasing power. Such circumstances focus on designing the balanced farm production plan to meat the family consumption needs regarding cereals, pulses vegetables, oilseeds and dairy etc.

Pulses are rich sources of protein (22%). These enrich soil fertility by virtue of symbiotic nitrogen fixation from atmosphere. The major portion of Indian population belongs to vegetarian groups which require pulses to consume 70-80 gm/day in order to maintain good health and physique (Chaturvedi and Ali 2002). Keeping in view, the above facts into consideration, the social, economical communication and psychological characteristics were assessed of those farmers engaged in pulse production in general and chickpea in specific, on the following objective:

1. To study socio-economic profile of chickpea growers.

Methodology

The present study was conducted in Asoha block of Unnao district, which was purposively selected out of 16 blocks in the district on the criteria of maximum chickpea growers and the area under chickpea cultivation. A sample size of 100 chickpea growers was selected from the sample village through proportionate random sampling technique keeping in view the holding size. An interview schedule was developed, modified and exercised for the collection of data from the respondents. The data was processed, statistically analyzed and interpreted accordingly as its findings.

Findings

1. Socio personal attributes

The data depicted in Table 1 indicate that the socio personal attributes of chickpea growers

(A) Age: The majority of chickpea grower (59%) was observed belonging to the middle age group (38 to 57 years) followed by the old (58 years and above) and young (up to 37 years) age groups respectively. The mean of age of the respondents was found to be 47.78 years. Almost similar finding was obtained by Chaudhary (1999) and Chandra (2000).

(B) Caste: The majority of chickpea grower (43%) were found belonging to general caste followed by backward caste (40%) and scheduled caste (17%) respectively. So, it shows the dominance of general caste in the study area.

(C) Education: The illiteracy percentage of respondents was found 85 while the literacy was 15% only. The education standard of literate once in the descending order was found as Primary (20%), Inter (19%), Middle (17%), High School (14%), Under Graduate (12%) and Post Graduate (3%).

(D) Family type: In rural family system, 55% chickpea grower belong to joint family system while the remaining 45% to the single family system. Therefore, the family system are almost equal in number in the study area.

(E) Family size: With regard to family size, 69% respondents families were such who had 6 to 10 members

followed by 19% families having members up to 5 and the 12% families had above 10 members in their families. Almost similar finding obtained by Mishra (2005).

(F) Housing pattern: Majority of chickpea grower 54% had pucca accommodation followed by 31% the mixed houses and only 15% reported their homes of kuccha type.

Table 1: Socio-personal attributes of chickpea growers

S.No.	Variables	Respondents No.	Percentage
A. Age			
1.	Young (up to 37 years)	19	19.00
2.	Middle (38-57 years)	59	59.00
3.	Old (58 and above)	22	22.00
	Total	100	100.00
Mean = 47.78, SD = 10.59, Min. = 28, Max. 72			
B. Caste			
1.	General caste	43	43.00
2.	Backward caste	40	40.00
3.	Scheduled caste	17	17.00
	Total	100	100.00
C. Education			
A.	Illiterate	15	15.00
B.	Literate	85	85.00
1.	Primary	20	20.00
2.	Middle	17	17.00
3.	High school	14	14.00
4.	Intermediate	19	19.00
5.	Under graduate	12	12.00
6.	Post graduate	3	3.00
	Total	100	100.00
D. Family type			
1.	Single	45	45.00
2.	Joint	55	55.00
Total		100	100.00
E. Family size			
1.	Up to 5 members	19	19.00
2.	6 to 10 members	69	69.00
3.	11 members and above	12	12.00
	Total	100	100.00
F. Housing pattern			
1.	Kuccha	15	15.00
2.	Mixed	31	31.00
3.	Pucca	54	54.00
	Total	100	100.00
G. Social participation			
1.	No participation	58	58.00
2.	Member of one organization	30	30.00
3.	Member of two organization	12	12.00
	Total	100	100.00

(G) Social participation: More than the half of the respondents (58%) had no participation at all while 30% and 12% were found who have participation in one organization and two organization, respectively.

2. Socio-economic attributes:

The data depicted in table 2 indicates the socio-economic attributes of chickpea growers.

(A) Holding size: Most of the respondents (54%) were marginal farmers followed by small (23%), medium (17%) and the large farmer (6%), respectively. Hence, it may be said that the land holding have become marginalized in the study area.

Table 2: Socio-economic attributes of chickpea growers

S.No.	Variables	Respondents No.	Percentage
A. Holding size			
1.	Marginal (below 1 ha)	54	54.00
2.	Small (1 to 2 ha)	53	23.00
3.	Medium (2 to 3 ha)	17	17.00
4.	Large (3 ha and above)	06	06.00
	Total	100	100.00
Mean = 1.44, Min. 0.25, Max. 7.2			
B. Occupation			

S.No.	Categories	Main occupation No.	%	Subsidiary occupation No.	%
1.	Agriculture	73	73.00	27	27.00
2.	Agriculture labour	0	00.00	12	12.00
3.	Service	11	11.00	10	10.00
4.	Caste based occupation	03	03.00	14	14.00
5.	Business	13	13.00	15	15.00

C. Annual income of the family

S.No.	Variables Respondents	No.	Percentage
1.	Below 20,000	18	18.00
2.	20,000 to 40,000	25	25.00
3.	40,000 to 60,000	23	23.00
4.	60,000 to 80,000	10	10.00
5.	80,000 to 1,00,000	07	07.00
6.	1,00,000 and above	17	17.00
	Total	100	100.00
D. Material possession			
1.	Low (up to 0.28)	22	22.00
2.	Medium (0.29 to 0.97)	63	63.00
3.	High (0.98 and above)	15	15.00
	Total	100	100.00
Mean = 0.63, S.D. = 0.35), Min. = 0.1, Max. = 1.45			

(B) Occupation: Most of chickpea growers 73% reported agriculture as their main occupation followed by business (13%), service (11%) and caste based occupation (3%), while in the case of subsidiary occupation, it was found in descending order as agriculture (27%), business (15%), caste based occupation (14%), agriculture labour

(12%) and service (10%).

(C) Annual income: 25 per cent respondents were those whose family annual income was found in range of (Rs. 20, 000 to 40,000) followed by 23% (Rs. 40,000 to 60,000), 18% (Rs. below 20,000), 17 per cent Rs 1,00,000 and above 10% (Rs. 60,00 to 80,000) and 7% families (Rs. 80,000 to 1,00,000), respectively. The average annual income was found to be Rs. 55,628.00.

(D) Material possession: The material possession was categorized in to three main category on the basis of mean score as low (upto 0.28), medium (0.29 to 0.97) and high (0.98 and above). Majority of respondents (63%) were observed in medium category (0.29 to 0.97) of material possession followed by low (22%) and high (15%) categories, respectively. It meant that there is much difference in material possession among the chickpea growers. Almost similar finding was obtained by Awasthi (2004).

3. Communication attributes

The data depicted in Table 3 indicate communication attributes of the chickpea growers

(A) Communication media possession: The majority of farmers (88%) had radio followed by Television (64%), Tape recorder (36%), general magazine (22%), Telephone (19%), News paper (18%), agriculture magazine (4%), agriculture books (3%) and Journals (1%), respectively. Hence, the communication media possession of the chickpea growers was found comparatively better.

(B). Extension contact with information sources: As for as contact with formal sources was concern, Gram Pradhan, V.D.O., fertilizer/seed store, Kishan Sahayak, A.D.O., B.D.O., Co-operative, Mandi Samiti, S.D.A.E.O., Agriculture school and college and Agriculture scientist had got rank orders viz. I, II, III, IV, V, VI, VII, VIII, IX, X, XI, respectively. The mean score for all the formal sources was found to be 0.162. Regarding the contact with informal sources, the family members, neighbors, friends, relative, progressive farmers and local leaders had got rank orders I, II, III, IV, V, VI, respectively. The mean of scores for informal information sources of found to be 0.619. Among the mass media exposure, Radio, T.V., News paper, Posters, Film show, Farmers fair, Exhibition, Demonstration, News bulletin, Agriculture books, Circular letter, Folder and Journals had got rank orders I, II, III, IV, V, VI, VII, VIII, IX, X. XI(a), XI(b), XII, respectively. The mean score of mass media exposure was found to be 0.198.

The overall mean of scores for formal, informal in mass media information sources was found to be 0.326 which may be considered as good contact with information sources.

Table 3: Communication attributes of chickpea growers

S.No.	Variables	Respondents No.	Percentage
A. Communication media possession			
1.	Radio	88	88.00
2.	T.V.	64	64.00
3.	Tape recorder	36	36.00
4.	Telephone	19	19.00
5.	Journals	01	01.00
6.	Agril. Magazine	04	04.00
7.	General magazine	22	22.00
8.	Agril. Book	03	03.00
9.	News paper	18	18.00
B. Extension contact with information sources			
S. No.	Categories of Information sources	Mean score value	Rank order
a. Formal sources			
1.	B.D.O.	0.121	VI
2.	S.D.A.E.O.	0.024	IX
3.	A.D.O.	0.137	V
4.	V.D.O.	0.371	II
5.	Kisan Sahayak	0.151	IV
6.	Gram Pradhan	0.654	I
7.	Co-operative	0.065	VII
8.	Agril. School & College	0.002	X
9.	Mandi Samiti	0.042	VIII
10.	Fertilizer/seed store	0.217	III
11.	Agriculture scientists	0.001	XI
	Average	0.162	
B.	Informal sources		
1.	Family members	0.990	I
2.	Nighbours	0.892	II
3.	Friends	0.842	III
4.	Relatives	0.364	IV
5.	Local leaders	0.307	VI
6.	Progressive farmers	0.321	V
	Average	0.619	
C.	Mass media exposure		
1.	Radio	0.942	I
2.	T.V.	0.685	II
3.	News paper	0.378	III
4.	Agril. books	0.017	X
5.	News Bulletins	0.032	IX
6.	Journals	0.001	XII
7.	Farm magazines	-	-
8.	Circular latter	0.060	XI(a)
9.	Posters	0.257	IV
10.	Farmers fairs	0.107	VI
11.	Exhibition	0.057	VII
12.	Demonstration	0.048	VIII
13.	Folder	0.060	XI(a)
14.	Film show	0.128	V
	Average	0.198	
	Over all average	0.326	

4. Psychological attributes

The data furnished in Table 4 reveals the psychological attributes of the respondents.

Table 4: Psychological attributes of chickpea growers

S.No.	Variables	Respondents No.	Percentage
A.	Scientific orientation		
1.	Low (up to 20)	28	28.00
2.	Medium (21 to 24)	43	43.00
3.	High (25 and above)	29	29.00
	Total	100	100.00
Mean = 22.68, S.D. = 2.87, Min. = 18, Max. = 29			
B.	Economic motivation		
1.	Low (up to 22)	29	29.00
2.	Medium (23 to 25)	51	51.00
3.	High (26 and above)	20	20.00
	Total	100	100.00
Mean = 23.73, S.D. = 2.11, Min. = 20, Max. = 29			
C.	Risk orientation		
1.	Low (up to 22)	24	24.00
2.	Medium (23 to 26)	63	63.0
3.	High (27 and above)	13	13.00
	Total	100	100.00
Mean = 24.12, S.D. = 2.11, Min. = 20, Max. = 29			

A. Scientific orientation: Little less than half (43%) of the respondents were found having medium level of scientific orientation followed by high (29%) and low (28%). The mean of scores was observed to be (22.68) with a range of minimum and maximum 18-29. Hence, it can be inferred that most of the respondents (43%) had medium level of scientific orientation. Almost similar finding was obtained by mishra (2005).

B. Economic motivation: The majority of the respondents (51%) were found having medium level of economic motivation, while 29% respondents were such who had low and high level of economic motivation respectively. The average mean of scores for economic motivation was observed to be 23.73 with a range of minimum 20 and maximum 29 scores out of all possible scores i.e. 30.

Risk orientation: Sixty three per cent of the respondents were found having medium level followed by 24% and 13% who had low and high levels of risk orientation respectively. The mean of scores for risk orientation was observed to be 24.12 with a range of minimum 20 and maximum 29 scores out of all possible scores i.e. 35. Hence, it can be concluded that the respondents have good interest to bear the risk relating to improved farming. Almost similar finding was obtained by Mishra (2005).

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Knowledge of dairy farmers in assured and less irrigated area regarding improved dairy husbandry practices in Aligarh district

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Abstract

To know the knowledge of dairy farmers in assured and less irrigated area regarding improved dairy husbandry practices, a study was conducted in Aligarh district of Uttar Pradesh. Twelve villages from six blocks were selected for the study. Three blocks from each category i.e. assured irrigated and more fertile and less irrigated and less fertile. Thereafter, 3000 farmers (i.e. 25 from each village); five from each category i.e. landless, marginal, small, medium and large were selected for this study. The results showed that majority of dairy farmers in both the area had medium level of Knowledge about improved dairy husbandry practices. But more number of farmers from assured irrigated (33.33%) fell in high category as compared to negligible in less irrigated (5.33%) area. Farmers in assured irrigated and less irrigated area had highly significant difference in the extension contact, mass media exposure, economic motivation, attitude towards dairy farming and knowledge about improved dairy husbandry practices.

Introduction

Dairying is an integral part of Indian agriculture and Indian economy, more so, the rural economy. The contribution of this sector to the national income is invaluable, estimated to be about eight per cent in the Gross Domestic Product (GDP) and about 26% to agriculture economy (Rajagopalan, 1996; Bhasin, 1997 and India, 1998). At the household level, dairy plays an important role in improving the economic condition of 70 million farm families. This sector provides insurance against crop failures and help directly in increasing the crop production by making available the drought power, organic manure and cash income on a regular and day-to-day basis. Dairying is crucial providing assured employment to family labour.

In India a wide variation in milk productivity per million exists among the different countries against the world average of 2,030 kg per lactation highest over 9,000 kg in Israel, whereas, in India as low as, 987 kg/ lactation. Within India at one end one herd in institutional farms, reared under improved management with an average yield of 2000- 3000 kg. At the other end there are villages reared animals, there output is just 400-500 kg (Dairy India, 1997). This low production in India is mainly due to low/lack level of knowledge about improved dairy husbandry practices by daily farmers.

Methodology

The Aligarh district of Uttar Pradesh was selected purposively for study because of acquaintance of researcher with the area. Aligarh district consist of 12 blocks. The whole district was divided into two parts according to there homogeneity i.e., more fertile and assured irrigation and the one having less fertile and less irrigation facilities. The three blocks from each parts were selected by stratified random sampling . Hence, 6 blocks were selected for this study.

Thus total 300 farmers constituted the sample for proposed study. The knowledge test prepared by Rao (1987) was used in this study regarding improved dairy husbandry practices. The data from selected farmers was collected on schedules prepared for the propose by the researchers himself. The data was analyzed using mean and standard deviation and frequency distribution method.

Results and Conclusion

Commensurate with the objectives of the study, the data was analyzed and results so obtained are disused below:

Knowledge level of farmers related to improved dairy husbandry practices

Table 1 reveled that majority of farmers, i.e., 62.67 and 64.0 percent from assured irrigated and less irrigated area respectively, had medium level of knowledge about IDHPs. More numbers of farmers from assured irrigated (33.33%) fell in high category as compared to negligible in less irrigated (5.33%) area. There are only 4.05 farmers from assured irrigation area and 30.67% from less irrigated area had found in low category.

When samples are pooled, majority of farmers (63.33%) fell in medium category of knowledge about IDHPs. Similar findings were observed by Singh (1992) who reported that majority of the respondents fell in medium category of knowledge about IDHPs. Almost an equal percentage of the farmers fell in low and high (17.33% &19.34%) category of knowledge about IDHP, respectively.

Practice wise knowledge of farmers about IDHPs

Table 1: Socio-personal profile of the farmers

Characteristics	Category (score)	Assured irrigated(N=150)	Less irrigated(N=150)	Pooled(N=300)
Age (Year)	Young (up to 30)	22(14.67)	38(25.33)	60(20.00)
	Middle (30-47)	53(55.33)	92(61.33)	175(21.67)
	Old (Above 47)	45(30.00)	20(143.34)	65(21.67)
Education	Illiterate	37(24.67)	40(26.67)	77(25.67)
	Primary	22(14.67)	33(22.00)	55(18.33)
	Middle	17(11.33)	41(27.33)	58(19.33)
	High School	37(24.67)	18(12.00)	55(18.33)
	Inter	30(20.00)	17(11.33)	47(15.67)
	Graduate and above	7(4.66)	1(0.67)	8(2.67)
Herd size (Number)	Small(<2)	29(19.33)	42(28.00)	71(23.67)
	Medium(2-9)	93(62.00)	100(66.67)	193(64.33)
	Large(>9)	28(18.67)	8(6.33)	30(12.00)
Milk production (Litres)	Low(<7)	3(2.00)	21(14.0)	24(8.00)
	Medium (7-41)	113(75.33)	119(79.33)	232(77.33)
	High(>41)	34(22.67)	10(6.67)	44(14.67)
Milk consumption (litres)	Low (<2)	1(0.67)	0(0.00)	1(0.33)
	Medium (2-7)	107(71.33)	144(96.00)	251(83.67)
	High (>7)	42(28.00)	6(4.00)	48(16.00)
Milk sale (Litres)	Low (<4)	3(2.00)	6(4.00)	9(3.00)
	Medium (4-33)	111(74.00)	135(90.00)	246(82.00)
	High (>33)	36(24.00)	9(6.00)	45(15.00)
Social participation				
a. panchayat	Member	12(8.00)	24(16.00)	36(12.00)
	Non-member	138(92.00)	126(84.00)	254(88.00)
b. Dairy cooperative	Member	76(50.67)	28(18.67)	104(34.67)
	Non-member	74(49.33)	122(81.33)	196(65.33)
family size	Low (<4)	12(8.00)	11(7.33)	23(7.67)
	Medium (4-9)	118(78.67)	125(83.33)	243(81.00)
	High (>9)	20(13.33)	14(9.34)	34(11.33)
Type of family	Nuclear	63(42.00)	87(58.00)	150(50.00)
	Joint	87(58.0)	63(42.00)	150(50.00)
Occupation				
Main	Farming	115(76.67)	102(68.00)	217(72.33)
	Dairying	18(12.00)	22(14.67)	40(13.33)
	Labour	17(11.33)	26(17.33)	43(14.34)
Subsidiary	Farming	8(5.33)	18(12.00)	28(8.67)
	Dairying	130(86.67)	128(85.33)	258(85.00)
	Labour	12(8.00)	4(2.67)	16(5.33)

Figures in parenthesis indicate percentage

The Table 2 clearly showed that all the farmers of assured irrigated area had knowledge about protected vaccine followed by 98.0 and 96.0 percent about mineral mixture and name of common exotic breed. Whereas, almost all the farmers of less irrigated area had knowledge about minerals mixture followed by 97.0 and 93.33 percent about protective vaccines and name of common exotic breed. These differences were lesser between samples. In assured irrigated area 46.67, 74.0, 72.0, 68.0, 66.67, 52.67, 74.67 and 64.00 percent farmers knew about calf starter, insemination of cow, quantity of dry fodder, concentrate requirement to animal, fat % in cow milk, bred of cow after parturition, name of ingredient in balance feed, drying of cow and time of dehorning in new born calf, whereas, 11.33, 36.67, 32.67, 31.33, 31.33, 42.00, 9.33, 36.00 and 38.67 percent in less irrigated area, respectively. When all 13 particles merged the knowledge level of farmers (74.87% and 42.92%) in assured irrigated and less irrigated area had found, respectively. There was much difference of knowledge between samples. Overall knowledge of both samples was 62.46 percent.

In pooled sample, almost all the farmers had knowledge about protective vaccines, mineral mixture and name of exotic breeds (98.67, 98.67,and 94.67%), whereas, good knowledge about bred of cow after parturition, insemination time of drying of cow before calving (65.33, 55.33 and 55.33%), respectively. Very

Table 2: Animals possessed by farmers

Type of animals	Assured irrigated (N =150)	Less irrigated (N=150)	Pooled (N=300)
Number of animals possessed by farmers			
Indigenous cattle			
Milch	15	6	21
Dry	4	0	4
Heifer	7	0	7
Total	26	6	32
Cow crossbred			
Milch	80	30	100
Dry	36	12	48
Heifer	26	2	28
Total	142	44	176
Buffaloes			
Milch	329	351	680
Dry	154	121	275
Heifer	11	40	51
Total	494	512	1006
Total calves	250	137	387
Total animals	912	699	1601
Animal/household	About 6	About 5	About 5
Distribution of animals according to average milk production/animal/day			
Indigenous cattle			
Low (<5)	2(10.53)	0(0.00)	2(8.00)
Medium (5-7)	15(78.94)	6(100.00)	21(84.00)
High (>7)	2(10.53)	0(0.00)	2(8.00)
Crossbred cattle	N=116	N=32	N=148
Low (<10)	16(13.79)	20(62.50)	36(24.32)
Medium (10-12)	90(77.58)	12(37.50)	36(24.32)
High (>12)	10(8.63)	0(0.00)	10(6.76)
Buffalo	N=483	N=472	N=955
Low (<6)	110(22.78)	220(46.61)	330(34.56)
Medium (6-7)	230(47.62)	159(33.69)	389(40.73)
High (>7)	143(29.60)	93(19.70)	236(14.71)
Wet to dry ratio of animals			
Indigenous cattle	3.75:1	6:1	5.25:1
Cross bred	2.22:1	1.66:1	2.08:1
Buffaloes	2.13:1	2.99:1	2.47:1

Figures in parenthesis indicate percentage

poor knowledge of farmers was fond about proper concentrate, calf starter and ingredient in balance seed (16.33, 30.00 and 31.00%).

Communication Traits

Communication plays an important role to make farmers aware about innovations either it was related to dairy or agriculture. If the farmers were exposed to different sources of information, it will help them to getting more information regarding dairy as well agriculture.

Table 3 revealed that the farmers in assured irrigated and less irrigated area had highly significant difference in extension contacts (t = 87.41). They were contacting supervisors, (cooperative society), village level workers, veterinary doctors and other officials in order to make themselves aware of the latest developments in relevant area such as dairying, agriculture and others. This might have made the farmers of assured irrigated area to sale more milk. The highly significant (t = 56.10) difference also observed in case of ass media exposure.

Psychological and knowledge traits

Table 3 clearly showed that both categories differed highly significant in economic motivation (t = 99.03), attitude toward dairy farming (t = 112.34) and knowledge about IDHPs (t = 188.73).

From the other finding, it is clear that farmers of assured irrigated area were motivated more to opt economic gain from dairy in comparison to less irrigated area. They have better knowledge about the IDHPs and have favorable attitude toward dairy farming. All these factors were mainly responsible for the better position of dairy in the assured irrigated area.

Relational analysis between selected traits of farmers and their knowledge related to IDHPs

It is apparent from Table 4 that these existed a positive and highly significant (P<0.01) relationship between farmers education, herd size, land holding, milk production, milk consumption, milk sale, village dairy cooperative, family size, extension contact, mass media exposure, economic motivation and attitude towards dairy farming in both area except family size in assured irrigated area and age in less irrigated area.

Table 3: Mean differences in farmers traits

S.No. Traits	Assured irigated Mean	SD	less irrigated Mean	SD	t-value
Communicational traits					
1. Extension contact	6.61	2.96	4.07	1.84	87.41**
2. Mass media exposure	8.24	2.89	6.71	2.86	56.10**
Psychological traits					
1. Economic motivation	8.32	1.17	7.15	1.31	99.03**
2. Attitude towards dairy farming	21.48	2.94	18.15	3.32	112.34**
Education	7.32	4.45	6.94	7.95	6.23**

** Significant at 1% level

Table 4: Correlation coefficients of the selected traits of the farmers with their knowledge level related to IDHPs

S.No. Traits	Assured irrigated (r-value)	Less irrigated (r-value)	Overall IDHPs (r-value)
1. Age	-0.2747**	-0.0732	-0.0637
2. Education	0.5660**	0.3305**	0.3614**
3. Herd size	0.3815**	0.3904**	0.3436**
4. Land holding	0.4265**	0.4491**	0.4819**
5. Milk production	0.4448**	0.4920**	0.5172**
6. Milk consumption	0.3955**	0.3455**	0.4713**
7. Milk sale	0.4408**	0.4837**	0.5070**
8. Village panchayat	0.0116	0.0370	-0.0388
9. Village dairy cooperatives	0.3489**	0.6282**	0.5239**
10. Family size	0.1526	0.2920**	0.2480*
11. Extension contact	0.5855**	0.5930**	0.6537**
12. Mass media exposure	0.5541**	0.5338**	0.5843**
13. Economic motivation	0.5327**	0.5695**	0.6526**
14. Attitude towards dairy farming	0.6915**	0.7224**	0.7713**
15. Overall adoption	0.6691**	0.3172**	0.6571**
16. Overall constraints	-0.5462**	-0.6146	-0.7010**

* Significant at 5% level ** Significant at 1% level

In pooled sample all the traits had positive and highly significant (P<0.01) relationship with knowledge about improved dairy husbandry practices; but age and membership of village panchayat. Family size was positively and significantly related with IDHPs at 5 per cent level of significance.

The present findings related to association of herd size and knowledge of farmers are in agreement with those of Nishi (1996), Meena (1997), Kumar (1998), Show (1998) and Sah (1999). Regarding knowledge of dairy farmers and milk production were found to be positive and significantly related by Verma (1993), Nishi (1996), Meena (1997), Show (1998) and Shah (1999).

The present findings also get support from Promila (1994), Show (1998) and Shah (1999) who observed a positive and significant relationship between knowledge and milk sale. Regarding economic motivation, Shah (1999) reported positive and significant association between economic motivation and knowledge about IDHPs.

Conclusion

In fact the knowledge level regarding improved dairy husbandry practices in the assured irrigated area higher than the area of less irrigated area. But the above results, it could be concluded that irrespective of area, their knowledge level about the IDHPs could be improved by enhancing their extension contact, mass media exposure, attitude towards dairy farming and membership of village dairy cooperative.

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Reproductive and productive performance of Gangatiri cow under rural management production system

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Abstract

Gangatiri is a dual-purpose cattle breed of eastern Uttar Pradesh. The breed is found mainly in Varanasi , Chandauli, Ghazipur and Ballia district of eastern Uttar Pradesh and adjacent area of Bihar state of India. Data on 875 Gangatiri cows belonging to 32 villages of Ghazipur and Ballia district were evaluated. Reproductive performances viz. AFO, OCL, AFM, AFC,CI,SP, no . of service/ conception and conception rate were found to be 32.15 ± 0.52 month, 21.30 ± 0.48 days ,33.95 ± 0.60 month , 44.22±0.40 month, 15.49±0.66 month , 104.24±0.48 days , 2.48 ±0.09 and 70.10 respectively . Production performances studied were DMY, PMY, LMY, LL and DP and observed as 4.11 ± 0.09 kg, 5.44±0.39 kg, 976.64±1.08 kg,200.64± 0.64 days and 162.43±0.52 days respectively in Gangatiri cows. The fat and SNF% were estimated to be 3.87±0.33 and 8.69± 0.28 respectively. Therefore, it may be concluded that efforts should be made for its genetic improve and conservation in the breeding tract.

Introduction

India is the world largest milk producing country with a share of 14% in the world milk production. Uttar Pradesh is the largest producer of milk that accounts 18% of total milk production of the country. However, the productivity of the animals is poor because of its genetic potential, inadequate feeding, breeding and health status. Therefore, a great scope to improve them through genetic manipulation and by providing adequate breeding inputs and supports for better management.

Gangatiri cattle known as Eastern Haryana or Shahabadi distributed in Varanasi, Chandauli, Ghazipur and Ballia district of eastern Uttar Pradesh and adjacent area of Bihar state of India. The breed is closely resembled to Haryana breed of cattle. This is a dual-purpose cattle breed and animals are fairly good milker and bullocks provide good draft power and well suited for other agricultural operations. The breed has better tolerance to drought and heat and is more resistance to common diseases as compared to crossbred animals. The profitability of dairy enterprises depends not only on milk production but also several reproductive traits viz. age at sexual maturity, age at fist calving, calving interval, service period, conception rate etc. An analysis of reproductive performance helps to design control reproductive programme, understand the result of selection for growth on other economically important traits and to identify problems at early stages. Information on reproductive and productive status of Gangatiri cattle under rural management condition is scanty. Therefore, an attempt has been made to study the reproductive and productive performance of the breed in its native tract.

Materials and Methods

In the present study survey of Ghazipur and Ballia district of Uttar Pradesh were made to study the reproductive and productive performance of Gangatiri cattle. A total of 875 animals belonging to thirty two villages of both the district were taken under the study . Data recorded on reproductive parameters included age at first oestrus (AFO) , oestrus cycle length (OCL), age at first mating (AFM), age at first calving (AFC), calving interval (CI), No. of service/conception (NCC) and service period (SP). Production traits analyzed were daily milk yield (DMY), peak milk yield (PMY), lactation milk yield (LMY), lactation length (LL) and dry period (DP). The fat and SNF percent of 90 samples of different lactation of Gangatiri cows were estimated. Information was collected through personal interview of the farmers.

The breeding tract of Gangatiri cattle is mostly plain and lies at 25^0 19'- 25^0 54' N latitude and 83^0 4'- 83^0 58' E longitude at an altitude of 67.5 m above msl. The forest area is almost negligible. The minimum temperature goes up to 4^0 C in the month of January and maximum of 46^0 c in the months of May and June. The average annual rainfall is 800-1200 mm. The climatic conditions were almost similar for both the district. The data collected were analyzed as per Snedecor and Cochran (1968).

*Part of Ph.D. Thesis of the first author

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Results and Discussion

Reproductive performance:

Reproductive performance is influence by many environmental, management and biological factors. The fertility of a heifer is also affected by age of heifer, herd reproductive management, herd health and feeding management. The reproductive performances of Gangatiri cows are presented in Table 1. The overall mean ± s.e. of age at first oestrus and oestrus cycle duration were found to be± 32.15 ±0.52 month and 21.30± 0.48 days respectively. Age at first mating of Gangatiri heifers were observed as 32.78±0.35 month in Ghazipur district followed by 34.36±0.75 month in Ballia district. The present finding was higher as reported by Maurya and Saraswat (2005) in Gangatiri cows under farm condition .The age of first calving was found to be 43.14±0.15 and 44.34± 0.42 month in Ghazipur and Ballia districts respectively .However , calving interval period reported is 14.56±0.53 month in Ghazipur district and 16.04±0.44 month in Ballia district . Result revealed that AFM and AFC did not differ significantly in both of the district. The observation was higher than those reported by Maurya and Saraswat (2005) in Gangatiri cows under farm condition . The findings of Malik et.al .(2006) was higher for CI in Haryana cows. The service period of the breed was found to be 102.35±0.80 and 105.74± 0.79 days in Ghazipur and Ballia district respectively, breeding tract of Gangatiri cattle. Higher value for SP was also observed by Maurya and Saraswat (2005) in Gangatiri cows under farm condition. The overall no. of service/ conception and conception rate of Gangatiri cows were estimated to be 2.48 ± 0.09 and 70.10 percent respectively. The performances of Gangatiri cows were little more in Ghazipur district than Ballia district and it may due to availability of better feed and fodder resources and managemental condition. The survey result in the present study was supported by Singh et. al. (2007) in a pilot study of Gangatiri breeding tract.

During the survey the major reproductive disorder in Gangatiri cows reported in farmers herd was retention of placenta (0.5-1.0%), abortion (0.75-1.5%) and post birth mortality (2-4%) . The disorders were generally treated with local medications.

Production performance

The production performance of Gangatiri cows has been given in table 1. The overall daily milk yield of the breed was found to be 4.11±0.09 kg. The average daily milk yield in both the district did not differ significantly (table 1). The peak milk yield in the breeding tract of Gangatiri cows was observed as 5.60±0.38 and 5.09±0.60 kg in Ghazipur and Ballia districts respectively. The average days to attain peak milk yield was found as 45-60 days .The overall lactation milk yield and lactation length of Gangatiri cows were estimated to be 976.64±1.08 kg and 200.64±0.64 days respectively. The dry period in Gangatiri cows was noticed is 162.43±0.52days. These observations were lower than the estimates of Maurya and Saraswat (2005) in Gangatiri cows at organized farm. The present findings were higher than those reported by Singh et.al. (2005) in Bachaur cows under field condition.

Milk quality traits

The analyses of 90 samples of different lactation of Gangatiri cows were made. The average fat percentage of the milk was estimated to be 3.87±0.33.

Table 1. Reproduction and production performances of Gangatiri cows

S.No	Traits	Means ± S.E.		
		Ghazipur	Ballia	overall
Reproduction Performance				
1.	Age at first Oestrus (month)	32.64± 0.63	30.56±1.03	32.15±0.52
2.	Oestrus Cycle Length (days)	20.95± 0.51	21.08±0.74	21.30±0.48
3.	Age at first mating (month)	32.78±0.35	34.36±0.75	33.95±0.60
4.	Age at first calving (month)	43.14±0.15	44.34±0.42	44.22±0.40
5.	Calving Interval (month)	14.56±0.53	16.04±0.44	15.49±0.66
6.	Service Period (days)	102.35±0.80	105.74±0.79	104.24±0.48
7.	No. of service/conception	2.45±0.30	2.34±0.25	2.48±0.09
8.	Conception rate(%)	76.31	68.50	70.10
Production performance				
9.	Daily milk yield(kg)	4.33±0.20	4.10±0.37	4.11±0.09
10.	Peak milk yield (kg)	5.60±0.38	5.09±0.60	5.44±0.39
11.	Lactation Milk yield (kg)	980.70±2.55	910.50±0.98	976.64±1.08
12.	Lactation length (days)	215.60±0.94	190.43±0.77	200.64±0.69
13.	Dry Period (days)	158.13±0.34	170.05±0.61	162.43±0.52

Fat percent ranges from 4.12 to 5.30 percent. The SNF% of Gangatiri cows' milk was found as 8.69±0.28. The fat percent was higher in Bachaur cows as reported by Singh et al. 2005.

Conclusion

The present findings revealed that Gangatiri cows performed better under rural management production system. Therefore, it may be concluded that elite bulls of Gangatiri cows could be used for breeding purpose either through al. or natural services in the entire breeding tract. Farmers should also be trained and demonstrated for cattle husbandry practices. A sincere effort should be made for its genetic improvement and conservation in the native tract.

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Performance of Jersey X Gangatiri crossbred cows over different lactation

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Abstract

An attempt was made to assess the economic traits of Jersy x Gangatiri crossbred maintained at Government livestock-cum-Agricultural farm, Arazilines, Varanasi U.P. during the year 1981 to 1988. Generally cows calved all through the year, although majority calved during November to March. Variation in economic traits from first to sixth lactation with overall average were recorded as: age at puberty 30±0.83 months, age at calving 39.54 to 95.20 months; service period 72.14 to 159.55 days (Av. 131.40±15.21 days); gestation period 281.00 to 284.80 days (Av. 282.82±1.18 days); calving interval 356.14 to 441.55 days (Av. 402.89±11.36) lactation length 265.00 to 318 days (Av. 291.09±6.18 days); lactation yield 1599.82 to 2032.60 kg (Av. 1750.73±52.08 kg) and peak yield 9.45 to 12.68 kg (Av. 11.29±0.35 kg).

Introduction

For rapid improvement in the production efficiency of dairy cattle cross breeding with exotic dairy breeds has been initiated through out the country. At present mainly 4 exotic breeds viz. Holstein Friesian, Red Dane, Brown Swiss and Jersey are being used for this purpose. A large number of reports on the performance of crosses between exotic bulls and indigenous cows are available. But information regarding the performance of Gangatiri cow (a popular and well adopted dual purpose breed of Eastern U.P. and western Bihar, also known as Sahabadi and Eastern Hariana) crossed with Jersey bull is lacking. The present investigation was, therefore, undertaken to study the reproductive and productive performance of Jersey x Gangatiri crossbred with the view to collect its scientific information.

Materials and Methods

The present investigation was undertaken on data of 55 first six lactation records of 11 Jersey x Gangatiri crossbred maintained at Government Livestock-cum-Agricultural Farm, Arazilines, Varanasi (U.P.) covering a period of 18 yrs (1981 to 1998).

Farmbred Gangatiri cows were inseminated with liquid or deep frozen semen of Jersey bull to produce crossbreds progeny. All the incomplete records due to still birth, abortion or death of the animals were not included in the data. Animals with lactation length of less than 100 days were not recorded. No culling was done on poor growth, reproduction and production traits and the data were free from selection effects.

Collected data scrutinized for various reproductive traits in terms of calving pattern, age at puberty (AP), age at first calving (AFC) and subsequent calving (AC), service period (SP), gestation period (GP) and calving interval (CI) and productive traits in terms of lactation length (LL), Dry period (DP), lactation milk yield (LMY), 305 days/less days milk yield (305 DY) and peak yield (PY). Only simple statistics unadjusted for environmental effects have been reported as the data were not adequate for the adjustment of these effects. The data has been analyzed for mean, S.E. and C.V. % of each trait for first six lactations separately and for all lactations taken together (Snedecor and Cocharan, 1967).

Results and Discussion

Age at Puberty: The average age at puberty observed in present study was 30 ± 0.83 months (Table 1) which was about 4 months earlier than that of its dam Gangatiri. The range of age at puberty was from 24 to 39 months. Almost similar findings were observed by Chetty and Rao (1986) in Jersey x local crossbred. However, Pyne et. al. (1988) had observed much lower AP (17.3 and 17.63 months) in Jersey x Hariana crossbreds.

Age at first and subsequent calving (AFC and AC): It was observed that these crossbreds deliver their first calf at the age of 39.54 ± 1.44 months and AFC was observed about 4 months earlier than its respective dam Gangatiri.

Average age at 2nd to 6th calvings were 53.91, 65.09, 77.50, 83.28 and 95.20 months, respectively (Table 1). The mean AFC observed in present investigation was slightly higher than the estimates reported by Bhat (1977) in Jersey x Rathi, Kaul et. al. (1985) in Jersey x Local crossbreds, but lower than the estimates reported by Reddy et al. (1987) in Jersey x Ongole crossbreds. As low as 26-28 month AFC in other crossbreds was reported by Parmar et. al. (1986). This variability in AFC clearly indicates that there is a scope for bringing about improvement in this trait. Early first calving ensures minimum investment and quicker gain from the dairy herd.

Service Period (SP): Average service period for first six lactations were 159.55 ± 25.95, 139.18 ± 30.97, 102.55 ± 30.88, 127.20 ± 20.94, 72.14 ± 11.68 and 90.60 ± 19.69 days, respectively (table 1). All lactations taken together it was 131.40 ± 15.21 days. The observed estimate for

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Table 1: Reproductive and productive performance of Jersey x Gangatiri crossbreds.

Traits		Order of lactation						Overall
		1st	2nd	3rd	4th	5th	6th	
	Nos	11	11	11	10	7	5	55
AP (Months)	Mean±	30	-	-	-	-	-	-
	±SE	±0.83	-	-	-	-	-	-
	CV%	13.95	-	-	-	-	-	-
AC (Months)	Mean	35.94	53.91	65.09	77.50	83.28	95.20	-
	±SE	±1.44	±2.07	±2.84	±3.04	±2.63	±3.35	-
	CV%	12.09	12.76	15.54	12.41	8.37	7.88	-
SP (Months)	Mean	159.55	139.18	102.55	127.20	72.14	90.60	131.40
	±SE	±52.95	±30.97	±30.88	±20.94	±11.68	±19.69	±15.21
	CV%	82.62	79.9	99.86	52.07	42.82	48.59	85.84
GP (Days)	Mean	282.90	282.82	283.45	281.00	282.86	284.80	282.82
	±SE	±1.77	±3.08	±3.38	±3.74	±1.65	±1.88	±1.18
	CV%	2.08	3.61	3.96	4.20	1.55	1.48	3.10
CI (days)	Mean	441.55	417.55	385.64	406.40	356.14	375.40	402.39
	±SE	±30.80	±30.85	±28.54	±18.70	±10.92	±18.99	±11.36
	CV%	23.13	24.50	24.55	14.55	8.11	11.32	20.95
LL (Days)	Mean	295.82	293.45	286.36	299.60	265.00	318.00	291.09
	±SE	±11.99	±16.88	±15.93	±10.75	±18.44	±0.84	±6.18
	CV%	13.44	19.08	18.46	11.34	19.06	0.59	15.74
DP (Days)	Mean	154.82	123.36	99.27	106.80	100.14	57.40	112.87
	±SE	±28.40	±33.54	±20.58	±16.82	±12.48	±18.89	±10.66
	CV%	60.84	90.17	68.74	49.81	32.96	13.59	70.06
LMY (kg)	Mean	1668.81	1599.82	1751.18	2032.60	1752.43	1695.60	1750.73
	±SE	±90.61	±127.39	±86.31	±187.99	±147.67	±83.17	±52.08
	CV%	18.00	26.41	16.32	29.25	7.20	10.97	22.06
305 DY (kg)	Mean	1612.09	1523.73	1603.00	1970.60	1720.57	1626.40	1878.89
	±SE	±87.47	±134.15	±105.21	±192.21	±41.07	±81.27	±50.43
	CV%	17.99	26.63	21.77	30.84	6.31	11.17	23.95
PY (kg)	Mean	9.45	11.12	12.35	11.55	12.68	10.92	11.29
	±SE	±0.37	±0.89	±0.73	±1.09	±0.97	±0.96	±0.35
	CV%	13.15	13.15	19.63	29.93	20.30	19.75	22.78

first service period is almost similar to 158.60 days reported by Mitra and Chatterjee (1980) but slightly higher than the estimate reported by Sharma and Singh (1986) and lower than the estimate report by Mishra and Mishra (1987) in Jersey x Hariana crossbreds.

Gestation Period (GP): Average gestation period (Table 1) had narrow range of variation and its estimates were 282.90, 282.82, 283.45, 281.00, 282.86 and 284.80 days for 1st to 6th lactations, respectively and for all lactations together it was 282.82 ± 1.18 days. Findings of Suresh Chand and Sharma (1985) in Jersey x Sahiwal crossbred (281.75 ± 2.60 days) and is very close to the present findings. The estimates of Maurique and Wilcox (1978) for Jersey, Sarojani et. al. (1979) for Canadian H.F., Prasad (1986) for Jersey x Sahiwal and Gill et. al. (1978) for Red Dane x Sahiwal were less than 280 days which was slightly lower than present estimates.

Calving Interval (CI): Calving interval is a very important aspect in lactating animals because of limited economic productive span. Calving interval varied between 356.14 ± 10.92 and 411.55 ± 30.80 days (Table 1) and was highest in 1st lactation and then showed a declining trend in subsequent lactations with an overall mean 402.39 ± 11.36 days. The present estimates are much lower than the estimates repored by Mishra and Mishra (1987) in Jersey x Hariana, Chetty and Rao (1986) in Jersey x Local crossbreds.

Lactation Length (LL): Lactation length recorded during the course of present investigation was 295.82 ± 11.99, 293.45 ± 16.88, 286.36 ± 15.93, 299.60 ± 10.75, 265.00 ± 18.44 and 318.00 ± 0.84 days for 1st to 6th parity respectively (Table 1). An overall LL was 291.09 ± 6.18 days which was much higher than that of lactation length (258.09) of its dam Gangatiri. It clearly indicates a fact that these crossbreds possessed longer LL than their dam. The values for mean LL are in agreement with the findings reported by Dalal et. al. (1991) and Chaudhary et. al. (1994) who observed similar estimates for first LL of Jersey x Hariana crossbreds.

Dry Period (DP): Means of first six dry periods were worked out and are presented Table 1. It was observed that longest dry period (154.82 ± 28.4 days) was observed

in first parity and shortest (57.40 ± 18.89 days) in 6th parity. Overall values was 112.87 ± 10.66 days which is much lower than the pure bred of Gangatiri cows indicating a fact that dry period of Indian dams may be reduced to a certain degree through cross with exotic bull. Average 1st DP in present study is slightly longer than reported by Thalkari et. al. (1995) in Jersey x Deoni and by Dalal et. al. (1991) in Jersey x Hariana crossbreds, but shorter than the overall estimates reported by Deshmukh et. al. (1995) in Jersey x Sahiwal crossbred.

Lactation Milk Yield (LMY): Maximum milk yield (2032.60 ± 187.99 kg) was recorded in 4th lactation and minimum (1599.82 ± 127.39 kg) in 2nd lactation with an overall as 1750.73 ± 52.08 kg (Table 1) which was about 1.5 times more than that of its indigenous dam (Gangatiri). Present estimates are slightly higher than Kaul et. al. (1985) working with 1st lactation yield of Jersey x Hariana crossbreds, but lower than the estimates reported by Pyne et. al. (1988) and Agasti et. al. (1988) working with LMY of Jersey x Hariana crossbreds.

305 days milk yield (305 DY): Means of 305 days milk yield from 1st to 6th lactations were computed and are given in table 1. It was observed that maximum 305 DY was 1970.60 kg in 4th lactation and minimum milk yield was 1553.73 kg in 2nd lactation and taken all lactations together it was 1678.89 ± 50.43 kg. Present estimates compare well with the estimates reported by Agasti et. al. (1988) but lower than the estimates reported by Duc and Taneja (1984) in Jersey x Hariana crossbred.

Peak Milk Yield (PY): Means of peak milk yield from 1st to 6th lactations were calculated and contained in table 1. It was noticed that peak yield was increased from 9.45 kg in 1st lactation to 12.68 kg in 5th lactation and after that it was decreased to 10.92 kg in 6th lactation and their overall mean was 11.29 kg. The present estimates for 1st peak yield compares well with the estimates reported by Koley et. al. (1981), Agasti et. al. (1988) in Jersey x Hariana cows.

From these results it may be concluded that Jersey is a very potential breed for consideration in the crossbreeding programme of the country along with other exotic breeds for the improvement of reproductive and productive efficiency of Indian cattle. But when compared with the performance of crossbreds obtained by Holstain Friesian x Local breeds as available in the literature Parmar et. al. (1986), it was found that Friesian crossbreds exhibit lower age at first calving and some higher yield/lactation. Thus due to these two factors Friesian crossbreds have an edge over Jersey crossbreds.

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Assessment of adoption level of potato growers and their adoption gap in potato production technology

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Abstract

The present study was carried out during the year 2004-05 in meerut district of Uttar Pradesh. To assess the adoption level of potato growers and their adoption gap in potato production technologies. Study reveals that the highest adoption level was found in soil selection of large potato growers (83.33 Per cent) and lowest 66.00 per cent of marginal potato growers.The adoption level of small and medium potato growers were 71.67 and 81.33 per cent respectively. The average adoption level of large potato growers were found highest 71.10 per cent and lowest 51.93% of marginal potato growers the adoption level of small and medium potato growers were 60.61 and 64.80% respectively. The highest adoption mean values were found in manures and fertilizers of all categories potato growers i.e. 8.00, 8.98, 10.53 and 11.25 marginal, small, medium and large potato growers respectively. The lowest mean value were found to be 4.20, 3.80, 3.75 and 3.00 large, medium, small and marginal potato growers with respect to time of fertilizers & manures application, water management and use of improved implements in case of marginal and small potato growers respectively. The average adoption mean values of large potato growers were found highest 65.42 and lowest 47.78 of the marginal potato growers. The adoption mean values of small and medium farmers were 55.77 and 69.62 respectively. The highest adoption gaps were found in plant protection measures of all categories potato growers i.e. 67.75, 59.25, 56.67 and 53.08 per cent marginal, small, medium and large potato growers respectively. The lowest adoption gaps were found in soil selection of all categories potato growers i.e. 35.67, 25.83, 19.16 and 11.67 per cent marginal, small, medium and large potato growers. The average adoption gaps of marginal potato growers were found highest 48.06% and lowest 28.75% of large potato growers, the adoption gaps of small and medium potato growers were 39,57 and 35.19 per cent respectively.

Introduction

Potato is one of the most important crop in the world. It is popularly known as the king of vegetables. The Indian vegetable basket is incomplete with out the potatos. The world's production of potato is 311.4 million tones from 19.22 million hectare of land with an average productivity of 16.20 tones per hectare during the year 2003 (FAO Report 2003).

India is producing 23.27 million tones of potato from an area of 1.28 million hectares with an average yield of 18113 kg per hectare (Agricultural Statistics at a Glance-2005). At present India rank 4th in area, 3rd in production and 10th in productivity in the world (Luthra et al. 2004).

During the last 5 decades our country has progressed significantly by developing high yielding varieties of potato, improved agro-techniques and other production techniques suitable for different agro-climatic zones in country. But there are wide gap between the available technologies and their adoption. Keeping in view the present study was under taken to know the adoption level of potato growers and their adoption gap in potato production technology.

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Methodology

The study was conducted in Meerut district of Uttar Pradesh during the year 2004-05. the district comprises of 12 blocks out of them two blocks were selected based on cropped area and the crop productivity. Five villages from each block and ten potato growers were randomly selected from each village. Thus the total sample size was of 100. The primary data were collected through personal interview with the help of structural scheduled developed and secondary data were collected from FAO, Report-2003 and Agricultural Statistics at a Glance-2005. The data were analyzed and find out the mean values and percentage.

Results and Discussion

The data presented in Table 1, indicates that the highest adoption level was found in selection of soil (83.33%) in case of large potato growers followed by 80.35, 75.83, 75.00, 74.12, 73.37, 72.50, 70.83 ,70.00, 70.00, 69.00 and 46.91 per cent adoption level with respect to the manures and fertilizers, seed rate, time of sowing, storage and transportation, method of sowing, water management, used of improved implements, time of manures and fertilizer application, harvesting of crop,

Table 1: Adoption level of Potato growers

S.No.	Potato production technology	Score assigned	Marginal Potato Growers	Small Potato Growers	Medium Potato Growers	large Potato Growers
1.	Selection of soil	6	66.00	71.67	81.33	83.33
2.	Improved varieties	8	49.37	56.25	61.00	69.00
3.	Seed rate	6	57.50	65.83	68.33	75.83
4.	Time of sowing	6	55.00	66.66	71.00	75.00
5.	Methods of sowing	8	48.37	57.50	61.25	73.37
6.	Manures and fertilizers	14	57.14	64.14	75.21	80.35
7.	Time of manures & fertilizer application	6	54.16	64.16	65.00	70.00
8.	Water management	6	57.50	95.83	63.33	72.50
9.	Plant protection	12	32.25	40.75	43.33	46.91
10.	Use of improved implement	6	50.00	62.50	64.16	70.83
11.	Harvesting of crop	6	54.16	64.16	66.67	70.00
12.	Storage and transportation	8	56.62	62.50	66.87	74.12
	Total and average	92	51.93	60.61	64.80	71.10

improved varieties and plant protection measures respectively.

In case of medium potato growers the highest adoption level was found in selection of soil (81.33%), followed by 75.21, 75.21, 71.00, 68.33, 66.87, 66.67, 65.00, 64.16, 63.33, 61.25, 61.00 and 43.33 per cent adoption level were regarding to manures & fertilizers, time of sowing, seed rate, storage & transportation, harvesting of crops, use of improved implements, water management, method of sowing, improved varieties and plant protection measures respectively.

In case of small potato growers the highest adoption level was found in selection of soil (71.67%), followed by 66.66, 65.83, 65.83, 64.10, 64.16, 64.14, 62.50, 62.50, 57.60, 56.25 and 40.75 per cent adoption level regarding to time of sowing, seed rate, water management, time of manures & fertilizers application, harvesting of crop, manures and fertilizers, use of improved implements, storage & transportation, method of sowing, improved varieties and plant protection respectively.

While the highest adoption level of marginal potato growers was found (66.00%) regarding to selection of soil, followed by 57.50, 57.50, 57.14, 56.62, 55.00, 54.16, 54.16, 50.00, 49.37, 48.37 and 32.25 per cent adoption regarding to seed rate, water management, manures and fertilizers, storage & transportation, time of sowing, time of manures and fertilizers application, harvesting of crop,

Table 2: Mean value of Potato growers on the basis of land holding

S.No.	Potato production technology	Score assigned	Marginal Potato Growers	Small Potato Growers	Medium Potato Growers	large Potato Growers
1.	Selection of soil	6	3.86	4.45	4.85	5.30
2.	Improved varieties	8	3.95	4.50	4.88	5.52
3.	Seed rate	6	3.45	3.95	4.10	4.55
4.	Time of sowing	6	3.30	4.00	4.26	4.50
5.	Methods of sowing	8	3.87	4.60	4.90	5.87
6.	Manures and fertilizers	14	8.00	8.98	10.53	11.25
7.	Time of manures & fertilizer application	6	3.25	3.85	3.90	4.20
8.	Water management	6	3.45	3.95	3.80	4.35
9.	Plant protection	12	3.87	4.89	5.20	5.63
10.	Use of improved implement	6	3.00	3.75	3.85	4.25
11.	Harvesting of crop	6	3.25	3.85	4.00	4.20
12.	Storage and transportation	8	4.53	5.00	5.35	5.93
	Total and average	92	47.78	55.77	59.62	65.42

use of improved implements, improved varieties, method of sowing and plant protection respectively.

The average adoption level of large potato growers found highest 71.10% and lowest 51.93%. The average adoption level of small and medium potato growers were 60.61 and 64.80% respectively.

The data presented in Table 2, reveals that the highest mean value was found 11.25 of large potato growers regarding to manures and fertilizers, followed by 5.93, 5.87, 5.63, 5.52, 5.30, 4.55, 4.50, 4.25, 4.20 and 4.20 mean value regarding to storage & transportation, method of sowing, water management, improved varieties, selection of soil, seed rate, time of sowing, use of improved implements, time of fertilizer and manures application and harvesting of crop respectively.

In case of medium potato growers highest mean value was found 10.53 regarding to manures & fertilizers, followed by 5.35, 5.20, 4.90, 4.88, 4.85, 4.26, 4.10, 4.00, 3.90, 3.85 and 3.80 mean value regarding to storage & transportation, plant protection, method of sowing, improved varieties, selection of soil, time of sowing, seed rate, harvesting of crop, time of fertilizer & manures application, use of improved implements and water management respectively.

In case of small potato growers highest mean value was found 8.98, regarding to manures and fertilizers, followed by 5.00, 4.89, 4.60, 4.50, 4.45, 4.00, 3.95, 3.95, 3.85, 3.85, and 3.75 mean values regarding to storage & transportation, plant protection, method of sowing, improved varieties, soil selection, time of sowing, seed rate, water management, time of fertilizers & manures application, harvesting of crop and use of improved implements respectively.

While highest mean value was found 8.00 of marginal potato growers regarding to manures & fertilizers, followed by 4.53, 3.95, 3.87, 3.87, 3.86, 3.45, 3.45, 3.30, 3.25, 3.25 and 3.00 mean values regarding to storage & transportation, improved varieties, plant protection, method of sowing, selection of soil, seed rate, water management, method of sowing, time of fertilizer & manures, harvesting of crop and improved implements respectively.

The average mean values of large potato growers were found highest 65.42 and lowest 47.78 of marginal potato growers. The mean values of small and medium farmers were 55.77 and 59.62 respectively.

The presented in Table 3, indicates that the highest adoption gap was found in plant protection (67.75%) in case of marginal potato growers, followed by 51.62, 50.62, 50.00, 45.83, 45.83, 45.00, 43.37, 42.85, 42.50, 42.50 and 35.67 per cent adoption gap regarding to method of sowing, improved varieties, use of improved implements, time of fertilizers & manures application, harvesting of crop, time of sowing,, storage & transportation, manures & fertilizers, seed rate, water management and selection of soil respectively.

In case of small potato growers the highest adoption gap was found in plant protection (59.59%), followed by 43.75, 42.50, 37.50, 37.50, 34.14, 35.83, 35.83, 34.16, 34.16, 33.33 and 25.83 per cent adoption gaps regarding to improved varieties, method of sowing, use of improved implements, storage & transportation, manures & fertilizers, water management, harvesting of crop, seed rate, time of fertilizer & manures application, time of sowing and selection of soil respectively.

In case of medium potato growers the highest adoption gap was found in plant protection (56.67%), followed by 39.00, 38.75, 35.83, 35.00, 33.33, 33.12, 31.67, 28.67, 24.78 and 19.16 per cent adoption gaps

Table 3: Adoption gap in Potato production technology of Potato growers

S.No.	Potato production technology	Score assigned	Marginal Potato Growers	Small Potato Growers	Medium Potato Growers	large Potato Growers
1.	Selection of soil	6	35.67	25.83	19.16	11.67
2.	Improved varieties	8	50.62	43.75	39.00	31.00
3.	Seed rate	6	42.50	34.16	31.67	24.16
4.	Time of sowing	6	45.00	33.33	28.67	25.00
5.	Methods of sowing	8	51.62	42.50	38.75	27.75
6.	Manures and fertilizers	14	42.85	37.14	24.78	16.07
7.	Time of manures & fertilizer application	6	45.83	34.16	35.00	30.00
8.	Water management	6	42.50	35.83	36.67	27.50
9.	Plant protection	12	67.75	59.25	56.67	53.08
10.	Use of improved implement	6	50.00	37.50	35.83	29.16
11.	Harvesting of crop	6	45.83	35.83	33.33	30.00
12.	Storage and transportation	8	43.37	37.50	33.12	25.87
	Total and average	92	48.06	39.57	35.19	28.75

regarding to improved varieties, method of sowing, water management, improved implements, time of fertilizers & manures application, harvesting of crop , storage and transportation, seed rate, time of sowing, manures & fertilizers and selection soil respectively,

While the highest adoption gap of large potato growers was found (53.08%) in plant protection, followed by 31.00, 30.00, 29.16, 25.75, 27.50, 25.87, 25.00, 24.16, 16.07 and 11.67 per cent adoption gaps regarding to improved varieties, time of fertilizers and manures application, harvesting of crop, use of improved implements, method of sowing, water management, storage & transportation, time of sowing, seed rate, manures & fertilizers and selection of soil respectively.

The average adoption gaps of marginal potato growers were found highest 48.06 per cent and lowest 28.75 per cent of large potato growers. The adoption gaps of small and medium potato growers were 39.57 and 35.19 per cent respectively.

Conclusion

It may be concluded that highest adoption level was found in selection of soil of all categories potato growers and the lowest in plant protection measures of all categories potato growers. The average adoption levels of large potato growers were found highest and lowest of marginal potato growers. The highest mean value was found in manures & fertilizers of all categories potato growers and the lowest in marginal and small potato growers regarding to use of improved implements. The highest adoption gap was found in plant protection measures of all categories potato growers. The average adoption gap of marginal potato growers was found highest and lowest of large potato growers. The investigators refer to provide training, farm advisory services and demonstrations to the potato growers for human resource development.

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Variability in seed germinability in low chill plum cultivars

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Abstract

To find out is there any effect of the time taken by plum fruits to mature on germination and seedling attributes. The different fruit growth parameters were taken at weekly interval after petal fall stage and compared with germination attributes. The cultivars on which investigation was undertaken were Alucha Black, Fla 1-2, Howe, Late yellow and Titron. The cultivars Late yellow took 80 days from petal fall stage to come to maturity and took minimum number of days (18.59) for radicle emergence and showed germination percentage 6.6 and maximum survival percentage 66.25 under field condition. So, it can be suggested for use as rootstock on the basis of its high survival ability. Whereas performance of cultivar Alucha Black was also found at par which gave around 9 plants under field condition because of higher germination percentage.

Introduction

In India, plum (Prunus salicina L.) is mainly grown in the hilly region and north-west plains. The cultivation of this fruit is plains of subtropical region became popular due to its quick growing and early maturing traits. Some low chilling requiring plum varieties namely Alucha Black, Fla 1-2, Howe Late yellow and Titron are grown successfully in northern parts of India under subtropical conditions. Stone fruits show double sigmoidal growth curve comprising initial and final phases of rapid growth with an intervening period of reduced growth. The lag phase is associated with diversion of resources to embryo or endosperm growth or endocarp lignifications (Monselise, 1986). Double sigmoidal fruit growth consists of three phases: Phase I (cell division), Phase II (seed development) and Phase III (flesh bulking). The food reserves available in seed are especially important in determining the potential of species to establish and to persist disturbance. Food reserves present in seed results in large differences in seedling establishment (Chapin et al., 2000). Embryos of early ripening stone fruits abort or fail to germinate (Bassi and Ryugo, 1990). Percentages of normal seed development of different peach cultivars seem to have a close relationship with the time they take to come to maturity (Hundal and Khajuria, 1976). The present study was undertaken to know about characteristics fruit growth pattern in plum cultivars and utilization of seed reserves for germination and seedling growth in different plum cultivars.

Material and Methods

The investigation was carried out at Horticulture Research Center, Patharchatta, G.B. Pant Univ. of Agric. & Tech., Pantnagar during the year 2005-06. the cultivars used were Alucha Black, Fla 1-2, Howe, Late yellow and Titron. About 400 fruits of each cultivars were tagged 2 weeks after petal fall. The samples were collected at 7 days interval from tagging onwards till harvest, 20 fruits used in each sampling. The experiment was laid out in randomized block design with four replications. The observations were recorded on petal fall stage, physical characters of fruit viz., fruit weight, fruit volume, fruit size and specific gravity. Final seed size and weight at the time of harvest was recorded. Endocarp free seeds were soaked in distilled water for 48 hours and then disinfected with 1 per cent NaOCL. The seed were sown in polythene bags filled with sterilized sphagnum moss, stratified in incubator at 80C temperature for 45 days. Germinated seeds were sown in pots filled with sand, soil and FYM in 1:1:1 ratio. Observations were recorded on seed germination percentage, days to radicle emergence, survival percentage, fresh weight of shoot and root, dry weight of shoot and root. The data were recorded were subjected to 'F' test.

Results and Discussion

The maximum fruit weight (41.17g) and fruit length (4.45 cm) were obtained from Fla 1-2 but showed poor germination percentage (2.11) (Table 2). The probable

Table 1: Physical changes during development and maturity of plum cv. Alucha Black.

Sampling	Fruit weight (g)	Fruit volume (ml)	Fruit length (cm)	Fruit diameter (cm)	specific gravity
16.3.05	1.32	1.27	0.722	0.762	1.030
23.3.05	2.24	2.20	0.925	0.855	1.011
30.3.05	3.02	2.62	1.520	1.480	1.150
6.4.05	3.77	2.83	1.610	1.650	1.330
13.4.05	3.79	3.04	1.650	1.660	1.240
20.4.05	3.84	3.54	1.660	1.660	1.080
27.4.05	4.30	3.13	1.930	2.240	1.022
4.5.06	7.93	8.93	2.130	2.750	0.992
11.5.05	10.67	10.65	2.250	2.830	0.992
18.5.05	12.71	12.82	2.330	2.940	0.991
S.Em±	0.25	0.13	0.120	0.960	0.140
CD at 5%	0.74	0.36	0.350	2.800	0.420

Table 2: Physical changes during development and maturity of plum cv. Alucha Black.

Sampling	Fruit weight (g)	Fruit volume (ml)	Fruit length (cm)	Fruit diameter (cm)	specific gravity
16.3.05	4.71	3.95	1.00	0.93	1.192
23.3.05	7.69	7.25	2.66	2.08	1.061
30.3.05	11.05	14.01	2.79	2.52	0.788
6.4.05	14.76	22.15	3.42	2.65	0.666
13.4.05	15.20	22.59	3.52	2.65	0.672
20.4.05	22.73	26.84	3.74	2.66	0.846
27.4.05	26.52	30.81	4.11	2.76	0.860
4.5.06	34.37	35.95	4.42	3.29	0.956
11.5.05	41.17	40.97	4.45	3.73	1.000
S.Em±	0.71	0.768	0.71	0.46	0.500
CD at 5%	2.08	2.24	2.05	1.30	1.400

Table 3: Physical changes during development and maturity of plum cv. Howe.

Sampling	Fruit weight (g)	Fruit volume (ml)	Fruit length (cm)	Fruit diameter (cm)	specific gravity
30.3.05	1.26	1.23	0.75	0.42	1.024
6.3.05	3.57	3.54	0.87	0.80	1.008
13.4.05	5.67	5.74	1.65	1.56	0.987
20.4.05	7.77	9.23	2.11	2.03	0.844
27.4.05	9.79	10.08	2.44	2.43	0.971
4.5.05	10.74	10.88	2.60	2.50	0.987
11.5.08	11.61	13.79	2.66	2.60	0.841
18.5.05	13.35	18.73	2.77	2.65	0.712
23.5.05	18.17	21.55	3.12	3.44	0.843
2.6.05	19.55	23.21	3.23	3.46	0.843
S.Em±	0.37	0.12	0.98	0.12	0.650
CD at 5%	1.02	0.37	2.80	0.35	1.900

Table 4: Physical changes during development and maturity of plum cv. Late yellow.

Sampling	Fruit weight (g)	Fruit volume (ml)	Fruit length (cm)	Fruit diameter (cm)	specific gravity
23.3.05	0.57	0.85	0.76	0.64	0.676
30.3.05	1.99	1.53	1.43	1.23	1.292
6.4.05	3.66	3.36	1.97	1.95	1.080
12.4.05	5.85	5.36	2.37	2.01	1.090
20.4.05	7.87	6.37	2.52	2.17	1.230
27.4.05	8.56	8.62	2.57	2.26	0.993
4.5.08	12.98	11.46	2.60	2.58	1.310
11.5.05	18.64	14.66	2.95	3.00	1.190
18.5.05	21.99	17.73	3.40	3.30	1.060
25.5.05	23.30	25.52	3.47	3.44	0.913
S.Em±	0.14	0.11	0.98	0.89	0.15
CD at 5%	0.42	0.32	2.50	2.50	0.44

Table 5: Physical changes during development and maturity of plum cv. ATitro.

Sampling	Fruit weight (g)	Fruit volume (ml)	Fruit length (cm)	Fruit diameter (cm)	specific gravity
16.3.05	0.30	0.83	0.50	0.27	0.361
23.3.05	0.60	1.34	0.72	0.49	0.447
30.3.05	2.10	4.56	1.39	0.88	0.460
6.4.05	4.10	6.29	2.01	1.04	0.651
13.4.05	5.30	8.17	2.21	1.07	0.648
20.4.05	7.70	10.62	2.22	1.11	0.725
27.4.05	9.60	11.45	2.24	1.13	0.838
4.5.06	11.20	11.79	2.25	1.16	0.823
11.5.05	14.92	14.03	2.28	1.18	1.063
16.5.05	16.70	14.23	3.15	2.34	1.170
S.Em±	0.30	0.89	0.28	0.15	0.17
CD at 5%	0.87	2.50	0.82	0.45	0.50

reason behind this may be that Fla 1-2 took minimum days 66 from petal fall to come to harvest. In cultivars Alucha Black petal fall stage occurred earliest and it took 88 days from petal fall to come to harvest stage, which was the maximum among different cultivars (Table 1) and under field condition maximum number of plants (9) were obtained that is, out of 100 seeds sown around 5 plants were obtained under field condition, whereas in case of Alucha Black which gave less survival percentage than Late yellow but because of maximum germination percentage (26.75) out of 100 seeds sown around 9 plants were obtained under field condition. Cultivars Titron inspite of taking 82 days from petal fall to come harvest showed minimum germination percentage (1) and survival percentage (0.455) among various cultivars (Table 6). This may be due to accumulation of some germination inhibitors during development and maturity. Cultivars Howe inspite of taking comparatively less number of days (75) Table 3) took 21.45 days for radicle emergence and germination percentage obtained was 5.99 survival percentage was also significantly better (57.75) among various cultivars. The reason behind this result may be comparatively longer lag period during which cotyledons might have accumulated sufficient food reserves (Table 5). Khajuria (1978) and Barbosa et al. (1985) working independently on peach seed germination. They reported positive

Table 6: Petal fall stage, seed parameters and germination attributes of different plum cultivars.

Cultivars	Petal fall	Seed length (cm)	Seed diameter (cm)	Seed weight (g)	Germination percentage	Days taken for redicle emergence	Survival percentage	Fresh weight of shoot (g)	Fresh weight of root (g)	Dry weight of shoot (g)	Dry weight of root (g)
Aluch Black	20.2.05	1.62	1.03	0.76	26.75	21.25	35.50	0.513	0.266	0.168	0.077
Fla 1-2	07.03.05	2.07	1.44	0.67	2.11	37.00	8.57	1.775	0.873	0.686	0.272
Howe	20.03.05	1.88	1.32	0.76	5.99	21.45	57.75	0.889	1.170	0.383	0.336
Late yellow	08.03.05	2.02	1.67	0.99	6.60	18.59	66.25	1.246	0.539	0.418	0.186
Titron	24.02.05	1.82	1.30	0.50	1.00	34.33	0.445	0.709	0.534	0.249	0.172
SEm±		0.076	0.077	0.24	1.27	0.866	1.28	0.99	0.671	0.272	0.187
CD at 5%		0.230	0.230	0.76	3.92	2.66	3.95	3.00	2.060	0.840	0.577

correlation between the days required from flowering to fruit maturity and the rate of germination. A double sigmoidal growth pattern was observed in all the cultivars. This finding was in accordance of Sharma and Sharma (1990), Javonovic and Velickovic (1982) and Thompson and Liu (1972). Cultivars Late yellow took minimum days (18.59) (Table 4) for radicle emergence and showed germination percentage 6.6 and survival percentage 66.25 under field condition Late yellow can be suggested for use as rootstock on the basis of its high survival ability. However, further research at molecular level is needed to approve this finding.

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Knowledge and adoption levels of farmers about improved seed technology

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Abstract

The present study was carried out in Aligarh district of Uttar Pradesh in year 2006-07 to assess the knowledge and extent of adoption of seed technology of wheat production. The data of 300 respondents revealed that very high majority of respondents had adopted seed technology. There is highly significant and positive relationship between caste, family composition, income, size holding, farm power, change agent linkage and socio-economic status of the small farmers with extent of adoption of seed technology.

Introduction

Agriculture continues to be the occupation and way of life for more than half of Indian population even today. Indian agriculture has been on traditional lines till the first waves of green revolution in late sixties. The green revolution gave a sudden boost to the production and productivity of major cereals in the assured irrigated areas of the Punjab, Haryana and western U.P. Quick dissemination of technological information from the agriculture research to the farmer's field and reporting of farmer feed back to the research is one of the critical inputs in transfer of agriculture technology. Adoption of any improved technology involves a process in which awareness created, attitude are changed and favorable condition for adoption are provided.

Materials and Methods

This study was conducted in Aligarh district of Uttar Pradesh comprising 17 blocks, out of these blocks only three blocks namely Dhanipur, Akrabad and Gangri were selected randomly, 10 villages were selected from simple random sampling method and 30 respondents were selected from each village. Thus the total 300 respondents are selected. The data were collected with the help of pre-tested interview schedule. In order to find out the association of different socio-economic attributes of respondents with the increase knowledge level and adoption of seed technology, X^2 test and r was employed.

Results and Discussion

It is evident from Table 1 that majority of the farmers (i.e. 73.33 per cent) have cultivated HYV of wheat in very high range of adoption level of 76-100 per cent of the potential area, while 23.99% respondents have adopted the HYV seed in the adoption level of 26-75% of the potential area. It is also clear from the table that out of total number of adopter small farmers most of them (94.33%) have used seed technology to high

Table1: Level of adoption of seed technology in wheat

Level of adoption (%)	HYV seed cultivated area	Seed rate	Seed treatment	Depth of sowing	Row to row distance	Sowing time	Method of sowing
Up to 25	8	2	260	5	0	0	5
	(2.67)	(0.66)	(86.67)	(1.67)	(0.0)	(0.0)	(1.67)
26-50	34	4	11	16	13	19	17
	(11.33)	(1.33)	(3.67)	(5.33)	(4.33)	(6.33)	(5.67)
51-75	38	11	12	42	92	57	31
	(12.66)	(3.67)	(4.00)	(14.00)	(30.67)	(19.00)	(10.33)
76-100	220	283	17	237	195	224	247
	(73.33)	(94.33)	(5.67)	(79.00)	(65.00)	(74.67)	(82.33)
Total	300	300	300	300	300	300	300
	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)

Figure in parenthesis indicate percentage

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range of adoption level.

The Table clearly reveals that majority of the small farmers (79.00%) have adopted the seed technology in term of depth of sowing in the range of 76-100% level of recommended technology. The seed technology in term of row to row distance was also adopted by the majority of respondents (65.00%) in the extent of 76-100 per cent.

Table 2: Overall adoption of seed technology of wheat

Adoption categories	No. of respondents	Per cent adoption
Low adoption	53	17.67
Medium adoption	140	46.67
High adoption	107	35.67
Total	300	100.00

The Table 1 further reveals that quit high per cent of the small farmers (93.67%) have adopted the seed technology in term of sowing in the extent of 51-100 per cent. The seed technology in term of method of sowing was also adopted in the extent of 76-100% by the majority of the respondents (small farmers) i.e. 82.33 per cent. Thus the study concluded that except seed treatment technology the rest of the practices concerned with seed technology was adopted by majority of the farmers to high level of adoption (Srivastava and Singh, 1998) have also observed the similar findings.

Table 3: Correlation between socio-economic characteristics and adoption of seed technology

S.No.	Socio-economic	Seed technology
1.	Age (r)	0.067NS
2.	Caste	23.762**
3.	Education	26.243*
4.	Family type	18.898**
5.	Family size	2.183NS
6.	Income	0.186**
7.	Size of holding	0.162**
8.	Farm power	0.353**
9.	Change agent linkage	33.482**
10.	Social participation	0.030NS
11.	Urban contact	0.032NS
12.	Socio-economic status	0.238**

* Significant at 1% level

** Significant at 5% level

NS - Non-significant

Table 2 clearly reveals that 46.67% respondents were observed in the medium adoption categories of seed treatment technology of wheat. The farmers who are found in the high adoption level are 35.67% and those who are in low adoption category are 17.67% only (Soni et al., 2003).

It is evident from the Table 3 that there was a significant and positive relationship between caste, family composition, income, size of holding, farm power, change agent-linkage and socio-economic status of the small farmers. The other variables like age, family size, social participation and urban contact were found to be non-significant in their relationship with the level of adoption of seed technology (Rai and Duggal, 2005 and Prakash et al., 2004) have also observed the similar findings.

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Effect of zinc sulphate, borax and calcium nitrate in flowering, fruiting, yield and quality of Litchi cv. Dehradun

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Abstract

An investigation was carried out to study the influence of Zn, B and Ca on floweing, fruiting, yield and quality attributes of litchi during the year 2007-08. Different levels of Zn 0.3%, 0.4%, 0.5%; B 0.3%, 0.4% and Ca 1.0% and 1.5% were sprayed in the month of October i.e. prior to flower bud differentiation and it was repeated in February at full blossom. The combination of zinc sulphate 0.4%, borax 0.4% and calcium nitrate 1.5% was found most effective in increasing fruit set, weight of fruit, T.S.S. content and yield/tree and decreasing fruit drop, controlling fruit cracking and minimizing acidity content in litchi fruits.

Introduction

Litchi (Litchi chinensis Sonn.) belonging to family sapindaceae is a delicious fruit of excellent quality. The translucent flavored aril of edible flesh of the litchi is liked very much as a table fruit all over the world. In China, it is very popular in dried or canned forms. Dried litchi is known as litchi nut. Despite the delicious juicy fruits of excellent quality its cultivation in the country has not made much head way and it is grown in restricted pockets. In India, its covers an area of about 63000 ha with a production of 381000 M.T. (Indian Horticulture Data base, 2006) mainly confined to Mujaffarpur (Bihar), Saharanpur (U.P.), Dehradun (Uttaranchal), states of West Bengal, Assam and Jharkhand. Its limited cultivation is mainly due to its exacting soil and climatic requirement having ample of micro and macronutrients. Besides calcium, micro nutrients particularly zinc and boron play significant role in improving quality and yield, and minimizing fruit splitting. An experiment was, therefore, planned to study the impact of foliar nutrition of these nutrients on litchi cv. Dehradun.

Material and Methods

The experiment was carried out at Horticulture Garden, Department of Horticulture, C.S.A. Univ. of Agri. & Tech., Kanpur during the year 2007-08 on 35 years old litchi trees. Zinc in the form of $ZnSO_4$ 0.3%, 0.4% and 0.5%, Boron as borax 0.3%, 0.4% and calcium in the form of $Ca(NO_3)_2$ 1.0% and 1.5% in different combinations were tried as foliar sprays in a randomized block design with three replications. NPK was applied in two splits first 15 days after fruit set and second 15 days after harvest. The spraying was done with a foot sprayer as per schedule taking 5 litres of respective solution using screen to avoid mixing of spray solution. First spray was done on 15 October before flower bud differentiation and it was repeated on 15 February at blossom. The observations regarding physical and chemical parameters of fruits were recorded by standard methods. The size of fruits was measured by a vernier calipers and weighing by an electronic balance. T.S.S. was recorded using hand refractometer, sugar and acidity content of fruit were estimated as per A.O.A.C. (1990).

Results and Discussion

Days to flower initiation

Foliar application of minerals hastened flowering significantly taking 99.78 days when Zn 0.4% +B 0.4% + Ca 1.5% (T_6) was applied. The next effective treatment was noted Zn 0.5% + B 0.4% + Ca 1.0% taking 99.87 days (T_{12}) and remaining at par with T_6 (Table 1). The flowering was delayed maximum (104 days) when the trees were devoid of salt application (control). It was, however, followed by $ZnSO_4$ 0.3% + B 0.3% and $Ca(NO_3)$ 1.0% , taking 103 days. Both the treatments i.e. control and T_1 remaining significantly at par in between took longest period plan than the rest of treatments. Rani and Brahmchari (2001) and Babu and Singh (2001) augment earlier flowering in litchi due to complex action of applied nutrients.

Fruit set and fruit drop

Foliar application of Zn 0.4% + B 0.4% + Ca 1.5% (T_6) in the present trial gave a high as 25.58% fruit set closely followed by Zn 0.4% + B 0.4% + Ca 1.0% (T_8) expressing 25.5% and T_7 giving 25.3% fruit set. All the three treatments i.e. T_6, T_7 and T_8 when compared among themselves remained statistically at par. The trees under control showed the poorest fruit set (21.59%). The superiority observed in fruit set caused by foliar spray of minerals may be ascribed to the complex role of zinc, boron and calcium. Zinc is an essential component of several enzyme systems which regulate metabolic activities in plants and control the equilibrium between CO_2, water and carbonic acid. Boron is concerned with

Table 1: Effect of NzSO4, Borax and $Ca(NO_3)_2$ on flowering, fruit quality and yield of litchi

S.No. Treatments	Days to flower	Fruit set (%)	Fruit drop (%)	Fruit cracking (%)	Fruit weight (g)	T.S.S. (%)	Acidity (%)	Yield (kg/tree)
T_0 Control - Water spray	104.0	21.59	78.6	15.44	18.26	18.10	0.643	78.5
T_1 Zn 0.3% + B 0.3% + Ca 1.0%	103.0	21.99	76.1	14.80	19.09	19.10	0.593	83.5
T_2 Zn 0.3% + B 0.3% + Ca 1.5%	100.7	22.75	76.6	13.08	19.61	19.00	0.578	86.8
T_3 Zn 0.3% + B 0.4% + Ca 1.0%	102.8	22.86	76.6	10.00	19.34	19.99	0.501	86.0
T_4 Zn 0.3% + B 0.4% + Ca 1.5%	100.0	23.99	76.6	9.94	20.47	20.80	0.490	91.6
T_5 Zn 0.4% + B 0.3% + Ca 1.5%	102.0	23.16	76.5	12.50	19.65	19.20	0.569	90.2
T_6 Zn 0.4% + B 0.4% + Ca 1.5%	99.8	25.58	70.2	9.10	22.68	21.76	0.434	99.6
T_7 Zn 0.4% + B 0.3% + Ca 1.5%	101.2	25.30	73.5	14.75	20.09	19.45	0.536	97.6
T_8 Zn 0.4% + B 0.4% + Ca 1.0%	100.5	25.50	78.1	11.35	22.44	20.10	0.449	98.6
T_9 Zn 0.5% + B 0.3% + Ca 1.0%	102.0	24.99	77.1	13.09	20.17	19.40	0.586	95.6
T_{10} Zn 05% + B 0.4% + Ca 1.5%	100.5	28.80	77.0	11.34	22.33	20.96	0.483	92.6
T_{11} Zn 0.5% + B 0.3% + Ca 1.5%	103.3	25.10	78.0	13.85	19.44	19.3	0.598	91.8
T_{12} Zn 0.5% + B 0.4% + Ca 1.0%	99.9	25.35	78.0	10.0	21.05	20.30	0.586	97.9
SEm (Diff.) $\pm$	0.609	0.738	0.889	0.819	0.584	0.590	0.007	1.814
CD at 5%	1.258	1.523	1.421	1.273	1.206	1.217	0.014	3.774

flowering and fruiting process, pollen germination, cell division, metabolism of carbohydrates, active salt absorption and hormonal movement (Babu and Singh 2001). Calcium is another important constituent which maintains the sap of cell and when deficient the cells do not grow. The results of the present investigation are in agreement with the reports of Brahmchari et al. (1977), Babu and Singh (2001) and Pathak and Mitra (2008) in litchi.

The trees under control expressed significantly greater fruit drop than the rest of the treatments barring T_{11} and T_{12}. The minimum fruit drop was observed under T_6 i.e. (70.20) followed by T_7 (73.50) and T_3 (76.56%). The foliar nutrition applied affected metabolic activities of the tree, improved the source sink relationship and favorable influenced the metabolic status resulting in better control of drop enhancing the fruits retention. These results are in conformity with the reports of Rani and Brahmchari (2001), Babu and Singh (2001) and Pathak and Mitra (2008).

Fruit cracking was minimized (9.10%) significantly when Zn 0.4% + B 0.4% + Ca 1.5% was applied. It was significantly lesser than the rest of treatments barring T_3 (10.00%) and T_{12} (10.02%). The trees under control caused maximum fruit cracking (15.44%). Different factors are associated with fruit cracking as moisture status, temperature, nutritional imbalances and hot winds. The cracking of litchi fruits in the present investigation was reduced due to cumulative effect of applied nutrients. Under borax deficiency, the supply of carbohydrates to the meristematic regions is reduced and tissues break down thus, cracking of fruits is favoured. Besides Zn, B and Ca regulate auxine in the plants increasing synthesis of tryphophane. Zn deficiency causes high osmotic pressure restricting uptake of water. Whereas, calcium imparts turgidity to cell playing an important role in the maintenance of membrane integrity and permeability (Sinha et al. 1999). The results of the present investigation are in line with the reports of Pathak and Mitra (2008).

Fruit quality

The quality of litchi fruits judged in terms of their weight T.S.S. and acidity content was improved significantly under the foliar application of Zn 0.4% + B 0.4% + Ca 1.5% revealing 22.68g, 21.76'B and 0.434% value respectively. The improvement in fruit weight and T.S.S. may be ascribed to be better vegetative growth imparted by foliar feeding of nutrients in optimal concentrations. As regards the acidity content, lower values are appreciable and T6 followed by T8 reduced it significantly. The trees under control produced lighter fruits having lower T.S.S. and greater acidity contents. Borax is known to stimulate rapid metabolism of water and sugar and the nutrient applied improved the synthesis of carbohydrates and metabolites. The findings are in conformity with the reports of Pathak and Mitra (2008) in litchi.

It was, however, decreased with increase in T.S.S. contents. The acids under the influence of applied nutrients might have either converted into sugars and their derivatives by the reaction involving reversal of glycolytic path way or may have been used rapidly as a substrate in the respiration or both.

Yield

The yield of fruit was recorded highest (99.56 kg/ tree) in T6 treatments. The treatmentT_7 (97.56kg) T8 (98.65 kg) and T_{12} 97.90 kg/tree) remained statistically at par with T_6. the trees devoid of nutrient application caused (control) gave significantly poor yield (78.50 kg). The superiority caused by nutritional treatments in increasing the yield are obviously due to their direct or indirect involvement in fruit setting, reducing fruit drop, improving fruit retention and inducing better growth and development in fruits. The finding are in line with the reports of Brahmchari et al. (1977) and Pathak and Mitra (2008) in litchi.

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Marketed and marketable surplus of pulses in Hamirpur district of Uttar Pradesh

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Introduction

India is the largest producer of pulses in the world, pulses are grown over an area of 21.7 million ha with a production of 11.0 million tonnes and productivity about 544 kg/ha during 2000-2001. The major pulses producing states are UP, MP, Maharastra, Orissa and Rajasthan which account for 68% of total pulse production of the country. No doubt, pulses play an important role in Indian agriculture. Besides being rich in protein, they sustain the productivity of the cropping system. Their ability to use atmospheric nitrogen through biological nitrogen fixation (BNF) is economically more sound and environmentally acceptable.

The common pulses grown during kharif season are chickpea, lentil, field pea and rajmah and during rabi the pigeonpea, mungbeen, mothbean, horsegram, cowpea and ricebean. 60 per cent area under rabi pulses and 40 per cent area under kharif pulses are covered. The per capita availability of pulses in India is 29 gm/day (2001). Uttar Pradesh stands with first rank with an area of 3.07 million ha and production 2.17 million tonnes during 2000-01. Hamirpur district in Uttar Pradesh occupies highest acreage i.e. 28.46 thousand ha with a production of 24.26 thousand metric tonnes.

One of the important functions of marketing system is the development of agricultural surplus. In rural household sccnario, it is an issue of most importance for developing country like India. Indeed, marketable surplus plays a vital role in contributing capital formation as well as meeting the requirements for ever increased urban population. Estimation of marketable surplus is also considered necessary for a sound procurement policy and for adoption of an appropriate and flexible strategy for exports and imports. It is important to find out the causes that limit the growth of agricultural surpluses in developed economy. Hence, the study was conducted with following objectives:

i) To study the marketed and marketable surplus of pulses on sample farms.
ii) To estimate the marketed surplus of pulses by period, place and agencies of disposal on different size of farms.
iii) To examine the nature and extent of marketed and marketable surplus of pulses on different size of farms.

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Research Methodology

The study was conducted in Hamirpur district of Uttar Pradesh. The selection of district and block-Maudaha was based on certain criteria, such as higher concentration of area and production in pulses. A sample of eight villages was randomly selected for the study of pulses producer i.e. four villages from first cluster and four villages from second cluster were randomly selected. Further, it was decided to select a sample of 80 producers from the selected pulses villages. The pulses producing farmers were then categorised as marginal (below 1 ha), small (1 to 2 ha), medium (2 to 3 ha) and large (above 3 ha) based on size of land holding. Thereafter, the household from each sample village were selected on the basis of proportionate random sampling which belonged to marginal (32), small (22), medium (16) and large (10) categories. For marketing of pulses, maudaha market was purposively selected because of maximum arrivals of pulses in this market during study period. Simple tabular analysis was used for the computation of the data.

Results and Discussion

It can be concluded from Table 1 that percentage sale to total production for all farms decrease with increasing size of family which accounted for 55.35, 52.94 and 48.93 with respect to small, medium and large family sizes. It is clear that consumption increased with increase in size of family, while marketed and marketable surplus decreased with increase in family size. So, this table shows a trend that if land holding increases, the percentage of sale also increase.

Table 2 indicated that percentage consumption to total production on all farms accounted for 11.93, 19.99 and 25.54 per cent on lentil, gram and arhar, respectively and 17.48% for total pulses crops. Percentage consumption of total pulse crops to total production was found to be decreasing with increasing size of farms and it was 29.92, 17.87, 15.72 and 11.00 per cent in marginal, small, medium and large size groups respectively. The marketed surplus of total pulses increasing with increased size of farms and it varied from 176.11 to 304.69 quintals with on an average of 263.55 quintals.

Table 1: Marketed surplus of pulses in relation to the size of farms and families.

Size of farm (ha)	Size of family								
	Small (1-3 members)			Medium (4-6 members)			Large (7 & above)		
	Total Production	Total sale	sale %tage	Total Production	Total sale	sale %tage	Total Production	Total sale	sale %tage
Marginal (Below 1)	102.25	39.27	38.41	79.90	23.90	29.92	61.65	25.27	40.98
Small (1 to 2)	132.20	63.24	47.84	138.40	72.50	52.39	70.60	39.47	55.91
Medium (2-3)	175.10	96.74	55.00	135.50	83.70	61.78	58.90	27.26	46.29
Large (3 & above)	167.80	120.8	72.00	135.90	79.12	58.22	53.60	27.76	51.79
All farm	578.15	320.05	55.35	489.70	259.22	52.94	244.75	119.76	48.93

Table 2: Consumption and marketed surplus of pulses by size of farms

Size of farm	Total production (quintals)				Total consumption (quintals)				%tage consumption to total production				Marketed surplus (quintals)			
	Lentil	Gram	Arhar	Total	Lentil	Gram	Arhar	Total	Lentil	Gram	Arhar	Total	Lentil	Gram	Arhar	Total
Marginal(Below 1)	102.25	79.90	61.65	243.80	23.05	27.04	20.90	70.99	22.54	33.84	33.90	29.11	78.88	52.51	44.72	176.11
Small (1to 2)	132.20	138.40	70.60	341.20	18.01	25.80	17.17	60.98	13.62	18.64	24.32	17.87	109.80	111.53	47.22	268.55
Medium (2 to 3)	175.90	135.90	58.90	370.70	16.08	27.13	15.07	58.28	9.14	19.96	25.58	15.72	153.59	107.36	43.91	304.86
Large (3 & above)	167.80	135.90	53.60	357.30	11.87	18.05	9.40	39.92	7.07	13.28	17.53	11.00	144.96	116.18	43.55	304.63
Average	144.53	122.52	61.18	328.25	17.26	24.50	15.63	57.39	11.94	19.99	25.54	17.48	121.80	96.89	44.85	263.55

Table 3: Monthwise disposal of pulses by size of farms

Month	Size of farms (hect.)														
	Below 1			1 to 2			2 to 3			3 and above			All farms		
	Lentil	Gram	Arhar	Lentil	Gram	Arhar	Lentil	Gram	Arhar	Lentil	Gram	Arhar	Lentil	Gram	Arhar
March	-	-	-	8.32 (7.57)	16.21 (14.53)	-	-	-	-	-	-	-	8.32 (1.70)	16.21 (4.18)	-
April	10.00 (12.67)	7.18 (13.67)	15.11 (33.78)	9.32 (8.48)	11.15 (9.99)	4.21 (8.85)	19.21 (12.50)	3.54 (3.29)	4.71 (10.72)	25.22 (17.39)	-	-	63.75 (13.08)	23.87 (6.15)	24.03 (13.37)
May	20.49 (25.97)	16.27 (30.98)	10.91 (24.39)	24.63 (22.43)	15.34 (13.75)	9.71 (20.43)	20.44 (13.30)	9.32 (8.68)	8.92 (20.31)	32.11 (22.15)	16.88 (14.52)	10.71 (24.59)	97.67 (20.04)	4.08 (19.11)	40.25 (22.39)
June	29.12 (36.91)	18.23 34.71)	9.77 (21.84)	35.71 (32.52)	53.27 (47.76)	25.48 (53.61)	62.71 (40.82)	32.27 (30.05)	17.53 (139.92)	16.23 (11.19)	44.21 (38.05)	9.21 (21.14)	143.77 (29.50)	147.98 (38.18)	61.91 (34.49)
July	-	-	-	-	-	-	-	24.51 (22.82)	-	-	12.87 (11.07)	14.81 (34.00)	-	37.38 (9.64)	14.91 (8.24)
Nov.	4.22 (5.34)	5.38 (10.24)	4.22 (9.43)	9.23 (8.40)	4.50 (4.03)	3.22 (6.77)	15.35 (9.99)	5.53 (5.15)	4.21 (9.58)	15.41 (10.63)	13.66 (11.75)	4.41 (10.12)	44.21 (9.07)	29.07 (7.50)	23.50 (13.07)
Dec.	15.05 (19.07)	5.45 (10.53)	4.71 (10.53)	22.59 (20.57)	11.06 (9.91)	4.90 (10.31)	35.88 (23.36)	30.19 (28.12)	8.54 (19.44)	55.99 (38.62)	28.56 (24.58)	4.40 (9.27)	129.51 (26.58)	75.26 (19.41)	22.22 (12.36)
Total	78.88 (100.0)	52.51 (100.0)	44.72 (100.0)	109.80 (100.0)	111.53 (100.0)	47.52 (100.0)	163.59 (100.0)	107.36 (100.0)	43.91 (100.0)	144.96 (100.0)	116.18 (100.0)	43.55 (100.0)	487.23 (100.0)	387.58 (100.0)	179.7 (100.0)

Note : Figures in parentheses show the percentage of total

Disposal amount of marketed surplus varies from month to month, in relation to quantity as well as quality. Table 3 indicates that the most of the farmers sell their produce mainly during April-June. After June, it usually falls rainy season, when farmers face problems in selling their produce. Moreover, during rainy season price of the produce comes down. Therefore, farmers stop selling till November and sell the remaining produce during November-December.

It is indicated in the Table 4 that 41.33, 37.17 and 30.77% on lentil, gram and arhar of total marketed surplus was disposed of in the village respectively and the rest

Table 4: Breakup of marketed surplus by agencies

Size of farm (ha)	Place of sale						Sale agencies						Total surplus		
	In side village			Out side village			Village traders			Consumers					
	Lentil	Gram	Arhar	Lentil	Gram	Arhar	Lentil	Gram	Arhar	Lentil	Gram	Arhar	Lentil	Gram	Arhar
Below 1	54.22	15.47	11.45	24.66	37.00	33.27	50.11	39.38	33.92	28.77	13.13	10.80	78.88	52.51	44.72
	(68.73)	(29.48)	(25.60)	(31.26)	(70.52)	(70.40)	(63.52)	(75.00)	(75.84)	(36.48)	(25.00)	(24.16)	(100.0)	(100.0)	(100.0)
1 to 2	60.92	45.71	19.44	48.80	65.82	28.02	74.23	77.93	36.2	35.57	33.60	11.30	109.80	111.53	47.52
	(55.48)	(40.98)	(40.90)	(44.52)	(59.02)	(59.10)	(67.60)	(69.87)	(76.22)	(32.40)	(30.13)	(23.78)	(100.0)	(100.0)	(100.0)
2 to 3	57.66	49.24	15.44	95.93	58.12	28.47	110.23	71.45	30.99	43.36	36.00	13.55	153.59	107.36	43.91
	(37.54)	(45.86)	(35.16)	(62.46)	(54.14)	(64.84)	(71.76)	(66.56)	(70.58)	(28.24)	(33.54)	(29.42)	(100.0)	(100.0)	(100.0)
3 & above	28.59	33.66	8.98	116.37	82.52	34.57	115.15	82.93	29.72	29.81	33.25	13.83	144.96	116.18	43.55
	(19.72)	(28.97)	(20.61)	(80.28)	(71.03)	(79.39)	(79.43)	(71.38)	(68.24)	(20.57)	(28.62)	(31.76)	(100.0)	(100.0)	(100.0)
Total	201.39	144.08	55.30	285.84	243.46	124.35	349.72	271.69	130.85	137.51	115.98	49.48	487.23	387.58	179.7
	(41.33)	(37.17)	(30.77)	(58.67)	(62.83)	(69.23)	(71.77)	(71.10)	(72.82)	(28.23)	(29.90)	(27.18)	(100.0)	(100.0)	(100.0)

Note : Figures in parentheses show the percentage of total

Table 5: Per farm nature and extent of marketed surplus by size of farms

Size of farm (ha)	Production			Stock retaine			Marketed surplus			Marketable surplus		
	Lentil	Gram	Arhar	Lentil	Gram	Arhar	Lentil	Gram	Arhar	Lentil	Gram	Arhar
Below1	3.19	2.49	1.92	0.13	0.12	0.09	2.15	1.27	1.05	2.15	1.27	1.09
1 to 2	6.00	6.29	3.20	0.13	0.13	0.14	4.82	4.48	2.10	5.10	4.89	2.30
2 to 3	10.99	8.49	3.68	0.11	0.15	0.13	9.37	5.90	2.31	9.90	6.21	2.44
3 and above	16.78	13.59	5.38	0.16	0.19	0.18	14.87	10.50	3.42	14.91	11.13	3.49
All farms	9.24	7.71	3.55	0.14	0.15	0.14	7.80	5.53	2.22	8.01	5.87	2.34

58.67, 62.63 and 69.23% on lentil, gram and arhar was sold outside the village, respectively. Another appearing inference in connection with percentage sale of lentil, gram and arhar to total sale in village side, increases with increasing size of farms, while in the case of outside of sale of these lentil, gram and arhar was showing increasing trend with increased size of farms. The percentage of total sale to village traders was 71.77, 70.10 and 72.82% in lentil, gram and arhar, respectively, whereas percentage sale by consumer was covered 28.23, 29.90 and 21.18 in lentil, gram and arhar, respectively.

The nature and extent of marketed and marketable surplus of pulses as indicated in Table 5 depicts that marketable surplus of different pulses was found lesser in marginal but in case of small, medium and large size groups having sizeable production of pulses, marketable surplus witnessed higher than marketed surplus, where considerable portion of produce was consumed by farm families.

Conclusion

It is, thus, concluded that the percentage sale to total production for all farms decreases with increasing size of family while marketed surplus were found decreasing with increase in family size.

In respect of marketed surplus and consumption to total pulses production, it showed decreasing trend and found out as 29.11, 17.87, 15.72 and 11.00% marginal, small, medium and large size groups respectively, side by side, marketed surplus of total pulse were found to be increased with increasing size of farms. Month wise distribution of marked surplus revealed that most of the farmers sell their produce mainly during April to June. Which ranged 30 to 42% disposal there in the village and 58 to 70% out side the village. The percentage of total sale to village traders was 71.77, 70.10 and 72.82% in lentil, gram and arhar, respectively. The marketable surplus of different pulses was found lesser in marginal size group. In case of small, medium and large size groups having sizeable production of pulses, marketable surplus was found higher than marketed surplus.

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Role of women in paddy and wheat production in Pusa, Bihar

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Abstract

Women in rural India accounts for a significant share of wage labour in agriculture. Paddy and wheat are the principal kharif and rabi crops cultivated in Bihar. Two representative paddy growing block of Samastipur district namely Pusa and Sarairanjan and for wheat growing blocks of District Samastipur and Muzaffarpur were purposively selected to examine the participation of women. Women played a greater role in the production of paddy than of wheat in the study area. Transplanting and weeding in paddy while weeding and harvesting in wheat were the major operations among all farm activities, women also played a role in many other farm activities including transplanting, primary tillage (in paddy but not wheat), application of manure and fertilizers and irrigation, but were excluded from activities which required operation of machinery.

Introduction

Women in rural India account for a significant share of wage labour in agriculture. Typically providing crucial support for poor farm households. Although their earnings contribute significantly to household incomes, many of the activities that women perform go unacknowledged as work, so that women are sometimes referred to as "invisible farmers" Technical change in agriculture-to the extent that it increases returns to labour and land-has a direct bearing on women's earnings, especially for women who have some control over income from land for example, Quisumbing (1994). Augmenting women's effective earning capabilities can also enhance their status and security in the family.

It is increasingly being recognized that if agricultural output and productivity is to be raised on a sustainable basis, that new technologies have to address the specific requirements and shills of women in the farm sector. Yet there are few studies that quantify the role of women in agricultural work. It is in this context that the present study was undertaken. In particular, it examines the participation of women in paddy and wheat production in the Samastipur district of Bihar.

Methodology

Paddy and wheat are the principal kharif and rabi crops cultivated in Bihar. Two representative paddy growing block of Samastipur district namely Pusa and Sarairanjan were purposively selected. Three villages from each block and ten farmers from each village were selected randomly, constituting the total sample of 60 paddy growers. Wheat is an irrigated crop. Four wheat growing blocks of district Samastipur and Muzaffarpur were purposively selected for the study. One wheat growing village from each block and 12 wheat growers from each village were then sampled. Thus, a total of 48 wheat growers were selected. The data on operation wise labour utilization pattern were collected by a survey during the year 2001-02.

Results and Discussion

Labour use patterns in paddy

Paddy is the most important cereal crop of the study area. As is the case with other crops, the timely availability of labour for crucial operations in important to relies the full yield potential of the crop. Table 1 details the labour utilization pattern for paddy disaggregated both by gender, and by type of (family versus hired) labour. For case of reading, Table 2 provide the relevant cross tabulation in percentage terms.

Gender-specificity to crop operations, and a skewed pattern of demand for hired labour, are the salient features of labour use in the crop. On an average, paddy production requires 66 days of labour per hectare, of which women provide 46%. Further hired labour (53%) and family labour (47%) are used in equal measure in this crop.

More illuminating is the operation-specific use of labour. We consider first transplanting labour. Which accounts for 38 of the 66 days of the labour used in paddy and is thus the most important. Men and women share equally in this operation (each accounting for about half of the 38 days). Furthermore, two-thirds of the women who work at the transplanting are hired labour.

Turning now to a disaggregating by family versus hired labour, as noted earlier half of the total labour use is accounted for by hired labour. Table 2 suggest that reliance on hired labour is the greatest during transplanting time. Given that labour demand peaks during transplanting time in paddy, it is not surprising that reliance on hired labour is much more marked during transplanting with 61% of the 38 days being accounted for by hired labour in contrast to the 53% figure for all activities.

Weeding is the second most time consuming operation, requiring about 17 labour days in all, half of which is contributed by hired labour. More significantly,

Table 1: Labour utilization pattern in paddy production by gender and type (number of person days per hectare)

Item	Family			Hired			Total		
	Female	Male	Total	Female	Male	Total	Female	Male	Total
Primary tillage	0.39 (0.50)	1.37 (1.40)	1.76	0.27 (0.50)	0.29 (0.50)	0.56	0.66	1.66	2.32
Manure	0.32 (0.04)	0.65 (0.90)	0.97	0.21 (0.40)	0.31 (0.60)	0.52	0.53	0.95	1.43
Chemical fertilizers	0.09 (0.20)	0.60 (0.30	0.69	0.06 (0.10)	0.31 (0.30)	0.37	0.15	0.90	1.06
Transplanting	6.54 (4.80)	8.33 (6.20)	14.87	12.05 (6.90)	11.09 (5.70)	23.14	18.58	19.42	38.00
Interculturing		1.94 (1.40)	1.94		0.28 (0.70)	0.28		2.22	2.22
Weeding	4.39 (3.40)	3.86 (2.80)	8.25	5.00 (3.00)	3.73 (2.70)	8.73	9.39	7.59	16.98
Irrigation	0.35 (0.50)	1.25 (1.70)	1.60	0.12 (0.30)	0.43 (0.80)	0.55	0.43	1.68	2.15
Plant protection		0.18 (0.50)	0.18		0.06 (0.20)	0.06		0.24	0.24
Harvesting	0.31 (0.30)	0.72 (0.40)	1.03	0.14 (0.20)	0.39 (0.30)	0.53	0.45	1.11	1.56
Total	12.39	18.89	31.28	17.85	16.89	34.73	30.24	35.78	66.02

women account for 55% of the weeding work. Weeding is a critical operation, and its timely completion translates directly into higher yields. Hand weeding is meticulous work believed in the domain of what women do best. Further, during weeding operations, men are engaged in other bullock-driven farm activities, precluding their participation in weeding. Women in Samstipur typically do not operate bullock-implements: this tends to be the preserve of men.

Table 2: Cross tabulation of labour use in paddy operations by gender and type

Items	%tage of labour use that is		%tage of labour use that is	
	Female	Male	Family	Hired
Primary tillage	28	72	76	24
Manure	36	64	66	34
Chemical fertilizers	14	86	65	35
Transplanting	49	51	39	61
Interculturing	0	100	87	13
Weeding	55	45	49	51
Irrigation	22	78	74	26
Plant protection	0	100	75	25
Harvesting	29	71	66	34
Total	46	54	47	53

In most of the remaining operation, which account for 17% (11 day) of total labour use. Women have a visible presence. This is true even in primary tillage activities, usually the exclusive domain of men. However, their presence is small, and confined to 'supportive' operations. Women do not yet operate machinery such as tractors. Similarly, while sowing, application of chemical fertilizers and manure and irrigation are male-dominated activities. Women's labour contributions in these activities are not insignificant either. The only operations in which are not seen at all are interculturing and plant protection, these are the responsibility of men in the study area because once again, these are equipment intensive operations, and women is the Samastipur region are not accustomed to operating machinery. These patterns suggest that seasonality in women's employment is much greater than that for men.

It is also interesting to not that in the 11 day spent in activities other then weeding and harvesting, the reliance is much greater on family labour-which accounted for eight of these days. The primary reason for the overwhelming reliance on family labour for most per hectare operations is the lack of alternative employment opportunities in rural areas, both on the farm and off-farm. The further implication of the skewness in labour demand is that the market for hired labour is markedly seasonal as well.

Labour use patterns in wheat

The pattern of labour use in wheat, the second most important crop of the study area, is rather different than that found in paddy. The figures are set in Table 3 and 4 first, wheat is less labour using than paddy with 54 days of labour used per hectare of wheat, as compared to the 66 day in paddy second, the contribution of women to labour use in wheat, at about one-third, is substantially less than is the case with paddy. Finally, the reliance on family labour in wheat, at two-thirds of overall labour use, is much greater than in the case of paddy. In fact, with the exception of harvesting and weeding operations, the share of family labour in the

Table 3: Labour utilization pattern in wheat production by gender and type (number of person days per hectare)

Item	Family			Hired			Total		
	Female	Male	Total	Female	Male	Total	Female	Male	Total
Primary tillage		1.36 (1.01)	1.36		0.12 (0.34)	0.12		1.48	1.48
Chemical fertilizers	1.08 (1.20)	2.11 (1.86)	3.19	0.72 (1.25)	0.50 (0.76)	1.22	1.80	2.61	4.41
Sowing	0.27 (0.32)	1.28 (0.74)	1.55	0.03 (1.18)	0.17 (0.42)	0.20	0.30	1.45	1.75
Weeding	3.21 (2.38)	2.79 (1.95)	6.00	3.08 (2.67)	1.17 (1.28)	4.25	6.29	3.96	10.25
Irrigation	0.70 (1.02)	15.82 (6.28)	16.52	1.08 (0.75)	4.78 (5.12)	5.87	1.78	20.60	22.38
Harvesting	3.08 (2.05)	3.94 (3.18)	7.02	3.50 (3.80)	2.96 (2.31)	6.46	6.58	6.90	13.48
Total	8.34	27.30	35.64	8.41	9.71	18.12	16.75	37.00	53.76

total labour used for any operation exceeds 70 per cent.

The most time-consuming activity in the case of wheat is irrigation-accounting for 40% of the total labour used. This operation is almost entirely performed by men and largely by members of the family. In the Samstipur region, wheat requires about 15 to 16 irrigations. The water for this is provided mainly through tube well irrigation which is often difficult given the erratic power supply conditions.

Table 4: Cross tabulation of labour use in paddy operations by gender and type

Items	%tage of labour use that is		%tage of labour use that is	
	Female	Male	Family	Hired
Primary tillage	0	100	8	92
Chemical fertilizers	41	59	28	72
Sowing	17	83	11	89
Weeding	61	39	41	59
Irrigation	8	92	26	74
Harvesting	49	51	48	52
Total	31	69	34	66

One quarter of the labour use is during harvest, in which both men and women and family and hired labour, share about equally. Weeding takes approximately ten days per hectare and is one operation in which women predominate-accounting for 61% of weeding labour figure somewhat higher than in the paddy. Other than weeding and harvesting, women's labour contribution in other activities are largely supportive in nature, women are conspicuous by their complete absence from primary tillage unlike the case with paddy. To the extent that women are employed in sowing interesting that family women are preferred. Finally, timeliness is an issue the demand for labour (especially female labour) is reported to be high during weeding and harvesting.

Conclusion

This paper demonstrates the visible nature of women's work on Samstipur farms. The preceding-discussion suggests that there is a great deal of specificity to labour use in agriculture-in terms of crop, gender and contract max. women played a greater role in the production of paddy than of wheat in the study area. Transplanting and weeding in paddy while weeding and harvesting in wheat were the major operations. Women also played a role in many other farm activities including transplanting, primary tillage (in paddy but not wheat), application of manure and fertilizers and irrigation, but were excluded from activities which required operation of machinery. Indeed, in this study area, the impact of mechanization has been to exclude women from certain operations.

It is also important to not that in these villages there are no wage differences between men and women for a given operation, and especially during times of peak labour demand.

The dynamics of the hired labour market are complex and seem to be driven by the need for timelycompletion of operations. This is superimposed by the gender-specificity of certain operations. Thus, demand for hired female labour peaks for weeding and transplanting operations in paddy, while weeding and harvesting in wheat cultivation. This implies a greater degree of seasonality for female workers and for hired labour. All these features suggest that the design of new crop technologies be sensitive to inevitably gender-specific effects.

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Designing rural market: The Indian perspectives

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Abstract

The designing of rural market is now needed when era of "produce and then sell" has gone. Rapid improvement in farm-to-market roads, packing points, rail, port, refrigerator facilities and access to information technology to get trade off between domestic and over seas markets, the designing of rural market is now imperative. For social gains efficient, effective and low cost rural markets, appear as urgency during new economic environment

Introduction

India is a agricultural country. In open economy era, India much insures that a strong position in competitive world has to be accomplished. To accomplish this, one much realize about the challenges ahead. Creating new domestic markets for farm product-market that offer stability and performance-is a realistic goal. The major recent emphasis has now been to make better production in market-driven context new uses-increase production, processing, transportation and selling of innovative high value products. Most of this acting is not occurring in rural areas close to the source of raw materials, gradually increasing in peri-urban areas. Presently, farmers are responsive for market signals and demand for new crops and markets that will increase their incomes. Also Indian farmers faced a surplus problem that threatened the hold back the development of economical agriculture. In country where our 80% of the people are farmers, most markets had to come from with in the agricultural economy of subsistence nature. But now Indian farmers have been gradually adaptive for new products, for new market setup. The present setup of rural markets needs to restructure designing while world is now becoming a field for equal playing. The present paper focuses imperative aspects needed for redesigning rural market in India. The present subject paper is based on general perceptions generated from several rural market studies.

Results and Discussion

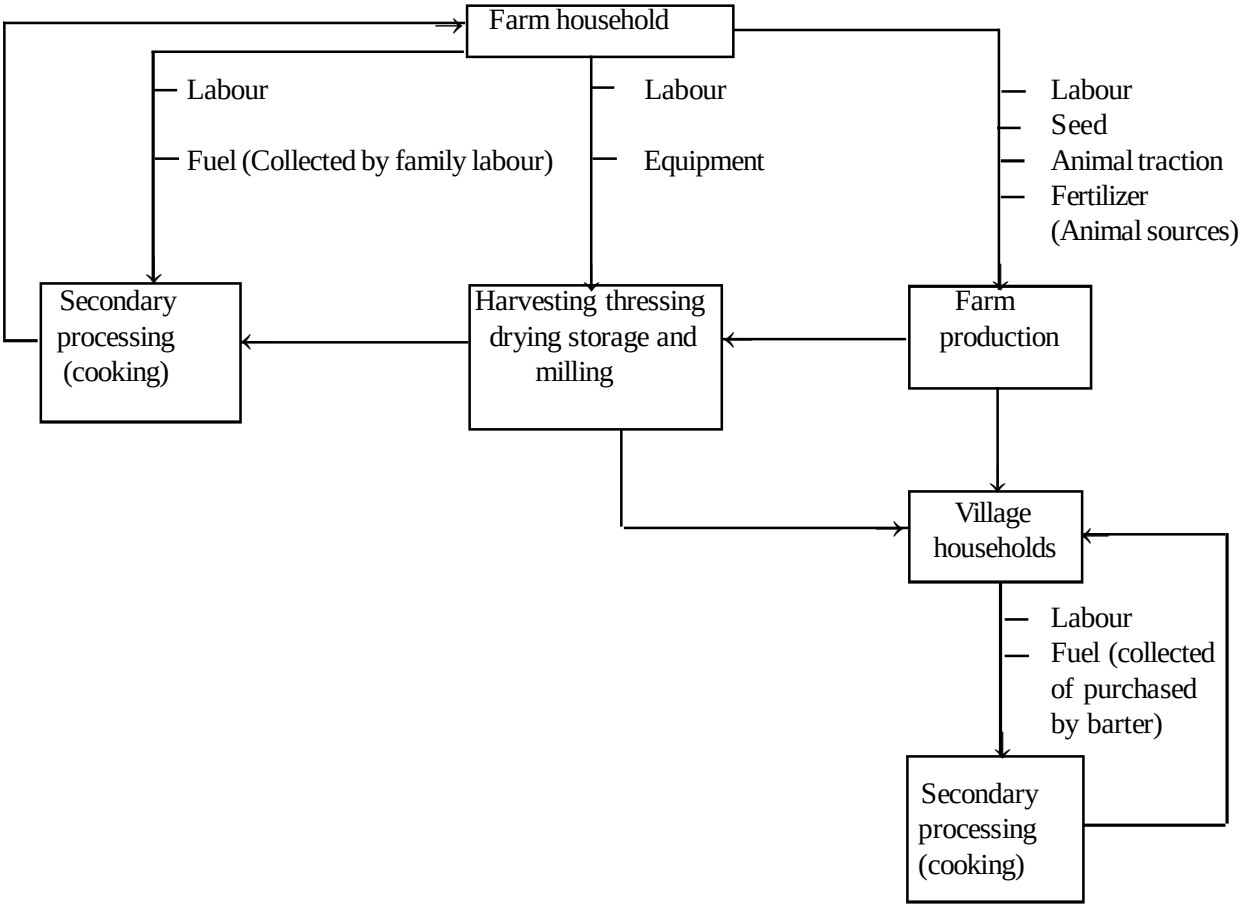
The effectiveness of marketing facilities, services such as training, market intelligence, research and advisory services etc. are initially important to improve structure, conduct and performance. The development of market/market functionary/channels and enterprises depend largely on the extent to which they are oriented to the particular situation of marketing and the stage of the country's development. Here, needs to be characterized the market in the light of content and orientation of marketing supports services. Although the characteristics identification of marketing system/ situation prevailing in changing situation is difficult, the following three broad categories may be helpful in analyzing the specific marketing requirements in various situations.

1. Predominantly substance type of agriculture (utility function)
2. Production oriented agriculture (Supply driven)
3. Market oriented agriculture (Demand driven)

Subsistence type of agriculture may be regarded as least developed area/state/country. Basis gains cereals and pulses are the main diet, with the consumption livestock products, fish, fruit and vegetables. There are still a number of marketing channels where farmers sell to consumers. Quality offered by the farmers is relatively small and vary in quality, quantity and time. There is little grading and most of the products have to inspect personally before purchase. In terms of Trams structural development, the privities for market improvement are road and Mandi yard construction, the building of small storage facilities and assembling market in cities. Under subsistence agriculture, the government has still to play an active role in marketing development for providing a farm business for organization of an efficient marketing system. Rural agricultural support services are still to assist in planning and building the infrastructure. Standard weight and measures are introduced and promoted on a wide scale. The introduction and promotion of agricultural production requisites in particulars, fertilizer is an other important area for a government support. The agricultural inputs marketing enterprises should not only after inputs for sale but should also provide fertilizers promotion services and credit to marginal small scale farms. As discussed earlier the three legs of stool of agricultural progress viz., economics, technology and organization are of vital importance. Thus, agrarian market/marketing system is clearly indicated by attributes as shown in Fig. 1.

The second condition/situation of marketing system has often seen in the area where large per cent of

Fig. 1: Agrarian Marketing System



population lives in towns. Where the local market demand for food is considerably high; especially livestock products and fruit and vegetable. Marketing channels are longer, quantities afford by farmers and handled by traders are huge than subsistence nature. Agriculture need well established network of transport and storage facilities. The market information services have to be strengthened to cover perishable food and food grains. The price policies are to be refined. Market research and advisory services have to more diversified and specialized. The peri-urban agriculture is being taken place speedily in feeling cities (Fig. 2).

Another way of grouping market system may be the degree of vertical land horizontal coordination affecting marketing of particular production as is clear from table 1.

Thus in India there is a needs to design rural market in contest of open economy. Currently in India the development of primary markets can be known by the data given in Table 2.

Rural market system and function

Currently three types of function have been performed in rural market in India. These are: Link farm production sector to non-farm sector (input supply-output disposal); physical and facilities function.

Table 1: Characteristics of market/marketing system and their nature of integration

S. No.	Character of market/ marketing system	Nature of integration
1.	Traditional subsistence	1. Loosely connected with marketing system of a low degree of vertical coordination 2. Supplies are modest and fluctu ate in quality and variety 3. Personal involvement in inspec tion sorting and clearing 4. Low consciousness of cost and time 5. Whole sale trade not found 6. Lack of proper weight and measurement
2.	Traditional-production oriented agricultural marketing system	1. Partly vertically coordinated production/marketing system
3.	Market oriented agriculture marketing system	1. Highly coordinated marketing/ production system 2. Full attention paid to timing, costs and prices 3. Product differentiation branding, and sales promotion are other important features of this system

Fig. 2: Agrarian/industrial society food system

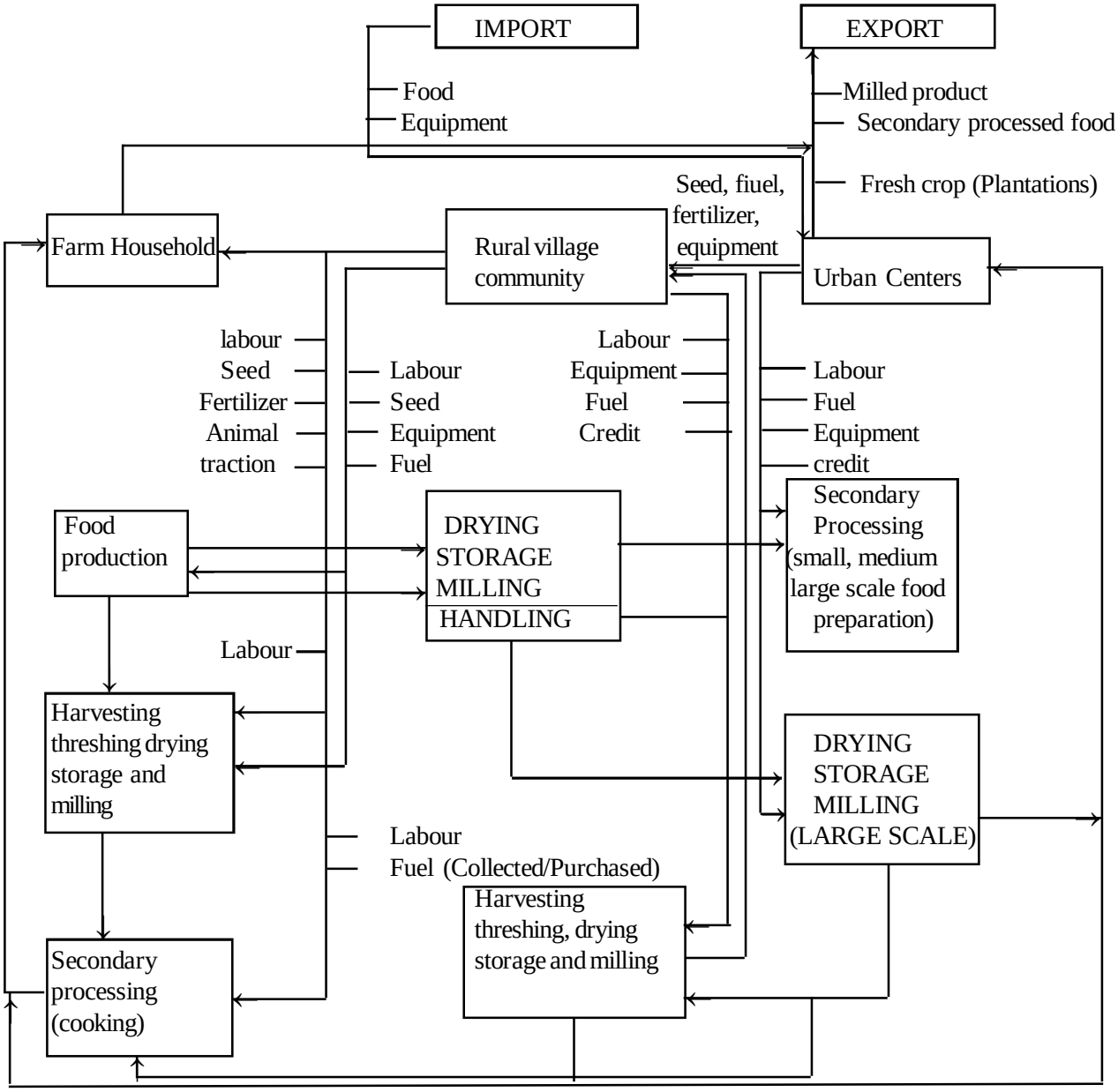


Table 2: Development of primary markets in 2001

S.No.	Items	Development/Number
1.	Regulated market	7161
2.	Main yards	2354
3.	Sub yards	4807
4.	Periodic markets	27294
5.	Area served per markets	459sq. km.

Farm gate to processor or consumer and discovery prices and transmits price signals. Its roles cover physical and economic access support to access opportunity to rural people. During transactions of commodities, the prices are paid and received by the rural producers and paid by rural consumers. The power of rural markets influences growth and income distribution. However, rural market is always under government scrutiny with intervention of various forms.

Rural markets infrastructure

Infrastructure is a basic key in shaping market. In India, infrastructure indicators indicate that designing of rural market has to be considered in two dimensions, first is filling gaps of existing infrastructure in Table 3 and second is linking Indian rural markets with markets of out side country boundary by using/developing technologies impacting marketing with their trade advantage.

Rural market structure

Basic characteristic of rural market can be known by private trade dominance. The general features of structure of rural markets have shown their weak linkages when market size is large and expending, market structure dominated by private sector. The spreads are wide ranging as 93% come under unorganized sector and 7 to 20% in unorganized. Processing capacity of fruit and vegetables is low and unused. The situations of local monopolies or oligopolies-transport bottleneck ness are carrying with too many regulations.

Table 3: Marketing infrastructure

S.No.	Items	Status	Gap
1.	Yards and sub yards(7230)	4820	2410
2.	Many facilities in (4820)	Lacking	Lacking
3.	Roads length (Lakh km.)	4.0 to 24.66	
	Village connected	48.4%	51.6%
4.	Railway lines (lakh km.) (53.6)	63.9	Needed
5.	Goods carriers (lakh km.) (0.82)	22.6	Needed
6.	Grading standard (19)	163(D) 41(E)	Needed
7.	AGMARK laboratories	22	-
8.	AGMARK testing labs.	700	-
9.	Authorized packers	4.00	-
10.	Markets	1321	-
11.	Graded products (Rs. Crores)	9268	-
12.	Primary level grading percentage	7.3	-

Table 4: Rural market structure

S.No.	Components	TE1982-83	2002
1.	Share in MS(%)	72.5	74
2.	Share in incremental output	86	-
3.	4.61 lakh EPS	75%private	
4.	2 Million whole sale	12 million retailer	
5.	Processors in food grains		
(a)	Paddy/Rice		
	Hullers	91801	
	Shelters	4538	30% 4km.lost
	H-cum-s	8365	-
	Rice mills	34686	70%
(b)	Wheat		
	Roller flour mills	812	25-30%
	Small scale unit	2.6 lakhs	-
	Domestic processing	-	-
(c)	Pulses		
	Dal mills	10000	75%
(d)	Oil seeds		
	Expeller	20000	30%
	Ghanies	131600	10%
	Refinaries	130	50%
	Hydrogenation	145	37%
	Solvent extractors excess capacity	761	34%
(e)	Cotton		
	Monopsony in Mahavastra		
	CCI + MSCC GMF	20-30%-	
	Private	Rest	-
(f)	Sugarcane		
	Local monopolies	-	-
(g)	F & V		
	90% fresh market processing capacity	19.1 lakh tonnes	50%
(h)	Milk		
	Cooperative as well as	-	-
	Private organized	-	20%
(i)	All food		
	Processed	Semi processed	Fresh
	10%	15%	85%

Designing a rural market

The discussion made earlier have illustrated about rural market foundation, have shown a horizontal spreading in India. After globalization the country needs design supporting rural technology, policy and priority decisions in the way to achieve place in the world market. In the initial supply is made, largely in consistence to single commodity, closed economy models that have to be extended to a horizontally disaggregated, multi market (open economy) frame work that may allow for international and interregional trade in both goods and technologies. To address concern of price and technology spilled over effects across various levels of the production and marketing chain, vertically disaggregated models have to be developed in the rural sector. Most agricultural markets face prices that are distorted by government base and subsidiary interventions, and these price distortions can directly influence the size and, in particular, the distribution of the benefits from market. More, recently, economist have begun to move away from partial equilibrium, single commodity models to consider the effect of research in a "general equilibrium" context in which the cross-commodity effect of efforts induced price changes are explicitly considered.

Changing vertical market organization

The rural market is the elaborate communication and trading system-linking consumers to producers and processors, in smoothly functioning rural market, that may enables production from the farms and quantity that consumers appear to want. Under the traditional marketing system for farm products, marketing commitments are left open until the production process is complete. When products are ready for market, the producer accept the prevailing market price and the processor accepts what ever quantity and quality producer brings to market. An effective agricultural grading system provides modest price incentives to encourage farmers to produce products with in a narrow quality range. Otherwise, food processors have traditionally had very little control over the quality of farm products entering the market.

This traditional system works reasonable, will for generic products that are sorted into a few very broadly defined categories. But as product specifications become more detailed markets signals can be structured, is evolving to shorten and clarify the market signals that link producers, processors and distributors. The new system emphasizes customized farm and products-rather than generic, commodities-up and down the system from farm to grocery. In brief, the food industry is moving away from the traditional open markets to non markets coordinating mechanism that are leading to more closely integrated sub sectors. New marketing arrangements join ventures, and mergers are blurring the distinctions between previously independent segments of the food

system. New computerized inventory control systems that are being adopted by retailers and wholesalers are also speeding up and tightening manufacture-distributor linkage.

Impact of market trend on high value crops production and marketing system and technology

Market trend	System/technology
Market Centralization	-Rationalize export industry to service client -Develop longer term strategy - Deliver to limited access points in respective destination - Consider regional supply strategy
Changes market	- Integrate production/marketing - Market intelligence - Increase flexibility in the supply base
All year supply	- Technologies to spread season of production - Protected cropping - Genetic screening - Flower initiation - Agro-ecology spread
Downward pressure on price	- Optimize on transportation/ fraught - Controlled atmosphere/ modified atmosphere - Improved container - Post harvest management - Increase productivity - Genetic screening - Production management
Quality assurance	- Integrated temperature management - Integrated product management - Define production specification /establish quality assurance procedures
Packaging	- Develop re-usable/ recyclable packaging - Heep/sanitary and phytosanitory
Reduce pesticide residues	- genetic manipulation - Pesticide application technology - Integrated pest management - Codes of practice on usage - Non-chemical post harvest treatment
Due diligence/food safely	- Establish integrated quality assurance procedures

Conclusion

The articulation for designing of rural market refers, process of getting trade off between supply and demand driver efforts in the country. This will be possible-by reducing the cost of bringing produce from the producer to the consumer. Efficient, effective and low-cost rural markets, must be developed in order to bring these costs down. The reduction in the costs call for investment in developing and maintaining infrastructure; policies and institutions that favor large scale capital intensive markets agents over rural small scale institutions.

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Socio-economic profile of SHG beneficiaries under SGSY in Faizabad district of eastern U.P.

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Abstract

The study was conducted in Milkipur block of Faizabad district where Swarna Jayanti Gram Swarojgar Yojana (SGSY) is running on 105 selected SGSY beneficiaries. The results depicted that, a maximum number of respondents was found in age group of 30-49 years, literate, belonging to backward caste. Single families were more in number than joint families, having 5-8 members in their families. The maximum number of respondents reported having mixed houses, having size of land holding below 1 ha and an overwhelming majority of respondents families was reported agro-based enterprise as their main occupation. A majority of respondents was found such who participate in one organization, earned the annual income of Rs. 16,811-32,313, having overall materials possession of medium category. The contact of respondents with Gram Pradhan was maximum among the formal sources, in case of informal sources, maximum contact of the respondents was seen with family members and neighbours, and in case of mass media exposures, the maximum respondents were reported radio as main source of information. The maximum respondents were observed in the medium level of economic motivation, scientific orientation, risk orientation and value orientations.

Introduction

The Union Ministry of Rural Development launched a restructured poverty alleviation programme, Swarna Jayanti Gram Swarojgar Yojana (SGSY) with effect from 1st April, 1999, which has replaced IRDP and its allied schemes.

The SGSY is different from earlier programmes in terms of strategy envisaged for implementation and has been conceived as a holistic programme of self employment, *viz*., organization of rural poor into self-help groups and their capacity building training, planning for activity clusters infrastructure builtup and technology and marketing support. Hence, it was intended to study the socio-economic profile of SHG beneficiaries under SGSY programme with following basic objective:

· To study the social, economic, psychological, communication characteristics of SGSY beneficiaries.

Methodology

The study was conducted in Milkipur block of Faizabad district where Swarna Jayanti Gram Swarojgar Yojana (SGSY) is running, besides, it is accessible to the researcher because of nearer to the University. At first, the list of villages (27) covered under SGSY was obtained from block headquarter. Out of this list, 5 villages were selected randomly. Further, the list of self-help groups of each sample village was prepared and three self-help groups from each sample village was selected randomly. At the final stage of respondents' selection, 07 members from each sample self-help group were selected randomly for the study. Thus, the total sample size of the respondents was 105 only. A semi-structured schedule was developed, pre-tested and used accordingly for assembling the relevant data.

Results and Discussion

Age composition

It is obvious from the Table 1 that the majority of the respondents (61.91 %) were observed in the category of 30-49 years of age followed by 20.95 % and 17.14 % for 50 and above and upto 29 years of age respectively. So, the majority of the dairy SHG entrepreneurs fall in the category of 30-49 years of age.

Education level

It is revealed from the Table 1 that literacy percentage of respondents was observed 60.95 per cent and 39.04 per cent respondents were found illiterate. Further, the educational standard of literate respondents in descending order was found as 20.0 %, 16.19 %, 6.67 %, 6.67 %, 4.76 %, 4.76 %, 0.95 % and 0.95 % per cent for Middle, Primary, High School, Graduate, Can sign, Intermediate, Can read and write and Post graduate and above, respectively.

Hence, it can be concluded that majority of SHG entrepreneurs (60.95%) were literate and the ratio existing between literate and illiterate was found 1.5:1.

Caste composition

The Table 1 indicates that maximum number of the respondents (51.43 %) belonged to backward caste, while the scheduled caste and general castes were 40 % and 8.57 %, respectively. The same results were observed by Singh (1985).

Table 1: Distribution of the respondents according to age, education, caste, family type, size of family, housing pattern and land holding.

N= 105

S. No.	Age categories (years)	Respondents Number	Percentage
A.	age		
1.	Up to 29	18	17.14
2.	30-49	65	61.91
3.	50 and above	22	20.95
	Total:	105	100.00
Mean = 39.73, S.D. = 10.66, Mini = 22, Maxi = 67			
B.	Education		
1.	Illiterate	41	39.05
2.	Literate	64	60.95
a.	Can sign	05	4.76
b.	Can read and write	01	0.95
c.	Primary	17	16.19
d.	Middle	21	20.00
e.	High school	07	6.67
f.	Intermediate	05	4.76
g.	Graduate	07	6.67
h.	Post graduate and above	01	0.95
	Total:	105	100.00
C.	Caste		
1.	General caste	09	08.57
2.	Back ward caste	54	51.43
3.	Scheduled caste	42	40.00
	Total:	105	100.00
D.	Family type		
1.	Single	67	63.81
2.	Joint	38	36.19
	Total:	105	100.00
E.	Size of family		
1.	Small (up to 4 members)	25	23.81
2.	Medium (5-8)	63	60.00
3.	Large (9 and above)	17	16.19
	Total:	105	100.00
Mean = 6.2, S.D. = 2.375, Mini, = 1, Maxi = 13			
F.	Housing pattern		
1.	Hut	04	03.81
2.	Kuchcha	43	40.95
3.	Mixed	46	43.81
4.	Pucca	12	11.43
	Total:	105	100.00
G.	Land holding		
1.	Land less	15	14.29
2.	Marginal (below 1 ha)	89	84.76
3.	Small (1-2 ha)	01	00.95
4.	Medium (2-3 ha)	-	-
5.	Large (3 ha and above	-	-
	Total:	105	100.00
Mean = 0.217, Min. 0, Max. 1 ha			

Thus, it is concluded that majority of dairy enterprise SHG entrepreneurs (51.43 %) belong to back ward caste.

Family composition

(A) Family type

The Table1 projected that 63.81 per cent respondent's families belonged to single family system followed by 36.19 % families to joint family system. It revealed the fact that the joint family system of rural society is now breaking up. The same results were observed by Satyanarayana *et al.* (2002) and Tiwari (2005).

Table 2: Distribution of respondents according to occupation

N = 150

S. No.	Category	Respondents Main occupation Number	%tage	Subsidiary occupation Number	%tage
1.	Agriculture labour	21	20.00	22	20.95
2.	Caste based occupation	02	01.90	01	00.95
3.	Service	02	01.90	02	01.90
4.	Agriculture	09	08.57	77	73.33
5.	Agro-based enterprise	45	42.86	59	56.19
6.	Business	26	24.77	05	04.76

(B) Family size

It is evident from Table 1 that 7.00 per cent respondent's families were observed such who had 5-8 members followed by 23.81 per cent families upto 4 members and 16-19 per cent respondents' families were found having 9 and above members in their families. The average size of family was observed to be 6.2 members. The range between minimum and maximum number of family members was recorded from 1 to 13. Thus, it is concluded that the majority of the respondents were found in middle family size category.

Housing pattern

It is apparent from the data given in Table 1 that maximum of the respondents (43.81 %) were found having their houses of mixed type followed by Kuchcha (40.95 %), Pucca (11.43 %) and Hut (03.81 %), respectively.

It focuses that the village residents are becoming economically sound day by day which has enabled them to convent their houses Hut and Kuchcha houses is to Pucca and mixed type of houses.

Holding size

The Table 1 indicates that the maximum respondents (84.76 %) were found in the land holding category *i.e.* marginal farmers (below 1.0 ha) and 0.95 per cent respondents were found in small farmers (1-2 ha). The 14.29 per cent respondents were found having no land. The medium and large farmers were not found in this study. The average land holding of the respondents was found to be 0.217 ha. Hence, it may be concluded that mostly land holding has become marginal in the study area.

Table 3: Distribution of the respondents according to social participation, Family income, farm power, farm imlements possessions, house hold material possession, transportation materials, communication media, overall materials possession, economic motivation, scientific orientation, rist orientation and value orientation

N = 150

A. social participation		
1. No participation	00	00.00
2. Participation in one organization	89	84.77
3. Participation in two organizations	14	13.33
4. Participation in more than two organizations	02	01.90
Total:	105	100.00
B. Family income		
1. Low (upto Rs. 16,810)	09	08.57
2. Medium (Rs. 16,811-32,313)	79	75.24
3. High (Rs. 32,314 and above)	17	16.19
Total:	105	100.00
Average = 24,561.9, SD = 7,752.3, Min = 13,000, Max = 54,000,		
C. Farm power		
A. Without farm power	33	31.43
B. With farm power	72	68.57
I. Bullock	39	37.14
II. Tractor	00	0.0
III. Diesel engine	31	29.52
IV. Electric motor	02	01.91
D. Farm imlements possession		
1. Desi plough	35	33.33
2. Thresher	03	02.86
3. Mould board plough	04	03.81
4. Sprayer	03	02.86
5. Cane crusher	01	00.95
6. Chaffcutter	78	74.29
7. Pata	38	36.19
8. Kudal	96	91.43
9. Shavel	100	95.24
E. House hold materials possession		
1. Fan	19	18.10
2. Heater	01	0.95
3. Stove	17	16.19
4. Double bed	04	03.81
5. Pressure cooker	09	08.57
6. Electric press	11	10.48
7. Watch	94	89.52
8. Crockery	105	100.00
9. Chair	21	20.00
10. Gas cylinder/ Gas chullah	06	05.71
11. Patromex	02	01.90
12. Sewing machine	31	29.52
13. Cots	105	100.00
14. Smokeless chullah	15	14.29
F. Transportation materials		
1. Bullock cart	05	4.76
2. Cycle	97	92.38
3. Motor cycle	03	2.86
4. Rickshaw	01	0.95
G. Communication media		
1. Radio	81	77.14
2. T.V.	14	13.33
3. V.C.D. (Player)	07	6.66
4. Tape recorder	13	12.38
5. Telephone	08	7.62
6. Agril. magazine	01	0.95
7. General magazine	01	0.95
H. Overall materials possession		
1. Low (up to 5)	07	6.67
2. Medium (6-17)	85	80.95
3. High (18 and above)	13	12.38
Total:	105	100.00
Mean = 11.85, S.D.= 6.386, Minimum = 3, Maximum = 44		
I. Economic motivation		
1 Low (upto 18)	17	16.19
2 Medium (19-22)	59	56.19
3 High (23 and above)	29	27.62
Total:	105	100.00
Mean = 20.78, S.D. = 2.50, Range- Min.-14, Max.- 27		
J. Scientific orientation		
1 Low (upto 19)	20	19.05
2 Medium (20-24)	67	63.81
3 High (25 and above)	18	17.14
Total:	105	100.00
Mean = 22.09, S.D. = 2.69, Range Min.- 14, Max.- 28		
K. Risk orientation		
1 Low (upto 18)	15	14.29
2 Medium (19-23)	61	58.09
3 High (24 and above)	29	27.62
Total:	105	100.00
Mean= 21.33, S.D. = 2.88, Range Min. – 14, Max.- 27		
L. value orientation		
1 Low (upto 19)	15	14.29
2 Medium (20-23)	59	56.19
3 High (24 and above)	31	29.52
Total:	105	100.00
Mean= 21.92, S.D. = 2.43, Range Min. – 15, Max.- 29		

Occupation

It is clear from the Table 2 that in case of main occupation, the agro based enterprises was emerged as main occupation (42.86 %) followed by business (24.77%), agriculture labour (20 %), agriculture (8.57%) and caste based occupation and service (1.9% each). While, in case of subsidiary occupation, the maximum 73.33 per cent of the respondents adopted agriculture followed by agro-based enterprises (56.19%), agriculture labour (20.95%), business (4.76%), service (1.19%) and caste based occupation (0.95%), respectively.

Social participation

A cursory glance over the data depicted in the Table 3 indicates that out of 105 respondents, 84.77 per cent respondents participation in one organization followed by participation in two organizations (13.33 %) and participation in more than two organizations (1.9 %), respectively.

Annual income of the family

It is obvious from the Table 3 that 75.24 per cent respondents were from these families whose annual income was found in the category of (Rs. 16,811-32,313) followed by other categories *viz.*, 16.19 per cent (Rs. 32,314 and above) and 8.57 per cent (Rs. upto 16,810), respectively.

The average income was observed to be Rs. 24,561.9 with a range average of minimum Rs. 13,000 and maximum Rs. 54,000. Hence, it may be said that the respondents were having considerably average economic condition.

Materials possession

A. Farm power

The Table 3 indicates that 68.57 per cent respondents were seen having farm power while, 31.43 per cent did not possess any farm power on their farm.

In case of having farm power indicates that 37.14 per cent, respondents were found having their bullock followed by 29.52 per cent, 1.91 per cent, diesel engine, electric motors, respectively. Tractor did not having any respondents.

B. Farm implements materials

It is clear from the data included there in Table 3 that a majority of the respondents (95.24%) was reported having shavel followed by Kudal (91.43%), Chaff cutter (74.29%), Pata (36.19%), Deshi plough (33.33%), Mouldboard plough (3.81%), Thresher and sprayer (2.86% each) and can crusher (0.95%), respectively. Thus, it can be said that the respondents were having a good number of implements with them.

C. Houses hold materials possession

The Table 3 clearly indicates that 100 percent respondents were reported that crockery and cots each followed by watch (89.52 per cent) , sewing machine (29.52 per cent), chair (20 per cent), fan (18.10 percent), stove (16.19 per cent), smokeless chullah (14.29%), electric press (10.48 per cent), presser cooker (8.57 per cent), gas cylinder/ gas chullah (5.71 per cent), double bed (3.81%), patromex (1.9%) and heater (0.95%) respectively. The condition of house hold materials seems to be good.

D. Transportation material possession

The Table 3 clearly indicates that an over-whelming majority of the respondents (92.38%) was found having cycle as a means of transportation followed by bullock cart (4.76%). motor cycle (2.86%) and rickshaw (0.95%) respectively. Thus, the interference can be drawn from the above data that cycle was important means of transportation with the respondents.

E. Communication media possession

Table 3 that the majority of respondents (77.14%) was observed possessing radio with them. The rest respondents who had other communication media were in descending order as T.V. (13.33%), tape recorder (12.38%), telephone (7.62%), VCD player (6.66%) and Agril. magazine and general magazine (0.95% each). Thus, it can be inferred that radio, TV were main sources for getting informations and recreation purposes.

Overall materials possession

The overall material possession was categorized into three main categories on the basis of scores as low (upto 5), medium (6 to 17) and high (18 and above). The data given in Table 3 revealed that highest number of the respondents (80.95 %) were observed in the medium category (6-17 scores) of materials possession followed by high (12.38 %) and low (6.67 %) categories, respectively. Thus, it can be concluded that the materials possession of respondents was appreciably better. The mean of scores for materials possession was observed to be 11.85 with a minimum 3 and maximum 44 scores.

Economic motivation

It is apparent from the Table 3 that the maximum number of respondents (59.19%) were found having medium level of economic motivation, 27.62 percent and 16.19 per cent respondents were such who had high level and low level of economic motivation, respectively. The average mean of scores for economic motivation was observed to be 20.78 with a range of minimum 14 and maximum 27. Hence, it can be concluded that most of the respondents were found having medium level of economic motivation.

Scientific orientation

It is clear from the Table 3 that 63.81 percent of the respondents were found having medium level followed by low (19.05) and high (17.14%) levels of scientific orientation respectively. The mean of scores for scientific orientation was observed to be 22.09 with a range of minimum 14 and maximum 28. Hence, it can be inferred that most of the respondents (63.81%) had medium level of scientific orientation.

Risk orientation

It is apparent from Table 3 that 58.09 per cent of the respondents were found having medium level followed by high (27.62%) and low (14.29%) levels of risk orientation. The mean of scores for risk orientation was observed to be 21.33 with a range of minimum 14 and maximum 27. Hence, it can be concluded that the respondents have average interest to bear the risk relating to improved farming.

Value orientations

It could be seen from the Table 3 that the maximum 59.19 per cent respondents had medium level of value orientation while, 29.52 per cent respondents were found in the high level and 14.29% were found low levels of value orientations. The average mean of scores was observed to be 21.92 with a range of minimum 15 and maximum 29. Hence, it can be concluded that the respondents have average inertest to be bear the value relating to improved farming.

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Economics of wheat production in Sultanpur district of U.P.

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Abstract

Hundred farmers randomly selected from Dostpur of Sultanpur district (U.P.) were surveyed to study the economics of wheat production. On an average, the total cost of cultivation of wheat on over all farms came to Rs. 19191.17 and net income was Rs. 12622.38 per hectare. Cost of production per quintal was found to Rs. 526.36 and input-output ratio came to 1:1.66. Factors included in study i.e. fertilizer, human labour, seed and irrigation were found be statistically significant.

Introduction

Wheat is the second most important staple food in India. It is consumed by a large population and provides more than 50 per cent of the calories to its consumers. Green revaluation in wheat played a important role in shaping the agricultural and food security policy. Globally, wheat is grown in 122 countries and occupies an area of 215 million hectares producing nearly 630 million tones of wheat during 2004-05 (FAO STAT). The total world consumption of wheat is around 595 million tones per year and this is expected to continue grow over the coming years. As over the past 20 years, world wide wheat consumption has been growing an average at a stable 01 per cent per annum.

India is maintaining its second position in the world next to only China and at present produces more wheat than the United State of America. About 91 per cent of the Indian wheat produced in the six states viz. Uttar Pradesh, Punjab, Haryana, Madhya Pradesh, Rajasthan and Bihar. It covers an area of 25.50 million hectare having a production of 73.30 million tones with a productivity of 27.60 quintals per hectare in India. Utter Pradesh is the highest wheat producing state contributes about 34.42 per cent of National production Mishra, The Hindu Survey of Indian Agriculture-2006 and the Pratiyogita Darpan Indian Economy 2007).

District Sultanpur stood on third rank in U.P. with the regard of area and production. It covers an area of 164944 hectares and produces 42554 metric tones with a productivity of 25.80 quintals per hectare. Statistical Bulletin, Directorate of Statistics, U.P. 2005-06). The agro-climatic condition is considered as an important enterprise for increasing the income and employed to the farmers. Keeping these facts in vies the present study entitled "Economics of wheat production in Sultanpur District of U.P." was under taken with the following objectives:

1. To study the farm structure, cropping pattern and cropping intensity of sample farms.
2. To work out the cost and returns and input-output relationship of wheat cultivation on sample farms.
3. To work out the resource use efficiency on sample farms.

Methodology

Three stage stratified cum random sampling technique was used to selected the block, the villages and the cultivars. A list of 22 blocks of Sultanpur district was prepared and arranged in ascending order of area under wheat. The one block namely, Dostpur having highest coverage under was selected purposively. A list of villages having maximum coverage wheat crop was obtained from official records and five villages having reasonably higher area under wheat were selected purposively.

A list of all the farmers from each selected villages was prepared along with their size of agriculture holdings and were classified in four categories i.e. marginal (below 1 ha), small (1-2 ha), medium (2-4 ha) and large (4 ha and above). Finally 100 respondents were selected randomly from each category of the farmers following proportionate ratio of sample to the population. Following statistical tools were used to analyze the data.

1. Weighted average

$$W.A. = \frac{\sum W_i X_i}{\sum W_i}$$

W.A. = Weighted average

W_i = Weights of x variable

X_i = Average of x variable

2. Regression analysis

To study the effect of various independent variables on the output, various forms of production function have been dealt. The Cobb-Douglas production function was found best suitable to the data and was used for measuring the resource use efficiency.

The mathematical form of production function is as follow:

$Y = aX_1^{b1}.X_2^{b2}.X_3^{b3}.X_4^{b4}.e\mu$

Y = Output per hectare (Rs.)

X_1 = Manure and fertilizers (Rs./ha)
X_2 = Total human labour (Rs./ha)
X_3 = Seed value (Rs./ha)
X_4 = Irrigation charges (Rs./ha)
eμ= Error term or disturbance term
b1, b2, b3 and b4 = production elasticity of the respective input variables.

Results and Discussion

Farm structure cropping pattern-cropping intensity and farm assets

The average size of holdings in the study area were found as 0.65, 1.58, 3.05 and 6.20 hectares on marginal, small, medium and large categories of farm respectively (Table 1). Whereas over all average of holding size was found to 1.48 hectare. Cropping pattern is the proportion of area under different crops at a point of time. It is one of the most important factors to determine the investment for different inputs on a farm and income of farmers, based on resource availability and climatic condition.

Table 1: Cropping intensity of different size of sample farms

Size of farms (ha)	Net cultivated area (ha)	Gross cropped area (ha)	Cropping intensity(%)
Marginal (<1a)	0.65	1.38	212.31
Small (1-2)	1.58	3.21	203.16
Medium	3.05	5.82	190.82
Large (>4)	6.20	11.31	182.42
All farms	1.48	21.72	189.20

Broad cropping pattern indicates preponderance of food grains as compared to non-food grains in gross propped area (India 2006). Wheat had occupied first place among the various cropping sequences followed by paddy and pulses on the sample farms. The total cropped area was found as 1.38, 3.21, 5.82 and 11.31 hectares on marginal, small, medium and large farms respectively. Whereas, overall gross cropped area was found to 2.92 hectare (Table 1).

As far as cropping intensity is concerned it is the ratio between total cropped area and actual net cultivated are expressed in percentage, it has been worked out by using the following formula.

$$\text{Cropping intensity} = \frac{\text{Gross cropped area}}{\text{Net sown area}} \times 100$$

The cropping intensity on different size group of farms is presented in Table 1. The maximum cropping intensity was observed to be 212.31 per cent in case of marginal farms followed by small, medium and large farms corresponding 203.16, 190.82 and 182.42 per cent respectively with an over all average 189.20 per cent. Highest cropping intensity on marginal group of farms was found due to intensive use of family labours in growing of more than two crops per year at their farms for securing maximum income. Whereas the decreasing cropping intensity with increasing holding size, shows the dominance of rice-wheat cropping system at the sample farms. Low cropping intensity indicate towards possibilities of growing at least one more crop at the sample farms for further improvement of income and

Table 2: Per hectare investment on different size groups of farms (Rs).

Particulars	Size of groups				
	Marginal	Small	Medium	Large	Average overall farms
Building	86293.01(60.81)	65896.96(69.62)	61658.07(70.00)	38141.93(57.69)	75745.45(63.27)
Implements & Machinery	37603.77(26.50)	27768.07(24.06)	23249.19(26.35)	23136.22(34.99)	31458.54(26.27)
Live stock	18010.63(12.70)	5982.04(6.32)	3173.30(3.60)	4838.71(7.32)	12508.23(2.46)
Total	141907.41(100)	94647.07(100)	88080.56(100)	66116.87(100)	119712(100)

Figures in parenthesis indicates

Table 3: Per hectare cost and income of wheat crop (Rs).

Particulars	Size of groups				
	Marginal	Small	Medium	Large	Average overall farms
Total cost	20313.55	18030.69	17532.95	17312.81	19191.17
Gross return	33161.73	30680.09	29350.75	28284.40	31813.55
Net income	12948.18	12649.40	11817.80	10971.39	12622.38
Cost of production (Rs/ha)	533.62	512.10	522.68	537.12	526.36
Yield (q/ha)	29.57	27.35	26.09	25.03	28.34
B.P. Straw	36.95	34.01	31.29	35.42	
Input-output ratio	1:1.64	1:1.70	1:1.68	1:1.63	1:1.66

Table 3: Production elasticity of wheat crop on different size group of farms.

Size group of farms	Production elasticities				Sum of elasticities return to scale	R^2
	X_1 Manure & fertilizers	X_2 Total human labour	X_3 Seed	X_4 Irrigation		
Marginal	0.3182928**	0.176166*	0.314399**	0.0950956**	0.9039	0.805
	(0.0435914)	(0.0863239)	0.0719503)	(0.0290873)		
Small	0.3025053**	0.20856*	0.3238354**	0.0834975	0.9183	0.825
	(0.0710255)	(0.1145277)	(0.1185209)	(0.0480812)		
Medium+Large	0.2965195**	0.2128*	0.3118737*	0.0936758*	0.9148	0.901
	(0.0946517)	(0.119222)	(0.134363)	(0.039284)		

Figures in parenthesis indicates standard error of respective variables
** 1% level of significance
* 5% level of significance

employment situation of the sample farmers.

Farm assets are the entities possessing market or exchange value and forming part of the wealth or property of the owner. The real farm assets considered for this study were tangible resources like farm buildings, implements-machineries, irrigation structure and livestock.

Per hectare investment on farm assets at different size group of farms in presented in Table 2. The table shows that the overall average per hectare total investment was Rs 119712.24, which includes the per hectare average investment on over all farm for buildings Rs 75745.45 for implements and machineries Rs 31458.54 and for livestock Rs 12508.23. Farm size group wise per hectare total investment was found to be highest in case of marginal farms followed by small, medium and large size group of farm corresponding to Rs 141907.41, Rs 94647.07, Rs 88080.56 and Rs 66116.87 respectively.

It is revealed from the table that the size of holdings had the negative relationship with per hectare investment on farm assets.

Per hectare costs and returns of wheat

Per hectare cost and income from the cultivation of wheat crop on different categories of farms were worked out and presented in Table 3. On an average of the over all farm total cost of cultivation (C_3) came to Rs 19191.17 per hectare it was maximum to Rs 20313.55 on marginal farms followed by small, medium and large farms corresponding to Rs 18030.69, Rs 17532.95 and Rs 17312.81 respectively. Average net income per hectare on over all farm came to Rs 12622.38, which was highest to Rs 12948.18 (marginal farm) followed by Rs 12649.40 (small farms) Rs 11817.80 and Rs 10971.39 on medium and large farms respectively. The over all average costs of production per quintal of wheat observed on cost C_3 basis was Rs 526.36, which was highest on large farms i.e. Rs 537.12 and was lowest on small farms Rs 512.10 per quintal. It was Rs 533.62 and Rs 522.68 per quintal on marginal and medium size group of farms respectively. The input-output analysis done on the basis of cost C_3 was found to 1:1.64, 1:1.70, 1:1.67 and 1:1.63 on marginal, small, medium and large size group of farm respectively. The input-output ratio on an average of the over all farms came to 1:1.66. In the study the data supported by the fact of positive relationship of the costs with the yield. As the highest cost of cultivation per hectare in marginal category offered the maximum yield per hectare.

Resource use efficiency

The Cobb-Douglas production function was applied to find out the efficiency of various resources (manure and fertilizer, human labour, seed and irrigation) used in the production of wheat.

The value of elasticity of production, standard error, coefficient of multiple determination and return to scale of production of wheat on different size group of farm are presented in Table 4. The higher value of R^2 of fitted function indicated that sufficient and large production of the total variation in the dependent variables is explained by the inputs included in function. The table further indicates that the four variables viz., manure and fertilizer, human labour, seed and irrigation, jointly explained 80.50, 82.50 and 90.10 per cent variation of the dependent variable on marginal, small and medium & large farms.

It is also revealed from the table that the manure & fertilizer (X_1) was found statistically significant at 1 per cent level of significance in all categories of farms. Where as (X_2) human labour was found statistically significant at 5 per cent level of significance in all size group of farms. As far as seed as a critical input is

concerned it was found statistically significant at 1 per cent level of significance in case of marginal and small farms and at 5 per cent in medium & large category of farms. While irrigation as an important factor of production was also found statistically significant at 1 per cent significance level in marginal category of farms and at 5 per cent probability level in case of small, medium & large size group of farms.

Returns to scale on marginal, small and medium & large farms were found to 0.9039, 0.09183 and 0.9148 respectively. It is therefore concluded that the cultivation of wheat is characterized by decreasing returns to scale to each farm situation viz., marginal, small and medium & large. It is therefore inferred that increasing all factors by 1 per cent simultaneously results in increasing of the return by less than one per cent on each farm situation.

Conclusion

The overall average size of holding was found to 1.48 hectare varying from 0.65 hectare on marginal farms to 6.20 hectares on large farms. The over all average cropping intensity came to 189.20 per cent ranging from 182.42 to 212.31 per cent. Cropping pattern reveals that highest area was covered by wheat followed by paddy and pulses. Per hectare investment on all farm assets was highest at marginal size group of farms. Size of holding showed negative relationship with investment on farm assets. The average total costs (C_3) of cultivation of wheat per hectare was found to Rs 19191.17 on over all farm, where as it was maximum of Rs 20213.55 on marginal farms and a minimum of Rs 17312.81 at large farms.

Over all average per quintal costs of production of wheat came to Rs 526.36 ranging from Rs 512.10 to 537.12. Over all average net income per hectare was found to Rs 12622.38, varying from Rs 10971.39 to Rs 12948.18. Overall average input-output ratio was found to 1:1.66.

The variation in yield is mainly explained by the inputs considered for the study, as the value of R^2 was found to 80.50, 82.50 and 90.10 per cent in marginal, small and medium & large size group of farms. The value of return to scale on all farms indicates that increasing independent factors by 1 per cent simultaneously increases the returns by less than one per cent on each farm situation.

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Effect of Saline Water on Growth and Yield of Wheat *(Triticum aestivum L.)* cultivars

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Abstract

The present investigation, it can be concluded that Pb-343 and Raj – 6485 genotypes proved more salt tolerant than other cultivars with respect to mineral composition of grain and straw, Pb-343 is superior to all in Ca, Mg and also has fair contents of P, Na, N and K. While Raj – 6485 has fair amounts of Ca, Na, Mg, P and N.

Introduction

The main emphasis in agriculture is now on to increase agricultural production per unit area, per unit time through multiple cropping, large area, coverage by yielding varieties, irrigation and intensive fertilizer use. Such technology makes a heavy demand from plant nutrients and resulting in rapid depletion of nutrient resources of soil unless regularly replenished.

India is the third largest wheat growing country in the world.Wheat occupies commanding position in Indian agriculture and is given over an area of 24.43 million hectares with a total production of 60.20 million tonnes in 1994-95 (The Hindu Survey of Indian Agriculture, 1995).India occupies about 4% of the World's cropped area and feeds 15% of World's population. Wheat is an important winter season cereal occupying 52.8 per cent of total rabi food grains.

The area covered under the crop has increased from 9.25 million hectares in 1950-51 to 24.43 million hectares in 1993-94 with corresponding total production 6.46 million tones to 56.76 million tones. Similarly the productivity during this period has enhanced more than three fold from 6.63 area in 1950-51 to 25.0 q/ha in 1996-97 (Fert.Statistics, 1997) of the total area under wheat, 36 per cent is in Uttar Pradesh and 13 per cent in Punjab. It is interesting to note that wheat area in Punjab (3.2 million hectares) is slightly less than that in Madhya Pradesh (3.5 million hectares) but the production in Punjab (12.2 million tones) is more than double that of Madhya Pradesh (5.5 million tonnes). The average yield of wheat is 4.01 tonnes per hectare area in Punjab and 3.58 tonnes per hectare in Haryana as compared with the National average of 2.32 tonnes per hectare. The increase in production and productivity has been the result of the development and cultivation of semi- dwarf, fertilizer and water responsive varieties. They have better potentials that the taller varieties. (Gill, 1994).

Materials and Methods

The experiment was conducted in the green house of Department of Agricultural Chemistry and Soil Science, R.B.S.College, Bichpuri, Agra during the rabi season of 1996-97 in earthen post of 15 cm diameter. The experiment comprising of six levels of salinity and four varieties of wheat was conducted in a factorial RBD design with three replication in pots (5kg/pot).

Results and Discussion

An evaluation of data given in Table 1 and depicted in reflect that each higher levels of salinity decreased significantly the grain and straw yields as compared to preceding levels of salinity throughout the investigation.

Table 1 : Effect of saline water on grain and straw yields (gm/pt) of wheat.

Treatments	Grain yield	Straw Yield
EC levels		
S_O	4.45	7.17
S_1	3.92	5.95
S_2	3.40	5.36
S_3	2.26	3.24
S_4	1.59	2.78
S_5	1.21	1.94
S.Em+	0.04	0.04
C.D. (P=0.05)	0.13	0.11
Varieties		
V_1	2.69	3.51
V_2	2.76	3.93
V_3	2.79	4.89
V_4	2.98	5.30
S.Em+	0.03	0.03
C.D. (P = 0.05)	0.10	0.09

The data presented in Table (1) further show that significantly more grain and straw yields were noted in case of V_4 and V_3 varieties as compared to V_1 and V_2 varieties of wheat. In general, the V_4 variety remained significantly superior over other varieties. The harmful effect of saline water is also confirmed by Chauhan (1991) and Kumar et al.(1997).

The data presented in Table 2 indicate that the salinity level S_5 decreased significantly the grain yield of all varieties over control (S_0) level of salinity of irrigation water. However, significant reduction was also noted under all levels of salinity in case of V_1, V_2 and V_3 varieties over V_4 variety. The V_4 variety remained significantly superior over other varieties of wheat.

The data given in Table 2 further show that the salinity levels of irrigation water affected the straw yield. The straw yield of each variety decreased significantly with increasing levels of salinity as compared to control (S0). However, significant reduction was also noted with all levels of salinity in case of V_1, V_2 and V_3 varieties over V_4 variety. The V_4 variety remained significantly superior over other varieties of wheat.

Table 2: Interaction effect of EC and varieties of wheat on grain yield and straw yield (gm/plot)

Varieties	EC levels					
	S_0	S_1	S_2	S_3	S_4	S_5
			Grain yield			
V_1	4.20	3.50	3.00	2.12	1.26	1.18
V_2	4.26	3.80	3.28	2.14	1.38	1.20
V_3	4.46	3.93	3.40	2.16	1.60	1.22
V_4	4.86	4.46	3.70	3.61	1.92	1.54
S.Em+			0.09			
C.D (P = 0.05)			0.26			
			Straw yield			
V_1	6.23	4.50	4.05	2.50	1.73	1.16
V_2	7.03	5.20	4.40	2.76	2.16	1.50
V_3	7.13	6.06	5.00	3.34	3.08	1.69
V_4	8.30	8.03	7.00	4.46	4.16	3.41
S.Em+	0.08					
C.D (P = 0.05)	0.22					

Table 3: Effect of saline water on plant height (cm) of wheat

Treatments	Plant height			
	Jan.1997	Feb.1997	March 1997	April 1997
EC levels				
S_0	33.75	61.74	63.98	65.99
S_1	31.35	56.15	59.29	60.53
S_2	30.66	51.19	53.66	56.41
S_3	29.25	48.99	50.40	52.55
S_4	28.11	42.02	43.30	43.69
S_5	24.85	35.52	36.86	38.63
S.Em+	0.25	0.05	0.96	0.05
C.D.(P=0.05)	0.69	0.16	2.66	0.16
Varieties				
V_1	27.49	45.25	48.09	48.81
V_2	28.35	49.61	50.54	53.31
V_3	28.84	50.84	53.00	53.74
V_4	33.29	51.36	53.36	56.01
S.Em+	0.20	0.04	0.78	0.04
C.D.(P=0.05)	0.26	0.13	2.17	0.13

Effect on plant height (cm) of wheat

The data recorded on plant height of wheat during January, February, March and April 1997 have been given in Table3 that salinity levels of irrigation water significantly affected the plant height of wheat. The plant height significantly decreased with increasing levels of salinity as compared to control. Such reduction in plant height is in accordance with Sharma (1997).The data presented in Table 3 further shows that significantly more plant height was noted in case of V_3 and V_4 varieties as compared to V_1 and V_2 varieties of wheat.

Effect on Number of tillers/plant

The data recorded on number of tillers/plant of wheat during January, February, March and April 1997 have been given in Table 4 show that the salinity levels of irrigation water significantly affected the number of tillers/ plant of wheat. The number of tillers/plant significantly decreased with increasing levels of salinity as compared to control throughout the investigation. Such reduction in number of tillers/plant is in accordance with Sorour et al. (1997).

Table 4: Effect of saline water on Number tillers/plant of wheat

Treatments	Number tillers/plant			
	Jan.1997	Feb.1997	March 1997	April 1997
EC levels				
S_0	4.70	7.99	8.28	8.53
S_1	4.23	5.98	6.35	6.74
S_2	3.98	5.65	5.88	6.13
S_3	3.68	5.15	5.35	5.65
S_4	3.50	4.38	4.70	4.90
S_5	3.30	3.60	3.85	4.10
S.Em+	0.05	0.04	0.05	0.04
C.D.(P=0.05)	0.15	0.13	0.15	0.11
Varieties				
V_1	3.15	4.32	4.67	5.07
V_2	3.40	4.39	4.82	5.17
V_3	4.22	6.17	6.42	6.64
V_4	4.82	6.95	7.02	7.15
S.Em+	0.04	0.04	0.04	0.03
C.D.(P=0.05)	0.12	0.11	0.12	0.09

Conclusion

The results can be concluded that Pb-343 and Raj-6485 genotyped proved more salt tolerant than other cultivars with respect to yield of grain and straw of wheat.

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Contribution of training programme in execution of new technology

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Introduction

The Krishi Vigyan Kendra (KVK) is one of the first line extension projects of ICAR devoted to vocational training of the practicing farmers, farmwomen and youth. It has taken deep roots in India based on its success and promises. More and more KVKs are coming up. KVKs are getting popularity among the rural masses especially through organized need based vocational training in the field of agriculture and allied sectors. Hence, it was felt necessary to see the impact of KVK training on the adoption of improved practice by the farmers.

Methodology

The study was conducted in seven villages of Meerut districts where the KVK SKD Hastinapur is carrying out its activities. The data were collected with structured interview_schedule from 150 farmers who received the training during 2004-05.The adoption behaviour of the farmers was measured by preparing the list of 16 improved practices of crop husbandry and horticulture and was scored as 3, 2, and 1 for complete, partial and non--adoption respectively. Adoption before training and adoption after training were measured and the impact of training was worked out by subtraction. Total score of impact of training on adoption was categorized into low, medium and high.

Results and Discussion

The finding revealed that half of the farmers (50 per cent) adopted the recommendation of KVK at medium level, whereas, the percentage of farmers with low and high level of adoption was 25 per cent each.

The results in table shows that the personal characteristics like education, land holding, social participation, socio- economic status and farmer's involvement in agricultural programme were significantly correlated with the impact of KVK training. The situational variables i.e. irrigation availability and credit availability, also showed significant relationship with the impact of training on adoption. It is, therefore suggested that the farmers should be provided credit facilities at the right time of cultivation.

Psychological variables like localite-cosmopoliteness, economic motivation and risk preference were also found to be significantly correlated with the impact of training on adoption behaviour. Hence, due consideration should be given to these variables while planning the training strategies of KVK.

Information input and information processing as communication variables have indicated positive relationship with the impact of training on adoption. The results stressed on need of agricultural information to the farming community which may be made available by the extension agencies.

Table 1: Relationship between characteristics of the farmers and impact of training on adoption

Characteristics	Impact of training on adoption (r' value)
Age	0.022 N.S.
Education	0.167*
Farming experience	0.009 N.S.
Annual Income	0.158 N.S.
Land Holding	0.225**
Social Participation	0.209 **
Social- economic status	0.253 **
Involvement in agricultural programme	0.198**
Irrigation availability	0.344**
Input availability	0.051 N.S.
Credit availability	0.248**
Localites /Cosmopoliteness	0.178*
Scientific orientation	0.095 N.S.
Economic motivation	0.499 **
Risk preference	0.276 **
Information input	0.329 **
Information processing	0.165 *

NS-Non Significant
*S*ignificant at 0.05 level of probability*
**Significant at 0.01 level of probability

Conclusion

The study revealed that 50 per cent of the farmers adopted the recommendation of KVK at medium level, followed by equal percentage (25%) at low and high levels. The personal characteristics like education, land holding, social participation, socio - economic status and farmers' involvement in agricultural programme were significantly correlated with the impact. KVK scientists should concentrate on these characteristics while planning, formulating and implementing the training programme. The efforts should also be made to motivate these farmers to act as a facilitators for the technology transfer to others. The situation variables i.e. irrigation availability and credit availability the impact of training on adoption and communication variable i.e. information input and information processing indicated significant relationship with the impact of training on adoption.

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Socio-economic correlates of emerging new pattern of Rural Leadership

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Abstract

The study was conducted in Milkipur block of Faizabad district with a sample size of 307 rural leaders to trace out the emerging new pattern of rural leadership. The study revealed the fact that the rural social systems are under transformation in modern era and now have relaxed the barriers in earlier leadership pattern. Thus, the emerging new pattern of rural leadership belong to any caste, class, creed, educational level, occupation, sex, age etc. as focussed in this paper.

Introduction

Man is social being. He lives in a social group and interacts in social group with social members and thus influences them by the virtue of his personality traits. Such individual is recognized as leader and the activity of influencing others for desirable goals, the leadership. Teed has truly stated leadership as the activity of influencing people to cooperate towards some goal which they come to find desirable.

Rural leaders are there in rural settings who guide, direct, influence or control the thoughts, feelings and behavior of ruralties. Sanderson stated that A village leader is one who has developed in himself a horizontal vision of communities felt needs, processes power and ability to make its members realize the needs and to prepare them to contribute in from of cash and kind towards their fulfillment.

Earlier social scientists indentified various sorts of rural leaders like factional leaders (Oscar Lewis, 1955); primary, secondary and teriary leaders (Harvant Dhillon and his associates, 1955); formal and informal leaders (Henry orentein, 1959); formal and traditional leaders (Allen r. Beals, 1955); Aristocrats, bureaucrats, religious professionals, oligarchs, autocrats and intermediaries (Elevyn wood, 1959); fractionalism (Willium Mc Cormach, 1959) and traditional, political opinion makers, decision makers, caste leaders (S.N. Singh and associates, 1965).

Mostly dominant castes in villages of U.P. rule over the rural society (Majoomdar, 1955).

But now, the dominance of higher castes are falling down with the pace of time cycle (Suraj Singh, 1979). New patterns of rural leadership are emerging. Any person being competent in leadership can be the leader irrespective of caste, creed, class, age, wealth, sex, education, family system and occupation etc.

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Research Methodology

The study was conducted in Milkipur block of Faizabad district. Out of 9 blocks in Faizabad district, one block Milkipur was selected randomly for the study. For selection of villages, the list of villages in Milkipur block was prepared and out of 113 villages in the list, 56 villages were selected randomly through lottery method for the study. Since, every village has various political parties supported clique leaders, six leaders from each sample village, were selected randomly through lottery method totaling 336 rural leaders, out of which 29 were out of reach. Therefore, only 307 rural leaders were finalized as sample size of respondents for the study undertaken.

The interview schedule was developed, pretested and used for gathering the needful information's. The assembled data were processed, analyzed and interpreted accordingly.

Findings

The socio-economic profile of emerging new rural leadership has been found out. The data furnished in Table 1 focuses that majority of the rural leaders (46.58%) has emerged from young age group of 21-30 years of age followed by 28.01% from 31-40 years, 14.01% from 41-50 years, 8.14% from 51-60 years and 3.26% from the age of 61 years and above in a descending order. Hence, it was concluded that the rural leadership has now emerged from young age group. As regards to literacy, the majority of rural leaders (98.05%) were literates due to literacy diffusion there in rural sector. Out of literate's rural leaders, their literacy levels were intermediate (55.70%) followed by graduates (32.90%) and primary (9.45%) in a descending order. The illiterates (1.95%) particularly the dropouts have also come forward in rural leadership (Table 2).

Table 3 shows the occupational pattern of the rural society. Agriculture was reported by the majority of the rural leaders (67.43%) followed by business (20.20%) and service (12.37%). So, it appeared that the rural leaders are mostly concerned with agriculture, which is

the chief source of their livelihood. These agriculture leaders can lead the agrarian society by focusing the agricultural problems for applicable solutions. It also seemed that business people have come forward to lead their rural society. They may be very helpful to rural society due to their business vision in leading the people towards installment of rural and agro-based enterprises as sound of generating income and employment opportunities to rural families for making them economically more sound.

Table 1: Age composition of rural leaders

Age categories	No.	Percentage
21-30	143	46.58
31-40	86	28.01
41-50	43	14.01
51-60	25	8.14
61 and above	10	3.26
Total	307	100.00

Table 2: Literacy level of rural leaders

Literacy levels	No.	Percentage
A. Illiterates	6	1.95
B. Literates	301	98.05
i. Primary	29	9.45
ii. Intermediate	171	55.70
iii. Graduate	101	32.90
Total	307	100.00

Table 3: Occupation of rural leaders

Age categories	No.	Percentage
Agriculture	207	67.43
Business	62	20.20
Service	38	12.37
Total	307	100.00

Table 4: Caste composition of rural leaders

Age categories	No.	Percentage
A. Higher caste		
i. Brahmin	109	35.50
ii. Kshatriya	48	15.64
B. Backward	83	27.03
C. Scheduled	58	18.90
D. Muslim	9	2.93
Total	307	100.00

The caste system has played a vital role in rural leadership. Table 4 focused that majority of rural leaders were from the higher caste i.e. Brahmin and Kshatriya (51.14%) fllowed by backward caste (27.03%), scheduled caste (18.90%) and Muslim (2.93%) in descending order. The table depicted the dilution trend also in rural leadership where the people from minority of other religion i.e. Muslim (2.93%) were also found the rural leaders.

Table 5 focused that the rural leaders with regard to their economic status were reported in majority (70.70%) from medium economic status followed by low (15.30%) and higher (14.00) economic status. It meant that the person from medium and low economic status might also lead the rural society on the ground for leadership traits.

Table 5: Economic status of rural leaders

Age categories	No.	Percentage
Higher	43	14.00
Medium	217	70.70
Low	47	15.30
Total	307	100.00

The rural society is comprised of joint and nuclear families in its system mainly the joint system. Table 6 reveals that the majority of the rural leaders (86.64%) were from joint system followed by nuclear (13.36%) family system, which shows the new emerging trend of rural leadership.

Table 6: Family system of rural leaders

Age categories	No.	Percentage
Joint	266	86.64
Nuclear	41	13.36
Total	307	100.00

Hence, it can be inferred that in current emerging pattern of rural leadership, any individual processing leadership traits may become the leader belonging to any caste, class, educational level, sex, family system, occupation, economic status. So, presently there is open system for rural leadership in the rural society.

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Technological and physico-chemical characteristics of chhana and rasogolla from milk and soy milk blends

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Abstract

Soymilk and its blends with cow milk in 70: 30 and 60:40 proportions were used for preparation of chhana using calcium lactate (2.0 percent) as coagulant. Two temperatures of coagulation, viz. 80^0 and 85^0 C were used. Chhana prepared from soymilk alone and from soy-cow milk blends possessed all desirable characteristics (physico-chemical and sensory) for rasogolla making. Rasogolla made from chhana prepared from soymilk and soy-cow milk blends were found to be highly nutritious and highly acceptable. It was inferred that desired quality rasogolla can be manufactured from soymilk alone as well as its blends with cow milk in 70:30 and 60:40 ratio

Introduction

Rasogolla is a classical Indian milk-based sweet and considered as the most popular indigenous milk product prepared from chhana. Rasogolla was first invented in 1868 in Calcutta by late Nobin Chandra Das (Bhattacharya, 1987) over a century ago.

Chhana is used as base material for preparation of large mumber of milk sweets such as rasogolla, sandesh, chum chum, pantooa, danadar, rasmalai etc. About 4 percent of the total milk produced in India is utilized for chhana making (Mathur, 1991). The method of preparation of rasogolla involves isolation of milk protein and fat (chhana) from milk by coagulation, the coagulum after proper kneading is converted into smooth, round small balls of uniform sizes, which are cooked in clarified sugar syrup and subsequently soaked in sugar syrup overnight.

Various types of rasogolla are sold in the market viz. ordinary (karapak), sponge, canned and diabetic rasogolla. Each variety differs from the other, in respect of colour, appearance, taste, body and texure, method of preparation and packaging. The quality of raw materials and methods used by the traders are likely to cause such variation.

Sponge rasogolla differs from ordinary rasogolla in terms of its taste, body and texture. Sponge rasagolla is more fluffy, and has spongy texture, whereas the ordinary rasogolla has slightly soft body. The diabetic rasogolla is specially prepared for the diabetic patient where sucrose is replaced by sorbitol (Chakrabarti and Gango padhyay, 1990). Canned rasogolla is usually prepared for long keeping quality and export purpose. The quality of milk used and lack of standardized method of manufacture coupled with unhygienic practices in handling and storage cause wide variations in the chemical, rheological and microbiological quality of the rasogolla available in market. Rasogolla has a limited shelf-life of about 4-5 days. During the period of storage it undergoes both physico-chemical and microbiological changes. The latter is more priminent which renders the product unfit for consumption. Also, there is no standard method for packaging of rasogolla in the market, though, now-a-days rasogolla is can-packed or packed in paper board cartons for long distance transportation.

The Bureau of Indian Standards (BIS, 1967) has formulated specifications for chemical and microbiological requirements of canned rasogolla, but there is no legal standard under the Prevention of Food Adulteration Act (1954). Hence, sweet makers are selling rasogolla of indeterminate quality.

Rasogolla is mostly prepared from channa obtained from cow's milk as it results into a smooth and soft body and porous texture. On the other hand, buffalo milk produces chhana with hard body and coarse texture rendering it unfit for rasogolla preparation (Ray and De, 1953). However, scientists are working for standardization of method for preparation or rasogolla from buffalo milk (Soni *et al.*, 1980; Verma, 1990).

A large portion of our country population are suffering from malnutrition specially children because of non-availability of milk due to its exorbitant price. Use of soy-milk in preparation of milk based sweets will certainly reduce the diversion of animal milk for preparation of such products. This will definitely increase the availability of milk in the market and at the same time reduce the cost of milk and also make it easily available for the common people of the society. Soy-milk can be very conveniently converted into soy-chhana, which can be utilized for the preparation of rasogolla analogue, thus reducing the use of cow and buffalo milk considerably for manufacture of milk sweets.

Numerous acceptable food and dairy product analogues have been developed in various countries

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either from soybeans or soy-milk. Most of the workers concentrated their study mainly in preparation of cultured products such as yoghurt, dahi, curd etc, while others utilized soy-milk for preparation of flavoured milk, cheese or cheese like products, ice-cream etc. Recently, attempts have been made to prepare soy-chhana from soy-milk which resembles milk chhana and also rasogolla from soymilk chhana (Chakrabarti and Gangopadhyay, 1990, Gangopadhyay *etal.*, 1997).

In view of the above considerations, the present investigation was undertaken to develop a suitable technology for the preparation of chhana and rasogolla analogue utilizing soy-milk as the base materials, so that knowledge and experience gained in the production and preservation of this product could be transmitted to the proper uses.

The major design of experiment proposed for the study involved: standardization of technique for preparation of soy-chhana from soy-milk as well as soy-milk cow milk blends; develop process for production of rasogolla from above chhana, and study of the sensory attributes and physico-chemical properties of these products with a view to scale-up the process.

Materials and Methods

Preparation of soy-milk: Soybean procured from local market was soaked overnight in one percent aqueous solution of sodium hydroxide in 1:4 ratio. After soaking, water was drained out and husk removed by rubbing beans in between two palms and washing with tap water. For extraction of soy-milk, the soaked soybeans were ground in electric mixer with lukewarm water till a suspension was obtained. It was then filtered though double layered muslin cloth to get the soy-milk (Gangopadhyay *etal.*, 1997).

Preparation of soy-chhana: soy-chhana was prepared from soymilk alone and blends of soymilk and cow milk (Fat 4.0% and MSNF 8.5%) at 80° and 85° C using two percent calcium lactate as the coagulant by the method of Kundu and De (1972).

Preparation of rasogolla: Soy-chhana and chhana from blends of cowmilk and soymilk were utilized in the preparation of rasogolla . Chhana was kneaded properly using a small quantity of maida, suji and baking powder to make a soft and smooth dough. About 8 g portions of chhana dough were taken and made into round balls of uniform size by revolving between palms. These balls were then cooked for 15 minutes in boiling 60 percent clarified sugar syrup. During cooking, the balls were gently stirred. The rasogolla balls were later transferred to clarified hot 40 percent sugar syrup for soaking overnight.

Analysis of samples: Samples of milk, soy-milk and chhana were analysed for total solids, fat, protein and ash contents by BIS (1961) and BIS (1964) methods, while the rasogolla samples were chemically analysed for fat, moisture, sucrose (Lane-Eynon method) and protein by micro-Kjeldahl method (BIS, 1967). Sensory evalnation of the products (appearance, flavour, body and texture) was performed by a panel of semi-trained judges using 9-point hedonic scale.

Results and Discussion

Composition of soymilk and blends: Results on chemical composition of soymilk and soymilk- cow milk blends used in preparation of chhana and rasogolla in present study are laid down in Table 1. These data revealed that soymilk contained 2.10% fat, 5.30% protein, 2.82% total carbohydrates and 0.48% ash. Thus, soymilk is a fairly rich source of energy and proteins. The cow milk contained higher percentages of fat, carbohydrates (lactose) and ash (minerals). The blends of soymilk and cow milk contained different proportions of these constituents, and were almost directly proportional to the ratio of blends used.

Effect of coagulation temperature on chhana: Preliminary studies revealed that 2.0 percent concentration of coagulant (calcium lactate) was found suitable for preparation of soy-chhana without affecting its sensory and physical quality. Lower (1.0%) and higher (3.0%) concentration were found unsuitable, as it produced either very soft or hard body and coarse texture. Further, two temperatures of coagulation, viz 80° and 85°C were chosen. Results obtained for soy chhana are presented in Table2. The yield of soy-chana was found to be slightly higher (34.05± 1.12) at 80°C coagulation than at 85°C (33.85± 1.05), because of slightly higher levels of fat, protein, total carbohydrates and minerals (ash) in the latter (85°). These findings are in agreement with the results of Gangopadhyay and Chakrabarti

Table 1: Composition of soy-milk and cow milk blends (%)*

Particular	Fat	Protein	Total Carbohydrate	Ash	Total Solids
Soymilk	2.10 ± 0.03	5.30 ± 0.04	2.82 ± 0.02	0.48 ± 0.02	10.70± 0.65
Cow milk	4.10 ± 0.04	3.45± 0.04	4.55± 0.04	0.72± 0.02	12.82± 0.56
Soymilk: Cow milk (70:30)	2.70± 0.02	4.65± 0.03	3.45± 0.03	0.54± 0.01	11.34 ± 0.68
Soymilk : Cow milk (60:40)	2.85± 0.05	4.50± 0.04	3.55± 0.03	0.56± 0.02	11.48 ± 0.58

*Average of 10 samples

(1989). Calcium lactate has also been found as a better coagulant than citric acid or lactic acid as it produces greater yield and better quality chhana from soymilk and its blends with bovine milk, suited for rasogolla making (Gangopadhyay and Chakrabarti, 1989; Gangopadhyay *etal.,* 1997).

Soymilk and cow milk blends in 70:30 and 60:40 ratio were also utilized to prepare chhana and collate its sensory quality, chemical composition and yield with the channa prepared from soymilk alone (Table 3). The results indicated that soymilk chhana was as good as chhana made from soymilk - cow milk blends. The yield (34.00 ± 1.10) was highest in case of soy-chhana and lowest in case of 60:40 blends (29:65 ± 0.80). The soy-chhana produced beany flavour but possessd soft and smooth body as desired for rasogolla making. The beany flavour diminished as the proportion of soymilk decreased and cow milk increased in the blends used for chhana making (Table3). Very slight beany flavour was perceived in 60:40 blends of soy-cow milk chhana. These results are also supported by observations of Gangopadhyay *etal.* (1997; 2003).

Preparation of soy-rasogolla: The chhana samples prepared from soymilk alone as well as from soymilk-cow milk blends were assessed for its suitability (end use) in the preparation of rasogolla, which is a highly relished chhana based sweet all over the country. The rasogolla samples made from chhana of soy milk and blends were analyzed for proximate composition (fat, protein, sugar, ash, total solids) and yield. Various data recorded in Table 4 indicated that the percentage of fat was lower but protein, sugar, total solids and yield were higher in soy-chhana rasogolla than in rasogolla from soymilk- cow milk blends. The fat content was higher in blends because of greater fat content in milk chhana. The ash content followed a similar trend. It increased with increase in the level of cow milk in the blends. These results indicated that soy-rasogolla was also a rich source of fat, protein, minerals and sugar. Lower fat content in soy-rasogolla is considered nutritionally superior from health point-of view, as it is devoid of animal cholesterol.

The quality of rasogolla is best adjudged on the basis of its sensory attributes. The data on sensory

Table2: Effect of coagulation temperature on chemical composition (%) and yield of soy chhana (Cal. lactate)*

CoagulationTemperature(^{0}C)	Fat	Protein	Total Carbohy-drate	Ash	Total Solids	Yield %
80	6.05± 0.06	15.01± 0.92	3.40± 0.04	0.93± 0.03	25.40± 1.10	34.05± 1.12
85	6.15± 0.07	15.14± 0.95	3.45± 0.03	0.94± 0.03	25.68± 1.20	33.85± 1.05

*****Average of eight samples

Table3: Composition and Yield of soy-chhana and its blends *

Description of blends Soymilk : Cow milk	Fat%	Protein%	Carbohydrate%	Ash%	Total Solids%	Yield %	Sensory comments
100 : 0.0	6.05± 0.04	15.05± 0.07	3.40± 0.02	0.93± 0.04	25.45± 1.20	34.00± 1.10	Beany flavour, soft, smooth body.
70 : 30	8.60± 0.03	13.96± 0.06	3.30± 0.02	1.32± 0.04	27.18± 1.15	31.40± 0.95	Slight beany flavour, soft, smooth body.
60 : 40	9.90± 0.04	13.80± 0.06	3.12± 0.02	1.35± 0.03	28.17± 1.10	29.65± 0.80	Slight beany flavour, soft, smooth and granular body

*Average of five samples

Table 4: Chemical composition and yield of rasogolla prepared from chhana made from soymilk and cow milk blends*.

Description of blends soymilk % : cow milk %	Fat %	Protein %	Ash %	Sugar %	Total solids %	Yield (g/100g chhana)
100 : 0.0	2.20± 0.01	6.50± 0.03	0.48± 0.01	39.10± 1.00	48.28± 1.84	232.12±3.20
70 : 30	3.68± 0.02	6.12± 0.03	0.74± 0.01	37.10± 1.10	47.64± 1.72	222.10±3.15
60 : 40	4.54± 0.02	6.08± 0.03	0.76± 0.01	36.22± 1.10	47.60± 1.72	218.80±2.86

* Average of five trials

Table 5: Sensory quality of rasogolla made from soymilk and soymilk –cow milk blends chhana*

Blends soymilk : cow milk	Appearance	Flavour	Body and texture	Overall acceptability	Sensory comments
100 : 0	7.40± 0.08	7.10± 0.12	8.10± 0.10	8.00± 0.14	Beany flavour , soft and smooth
70 : 30	8.10± 0.07	7.90± 0.11	8.60± 0.08	8.50± 0.14	Less beany flavour, soft, smooth, fairly spongy
60 : 40	8.30± 0.09	8.20± 0.10	8.78± 0.09	8.65± 0.15	Pleasant flavour, fairly soft and spongy body

* Average of 5 trials.

scores for soy-rasogolla and rasogolla made from blends of soymilk and cow milk are presented in Table 5, which revealed that the soy-rasogolla achieved fairly good sensory scores in terms of appearance, flavour, body and texture and overall acceptability. Although, it possessed beany flavour but the body was soft with smooth texture, which are disired for acceptable quality rasogolla. In general, it was very much liked by panel members as well as others. The intensity of beany flavour, which is innate in soy-products, decreased as the proportion of cow milk increased in the blends. As expected, the sensory scores were highest (8.65± 0.15) for rasogolla made from chhana of 60:40 blends of soy-cow milks, as revealed by least beany flavour and a fairly greater soft and spongy body. Such results are in agreement with those of Biswas *etal*. (2000) and Gangopadhyay etal. (2003).

It is , thus , inferred from results of present investigation that soymilk alone and in combination with cow milk could fairly be utilised in the manufacture of chhana and rasogolla at a much lower cost , yet nutritionally as effective as milk chhana and rasogolla .

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Performance of potato genotypes in western Uttar Pradesh

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Abstract

The experiment was conducted on twenty genotypes of potato during Rabi *season 2004-05 and 2005-06 at a spacing of 60x20cm with three replications. Variety had significant effect on all the quantitative and qualitative traits except specific gravity. The pooled data for various traits indicated that K. Ashoka had highest emergence (87.9%), plant height (75.0cm), number of leaves per plant (85.3) and ascorbic acid (23.1mg/100g); number of stolon per plant (25.5) and specific gravity (1.100 g/cm^2) with JX-371; number of shoots per plant (7.8) and crude protein (9.1%) with MS/92-3146; total tuber yield (409.0 q/ha) with MS/91-1326. The maximal value for shoot dry matter recorded with K. Jawahar (10.9%); stolon length (5.1cm) with K. Chandramukhi; shoot fresh weight per plant (228.0g) and number of tubers per plant (17.6) with K. Anand; tuber dry matter (20.2%) and total soluble solid (6.6 ^{0}B) with K. Lalima.*

Introduction

Potato (*Solanum tuberosum* L.) is a world food crop and can be compared only with rice, wheat and maize for its contribution towards the food and nutrition security and avoiding the poverty and hunger, especially in developing world where food is perpetually on demand to feed the increasing population where nutrition is in reality a second choice rather a luxury. In India, it has not been confined to only 'Kitchen gardens' now-a-days but it has covered a vast agricultural area throughout the country. It contributes an important share in Indian table-food and demand is further increasing. It contributes approximately fifty per cent of the total production of roots and tubers globally. Yield is associated with several characters greatly influenced by environmental factors. The germplasm collection constitutes a reservoir of gene and gene complex and is the raw materials for improvement of crop plants. Knowledge of variability present in population due to genetic and non genetic factors is important to start any systematic breeding programme. An effective breeding programme for the development of good quality and high yielding varieties/ hybrids required preliminary information on the nature and magnitude of genetic variation in the available material and association of characters with yield and among themselves.

Materials and Methods

The present investigation was carried out during *Rabi* 2004-05 and 2005-06 at Hindu college Moradabad, Uttar Pradesh. The experimental material comprised of twenty hybrids received from CPRI, Shimla. Experiment was laid out in Randomised Block Design with three replications. The inter and intra row spacing was kept at 60 cm and 20 cm, respectively. Regular cultural operations were done according to the need of the crop. The observations were recorded randomly on selected plants for each genotype on ten characters viz., emergence (%), plant height (cm), number of shoots per plant, number of leaves per plant, shoot fresh weight (g), shoot dry matter (%), number of stolon per plant, stolon length (cm), number of tubers per plant, tuber dry matter (%), tuber yield (q/ha), total soluble solid (^{0}B), specific gravity (g/cm^3),ascorbic acid (mg/100g) and crude protein (%). The yield was recorded on plot basis. The pooled of mean data over the years were subjected to statistical analysis as per the standard procedure (Gomez and Gomez, 1984).

Results and discussion

Significant difference among the genotypes for all the traits in pooled analysis was observed which is an indicative of high degree of variability for these traits (Table 2) and thus indicated more opportunities for selection to improve the population for these characters. Significant mean squares due to genotype revealed high degree of variability among the genotypes for all the traits except specific gravity

As shown in Table 1, minimum percentage of emergence was obtained in K. Pukhraj (52.8%) followed by MS/92-3146 (61.3%) and MS/91 (67.2%). Plant height is a good indicator of plant vigour and genetic potentiality of the genotype, which may contribute towards higher productivity. Analysis of data revealed the superiority of K.Ashoka (75.0 cm) and K.Anand (65.6 cm) for attaining better plant height. The differences among the genotypes have also been reported by earlier workers (Kumar, 2003). Significant variability for number of shoot per plant was observed among the genotypes in pooled mean values. The number of shoot produced per plant was influenced by the genetic composition, size of tubers as well as environmental factors (Pushkarnath, 1969). Superiority for the trait was observed in MS/92-3146 (7.8) followed by JX-90 (7.2) and MS/91-1326 (6.3).Number of leaves per plant showed significant variation among the genotypes. This showed that large amount of variability was present in the population. Analysis had revealed superiority of K.Ashoka (85.3), K.Anand (78.8) and K.Pukhraj (77.9)

Table 1: Mean performance of potato (*Solanum tuberosum* L.) genotypes for growth, yield and quality traits pooled over two years

Cultures/Varieties	Emergence (%)	Plant height (cm)	Number of shoots/ plant	Number of leaves plant	Shoot fresh weight/ (g/plant)	Shoot dry matter (%)	Number of stolons/ plant	Stolon length (cm)	Number of tubers/ plant	Total tuber yield (q/ha)	Tuber dry matter (%)	T.S.S (^{O}B)	Specific gravity (g/cm^3)	Ascorbic acid (mg/100 g)	Crude protein (%)
JW-160	83.2	61.3	5.7	69.8	172.5	9.2	20.5	1.3	11.4	311.0	16.3	6.1	1.083	17.3	7.5
JX-90	72.1	50.2	7.2	67..0	138.5	10.4	18.0	0.9	8.5	297.5	18.0	5.7	1.095	20.1	8.0
JX-576	80.4	52.4	5.8	67.5	115.5	10.4	25.5	2.4	10.3	293.5	16.7	6.0	1.075	16.4	8.8
JX-371	79.5	56.7	6.2	76.2	155.5	10.0	25.5	3.4	13.7	333.5	18.4	6.3	1.100	16.8	7.7
MS/91-1325	67.2	44.2	3.9	55.1	92.5	10.2	16.5	2.4	9.1	155.5	16.5	5.6	1.087	16.2	7.5
MS/92-3146	61.3	53.0	7.8	78.3	176.0	10.4	24.5	3.0	11.6	285.5	17.2	5.7	1.090	17.4	9.1
MS/92-2105	74.4	57.5	3.9	61.4	140.0	10.1	17.0	1.9	8.4	288.0	14.9	5.4	1.078	16.3	7.8
MS/92-209	79.7	55.25	5.6	62.6	106.0	10.2	18.5	1.8	10.3	379.5	16.7	5.1	1.095	19.5	8.6
MS/91-1326	75.6	50.2	6.3	71.4	174.5	10.0	24.0	2.3	13.1	409.0	16.9	5.8	1.099	17.2	7.7
91-PT-27	82.6	60.0	6.2	67.4	181.0	9.4	20.5	2.0	8.8	335.0	15.8	6.0	1.082	19.9	8.8
K. Ashoka	87.9	75..0	6.2	85.3	174.0	7.9	22.5	1.5	11.1	387.5	16.4	5.0	1.091	23.1	8.1
K. Jawahar	72.0	40.8	4.2	61.3	61.0	10.9	14.5	1.7	7.2	198.0	17.6	6.0	1.082	18.3	8.5
K. Sutlej	84.8	63.8	4.1	71.4	150.5	10.1	13.5	1.5	9.1	324.0	18.5	6.0	1.089	18.9	8.3
K. Pukhraj	52.8	49.3	4.8	77.9	140.5	8.7	19.5	4.4	7.3	256.5	16.2	5.8	1.072	17.3	7.7
K. Chandramukhi	73.1	52.4	5.3	65.8	134.0	9.8	22.5	5.1	9.0	286.0	17.1	6.0	1.088	18.8	7.1
K. Badshah	76.2	55.2	6.5	77.9	156.0	10.8	19.5	1.1	9.7	354.5	16.9	5.2	1.078	21.7	7.4
K. Bahar	74.3	60.5	5.8	68.5	129.5	10.6	19.5	1.8	8.5	239.5	16.4	6.0	1.096	16.7	7.2
K. Anand	80.7	65.6	5.0	78.8	228.0	10.4	17.5	1.8	17.6	355.0	18.3	5.2	1.095	16.3	8.6
K. Sinduri	71.5	49.1	5.6	68.3	115.0	11.2	18.5	2.5	9.2	240.0	18.0	5.7	1.084	19.4	8.9
K. Lalima	76.3	52.2	6.5	75.8	131.0	10.3	21.0	2.5	8.0	240.5	20.2	6.6	1.091	20.8	7.2
CD at 5%	12.22	11.28	1.01	11.45	15.78	2.01	3.86	0.39	1.26	26.69	2.18	0.83	0.084	2.98	0.26

for number of leaves per plant. Significant variation for number of leaves per plant among the potato genotypes have also been reported by several workers (Moorby, 1970). Number of leaves per plant is a very important trait since they are the major photosynthetic organ in the plant. In potato, about 90 per cent of the total dry matter is found in tuber is resulted from direct movement of photo assimilates from leaves and rest 10 per cent from stem (Gawaronska *et al.*, 1984). Significant difference was reported among genotypes for shoot fresh weight and shoot dry matter. Highest shoot fresh weight was observed with genotypes K. Anand (228.0 g/plant) followed by 91-PT-27 (181.0g/plant) and MS/92-3146. Shoot fresh weight varied from 61.0 to 228.0 g/plant. Genotypes K. Jawahar (10.9%), K. Badshah (10.8%) and K. Bahar (10.6%) gave maximum shoot dry matter. It varied from 7.9% to 10.9%. Number of stolon is a varietals character which is related to number of tubers and number of haulms. Large number of stolon renders more number of tubers with reduced size. Genotype JX-576 and JX-371 had maximum number of stolon per plant ranging from 13.5 to 25.5. Significant difference was reported among genotypes for stolon length. Maximum stolon length was observed with K. Chandramukhi (5.1cm) followed by K. Phukhraj (4.4cm) and MS/92-3146 (3.0cm). Significant variations among the genotypes were observed for number of tubers per plant. Genotypes with less number of tubers per plant exhibited tuber with better size and weight which is very important in potato processing industry. The large size of tubers is preferred for the preparation of chips and French fry while, tubers of small size are used for canning (Ezekiel, 1999). The pooled analysis has revealed superiority of K.Anand (17.6) and JX-371 (13.7) for number of tubers per plant. Significant differences were observed for tuber yield among the genotypes. MS/91-1326 showed maximum tuber yield followed by K.Ashoka and MS/92-209. These genotypes may be utilized to improve tuber yield per plant. Scientists observed yield variation from 15.5 to 40.90 t/ha among Indian potato cultivars (Singh and Pandey, 1996). These results were comparable to those of present investigation. The perusal of results revealed that genotypes with higher yield maintained good plant growth as plant height, number of leaves per hill and leaf area which might have improved photosynthetic efficiency resulting into better tuber yield.

Table 2: Analysis of variance for growth, yield and quality characters in potato (*Solanum tuberosum* L.)

Characters	Mean Sum of Sequare		
	Replication	Genotype	Error
d.f.	3	19	57
1. Emergence (%)	42.23	1544.99**	53.58
2. Plant height (cm	146.60	389.11**	63.50
3. Number of shoots/plant	4.16	6.92**	0.51
4. Number of leaves/plant	119.40	231.61**	65.44
5. Shoot fresh weight (g/plant)	4040	10928**	929
6. Shoot dry matter (%)	1.75	5.31**	2.01
7. Number of stolon/plant	7.35	72.16**	9.74
8. Stolon length (cm)	0.19	4.70**	0.91
9. Number of tubers/plant	2.58	14.92**	0.85
10. Tuber dry matter (%)	1.78	9.97**	2.38
11. Total tuber yield (q/ha)	12071	23332**	1852
12. T.S.S (^{0} B)	1.33	0.68**	0.34
13. Specific gravity (g/cm^3)	0.40	0.32	0.69
14. Ascorbic acid (mg/100 g)	5.64	20.29**	7.16
15. Crude protein (%)	1.02	1.46**	0.54

*and ** denotes significance at 5 and 1 per cent level, respectively

Dry matter content is associated with the industrial value of tubers for making the dehydrated products. Therefore, high dry matter content is desirable (Marwaha, 2000). Potatoes containing high dry matter (> 20%) are preferred for fried and dehydrated products, while those containing low dry matter are preferred for canning. Higher dry matter content is an index of better processing quality, as its results lower oil absorption and less frying time (Pavlista and Ojala, 1997). Significant variations were observed among the genotypes for dry matter content. Pooled analysis has also revealed significant effect of environment on these traits. The best performing genotypes namely K. Lalima (20.2%) followed by K.Sutluj (18.5%) and JX-371 (18.4%) are suggested to be utilized in a potato breeding programme to improve dry matter content of tubers. The differences among the genotypes for dry matter have also been reported by Uppal and Khurana (2003). Varietal differences for total soluble solids (TSS) content were also significant in pooled means. The genotypes showed superiority for T.S.S were K. Lalima (6.6 ^{0}B), JX-371 (6.3^{0}B) and JW-160 (6.1^{0}B). Specific gravity of tuber showed non-significant variation among the genotypes. Specific gravity ranged from 1.076 to 1.100 g/cm^3. Pooled analysis revealed superiority of variation JX-371 (1.100 g/cm^3) MS/91-1326 (1.099 g/cm^3) and K. Bahar (1.09 g/cm^3) for specific gravity of tuber. Ascorbic acid from tubers have been studied and their high quality verified by several investigations (Kapoor *et al.,* 1975). Significant variations among the genotypes were observed for ascorbic acid and vitamin A in pooled mean. Pool mean revealed that superior genotypes for ascorbic acid were K. Ashoka (23.1mg/100g), K. Badshah (21.7mg/100g) and K. Lalima (20.8mg/100g). Ascorbic acid ranged from 16.2 to 23.1 (mg/100g) in pooled analysis. Significant variation for TSS, specific gravity and ascorbic acid in tuber among the potato genotypes have also been reported by Dalakoti *et al.* (2003).Potato tuber proteins have been studied and their high quality verified by several investigators (Racusen and Foote, 1980). Pooled mean revealed that superior genotypes for crude protein content were MS/92-3146 (9.1%), K. Sinduri (8.9%) and 91-PT-27 (8.8%). Crude protein content ranged from 7.1to 9.1 per cent in pooled analyses. Higher content of protein in the tubers may be due to efficiency of the plant in uptake of nitrogen (Randhawa *et al.*, 1980).

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Institution wise varietal study of wheat seed production in Haryana state

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Abstract

The paradox of varietal genetic diversity of wheat seed production explain that nearly 24% of the total varieties were contributing nearly 79% and 81% in both area and production and 76% of the remaining varieties were contributing nearly 21% and 19% of in area and production, respectively. Out of 33 varieties only six varieties viz. PBW-343, WH-147, WH-238, HD-2329, WH-542 and PBW-373. Contributed nearly 69.82% and 72.6% is total area and total wheat seed production respectively. Eight varieties out of 33 varieties viz. PBW343, WH-147, WH-283, HD-2329, WH-542, PBW-373, UP-2338 and WH-416 contributed 78.56% in area and 80.93% in wheat seed production. Remaining 25 varieties out of 33 contributed nearly 21.44% in area and 19.07% in wheat seed production. This concludes that a few varieties are contributing a major portion in total wheat seed production and area. It gave inside to the researcher and policy maker that wheat farming is marching towards varietal specialization and genetic biodiversity of the wheat varieties was narrowing down. If the genetic resistant levels of nearly six varieties break down due to attack of some virulent pathogens this would lead to epidemic to wheat farming in the state. This gives birth to a new direction, "Paradox of varietal genetic diversity of wheat seed production".

Introduction

Food feed and fibre are the basic and essential requirement of human beings and animals. Hence agriculture has been one of the most important primary industries in many countries. The seed industry is a part of this great primary industry of agriculture, comprising of all the complex interrelated operations necessary to ensure a regular supply of uniformly high quality seeds to farmers. Introduction of high yielding wheat varieties in India was initiated in 1965-66 during the era of green revaluation. Haryana strategically falls in the indo gangatic plains of country, which is famous for wheat seed production. Haryana ranks 2nd in wheat productivity after Punjab, 3rd in production and 5th in area in the country (Indian Agriculture, 2000). Today seed industries and technology are being involved to ensure the continuous supply of high quality seeds of wheat crops to farmers. One of the quickest and easiest way of increasing the wheat productivity to harness the higher and better quality yields offered by improved seeds of different varieties. Institution wise varietal study of wheat seed production in Haryana was felt necessary in view of the liberalization, globalization and privatization of policies introduced in the country to cope with changing global scenario. The researcher and planners may find this investigation useful in the formation of policies for overall development of high yielding wheat varieties.

Methodology

The present study makes use of primary and secondary data of wheat seed production were collected from the annual reports of the Haryana State Development Corporation and the Haryana State Seed Certification Agency. For the analysis of this study, 10% of the total seed farmers were selected through out of Haryana state using proportional probability to size method from the list of the registered growers. A sample of 160 farmers was categorized into small, medium and large farmers. The information's needed for the study were collected from the wheat seed farmers by personal interview method using pre-tested schedule. In addition simple tabular analysis has also been used in this paper to interpretate the results of these constraints.

Results and Discussion

Table 1 depicted the number of wheat varieties introduced legally, area covered under respective varieties and wheat seed produced in the state during 1999-2000. It I revealed that there were seven institutes/universities around the state whose varieties had been successfully grown an multiplied seed in the state. The total number of varieties prevailing in the state was observed to be 33 as sown in Table 1. the IARI, New Delhi had contributed maximum number i.e. 12 varieties in the state. The area covered and seed produced by the varieties of IARI were observed to be 18.22 and 18.54%, respectively. The H.A.U. Hisar, P.A.U. Ludhiana each had contributed seven varieties and R.A.U. had contributed 3 varieties in the state. The area covered and wheat seed produced by H.A.U. Hisar and P.A.U. Ludhiana were 37.97, 31.97 and 39.02, 30.94% respectively. The area covered by wheat seed produced by R.A.U. were 5.78% and 5.36% respectively. The number of varieties by G.B.P. Agric. & Tech. Univ. Pantnagar, B.H.U. Varanasi and Gujrat Lok Bharati were commercialized for wheat seed multiplication were counted to be 1, 2 and 1 varieties in the state. The area covered and wheat seed multiplication by G.B.P. Agric. & Tech. Univ. Pantnagar, B.H.U. Varanasi and G.A.U. were observed to be 4.69, 0.07, 1.30 and 4.84, 0.06, 1.24% respectively in the state. Table also revealed that a few varieties each institution/university showed maximum popularity among the farmers in respect of area covered and wheat seed produced in the state.

Table 1: Institutional share of different varieties in area and production of total whaet seed in the state during (1999-2000)

Institute/ University	Name of varieties	Area covered (%)	Wheat seed produced(%)
IARI	HD-2229	10.40	10.84
	HD-2285	2.96	2.96
	HD-2009	2.85	2.86
	HD-1553	1.18	1.13
	8 other varieties	0.83	0.75
Total	12 varieties	18.22	18.54
H.A.U.	WH-147	12.00	12.71
	WH-283	10.81	11.01
	WH-542	10.00	10.18
	WH-416	4.05	4.09
	3 other varieties	1.11	1.03
Total	7 varieties	37.97	39.02
P.A.U.	PBW-343	18.27	19.42
	PBW-373	8.34	8.44
	C-306	3.99	1.84
	4 other varieties	1.37	1.24
Total	7 varieties	31.97	30.94
R.A.U.	RAJ-3765	2.49	2.39
	RAJ-1842	1.76	1.60
	RAJ-3077	1.53	1.38
Total	3 varieties	5.78	5.36
GBPUA&T	UP-2338	4.69	4.84
Gujrat(Lok Bharti)	Lok 1	1.30	1.24
BHU	HOW-206&234	0.07	0.06
Grand total	33 varieties	100.00	100.00

IARI = Indian Agricultural Research Institute
P.A.U. = Punjab Agriculture University
H.A.U. = Haryana Agriculture University
R.A.U. = Rajasthan Agriculture University
GBPUA&T = G.B. Pant Univ. of Agric. & Tech.
Gujrat = Lok Bharati

The varieties viz. HD 2329, HD 2285, HD 2009, HD 1553 of IARI covered acreage nearly 10.40, 2.96, 2.85, 1.18% and contributed nearly 10.84, 2.96, 2.85, 1.18% contributed nearly 10.84, 2.96, 1.13 % respectively of the total wheat seed production in the state. The other varieties covered a small area and contributed very less in wheat seed production. The variety HD 2329 covered maximum area and contributed maximum wheat seed production because this variety is high yielding, high tillering, dwarf ness, short (strong) stem, timely sown and suited for irrigated conditions. The variety HD 2385 covered nearly 3% area in total wheat seed production in the state due to high yielding high tillering resistant to Karnal Bunt and suited for very late sown in irrigated conditions. The variety HD 2009 is also popular among farmers due to its high yielding quality and timely sown in irrigated condition. The varity H.A.U. viz. WH 147, WH 283, WH 542 and WH 416 covered the area nearly 12.00, 10.81, 10.00 and 4.05% and contributed nearly 12.71, 11.01, 10.18 and 4.09 per cent respectively of total wheat seed production in the state. The remaining varieties of H.A.U. the covered are and contributed 1.01 and 1.03% in total wheat seed production in the state. The variety WH 147 is more popular among farmers and covered maximum area due to its attributes of good quality, dwarfness, high tileering and resistant to born rust and Karnal Bunt disease. The varieties WH 283 and WH 542 were also popular among farmers in wheat seed production because of their attributes of high yielding, high tillering, strong stem, suited for irrigated conditions and disease resistance. The variety WH 416 was popular among farmers due to suitability for less fertile soil, dwarfness, high yielding, high tillering, golden colour of grains and resistant to born rust. The varieties of P.A.U. viz. PBW 343, PBW 373 and C 306 covered area nearly 18.27, 8.34, 3.99% and contributed nearly 19.42, 8.44, 1.84% respectively in total wheat seed production in the state. The remaining varieties of H.A.U. covered area 1.37% and contributed 1.24% in total wheat seed production in the state. The variety PBW 343 was the most popular among farmers due to its attributed of high yielding good cooking quality, very high tillering, timely sown, suitable for high fertile irrigated land, dwarfness, medium size and glossy grains and resistant to rust. The variety PBW 373 also covered maximum area due to its late sown, good cooking quality, high yielding and suitable for fertile irrigated land. The variety C 306 was also popular among farmers due to its very good cooking quality, desi type, high market value and very suitable for an irrigated conditions. The varieties of R.A.U. viz. RAJ 3765, RAJ 1482 and RAJ 3077 covered area nearly 2.49, 1.76 and 1.53% and contributed about 2.38, 1.60 and 1.38% respectively in total wheat seed production. These varieties were still popular among farmers in certain wheat pockets in the state due to late sown quality, suitable for irrigated belt high yielding, strong stem, thick and golden color of grains, dwarfness and resistant to rust. The variety RAJ 3077 was well suited to saline soil. Only one variety of Pantnagar UP 2238 covered area nearly 4.69% and contributed nearly 4.84% in total wheat seed production. This variety was popular among farmers due to beneficial to both timely and late sown, high yielding, suitable for high fertile irrigated land, dwarfness, high tillering, stiff stem, thick, strong and golden color of grains and resistant to rust except yellow rust. Only one variety of Gujrat (Lok Bharti) Lok 1 covered nearly 1.3% and contributed nearly 1.24% in total wheat seed production in the state. This variety was grown in certain wheat pockets due to resistant to saline soil, suitable for unirrigated conditions, timely and late sown but irrigated condition. Only two varieties of B.H.U. University viz. HOW 206 and HOW 234 covered area nearly 0.07% and contributed about 0.06% in total wheat seed production in the state. Although the share of these varieties were merge but suited to certain pocket of the state.

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Response of African marigold (Tagetes eracta L.) to integration of nutrient management with the bio-fertilizers I vegetative growth

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Abstract

The response of floral crop of marigold or Pusa Narangi to integration of NPK with the biofertilizers was studied and it was concluded the application of 150 kg N, 60kg P_2O_5 and 80 kg K_2O along with 10 kg VAM and 2 kg Azospirillum per hectare is most effective for promoting the plant growth and the dry matter content of leaves and shoots.

Introduction

Marigold is an economically important loose-flower crop. The conventional nutrient (NPK) applications to crops in general are creating threat to the soil health. Therefore, the NPK integration with bio-fertilizers, could be a safer and economic choice. With this idea an investigation with the integration of NPK, VAM and Azospirillum was carried out on African marigold variety Pusa Narangi Gainda.

Materials and Methods

The experiment was conducted during 2002-03 and 2003-04 at the experimental farm of R.B.S.College, Bichpuri, Agra. The treatments under comparison have been T_1 (No fertilizers & No biofertilizers, i.e. control), T_2 (Full dose of NPK i.e. 200, 80 and 80 kg/ha, respectively), T_3 3/4th of NP and full K), T_4 (half NP and full K), T_5 (VAM 10 kg/ha), T_6 (Azospirillum 2 kg/ha), T_7 (Full NPK + VAM), T_8 (3/4th NP and full K + VAM), T_9 (Half NP and full K + VAM), T_{10} (Full NPK + Azospirillum), T_{11} (3/4th NP and full K + Azospirillum), T_{12} (Half NP and full K + Azospirillum), T_{13} (VAM + Azospirillum), T_{14} (Full NPK + VAM + Azospirillum, T_{15} (3/4th NP and full K + VAM + Azospirillum) and T_{16} (Half NP and full K + VAM + Azospirillum). VAM with FYM in 1:12.53 ratio was applied at the time of transplanting @ 2 g of mixture per planting hole, whereas Azospirillum was added with FYM in 1:62.5 ration and applied VAM. The experiment carried out in the randomized block design with three replications.

FYM was applied @ 25ton/ha as basal dose with all the treatments except T_1 (Control). Half dose of nitrogen, full dose of P_2O_5 and K_2O were applied as basal dose as per treatment, whichever, required, while remaining half of N was applied as top dressing 45 days after transplanting. The seeding of about 4 week age were transplanted in the month of October during both the years. The plant growth parameters were recorded in the middle of March at the full bloom stage.

Results and Discussion

Data portrayed in Table 1 revealed that the T_2 to T6 treatments significantly envigorated the plant growth parameters viz., the plant height, thickness of main stem, spread of plant, number of primary branches per plant, length of the longest primary branch, diameter of the longest primary branch and number secondary branches of the longest primary branches, fresh weight of plant biomass and these characters performed the best invariably under T_{15} (150 kg N, 60 kg P, 80 kg K, 10 kg VAM and 2 kg Azospirillum per ha). Integration of nitrogen, phosphorus and potassium with the biofertilizers, thus, proved conducive for effective and intensive plant canopy of marigold. Kumar (2003) explained that VAM is widely known for exploration of more soil volume, thereby the nutrients available for diffusion of phosphorus ion and increasing the surface area for absorption of nutrients such as N, K, Mn and Zn. Similar improvement in plant growth with the application of NPK and biofertilizers has been reported by Johson et al., (1982), Bagyaraj and Powell (1985), Kirad (2002) and Kumar (2003). Singh (2003) explained that impact of INM treatments on growth parameters of tuberose was due to more availability of micro-nutrients causing thereby synthesis of NAA, GA and Cytokinins which in turn promote the crop growth Girradi et al., (1994) attributed spread increase to harbour microflora with the use of NPK and bio-fertilizers. Prasad (2003) reviewed that nitrogen is universally known essential for crop growth with its maximum need during the grand growth period. Similarly phosphorus is required during the early growth period for root development which finally leads in better growth. Potash also behaves partly like nitrogen and partly like phosphorus. Thus, total growth of plant in terms of height, diameter (thickness) of shoots, number and size of leaves etc. is the joint venture of NPK absorbed from soil under the INM treatments. Some soil micro-organism play an important role in improving soil fertility and crop productivity due to their capability to fix atmospheric nitrogen, solubilize insoluble phosphate and decompose wastes resulting in the release of plant

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Table 1: Growth studies of marigold as affected by integration of NPK with the biofertilizers

Treatments	Plant height (cm)		Thickness of main stem		Plant spread (cm)		No. of primary branches/plant		Length of longest primary branches (cm)		Diameter of the longestprimary branches (cm)		No. of Sec. branches on the longest pri. branch		Fresh wt. of plant bio-mass (g)		D.M. contents of leaves (%)		D.M. contents of stem & stem without leaves	
	2002-03	2003-04	2002-03	2003-04	2002-03	2003-04	2002-03	2003-04	2002-03	2003-04	2002-03	2003-04	2002-03	2003-04	2002-03	03-04	2002-03	2003-04	2002-03	2003-04
T_1 (Control)	39.7	62.0	1.35	1.41	32.6	36.1	6.13	6.37	31.8	36.5	0.55	0.61	2.4	2.87	152.3	166.4	10.15	11.73	11.10	13.03
T_2 (RDs of NPK @ 200, 80 and 80 kg/ha)	65.7	79.3	1.79	1.66	46.8	49.6	13.33	15.20	56.2	60.0	0.75	0.81	4.27	6.07	342.2	357.4	16.25	17.3	20.47	22.00
T_3(3/4th N,P and full K)	64.2	74.9	1.77	1.63	43.8	46.5	11.73	13.33	52.5	54.6	0.71	0.76	3.70	5.47	265.4	275.4	14.18	15.63	18.50	20.50
T_4 (Half N,P and full K)	57.9	70.7	1.69	1.60	42.5	44.2	9.60	11.27	46.3	48.6	0.69	0.73	3.07	4.53	225.8	235.7	12.46	14.20	17.01	18.70
T_5 (VAM 10kg/ha)	48.7	68.7	1.43	1.55	40.7	42.4	8.90	10.47	42.9	47.0	0.64	0.70	2.93	4.20	217.0	227.2	11.79	13.47	15.50	17.70
T_6 (Azospirillum 2 kg/ha)	47.8	67.3	1.42	1.54	39.3	41.3	8.80	10.00	40.2	45.5	0.65	0.69	2.53	3.87	205.9	226.4	10.42	13.27	15.23	17.47
T_7 (Full N,P,K + VAM)	67.8	82.2	1.81	1.69	48.0	51.1	14.80	16.90	57.7	62.5	0.79	0.83	5.33	6.70	378.5	390.1	18.02	18.63	22.40	23.67
T_8 (3/4th N,P @ full K + VAM)	62.5	79.1	1.78	1.65	46.4	49.0	12.93	14.93	55.2	58.9	0.76	0.80	4.27	5.90	330.5	340.6	15.73	16.73	20.37	21.67
T_9 (half N,P & full K +VAM)	64.5	75.9	1.77	1.64	44.1	46.5	12.13	13.60	52.8	54.9	0.73	0.77	4.03	5.43	291.0	282.7	14.68	15.90	19.30	20.57
T_{10} (Full N,P,K + Azospirillum)	66.9	82.1	1.81	1.68	47.5	50.9	14.57	16.67	57.4	62.4	0.79	0.82	4.93	6.60	368.7	379.0	17.15	18.40	21.57	22.93
T_{11} (3/4th N,P and full K + Azospirillum)	65.2	78.5	1.78	1.64	45.7	48.4	12.80	14.80	54.0	57.6	0.74	0.79	4.10	5.83	307.7	321.9	15.15	16.50	20.21	21.43
T_{12} (Half N,P & full K + Azospirillum)	64.1	4.5	1.76	1.63	43.6	45.9	11.33	13.07	50.9	53.5	0.71	0.75	3.60	5.33	263.8	268.0	14.16	15.40	18.45	20.30
T_{13} (VAM + Azospirillum)	62.8	72.2	1.76	1.62	43.1	45.5	9.93	11.83	49.0	52.0	0.70	0.74	3.37	4.87	260.0	249.9	13.32	14.93	17.73	19.50
T_{14} (Full N,P,K + VAM + Azospirillum)	67.9	83.5	1.83	1.72	49.4	52.8	14.9	17.20	59.0	64.4	0.81	0.85	5.47	6.93	391.9	401.7	18.29	19.23	23.62	25.57
T_{15} (3/4th N,P & full K +VAM+Azospirillum)	70.6	85.7	1.98	1.85	52.8	55.6	15.23	17.87	63.2	67.6	0.84	0.89	6.27	7.60	432.4	442.5	19.79	20.90	26.11	27.70
T_{16} (half N,P &full K+VAM+Azospirillum)	66.3	81.3	1.80	1.65	47.2	49.9	14.40	16.00	57.2	61.1	0.78	0.82	4.40	6.10	353.1	370.0	17.03	17.90	21.10	22.83
CD at 5%	8.70	7.38	0.20	0.13	5.41	6.70	1.56	0.83	7.13	5.88	0.07	0.07	0.57	0.89	43.28	42.33	2.29	2.51	2.45	2.58

nutrients. The bio-fertilizers such as VAM and Azospirillum hasten biological activities to improve availability of plant nutrients for promoting plant growth, both vertical and horizontal. Further Azospirillum inoculates ability to fix nitrogen, while Mycorrhizea facilities increased phosphorus uptake. The hyphase of VAM absorb the mineral salts and water for soil (Prasad 2003).

For increasing dry matter content of plant canopy the treatments T_2 to T_{16} indiscriminately proved effective over control. It was further noted that the magnitude of dry matter increase was more marked with the treatments involving either of VAM or Azospirillum, or both, in addition to full or 75% doses of NPK.

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Validation of fertilizer adjustment equations based on yield target concept and complementary use of organic and biofertilizers along with inorganic fertilizers in rainfed maize-wheat system in moutain acid soil of Himanchal Pradesh

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Abstract

Field experiment were conducted with maize (Zea mays L.) during kharif 2000 and wheat (Triticum astivum L.) during rabi 2000-01 for validation of already developed fertilizer adjustment equation along with organic and biofertilizers for fertilizer recommendations based on yield target concept at Research farm of CSKHPKV, Palampur at wet temperate zone of Himanchal Pradesh. Different nutrient sources fertilizer recommendation methods along with varying levels of targeted yields of maize and wheat were evaluated. Results indicate that fertilizer recommendations based on targeted yield concept were more precise and dependable up to the yield targets of 5.0 t/ha for maize and 3.0 t/ha wheat, respectively. Moreover, with the application of FYM @ 5.0 t/ha fertilizer dose could be reduced by 50, 17 and 31 kg/ha for N, P_2O_5 and K_2O respectively. With the use of phosphbacteria (PB) and Azotobactor (AB) there could be further reduction to 25 kg/ha of N and 25 kg/ha of P_2O_5 for the fertilizer dose.

Introduction

Among the cereal crops maize and wheat are the major crops grown in Himanchal Pradesh. The average productivity of maize and wheat is 2.0 and 1.6 t/ha, respectively. The low productivity of these crops in the state is due to low fertilizer use, unjudious use of fertilizer and marginal farming. The productivity of these crops can be enhanced by 2-10 times only through better soil fertility management practices alone. Fertilizer recommendation based on the soil testing is more commonly used method for quick characterization of soil fertility status. On the basis of medium soil fertility class, general fertilizer recommendations kg/ha in term of N, P_2O_5 and K_2O such as 120:60:40 for maize and 80:40:40 for wheat respectively are made. However, a soil is tested low in particular nutrient, the generalized fertilizer recommendation for that nutrient will be increased by 25% and if, fertility status is high, the generalized fertilizer dose is decreased by 25 per cent.

There are several approaches and methods for fertilizer recommendation, target yield approach (Ramamurthy and Velaythan, 1971) is unique one because, in this method, three basic parameters viz., nutrient requirement is kg per quintal of grain of a particular crop, efficiency of nutrients from soil available nutrient and efficiency of nutrients from added fertilizer, are worked out by conducting standard test crop experiments. After calculation of these parameters, simple workable fertilizer adjustment equations are developed. Earlier, the total fertilizer dose based on these equations only included the chemical fertilizer and there was not any recommendation for complementary use of organic and biofertilizers. The large number of experiments/trials conducted by peoples on research stations and on farmers field have demonstrated the importance of organics, FYM and biofertilizers as complimentary use to supply the nutrients to rainfed crops and providing the yield stability (Venkateswarlu and Wani 1999). In the present study, the fertilizer equations developed for maize and wheat are verified on research farm of Palampur with the objectives that (i) whether targeted yield can be achieved or not then (ii) whether or not there is reduction in applied fertilizers with the use of FYM and biofertilizers.

Materials and Methods

Field experiments were conducted during kharif 2000 and Rabi 2000-01 in wet temperate zone with maize and wheat at research farm of CSKHPKV, Palampur. The soil of Palampur farm is thermic Typic Hapludalf with average value of pH 5.9, organic carbon 0.70%. The soil is silty in texture and contained 570, 12 and 172 kg/ha available N, P and K respectively. The field layout for each crop essentially created by applying graded dose of N,P and K fertilizers so as to get a wide range of soil fertility. An exhaust crop was later on raised on these four strips to stabilize the soil system. For the test crop of maize, wheat was used as an exhaust crop and for wheat maize was used. After the harvest of exhaust crops, the experiment on maize and wheat as test crops were conducted in the subsequent season by dividing each of the four fertility strips into 16 plots which received

Table 1: Basic data and fertilizer adjustment equations for maize and wheat in wet temperate zone of H.P.

Crop	Nutrient requirement (kg/ha) grain			Nutrient contribution from soil (%)			Nutrient contribution from fertilizer (%)		
	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O
Maize	2.30	0.81	1.64	6.80	42.54	5.96	40.56	18.53	71.75
Wheat	2.35	0.63	1.66	6.00	41.60	12.80	47.80	8.00	68.30

Fertilizer adjustment equation:

Maize: FN = 5.67 T - 0.17 SN, FP_2O_5 = 4.38 T - 5.26 SP, F K_2O = 2.29 T - 0.10 SK

Wheat: FN = 4.91 T - 0.124 SN, FP_2O_5 = 7.86 T - 5.16 SP, F K_2O = 2.44 T - 0.19 SK

where, FN, FP2O5 and FK2O are fertilizer N, P2O5 and K2O respectively in kg/ha ; SN, SP and SK are soil test values for N,P and K in their elemental form in kg/ha and T is yield target in q/ha

13 selected treatments out of the combinations of four levels of N and three levels of P and K. the remaining three plots in each strip were kept as controls (Ramamurthy and Velayuthan, 1971).

The fertilizer materials used were urea, single super phosphate and muriate of potash for all the crops. Full dose of P and K and half dose of N were applied at the time of sowing. The remaining half dose of N was top dressed at knee-high stage in maize and at maximum tillering stage of wheat. Representative soil samples (0-15cm) were taken from each of the 64 plots for each crop before the application of fertilizers at sowing of crops. The data of grain and straw/stover for all the plots were recorded at the harvest of each crop. Grain and straw samples were analyzed for N, P and K contents and total uptake was calculated. Similarly, available N (alkaline-$KMnO_4$), available P (Olsen-P) and available K (ammonium acetate-K) were determined in all the soil samples taken before sowing of each crop.

With the help of nutrient uptake data and soil test values, the basic data (nutrient requirement in kg/quintal of grain, per cent contribution of a particular nutrient from soil and applied fertilizers) required for making target yield concept based fertilizer recommendations for maize and wheat were computed according to the procedure of Ramamurthy et al., 1967).

To validate the developed fertilizer adjustment equations as well as see whether or not, there is reduction in applied fertilizers with the use of FYM and biofertilizers; field experiments were conducted at Research Farm of CSKHPKV, Palampur. In order to enhance overall nutrient efficiency, the entire field was limed (3.5 t/ha) prior to start of study. In above experiments, 13 treatment combinations viz., Control, Phosphobacteria (PB), Azotobactor (AB), FYM_5 PB AB, Farmer Practice (FP), FP PB AB, State Level Dose (SLD), Soil Test Based Dose (STB), STB FYM_5 PB AB and 3 pre fixed yield targets of 30, 40 and 50 q/ha along with FYM_5 PB AB for maize and 10, 20 and 30 q/ha along with PB AB for wheat were tested in rainfed maize-wheat cropping system. All treatments were replicated thrice and imposed on both the crops, except FYM, which was applied to maize crop only. It was estimated that FYM to supply 33, 8 and 16 kg/ha N, P_2O_5 and K_2O, respectively. Phosphobacteria and Azotobactor were applied by usual seed dressing method and assumed to supply about 30 kg/ha of $P_2O_5$and 30 kg/ha of N, respectively.

Results and Discussion

The amount of nutrients required to produce one quintal of maize and wheat was 2.3 and 2.3 kg N, 0.8 and 0.6 kg P_2O_5 and 1.6 and 1.7 kg K_2O respectively (Table 1). The contribution from available N was 6.8 and 6.0% maize and wheat, respectively. The corresponding contribution of N from fertilizer to these crops was 40.6 and 47.8%. the comparatively low efficiency of N from soil is attributable to low rate of mineralization of soil N and low winter soil temperature. Similarly, the lower efficiency of fertilizer N to maize as compared with wheat could be owing to leaching losses of applied N due to heavy rainfall during the season (Verma and Bhagat, 1972).

The per cent contribution of P_2O_5 from soil was 42.5 and 41.6 for maize and wheat respectively while that from fertilizer was 18.5 and 8.0 respectively. The higher efficiency of soil P_2O_5 in comparison to added P_2O_5 during both maize and wheat growth might be because of hydrolysis of soil Al-P, transformation of ferric-P to more soluble ferrous P and conversion of insoluble tricalcium-P to more soluble mono and dicalcium-P under optimum soil moisture conditions prevalent during both the seasons. Another reason for low efficiency of fertilizer P (P_2O_5) with active Al and Fe with the formation of insoluble-P compounds such as $Al(OH)_2H_2PO_4$ and $Fe(OH)_2H_2PO_4$ (Sharma, 1979).

The contribution of K_2O was 6.0, 12.8 per cent from soil and 71.5, 68.3 per cent from fertilizer to maize and wheat respectively. The comparatively lower efficiency of soil K_2O in both maize and wheat may be attributed to high fixation and low availability of K on heavy textured soils particularly when such soils are rich

Table 2: Verification of fertilizer prescription models under complementary use of FYM and biofertilizers along with inorganic fertilizer in maize cv Parvati (2000)

Treatments	Nutrient dose (kg/ha)			Fertilizer/manure cost (Rs.)	Yield (q/ha)	% deviation (±)	Yield cost (Rs.)	B:C ratio
	N	P_2O_5	K_2O					
Control	0	0	0	0.0	7.66	-	4596	-
PB	0	0	0	40	9.60	-	5760	144
AB	0	0	0	40	10.36	-	6216	155.4
FYM_5	0	0	0	1500	16.20	-	9720	6.48
FYM_5 PB AB	0	0	0	1580	23.66	-	14196	8.98
FP	40	0	0	1000	25.60	-	15360	15.36
FP PB AB	40	0	0	1080	27.20	-	163.20	15.11
SLD	120	60	30	2527	29.90		17940	7.09
STB	120	45	40	2317	30.60		18360	7.92
STB FYM_5 PB AB	24	7	24	2118	26.50		15900	7.50
T30 FYM_5 PB AB	61	0	47	2519	27.33	-8.9	16398	6.50
T40 FYM_5 PB AB	118	0	70	3250	36.00	-10.0	21600	6.64
T50 FYM_5 PB AB	175	0	93	3981	46.45	-7.1	27870	7.00
C.D. at 5%					1.70			

FYM5 = FYM applied @ 5 t/ha; Beside 40 kg N, farmers apply 2 t/ha FYM; contribution (on average) from FYM (kg/ha): N = 33, P_2O_5 = 8 and K_2O = 16

		Maize	wheat
Sale price of grain (Rs/kg)		5.00	6.00
Cost price of FYM (Rs/kg)		0.30	
Cost price of fertilizer (Rs/kg)	N	10.00	10.00
	P_2O_5	18.62	19.38
	K_2O	7.0	7.09

in K fixing clay minerals like illite and chlorite (Sharma 1979). For calculating the fertilizer requirement for any yield target on the basis of initial soil test values, the basic data have been transformed in the form of simple workable fertilizer adjustment equations. These equations for maize and wheat are given in Table 1.

The yield data obtained from maize experiments (Table 2) indicated that FYM was much superior in comparison to either PB or AB in case of rainfed maize and can be inferred that though PB and AB produced significantly higher maize yield over the control but they were inferior in comparison to FYM. It is clear from the yield data that the treatments based on fertilizer recommendation approaches have higher yields and return compared to PB, AB, FYM_5, FYM_5 PB AB, FP and FP PB AB treatments. Although the B:C ratio was very high in case of PB and AB because of low input cost. The percent deviation up to yield target 50 q/ha was less than –10, which clearly explain that target yield concept is more precise and accurate. In general, targeted yield treatments have higher grain yields and return compared to SLD, STB and STB FYM PB AB. Among the targeted yield treatments, FYM_5 PB AB treatment has higher yield, return and B:C ratio compared to other targeted yield treatments. The data presented in Table 3 indicated that the treatments containing residual organic (FYM) and biofertilizers have higher yield and return compared to control but PB, AB and FYM_5 were at par because FYM was not added to wheat crop. The higher yields under the treatments containing residual FYM was an indication that FYM applied to a crop can significantly contribute to preceding crop. It is clear from the yield data that the treatments based on fertilizer recommendation approaches have higher yields and return compared to PB. AB, FYM_R PB AB, FP and FP PB AB treatments. Though, the B:C ratio values were not higher than the organics and biofertilizer treatments. The high B:C ratio values were due to low input cost. The data obtained showed that per cent deviation among targeted yields was +31, -21 and –25 for 10, 20 and 30 q/ha yield target respectively. This indicated that the deviation is slightly higher and need to improve the equations and management practices to achieve the said targets. Among the treatments of targeted yields, the B:C ratio decreased with increasing levels of fertilizers because of high input cost but the grain yield and return increased with increasing levels of fertilizers doses based on targeted yields.

It could be inferred from the results of the present study that prescription based fertilizer recommendation

Table 3: Verification of fertilizer prescription models under complementary use of FYM and biofertilizers along with inorganic fertilizer in wheat cv HPW-89/Aradhana (2000-01)

Treatments	Nutrient dose (kg/ha)			Fertilizer/manure cost (Rs.)	Yield (q/ha)	% deviation (±)	Yield cost (Rs.)	B:C ratio
	N	P_2O_5	K_2O					
Control	0	0	0	0.0	2.61	-	1566	-
PB	0	0	0	40	3.60	-	2160	54
AB	0	0	0	40	3.25	-	1950	49
FYM_R	0	0	0	1500	3.83	-	2298	-
FYM_R PB AB	0	0	0	80	5.76	-	3456	43.2
FP	30	0	0	300	8.30	-	4980	16.60
FP PB AB	30	0	0	380	12.58	-	7548	19.86
SLD	80	40	40	1858	14.26	-	8556	4.60
STB	100	30	47	1915	15.16		9096	4.74
STB FYM_R PB AB	63	10	47	1237	16.41	-	9846	7.95
T30 FYM_R PB AB	0	0	0	0	13.16	+31.6	7896	-
T40 FYM_R PB AB	52	37	27	1508	15.66	-21.7	9396	6.23
T50 FYM_R PB AB	96	118	48	3667	22.25	-25.83	13350	3.64
C.D. at 5%					1.26			

FYM_R = FYM residual

i.e. yield target concept can be used efficiency up to yield target of 50 q/ha for maize and 25 q/ha for wheat in wet temperate zone of Himanchal Pradesh which is considered to be granary of Himanchal Pradesh. And, the another significant point which emerged from this study that if we apply 5 t/ha FYM to maize, we can reduce the doses of N, P_2O_5 and K_2O by about 33, 8 and 16 kg/ha respectively. Similarly the use of PB and AB in maize and wheat can be made, then, there is a further reduction to 30 kg/ha of N and 30 kg/ha of P_2O_5 respectively. This can ensure some economy in the use of mineral fertilizers, which are otherwise very costly.

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Socio-economic and nutritional status of school children of rural families of Faizabad district (Eastern U.P.)

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Abstract

A study pertaining to socio-economic and nutritional status of school children of rural families was undertaken in Faizabad district of Eastern U.P. for detailed investigation it was found that among nine socio-economic indicators viz. family education, family occupation, family size, caste, family assets and farm assets were the most significant indicators which contributed substantially to the level of SES of category-I (marginal farmers) and category-II (landless labourers) while type of family, caste, family education, family occupation, type of house and family assets were important significant indicators for the category-III (rural artisans). The results of nutritional status of school children up to 8th standard were highlighted that more than 55% children in respect of age and sex suffered from nutrition. This paper throws light on the degree of malnutrition, which scored 40.05% male and 42.86% female children with respect to weight for age. 32.6% male and 42.46% female with respect to height for age and 39.26% male and 42.96% female children with respect to mid upper arm circumference for age by using anthropometrics measurement were exhibited normal and rest suffered from various grades of under-nutrition. Dietary intake was relatively much deficient in energy, proper supplementary amino acids makeup iron and vitamins causing in different grades of disorders.

Introduction

In India malnutrition prevails widespread in the rural horizons and it is clearly visible among vulnerable section of the rural community. Inadequate dietary intake and unbalanced nutrition directly retard workable efficiency. By and large majority of rural community including rural school children impart most of the indispensable farming and allied activities operations. Malnutrition is an important battle which is to be fought and won. As compared to urban rural school children are prime victims of malnutrition. Common disorders exist like anemia, night blindness, protein, energy, malnutrition and other vitamin deficiency syndromes (Rao et al, 1978, Devdas and Chandrasekhar 1982). Studies pertaining to socio-economic and dietary intake are well recongnized for making an assessment of nutritional status (Bhagat and Koshy, 1984, Tripathiu et al., 1985 and Singh et al., 1990). Numbers of studies have been explored in view of various sections of the rural community with covering pre-school children, pregnant and lactating mothers (Rajlakshmi et al., 1974, Rajlakshmi et al., 1980 and Murlidharan 1982). Currently studies on dietary pattern and nutritional status of school going children are still meager in eastern region of Uttar Pradesh. Keeping in view of its prime urgency and global emerging issue for ensuring per capita nutritive dietary intake especially in the age group of 6-10 + school going children as dependent on marginal farmers, land less labourer and rural artisans the proposed investigation was explored. The specific objectives were (i) T study socio-economic status (ii) To assess dietary intake and nutritional status of rural school children by anthropometrics measurement. Data pertained for the year 2002-03.

Methods and Materials

Milkipur block of Faizabad district of eastern U.P. was purposively selected random sampling technique was adopted for procuring the samples from junior high school children. The sample was undertaken 377 male and 252 female belong to the age group of 6+-10+. The socio-economic status scale developed by Pareek and Trivedi (1963) was applied in order to examine the socio-economic status of school children's parent Multiple Regression Analysis.

The relationship between the dependent variables y and a set of independent variables x_1, x_2

X_1 was obtained by fitting the multiple linear regression equation

$Y1 = a + b_1x_1 + b_2x_2 \ldots\ldots + b_xx_x + e \ldots i = 1, 2 \ldots.n$

Where, b_1, b_1……..bx are partial; regression coefficients of corresponding independents variables

a y – intercept constant

e - error term associated with i-th observation, it is assumed that error terms follow independently normal distribution with mean zero and variance o^2

The partial regression coefficient (b) represents the amount of change in Y that can be attributed due to a given change in one of the independent variables x

with remaining independent variables held fixed

The partial regression coefficient (b) was tested by t-test as follows

T = b/SE (b) which follows t-distribution with (n-1-k) df.

SE (b) = Standard error of b

The overall significance of the fitted multiple regression equation was tested by f-test (Snedecor & Cocharu, 1967)

In order to fulfill the first objective of the study, the following multiple regression analysis based on the model of the study as mentioned is carried out.

Dependent variable Independent variable

(1) x_{10} $x_1, x_2, x_3 x_4 x_5 x_6 x_7 x_8 x_9$

where- x_1-family, x_2-caste, x_3-family size, x_4-family education, x_5-family occupation, x_6-land holding, x_7-type of house, x_8-household assets, x_9-farm assets, x_{10}-total SES score.

Various parameters used in assessment of nutritional status were antithromometry (height weight, Mid upper arm circumference) and quantification of food intake of samples were assessed Nutritive value of consumed food was examined with prescribed standard as designated by I.C.M.R. 1981. The pattern of growth and physical status of body through genetically determined are profoundly influenced by the diet and nutrition. Hence, anthropometric measurement is useful criteria for assessing nutritional status (Swaminathan 1990). Anthropometric technique was explored for measuring the body weight, height, arm circumference, food consumption pattern etc. the data were analyzed and rating indices compared with Indian Standard (Gopalan and Raghvan, 1971). By personal interview the data regarding age and occupational status of family head of the children were recorded. Distribution of children by age and sex is given in Table 1.

Table 1: Distribution of children by age and sex

Age	Males (No.)	Female (No.)
6+	75	45
7+	85	52
8+	78	53
9+	71	61
10+	68	41
Total	377	252

Results and Discussion

Socio-economic status of school children parent

Different components of socio-economic status (SES) viz. type of family, family size, family education, caste, family occupation, land holding, type of house, household assets, farm assets were undertaken as independent variables. An overall SES level of parent were analyzed through step-wise regression model. The influences showed for three categories of children's parent viz. (1) marginal farmers (2) landless labourer and (3) rural artisan. Table 2 exhibits that all the variables except type of family caste, family size, only type of houses was found significantly effect (<0.05) whereas family education, family occupation and land holding also found significant effect (P<0.01) on SES level of the school children under category of marginal farmers. The values of partial correlation r2 indicate that major contribution towards SES level was family occupation followed by family education, land holding and farm assets. All these four variables in the multiple regression model were found to predict 83% the SES of school children belonging to marginal farmers in landless farmer

Table 2: Different component of socio-economic status (SES) of rural scholl children parent

S.No. Variables	SES of school children parent								
	Marginal farmer			Landless farmer			Rural artisan		
	Reg coeff.	r^2	R	Reg coeff.	r^2	R	Reg coeff.	r^2	R
1. Type of family	-	0.0077	9	-	0.0323	7	-	0.0264	6
2. Caste	-	0.0122	6	-	0.0311	6	0.8123(0.3014)	0.1450	5
3. Family caste	-	0.0018	5	0.8120**(0.2432)	0.0116	4	0.0512**(0.1274)	0.2133	4
4. Family education	1.2272*(0.3132	0.5384	2	0.7843**(0.0748)	0.6424	2	0.9101**(0.5220)	0.6287	3
5. Family occupation	1.0872*(0.3942)	0.6272	1	0.8861**(0.2223)	0.5231	1	1.0814*(0.0646)	0.8532	1
6. Land holding	1.3281*(0.6566)	0.2174	7	-	-	-	1.4932*(0.0246)	0.1011	9
7. Hype of house	1.0241**(0.5324)	0.0018	8	-	0.0454	8	-	0.0732	7
8. Household assets	-	0.0029	3	0.4654**(0.1567)	0.1887	5	1.0532*(0.5672)	0.6521	2
9. Farm assets	-	0.0127	4	1.2848*(0.2722)	0.4657	3	1.2242*(0.0987)	-	8
10. Constant	6.7832	-	-	11.5221	-	-	6.5431	-	-
R^2	83.24**			80.21**			91.17**		

* significant at P<0.05; ** significant at P<0.01; Reg. Coeff. - Regression coefficient; R - Rank partial r^2

Note - figures in parenthesis indicates standard error of regression coefficient

Table 3: Details related weight of 6+ to 10+ year rural school children for age by anthropometric measurement

Age	Male				Female			
	Normal	Mild	Moderate	Severe	Normal	Mild	Moderate	Severe
6+	25	29	10	2	19	18	08	-
7+	44	26	20	1	20	27	09	-
8+	31	38	14	1	18	25	04	1
9+	27	21	28	-	26	19	13	1
10+	24	23	22	-	25	09	10	-
Total	151(40.05)	137(36.34)	85(22.55)	4(1.06)	108(42.86)	96(38.89)	44(17.46)	02(0.79)

Note - Figures in parenthesis show the percentage of total

Table 4:Details related height of 6+ to 10+ year rural school children for age by anthropometric measurement

Age	Male				Female			
	Normal	Mild	Moderate	Severe	Normal	Mild	Moderate	Severe
6+	31	21	21	2	32	19	01	-
7+	27	51	05	1	29	25	06	1
8+	34	35	18	1	18	21	02	-
9+	18	47	22	-	19	40	10	-
10+	12	26	06	-	15	17	03	-
Total	122(32.36)	180(47.74)	72(19.10)	03(0.80)	107(42.46)	122(48.41)	22(8.73)	01(0.40)

Note - Figures in parenthesis show the percentage of total

Table 5: Details related mid upper arm of 6+ to 10+ year rural school children for age by anthropometric measurement

Age	Male				Female			
	Normal	Mild	Moderate	Severe	Normal	Mild	Moderate	Severe
6+	39	12	08	03	19	24	05	02
7+	35	19	14	03	29	12	06	03
8+	23	41	19	03	13	26	09	04
9+	21	38	22	01	33	06	10	01
10+	33	32	13	01	18	20	12	-
Total	148(39.26)	142(37.67)	76(20.16)	11(20.92)	112(44.44)	88(34.92)	42(16.67)	10(3.97)

Note - Figures in parenthesis show the percentage of total

the results were exhibited that except type of family, caste, land holding and type of house and rest variables family size, family education, family occupation and household assets witnessed a significant effect ($P<0.01$) whereas, farm assets variables was reported highly significant ($P<0.05$) on SES level. It is seen from values of partial r2 the family education effected much towards SES level followed by family occupation farm assets and family size included in the model were able to explain 80% of the total variation in the SES level. However, only three variables viz. caste, family size, family education were found to effect significantly ($P<0.01$) whereas, family occupation, land holding, farm assets and household assets were showed significant effect ($P<0.05$) to the SES level of school children parent belonging to category of rural artisan. As such these significant variables together explained about 91% of total variation on SES level. The overall results show that family occupation, family education, household assets, farm assets, type house, family size and land holding were the most important variables which contributed maximum to the SES level school children of marginal farmers and landless farmers while in case of rural artisan the important variables were land holding farm assets, caste, family size, family education, house hold assets and family occupation for the SES level.

Nutritional status of rural school children

Anthropometric measurements of young children are particularly sensitive to change in nutritional status say Wateriow FAO has especially recommended the

Tabale 6: Dietary intake (g) of 6+ to 10+ year rural school children by age

Food type	Age (in years)			
	4-6		7-9	
	PD	RD	PD	RD
Cereals	226	200	270	250
Pulses	18	60	32	70
Green + leafy vegetable	14	75	20	75
Other vegetable + tuber	25	50	25	50
Fruits	-	50	-	-
Milk	-	250	-	250
Fat and oil	05	25	15	30
Sugar and iggery	12	40	25	40
Meat, fish, eggs etc.	-	-	-	-
Calone	1100	1500	1350	1800
Protein	28	22	34	33

use of weight and height for age assessment. The interference of anthropometric measurement viz. average body weight, height and mid upper arm circumference clearly show that number of rural school children in respect of sex and age was affected due to malnutrition. The study incorporated for analyzing deficits in weight for age as assessment of degree of malnutrition as given by Gomez et al., (1956) only 40.05% male and 42.86% female children were observed normal whereas, rest were affected by degree of malnutrition (Table 3). The other method examining deficit in height for age 32.36% male and 42.46% female children were fallen under normal grade and rest suffered under growth retardation (Table 4). The study further indicated on the basis of Mid Upper arm circumference for age was highlighted 39.26% male and 44.44% female children as normal and rest under nourished (Table 5). In turns the study exhibited that 40.20% children were found to be as normal whereas, rests were suffering from the degree of under-nutrition. By comparison with recommended dietary requirements the results showed that calories intake was found deficit 25.67% under 4-6 age group and 25% under 7-9 age group (Table 6). In contrast supply of protein in the diet was not serious concern although it was sufficiently supplemental through rice, wheat, maize, bajra etc. majority of cases of deficiency of vitamin-A, vitamin-C, vitamin-D and B-complex were observed among rural school children because of non-habitant of taking seasonal fruits in their usual diet.

Summary and Conclusion

The analysis of rural school children exhibited that under-nutrition was caused might be the reason of unawareness, poor socio-economic status and less perception of information related nutritive based balanced diet. Therefore, it can be concluded that joint coverage of parents and teachers to be educated effectively regarding balanced diet and it should be supplemented through locally produced food grains especially pulses, fruits and vegetables for utmost growth of rural school children.

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Economic analysis of milk marketing in Faizabad district of eastern U.P.

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Abstract

Animal husbandry and dairying plays its vital role in the development of nation and upliftment of socio-economic profile of countrymen. India has attained first rank in the world milk production. During 2006-07, the milk production in the country was achieved 100.90 million tones. As per Parag dairy Faizabad, the milk production in Faizabad district of U.P. was secured 1220 tones during 2005-06. An efforts was done for the economic analysis of milk marketing in Faizabad district for which the Haringtanganj block was selected purposively selected out of 9 blocks in the district on the criteria of Parag dairy existing and functioning in the district and also the accessibility and familiarity of locale to the investigator. The sample size selected for the study was 100 households in proportion of population of each sample village of each holding category of the milk producers.

Introduction

The contribution of livestock sector of total GDP was 6.5 per cent during 2002-03 at the then prices. Animal husbandry and dairying play an important role in national economy and in socio-economic development of the country. (Livestock Census, 2003). India ranks first in the world milk production. While USA stands second rank in the world. In the year 2006-07, milk production was 100.90 million tones in India. India accounts for a significant share of world's livestock resources with nearly 60% of world's buffaloes, 16.5% of cow, 16.20% of goats (Annonymous 2006-07). The milk production was 987 litre per lactation in India as compared to the world average of 2038 litre per lactation (Livestock Census 2003).

About the milch animal population it is 284 million (187.38 cow and buffalo 92.62) in India (Annonymous 2006). The milch animal population was 45.72 million (coe 25.63 and buffalo 20.86 million) and milk production was recorded 12 million tones in Uttar Pradesh in Faizabad district of eastern U.P., the milk production was 1220 tonnes during 2005-06, (Parag dairy, Faizabad)

Milk being the highly perishable commodity needs quick and an efficient marketing system. There is growing concern that the consumers are loosing purchasing power due to rising prices while the producers are not getting remunerative prices of their produce. An efficient marketing system is one which minimizes the cost of marketing services so as to ensure the largest share of the consumer's price of the producer and availability of the product to the consumer's are reasonable price in the desired form. The collection and sale of rural produced milk is dominated by hierarchy of mobile milk vendors. These middlemen not only exploits the producers by paying low price and using faulty weights of measures, but also cheat the consumers by way of charging high price and resorting to malpractice's like under weighing, adulteration of milk with water and various other extraneous matters. Dairy cooperatives have been considered one of the most important measures for the improvement in the marketing mechanism of milk in the rural areas by providing effective marketing facilities to the milk producers and enabling them to get remunerative prices for their milk. Dairy co-operative links the milk producers in the rural areas and the consumers in the distant urban areas. The specific objectives for the study are:

1. To study the different channels of milk marketing
2. To workout the price spread and marketing cost of milk marketing through co-operatives and private agencies.

Research Methodology

A multistage stratified; purposive-cum random sampling technique was used for the selection of district, block, villages and sample of households in the ultimate stage of study. Faizabad district was selected purposively because of convenience of the investigator. Out of nine blocks in district Faizabad, one block i.e. Haringtanganj was selected randomly for the study. A list of all the villages of selected block was prepared and arranged in descending order on the basis of number of milch animals. Five villages from top having higher number of milch animals were selected for this study.

A list of all the milk producers from the five selected villages were prepared. The households/milk producers were divided in to five categories on the basis of land holding i.e. landless (No land), marginal (below 1 ha), small (1 to 2 ha), medium (2 to 3 ha) and large households (3 ha and above). A predetermined sample of 100 households from all the five villages (20 from each village selected randomly) was drawn for detailed

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investigation. The number of milk producer/household in each category of households was in proportion to their population in each village.

Selected of milk marketing agencies

Both the organized and unorganized marketing systems were operating in Faizabad district. In the organized sector, while in unorganized sector, mainly two middlemen i.e. milk vendor and halwai were found to be working as milk marketing agencies. The channel of milk cooperative societies was used for the study. The milk cooperative societies supply milk to the milk plants. The plants further process the milk and supply it in the form of packed milk to the consumers. The following milk marketing were studied i.e.

(i) Milk producer – Consumer
(ii) Milk producer – Milk vendor – Consumer
(iii) Milk producer – Milk vendor – Halwai – Consumer
(iv) Milk producer – Cooperative societies – cooperative milk plant – Consumer.

Collection of data

The primary data was collected in the year 2006-07 from sample households by survey method on total milk produced, amount of milk consumed, milk sold to different milk marketing agencies and price of milk. Milk marketing agencies, considered for data collection were cooperatives. The information was collected from milk vendors on average quantities of milk purchased per day from the producers and sold to the consumers at different prices. The other secondary data were collected from official records of district (Statistical Bulletin and Parag dairy), block headquarters, tehsil and other agencies for the district.

Tabular analysis was employed to study the production, consumption, marketed surplus of milk, disposal of milk to different milk marketing agencies by different categories of households.

Marketing cost were worked out using the following formula,

$$T_c = C_p + \sum_{i=1}^{n} M_{ci}$$

Where,

T_c = Total cost of marketing
C_p = The cost incurred by the producer in marketing of their produce
M_{ci} = The marketing costs incurred by all middlemen

The producer's share in consumer's rupee was worked out as below,

$$P_s = \frac{P_f}{P_r} \times 100$$

Where,

P_s = Producer's share in consumer's rupee
P_f = Producer price
P_r = Retail price

Marketing efficiency

Marketing efficiency was worked out by using Shepherd's formula. Marketing efficiency moves around the fact that to what extent the marketing agencies were above the goods from producer at minimum cost extending maximum services to the consumer.

Therefore, marketing efficiency was calculated by using the following Shepherd's formula,

$$ME = \frac{V}{I} - 1$$

Where,

ME = Marketing Efficiency
V = Net price received by the producer
I = Gross marketing margins (costs)

Price spreads

Price spreads were studied at the point of time in the selected marketing agencies. The price for the purposes were calculated through the mode method. In mode method, model prices of different levels were obtained to workout the gross margin of various agencies. To arrive at the net margin, the cost incurred by the concerned agencies were deducted from the gross margin.

Results and Discussion

In this paper, an attempt is made to examine the marketing aspects of milk. It can be seen from the Table 1 that, on an overall average, taking all the categories together, the daily milk production per household was worked out to be 8.37 litres, out of which 6.02 litres was sold, representing marketed surplus of 71.92% in the study area. It was observed that total milk (marketed surplus) sold by these channels were 363.50 litre (20.84%), 442.00 litre (25.34%), 315.50 litre (18.08%) and 623.50 litres (37.74%) from channel I, II, III and IV respectively (Table 2).

Table 1: Dairy production, consumption and marketed surplus of milk (Litre/households)

Category of households	Production	Consumption	Marketed surplus	%tage of marketed surplus of production
Landless	7.63	1.67	5.96	78.11
Marginal	7.46	2.01	5.45	73.06
Small	8.46	2.56	5.90	69.74
Medium	9.16	2.73	6.43	70.20
Large	9.14	2.80	6.34	69.36
Overall	8.37	2.35	6.02	71.92

Price spreads for milk and marketing in rural area of Haringtanganj block of Faizabad district was worked out for important channels of milk marketing. It was observed that the price spread, marketing cost and

Table 2: Disposal pattern of milk under different marketing channel/agencies

Size group	Total Qty. (litre)	Channel I No. of household	Channel I Quantity (litre)	Channel II No. of household	Channel II Quantity (litre)	Channel III No. of household	Channel III Quantity (litre)	Channel IV No. of household	Channel IV Quantity (litre)
Landless	121.00	2 (6.25)	40.00 (11.00)	5 (17.24)	81.00 (18.32)	-	-	-	-
Marginal	566.50	21 (65.62)	213.50 (58.73)	10 (34.48)	124.00 (28.05)	8 (40.00)	101.00 (32.01)	5 (26.31)	128.00 (20.53)
Small	449.00	9 (28.12)	110.00 (30.26)	8 (27.59)	159.00 (35.97)	4 (20.00)	95.00 (30.11)	3 (15.79)	85.00 (13.63)
Medium	405.00	-	-	6 (20.69)	78.00 (17.65)	4 (20.00)	77.00 (24.40)	5 (26.31)	250.00 (40.09)
Large	203.00	-	-	-	-	4 (20.00)	42.50 (13.47)	6 (31.58)	160.50 (25.74)
Total	1744.00	32 (100.00)	363.50 (100.00)	29 (100.00)	442.00 (100.00)	20 (100.00)	315.50 (100.00)	19 (100.00)	623.50 (100.00)

Figures in parenthesis indicate percentage to total

Table 3: Inter-channel comparison as a whole (Channel I, II, III and IV) for milk (Rs./litre)

S. No.	Functionaries	Marketing Chennels I	II	III	IV
1.	Net price recived by producer	12.92 (92.75)	10.25 (72.65)	10.60 (65.55)	9.73 (60.02)
2.	Expenses incurred by the milk production	1.01 (7.25)	-	-	1.01 (6.23)
(i)	Labour charges	0.25 (1.79)	-	-	0.25 (1.54)
(ii)	Transportation charges	0.31 (2.22)	-	-	0.31 (1.91)
(iii)	Refreshment charges	0.26 (1.86)	-	-	0.26 (1.60)
(iv)	Other charges	0.20 (1.44)	-	-	0.20 (1.23)
3.	Expenses incurred by the milk vender	-	2.11 (14.91)	2.75 (17.01)	-
(i)	Transportation charges	-	1.23 (8.69)	0.96 (5.94)	-
(ii)	Refreshment charges	-	0.27 (1.91)	0.25 (1.55)	-
(iii)	Other charges	-	0.61 (4.31)	0.55 (3.40)	-
(iv)	Milk vender net charges	-	1.75 (12.37)	1.00 (6.18)	-
4.	Milk vender sale price/ Halwai purchse price	-	-	13.35 (82.56)	-
5.	Expenses incurred by the Halwai	-	-	2.81 (17.38)	-
(i)	Labour charges	-	-	0.30 (1.85)	-
(ii)	Boiling charges	-	-	0.95 (5.87)	-
(iii)	Other charges	-	-	0.57 (3.52)	-
(iv)	Halwai net margin's	-	-	1.00 (6.18)	-
6.	Milk producer sale price/ milk co-operative. society purchase price	-	-	-	10.74 (66.25)
7.	Expenses incurred by the milk co-operative society	-	-	-	1.72 (10.61)
(i)	Transportation charges	-	-	-	0.63 (3.89)
(ii)	Other charges	-	-	-	0.53 (3.27)
(iii)	Milk co-operative society net margin's	-	-	-	0.57 (3.52)
8.	Milk co-operative society sale price/co-operative milk plant purchase plant	-	-	-	12.47 (76.93)
9.	Expenses incurred by the co-operative milk plant	-	-	-	3.73 (23.01)
(i)	Processing charges	-	-	-	2.59 (15.98)
(ii)	Other charges	-	-	-	0.47 (2.90)
(iii)	co-operative milk net margin's	-	-	-	1.00 (6.17)
10.	Gross marketing margin's	1.01 (7.25)	3.87 (27.35)	5.57 (34.45)	6.47 (39.91)
11.	Consumer's purchase price	13.93 (100.0)	14.15 (100.0)	16.17 (100.0)	16.21 (100.0)

margins for milk marketing have been presented in Table 3. for inter-channel comparison, the marketing cost, margins and price in milk marketing on all channels were analyzed. Marketing cost increased with increase in number of intermediate from Channel - I, Channel – II, Channel – III and Channel – IV. By comparing, gross marketing margins, it was found maximum 39.91% in Channel – IV followed by 34.45%, 27.35% and 7.25% in Channel – III, Channel – II and Channel – I, respectively. The per cent producer's share in consumer's rupee in milk marketing was 92.75% in Channel – I, 72.65% in Channel – II, 65.55% in Channel – III and 62.02% in Channel – IV.

Table 4: Marketing efficiency of different marketing channels

Channel	Value of the sold milk (V) (Rs./litre)	Marketing cost of milk (I) (Rs./litre)	Marketing efficiency
I	13.93	1.01	12.79
II	14.15	3.87	2.66
III	16.17	5.57	1.90
IV	16.21	6.47	1.50

It is quite evident that Channel – I was found most efficient which was well supported by the foregone analysis of marketing cost and margins. The reasons are obvious as the number of intermediates were less in Channel – I over II, III and IV, which is enumerated in Table 4.

Conclusion

The inter category analysis revealed that, the average milk production per day was observed highest in case of medium households, in case of large households, the proportion of marketed surplus to the production was lowest. Thus this investigation revealed that Channel – I who was used by larger number of milk producers (32%), but maximum quantity of milk was sold through Channel – IV. The producers received maximum share of the consumer's rupee in Channel – I and minimum in Channel – IV. The results showed that producer's share in consumer's rupee decreased with increase in the intermediaries. The highest marketing efficiency was found in Channel – I and lowest in Channel – IV. It is clear that the Channel – I was most efficient in milk marketing.

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