THE JOURNAL

OF

RURAL AND AGRICULURAL RESEARCH

Volume 9 Number 2 December 2009

Journal of Rural and Agricultural Research Vol. 9 No. 2, 1-4 (2009)

Cost and returns of wheat crop on different farm size groups in Rajouri district of J & K

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Abstract

The present paper makes an attempt to study the cost and returns in wheat crop on Sample forms. In all 180 wheat growing farms consisting 90 small, 60 medium and 30 large were selected from Rajouri district of Jammu and Kashmir. The data pertained to 2004-05. Arithmetic mean. Frequency, Percentage, Coefficient regression, Correlation coefficient technique was used for estimating cost and returns and resource productivity. Among crops wheat is most important crop grown in Rabi season, which occupy for about 44.19 per cent of total cropped area. The over-all per hectare cost of inputs used in wheat production comes to Rs.16441.90. It increase with increased in farm size. The over-all per hectare net income worked out to 2527.23. It was highest on medium farms Rs. (2725.80) and lowest on small farms Rs. (1813.01). The result of correlation and regression analysis used to estimate the resource productivity indicate that out of the four independent variables (Human labour, Bullock labour, Machine labour, Material used) were significantly contributing to productivity of wheat on over-all farms at 1 per cent level of significance.

Introduction

Wheat is the principle food crop of mankind next to Rice; which is grown in almost every part of the world under a wide range of soil and climatic conditions. Wheat is one of the most important food crops of the world and is usually accorded a premier place among cereals because of the vast acreage devoted to its cultivation and its high nutritive value. It is claimed that if rice is the staple food of half of the world, it is the chief sustenance of other half. Wheat is very important food grain crop of Jammu division. It occupies 45.75 thousand hectares in the state (J&K) but major area of 239.88 thousand hectares is being cultivated in Jammu division, In 1999-2000 the production of wheat was about 4343 thousand quintal out of which about 99 per cent production was in Jammu region. District Rajouri ranked third after Jammu and Kathua districts with respect to area and production of wheat crop. In the study area almost all the sample farmers grew wheat. Overall it occupied 2.55 ha. Per form accounted to about 46 per cent of the total cropped area among the different farm size groups the area under wheat increases with the increase in farm size. The present study entitled, cost and returns of wheat crop on different farm size groups in Rajouri district of J &K denoted to analyse the certain fundamental relationship in production. It seeks to indicate the pattern of resources endowments, utilization of these resources and income levels emanating there from .This investigation is particularly significant in view of paramount importance of wheat production in the future growth of rural economy. The following are the main objective of the study:

Objectives:

1. To examine the resource structure on the farms under study.
2. To estimate cost and returns in wheat production in different farms size groups.
3. To find out the constraints in production of wheat crop.

Research Methodology

The Rajouri district of J&K was selected purposely for the present study. Out of the 6 tehsils three were selected randomly and from these three selected tehsils four villages from each Tehsil were opted randomly. Thus a total of 12 villages were selected for the present study. A census of agricultural house holds was done in the selected villages and a list of owner of land was arranged in ascending order accordingly. Then the list was classified into three categories i.e. small, medium and large farm size groups and about 50 per cent sample was drawn randomly from each size group in proportion to the number of farmers in each group. In this way the final sample consists of 180 farmers. The number of farmers in different form size group came to 90, 60 & 30 in small, medium and large respectively. The survey method was adopted in the collection of field data from the selected cultivators. Secondary data were collected from revenue records of the concerning offices of Tehsils & District statical office etc. Input output estimates for crop cultivation have been analyzed with the help of two methods, empirical analysis and content analysis. The primary data were related to the agricultural year 2004-05.

Results and Discussion

Asset structure

Table 1 shows assets item wise value fixed asset per cultivated hectare in different farms size group. Table per ha value of fixed assets excluding land on different farms size groups

Table 1: Per hectare value of fixed assets excluding land on different farm size groups.

Farm size groups	Value in Rs. livestock	Implements	Farm Building	Total
Small	19926.2	282.9	87064.1	107273.1
	(18.58)	(0.26)	(81.16)	(100.00)
Medium	11766.9	202.2	63574.4	75543.5
	(15.58)	(0.27)	(84.16)	(100.00)
Large	7505.7	159.2	36153.4	48818.3
	(17.13)	(0.36)	(82.51)	(100.00)
Over all	12392.2	207.9	59865.4	72465.6
	(17.10)	(0.29)	(82.61)	(100.00)

(Figures in parenthesis indicate Percentages)

The above Table 1 shows that the overall per hectare value of fixed assets including farm building, implements and live stock Was estimated to be Rs 72465.56 on small medium and large farm value of total fixed capital per hectare was about Rs 107273, Rs 75544 and 43818 respectively. Farm buildings occupied the maximum share in the total fixed investment followed by value of livestock. The table further reveals that per hectare value of implements inversely related to the farm size as the farm size increase the value of implements decrease which accounts for about 0.29 per cent live stock for about 17.10 percent and farm building for about 82.61 per cent in overall.

Cropping pattern

Cropping pattern refer to the area of crops and crop combination which the farmer follows within specific period of time. The types of crop grown on a particular farm play a very important role in its costs and income position (Table 2).

Table 2: The per farm area under different farm size groups

Name of the Crops	Farm size groups Small	Medium	Large	Over-all
Maize	1.27(43.08)	2.82(46.09)	5.63(47.40)	2.51(45.76)
Paddy	0.20(6.29)	0.24(3.91)	0.31(2.60)	0.23(4.24)
Total Kharief	1.47(50.00)	3.06(50.00)	5.06(50.00)	2.75(50.00)
Wheat	1.30(44.19)	2.86(46.69)	5.67(47.73)	2.55(46.39)
Berseem	0.17(5.81)	0.20(3.31)	0.27(2.27)	0.20(3.60)
Total Rabi	1.47(50.00)	3.06(50.00)	5.06(50.00)	2.75(50.00)
Total cropped area	2.94(100.0)	6.12(100.0)	11.88(100.0)	5.49(100.0)

(Figures in parenthesis indicate Percentages)

Maize and wheat were the main crops of their respective seasons and occupied 45.76 and 46.39 percent of the total cropped area respectively. Besides, these crop paddy and Berseem were the other crop grown by the sample farmers occupied 4.24 and 3.60 percent of the cropped area respectively. Further, it can also be seen from the table that area under Maize and Wheat increase as the farm size increases. On the contrary, the share of the paddy and Barseem to the cropped area reduces invariable with the size of the

Table 3: The per farm cost of cultivation of wheat on different farm size groups

Name of the Cost items	Farm size groups Small	Medium	Large	Over-all
Family labour	3927.00(19.58)	5469.40(11.72)	7479.80(7.40)	5033.27(11.86)
Casual Labour	1606.33(8.01)	6167.60(13.21)	19233.27(19.02)	6064.68(14.29)
Human labour	5533.33(27.59)	11637.00(24.93)	26713.67(2642)	11097.94(26.15)
Bullock Labour	6827.78(34.04)	17069.2(36.57)	36814.33(36.41)	15239.35(35.91)
Machine Labour	1549.28(7.72)	4539.08(9.73)	10524.17(10.41)	4041.70(9.52)
Material cost	2731.12(13.62)	6083.57(13.03)	12529.25(12.39)	5481.63(12.92)
Interest on working capital	499.25(2.49)	1179.87(2.53)	2597.44(2.57)	1075.82(2.54)
Total variable cost	17140.76(85.46)	40508.72(86.80)	89178.86(88.20)	1075.82(2.54)
Land revenue	11.76 (0.06)	28.89(0.06)	60.95(0.06)	25.67(0.06)
Depreciation on fixed capital	171.31(0.85)	226.37(0.49)	302.32(0.30)	211.50(0.50)
Interest on fixed capital	132.62(0.66)	187.33(0.40)	227.03(0.22)	166.59(0.39)
Rental value of land	2600.00(12.96)	5720.00(12.26)	11340.00(11.22)	5096.67(12.01)
Total fixed cost	2915.69(14.54)	6162.59(13.20)	11930.30(11.80)	5500.43(12.96)
Total cost c_2	20056.45(100.00)	46671.31(100.00)	101109.16(100.00)	42436.82(100.00)

(Figures in parenthesis indicate Percentages)

farm.

It can also be seen from the Table 3 the value of bullock labour occupied maximum share (36%) followed by the human labour, which occupied about 26 per cent share in the total cost of cultivation. The share of total human labour to the total cost was found the highest on small farms followed by large and medium size farms. Per farm value of material used (seed, fertilizer and manure etc.) ranked third in the total cost of wheat cultivation, occupied about 11 per cent share in the total per farm cost. As the table depicts, proportionate expenditure on this input was the highest on large size farms followed by small and medium farms.

Per hectare cost

The Table 4 reveals that per hectare over-all total cost of wheat cultivation was Rs. 16641.90, which was about Rs. 15428.03 on small farms. Rs. 16318.64 on medium and Rs. 17832.30 or large farms value of human labour, value of material used and bullock labour charges were the item occupied cost respectively. Total variable cost was estimated to be about 87.04 per cent while 12 per cent was the total fixed cost. Thus from the above discussion, it can be concluded that the total cost of cultivation of wheat varies directly with the farm size.

The Table 5 shows that over-all net income per hectare worked out to about Rs. 2327.23 and it being about Rs. 1813, Rs. 2725 and Rs. 2282 on small medium and large farms respectively. Thus, net income was the highest on Medium farms. There turn per rupee of investment was also highest on medium farm size groups. Relationship between selected independent variables with productivity of wheat crop. The multiple regression coefficients as well as coefficient of correlation between the selected independent variables with the productivity of wheat crop are given in table 7

The data compiled in the Table 6 Shows that the human labour, machine labour and material used were significantly contributing to productivity of wheat on over all farms contribution of all the independent variables was found 86 per cent. Cumulative contributing of all the independent variables showed the increasing trend with the increase in farm size as it was 26, 57 and 75 in

Table 4: Per hectare cost of cultivation of wheat on different farm size groups

Name of the Cost items	Farm size groups			
	Small	Medium	Large	Over-all
Family labour	3020.77(19.58)	1912.38(11.72)	1319.19(7.40)	1973.83(11.86)
Casual Labour	1235.64(8.01)	2156.50(13.21)	3392.22(19.02)	2378.30(14.29)
Human labour	4256.41(27.59)	4068.88(24.93)	4711.41(26.42)	4352.13(26.15)
Bullock Labour	5252.14(34.04)	5968.25(36.57)	6492.83 (36.41)	5976.21(35.91)
Machine Labour	1191.75(7.72)	1587.09(9.73)	1856.11(10.41)	1584.98(9.52)
Material cost	2100.86(13.62)	2127.12(13.03)	2209.74(12.39)	2149.66(12.92)
Interest on working capital	384.03(2.49)	412.54(2.53)	458.10(2.57)	421.89(2.54)
Total variable cost	13125.20(85.46)	14163.89(86.80)	15728.19(88.20)	14484.87(87.04)
Land revenue	9.05(0.06)	10.10 (0.06)	10.75(0.06)	10.07(0.06)
Depreciation on fixed capital	131.78(0.85)	79.15(0.49)	53.32(0.30)	82.94(0.50)
Interest on fixed capital	102.02(0.66)	65.50(0.40)	40.04(0.22)	65.33(0.39)
Rental value of land	2000.00(12.96)	2000.00(12.26)	2000.00(11.22)	2000.00(12.01)
Total fixed cost	2242.84(14.54)	2154.75(13.20)	2104.11(11.80)	2157.03(12.96)
Total cost c_2	15428.03(100.00)	16318.64(100.00)	17832.30(100.00)	16641.90(100.00)

(Figures in parenthesis indicate Percentages)

Table 5: Cost and return on the farms

Size groups	Cost		Gross Income		Net Income		Input Output Ratio
	Rs./farm	Rs./ha	Rs./farm	Rs./ha	Rs./farm	Rs./ha	
Small	20056.45	15428.03	22413.35	17241.04	2356.90	1813.32	1:1.12
Medium	6671.31	16318.64	54467.10	19044.44	7795.79	2725.80	1:1.17
Large	101109.16	17832.30	114053.50	20115.26	12944.34	2228.96	1:1.13
Over-all	42436.85	16641.90	48371.29	18969.13	5934.44	2327.23	1:1.14

case of small, medium and large farm size groups respectively.

Table 7: Correlation Bi-variate of wheat crop

Particulars	Small	Medium	Large	Over-all
Human Labour	1.000	1.000	1.000	1.000
Bullock Labour	0.997**	0.072	0.614**	0.709*
Machine Labour	0.917**	0.720*	0.1376	0.492**
Material used	0.990**	0.244*	0.765**	0.973*
No of observation	90	60	30	180

** Significant at 0.01 level

*Significant at 0.05 level

The findings revealed in Table 7 that machine labour, bullock labour and material use were the import factors which significantly associated with the productivity of wheat crop within the different farm size groups bullock labour was significantly associated with the productivity at 1 per cent level of significance on small& large farms while it was found non-significant on medium farm size groups it could be concluded from the above results that, productivity of wheat crop are highly associated and governed by the variables i.e. human labour, machine labour & material used, the contribution of these set of factors was quite high in case of large farms it shows that the effect of some other residual variables was more in case of small and large farms of the study area. The main constraint found during period of investigation were fragmentation of holding, untimely available of inputs, farmers of study area are not aware about the latest technology, yet adopted traditional crop varieties and excess rainfall at the time of harvesting price fluctuation, high cost of transportation. The marketing is predominantly in the hands of private traders and commission agents who fix the whole sale price, Non-availability of labour in the peak season etc. The financial institutes can encourage the occupation by financing at the lowest interest rates. The Government can ensure support in taken so

For transport and packed under control(condition to the place its marketing can fetch higher prices and demonstration of Research will improve the economic levels above the farmers.

Conclusion

The main conclusions that emerge from this study are: -

1. Farm building is the most important asset accounting for about 82.61 per cent of total assets. The adoption of new farm technology is quite obvious.
2. The over-all intensity of cropping comes to about 200 per cent. The intensity of cropping found to be the same in all farm size groups.
3. Maize during khareif & wheat during Rabi are the most important crop grown on sample farms.
4. The over-all cost of cultivation per hectare comes to about Rs. 6641. It is about 15428, 16318 and 17832 on small, medium and large farms. Which shows increasing trend with increase in farm size?
5. The over-all net income per hectares comes to about Rs. 2327. It is being about Rs. 1813 on small Rs. 2725 on medium and 2282 on large farms. Thus, net incomes per hectare are the highest on Medium farm size groups. There turn per rupee investment is also highest on Medium farm size groups.
6. The results of multiple regression analysis shows that human labour, Machine labour and material used were significantly contributing to the productivity of wheat crop. All these independent variables together were found to the contributing about 26,57 and 75 per cent to the productivity of wheat crop on Small, Medium and Large farms respectively.

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Journal of Rural and Agricultural Research Vol. 9 No. 2, 5-7 (2009)

Training Needs of Agricultural Development Officers in Sonipat District of Haryana

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Abstract

Transfer of technology to the farmers and other stakeholders is essential for increasing agricultural production. It should be communicated in a manner so that they are able to understand and follow. The Agriculture Development Officers (ADOs) are the grass root level extension workers for dissemination of information to the farmers, farm women and other stakeholders. Their effectiveness depends on their technical knowledge and communication skills. Agriculture Department regularly organizing Fortnightly Training Camps to keep their knowledge updated. Therefore, a study was conducted during 2006-07 to determine the Training Needs of the Agriculture Development Officers. ADOs indicated relatively more need of training in vegetable cultivation followed by flowers, pulses, sugarcane and mushroom.

Introduction

The economic development of the India as well as the well being of the vast majority of its population considerably depends on agricultural development. The present agricultural policy has given a further impetus to its role and importance in nation building. Now these days emphasis is on diversification and commercialization of agriculture to promote its export, increase income and to encounter problems raised by cereal based cropping system. It suggests that the farmers should be provided more knowledge about the latest recommended technology and new enterprises.

The major responsibility of transfer of technology lies with the State Department of Agriculture. The Haryana state has adopted the Training and Visit System (T & V) of Agricultural Extension since 1978-79. The training include two types i.e. one for the (Sub-divisional Agriculture Officer) SDAOs and (Subject Matter Specialists) SMSs every month, called Monthly Workshops at four places in Haryana organized by the CCS Haryana Agricultural University. Similarly, another is the Fortnightly Training Camps organized by SDAOs and SMSs at their headquarters for the (Circle Agriculture Officers) CAOs and ADOs. During these training camps, the ADOs and CAOs are provided technical know how and important technical messages for communication to the farmers and other stakeholders. The training should be need based, if it is not relevant than it would not serve any purpose, rather it would be a wastage of resources and time both.

Therefore, keeping all these facts in view, a study was planned and conducted during 2006-07 to determine the Training Needs of the ADOs.

Materials and Methods

The main objective of the present study was to develop suitable training prototypes for ADOs working under T & V System in the Department of Agriculture in Sonipat district of Haryana. The district was selected due to its vicinity to national capital 'Delhi' where the farmers enjoy better facilities of transportation and marketing. Therefore, training needs of ADOs working in this area are entirely different from the other part of the State. Hence, cereals crops like rice and wheat are not taken for determination of training needs. All the seven blocks of the district were selected to get wider representation. The block-wise list of ADOs was prepared with help of DDA and from each block 20 ADOs were selected as respondents for the study. Hence in all 140 ADOs were taken as the respondent for the study. The training requirement of ADOs is operationalism as an expression of need felt by them and measured in terms of the expressed opinion of respondents on three point continuum i.e. most needed, somewhat needed and least needed and the scores assigned were 3,2 and 1, respectively.

The data was collected personally with the help of pre tested interview schedule in fortnightly training camps during 2006-07. The data so collected were tabulated to draw meaningful inferences.

Results and Discussion

The main focus of the study was to ascertain the training needs of ADOs. Therefore, their training needs have been determined in technical areas and extension techniques separately.

Profile of the Respondents:

The data presented in Table 1 revealed that majority of the respondents (77.85 %) were from young to middle age group. A thumping majority of them (86.43%) were from rural area and had farming as

parental occupation (69.28%) .Thus, it shows that most of them have farming background which is certainly a desirable feature for extension work.

Table 1: Profile of the Respondents

N=140

Variables	Categories	Frequency	Percentage
Age	Below 35 years	48	34.28
	36-50 years	61	43.57
	Above 50 years	31	22.15
Education	B.Sc. Ag.	55	39.29
	M.Sc. Ag.	85	60.71
	Ph.D	00	00.00
Background	Rural	121	86.43
	Urban	19	13.57
Parental Occupation			
	Farming	97	69.28
	Service	32	22.86
	Business	08	05.72
	Any other	03	02.14
Experience	Upto 5 years	00	00.00
	6-10 years	75	53.57
	11-15 years	00	00.00
	Above 15 years	65	46.43
Mass Media Exposure			
	Low	22	15.71
	Medium	82	58.57
	high	36	25.72

Training Needs

The ADOs are grass-root level field functionaries and their major responsibility is to disseminate useful information and technologies to the farmers and other stakeholders. Therefore, they should have the sound technical knowledge of about various technical subjects as well as knowledge and command over various extension techniques etc. Hence, their training needs have been determined in both the areas separately.

A. Transfer of Technology Training Needs

B. Technical Training Needs

A. Transfer of Technology

It can be seen from the table 2 that among extension techniques and methods of transfer of technology, the highest score has be assigned to technical message development (2.29), audio-visual aid use (2.27), and field day organization (2.14). Therefore, these aspects need maximum emphasis. The least score has been given to the identification of local leaders (1.42).

B. General Technological Training Needs

It can be seen from Table 3 that ADOs indicated relatively more need of training in vegetable cultivation which attained first rank on the basis of training need mean score. Whereas mushroom was placed at lowest rank (V). In case of flowers, it was placed at second rank (II) with mean score of 2.34 followed pulses (III) and sugarcane (IV) with training need mean score of 2.17 and 2.08, respectively.

Table 2: Transfer of technology training needs of ADOs

S. No	Aspect/Area	Training Need Mean Score	Rank
1	Rapport building	1.92	VI
2	Conducting meetings	1.86	VII
3	Conducting result demonstrations	1.85	IX
4	Conducting method demonstrations	2.08	IV
5	Understanding farmers problems	1.75	X
6	Identification of local leaders	1.42	XIII
7	Selection of contact farmers	1.75	X
8	Site selection for demonstration	1.75	X
9	Visual Aids preparation	2.05	V
10	Audio-visual aid use	2.27	II
11	Field day organization	2.14	III
12	Technical message development	2.29	I
13	Persuasion of farmers	1.86	VII

Table 3: Training needs of ADOs for different crops/enterprises

S. No	Name of the crop/enterprise	Training need mean score	Rank
1	Vegetables	2.62	I
2	Flowers	2.34	II
3	Pulses	2.17	III
4	Sugarcane	2.08	IV
5	Mushroom	1.81	V

Vegetable Crops, Pulses and Sugarcane Crop

It is apparent from the table 4 that ADOs require relatively more training on the aspect of plant protection and opined no need of training on aspect of soil type. Thus, all the important aspects should be imparted intensive training, but more attention should be paid on plant protection measures, suitable varieties, nursery management in vegetables and weed management.

Flower Cultivation

The data presented in Table 5 pertains to the training needs of ADOs for flower crops. It is quite revealing that the earlier trend of placing plant protection measures on the top continued in this case too. While, suitable varieties and weed control measures attains equal & high training need mean score. It was due to fact that flower is a high value crop and wide spacing crop needed more attention on plant protection and weed control, which directly affect crop production and income of farmers.

Table 4: Training needs of ADOs for Vegetable Crops, pulses and sugarcane crop

S. No	Aspect	Vegetables	Pulses	Sugarcane
1	Soil Type	XIV	XII	IX
2	Land preparation/seed bed preparation	VI	XIII	VIII
3	Suitable varieties	II	III	II
4	Seed rate	VII	VI	VI
5	Seed treatment	VII	V	VI
6	Time of sowing	-	VII	V
7	Nursery management	III	-	-
8	Spacing	IX	VIII	-
9	Irrigation	V	IV	VII
10	Manures & fertilizers	IV	II	IV
11	Plant protection measures	I	I	I
12	Weed control	IV	II	III
13	Harvesting	X	VIII	-
14	Grading of produce	XI	IX	-
15	Storage	XII	X	-
16	Marketing	XIII	XI	-

Table 5: Training needs of ADOs for flowers

S. No.	Technological Aspect	Training need mean score	Rank Order
1	Land preparation/ seed bed preparation	1.98	VII
2	Suitable/improved verities	2.48	II
3	Seed rate	1.97	VIII
4	Seed treatment	1.97	VIII
5	Nursery raising	1.93	IX
6	Selection of nursery plants	1.93	IX
7	Time of plantation	1.89	XI
8	Method of plantation	1.89	XI
9	Spacing	1.92	X
10	Irrigation	2.28	IV
11	Manures & fertilizers	2.32	III
12	Weed control	2.48	II
13	Plant protection measures	2.66	I
14	Picking of flowers	2.10	V
15	Grading of produce	2.08	VI
16	Marketing	2.08	VI

Mushroom Production

The Table 6 shows that farmers needed highest training on insect-pest/disease control. However, training requirement on other technological aspects was found moderate. This may be due to the perishable nature of mushroom and require high investment.

Table: 6: Training needs of ADOs for mushroom

S. No.	Technological Aspect	Training need mean score	Rank Order
1	Variety/strain	2.80	II
2	Time of growing	1.98	IX
3	Compost making	2.78	III
4	Spawn rate	2.54	IV
5	Spawn treatment	2.54	IV
6	Method of spawning	2.48	V
7	Cropping	2.40	VI
8	Insect-pest/disease control	2.82	I
9	Harvesting	2.38	VII
10	Grading	2.38	VII
11	Storage	2.20	VIII
12	Marketing	2.20	VIII

Conclusion

Agricultural Development Officers are playing vital role in dissemination of technology to the farmers. They are the grass-root level workers working at the village level and indicated relatively more need of training in vegetable cultivation followed by flowers, pulses, sugarcane and mushroom. Hence, attention should be paid accordingly. Similarly, more attention should be paid on providing information about plant protection measures of all the crops.

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Journal of Rural and Agricultural Research Vol. 9 No. 2, 8-9 (2009)

Changes in physico-chemical characteristics of custard apple squash at ambient temperature

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Abstract

Storage studies revealed that total soluble solids and acidity were increased during storage of squash where ascorbic acid, tannin and reducing sugars were declined throughout the storage period while the total sugars was increased with storage and declined at the end of storage. The acceptable quality of squash was maintained up to 60 days of storage at ambient temperature. The colour, flavour and taste were found to be decreased with advancement of storage.

Introduction

Custard apple (*Annona squamosa* L.) has wider adaptability to soil and climatic conditions as custard apple is very delicious fruit and it is one of the rich of source of vitamin 'C', energy and minerals and has excellent medicinal properties. The pulp of custard apple is sweet with slight acidity and has pleasant flavour. Being climacteric and highly perishable fruits of custard apple cannot be stored for a long period. The shelf life of custard apple in ambient temperature is only 1 to 2 days. Therefore, processing of this fruit becomes an essential alternative for best utilization of this fruit. Very little research work is available on the processing of custard apple. The present investigation was therefore, undertaken to determine the storage stability of squash by assessing the chemical changes and sensory evaluation.

Methods and Materials

The investigation was carried out at Department of Horticulture, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (MS) during year 2007-08. Fully ripe and sound fruits of custard apple were selected for extraction of pulp. The fruits were hand peeled and unseeded. Pulp was homogenized in the "Automatic Mixer".

Custard apple squash were prepared by adding 30 per cent pulp, 40 per cent sugar and 3 per cent acidity to the water and dissolved by heating 60 mg KMS was added to avoid fermentation. No synthetic colour and essence were added to the squash. The squash was filtered by using muslin cloth and filled immediately in already sterilized bottles leaving 3 cm head space and sealed air tight. Bottled product pasteurized for 20 minutes and finally stored at room temperature. A flow chart for preparation of custard apple squash, as used in the present study is depicted in figure 1.

TSS was analyzed by sing digital refractometer, titrable acidity was determined by the method of Rangana (1986), ascorbic acid and tannin were estimated with the method of Majumdar (2003), total and reducing sugars were determined by the method of Sadasivam and Manickam (1996). The organotropic evaluation assessed by a panel of five judges following Hedonic rating test as described by Rangana (1986).

Results and Discussion

Chemical changes of squash during storage

Total soluble solids (°B)

Data revealed that there was increased in total soluble solids of squash during storage. The reason for increased TSS content in squash might be due to conversion of polysacchrides into soluble sugars during hydrolysis process. The findings are agreement with the finding of Sethi (1993) in litchi squash.

Acidity

Acidity content of custard apple squash increased through out the storage. Degradation of pectin substances of pulp into soluble solids might have contributing towards on increased in acidity with storage period has been observed in aonla squash (Kumar and Singh, 2001).

Ascorbic acid

The ascorbic acid content of squash decreased gradually during storage. Decrease in ascorbic acid might be due to oxidation by trapped oxygen in glass bottle resulting in the formation of dehydro-ascorbic acid during storage. Similar results are in close agreement with those of Sogi and Singh (2001) in kinnow squash.

Total sugars

Total sugars of squash increased during storage period and declined at end of storage. An increase in total sugars during storage could be attributed to the fact that, the hydrolysis of polysaccharides. This findings is in accordance with that of Kumar and Singh (2001) in aonla squash.

Reducing sugars

The reducing sugars of custard apple was declined with advancement of storage period. It is might be due to oxidation reaction.

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Table 1. Chemical changes in custard apple squash

Storage period (days)	TSS (°B)	Acidity (%)	Total (%)	Reducing sugar (%)	Ascorbic acid (mg/100 ml)	Tannin (mg/100 ml)
0	40.00	3.00	36.55	31.86	28.14	2.08
30	40.43	3.42	37.89	30.38	27.61	0.82
60	40.57	3.81	36.27	29.04	26.88	0.35

Tannin

Tannin content of squash was declined as the storage period prolonged. Decreased of tannin might be due to the oxidation reaction and their condensation into brown pigments. Similar results were observed by Knnan *et al.* (2001) in jamun squash and Kaushik et al (2002) in bael squash.

Organoleptic evaluation

There was a gradual decrease in organoleptic evaluation score of custard apple squash during storage at ambient temperature. Loss in organnpleptic quality and storage stability of squash after certain period is obvious. The acceptable quality of squash was maintained up to 60 days. The decreasing trends were observed for colour, flavour and texture with increase storage period. This might be due to degradation of volatile substance and flavour constituents. Similar result was reported by Srinivas *et al.* (2007) in pomegranate squash.

Table 2. Organoleptic evaluation of custard apple squash

Storage period (days)	Colour	Flavour	Texture	Average
0	8.0	8.5	8.0	8.2
30	8.0	8.0	7.0	7.6

Scale : Below 4.00 - Not good, 4.00 to 6.00 - Average, 6.00 to 8.00 - good, Above 8.00 - Excellent

Flow chart

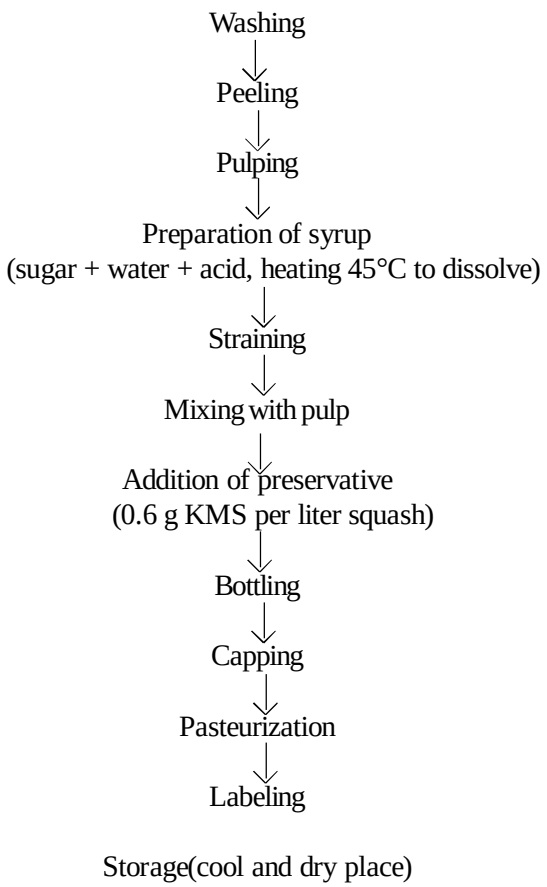

Fig. 1 Flow chart for preparation of custard apple squash

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Journal of Rural and Agricultural Research Vol. 9 No. 2, 10-11 (2009)

Status of Zinc and Manganese in soils of district Firozabad

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Abstract

The results revealed from field survey of district Firozabad that the ranges of total and available Mn in soils of Firozabad district were from 150-375 mg kg^{-1} and from 1.10-8.20 mg kg^{-1}, respectively. Only 44 per cent soils were deficient in available Mn and may respond to its application and the total Zn content in these soils range from 9.5-26.7 mg kg^{-1}. The range for DTPA-Zn was from 0.30 to 1.69 mg kg^{-1}. There was positive and highly significant relationship between total and available Mn and Zn, respectively. Majority of the soils were deficient in available zinc.

Introduction

The deficiency of micronutrients like Zn and Mn has already started appearing fast in the intensively cultivated areas of various parts of the country and crop responses to their application are becoming more and more prominent. Based on the work done under the auspicious of the all India Co-ordinate Scheme of Micronutrients in Soils and Plants (ICAR), analysis of 2.52 lakh soil samples drawn from 20 states of the country indicated 49 and 5 per cent mean deficiency of Zn and Mn, respectively. Micronutrients are generally deficient in saline sodic, highly leached, sandy highly calcareous soils and an application of these micronutrient cations on such soil has favored the growth and yield of crops. In addition, several factors including weathering of minerals, liming, degree of leaching, mineralization of organic matter and moisture content are said to control the status of micronutrient cations of soils the relative abundance of different chemical forms of these micronutrient cations varies from soil to soil, depending upon these factors. Since the systematic information on micronutrient cations status of alluvial soil of Firozabad district is meagre, it is therefore, essential to assess the status of micronutrient cations (Mn and Zn) in these soils and study their relationship with certain soil attributes.

Materials and Methods

A field survey of Firozabad district was done during the year of 2003-04 for the present study. Four tehsils (Firozabad, Jasarana, Shikohabad and Tundla) of Firozabad district were selected for soil sampling. In all 100 soil samples were collected from cultivated field of Firozabad district (25 villages from each tehsil). The soil samples were drawn 0-23 cm depth with the help of a soil augar. The soil were put in polytheline bags, lebeled properly and carried to the laboratory. The soil samples were air dried and the kankar nodules were removed there from. The samples were crushed with wooden hammer and sieved through cloth. The powdered samples, thus obtained were stored in the stoppered wide mouth bottles properly labeled. The samples were subjected to chemical analysis.

Results and Discussion

Status of Total Zn and Mn in soils :

Zinc : The total zinc content of these soils ranged from 9.5 to 26.7 mg kg^{-1} (Table 2). The ranges of variation with in the soils of Firozabad, Jasarana, Shikohabad and Tundla tehsils were from 12.1 to 26.7, 9.5-23.7, 11.1 to 24.1 and 11.5 to 24.5 mg kg^{-1}, respectively. The mean value of total zinc in these soils were; 19.40, 16.60, 17.60 and 18.00 mg kg^{-1}, respectively. Thus, on an average, the Firozabad soils were found to be relatively rich in total zinc as compared to the soils of other tehsils of Firozabad district.

Manganese:

The range of total Mn in soils of Firozabad district was from 150.0 to 375.0 mg kg^{-1} (Table 1). The ranges of variation with in the soils of Firozabad, Jasarana, Shikohabad and Tundla tehsils were from 161 to 375, 175 to 370, 160-300 and 150 to 320 mg kg^{-1}, respectively. The mean values of total Mn in these soils were 268.00, 272.50, 230.00 and 235.00 mg kg^{-1}, respectively. Thus the soils of Jasarana tehsil had relatively higher content of total Mn as compared to the soils of other tehsils of Firozabad district. In general, the amount of total Zn and Mn in the soils of Firozabad district varied from 9.5 to 26.7 and 150.0 to 375.0 mg kg^{-1}, respectively. Thus, values are fairly comparable to the results reported by Ram et al. (1984) and Singh et al. (1987).

Status of available Zn and Mn in soils :

Zinc : The available zinc content in the soils of various tehsils of district Firozabad varied from 0.30 to 1.69 mg kg^{-1} (Table 1). On the basis of average values

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Table 1:Status of total and available micronutrients cations in Firozabad soils

Tehsil	Zinc in soil		Available Zn/Total Zn X 100	Mn in soil		Available Mn/Total Mn X 100
	Total	Available		Total	Available	
Firozabad	12.1-26.7	0.30-1.69	1.82-8.50	161-375	1.1-5.87	0.74-2.35
	(19.40)	(0.99)	(5.16)	(268.00)	(3.48)	(1.54)
Jasrana	9.5-23.7	0.33-1.19	2.36-6.60	175-370	1.70-8.20	0.80-2.33
	(16.60)	(0.76)	(4.48)	(272.50)	(4.95)	(1.56)
Shikohabd	11.1-24.1	0.4-1.4	2.4-6.54	160-300	1.32-6.40	0.66-2.28
	(17.60)	(0.90)	(4.47)	(230.00)	(3.86)	(1.47)
Tundla	11.5-24.5	0.34-1.13	2.52-6.66	150-320	1.72-7.62	0.84-2.73
	(18.00)	(0.73)	(4.59)	(235.00)	(4.67)	(1.78)
Whole	9.5-26.7	0.30-1.69	1.85-8.5	150-375	1.1-8.2	0.66-2.73
district	(18.10)	(0.99)	(5.16)	(262.50)	(4.65)	(1.69)

the soils of Firozabad tehsil were relatively rich in available zinc as compared to soils of other tehsils, the range being 0.30 to 1.69 mg kg^{-1} with a mean value of 0.99 mg kg^{-1}.

64 per cent samples in the present investigation are classified as deficient, 31 per cent marginal and 5 per cent adequate. In Firozabad tehsil 70.0, 16.6 and 13.4 per cent samples fell in deficient marginal and adequate categories of available zinc, respectively. The percentage of deficient marginal and adequate soil samples in available zinc in Jasarana tehsil were 55.0, 45.0 and 0.0, respectively. The corresponding values for Shikohabad tehsil soils were 64.0, 32.0 and 4.0 per cent.

Manganese: The amount of DTPA-extractable Mn in soils of district Firozabad ranged between 1.1 and 8.2 mg kg^{-1} (Table 1). Among these soils, the Firozabad soils contained the lowest amount of available Mn, the variation being 1.10-5.86 mg kg^{-1} with a mean value of 3.48 mg kg^{-1}, while the Jasarana soils showed relatively high content, the variation being 1.70 to 8.20 mg kg^{-1} with an average of 4.95 mg kg^{-1}. The range of available Mn content in the soils of Tundla and Shikohabad tehsils were from 1.72 to 7.62 and 1.32 to 6.40 mg kg^{-1}, respectively. When the soils were classified in the light of the critical value of 2.65 ppm of DTPA-extractable Mn proposed by Katyal (1985), it is observed that only 44.0 per cent soils were deficient in available manganese.

Under the present investigation, DTPA-extractable Zn and Mn in the soils of district Firozabad ranged from 0.30 to 1.69 and 1.10 to 8.20 mg kg-1, respectively. Takkar et al. (1976) and Singh and Tripathi (1983) while working on citrus growing soils of Agra region reported 7.2 to 32.0 and 0.84 to 5.40 ppm DTPA-extractable Mn and Zn respectively.

In the present investigation 64.0 per cent soils are deficient in available Zn and 44.0 per cent in available Mn, respectively. Tiwari et.al. (1995) also reported that 11.4 and 44.0 per cent soils of Aligarh district were deficient in Mn and Zn, respectively.

Inter-relationship between total and available Zn and Mn :

The relationship between available and total Mn and Zn as evident from Table 2 is highly significant. The coefficient of correlation being 0.65 for Firozabad soils, Ram et al. (1984) and Singh and Singh (1996) also reported significant positive relationship between total and available Mn. The available Zn had highly positive and significant correlation with total zinc in all the soils.

Table 2 : Correlation coefficient between total and available Mn and Zn

Total Zn Vs DTPA-Zn	0.78**
Total Mn Vs. DTPA-Mn	0.65**

** Significant at 1% level.

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Journal of Rural and Agricultural Research Vol. 9 No. 2, 12-13 (2009)

EFFECT OF ETHEPHONE (2-CHOLOROETHYL PHOSPHONIC ACID) ON GERMINATION AND SEEDLING GROWTH OF OKRA (*Abelomoschus esculenthus* (L.) Moench.) CV. Parbhani kranti

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Abstract

Seed germination experiment were conducted during Kharif Season on March, 2008 Lab Department of Botany Hindu College, Moradabad to study to effect of Okra (Abelmoschus esculenthus (L.) Monench.) different concentration of ethephon CV. Parbhani kranti were treated with ethephon in beaker for 6 hours and seeds were transferred into pertriplate for germination. Studies were conducted on the various concentration of ethephon i.e. 1, 10, 50, 100, 200,ppm (Parts per million) and compared with control three replication lower concentration of ethephon increased percentage of germination and shoot length in higher concentration similar result were recorded by germination percentage and increasing concentration decreases the length of root.

Introduction

Okra commonly known as Bhindi (Abelmoschus esculenthus (L.) Monench.) or Lady's finger is said to be the native of South Africa, Asia and has been predominantly a vegetable of the tropics (Thompson, C.H. and William C. Kelly, 1957) and hence it has found its place in India for more than a century, where some other wild relatives are available giving an idea that is may be native of India. It has a prominent position among vegetable due to its wide adaptability year round cultivation and high nutritive value. It is grown in the plains and is consumed by the common people in almost all the states. It is the most common vegetable. It is a seasonal crop thrives and best during warm and most season although it grows fairly well in the hottest summer and in every type of soil. It belong to the family Malvaceae.

Materials and Methods

Seeds of different CV. were obtained from Genetic and Plant breeding department of G.B. Pant University of Agricultural and Technology, Pant Nagar (U.A.). The seed germination experiment was carried out in plant physiology lab department of Botany Hindu College, Moradabad (U.P.) During summer March, 08. The optimum temperature for germination is 26.7^{0C} to 30^{0C} and it does not germinate below 15.6^{0C} . First seeds were sterilized with 1.1% $HgCl_2$ (Mercuric Chloride) for 5 minutes and selected for experimentation. The solution of ethephon different concentration are prepared for ambition/soaking of Okra seeds. And after this are soaking for 6 hours at 1,10,50,100,200 ppm. After soaking seeds transferred into pertriplate for germination. Twenty seeds of each treatment were counted for one replication. All the treatment will be three replicated. Three times with 20 uniform size seed after 24 hours also in control. Regular and uniform moisture is maintained by the distil water. The first germination count was taken after 5^{th} days, second after 10^{th} days, 15^{th} days of soaking.

Due to greater variation in the data is some of the treatment the critical difference was worked out (Panse, V.G and Sukhaatma, P.V. 1967)

Results and Discussion

Effect on germination

Ethephon with in the range of concentration applied, stimulated germination of Okra (Abelmoschus esculenthus (L.) Monench.) Seeds. The lower concentration 1,10 ppm were highly stimulatory inducing 83.34% germination respectively. These concentration in henced germination and took only 12 days to complete the maximum germination. The higher three concentration 50, 100, 200 ppm were supra optimal and recorded 68.34, 66.67,65% germination respectively in Figure 1.

After 15^{th} days of sowing the lower concentration of Ethophon exhibited stimulatory effect while higher concentration inhibited the germination of Okra seeds, ethephon at the concentration of 50,100,200 ppm provided inhibitory.

After 15 days the percentage germination was recorded 70, 83.34, 86.67, 68.34, 66.67, 65 at 0, 1, 10, 50, 100, 200 ppm of ethephon respectively.

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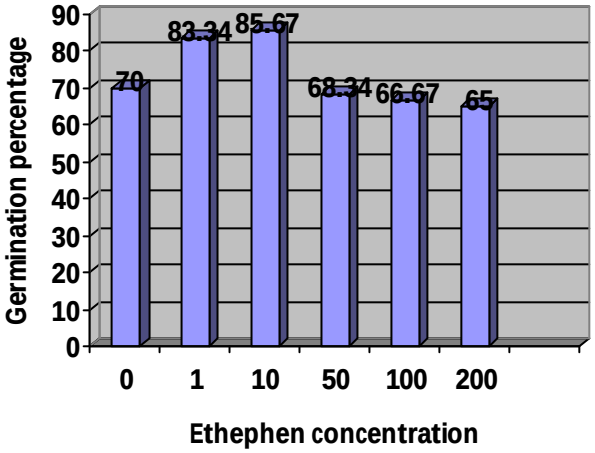

Fig. 1: Germination percentage in different concentration of Ethephon

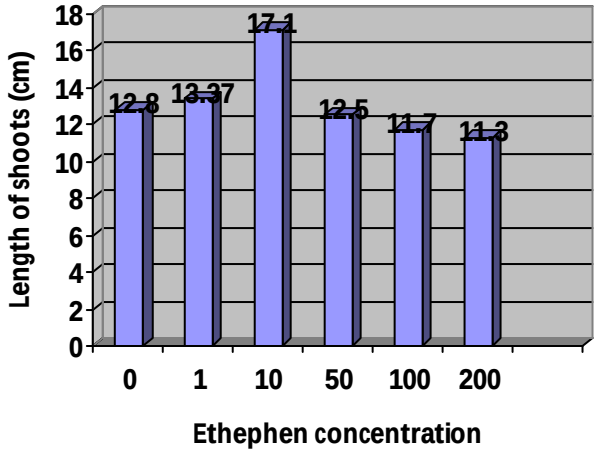

Fig. 2: Length of shoots (cm) in different concentration of Ethephon

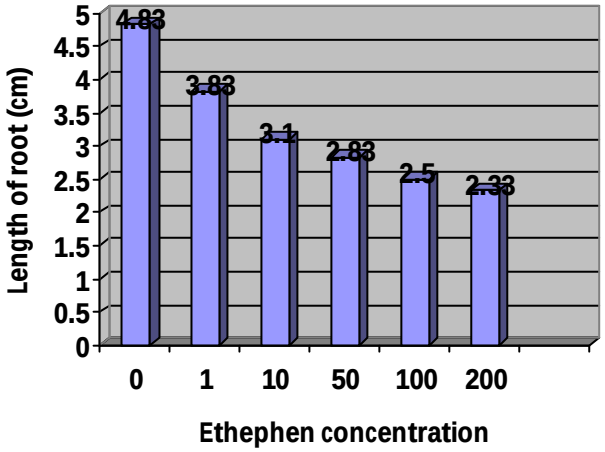

Fig. 3: Length of root (cm) in different concentration of Ethephon

Effect on seedling growth:

Shoot:

Ethephon within the range of concentration applied, stimulated seedling of Okra seeds the lower concentration 1,10 ppm was highly stimulatory inducing 13.37, 17.1 cm length of shoot. This concentration enhanced seeding growth and took only 15th days to complete the maximum shoot length the highly three concentration 50,100,200 ppm were supra optimal and recorder 12.5, 11.7, 11.3cm in Figure 2.

Root:

Increasing concentrating decreases the length of root. The root length were 4.83, 3.83, 3.1, 2.83, 2.5 and 2.33 in the treatment of 0,1,10,50,100,200 ppm respectively Figure 3.

Conclusion

In conclusion it can be inferred that ethephon induced higher percentage of germination and better shoot length in Okra seeds we thanks Dr. P.K. Singh head department of Botany Hindu College, Moradabad (U.P.) . Who made useful suggestion about the manuscript and Dr. V.K Bhatnagar reader Plant physiology and biochemistry department of Botany Hindu College, Moradabad (U.P.) who encouraged the senior author for under taking this problem of industrial value.

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Journal of Rural and Agricultural Research Vol. 9 No. 2, 14-17 (2009)

Information Needs of the Farmers on Organic Farming

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Abstract

Organic farming can be defined as an approach to agriculture where the aim is to create integrated, human, environmentally and economically sustainable agricultural production systems. Maximum reliance is place on locally or farm-derived renewable resources and the management of self-regulating ecological and biological processes and interactions in order to provide acceptable levels of crop, livestock and human nutrition, protection from pests and diseases, and an appropriate return to the human and other resources employed.

Introduction

India is an agrarian country where about 73 per cent of the population resides in rural areas. Farmers are the backbone of agricultural enterprise which plays an important role in the national economy. Sustainable production of agriculture is possible when we follow a system that enhances environmental quality and maintain basic resources like land and water, on which agriculture depends. One such alternative is organic farming, which relies on minimal artificial external inputs such as chemical fertilizers and pesticides.

With the passage of time and particularly in the later half of 20th century, unprecedented population growth compelled higher use of external inputs in terms of chemical fertilizer, pesticides, and plant growth regulators in the agricultural system. In India, the fertilizer consumption was as low as 0.66 m tons during 1951-52 but increased to 16.75 m tons during 1998-99 (Swaminathan, 2002). Similarly, pesticides consumption was 24.3 thousand tons in 1970-71 and reached 56.1 thousand tons in the year 1996-97 (Fertilizer Statistics 1997-98). The application of such high input technologies has undoubtedly increased agricultural production but, now there is a plateau. Realizing this, there is serious concern over their adverse effects on soil productivity and environmental quality. These concerns have led to the need for some alternative form of agriculture which rely more on chemical free technologies. One such alternative is organic based agriculture. Under Organic agriculture, sustainable production can be achieved without use of artificial external inputs such as chemical fertilizers and pesticides. Organic farming can be defined as an approach to agriculture where the aim is to create integrated, human, environmentally and economically sustainable agricultural production systems. Keeping in view the need to promote organic farming among the farmer's. The study was undertaken with the following specific objectives:

Objectives:

1. To study the socio economic and communication profile of farmers.
2. To identify the information needs of the farmers related to organic farming.

Research Methodology

The objectives of the study where to study the socio-personal and communication profile of the farmers identify the information needs of the farmers related to organic farming, design a radio programme based on information needs of farmers. The study was conducted in two purposively selected village viz. Kalinagar and Jainagar 1 in Gadarpur developmental block of Udham Singh Nagar District of Uttarakhand. Out of the total number of households present in each village, only ten per cent of them were selected following quota method and individual households from this 10 per cent was done through purposive sampling, a sample of 105 respondents. The data was collected through self administered structured questionnaire, specially developed for the study. Data, thus collected, was organized, tabulated and analyzed using appropriate statistical measures.

Results and Discussion

(A) Profile of Farmers

The findings of the study indicates that majority of the respondents were of middle age, had nuclear families, studied up to primary educational level, had medium size land holding and practiced farming as the main occupation. Further, the study reveals that most of the respondents considered television as a credible source of information due to presence of visuals. Majority of respondents (74.29%) listen to radio together new information. Farmers have little exposure towards modern organic farming practices. For making organic farming success in the area, traditional practices and modern practices both need to be blended and

popularized among the farmers using suitable communication strategy.

(B) Information needs assessment of the farmers related to organic farming.

1. Definition of organic farming

Knowledge level of an individual is an important factor in influencing adoption behavior. The data present in the Table 1 indicate that majority (88.58%) of farmers having correct information regarding organic farming refers to the understanding of the farmers about selected organic farming practices.

2. Crop under organic farming

During the last decade, organic farming in India has attracted farmers across the country. Many of them have been successfully growing crops like coconut, spices, banana, grapes, etc. with the liberal use of organic manure. The data present in the Table 1 indicate the knowledge of the farmers regarding crops used in organic farming. It depicts that 71.42 per cent felt that organic farming is practicable only for cereals crops and 4.77 per cent for vegetables and fruits, rest 23.80 per cent felt that it can be used for all crops. The score obtained thus show that majority of farmers felt that organic farming is practicable only for cereals crops. They do not have much idea about use of organic farming in other crops although organic farming can be used in all crops.

3. Area under organic farming

Organic farming can be done in plains as well as in hilly areas. This is especially of great significance for marginal and small farmers who are resource poor. The farmers in the hills of Uttarakhand are mostly marginal farmers and are practice low external input based production system. So, it is more useful for hilly areas. Data presented in Table 4.12 depicts that a majority (63.80%) of farmers felt that organic farming can be practiced in any area 21.90% respondents felt that organic farming can be practiced in plains only while an other 14.29% said that organic farming can be carried out in hills alone. Data indicates that the respondents had a fairly good idea about the area in which organic farming can be practiced.

4. Components of organic farming

Organic farming includes practices like crop rotation, green manuring, bio-fertilizer application, vermi-culture, pest management through cultural, biological means and biodynamic agriculture. Findings of the study (Table 2) data indicate that maximum number of respondents (39.04%) felt that organic farming involves crop rotation practices only. Another 34.30 per cent farmers felt that it involves green manuring 1.90 per cent included vermiculture and 0.95 per cent included biological pest management practices under components of organic farming. Finally, (23.81%) farmers were in

Table 1: distribution of respondents according to knowledge on various aspects of organic farming

S.No. Category	No. respondents	%tage
Definition of organic farming		
1. Organic manure	93	88.58
2. Use of chemical pesticides and fertilizer	-	-
3. Both of them	12	11.42
Cropped used in organic farming		
1. Only for agricultural crop	75	71.42
2. Vegetable and fruits	5	4.77
3. All crops	25	23.80
Organic farming practicein areas		
1. Any area	67	63.80
2. Only hill areas	15	14.29
3. Only plain	23	21.90
Component of organic farming		
1. Only crop rotation	41	39.04
2. Only green manuring	36	34.30
3. vermiculture and biofertilizer	2	1.90
4. Pest maangement	1	0.95
5. All of the above	25	23.80
Need of organic farming		
1. Avoid use of chemical pesticidesq	41	39.04
2. Reduse contamination of food and water	3	2.86
3. Enhance productivity	19	18.09
4. Prevent pest and disease resistance	7	6.67
5. All of the above	35	33.34
concept of vermicompost		
1. Vermiculture	98	93.33
2. Chemical fertilizer	-	-
3. Cattle dung	7	6.67
Size of vermicompost tank		
1. 3.0m x 1.8m x 0.96m	11	10.47
2. 1.5m x 1.5m x 0.30m	7	6.67
3. Both of them	87	82.86
Days for preparation of organic manure		
1. Three months	56	53.34
2. 10-15 days	3	2.86
3. None	46	43.80
Input cost factor in organic farming		
1. Higher than conventional farming	54	51.42
2. Lower than conventional farming	8	7.61
3. Same	43	40.96
Profit earning through organic farming		
1. Higher than conventional farming	7	6.67
2. Lower than conventional farming	27	25.71
3. Same	71	67.61
Yield in organic farming		
1. More	13	12.39
2. Less	11	11.47
3. Same	81	77.14

favor of use of all of the above components in organic farming. It was evident from the above analysis that the farmers need information on various components of organic farming.

5. Need for organic farming

Organic farming methods are advocated to avoid the use of chemical pesticides which get dissolved easily in water and quickly find their way in soil, water bodies and food chains. Organic farming an approach to protect the environment from pollution caused by the uses of chemicals, fertilizers and pesticides. The results of the study presented in Table 2 indicated that data majority (39.04%) of farmers felt the organic farming is needed to avoid use of chemicals. Further, 18.09 per cent of respondents felt organic farming needed for enhancing productivity, (6.67%) respondents said that organic farming is required for prevention of pests and least number of respondents (2.86%) felt that organic farming is required to reduce contamination of soil, water and food chain. Further, (33.34%) respondents felt that organic farming offered all the above benefits. The data revealed that this benefit of organic farming needs to be emphasized upon the farmers.

6. Concept of vermicompost

Compost that is prepared with the help of earthworms is called vermicompost. Earthworms consume large quantities of organic matter and excrete soil as casts. (93.33%) farmers knew that vermicompost is the compost that is prepared with the help of earthworms. Only 6.67 per cent farmers felt that vermicompost means cattle dung. Due to regular contact with extension workers and university training programmes that were running in that area, farmers were well aware of vermicompost.

7. Size of vermicompost tank

Vermicompost is made in small pits of suitable size in a shady area in the farm. The vermicompost pits are of different but standard sizes.

The study revealed that the farmers were not aware of the actual size of the vermicompost pits. Majority of the farmers (82.86 per cent) felt that the tank can be both the sizes and 10.47 per cent of farmers said that the size should be 3 m x 1.8 m x 0.96 m and 6.67 per cent felt that it should be of 1.5 m x 1.5 m x 0.30 m. This indicates a high level of knowledge about the size of vermicompost tank.

8. Duration for preparation of organic manure

Preparation of organic manure requires three months time. As can be noticed from Table 1., 53.34 per cent farmers were aware that the manure can be prepared in three months. Further, 2.86 per cent farmers felt that organic manure can be prepared in 10-15 days duration. However, a substantial number of farmers (43.80 per cent) had no idea about the duration indicating that they need to be informed about the same.

9. Input cost

Cost is an important determinant for use of any service or facility. The recycling of crop residues and organic wastes through composting methods is key technology for disposal and production of organic manure. The hygienic disposal of organic wastes by composting is an environmental friendly.

As evident from (Table 1), majority of the farmers (51.42%) said that input cost in organic farming was higher than conventional farming. Further, 40.97 per cent farmers were of the opinion that input costs of organic and conventional farming input are same and the remaining 7.61 per cent indicated that input cost is lower in case of organic farming. With respect to input costs, organic farming is costlier as the farmers are often not self sufficient in requirement of resources for composting and pest control. The study indicates that the farmers need information on input costs and optimal utilization of on farm resources for practice of organic farming.

10. Output cost

Studies indicate that organic farming ensures a profit comparable to that of conventional farming. Analysis of the data from (Table 3), indicates that maximum number (67.61%) of farmers feel were aware that organic farming and conventional farming both generate equal in profit. Further, 25.72 per cent farmers were of the opinion that organic farming gives lower profit. Rest 6.67 per cent respondents felt that organic farming generates more profit. Some of the farmers in the study area have recently shifted from conventional to organic farming and hence were not very clear about the economic viability of the new venture.

11. Yield in organic farming

In the long run, yields in organic farming are far greater than those obtained by conventional farming. The basic fact is that crops require sixteen nutrients for growth.

Table 1 indicates that majority 77.14 per cent of farmers felt that organic and conventional farming give same yield, while 12.39 per cent expected more yield from organic farming. Only 10.47 per cent farmers felt that less yield is obtained from organic farming. Since, Tarai soil is already fertile, addition of nutrients hardly make any difference. So, majority of farmers were unable to differentiate between the yields obtained from conventional and organic farming.

Conclusion

On the basis of the findings of the study, it can be concluded that majority of the respondents were middle aged having primary educational status involved only in farming having medium land holding. The majority of the respondents had a medium land holding. The majority of the respondents had a medium mass media exposure.

Radio was the IInd most credible source of information. Most of respondents had a general awareness regarding organic farming. From the study it can be concluded that farmers in the area are marginal farmers following traditional practices in agriculture. These traditional practices have not been much profitable but are helpful in environmental conservation and in maintaining sustainability of the agricultural production system.

The success of Green Revolution in India has been regarded as a great achievement after independence. Undoubtedly, it has been a significant accomplishment from qualitative point of view, but in this process there are many aspects, which have been overlooked. As a result of intensive agriculture, an increase in soil cultural problems and environmental pollution has been observed. Hence, it is time to consider the ultimate cost of environmental degradation, which has to be borne by the farmers themselves and the society at large.

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Journal of Rural and Agricultural Research Vol. 9 No. 2, 18-20 (2009)

Diversified products of sugarcane juice: Helpful in fetching higher price in the market

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Abstract

Sugarcane is the main source of sugar, jaggery and khandsari and holds prominent position as a cash crop. It occupies 1.8% of the total cropped area in the country. Sugarcane plays an important role in agricultural and industrial economy of the country. At present, nearly 40% of the sugarcane produced in the country is used for jaggery/khandsari production. The varieties suitable for this purpose should possess high sucrose content, low reducing sugar, low ash content, less phenolics, less polysaccharides and chlorophyll content in juice. Although India has emerged as a largest sugar producing country of the world, but sugar industry of Uttar Pradesh which contributes a large share to total sugar production of the country has become sick due to high prices of cane and lowest decline in market prices. About 18 sugar mills have been closed in the state during last 3 years. Therefore, it is imperative for the sugarcane growers to rely on other alternative value addition and processing in other forms. Apart from traditional jaggery, solid jaggery can be prepared in attractive shape and sizes such as bricks and cubes. Jaggery in other forms like granular jaggery and liquid jiggery, can also be prepared. Value addition in other products of sugarcane juice live jaggery chocolate, vinegar, gazak, reori, chikki and ramdana can also be prepared. As value addition in these forms fetch higher prices in the market and has great export potential in global market, the sugarcane growers can increased their incomes.

Introduction

Sugarcane and sugarbeet are two main crops that contribute approximately 56 and 44 per cent, respectively of the total sugar production in the world. Sugarcane is the main source of sugar in India and holds a prominent position as a cash crop. It occupies about 1.8 per cent of the total cropped area in the country. The area under sugarcane has been fluctuating from year (Table 1). Sugarcane plays an important role in agricultural and industrial economy of the country. Sugarcane is used for different purposes. Although, it is mostly used for production of sweetening agents viz. sugar, jiggery (gur) and khandsari. But it is also used for chewing, juice purpose etc. Nearly 40% of the sugarcane produced in this country is used for jiggery/khandsari production. The varieties suitable for this purpose should possess high sucrose content, low reducing sugar, low ash content, less polysaccharides and chlorophyll content in juice.

Uttar Pradesh has the largest acreage under sugarcane and it is about 57% of the area under this crop in India and accounts for 47% of the annual production in terms of raw sugar. But the production is highest in Karanataka followed by Maharastra and Andra Pradesh. Sugar industry of Uttar Pradesh which produces about one third of total sugar production of the country has become risk due to high prices of cane and lowest decline in market prices. About eighteen sugar mills have been closed in the state during last three years. These mills belong to private, cooperative and public sector. Therefore, it is imperative for the sugarcane growers to rely on other alternative source of value addition. Value addition and processing in other forms is very remunerative for the farmers. In this paper, different forms of diversified products have been discussed.

Although jiggery and khandsari was prepared in India since the time immemorial whiles the production of modern granular sugar was started in twentieth century in India. Data embodied in Table 2 revealed that 57.8% of total sugarcane production was utilized for jiggery and khandsari production in India during 1970-71 which has been reduced to 40% during 1996-97. Thus, a large share of sugarcane juice is still used for making jiggery. Jiggery prepared by traditional methods does not fetch higher price. Therefore, there is an urgent need to prepare jiggery in other attractive shapes and size and explore other uses of sugarcane juice. A diversified product of sugarcane juice has been discussed below:

Solid jaggery

Jiggery is being used since the time immemorial. Traditionally, it was made in different shapes and sizes

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varying in weight from a few grams up to about 40 kg. For fetching better price in the market, it is essential to have uniform shapes and sizes as per consumers preference. Processing work for making solid jiggery in attractive shapes has been standardized at Indian Institute of Sugarcane Research located at Raebareilly road, Lucknow. By using this technique, jiggery can be shaped as bricks or cubes.

Table 1: Area, production and yield of sugarcane (Cane)

Year	Area (Million hectare)	Production (Million tones)	Yield (kg/ha)
1950-51	1.71	57.05	33422
1960-61	2.42	110.00	45549
1970-71	2.62	126.37	48322
1980-81	2.67	154.25	57844
1990-91	3.69	241.05	65395
1995-96	4.15	281.10	67789
1999-2K	4.07	292.64	71989

Source: Agricultural statistics at a glance 2000, Directorate of Economics and statistics, Directorate of Agriculture and Cooperation, Ministry of Agriculture, Govt. of India

Granular jaggery

Jiggery is also made in granular form. It does not create the problem of storage as in the case of solid jiggery. The process for making granular or powder jiggery was standardized at Regional Agricultural Research Station, Acharya N.G. Ranga Agricultural University, Anakapalle centre. Indian Institute of Sugarcane Research, Lucknow has also standardized it own technique for granules formation. The sieved and dried granules packed in polythene packets fetched higher prices in the market.

Liquid jiggery

Jiggery is also processed in liquid form which can be safely stored for long period of time. It is an intermediate product. The process for its manufacturing was standardized at Regional Sugarcane and jiggery Research Station (Mahatma Phule Krishi Vishwa Vidyalaya), Kolhapur centre. Liquid jiggery contains proteins, fats, calcium, phosphates, potassium, iron and magnesium. It has been reported that invert sugar content of liquid jiggery (33.71%) is much more compared to other forms of jiggery (6.28%) and also the white sugar. Invert sugar is assimilated easily and quickly by human digestive system. For good palatability and taste, orange and grape essences are also added. Liquid jiggery is preferred by majority of the people and fetches higher prices to the manufacturers.

Jiggery chocolate

The process for making jiggery chocolate mixing cocoa powder and fat in different proportions has been standardized by Pantnagar centre of AICRP on Sugarcane. Jiggery chocolate also resembles with the commercially available chocolate in respect of hardness, texture and taste. The problems of tooth decay, plaque formation and decay of tooth enamel etc. associated with consumption of commercially available chocolate can be reduced by use of jiggery chocolates. There is immense potential in the domestic as well as international markets.

Vinegar

Vinegar which takes 3 to 4 months by traditional methods can now be produced in 2 to 3 weeks time by process developed by Indian Institute of Sugarcane Research, Lucknow.

Other products

Some other products/sweet meets like reori, gazak, chikki, patti and ramdan are also prepared by value addition. In all these products, generally solid jiggery is used as a raw material along with sesame, groundnut, lai and ramdana.

Thus, a number of options are available before the sugarcane growers to process sugarcane juice. Value addition in any of these forms will help the farmers in

Table 2: Utilization of sugarcane for different purposes

Year	Production of Sugarcane (000 tonnes)	Cane used for (000 tonnes)			Percentage of cane production utilized for		
		Production of white sugar	Seed, Feed & chewing etc.	Jaggery & Khandsari	White suagr	Seed, Feed & chewing etc.	Jaggery & Khandsari
1970-71	126368	38205	15173	72990	30.2	12.0	57.8
1975-76	140604	48435	17188	78666	33.6	11.9	54.5
1980-81	154248	51627	18201	84475	33.5	11.8	48.0
1985-86	170648	68566	20205	81883	40.2	11.8	48.0
1990-91	241046	122338	28555	90207	50.8	11.9	37.4
1995-96	282895	*	*	*	61.6	11.9	26.4
1996-97	267500	*	*	*	48.0	12.0	40.0

* Not available

fetching higher prices in the market and the consumers in removing malnutrition.

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Journal of Rural and Agricultural Research Vol. 9 No. 2, 21-22 (2009)

Effect of Trichoderma viride and Ergostim on Rhizoctonia solani

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Abstract

Trichoderma viride and Ergostim were evaluated for effect of Rhizoctonia solani both in field and lab conditions. In vitro pathogen's radial growth by means of Trichoderma viride and its compatibility with Ergostim and Ergostim's effect on pathogens revealed the efficiency of Trichoderma viride for controlling pathogen's growth and also found compatible with biostimulation (Ergostim). Biostimulator was found to inhibit sc lerotial production of pathogens. In vivo, seeds of green gram treated with Ergostim and Trichoderma viride gave better results than the uninoculated ones compatibility of these both for overcoming pathogenic effects.

Introduction

Rhizoctonia solani causes different types of diseases to a wide variety of plants, over a larger part of the world and under diverse environmental conditions than any other plant pathogenic species including green gram, for instance, seed decay, root rot, damping off at seedling and podding stages. The practical way to control is by drenching with fungicides, but leads to environment pollution and development of fungicide resistant strains in pathogens. The pathologists are looking out for an alternate strategy for their control. In the present study, an attempt has been made to evaluate the efficacy of Trichoderma viride and Ergostim and also their compatibility against this versatile pathogen Rhizoctonia solani.

Materials and Methods

Affected seed were collected from Agronomy field, Kisan (P.G) College Simbhaoli, and pathogen was isolated by tissue segment method on PDA medium. The pathogen was identified as Rhizoctonia solani (Kuhn) based on the character described by parameter (1970).

In vitro experiments

To check the effect of Trichoderma viride on Rhizoctonia solani, four treatments were taken including control (Rhizoctonia solani mycelial disc), one (1) mycelial disc (5mm) of each of fungi (1:1) and similarly at 1:2 and 1:4 ratio were Rhizoctonia solani was kept in center of PDA petridishes only.

Effect of Ergostim on Rhizoctonia saloni, was checked by preparing four different levels of PDA i.e. control, 500 ppm, 1000 ppm and 1500 ppm. Ergostim PDA was used as a medium for growth of pathogen.

A similar experiment was conducted to check the compatibility of Ergostim with Trichoderma viride instead of Rhizoctonia solani. Observations recorded included growth, number of sclerotia/treatment.

In vivo experiment

Soil was collected from research field of Kisan (P.G.) College, Simbhaoli and sterilized at 15 lbs/inc^2 pressure for 6 hours and filled in pots. The pathogens multiplied on PDA both was incorporated to the pots @ 1.25 gm/kg soil i.e. 12.5 g/pot. The pure mycelium of Trichoderma viride @ 6 g/kg seeds and Ergostim formulation @ 3 ml/kg seeds were used for seed treatment. There were five treatments viz. control, Rhizoctonia saloni, Rhizoctonia saloni + Trichoderma viride, Rhizoctonia saloni + Ergostim and Rhizoctonia saloni + Trichoderma viride + Ergostim. Each pot was sown with 10 seeds c.v. K- 851 and irrigated timely. Observation like germination percentage (15 DAS), disease incidence (15 and 30 DAS), plant weight (30 and 60 DAS), shoot weight and yield (60 DAS) were recorded.

Results and Discussion

In vitro

For first experiment about effect of Trichoderma viride on Rhizoctonia solani, Tricoderma viride significantly inhibited pathogens growth (both mycelial and sclerotial) as compared to control and showed greatest effect at 1:4 amount. In second experiment, Ergostim though showed some mycelial inhibition of pathogen but effect was more impact on sclerotial reduction but at higher concentrations. Third experiment clearly showed the compatibility of Ergostim with Trichoderma viride. These results corroborated the findings by Castro (1987) that Trichoderma viride effectively reduce mucelial growth and sclerotial production of Rhizoctonia solani.

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Table 1: Effect of trichoderma virid and Ergostim on Rhizoctonia solani and their compatibility In vitro

Treatments	Mean growth	% reduction over control	Sclerotial No.	%reduction over control
R. solani : T. viride (1:1)	35.67	52.07	4.75	85.28
R. solani : T. viride (1:2)	34.21	44.04	3.25	89.93
R. solani : T. viride (1:4)	25.39	65.89	1.75	94.58
Control (R. solani)	74.42	-	32.25	-
CD (P = 0.05)	2.63(S)			
Ergostm (PDA)	55.14	11.99	18.0	38.99
R. solani (1000 ppm Ergostim PDA)	54.85	12.46	11.5	61.02
R. solani (1500 ppm Ergostim PDA)	56.75	9.42	8.75	70.34
Control (R. solani)	62.75	-	29.5	-
CD (P = 0.05)	3.71(S)			
T. viride(500 ppm Ergostim PDA)	66.00	1.13	-	-
T. viride(1000 ppm Ergostim PDA)	62.67	6.12	-	-
T. viride(1500 ppm Ergostim PDA)	61.75	7.5	-	-
Cotrol (T. viroide) Simple PDA	66.75	-	-	-
CD (P = 0.05)	2.93(S)			

S = Significant ppm = Parts per million

Table 2: Effect of Trichoderma viride and Ergostim on Rhizoctonia solani IN vivo

Treatments	Germination percentage (15 DAS)	Disease incidence 15 DAS	30 DAS	Plant height (cm) 30 DAS	60 DAS	Shoot weight (g) 60 DAS	Yield (g)
R. solani	3.75	3.00	3.75	5.02	9.70	3.89	11.10
R. solani + T. viride	6.50	0.50	0.50	11.07	14.10	4.29	20.37
R. solani + Ergostim	4.25	2.75	3.25	7.27	13.29	4.78	12.47
R. solani + T viride + E.	6.60	0.25	0.25	11.97	17.66	5.27	51.85
Control (Sterilized soil)	7.00	-	-	11.26	14.87	4.30	19.97
CD (P = 0.05)	1.08(S)	0.915(S)	1.55(S)	1.77(S)	1.805(S)	0.446(S)	4.246(S)

S = Significant

In vivo

Seed treatment with Trichoderma viride (@ 6 g/ kg seeds) and Ergostim (@3 ml/kg seed) individually and in combination reduced the disease incidence quite significantly as much as 93.34% and also increased the germination percentage, plant height, shoot weight and yield significantly over the control (Table 2). Trichoderma viride reduced the growth of pathogen by production of antibiotics like virdin, giliotorin and trichodermin as reported by Dennis and Webstar, 1971. Ergostim on the other hand helped the plant to have better growth. Based on the results obtained in the present study it may inferred that disease incidence in green gram can be effectively managed by treatment with Ergostim +Trichoderma viride application and are similar to reports by Castro (1987), Ercole (1988) and De (1996).

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Journal of Rural and Agricultural Research Vol. 9 No. 2, 23-26 (2009)

Socio- personal characteristics and effectiveness of personal localite channel (PLC) on farm development

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Abstract

The study was conducted to investigate the socio-economic characteristics effectiveness of personal localite channels and overall usefulness of the channel regarding adoption of new technology. The sample size consisted of 300 respondents of Aligarh district of U.P. The overall analysis indicated that majority of the respondents were belong to low socio- economic status 45 years age group and educated middle to intermediate, living in nuclear family system. In overall usefulness of personal localite channel (PLC) 34.33 and 25.33 percent respondents considered the channels as useful and less useful. In personal localite channels the most wide used channels were KVK, Agriculture supervisors with 2.33, 2.50 and 3.25 pool rank order. In overall of PLC 10.83, 10.42 and 9.83 percent respondents considered B.D.O., Panchayats and farmers organizations were least used channels. Multiple correlations emphasized that adoption parameters and socio-economic variable were correlated significantly except phosphatic fertilizers and seed technology.

Introduction

The overall development of rural areas in developing countries is taking new avenues of expansion; the new paradigm of agricultural development is emerging at a faster pace. Information technology applications never required more visionary leadership than now. Agricultural scientists and extension professional need to develop a positive disposition towards the relevance and efficiency of information technology to improve their job performance, speedup technology generation and also facilitate faster transfer of technology to farmers without any time lag and distortion of information. Since these agricultural professionals are the leaders in the agricultural development, they need to be fully prepared and tuned to the future challenges. Socio- economic development and effective transfer of technology requires a wide array of human skill. In the era of globalization, our extension strategy should not depend only on conventional system. Extension worker should be very fast, need based and look for resources, market and cost benefit ratio.

Communication of new agricultural technologies to the farmers in a matter of paramount importance for the agricultural development of the country. Generation of new technology will be fruitful only when it is understood and accepted by the farmers without any time lag. The present study was carried out to study the effectiveness of personal localite channel in farm development as well as to ascertain the correlation which affects their communication behavior.

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Methodology

The present study was undertaking in Aligarh district of U.P. Out of 17 blocks of Aligarh district, Dhanipur, Akrawad and Gangiri were selected randomly. Out of ten randomly selected villages, 30 respondents were selected from each villages on randomly basis, thus the total 300 respondents were selected for this study. The data were collected with the help of present structured schedule by personally interviewing the respondents. The data was analyzed using appropriate statistical methods.

Results and Discussion

It is evident from the Table 1 that the majorities (45.67%) of the respondents were of 31 to 45 age group and belongs to higher caste (40.33%). Half of the respondents were middle to intermediate educated. Majority (94.66%) of the respondents living in single type of family system and majority of them was not the member of any organization.

The data presented in Table 1 also indicates that 76.99% respondent's annual income was in the range of Rs.10,000- 20,000. Most of them were living in pucca house and engaged in agriculture.

It is evident from Table 2 that majority (50.0 per cent) respondent belong to low socio- economic status, 31.3 per cent to medium status and rest 18.7 per cent belong to high status. Similarly, Table 3 clearly reveals that 34.3 per cent respondents considered the channels as useful, while 25.3 per cent respondent were considered the channels as less useful and 20.3 per cent respondents were considered the channels as most useful in regarding the adoption of new technology. Table 4

Table 1 Socio- economic features of small farmers

Variables	Group/ Categories	No. of respondents	% age
Age	Upto 30 years	125	41.66
	31 to 45 years	137	45.67
	Above 45 years	38	12.66
	Total	300	100.00
Caste	High Caste	121	40.33
	Backward Caste	109	36.33
	Schedule Caste	53	17.66
	Others	17	5.66
	Total	300	100.00
Education	Illiterate	11	3.66
	Can read only	46	15.33
	Primary	52	17.33
	Middle	77	25.66
	High School/ Intermediate	77	25.66
	Graduate	37	12.33
	Total	300	100.00
Family type	Single	256	85.33
	Joint	44	14.67
	Total	300	100.00
Social Participation	No Participation	194	64.66
	One organization	58	19.33
	More than one origination	18	6.00
	Office holder	16	5.33
	Public leader	14	4.66
	Total	300	100.00
Urban contact	Not even once	77	25.67
	Thrice a week	0	0
	Weekly	78	30.00
	Fortnightly	69	19.33
	Monthly	42	12.00
	Quarterly	28	9.66
	Half yearly	19	2.00
	Yearly	8	1.33
	Total	300	100.00
Size of holding	Below 2 acres	65	18.33
	2- 3 acres	172	57.33
	3- 4 acres	69	23.00
	4- 5 acres	4	1.33
	Total	300	100.00
Income	Upto Rs. 5000	11	3.66
	5,000- 10,000	14	4.67
	10,000- 15,000	79	26.33
	15,000- 20,000	152	50.66
	20,000- 25,000	28	9.33
	25,000- 30,000	9	3.00
	Above Rs. 30,000	7	2.33
	Total	300	100.00
House pattern	Kaccha	76	25.33
	Pucca	182	60.66
	Mixed	42	14.00
	Total	300	100.00
Occupation	Labour	23	7.66
	Caste occupation	38	12.66
	Business	52	17.33
	Cultivation	176	58.67
	Service	11	3.66
	Total	300	100.00
Farm power	Bullock cart	17	5.66
	Tube well	122	40.67
	Diesel pump	77	25.66
	Chaff cutter	103	34.33
	Tractor	62	20.66
Farm implements	Deshi plough	42	14.00
	M.B.Plough	28	9.33
	Disc harrow	21	7.00
	Cultivator	29	9.67
	Sprayer	25	8.33
	Seedrill	51	17.00

Note- More than one farm power and farm implements have been possessed by the respondents, hence total percentage exceeds to 100.

also clearly reveals that out of 13 personal localite channels K.V.K., Agriculture supervisor and progressive farmers are the most used channels, which pool rank order 2.33, 2.50 and 3.25 while B.D.O., Panchayats and farmers organizations are the least used channels by the farmers.

Table 2: Overall socio- economic status of the farmers

S. No	Socio- economic status	No. of respondents	% age
1	High Status	56	18.67
2	Medium Status	95	31.33
3	Low Status	150	50.00
	Total	300	100.00

Table 3: Overall usefulness of personal localite channels regarding adoption of new technology

S. No	Degree of usefulness	No. of respondents	Percentage
1	Not useful	21	7.00
2	Least useful	39	13.00
3	Less useful	76	25.33
4	useful	103	34.33
5	Most useful	61	20.34
	Total	300	100.00

It is evident from Table 5 that F value in the adoption parameters and variables had been found to be significant at 1% level of significance which shows the goodness of fit, the co-efficient of determination R2 given an

Table 4: Use of personal localite channels by the small farmers regarding adoption of wheat technology

S.No.	Communi-cation media	H.Y.V. Seed		Seed rate		Time of sowing		Method of sowing		Depth of sowing		Seed treatment		Nitrogenous fertilizer		Phosphatic fertilizer		Irrigation		Organic matter		Plant protection		Weedicide		Rank of Pooled package	
		No.	RO	No.	RO	No.	RO	No.	RO	No.	RO	No.	RO	No.	RO	No.	RO	No.	RO	No.	RO	No.	RO	No.	RO	No.	RO
1	Agriculture supervisor	72 (24.0)	5	127 (42.3)	1	99 (33.0)	3	117 (39.0)	1	110 (36.7)	2	31 (10.3)	3	121 (40.3)	1	94 (31.3)	1	40 (13.3)	3	36 (12.0)	5	18 (6.00)	3	41 (13.67)	2	2.50	2
2	A.E.O.	31 (10.3)	10	29 (9.67)	8	24 (8.00)	9	26 (8.67)	7	19 (6.33)	8	14 (4.67)	9	10 (3.33)	11	16 (5.33)	12	7 (2.33)	10	19 (6.33)	8	11 (3.67)	5	19 (6.33)	8	8.75	9
3	B.D.O.	19 (6.33)	12	7 (2.33)	126	11 (3.67)	12	9 (3.00)	11	7 (2.33)	12	11 (3.67)	10	11 (3.67)	10	12 (2.33)	13	5 (1.67)	11	17 (5.67)	9	5 (1.66)	9	9 (3.00)	9	10.8	13
4	S.M.S.	53 (17.67)	7	41 (13.7)	4	47 (15.7)	6	42 (14.0)	5	49 (16.3)	4	35 (11.7)	2	40 (13.3)	6	29 (9.67)	7	44 (14.7)	2	22 (7.33)	6	11 (3.67)	5	21 (7.00)	7	5.25	5
5	K.V.K./ F.T.C.	121 (40.3)	1	105 (35.0)	10	107 (35.7)	2	109 (36.3)	3	111 (37.0)	1	5 (18.3)	1	121 (40.3)	1	24 (8.00)	10	80 (26.7)	1	120 (40.0)	2	42 (14.0)	1	111 (37.0)	1	2.33	1
6	Co- operative	39 (13.0)	8	21 (7.00)	9	22 (7.33)	10	6 (2.00)	12	27 (9.00)	5	30 (10.0)	4	75 (25.0)	3	34 (11.3)	5	25 (8.33)	5	21 (7.00)	7	7 (2.33)	7	0 (0.00)	11	7.25	8
7	Farmers Organization	24 (8.00)	11	22 (7.33)	11	18 (6.00)	11	23 (7.67)	8	9 (3.00)	11	1 (0.33)	12	40 (13.3)	6	27 (9.00)	8	0 (0.00)	13	19 (6.33)	8	0 (0.00)	10	0 (0.00)	11	9.83	10
8	Panchayats	13 (4.33)	13	9 (3.00)	2	5 (1.67)	13	5 (1.67)	13	11 (3.67)	10	3 (1.00)	11	25 (8.33)	9	25 (8.33)	9	2 (2.66)	12	22 (7.33)	6	6 (2.00)	8	3 (1.00)	10	10.4	12
9	Progressive farmers	109 (36.3)	2	111 (37.0)	7	109 (36.3)	1	41 (13.67)	6	25 (8.33)	6	21 (7.00)	5	66 (22.0)	4	66 (22.0)	3	29 (9.67)	4	127 (42.3)	1	23 (27.7)	2	36 (12.0)	3	3.25	3
10	Friends	77 (25.67)	4	34 (11.3)	3	27 (9.00)	8	13 (4.33)	9	19 (6.33)	8	18 (18.0)	7	32 (10.7)	8	32 (10.7)	6	22 (7.33)	6	55 (18.3)	3	17 (5.67)	4	33 (11.0)	4	6.16	7
11	Neighbors	82 (27.33)	3	109 (36.3)	5	98 (32.7)	4	110 (36.67)	2	65 (21.7)	3	16 (5.33)	8	107 (35.7)	2	90 (30.0)	2	20 (6.67)	8	52 (17.3)	4	11 (3.67)	5	21 (7.00)	7	4.25	14
12	Farm leader	62 (20.7)	6	61 (20.3)	9	52 (17.3)	5	49 (16.33)	4	17 (5.67)	9	55 (18.3)	1	44 (14.7)	5	40 (13.3)	4	18 (6.00)	9	14 (4.67)	10	23 (7.67)	2	29 (9.67)	5	5.42	6
13	Relations	36 (12.0)	9	22 (7.33)		29 (9.67)	7	12 (4.00)	10	24 (8.00)	7	19 (6.33)	6	34 (11.3)	7	22 (7.33)	11	21 (7.00)	7	9 (3.00)	11	9 (3.00)	6	23 (7.63)	6	8.00	9

Note: - 1. Figures in parentheses indicate percentage of the respondents.

2. Total of percentage in any column when added will exceed 100 since more than one channel was cited by the respondents.

3. RO = Rank Order

Table 5: Influence of socio- agro economic factors on the knowledge, attitude and adoption behaviour of small farmers.

S.No.	Adoption Parameters	R	R^2	F Value
1	Seed technology	0.404	0.163	9.53**
2	Nitrogenous Fertilizer	0.508	0.258	16.99**
3	Phosphatic Fertilizer	0.444	0.197	11.99**
4	Potassic Fertilizer	0.287	0.182	4.38**
5	Plant Protection technology	0.739	0.546	58.76**
6	Weedicide technology	0.494	0.244	15.76**
7	Irrigation technology	0.554	0.307	21.62**

** Significant at 1%
NS Non – Significant

estimate of variation as explained by the different variables under consideration (age, income, size of holding, farm power, urban contect and social contect). The variation in the adoption of technology as explained by these parameters were 16.30, 25.80, 19.70, 8.20, 54.60, 24.40, and 30.70 per cent in the seed technology, nitrogen, phosphatic and potassic fertilizer technology, plant protection technology, weedicide technology and irrigation technology respectively. These values of R2 indicate that the majority variation in the adoption of plant protection is found and minimum variation in the case of seed technology.

Conclusion

It may be concluded that majority of the farmers belongs to low socio- economic status, they considered communication channels as useful and less useful 34.3 and 25.3 per cent. In personal localite channels K.V.K./ F.T.C., Agriculture supervisor and Progressive farmers were most widely used channels .

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Journal of Rural and Agricultural Research Vol. 9 No. 2, 27-29 (2009)

Evaluation of intercropping system of mustard under Agra region

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Abstract

*An experiment was conducted during winter (rabi) seasons of 2005-06 and 2006-07 at Research farm of R.B.S. College Bichpuri, Agra, to work out productivity and economic association of mustard (*Brassica juncea*) with different pulses, oil seed and potato (*Solanum tuberosum*) on sandy loam soils of Agra region. Mustard with potato in 1 : 3 row proportion was found better than either sole crop of mustard or potato in terms of total production and net return.*

Introduction

On the food front, India has achieved self sufficiency. Since mid-sixties the situation on cereal production, especially that of wheat and rice, has changed the scene of the agricultural production in the country with the development of high yielding, input-responsive varieties of these crops. However, on the nutritional aspect, not much progress has been made. Pulses, as a whole have pivotal position for a country like India where the major population is vegetarian and derives its significant portion of protein needs from these crops. Not only this, pulses are indispensable in the overall economy of the country. Every plant of pulses of country is itself a mini fertilizer factory and has maintained Indian soils in good health. According to the consecutive estimates, pulses add even much move nitrogen that what is being added in the soil through chemical fertilizers.

Since mustard is an important rabi oil seed crop grown on an average of 52 thousand hectare in mid-western plains of U.P. it is often grown as an intercrop or mixed crop either with pulses or cereals crops but its productivity is very low due to improper combination. Thus, the present investigation was carried out to find Out the present best inter crop combination with mustard and also to find out the extant of reduction in yield of mustard and inter crop in the system.

Materials and Methods

An experiment was conducted during the winter season (rabi) of 2005-06 and 2006-07 in sandy loam texture, highly permeable, near to neutral in reaction (pH 7.9) poor in organic matter (0.30) and medium in P and K status (15.6 Kg P_2O_5 and 214.2 Kg K_2O ha^{-1}) of R.B.S. College, Research farm Bichpuri, Agra Treatments details showing plan and harvesting schedule are given in Tables 1 and 2, respectively. The treatments were replicated four time in randomized block design. Sowing was done in first week of November during both the years. All the crops were raised with recommended package of practices. The quantity of seed and fertilizer in intercropping system was adjusted proportionality to the area of the respective crop. Mustard seed equivalent was worked out on the basis of existing market price of each crop. The land equivalent ratio (LER) income equivalent ratio (IER) and Net returns were worked out on the basis of pooled yield data over two years. The variety of mustard was 'vardan', chickpea 'Avrodhi', pea ' Arpana', lentil ' K-75', Linseed ' Neelam' and potato 'Kafari bahar'. The plot size was 5.0m × 3.6m rainfall received during crop season was nil and 6.3 mm during 2005-06 and 2006-07, respectively.

Table 1: Details of the treatments

T_1 Pure mustard at 30 cm. apart	-
T_2 Mustard + Chickpea	1 : 5
T_3 Mustard + Lentil	1 : 5
T_4 Mustard + Linseed	1 : 5
T_5 Mustard + Pea	1 : 5
T_6 Mustard + Potato	1 : 3
T_7 Pure chick pea at the same place without mustard	0 : 5
T_8 Pure lentil at the same place without mustard	0 : 5
T_9 Pure linseed at the same place without mustard	0 : 5
T_{10} Pure pea at the same place without mustard	0 : 5
T_{11} Pure potato at the same place without mustard	0 : 3

Results and Discussion

Though data of two years are given but the authors interpreted and discussed only pooled data.

Seed yield of mustard

Seed yield of mustard was significantly higher in sole crop treatment than that of recorded in the intercropping treatments (Table 3). The seed yields were nearly proportional to population and some deviation from it might be due to the competition offered by an intercrop for nutrients, moisture and solar radiation in the vegetative phase of mustard. Similar results were

reported by Rathi et. al. (1979).

Table 2: Harvesting schedule of the different treatments

T_1-	Twelve rows of mustard harvested (30 cm × 12 row = 3.6 m width).
T_2 to T_5-	1. Ten intercrop rows harvested (all five from each sett). 2. Central row of mustard harvested and then double the yield to make two rows yield to get 3.6 m width as in case of treatment No-1, for compensation of 12 rows yield.
T6-	1. Six rows of potato harvested (all three rows in each sett) 2. Central rows of mustard harvested and then double the yield to get total 3.6m width as in case of pure mustard.
T_7 to T_{10}-	1. Harvested total six rows (three rows in each sett) and then double the yield by multiplying 2 to equate 12 rows yield as in case of mustard to get 3.6m width. 2. Remaining four rows (two rows in each sett) harvested and than add with six rows yield. Thus, it should be the yield of 10 rows without intercrops as in treatments 2 to 5 to know the effect of mustard on inter crop.
T_{11}-	1. Harvested total two rows (One central row from each sett) leaving two border rows in each sett. Then it was multiplied by 4 to equate the yield of 3.6 m width. 2. Remaining four rows (two border rows in each sett) were harvested and then add two rows yield to make six rows yield as in case of No.6 to know the ef fect of mustard on the potato intercrop.

It was further noted that among intercropping treatments, intercropping of pulses and oil seed (linseed) with mustard produced significantly higher mustard seed yield in comparison to mustard + potato intercropping system (Table 3). It might to be due to the facts that potato offered more competition for moisture, nutrient and solar radiation with mustard in comparison to other intercrops, namely, chickpea, pea, lentil and linseed.

Seed/tuber yield of intercrop

Significant reduction in seed yield/tuber yield of different crops when there were grown as an intercrop with mustard except in case of linseed where differences in sole yield as well as intercrop were found to be non-significant (Table 3). The reduction in yield of intercrops might also be due to the shading effects of mustard on these crops besides the competition for nutrients, moisture and radiation.

Total productivity (mustard seed equivalent)

Total productivity measured in terms of mustard seed equivalent indicated that the mustard + potato combination with 1:3 row proportion produced significantly higher mustard seed equivalent than sole stand of these crops and in their intercropping systems (Table 3) It might be due to the higher tuber yield of potato (307.0 q ha^{-1}) which compensated higher price ratio with pulses and oil seeds grown as an intercrop similar rents reported by Kaushik and Chaubey (2001).

Effect of mustard on intercrop yield and vice-versa

As mentioned in harvesting schedules for recording adverse effects of intercrops on the seed yield of mustard, seed yield of mustard obtained in treatment No.1. The seed yield of mustard was with potato followed by pea and minimum was with linseed (41.5%) (Table 4). It might be due to the facts that potato, a very exhaustive crop, offered much more competition for

Table 3: Mustard and intercrop seed/tuber yield and mustard seed equivalent under different treatments.

Treatments	Seed yield of mustard (qha^{-1})			Seed yield of intercrop (qha^{-1})			Mustard seed equivalent Av. Two years (qha^{-1})
	2005-06	06-07	Mean	2005-06	06-07	Mean	
T_1 Mustard Sole	21.8	17.3	19.5	-	-	-	19.5
T_2 Mustard+Chick pea	10.4	9.2	9.8	6.4	5.2	5.8	18.8
T_3 Mustard+lentil	11.4	9.5	10.5	7.4	6.8	7.1	13.3
T_4 Mustard+linseed	10.6	9.7	10.2	8.5	7.3	7.9	17.2
T_5 Mustard+pea	11.6	9.6	10.6	7.2	6.1	6.7	17.3
T_6 Mustard+Potato	10.6	9.2	9.9	164.4	148.8	156.6	21.4
T_7 Chick pea sole	-	-	-	14.1	12.8	13.5	13.3
T_8 Lentil Sole	-	-	-	14.5	13.1	13.8	8.3
T_9 Linseed sole	-	-	-	15.8	13.7	14.8	10.0
T_{10} Pea sole	-	-	-	15.8	13.9	14.9	8.1
T_{11} Potato Sole	-	-	-	315.1	298.8	307.0	18.5
CD at 5%	1.9	1.3	1.6	12.8	11.2	12.0	3.2

Table 4: Effect of different intercrops on the yield (qha^{-1}) of mustard and vice-versa (Av. Two year).

Treatments	Mustard yield (qha^{-1})	% reduction in yield	Seed yield of intercrops (qha^{-1})	% reduction yield
T_1 Mustard Sole	19.5	-	-	-
T_2 Mustard+Chickpea	9.8	57.1	5.8	57.1
T_3 Mustard+lentil	10.5	47.4	7.1	48.6
T_4 Mustard+linseed	10.2	41.5	7.9	46.6
T_5 Mustard+pea	10.6	50.4	6.6	55.7
T_6 Mustard+Potato	9.9	56.6	156.6	48.9
T_7 Chickpea sole	-	-	13.5	-
T_8 Lentil Sole	-	-	13.8	-
T_9 Linseed sole	-	-	14.8	-
T_{10} Pea sole	-	-	14.9	-
T_{11} Potato Sole	-	-	306.9	-

nutrients, moisture and radiation in comparison to other crop grown as an intercrop.

In intercrops, the maximum reduction in seed yield was recorded with chickpea (57.1%) followed by pea and minimum was with linseed (46.6%) (Table 4).

Biological and economic evaluation

Average data of two years (pooled) on biological advantage measured in terms of land equivalent ratio (LER) and income equivalent ratio (IER) were significantly higher in Mustard + Potato with 1:3 row proportion compared with sole crop and intercropping systems. The value of LER emphasized that to produce the combined crop yield by growing intercrop with pure stand would require 16% more area or otherwise the arrangement gave 16% yield increase compared to sole crop of mustard or potato (Table 5). This revealed a greater degree of efficiency and compatibility of intercrop potato in mustard, particularly with the system which provided maximum advantage.

Table 5: Land Equivalent ratio (LER), income equivalent ratio (IER) and net return as influenced by different treatments.

Treatments	Land Equivalent Ratio(LER)	Income Equivalent Ratio(IER)	Net returns (Rs ha^{-1})
T_1 Mustard Sole	1.00	1.00	24012
T_2 M.+Chickpea	1.11	1.05	18732
T_3 M.+lentil	1.09	0.90	20258
T_4 M.+linseed	1.25	0.94	16756
T_5 M.+pea	1.28	0.98	19337
T_6 M.+Potato	1.45	1.25	36517
T_7 Chickpea sole	1.00	0.88	19257
T_8 Lentil Sole	1.00	1.04	22148
T_9 Linseed sole	1.00	0.75	9566
T_{10} Pea sole	1.00	0.87	18364
T_{11} Potato Sole	1.00	1.13	47432
CD at 5%	0.07	0.06	-

M. - Mustard

Pooled economic evaluation in terms of net returns showed that combination of mustard and potato with 1:3 row proportion gave the highest net returns (Rs. 47, 432 ha^{-1}) (Table 5).

It was concluded that inter cropping of potato in 1:3 row proportion with mustard may be adopted for intercropping returns and to best up edible oil production to satisfy the demand of growing population.

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Journal of Rural and Agricultural Research Vol. 9, No. 2, 30-32 (2009)

Effect of various doses of paclobutrazol on incidence of mango malformation

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Abstract

An experiment was carried out to study the effect of different cultivars, various doses of paclobutrazol and their interaction on the incidence of mango malformation and the results differed significantly. Among cultivars, significantly higher healthy panicles were recorded in cultivar Dashehari followed by Langra and Chausa during both the years. Significantly lowest malformed panicles were recorded in cultivar Dashehari followed by Langra and highest in Chausa. Minimum number of medium malformed panicles was recorded lower in Dashehari followed by Chausa while it was highest in Langra. Significantly lowest light malformed panicles were noted in Langra and Dashehari and highest in Dashehari and Chausa during both the years, respectively. With regard to various doses of paclobutrazol showed varied results for healthy panicles, malformed panicles (light, medium and heavy). Significantly the highest percentage of healthy panicles was found in 5.0 g paclobutrazol treatment. On the basis of foregoing results it can be concluded that 5.0 to 7.5 g paclobutrazol concentrations were effective to minimize all types of malformed panicle.

Introduction

Mango (*Mangifera indica* L.), the worlds most luscious fruit has been recognized as the 'king of fruits' in India long back. India ranks first in area and production of mango in the world (Shikamany and Sudha, 2004). Mango malformation is of two types vegetative and floral, the former being more common on the nursery seedlings and young plants and the later, on trees at the bearing stage. It is the floral malformation which directly affects the productivity. The disease is characterized in the growing plants by production of multiple shoots with rudimentary leaves from either at leaf and or at the base of the shoot, which gives an impression of bunchy top. These symptoms are very usually seen in vegetative malformation. In floral malformation because of short internodes length and thickened peduncle, the malformed peduncles give the appearance of compact mass of flowers which are mostly male (Majumdar and Sinha, 1972). The peduncles keep hanging on tree for many more months without any fruit set.

Materials and Methods

The experiment was conducted at the Main Experiment Station, Department of Horticulture, Institute of Agricultural Science, Banaras Hindu University, Varanasi during 2000-01 and 2001-02. The experiment was conducted on mango cultivars Dashehari, Langra and Chausa. Which are the most popular varieties among north Indian mango cultivars and exhibit malformation behavior.

Experiment was laid out in factorial randomized block design with three replications. Application of different doses of paclobutrazol *viz*., 2.5, 5.0 and 7.5g per canopy diameter along with control was done. Paclobutrazol was applied once in a year i.e. 15th September 2000 and 2001 in soil around the tree canopy spread and in the next year half dose was applied, in view that the paclobutrazol possesses 50 per cent residual effect after one year of its application in the soil/plant. The following observations were recorded on healthy panicles, malformed panicles, medium panicles and severe malformed panicles.

Results and Discussion

The Results (pooled over two years) of the present study are presented in the Table 1. Among cultivars, significantly highest percentage of healthy panicle was recorded in cultivar Dashehari (84.43 and 86.01 %) followed by Langra (82.83 and 83.65 %) and lowest was in Chausa (79.97 and 81.49 %) during both the years. With regard to various doses of paclobutrazol, significantly highest percentage of healthy panicle was recorded in 5.0g paclobutrazol (86.50 and 88.04 %) both at par followed by 7.5g paclobutrazol (84.03, 85.26 %) in the second year. The lowest percentage of healthy panicle was recorded in control (75.46 and 77.40 %) during both the years. Interaction between cultivars and paclobutrazol was found to be non significant in healthy panicle during first and second year. Kumar (1999) reported that higher concentration is more effective than lower doses of paclobutrazol. Higher doses of paclobutrazol increased in per cent of healthy panicle

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Table 1: Effect of paclobutrazol treatment on incidence of malformation in mango cvs. Dashehari, Langra and Chausa (Pooled over two years)

Treatments	Healthy panicles (%)	Malformed panicles (%)	Partially Malformed panicles (%)	Light Malformed panicles (%)	Medium Malformed panicles (%)	Severe Malformed panicles (%)
Cultivar						
V1 (Dashehari)	85.22	14.45	1.83	3.20	3.425	4.45
V2 (Langra)	82.99	16.70	2.68	2.79	4.635	5.48
V3 (Chausa)	80.73	18.93	3.05	3.33	3.905	6.40
S.Em+	0.50	0.35	0.06	0.09	0.095	0.13
CD at 5%	1.49	1.03	0.17	0.28	0.270	0.38
Paclobutrazol Doses						
To (Control)	76.43	21.00	3.46	5.37	5.675	6.98
T1 (Paclobutrazol @ 2.5g/tree	83.57	16.89	2.39	2.55	3.540	5.15
T2 (Paclobutrazol @ 5g/tree	87.27	14.25	1.98	2.16	3.205	4.70
T3 (Paclobutrazol @ 7.5g/tree	84.64	14.64	2.25	2.35	3.435	4.93
S.Em±	0.58	0.40	0.07	0.10	0.105	0.14
CD at 5%	1.71	1.19	0.20	0.32	0.310	0.44
VXT Interaction						
V1xT0 (Dashehari x control)	80.01	18.59	2.18	6.02	4.350	5.66
V1xT1 (Dashehari x Paclobutrazol @ 2.5g/tree	85.66	14.78	1.82	2.36	3.280	4.15
V1xT2 (Dashehari x Paclobutrazol @ 5g/tree	88.24	11.46	1.62	2.15	2.960	3.93
V1xT3 (Dashehari x Paclobutrazol @ 7.5g/tree	86.86	12.96	1.70	2.29	3.100	4.04
V2xT0 (Langra x control)	77.37	21.36	3.89	4.37	6.920	7.55
V2xT1(Langra x Paclobutrazol @ 2.5g/tree	83.07	16.64	2.42	2.56	4.030	4.96
V2xT2 (Langra x Paclobutrazol @ 5g/tree	87.36	12.75	2.10	1.97	3.730	4.61
V2xT3 (Langra x Paclobutrazol @ 7.5g/tree	84.14	15.14	2.30	2.26	3.860	4.77
V3xT0 (Chausa x control))	71.91	23.04	4.32	4.38	5.750	7.73
V3xT1(Chausa x Paclobutrazol @ 2.5g/tree	81.96	18.35	2.92	2.75	3.610	6.33
V3xT2 (Chausa x Paclobutrazol @ 5g/tree	86.06	13.51	2.20	2.36	2.915	5.56
V3xT3 (Chausa x Paclobutrazol @ 7.5g/tree	82.73	15.81	2.76	2.50	3.345	5.99
S.Em±	NS	0.61	0.12	0.16	0.185	NS
CDat5%	NS	1.78	0.35	0.48	0.54	NS

compared to lower doses of paclobutrazol.

It is obvious from the data presented in Table 1 that among cultivars, malformed panicles were significantly lower in Dashehari (15.51 &13.39 %) followed by Langra (17.77 & 15.64 %) and higher in Chausa (19.58 and 18.29%) during both the years. Various doses of paclobutrazol differed significantly during both the years. Malformed panicles were less with 5.0g paclobutrazol (13.25 and 13.87 %) followed by 7.5g paclobutrazol (15.41 and 15.26 %) during both the years and highest numbers of malformed panicles were recorded in control (23.40 and 18.60 %). Interaction between cultivars and paclobutrazol was non-significant in malformed panicles during first year. Significantly lowest malformed panicles were noted in Dashehari x 5.0g paclobutrazol treatment, this was similar with Dashehari x 7.5g paclobutrazol, Langra x 5.0g paclobutrazol and Chausa x 5.0g paclobutrazol during second year. Malformed panicles were highly affected by the climatic condition and the results varied in both the years. Paclobutrazol appear to control malformation. The control of malformation may be because of antifungal nature of paclobutrazol (Fletcher, 1985 and Fletcher *et al.*, 1986).

Among cultivars significantly lower number of light, medium and severe malformed panicles was recorded in cultivar Langra (2.88 and 2.59 %) followed by Chausa (3.59 and 2.71 %). Significant variations were also observed with various doses of paclobutrazol during both the years. Percentage of light, medium and heavy malformed panicles were lower with 5.0g paclobutrazol (2.26 and 2.07 %), which was similar with 7.5 and 2.5g

paclobutrazol. The highest light, medium and severe malformed panicles were recorded in control (6.36 and 4.39 %) during both the years. Interaction between cultivars and paclobutrazol light malformed panicles showed differences, being lowest in Langra x 5.0g paclobutrazol followed by Langra x 7.5g paclobutrazol and was the highest in Dashehari x control during first year and non-significant effect was observed in the second year. Interaction effect on medium malformed panicles was recorded lower in Chausa x 5.0g paclobutrazol (3.0 and 2.83 %), which was similar with Dashehari x 2.5,5.0 and 7.5g paclobutrazol and Chausa x 7.5g paclobutrazol (3.40; 3.0; 3.20; 3.16; 2.92, 3.0% and 3.43, 3.26 respectively. The highest percentage was observed in Langra x control (7.48 and 6.36 %) during both the years. Interaction effects on heavy malformed panicles were found non-significant during both the years. Similar findings were also reported by Kumar (1999). However, Ram and Yadav (1999) reported in mango that the malformation intensity was reduced along with malformis levels in high density Dashehari plantation and malformation was reduced to less than 0.1 % by shoot pruning after the crop harvest and with the use of paclobutrazol.

On the basis of foregoing results it can be concluded that 5.0 to 7.5 g paclobutrazol concentrations were effective to minimize all types of malformed panicle.

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Journal of Rural and Agricultural Research Vol. 9 No. 2, 33-37 (2009)

Economics of storage of wheat in case insecticides users and non-users farmers

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Abstract

The study mainly confined on economics of storage of wheat between users and non-users of insecticides at farmers level in East U.P. It reveals that bulk method of storage is more economical among all the methods of storage on various farm size group. This difference in percent margin is mainly due to price of variation as well as storage cost etc. Thus, percent margin from storage are increasing as the period of storage are enhancing. It means longer the period of storage in any method better will be the margin. Therefore, it is obvious that the percent margin in wheat in bulk method of storage will be more in commercial point of view followed by bag method of storage. Kuthila method of storage was used only by semi-medium cultivators due to less marketable surplus, hence; the percent margin was the lowest in this category of farmers.

Introduction

In broad terms the object of storage is to help balance supply and consumption. Storage is one of the major marketing services required for the orderly marketing of food products. Properly performed, storage offers opportunities for profitable marketing of food products. Almost all agricultural products are produced seasonally and are consumed throughout the year. Thus, storage adds time utility to goods.

"Wheat is a staple food for about a third of the population, and a major supplement in the diet of a substantial portion of the remaining two third rice eating population of India. It is the second most important crop, next only to rice, in terms of area, production, contribution to the gross agricultural in-come of the country. In terms of grain yield per hectare, it stands first among all the food grains including rice.

Farming is a major occupation of the people in Uttar Pradesh, as about 70 percent working force is engaged in it, Therefore, storage facilities for farmers are essential to save them from exploitation at the time of harvesting. If proper storage facilities are made available, he can be in a better position to bargain rather than depend on the mono-dictates of the traders. The main moto of the study is to examine the relative economy and the relationship between seasonal price variation and profitability of storage under various methods of storage prevailing in study areas.

Methodology

To meet out these objectives, Dohari ghat block in Mau District (U.P.) was purposely selected for the study because production of wheat was the highest in this block. Firstly, the list of village together with the cropped area was obtained from the Tehsil for the Year 2004-05. Then percentage of are under wheat crop to total cropped are was calculated for each village. The villages having less than 30 percent of its gross cropped area under wheat crop were omitted and formed the universe for the present study and five of them were selected randomly. A list of farmers for each selected village along with the area under wheat crop and total cropped area was obtained from respective Lekhpals. Proportion of wheat to cropped area of individual farm was worked out. Farmers having less than 30 percent cropped area under wheat crop were omitted having less than 30 percent cropped area under wheat crop were omitted and remaining were arranged in ascending order with respect to the area under wheat crop. Further, lists were divided into three farm size groups/strata keeping in view the size of farm viz. Large (above 3 ha.) medium (2-3 ha) and semi-medium (1-2 ha). A sample of 120 cultivators was selected on random basis which is about 25 percent of the population; Data on various aspects such as production, rentation, and marketed surplus were obtained from the selected cultivators during 2004-2005 through personal interview method.

The marketable surplus and marketed surplus of wheat different farm sizes were worked out and the result have been described in Table 1

Table indicates that excepting the farmers of the large and medium size, distress sale is resorted to by farmers in case of semi-medium group of farmers.

To study the economics of storage methods, costs, losses besides their tabular analysis, following models are applied.

(i) Economics of Storage

$NR = CR - C$

Where,

NR = Net return to storage.

CR = $P_1 - P_0$

P0 = Price at the time of storage.

Table 1: Percentages of Marketable and Marketed Surpluses of Wheat (quantity in quintals)

Farm size	Number of farmers	Total production (qtls)	Marketable surplus (qtls)	Marketed surplus (qtls)	%tage of marketable and marketed surpluses to total prpoduction	
					Marketable	Marketed
Large	20	99.00	74.04	72.89	74.80	73.63
Medium	45	59.40	39.02	39.01	66.09	66.07
Semi medium	55	40.69	24.54	25.31	60.31	62.20
Overall		57.29	38.02	38.71	66.71	66.99

P1 = Price at the time of destoraged.
C = Cost involved in storage.

The percent margin from storage is worked out with the help of this equation.

$$MS = \frac{P_1 - P_0 - C}{P_0 + C} \times 100$$

Components of cost storage:

Owing to certain peculiarities of agricultural products and the high risks involved in storage, it is difficult to measure the exact cost of storage of agricultural commodities. However, an attempt has been made in the present study to measure the cost of storage of wheat. There are two types of storage cost.

(a) Fixed Cost or Over head Cost:

It is non-recurring cost which does not vary with change in the quantity stored. It remains almost constant. Constituents of fixed cost in storage are:

(i) Interest on Building:

To calculate the interest on building, it is desirable to take into account the prevailing rate of interest. The rate of interest varies from place to place and from one bank to another bank. In Mau, rate of interest in Union Bank of India was 11.50 percent at the end of year 2005. So the prevailing rate of interest on fixed capital is charged by assuming 11.50 percent.

(ii) Repair on Building :

Repair of building is directly charged on storage building.

(iii) Depreciation on building:

Depreciation of building is calculated by straight line method i.e. value of storage building divided by estimated life.

The fixed cost on building (storage room) comprises the total fixed costs to be divided into Kharif and Rabi grains. Since Ravi grains are the main grains to be stored for a slightly longer period, the entire fixed costs have been divided on kharif and Rabi grains in the ratio of 4:6. Since there was no other rabi grain stored except wheat the entire proportion of fixed cost (for rabi grains) has been allotted to wheat. Thus, if Rs.100/- per year is the fixed cost the proportion on kharif grain and rabi grain will be Rs.40/- and Rs.60/- and the entire cost of Rs.60/- per year will be allotted to wheat.

(b) Variable Cost:

It is recurring cost incurred in the storage which varies with the change in quantity store. Following are the constituents of variable cost of storage.

(i) Cost of bag:

The cost of bag used for storage of wheat was rupees twenty five and the average life of a bag is three years. In our study different type of bags such as empty bag of fertilizer, empty bag of cement and jute bag of sugar etc. for food grains were used by the farmers. Average cost of a bag rupees six was taken into account including the interest on the value of bag.

(ii) Handling Charges:

Actual handling charges were directly charged i.e. cost of labour used in handling grain was charged at the rate of wage paid to the permanent hired labour and the packing of wheat in bags also involves some handling expenses in the form of sutli and sewing of bags.

(iii) Cost of Insecticides/Pesticides:

The actual amount paid by the farmer was charged directly for the commodity for which they were used. These insecticides/pesticides have been charged on market price.

(iv) Interest on the value of wheat stored:

The value of wheat is taken at the prices prevailing at the time of storage. The interest rate prevailing was 7.5 percent up to the period of 46 to 179 days and 9.0 percent was up to the period of 180 to 365 days. Therefore, for calculating rate of interest on value of wheat stored, same technique is adopted for periodicity of storage. However, interest on value of wheat stored for the period up to 3 months has been charged one-fourth of the yearly value, for the period 3 to 6 months. It has been charged as half of the yearly value and for the period above 6 months. Is has been charged three-fourth of the yearly value assuming the period to be up to 9 months.

(v) Interest on Working Capital:

The rate of interest on working capital is calculated by taking the prevailing rate of interest. This interest is

Table 2: Showing storage per quintal in case of users and non-users of insecticides in different method in different periods on large farm size group (Rupees per quintal).

Period of storage	Cost of storage	Method of storage									
		Bulk		Bag		Steel bin		Kuthila		Overall	
		U	UN	U	UN	U	UN	U	UN	U	UN
Up to 3 months	Fixed cost	5.53	9.95	12.56	24.29	Nil	Nil	Nil	Nil	8.89	17.67
	Variable cost	16.51	14.77	28.54	25.18	Nil	Nil	Nil	Nil	22.26	20.38
	Total storage cost	22.04	23.72	50.47	50.47	Nil	Nil	Nil	Nil	31.15	38.05
3-6 months	Fixed cost	12.10	24.70	21.49	36.46	Nil	Nil	Nil	Nil	16.27	32.54
	Variable cost	28.54	27.01	40.26	37.02	Nil	Nil	Nil	Nil	33.74	33.68
	Total storage cost	40.64	51.71	61.75	73.48	Nil	Nil	Nil	Nil	50.01	65.72
Above 6 month	Fixed cost	21.06	27.42	42.74	70.83	45.81	55.67	Nil	Nil	35.36	56.08
	Variable cost	45.90	43.94	54.54	53.79	47.88	42.93	Nil	Nil	49.78	47.48
	Total storage cist	66.96	71.36	99.28	124.69	93.69	98.60	Nil	Nil	85.14	103.56
Over all	Fixed cost	13.42	18.01	25.97	42.83	45.81	55.67	Nil	Nil	22.79	36.86
	Variable cost	31.30	25.12	42.16	37.95	47.88	42.93	Nil	Nil	37.81	34.60
	Total storage cost	44.72	43.13	78.13	80.78	93.69	98.60	Nil	Nil	60.60	71.46

U- Users of insecticides NU- Non – users of insecticides

Table 3 : Showing storage cost per quintal in case of users and non-users of insecticides in different methods in different periods on medium farm size group (Rupees per quintal).

Period of storage	Cost of storage	Method of storage									
		Bulk		Bag		Steel bin		Kuthila		Overall	
		U	UN	U	UN	U	UN	U	UN	U	UN
Up to 3 months	Fixed cost	7.59	9.12	14.40	27.82	Nil	Nil	Nil	Nil	10.49	16.77
	Variable cost	15.09	13.04	25.77	25.14	Nil	Nil	Nil	Nil	19.64	18.40
	Total storage cost	22.68	22.16	40.17	52.96	Nil	Nil	Nil	Nil	30.13	35.17
3-6 months	Fixed cost	19.28	44.73	41.36	54.02	Nil	Nil	Nil	Nil	28.03	49.17
	Variable cost	21.74	42.20	40.17	34.71	Nil	Nil	Nil	Nil	29.40	38.62
	Total storage cost	41.02	86.93	81.53	88.73	Nil	Nil	Nil	Nil	57.07	47.79
Above 6 month	Fixed cost	29.80	46.77	56.40	78.42	54.11	59.66	Nil	Nil	45.27	60.71
	Variable cost	46.76	44.12	57.32	53.79	48.69	44.10	Nil	Nil	50.10	46.99
	Total storage cist	76.60	90.89	113.72	132.21	102.80	103.76	Nil	Nil	95.37	107.70
Over all	Fixed cost	18.9	33.24	36.37	55.07	54.11	59.66	Nil	Nil	31.34	45.79
	Variable cost	27.80	32.88	40.35	38.99	48.69	44.10	Nil	Nil	35.34	36.97
	Total storage cost	46.70	66.12	76.72	94.06	102.80	103.76	Nil	Nil	66.68	82.76

U- Users of insecticides NU- Non – users of insecticides

calculated on the working capital actually invested for the storage of a particular commodity such as cost of bag, handling charges, insecticides/pesticides etc. The interest has been charged in the same manner as defined in above case (IV).

Cost of Storage:

The storage cost of wheat per quintal with treated and untreated insecticides included the fixed and variable cost as enumerated above. However, the loss during storage has not been taken as cost item in the study for cost structure. The following table shows the fixed and variable costs of storage of wheat per quintal between users and non-users of insecticides.

Foregone discussions lead to this conclusion that the overall average storage cost is more in case of non users of insecticides in comparison to users of insecticides except in case of bulk method of storage. Table further depicts that in case of users at insecticides in wheat the storage cost has increased with the increase of storage period as compared to non-users of insecticides.

Table 4 : Showing storage cost per quintal in case of users and non users of insecticides in different method in different periods on semi medium farm size groups (Rupees per quintal).

Period of storage	Cost of storage	Method of storage									
		Bulk		Bag		Steel bin		Kuthila		Overall	
		U	UN	U	UN	U	UN	U	UN	U	UN
Up to 3 months	Fixed cost	5.83	7.35	6.06	9.80	Nil	Nil	9.17	8.19	6.19	8.69
	Variable cost	15.63	15.05	24.05	20.22	Nil	Nil	15.58	12.89	19.30	17.34
	Total storage cost	21.45	22.40	30.11	29.06	Nil	Nil	24.75	21.78	25.49	26.03
3-6 months	Fixed cost	14.45	24.20	18.89	25.08	Nil	Nil	9.95	11.93	15.89	23.15
	Variable cost	27.94	24.42	35.74	32.69	Nil	Nil	37.30	23.13	32.74	27.77
	Total storage cost	42.39	48.62	54.63	57.77	Nil	Nil	47.25	35.06	48.72	50.92
Above 6 month	Fixed cost	30.25	50.03	48.93	75.45	49.80	54.45	Nil	Nil	52.61	59.86
	Variable cost	42.85	40.10	55.75	49.79	41.68	39.51	Nil	Nil	47.90	42.60
	Total storage cist	73.10	90.13	104.68	123.24	91.48	94.06	Nil	Nil	99.51	101.46
Over all	Fixed cost	16.36	29.67	24.89	35.56	49.80	54.45	9.63	10.06	26.05	32.84
	Variable cost	28.21	27.95	38.72	33.11	41.68	39.51	31.61	18.01	33.99	30.39
	Total storage cost	44.57	57.62	63.61	68.67	91.48	94.06	41.24	28.07	59.94	63.23

U- Users of insecticides NU- Non – users of insecticides

Table 5 : Storage Economy of wheat per quintal (consolidated) between users and non-users of insecticides in different methods, on different period on various farm size group (Rupees per quintal).

Farm size group	Method of sowing												
	Bulk			Bag			Steel bin			Kuthila			Over all
	Upto 3 months	3-6 months	Above 6 months	Upto 3 months	3-6 months	Above 6 months	Upto 3 months	3-6 months	Above 6 months	Upto 3 months	3-6 months	Above 6 months	
						User of insecticides							
Large	95.05	176.26	337.22	80.69	162.78	215.09	Nil	Nil	352.46	Nil	Nil	Nil	221.28
Medium	93.58	174.84	329.68	86.49	147.75	301.61	Nil	Nil	355.98	Nil	Nil	Nil	215.63
Semi medium	93.58	17.90	323.40	85.65	162.82	298.10	Nil	NIl	363.51	61.55	143.61	Nil	196.20
Over all	94.33	175.90	329.40	85.02	157.16	303.08	Nil	Nil	356.90	61.55	143.61	Nil	209.81
						Non-user of insecticides							
Large	81.76	139.29	306.06	70.44	130.56	273.57	Nil	Nil	340.13			Nil	183.37
Medium	93.53	120.64	294.70	75.29	137.82	277.59	Nil	Nil	334.09			Nil	196.16
Semi medium	83.39	144.80	271.51	80.45	151.15	262.39	Nil	Nil	352.26	55.61	138.75	Nil	173.88
Over all	87.91	133.13	285.91	68.72	141.15	271.40	Nil	Nil	340.37	55.67	138.75	Nil	185.05

Table 3 indicates that the overall storage cost per quintal increase with the increase in the period of storage and it decreases with the increase in volume of storage.

The above discussions lead to this conclusion that the storage cost is more in case of non-users of insecticides particularly in bulk and bag methods of storage as compared to the users of insecticides while it is less in remaining two methods viz. Steel bin and Kuthila with the increase in the period of storage and its decrease with increase in volume of storage.

Estimation of Storage economy:

Economics of storage refers to the profit occurred due to storage of the commodity over a period of time. This profit is calculated by deducting the sum of storage cost, value of storage losses and value of produce at the time of storage from the sale value of produce after a certain period of time between users and non-users of insecticides/ pesticides separately. The returns were estimated under different methods of storage on various farm size groups.

The overall average Economy of storage of wheat grain per quintal in case of users of insecticides is higher say 14.59 as compared to users and non-users of insecticides. It seems that in all the four method of storage as the period increases better will be the Economy. While Comparing all the four method viz bulk, bag, steel bin and Kuthila (in any farm size group) storage Economy

Table 6: Showing percent margin between users and non-users of insecticides in different period on various farm size group (per cent margin).

Farm size group	Method of sowing											
	Bulk			Bag			Steel bin			Kuthila		
	Upto 3 months	3-6 months	Above 6 months	Upto 3 months	3-6 months	Above 6 months	Upto 3 months	3-6 months	Above 6 months	Upto 3 months	3-6 months	Above 6 months
						Users of insecticides						
Large	15.94	28.25	51.13	13.12	25.37	45.15	Nil	Nil	53.89	Nil	Nil	Nil
Medium	16.94	27.94	48.72	14.21	22.30	42.72	Nil	Nil	53.66	Nil	Nil	Nil
Semi medium	15.64	27.02	47.43	14.17	25.56	42.17	Nil	Nil	55.72	9.87	21.92	Nil
						Non-users of insecticides						
Large	13.43	21.11	44.62	10.98	19.36	36.71	Nil	Nil	51.48	Nil	Nil	Nil
Medoum	15.58	17.60	41.84	11.84	20.40	37.62	Nil	Nil	50.17	Nil	Nil	Nil
Semi medium	13.81	22.05	36.85	13.14	23.17	34.73	Nil	Nil	53.61	8.83	21.08	Nil

of wheat grain is the highest in the steel bin method of storage because of the fact that farmers stored wheat for seed purpose and do not use for commercial purpose and stored wheat for the period above 6 months only. But for commercial purpose bulk method of storage is more Economical among bag and Kuthila method of storage. This difference in Economy is mainly because of the price variation as well as cost of storage. Thus, the net return from storage per quintal is increasing as the period of storage is increasing. It means longer the period of storage in any method better will be the Economy, Therefore, it is obvious from the foregone discussions that the economy of wheat commodity per quintal in bulk method of storage will be more if it is used for commercial purpose and minimum in kuthila method of storage and bag method of storage lies in between. It can further be stated that return were higher in case of users of insecticides grain as compared to non-users of insecticides grain. The study once again indicates that it was more economic to store wheat commodity for the period above 6 months almost in all the methods of storage in different group of farmers.

The foregone discussion lead to this conclusion that in all of the four method of storage as the period rises the percent margin increase, which is longer the period of storage the sound, will be the percent margin. While comparing all the four method Viz. bulk, bag steel bin, and kothila (in any farm size group) percent margin of wheat grain during storage is the maximum in steel bin method of storage. This method is not used for commercial purpose in all the period of storage. Only little amount of marketable is used in this method.

In commercial point of view, bulk method of storage is more economical among all the methods of storage of various farm size groups. This difference in percent margin is mainly due to price of variation as well as storage cost etc. Thus, percent margin from storage are increasing as the period of storage are enhancing. It means longer the period of storage in any method better will be the margin. Therefore, it is obvious that the percent margin in wheat in bulk method of storage will be more in commercial point of view followed by bag method of storage. Only sem-medium cultivators due to less marketable surplus used Kuthila method of storage, hence, the percent margin were the lowest in this category of farmers. The study further reveals that the percent margin was higher where the quantity of the wheat stored more than 6 months in all the methods of storage.

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Journal of Rural and Agricultural Research Vol. 9 No. 2, 38-40 (2009)

Effect of various fertility treatments on growth, yield and quality of potato (*Solanum tuberosum* L.)

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Abstract

A field experiment was conducted during rabi season of 2006-07 and 2007-08. Application of Recommended Dose of Fertilizers (RDF) 150+80+100 kg NPK/ha + FYM @ 20 t/ha (T_4) recorded the maximum growth attributes (plant height, haulms/hill and dry weight) and yield attributes (No. of tubers/plot, grade wise, total number of tubers/plot, yield of tubers/plot (kg) yield of tubers q/ha while quality attributes (dry matter (%), specific gravity, starch content (%) and Ascorbic acid) were found significantly better as compared to other treatments.

Introduction

Potato (*Solanum tuberosum* L.) belongs to the family solanaceae Sekhawat *et al.*, (2000) reported that among major potato growth countries, India ranks fifth after China, USSR, Poland and Ukraine. Bio-fertilizers have been recognized as cheapest fertilizer for developing countries like-India as a source of supplement to the application of chemical fertilizers for better crop production. Nitrogen is the most limiting factor in Indian soil. It is known that approximately 78% nitrogen present in atmosphere, this unutilized vast reserve of nitrogen converted into available form through bio-fixation and industrial synthesis. Among micro-organisms Azotobacter has play an important role to supplement nitrogen in crops, besides, phosphorus is another most important nutrient for plant. However, Indian soils generally found low to medium in available phosphorus and not more than 30 per cent of applied phosphate is available to current crop, remaining par gets converted into unavailable form. Bhattacharya *et al.*, (2000) reported that around 95.99 per cent of total soil phosphorus is insoluble which are not directly available to plants, several bacteria such as Bacillus/Aspergillus and Phospho bacteria converted insoluble P into soluble form.

Indiscriminate use of chemical fertilizers and pesticides has resulted in environmental and health hazards along with socio-economic problems. Though agriculture production has continued to increase but productivity rate per unit area has started to decline. Sustainable agriculture is unifying concept, which considered ecological, environmental, philosophical, ethical and social impacts, balanced with cost effectiveness.

Material and methods

The field experiment was conducted at Shri F.H. (PG) College Crop Research Farm, Nidhauli Kalan, Etah during Rabi season of 2006-07 and 2007-08. The experiment was laid out in Randomized Block Design with 4 replications. The experiment consisted of five treatment combinations involving T_1 - FYM @ 10 t/ha + Biofertilizers (Azotobacter + Phospho bacteria), T_2 - FYM @ 20 t/ha + Biofertilizers (Azotobacter +Phospho bacteria), T_3 - FYM @ 20 t/ha + Biodynamics, T_4 - Recommended Dose of Fertilizers (150:80:100 kg NPK/ha) + FYM @ 20 t/ha and T_5 -Control. For the treatments of T_1 and T_2, Jaggary solution was prepared by dissolving 100 g of Jaggary in one litre of water, 200 g each of Azotobacter and Phospho bacteria were added to this solution. Solution was spread on 33.6 kg tubers, @ 25 q/ha for the 67.2 m^2 area (T_1 & T_2 treatments) and mixed thoroughly with hands to obtain uniform coating treated tubers were kept in shade for drying. For the treatment of T_3 BD 500 (cow horn manure), 3.50 kg was dissolved in 250 lit. of water. The solution was spread with the help of tree twig in one hectare area at the time of field preparation. The solution was prepared by dissolved 2.5 kg of BD 501 (cow horn silica manure) in 250 litres of water and spread on the leaves in the form of 'mist' before sunrise at plant emergence stage i.e. 20 DAP in one hectare area.

Result and Discussion

Growth attributes:

The growth attributes (plant height (cm), number of leaves/plant, haulms/hill) were obtained significantly higher with T_4 RDF (Recommended dose of fertilizers) 150+80+100 kg NPK/ha + FYM @ 20 t/ha) as compared to all other treatments at all the stages of plant growth (Table 1 and 2) Sood and Sharma 2001 were reported similar results. The maximum fresh and dry weight per plant was recorded with T_4 and this was found significantly superior over all other treatments at all the recorded stages. Similar results were obtained

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Table 1: Effect of various fertility treaments on growth parameters

Treatments	Plant emergence (%)				Plant height (cm)							
	2006-07		2007-08		2006-07				2007-08			
	15 DAP	30 DAP	15 DAP	30 DAP	30 DAP	45 DAP	60 DAP	75 DAP	30 DAP	45 DAP	60 DAP	75 DAP
T_1	10.48	92.65	11.25	80.78	15.53	29.96	31.50	33.50	15.87	29.31	34.00	36.69
T_2	16.28	92.75	16.63	93.28	18.18	28.65	33.25	34.25	18.18	30.43	35.06	39.00
T_3	11.56	92.37	22.00	93.28	16.84	27.35	34.25	35.25	17.50	33.75	35.31	41.18
T_4	16.87	95.15	22.97	93.75	18.87	39.68	59.68	62.25	19.50	40.00	46.93	50.18
T_5	15.65	91.87	17.75	92.18	17.59	30.56	29.50	32.00	18.50	28.68	32.93	35.50
CD at 5%	NS	NS	NS	NS	NS	3.23	8.36	8.03	NS	4.58	4.88	2.35

Table 2: Effect of various fertility treaments on growth parameters

Treatments	Number of leaves per plant								Haulms/hill			
	2006-07				2007-08				2006-07		2007-08	
	30 DAP	45 DAP	60 DAP	75 DAP	30 DAP	45 DAP	60 DAP	75 DAP	15 DAP	30 DAP	15DAP	30DAP
T_1	29.00	56.00	47.31	47.62	17.75	39.68	43.12	41.87	3.50	4.25	3.50	3.75
T_2	32.50	62.12	51.17	50.00	21.68	42.93	49.31	48.12	4.00	4.50	3.87	4.00
T_3	32.62	68.12	54.12	52.50	21.87	50.00	55.50	53.25	4.00	4.75	4.30	5.00
T_4	40.12	69.18	84.56	82.75	22.75	56.50	60.75	58.12	7.00	7.00	5.42	5.65
T_5	32.00	49.62	47.68	46.00	21.75	29.81	40.50	39.37	3.50	3.75	3.20	3.33
CD at 5%	1.19	NS	11.39	9.88	2.96	4.60	13.33	12.00	1.19	0.61	1.12	0.46

Table 3: Effect of various fertility treatments on Fresh weight, Dry weight of plants and Total number of tubers/plot

Treatments	Fresh weight of plant (g)						Dry weight of plant (g)						Total No. of tubers/plot	
	2006-07			2007-08			2006-07			2007-08				
	60 DAP	75 DAP	90 DAP	60 DAP	75 DAP	90 DAP	60 DAP	75 DAP	90 DAP	60 DAP	75 DAP	90 DAP	2006-07	07-08
T_1	108.50	111.25	126.50	83.75	133.50	137.50	20.38	23.90	26.55	11.75	23.72	29.94	1040	695
T_2	128.75	125.00	151.50	89.75	135.50	147.75	22.47	24.49	30.86	12.82	24.36	36.06	1134	713
T_3	152.00	181.25	183.75	119.25	146.50	162.50	29.75	36.92	36.19	14.50	25.01	36.40	1203	833
T_4	270.00	298.75	296.75	177.0	293.75	288.75	36.39	53.51	48.87	22.36	39.50	49.25	1410	1231
T_5	95.00	102.75	113.50	65.75	132.25	132.75	15.75	18.90	22.50	11.74	23.24	27.67	1049	563.0
CD at 5%	17.75	19.45	23.17	16.64	24.01	37.16	2.16	4.51	4.24	1.58	5.23	8.04	168.1	50.2

by Swaminaathan and Verma 1997, Graham *et al.*, 1976, Ghos and Das 1998).

Yield attributes:

All the fertility treatments produced higher number of A, B, C and D grade tubers/plot as compared to control (T_5). The maximum number of A, B, C and D grade tubers was recorded in T_4 (Recommended Dose of Fertilizers (150:80:100 kg NPK/ha) + FYM @ 20 t/ha) followed by T_3 (FYM @ 2 t/ha + Biodynamics), T_2 (FYM @ 20 t/ha + Biofertilizers (Azotobacter + Phospho bacteria)) and T_1 and all these treatments were found significantly superior over control in this respect. These results are in close agreement with the findings of Imam and Badaway 1978. The total number of tubers/pot (1410.50, 1230.75) and yield of tubers/per ha (416.89 q, 335.02 q) were obtained significantly higher with T4 Recommended Dose of Fertilizers (150:80:100 kg NPK/ha) + FYM @ 20 t/ha as compared to all other treatments. The next best treatments were T_3 in these respects. The present findings confirm by the earlier findings of Patel and Mehta 1984 and Singh *et al.*, 1999).

Quality attributes:

The maximum dry matter (24% and 25.25%) was associated with the treatments T3 (FYM @ 20 t/ha +

Table 4: Effect of various fertility treatments on yield parameters

Treatments	Number of tubers per plot (grade wise)								Total yield of tubers/ha (q)	
	2006-2007				2007-08				2006-07	2007-08
	A	B	C	D	A	B	C	D		
T_1	51.75	177.75	409.25	401.25	17.50	120.00	265.00	292.00	224.07	155.40
T_2	66.50	195.50	429.50	442.50	17.50	120.50	280.00	295.25	250.84	163.34
T_3	68.75	201.25	453.25	480.25	27.50	140.50	330.00	335.00	269.82	217.66
T_4	127.25	340.25	521.25	421.75	73.00	230.25	577.50	350.00	416.89	335.02
T_5	20.50	114.50	308.50	605.50	10.50	45.00	105.00	402.50	202.39	96.37
CD at 5%	7.36	21.66	43.24	46.91	7.19	32.60	63.49	33.98	49.45	28.25

Table 5: Effect of various fertility treatments on the quality parameters

Treatments	Dry matter (%) of tubers		Specific gravity of tubers		Starch content (%) of tubers		Ascorbic acid content (%) (mg/100 g) in tubers	
	2006-07	2007-08	2006-07	2007-08	2006-07	2007-08	2006-07	2007-08
T_1	22.00	22.00	1.079	1.108	18.87	21.81	16.75	16.75
T_2	22.00	22.50	1.076	1.068	18.98	21.87	16.63	16.81
T_3	24.00	25.25	1.086	1.125	19.62	22.91	17.31	17.37
T_4	22.50	23.50	1.085	1.127	18.18	18.18	16.62	16.50
T_5	21.50	21.75	1.083	1.074	18.00	18.43	16.50	16.25
CD at 5%	1.75	1.78	NS	NS	0.47	1.34	0.53	0.36

Biodynamics), which was found to be significant over the control (T_5). Maximum starch content (19.62%, 22.91%) of tubers was recorded in T_3 treatment and maximum ascorbic acid content of 17.31 mg/100 g and 17.37 mg/100 g were observed in treatment T_3 and this was found statistically superior over all other treatments except T_1 and T_2 in case of starch in second year only.

Conclusion

On the basis of above results and discussion it may be concluded that the maximum plant emergence, number of haulms per hill, plant height (at 30, 45, 60 and 75 DAP), number of leaves per plant (at 30, 45, 75 and 90 DAP) and yield of A and B grade, tubers/plot, yield q/ha and total number of tubers/plot were recorded in treatment T_4, Recommended Dose of Fertilizers (150:80:100 kg NPK/ha) + FYM @ 20 t/ha followed by application of FYM @ 20 t + Biodynamics (T_3) and quality parameters viz. dry matter, starch and ascorbic acid content of tubers were significantly improved with the application of FYM @ 20 t/ha + Biodynamics (T_3) as compared to other treatments.

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Journal of Rural and Agricultural Research Vol. 9 No. 2, 41-44 (2009)

Study of price spread and constraints in marketing of paddy in Basti district of U.P.

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Abstract

Agricultural production and its marketing provide gainful employment to Indian people. Efficient production alone cannot provide more income to the Indian farmers, unless efficient marketing system are not to be introduced marketing of agricultural produce are playing important role for increasing farmers income. From the welfare point of view of farmers, consumers and middleman, agricultural marketing plays a crucial role. Producer's share in the consumer's rupee for a commodity is based on the development of marketing system in the economy. Rice farmers are in a miserable condition as they do not get remunerative price of their produce in Basti district of U.P. Keeping in view, the operational convenience of investigator, Basti district was purposively selected. Out of 14 blocks, Saltauwa Gopalpur block having highest area under paddy crop was selected. Ten villages were selected in two clusters for the study. A list of paddy grower of each selected village was prepared along with their size of holdings and classified into four categories i.e. (i) Marginal (>1 ha), (ii) Small (12 ha), (iii) Medium (2-3 ha) and (iv) Large (3 ha and above). Hundred farmers were selected from both clusters. The net price received by the farmers was higher in channel -II i.e. Rs. 575 per quintal as compared to Rs. 561 and Rs. 562 per quintal in channel -I and channel -II, respectively in cluster-I, and in case of cluster-II, the net price received by producer was also higher at Rs. 573 per quintal in channel-III. While it was Rs. 558 and Rs. 556 in channel-II farmers were less benefited because it was due to high marketing cost of margin as well as distance from the market. The price spread in both clusters (I & II) farmers were higher in channel-III i.e. Rs. 165 and Rs. 175 per quintal due to higher marketing cost, margin and large number of intermediaries. The main problems of paddy marketing of both clusters were storage followed by processing, transportation and grading.

Introduction

In under developed countries like India, agriculture is the main source of livelihood. About 70 per cent of people in our country are still dependent on agriculture. Agricultural production and its marketing provide gainful employment to Indian people. Efficient production alone cannot provide more income to the Indian farmers, unless efficient marketing system are not to be introduced marketing of marketing produce are playing important role for increasing farmers income. Therefore market reform and marketing system improvement ought to be an integral part to policy and strategy for agricultural development. Agricultural marketing occupies a fairly low place in agricultural development policies of developing countries. The national commission on agriculture (1976) had emphasized that it is not enough to produce a crop or an animal product; it must be satisfactorily marketed too. So that producer's may get remunerative prices of their produce. Rice is a plant of Asian origin and 90% of the world's rice is produced and consumed in Asia. It is one of the important cereal crops which are grown worldwide.

India stand at first in area under rice (i.e. 44.60) million hectares, second in production (90 million tones 2003-04) with the productivity of 20-26 q/ha in the world. China which ranks first in production (134.4 mt) with the average productivity of 6.24 tones/ha.

In India, west Bengal is a leading state in paddy both in production and productivity, While Uttar Pradesh has second position in production of paddy.

From the welfare point of view of farmers, consumers and middlemen, agricultural marketing plays a crucial role. Producer's share in the consumer's, rupee for a commodity is based on the development system in the economy. For majority of the middlemen marketing is a source of their livelihood. Middlemen wish to obtain higher margin for their marketing services. Hence, an efficient marketing system should always direct towards bringing the welfare to all these categories.

Basti district of Eastern U.P. having an area of 119463 ha under paddy with 254295 mt production 21.29

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q/ha, as productivity. Rice farmers are in a miserable conditions as they do not get remunerative price of their produce. Rice production has been better scope for increasing income of the farmers and generating employment in the rural sector but marketing of produce is itself a problem. Various exploitations are experienced at various levels. Considering these fact a study on "Marketing cost, margin and price spread and constraint in marketing of paddy in Basti district (U.P.)" was under taken with following objectives:

1. To workout marketing cost, margins and price spread of paddy through different marketing channels.
2. To workout producer's share in consumer's rupee and to find out the major constraints of marketing of paddy and to suggest suitable remedies measures.

Methodology

Three stage stratified random-com-purposive sampling technique was used to select the blocks, villages and samples farms.

A list of all 14 blocks of Basti district of eastern U.P. was prepared and out of where one block namely "Saltauwa Gopalpur" having highest concentration in acreage of rice was selected purposively for the study.

A list of all village is selected block was prepared and two nucleus namely Hatwa and Bale deeha were selected i.e. one nearer to the market and another 30 km away from the market than four surrounding villages of each nucleus were selected to form the two clusters.

A list of rice growers from each cluster was prepared along with their size of holding and were classified into four size groups i.e. (i) marginal (<1 ha), (ii) Small (1-2 ha), (iii) Medium (2-3 ha) large farms (above 3 ha).

The data was collected from the farmers through personal interview and was analyzed with help of following statistical techniques.

Marketing margin:

The following formula was used to work out the total marketing margins:

$$M_T = \sum_{i=1}^{n} \{ Si - Pi/Qi \}$$

Where:

M_T = Total marketing margin

Si = sale value of product for i^{th} firm

Pi = Purchase value of a product paid by the i^{th} firm

Qi = Quantity of the product handled by i^{th} firm

i = 1, 2, ……., n.

Producers price:

Producers price worked out by following formula

$P_F = P_A - C_F$

Where,

P_F = Producer's price

P_A = Wholesale price

C_F = Marketing cost

Results and Discussion

The main marketing channel for marketing of paddy were identified in study area as follows-

1. Producer-consumer
2. Producer-village bania- consumer
3. Producer-cooperative society-retailer-consumer

Table 1: Marketing cost and marketing margin in cluster-I farmers

S.No. Particulars	Channel-I		Channel-II		Channel-III	
	Rs/q	%age	Rs/q	%age	Rs/q	%age
1. Net price received by the producer	562	96.90	561	83.11	575	77.71
2. Total price received by the producer	580	100.00	580	85.92	600	81.19
3. Expenses incurred by the producer	18	3.10	19	2.81	25	3.38
4. Village bania purchase price/producer selling price	-	-	580	85.92	-	-
A. Expenses incurred by the village bania	-	-	64	9.64	-	-
B. Village bania margin	-	-	30	4.44	-	-
5. Cooperative societies purchase price/producer selling price	-	-	-	-	600	81.19
A. Expenses incurred by cooperative societies	-	-	-	-	37	5.00
B. Cooperative societies margin	-	-	-	-	30	4.05
6. Cooperative societies selling price/retailer purchase price	-	-	-	-	667	90.25
A. Expenses incurred by the retailer	-	-	-	-	32	4.32
B. Retailer margin	-	-	-	-	41	5.54
7. Gross marketing margin	-	-	30	4.44	71	9.59
8. Gross marketing cost	18	3.10	83	12.45	94	12.70
9. Retailer selling price/consumer price	580	100.00	674	100.00	740	100.00

Table 2: Marketing cost and marketing margin in cluster-II farmers

S.No. Particulars	Channel-I		Channel-II		Channel-III	
	Rs/q	%age	Rs/q	%age	Rs/q	%age
1. Net price received by the producer	561	96.72	558	81.93	573	76.60
2. Total price received by the producer	580	100.00	580	85.16	600	80.21
3. Expenses incurred by the producer	19	3.28	22	3.23	27	3.61
4. Village bania purchase price/producer selling price	-	-	580	85.16	-	-
A. Expenses incurred by the village bania	-	-	70	10.29	-	-
B. Village bania margin	-	-	31	4.55	-	-
5. Cooperative societies purchase price/producer selling price	-	-	-	-	600	80.21
A. Expenses incurred by cooperative societies	-	-	-	-	38	5.09
B. Cooperative societies margin	-	-	-	-	35	4.68
6. Cooperative societies selling price/retailer purchase price	-	-	-	-	673	89.85
A. Expenses incurred by the retailer	-	-	-	-	32	4.27
B. Retailer margin	-	-	-	-	43	5.75
7. Gross marketing margin	-	-	31	4.55	78	10.43
8. Gross marketing cost	19	3.28	92	13.52	97	12.97
9. Retailer selling price/consumer price	580	100.00	681	100.00	748	100.00

Price spread:

The price spread refers to the differences between price paid by consumer and actual price received by the producer for an equivalent quantity and quality of farm product.

The net price received by the producers, total marketing costs and margins were analyzed separately for cluster-I and cluster-II. Results are as follows,

The results of price spread (in case of cluster-I farmers) were calculated and presented in Table 1.

Table 1 reveals that the net price received by the farmers was maximum in channel-III i.e. Rs 575 per quintal as compared to Rs. 561 and Rs. 562 per quintal in channel-I and II, respectively. The marketing cost incurred by the producer, 3.10 per cent consumer's rupee in channel-I. The percentage of marketing cost of consumer's price in channel-II came 2.81. The marketing margin to consumer's price was observed 4.44 per cent to the village bania. In channel-III, the percentage of marketing cost to consumer's price for producer, cooperative societies and retailer are 3.38, 5.00 and 4.32, respectively. While percentage of marketing margin to the co-operative societies and retailer were 4.05 and 5.54 respectively.

The price spread in cluster-II farmers were worked out and presented in Table 2, it clear from table 2 that the cluster-II farmers were less benefited since the net price received by producer was higher at Rs. 573 per quintal in channel-III while it was Rs. 558 and Rs. 561 in channel-II and channel-I respectively. This was due to high marketing cost of margins as well as distance from the market. The gross marketing cost constituted 3.28 per cent of consumer price in channel-I while the marketing cost and marketing margin constituted 13.52 and 4.55 per cent in channel II, respectively, while it was 12.97 and 10.43 per cent in channel III respectively. Thus it may be inferred from the analysis that channel I was highly profitable when comparing with channel II and III in the study area, because producer's share in consumer's rupee was higher in case of channel I.

Price spread analysis shows producer's price, marketing margin, marketing cost and consumer price for the three marketing channels. The analysis of price spread in the three marketing channels for cluster I farmers is presented in Table 3. It shows that the price spread in cluster I farmers was higher in channel III at Rs. 165 per quintal than other channels due to higher marketing cost, margin and large number of intermediaries. Channel I is economical to the farmer since its price spread is less at Rs 18 per quintal.

Table 3: Price spread in cluster -I farmers under different channels (Rs/q)

S.No. Particulars	Channels		
	I	II	III
1. Producer's price	562	561	575
2. Market margin	-	30	71
3. Marketing cost	18	83	94
4. Consumer price	580	674	740
5. Price spread	18	113	165

The analysis of price spread in the three marketing channels for cluster II farmers is presented in table 4. It shows that the price spread was maximum Rs. 175 per quintal in channel III and minimum of Rs. 19 per quintal in channel I. it was observed that in cluster I farmers

have lesser price spread than the cluster II farmers in all the three marketing channels because cluster I is near to the market, resulting less marketing cost and margins.

Table 4: Price spread in cluster -I farmers under different channels (Rs/q)

S.No.	Particulars	Channels I	II	III
1.	Producer's price	561	558	573
2.	Market margin	-	31	78
3.	Marketing cost	19	92	97
4.	Consumer price	580	681	748
5.	Price spread	19	123	175

Table 5: Producers shares in consumers rupee for various marketing channels

S.No.	Particulars	Channels I	II	III
Cluster-I				
1.	Producer's share			
A.	At net price received	96.90	83.11	77.80
B.	At total price received	100.00	85.92	81.19
2.	Village bania share	-	14.08	-
3.	Cooperative societies share	-	-	9.01
4.	Retailer share	-	-	9.80
	Total	100.00	100.00	100.00
Cluster-II				
1.	Producer's share			
A.	At net price received	96.72	81.93	76.60
B.	At total price received	100.00	85.16	80.21
2.	Village bania share	-	14.84	-
3.	Cooperative societies share	-	-	9.77
4.	Retailer share	-	-	10.02
	Total	100.00	100.00	100.00

Producer's share in consumer's rupee for various marketing channels of both the clusters were worked out and presented in Table 5. The producers share in consumer's rupee was found maximum in channel I (in both cluster I and II) i.e. 96.90% and 96.72% respectively. Intermediaries were not involved in channel I, followed by channel II. The minimum produce's share was observed i.e. 77.80 and 76.60 per cent in channel III in cluster I and cluster II respectively, because of intermediaries were involved in channel III. The village bania's share was found 14.08 and 14.84 per cent in cluster I and cluster II, respectively in channel II. The cooperative societies and retailer's share was found 9.01 and 9.80 per cent respectively in cluster II in channel III.

Producer's share in consumer's rupee for various marketing channels of cluster II was found minimum because cluster II farmers were residing away from market resulting higher marketing cost and margins incurred by intermediaries.

Constraints:

Constraints analysis of the marketing of paddy were made. The marketing problem of paddy of both clusters are given in Table 6. Table indicate that main problem of paddy marketing was storage in both clusters that 60 and 64 per cent in cluster I and cluster II respectively, followed by processing, transportation and grading respectively in both cluster.

Table 6: Constraints paddy marketing

S.No.	Particulars	Cluster-I Number	%age	Cluster-II Number	%age
1.	Transportation	25	50	28	56.00
2.	Processing	27	54.00	29	58.00
3.	Grading	22	44.00	21	42.00
4.	Storage	30	60.00	32	64.00
	Total sample	50	100.00	50	100.00

Suggestion

On the basis of the study following suggestion are made.

1. Efforts should be made by government to make pucca road for carrying inputs and disposal of farm produce conveniently.
2. With a view to establish the rice processing mills in rural sector, the license should be issued to rural households.
3. The storage facilities should be developed through cooperative and private godowns, so as to protect the produce against the losses.
4. Purchasing by Govt. agency at minimum support price (M.S.P.) should make dynamic.

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Journal of Rural and Agricultural Research Vol. 9 No. 2, 45-48 (2009)

Interrelationship of various production and reproduction traits and prediction models to estimate first and second lactation milk yield performance of crossbred dairy cow

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Abstract

The ultimate aim of animal farmers is to achieve high profit from the dairy industry. However, breeding technologies based on higher milk production alone may not be sufficient to get maximum possible economic gain from animal husbandry as many managerial practices, production and reproduction factors may significantly affect the milk production. Phenotypic expression of economic traits depends on genes and environment, which is influenced by feeding, housing, health condition and other environmental factors. Livestock Husbandry has 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. It is greatly affected by various production and reproduction traits. Therefore, studies related to find out interrelationship between various traits and to develop prediction models for estimation of first lactation milk yield and second lactation milk yield on the basis of various production and reproduction characters.

Introduction

To study the interrelationship between various traits and to develop prediction models for estimation of first lactation milk yield and second lactation milk yield on the basis of various production and reproduction characters of crossbred cattle maintained at Livestock Research Centre of G.B. Pant Univ. of Ag. & Tech., Pantnagar. The relationship between 26 pairs of variables were studied namely Age at first calving (AFC X_1) First lactation milk yield (FLMY X_2), first lactation length (FLL X_3), age at second calving (ASC X_4), second lactation milk yield (SLMY X_5), second lactation length (SLL X_6), first calving interval (FCI X_7), First gestation period (FGP X_8), first estrus post first calving (FEPFC X_9), first fertile estrus post first calving (FFEPFC X_{10}), No. of services per conception for first pregnancy (NOSCFP X_{11}), No. of services per conception for second pregnancy (NOSCSP X_{12}), No. of estrus per conception for first pregnancy (NOECFP X_{13}), No. of estrus per conception for second pregnancy (NOECFP X_{14}) of exotic crossbred dairy cows were considered and SRSWOR method was applied.

The present study of crossbred cattle to draw conclusions, which may be helpful in decision making regarding selection of dairy cattle for commercial and breeding herds.

Methods and Materials

Present investigation was carried out on data collected from the production and reproduction records of crossbred (Crosses of Red Dane, Holstein Friesian, Jersy with Sahiwal, Haryana and Rathi) cattle maintained at the Livestock Research Centre (L.R.C.) of G.B. Pant Univ. of Ag. & Tech., 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.

(1) The relationship between 26 pairs of variables were studied:

(a) X_1 with X_2, X_3, X_4, X_6, X_7, X_8, X_{10}, X_{11} and X_{12},
(b) X_2 with X_5
(c) X_3, with X_2, X_6, X_7, X_9, X_{10} and X_{13}
(d) X_4 with X_5, X_6, X_7, X_{12} and X_{14}
(e) X_6 with X_2
(f) X_7 with X_8
(g) X_9 with X_{10}
(h) X_{11} with X_{12}
(i) X_{13} with X_{14}

For finding relationship between variables values of Karl Pearson's coefficients was calculated in each case and its significance was tested by t-test, for the pairs of variables, where the correlation coefficient was significant, linear regression equations of Y on X was fitted and the significance of regression coefficient was also tested using t and F tests in each case.

In the pairs, where correlation coefficient was not significant an attempt was made to fit the non-linear

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regression equation of the type $Y = ae^{bx}$ and the significance of fitted model was tested in each case using F-test.

(i) Karl-Pearson's correlation coefficient:

The sample correlation coefficient r is calculated from the formula

$R = S_{xy}/\sqrt{(S_{xx}\ S_{yy})}$, where $S_{xy} = \sum(x_i - \bar{x})\ (y_i - \bar{y})$, $S_{xx} = \sum(x_i - \bar{x})^2$, $S_{yy} = \sum(y_i - \bar{y})^2$

Hypothesis to be tested for significance of correlation coefficient:

Ho: p = 0 (r is not significant) and H_1 : p = 0 (r is not significant)

Test statistic: $t\ cal = r\sqrt{(n-2)}/\sqrt{(1-r^2)}$

Critical region: Reject H_o at α% level of significance if $|t\ cal| \geq t_{(n-2,\ \alpha)}$

(2) Prediction models for the estimation of first and second lactation milk yield was done using Multiple Regression Analysis.

The multiple regression equation of dependent variable Y on independent variables X_i (i – 1, 2, ……., k) is given by the equation $Y = \alpha + \beta_i X_i$ where i = 1, 2, …., K and β_i is partial regression coefficients of Y on X_i.

Testing significance of multiple correlation coefficients.

Hypothesis to be tested: H_0: $\beta_i = 0$ or R = 0 and H_1: not of all βs are zero or R>0

ANOVA Table:

Source of variation	d.f.	S.S.	M.S.	F_{cal}
Regression	K	S_R^2	S_R^2	S_R^2/S_e^2
Error	n-k-1	S_e^2	S_e^2	

Where, k = number of independent variables.

Critical region: reject Ho at α% level of significance if $Fcal \geq F_{(k,\ n-k-1,\ \alpha)}$

Testing significance of individual partial regression coefficient was tested using t-test as described below:

Hypothesis to be tested: H_0: $\beta_i = 0$ and H_1: $\beta i \neq 0$, where I = 1, 2, ….., k

Test statistic: $t\ cal = |bi|/\sqrt{(s_e^2\ C_{ii})}$

Critical region: Reject H0 at α% level of significance if $tcal \geq t_{(k,\ n-k-1,\ \alpha/2)}$

Results and discussion

(1) The relationship between 26 pairs of variables were studied:

Table 1: The relationship between 26 pairs of variables

S.No.	Name of the traits	Values of Correlation Coefficients	Linear and non-linear Regression equation	F_{cal}
1.	AFC (X) and FLMY (Y)	-0.123	$Y = 2402.19-4.468X$	0.20
2.	AFC (X) and FLL (Y)	-0.112	$Y = 308.69-0.33X$	0.31
3.	AFC (X) and ASC (Y)	0.743**	$Y = 21.23+0.84X$**	146.48**
4.	AFC (X) and SLL (Y)	0.057	$Y = 415.45+1.174x$	1.21
5.	AFC (X) and FCI (Y)	0.068	$Y = 486.53E^{-0.399X}$	3.61
6.	AFC (X) and FGP (Y)	0.100	$Y = 271.5e^{0.001X}$	1.66
7.	AFC (X) and FFEPFC (Y)	-0.012	$Y = 71.88e^{-0.685X}$	0.25
8.	AFC (X) and NOSCFP (Y)	-0.199**	$Y = 2.6391-0.0221X$**	6.42**
9.	AFC (X) and NOECSP (Y)	-0.126	$Y = 3.24e^{-0.103X}$	0.22
10.	FLMY (X) and SLMY (Y)	0.105	$Y = 1826.21e^{0.0001X*}$	4.00*
11.	FLL (X) and SLL (Y)	0.265**	$Y = 255.033 +0.307X$**	9.17**
12.	FLL (X) and FLMY (Y)	0.598**	$Y = 2283.956+5.33X$**	31.25**
13.	FLL (X) and FEPFC (Y)	-0.066	$Y = 50.50e^{-0.0004X}$	1.19
14.	FLL (X) and FCI (Y)	-0.02	$Y = 516e^{-0.0007X}$	3.94*
15.	FLL (X) and FFEPFC (Y)	0.076	$Y = 65.267e^{0.0002X}$	0.88
16.	FLL (X) and NOSCFP (Y)	-0.112	$Y = 2.778e^{-0.0008X}$	1.45
17.	ASC (X) and SLMY (Y)	-0.056	$Y = 2190.75e^{-0.002X}$	0.29
18.	ASC (X) and SLL (Y)	0.041	$Y = 2033.47e^{-002X}$	0.34
19.	ASC (X) and FCI (Y)	0.080	$Y = 448.54e^{-0.001X}$	0.59
20.	ASC (X) and NOSCSP (Y)	0.008	$Y= 2.192e^{-0.001X}$	0.03
21.	ASC (X) and NOECSP (Y)	0.019	$Y = 2.99e^{-0.001X}$	0.20
22.	SLL (X) and SLMY (Y)	0.168**	$Y = 630.58+5.86X$**	3.85**
23.	FCI (X) and FGP (Y)	-0.190	$Y = 280.05e^{-0.0003}$	1.080
24.	FEPFC (X) and FFEPFC (Y)	-0.070	$Y = 2.007e^{0.112X}$	0.11
25.	NOSCFP (X) and NOSCSP (Y)	-0.110	$Y = 2.088e^{0.112X}$	0.11
26.	NOECFP (X) and NOECSP (Y)	-0.014	$Y = 3.1465e^{-0.001X}$	0.11

** ($p<0.01$ and * ($p<0.05$)

The values of correlation coefficient between different pairs of traits and the linear and non-linear regression equation are presented in the Table 1.

On the basis of significance of correlation coefficient at 1% and 5% level of significance, the regression equations are listed in the Table 1. The following linear and non-linear equations are interpreted.

Significant linear relationship

(i) The AFC(X) and ASC (Y) having positive and significant ($p<0.01$) relationship, form the equations. S.No. 3, Y = 21.23+0.84X, it was observed that for the increase of one month for AFC the average age at ASC is increased by approximately 0.84 month (appox. 25 days).

(ii) AFC (X) and NOSCFP (Y) having negative and significant ($p<0.01$) relationship, from the equation S.No. 8, Y = 2.6391 – 0.0221X, it was observed that for the increase of one day in AFC the average No. of services per conception for first pregnancy is decreased by 0,0221 (approx. 0) which indicates no bearing on services per conception.

(iii) The FLL (X) and SLL (Y) having positive and significant ($p<0.01$) relationship, from the equation $S._{(k, n-k-1, á)}$ No. 11, Y = 255.033 + 0.307X, it was observed that for the increase of one day in first lactation length the average second lactation length is increased by 0.307 (approx. 8 days).

(iv) FLL (X) and FLMY (Y) having positive and significant ($p<0.01$) relationship, from the equation S.No. 12, Y = 2283.956 + 5.33 X, it was observed that for the increase of one day in first lactation length the average first lactation milk yield is increased by 5.332 kg.

(v) SLL (X) and SLMY (Y) having positive and significant ($p<0.01$) relationship, from the equation S.No. 22, Y = 630.58 + 5.86 X, it was observed that for the increase of one day in second lactation length the average second lactation milk yield is increased by 5.35 kg.

Significant non-linear relationship

The exponential function of the type $Y = ae^{bx}$ was fitted for the variables having significant non-linear relationship.

(vi) The traits SLMY (Y) has exponential equation $Y = 1826.21e^{0.0001x}$ on FLMY(X), regression coefficient was tested at 5% level of significance. The second lactation milk yield exponentially depends on first lactation milk yield.

(vii) The traits FCI(Y) has exponential equation $Y = 516.46e^{-0.0007x}$ on FLL(X), regression coefficient was tested at 5% level of significance. The first calving interval exponentially depend on first lactation length.

(2) Prediction models to estimate milk yield performance:

Table 2: Prediction equation for firstlactation milk yield (FLMY)

S.No.	Prediction equation	F_{cal}	(r^2) R^2
a.	$Y = 2686.68-10.31X_1$	2.35	0.02
b.	$Y = -96.69 +7.46X_2$**	84.61**	0.36
c.	$Y = 120.63-4.76X_1+7.38X_2$**	42.62**	0.35

(i) Prediction equation for firstlactation milk yield (FLMY):

For prediction equations for FLMY(Y) taking AFC(X_1) and FLL(X_2) as independent traits are given in Table 2.

The prediction equations having significant effect of independent variables on FLMY. The traits FLL(X_2) can be used as predictor and equation b and c can be used as a prediction model.

(ii) Prediction equation for second lactation milk yield (SLMY):

For prediction equations for SLMY(Y) taking AFC(X_1), ASC(X_2), SLL(X_3) and FLMY(X_4) as independent variables are given in Table 3.

Table 3: Prediction equation for second lactation milk yield (SLMY)

S.No.	Prediction equation	F_{cal}
a.	$Y = 3703.05-25.25X_1$	1.34
b.	$Y = 3369.59-12.46X_2$	0.41
c.	$Y = 630.58+5.87X_3$**	3.85**
d.	$Y = 1269.24+0.62X_4$*	4.69*
e.	$Y = 3505.62-33098X_1 +9.37X_2$	0.71
f.	$Y = 1669.25-27.75X_1+6.08X_3$*	2.75*
g.	$Y = 2279.15-25.03X_1+0.62X_4$*	3.03*
h.	$Y = 1366.27-14018X_2+5.96X_3$	2.14
i.	$Y = 1903.69-14107X_2+0.62X_4$	2.51
j.	$Y = -1468.635+5.27X_3+0.57X_4$*	3.94*
k.	$Y = 1468.635-35.70X_1+9.49X_2+6.09X_3$	1.86
l.	$Y = 2030.30-34.58X_1+11.40X_2+0.62X_4$	2.06
m.	$Y = 566.63-27.31X_1+5.49X_3+0.57X_4$*	3.19*
n.	$Y = 225.64-12.91X_2+5.36X_3+0.56X_4$*	2.77*
o.	$Y = 319.69-36.79X_1+11.33X_2$ $+5.49X_3+0.57X_4$*	2.41*

It is clear from the Table 3 that the prediction equations having significant multiple correlation coefficient for SLMY(Y) are equation number c, d, f, g,

j, m, n and o. The traits AFC(X_1), ASC(X_2), SLL(X_3) and FLMY(X_4) can be taken as predictors for second lactation milk yield. The value of coefficients of multiple determinations for the prediction equations ranges from 0.01 to 0.06, which indicates that in addition to the traits X_1, X_2, X_3 and X_4 there may be other traits also responsible for the variations in SLMY.

Summary and Conclusion

The interrelationship between different variables were studied and the extent of inter relationship was found by calculating the value Karl Pearson's coefficients of correlation between various pairs of production and reproduction traits. The values of correlation coefficients were found to be significant and positive for the (AFC, ASC), (FLL, SLL), (FLL, FLMY) and SLL, SLMY) pairs of variables. The correlation coefficients were found to be significant and negative for Age at first calving and number of services per conception for first pregnancy pair of variables. On the basis of linear regression analysis inferences were drawn. The animal scientists have paid very little attention for non-linear relationship between the traits. Therefore, an attempt was made to find non-linear relationship between the variables and was fitted for the traits having non-significant correlation coefficients. The significance of fitted model was tested. It was found that pairs of the traits FLMY (X), SLMY (Y) and FLL (X), FCI follow non-linear relationship of the type $Y = e^{bx}$ between them. The prediction of first and second lactation milk yield was done on the basis of various production and reproduction traits using multiple regression equations. The significance of partial regression and multiple correlation coefficients were also tested. To estimate FLMY (Y) trait FLL (X_2) can be used as predictor and equation $Y = -96.69 + 7.46X_2$ can be used as a prediction model. To estimate SLMY (Y) the traits AFC(X_1), ASC(X_2), SLL(X_3) and FLMY(X_4) can be taken as predictors and equations $Y = 630.58 + 5.87X_3$, $Y = 1269.24 + 0.62X_4$, $Y = 1669.25 – 27.75X1 + 6.08 X_3$, $Y = 22.79.15 – 25.03 X_1 + 0.62X_4$, $Y = -462.69 + 5.27 X_3 + 0.57 X_4$, $Y = 566.63 – 27.31X_1 + 5.49X_3 + 0.57X_4$, $Y = 566.63 – 27.31X_1 + 5.49X_3 + 0.57 X_4$, $Y = 225.64 – 12.91X2 + 5.36X_3 + 0.56 X_4$ and $Y – 319.69 – 36.79X_1 + 11.33X_2 + 5.49X_3 + 0.57X_4$ can be used as prediction model.

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Journal of Rural and Agricultural Research Vol. 9 No. 2, 49-50 (2009)

Effect of INM Treatment on Fodder yield and Nutrient composition of Oat crop (Avene sativa L.)

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Abstract

The integrated use of inorganic fertilizer along with organic source positively affected the growth and yield of oat crop. The higher yield of oat fodder could be achieved by adopting integrated nutrient management treatment as T_7 (75% NPK + FYM @ 10 + ha^{-1}+$ZnSO_4$ @ 25 Kg ha^{-1}) The soil application of inorganic fertilizer with organic source improved the nutrient content of Nitrogen, phosphorus, potassium, calcium, magnesium, sodium and zinc of Oat crop.

Introduction:

The Indian Agriculture being primarily cereal production oriented the main problem be setting the livestock industry, in the extremely levee nutritional status of our cattle. Feeding of live stock population (343.7 million) has created an acute imbalance between fodder resources and the number of animals and availability of feeds and fodder. There exists a big gap between the requirement and available supplies of feeds and fodders.

To meet this pressing demand, there are two sources open to us, one to increase the area under the plough and other to increase production per unit by using adequate amount of plant nutrients. So far as the extension of area is concerned there is marginal scope for increasing area under cultivation. Therefore, a greater attention will have to paid for increasing the production per unit area unit time for which there is considerable scope in our country. The pressure of population per unit area is major driving force behind the quest for high yields.

Management of nutrients is important aspect of there problems. The application of FYM in the soils helps in increasing the fertility of the soils as well as physical condition including its water holding capacity. Organic manures, which were perhaps the major sources of plant nutrients in traditional agriculture, received less emphasis with advent of high analysis chemical fertilizers. Recent researches indicate that a judicious combination of organic manures and fertilizers can better increase the production of fodder crops.

Materials and Methods

The field experiments were conducted during the Rabi season of 2006-07 and 2007-08 at Agricultural Research farm of R.B.S. College, Bichpuri, Agra. The field experiments were carried out with ten treatments of organic sources and inorganic fertilize as T_1(N_0P_0,K_0), Control, T_2, $N_{120}P_{30}K_{30}$ (100% NPK), T_3 N_{90} $P_{22.5}$ $K_{22.5}$ (75% NPK), T_4 $N_{60}P_{15}K_{15}$(50%NPK), T_5 (75% NPK+$ZnSO_4$ @ 25 Kg ha^{-1}), T_6 (75% NPK + FYM @ 10 + ha^{-1}), T_7 75% NPK + FYM @ 10 + ha^{-1} + $ZnSO_4$ @ 25 Kg ha^{-1}), T_8 (50% NPK + $ZnSO_4$ @ 25 Kg ha^{-1}), T_9 (50% NPK + FYM @ 10 + ha^{-1}), T_{10} (50% NPK + FYM @ 10 + ha^{-1}). The treatments were replicated three times following randomized block design. The soil having EC 3.2 dSm^{-1}, p^H 8.6, organic carbon 0.44% available NPK and Zn 195.20, 18.30, 234.00 Kg ha^{-1} and 3.2 ppm. The seed of oat was sown in each plot in 29.10. 2006 and 30.10.2007. Equal amount of water was supplied to every plot at the time of irrigation. At the time of harvest at each cutting, the green foliage yield was recorded. After drying it in oven the dry matter yield was also recorded. Plant sample were analyzed for their N, P, K, Ca, Mg, Na and Zn content by adopting standard procedure.

Result and Discussion :

It can be concluded from the Table 1 that the plant height and green foliage yield of oat crop also increased significantly with T_5, T_6, T_8, T_9 and T_{10} treatments in comparison to T_1, T_2, T_3 and T_4 treatment during both the years of experimentation. It is also notated that the treatments T_7, T_8 and T_9 proved significantly superior over rest of the treatments. The plant height and green foliage yield of oat crop at each cutting. On the basis of pooled data of INM treatments T_2, T_3, T_4, T_5, T_6, T_7, T_8, T_9 and T_{10} increased 25.5, 20.0, 11.1, 8.8, 31.12, 44.4, 14.4, 7.7 and 37.7 percent in 2006-07 and 18.8, 15.6, 11.7, 4.6, 27, 38.7 and 32.7 percent plant height in 2007-08. The percent of green foliage yield of oat due to different INM treatments increased 13.0, 4.7, 1.2, 13.0, 19.0, 38.0, 2.3, 13.0 and 30.9 percent in 2006-07 and 12.9, 5.8, 2.5,13.17, 17.64, 14.11, 1.17, 12.9 and 31.76 percent in 2007-08 over control respectively. These findings are similar to Ahmad et al (1986), Singh et al. (1996).

Table 1: Effect of INM treatments on nutrient composition of oat crop

Treatments	Ca content (%)		Mg content (%)		Na content (%)		Zn content (ppm)	
	2006-07	2007-08	2006-07	2007-08	2006-07	2007-08	2006-07	2007-08
T1	1.26	1.28	0.670	0.672	0.23	0.22	1.30	1.32
T2	1.29	1.28	0.668	0.690	0.26	0.26	1.43	1.45
T3	1.28	1.27	0.681	0.685	0.25	0.25	1.41	1.42
T4	1.26	1.26	0.676	0.675	0.25	0.26	1.40	1.44
T5	1.26	1.27	0.671	0.72	0.24	0.25	1.38	1.40
T6	1.29	1.28	0.690	0.691	0.22	0.29	1.40	1.42
T7	1.31	1.30	0.705	0.703	0.21	0.22	1.58	1.55
T8	1.27	1.28	0.678	0.677	0.26	0.25	1.39	1.28
T9	1.26	1.27	0.670	0.672	0.21	0.22	1.37	1.39
T10	1.30	1.30	0.695	0.693	0.20	0.21	1.45	1.48
CD at 5%	0.02	0.02	0.024	0.020	0.120	0.010	0.100	0.100

Table 2: Effect of INM treatments on plant height, green foliage and N, P, K content of oat crop

Treatments	Plant height (cm)		Green foliage(q/ha)		N content (%)		P content (%)		K content (%)	
	2006-07	2007-08	2006-07	2007-08	2006-07	2007-08	2006-07	2007-08	2006-07	2007-08
T1	45.0	46.8	420	425	1.50	1.52	0.20	0.19	1.45	1.46
T2	56.5	55.7	475	480	1.71	1.72	0.23	0.24	1.48	1.49
T3	54.5	54.2	440	450	1.70	1.70	0.22	0.21	1.47	1.46
T4	50.0	51.3	425	436	1.66	1.65	0.20	0.21	1.45	1.45
T5	49.0	49.0	475	481	1.65	1.66	0.29	0.27	1.45	1.46
T6	59.5	59.5	500	510	1.73	1.73	0.25	0.26	1.49	1.48
T7	65.0	65.0	580	585	1.80	1.78	0.28	0.29	1.55	1.56
T8	51.5	52.3	430	430	1.69	1.70	0.21	0.22	1.46	1.47
T9	48.5	49.5	475	480	1.65	1.66	0.20	0.20	1.45	1.46
T10	62.0	62.2	530	560	1.75	1.75	0.27	0.28	1.51	1.50
CD at 5%	5.0	5.5	9	8	0.03	0.04	0.02	0.03	0.02	0.03

It is apparent from Table 2 that N,P,K content enhanced significantly with each INM treatment in comparison to control during both the years of investigation. The treatment T_6, T_7 and T_{10} gave significantly higher N,P,K content in comparison to T_1, T_2, T_3, T_4 and T_5 treatments. The concentration N,P,K increased significantly with treatments T_6, T_7 and T_{10} over rest of the treatments during both the years of experimentation. Same findings with Singh et al. (1998), Mishra S.K.(2003) and Nair et al. (1982).

An analysis of Table - reflects that the INM treatment T_7 and T_{10} resulted significantly better over T_1, T_2, T_3, T_4, T_5 and T_6 treatments with respect to Ca, Mg, Na and Zn content of Oat crop during both the years of research experimentation. It is clear that treatment T7 was found superior in case of Ca, Mg, Na and Zn content on the basis of pooled data of 2006-07 the superiority of treatments may be arranged as $T_7>T_{10}>T_6>T_2>T_3>T_8>T_4>T_5>T_9>T_1$. Our findings are in agreement with those of Nair et al. (1982), Mishra S.K. (2003) and Singh et al. (1998).

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Journal of Rural and Agricultural Research Vol. 9 No. 2, 51-54 (2009)

Farmer Centered Quantification and Prioritization of Researchable Agricultural Problems using Participatory Rural Appraisal – A Case Study from Kerala

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Abstract

Participatory rural appraisal is one of the most commonly used tools to gain information about a wide range of activities including production constraints in agriculture at the village level. In a bottom up approach for planning of agricultural development, villages are the preferred unit of choice. PRA can be used to develop and refine methods of intervention to be used at grass root level. A study was conducted in Chakkittappara Panchayath, of Calicut district (Kerala) during March, 2007 to identify and prioritize the major agricultural problems .Both primary and secondary sources of data were used .The farmers ranking were tabulated using matrix ranking technique. The RBQ, VMV and VBI values of the selected problems were calculated. The results indicated yellowing of areca nut to be the major researchable problem that exists in the village. The RBQ values ranged from a very high value of 92.50 for yellowing of areca nut to 48.75 for the loss of soil fertility. The results indicated that the most suitable plan of action for agricultural research should be to implement a programme for control of the yellowing of arecanut in the Panchayath.

Introduction

Agriculture is characterized by a large number of constraints in production. These constraints can be technical (biotic and abiotic factors) economic or social. The identification and prioritization of the major constraints is sine qua non for taking necessary amelioration measures. In a bottom up approach for planning of agricultural development, villages are the preferred unit of choice. Participatory rural appraisal is one of the most commonly used tools to gain information about a wide range of activities including production constraints in agriculture. The involvement of key stake holders in identification and quantification in itself acts as a validation point apart from increasing the reliability of the findings. Raising the level of agricultural production and productivity is one of the key targets of any agricultural development programme. The stagnant growth rate witnessed by the agricultural sector during the last decade has been a matter of grave concern for policy makers.. In view of these factors, a comprehensive programme needs to be developed to address the production constraints in agriculture. Since most of the constraints in agriculture are location specific, lessons learned from PRA can be used to develop and refine methods of intervention to be used at grass root level.

A study was conducted in Chakkittappara Panchayath, a representative Panchayath of Calicut district with the objective of identifying and prioritizing the major agricultural problems face by the farmers through a participatory farmer centered approach .The study was undertaken as a part of the fields experience training provided by ICAR for ARS scientist probationers. The study was facilitated by Krishi Vigyan Kendra (KVK), Peruvannamuzhi, Calicut.

Methodology

The study was undertaken in Chakkittappara Panchayat of Calicut district of Kerala selected on the basis of purposive sampling. The Panchayat has a predominantly agrarian economy. Almost all the major crops of the state are found cultivated in the Panchayat. Both primary and secondary sources of data were used in the study. Primary data were collected from selected key informants and a field survey was conducted at 20 randomly selected farm households. Sources like village office, panchayat office, Krishibhavan, veterinary clinic and NGOs were used to collect secondary data. The Key resource persons for the study were selected in consultation with local leaders, Krishibhavan officials and KVK personnel. The selected Key Resource Persons were those with an adequate knowledge and practical experience of agriculture. Five key resource persons were selected for the conduct of the exercise.

The key resource persons listed out all the major problems in agriculture. The resulting list of problems were ranked based on its importance to the village. Using cumulative scores obtained, the top ten problems were selected. Out of these ten problems, three were of non researchable nature and were set aside from subsequent analysis. The selected list of top researchable agricultural

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problems was presented to and ranked by twenty randomly selected farmers and tabulated using matrix ranking technique. The average yield loss percentage for each problem was obtained from direct field visit of the twenty randomly selected farm households and technical bulletins.

The data collected from Key resource persons were presented to a twenty farmers selected at random individually. The problems were quantified in the order of their magnitude by ranking the problems by each of the farmers. The RBQ, VMV and VBI were calculated based on the farmers ranking as follows.

RBQ (Rank Based Quotient)

RBQ values indicate the relative importance of thee problem that the villagers perceive about the severity of the problem.

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

Where

i = concerned ranks (1-7)

N = Total no: of farmers

n = No of Problems selected for study

f_i = Frequency(No of farmers classifying that particular problem under ith rank)

VMV (Village Magnitude Value) and VBI (Value Based Index)

The magnitude of the problem and the loss of value due to the problems in the village were arrived at by using the following formula

VMV = RBQ x Area Affected

Value Based Index = VMV x Average loss experienced

Results and Discussion

By using the client oriented preferential ranking and prioritization techniques the major researchable problems of Chakkittappara village were identified. The results are presented in Table 1.

The results indicated yellowing of areca nut to be the major researchable problem that exists in the village as identified by the farmers. Since the average loss due to the disease is high (60%), the value of the loss is also high. Quick wilt of pepper followed by mite infestation of coconut was ranked second and third respectively. The economic loss due to yellowing of areca nut is very high to the tune of 22,20,000/- where as other problems , though severe are of lesser magnitude. This explains the expression of real felt need of the farmers manifested through prioritization, to address the yellowing disease of areca nut. The absence of any viable control measures also increases the urgency for a timely solution.

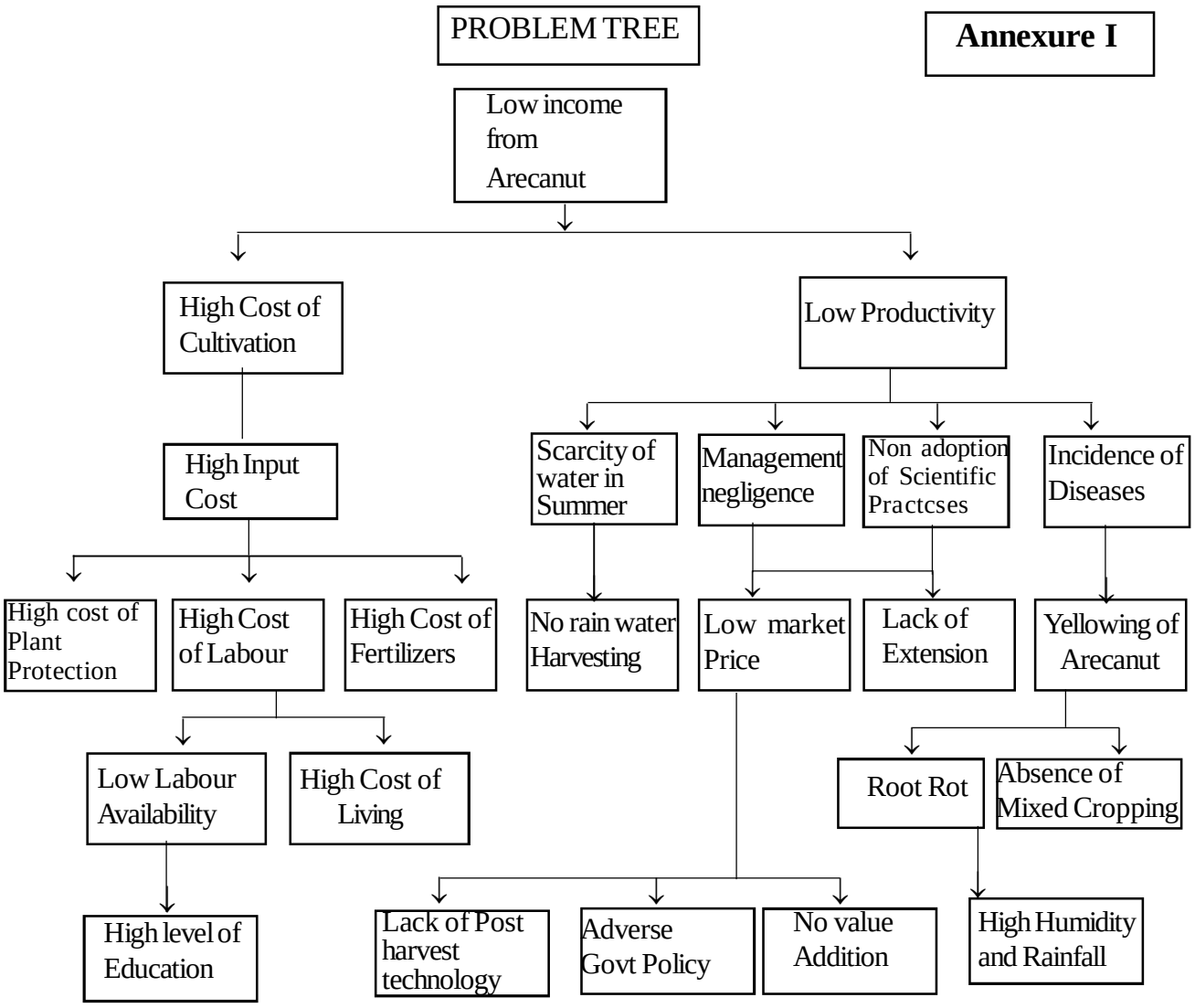
Surprisingly the loss of soil fertility was rated as a major problem (rank IV). The fear of fertility loss of soil points to an increased awareness among the farmers about the importance of sustainable production practices. Many farmer education programmes conducted by governmental and Non Governmental agencies have contributed in making the farmers more aware about the crucial role of soil in sustaining agricultural production. This also can explain the higher rank obtained by soil fertility among agricultural problems.

A perusal of the values o RBQ values shows that the values ranged from a very high value of 92.50 for yellowing of areca nut to 48.75 for the loss of soil fertility. A high RBQ indicates the intensity of the problem as perceived by the farmers. The VBI is more inclusive in the sense that it captures the economic loss caused by the particular problem and the extend of spread of the problem within the area under study. Thus Value Based Index reflects the net economic loss to the community as a whole. Priority in agricultural research should allocated based on the value based Index. The higher the value of Value based index, higher should be the priority accorded to that problem.

The results of the study clearly indicated that the most suitable plan of action for agricultural research should be to implement a programme for control of the yellowing of arecanut in the Panchayath . The analysis of the problem of low income from Arecanut was further studied through the PROBLEM TREE approach

Table1: Ranking of Researchable Agricultural Problems In Chakkittappara Village

S N	Problems	RBQ	Area affected (ha)	VMV	Average Loss(%)	VBI	Rank
1	Lower Income From arecanut	92.50	400	37000	60	22,20,000	I
2	Quick Wilt of pepper	78.75	300	23625	50	11,81,250	II
3	Mite Infestation of Coconut	73.75	500	36875	30	11,06,250	III
4	Loss of Soil Fertility	48.75	1000	48750	20	9,75,000	IV
5	Tapping Panel Disorder of Rubber	70.00	500	35000	10	3,50,000	V
6	Bud Rot of Coconut	87.50	1000	87500	10	2,62,500	VI
7	Abnormal leaf Fall of Rubber	52.50	400	21000	10	2,10,000	VII



(Annexure I). It shows that the high cost of inputs, the lack of management , high incidence of disease and scarcity of water during summer were the major reasons for the declining yield and income from arecanut cultivation. The SOLUTION TREE (Annexure II). For the same problem suggest that adoption of rain water harvesting , value addition , adoption of management practices against root rot and yellowing , providing adequate drainage during rainy season and adoption of organic farming can provide a solution to the problem .

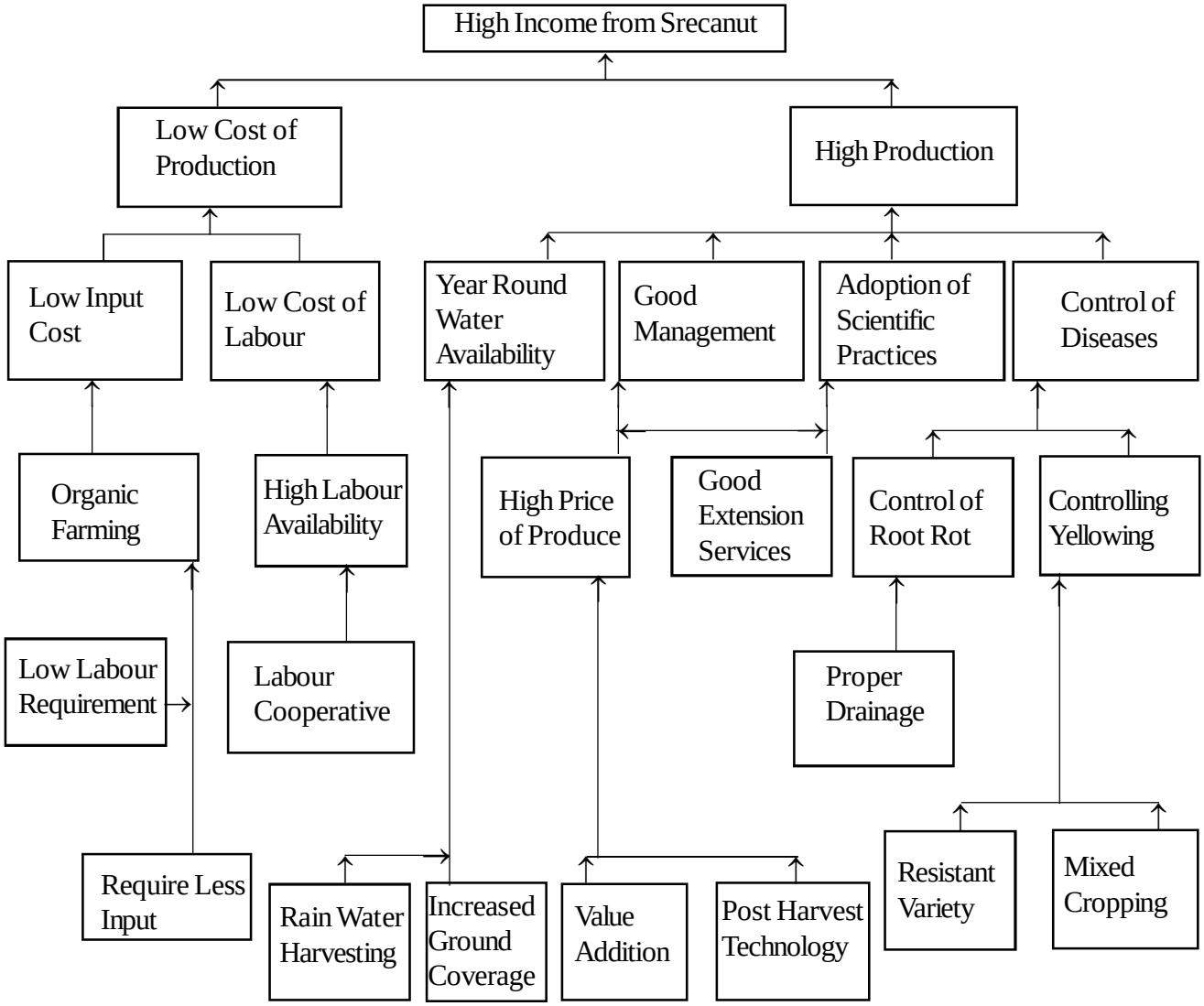
The findings also were validated with the Krishibhavan officials who were of the opinion that the yellowing disease of arecanut is now a major problem in the entire district of Calicut.

Conclusion

Proper and timely identification of constraints in agricultural production is very important. For this, a farmer centered approach is more suitable as the process involves the participation of the key stake holders. The technique of preferential ranking followed by calculation of Value based index for particular agricultural problems has definite advantages. It enables research prioritization and gives direction to agricultural development programmes. It can also serve as a tool for adopting course correction in on going developmental programmes. The technique can be easily used and can be adapted to a wide range of situations involving direct participation of stake holders. The exercise done at Chakkittappara village Panchayath lead to the prioritization of the agricultural problem in the Panchayath. The concurrence of the Governmental agencies to the findings of the study point to the utility

SOLUTION TREE

Annexure II



of this participatory approach .The exercise clearly brings out the effectiveness of value based indexing in quantifying and prioritizing researchable problems .

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Journal of Rural and Agricultural Research Vol. 9 No. 2, 55-56 (2009)

Screening of invasive flora used medicinally by rural people in Moradabad district (U.P.)

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Abstract

In present study an attempt has been made to explore and record medicinal uses of invasive flora which are normally used by rural people of Moradabad district and to treat their ailments by using these fresh plant materials only. In the present study 24 invasive species belonging to 16 families have been recorded from the study area. Out of 24 invasive species, 13 species viz. Ageratum conyzoides, Argemone maxicana, Calotropis procera, Cassia tora, Cleome viscose, Eclipta Prostrata, Ipomoea carnea, Lantana camera, Mimosa pudica, Oxalis corniculata, Sida acuta, Tridex procumbens and Xanthium strumarium are commonly used as herbal medicine. Asteraceae family is the most dominant with four plant species.

Introduction

Invasion is considered as the second most important threat to biodiversity after habitat destruction. Alien species which locally become dominant and invade natural communities are referred to as invasive species. Further, IUCN also defines alien invasive species, as a species that becomes established in natural or semi-natural habitat, is an agent of change and threatens biological diversity.

Invasive species found in all kind of system like cropland, wasteland, plantation, gardens and road sides. They are ready colonizers in disturbed areas and cause considerable ecological damage to natural areas. They compete with cultivated crops for moisture, light and nutrition. In addition to negative impact on indigenous flora and economy, some invasive species are very much useful to rural people (Mooney and Hobbs, 2000). They can be utilized as green manures, fodder, erosion control, fencing and controlling diseases like dermatitis. Present study is mainly concerned with medicinal uses of these invasive species of Moradabad district.

Study area

Moradabad is located at an average height of about 76.19 meter above sea level in the Western Gangatic plain of the Indian subcontinent at latitude 28.51 N and longitude 78.48E. the maximum and minimum atmospheric temperature are 42.20C and 3)C respectively. The average rainfall varies between 800 to 1100mm, the relative humidity is upto 90% in monsoon season and in drier part of the year it decreases to less than 20%.

Methodology

The field trips were arranged in such a way that the entire area was covered in all the seasons. During every visit as many specimens as possible were collected so that triplicate of plant material could be prepared for laboratory observations.

The present study involves field work and interviews, medicinal uses of invasive flora from native informants', vaidhya and elderly village people, who have knowledge about traditional medicine. Oral interviews were held in villages and new information recorded on the spot. The plants were collected in flowering period throughout the year in the area. The websites were also examined extensively for background information. The invasive species were indentified with the help of available floras (Hooker, 1972-1997). The indentified plants were passed, dried and preserved according to standard herbarium techniques for the future use.

Results and Discussion

The present work is need of today to know medicinal status of invasive flora of Moradabad. The medicinal plants are well study and reported by many renowned scientists like Basu and Kirtikar (1918), in this Indian Medicine plants; Chopra (1956), in their glossary of medicinal plants; Jain (2005) in his medicinal plants, Agrawal (1988) in economic plants of India and Dhiman (2005) in his wild medicinal plants. From this study, it is noticed that thirteen invasive species play an important role for treatment of different diseases by rural people in this district.

Invasive plants enumerated here are arranged alphabetically in their botanical names followed by families, local name and medicinal uses as follows:

1. Ageratum conyzoides L.
   Family: Asteraceae
   Local Name: Goat weed
   Uses: Leaf juice is applied on wounds and cuts to stop bleeding

2. Argimone maxicana L.
   Family: Papaveraceae
   Local Name: Pili kateli
   Uses: Roots paste is applied on various skin diseases
3. Calotropis procera (Ait.) R. Br.
   Family: Asclepiadaceae
   Local Name: Akua, Madar
   Uses: Milky latex from the plant is applied to cure skin infection specially for ring worm diseases and old wounds.
4. Cassia tora L.
   Family: Caesalpiniaceae
   Local Name: Chirta
   Uses: The seed paste is used in the treatment of ring worm and itching. The crushed seeds about 5 gm are taken with water in cough.
5. Cleome viscosa L.
   Family: Capparidaceae (Cleomaceae)
   Local Name: Pila hurhur
   Uses: The seed are ground into a paste and are applied as a pouttice in chronic painful joint.
6. Eclipta prostrate (L.) Mant.
   Family: Asteraceae
   Local Name: Bhangra
   Uses: Juice of leave is applied in to ear ache. Leaves paste used to colour the hair black
7. Ipomoea comea Jacq.
   Family: Convolvulaceae
   Local Name: Hakim
   Uses: The leaves of this plant are warmed and tied over the affected area in sprains and swellings
8. Lantana pudica L.
   Family: Verbenaceae
   Local Name: Kali makoi
   Uses: Leaves paste used for cut injuries
9. Mimosa pudica L.
   Family: Mimosaceae
   Local Name: Chuimui
   Uses: Leaves juice is used to cure diarrhea
10. Oxalis corniculata L.
    Family: Oxalidaceae
    Local Name: Kathmithi
    Uses: Leaves juice with sugar is used in dysentery. Its leaves are frequently eaton by children.
11. Sida acuta Burm. f.
    Family: Malvaceae
    Local Name: Bariara
    Uses: Expressed juice of this roots is used to remove intesitinal worms.
12. Tridex procumbens L.
    Family: Asteraceae
    Local Name: Ghundi
    Uses: Paste of leavesis applied on cuts, wounds and burns
13. Xanthium strumarium L.
    Family: Asteraceae
    Local Name: Laptaua
    Uses: Decoction of plant is given in dysuria and fever

Present studies is specifically focused on invasive plants and their use as herbal medicine by rural inhabitants and are not reported earlier for its specific uses, like poultice of leaf of Ageratum conyzorids L. is applied on skin disease and leprosy, juice of leaves of Eclipta prostrate (L.) Mant. is applied in ear ache. Paste of leves is applied on cuts, wounds and burns and seed paste of Cleome viscosa L. is applied as a poultice in chronic painful joints.

Acknowledgement

The first author is thankful to the UGC for financial support during her research work and rural people of this area for their kind co-operation.

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Journal of Rural and Agricultural Research Vol. 9 No. 2, 57-60 (2009)

Effect of sowing dates and nitrogen levels on growth, yield of vegetable pea in Maize-vegetable pea-wheat cropping system

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Abstract

A field experiment was conducted during two consecutive years of 2004-05 and 2005-06 at C.S. Azad University of Agriculture and Technology, Kanpur to see the effect of date of sowing and N levels in the vegetable pea in vegetable pea-wheat-maize cropping system. The growth characters of vegetable pea i.e. plat height, number of nodules plat-1, dry weight nodules plat-1, dry weight plat-1, and days of first picking of pods significantly higher in 20th October date of sowing compared with 30th September and 10th October date of sowing in pooled data. The higher pod yield 54.3 q ha^{-1}, which was found 4.3 and 8% higher than the pod yield obtained in 10th October and 30th September respectively. The yield of wheat crop maximum in first date of sowing 36.6 q ha^{-1}, which was found 3.0 and 6% higher second and third date of sowing. The N levels growth characters of vegetable pea and wheat crop so significant in higher dose of N_{80} compared with N_{60}, N_{40}, N_{20} and N_0 Kg ha^{-1} respectively. The N levels of vegetable pea the significantly higher yield recorded at 54.8 q ha^{-1}, which was found to be 0.8, 2.7, 6.5 and 1.5% higher than N_{60}, N_{40}, N_{20} and N_0 Kg ha^{-1}. The residually N_{80} being at par with N_{60} and N_{40} levels producing significantly higher yield of wheat than N_{20} and N_0 levels. The third crop of maize does not significant results in all the treatments.

Introduction

Under such situations, the farmers are looking for alternate crop sequence. A view of them are initiated to grow early vegetable pea for green pods in place of potato in the same sequence. Fertilizer and water requirement of pea in much lesser than potato and the crop vacate the field even earlier than potato. At picking of green pods, vegetative plants parts provide good green fodder to the cattle's and/ or may be used as green manure by barring it before wheat sowing. Market rates of green pea pods early in the season also prevail encouraging. Cost of pea cultivation is much lesser than potato, thus it fetches good returns in this regard and no scientific information are available for suitable time of sowing early vegetable pea crop in the area, optimum rates of fertilizer nitrogen and the effect of crop on succeeding wheat. It indicates about the need of research on these topics to make the maize- vegetable pea- wheat cropping systems were taken.

Methods and Materials

A field experiment was carried out during 2004-05 and 2005-06 at students instructional farm of the C.S. Azad University of Agriculture and Technology, Kanpur on sandy loam soils analysis slightly saline (pH 7.8), low in organic carbon (0.45%) and available N (225 Kg ha^{-1}) and medium in available P (15.1 Kg ha-1) and K (176 kg ha^{-1}). The fixed plot experiment was laid out in three times replicated split plot design except for the first crop of vegetable. The first crop "Arkel" for vegetable Pea was grown during rabi season of 2004-05 forth week of September to last week of December, received three treatments in date of souring viz. September 30, October 10 and October 20 and five levels of nitrogen i.e. control (No), 20,40,60 and 80 Kg ha^{-1} to succeeding (K-7903 Halna) wheat which was sown in the third week of December to first week of January and harvested in to last week of April. After the harvest of wheat (*Azad uttam*) Maize was grown on residual fertility during Kharif season. This crop rotation of vegetable Pea – wheat – Maize was grown continuously for two years on the same site. The vegetable pea received in all treatments like date of sowing and nitrogen level only but wheat and maize crop as residual effect of the vegetable pea fertilization in both the years. The phosphorus and potassium were applied through single super phosphate and muriate of potash in the sowing time respectively. The nitrogen applied through urea was at per treatments. Other management practices were adopted as per recommendations and need of the crop. Seed/grain yield of component crops and important yield attributes were worked out based on the net plot yield and randomly selected four plants sample. Soil samples were taken from 0-22.5 cm soil layer at the beginning and end of experiment of find out initial status of experimental site soil and changes in available N, P and

K in the soil after the experimental period. Soils samples drown at the beginning of the experiments were analyzed for organic carbon, pH and available NPK by following standard procedure. The data was analyzed for analysis of variance by following standard statistical procedure. The rainfall receiving the crop rotation time, not rain received at vegetable pea, 35.5 and 39.5 mm wheat and not rain received at maize period in 2004-05 and 2005-06 respectively.

Results and Discussion

Growth Characters of Vegetable Pea in data of sowing:

The growth characters of vegetable pea i.e. plant height, no. of nodules, dry weight of nodules (mg), fresh weight/plant (gm), dry weight/plant (gm), days of 50% flowering and days of first picking of pods (Table 1) clearly indicated that the date of sowing statistically significant. The plant height increased significantly with each delay in sowing and maximum under 20th October sowing with pooled height of 43.5 cm, which was 3.5 and 8.3% higher than 10th October and 30 September. On the pooled basis, 20th October sowing produced significantly maximum of 15.6 nodules/plant which were found 3.4 and 7.5% more than nodules in 10th October and 30th September. The dry weight of nodules resulted that 20th October sowing produced maximum of 9.6 mg/plat it was found 4.6 and 10.2% higher than nodules weight under 10th October and 30th September sowing respectively. The fresh dry matter accumulation from pooled date of 60 days stage that 20th October sowing accumulated maximum 29.7 gm/plant which was found 1.4 and 5.4% higher than 10th out and 30th September. The dry weight/plant (gm) significantly higher 20th October sowing (9.1 gm) which was found 3.9 and 8.4% more than dry weight under 10th October and 30th September. In pooled results, 20th October took significantly maximum and 30th September took minimum number of days of flowering. The time to marketable pods delayed in later sowing, thus 20th October sowing maximum 73.6 days, which were found 2.7 and 1.3 days more than 10th October and 30th September results may be reported by finding of Sharma (2001). In second wheat crop residual effect on plant height was significantly earlier sowing produced taller plants than later sowing. On pooled basis wheat plant height maximum in 76.7 cm in 30th September sowing and this height were found 4.1 and 15.2% more over 10th and 20th October. The fresh weight of plant significantly higher in 30th September and lowest in 20th October. The dry weight 30th September produced 5.7 gm of wheat, which were found to be 1.6 and 3.6% more dry weight over 10th and 20th October respectively. There results supported by the finding of Sharma and Choker (1989), Samre et al. (1989).

Effect of N in growth Characters:

The data of two years pooled of plant height clearly indicated (Table 2) that increasing N levels increasing plant height significantly up to N_{80} kg ha^{-1} which being at par with N_{60} kg ha^{-1}. The N_{80} maintained maximum plant height of 45.6 cm which was found 2.7, 6.6, 11.4 and 28.4% higher than N_{60}, N_{40}, N_{20} and N_0 Kg ha^{-1}. The number of nodules N_{80} Kg ha^{-1} produced maximum of 16.8 root nodules/plant and this was found 3.8, 9.5, 15.2 and 34.0% more than the nodules at N_{60}, N_{40}, N_{20} and N_0 levels respectively. The dry weight of root nodules N_{80} produced significantly maximum nodules weight of 10.9 mg/plat which remained 6.1, 17.1, 35.2 and 59.6% more over nodules weight at N_{60}, N40, N20 and N_0 Kg ha^{-1}. The fresh weight/plant was maximum in N_{80} and significantly lowest in N_0 Kg ha^{-1}.

Table 1: Growth characters of vegetable pea as affected by different treatments (Pooled of two years)

Treatments	Plant height (cm)	No. of nodules /plant	Root nodules dry wt. (mg/plant)	Fresh wt. /plant(gm)	Dry wt. /plant(gm)	Days of 50% flowering	Days of Ist picking of pods
Date of sowing							
30th Sept	40.1	14.5	8.7	28.2	3.9	37.5	70.9
10th Oct.	42.0	15.1	9.2	29.3	4.1	38.5	72.3
20th Oct.	43.5	15.6	9.6	29.7	4.3	39.4	73.6
CD at 5%	0.7	0.4	0.2	0.7	0.2	0.7	0.6
N Levels (kg/ha)							
N0	35.5	12.5	6.9	25.6	3.4	35.6	57.0
N20	40.9	14.6	8.1	28.6	4.1	37.8	71.0
N40	42.8	16.8	10.9	29.4	4.2	38.7	72.0
N60	44.4	16.2	10.4	30.5	4.4	39.8	74.5
N80	45.6	15.3	9.4	31.1	4.5	10.4	75.1
CD at 5%	1.5	0.9	0.4	1.1	0.4	1.4	1.2

Table 2: Growth characters of wheat crop as affected by difference treatments (Pooled data two years.)

Treatments	Plant height (cm)	Fresh wt. (gm/plant)	Dr weight (gm/plant)
Date of sowing			
30th Sept	76.6	14.3	5.7
10th Oct.	73.6	14.1	5.6
20th Oct.	66.5	13.7	5.5
CD at 5%	1.1	0.2	0.4
N levels (kg/ha)			
N0	60.5	13.7	5.6
N20	70.2	13.9	5.6
N40	74.6	14.1	5.6
N60	76.9	14.2	5.7
N80	78.9	14.2	5.7
CD at 5%	2.2	0.4	NS

The dry weight/plat also increased with increasing N levels up to maximum of N_{80} produced highest of 9.4 gm/plat dry weight which was found 1.3, 5.6,12.8 and 22.9% higher than the dry weight obtained at N_{60}, N_{40}, N_{20} and N_0 Kg ha^{-1}. The differences between N_0 and N_{80} levels remained of 4.8 days in flowering and 8.5 days in picking on the pooled basis results be supported by Basen et al. (1985), Van et al. (1990). The second wheat crop plant height increased with increasing levels of residual nitrogen up to height of N_{80}. On the pooled basis N_{80} produced tallest plant with 78.9 cm which was calculated to be 2.4, 5.7, 12.3 and 30.3% higher than at N_{60}, N_{40}, N_{20} and N_0 Kg ha^{-1}. The effect of residual nitrogen was not found significant on fresh and dry matter accumulation of succeeding wheat except fresh weight only in pooled analysis. Where, N_{80} produced significantly higher plant weight only over control N_0 Kg ha^{-1} there results supported by Sharma and Choker (1989).

Green pod yield of vegetable pea:

The Table 3 clearly indicated that the green yield of vegetable pea increased significantly with each delay in sowing and thus maximum under last sowing on 20th October during both individual years and also in pooling. In pooled results 20th October sowing produced highest pod yield of 54.3 q ha^{-1}, which was found 4.3 and 8.0% higher than the pod yields obtained in 10th October and 30th September sowings, respectively. Increasing levels of N increased pod yield up to highest level of N_{80}. The yield at this level of N remained at par with the yield at N_{80} level but significantly higher than all other lower levels of N during second year and pooling. In first year, yield at N_{40} level was also found at par with the yield at N_{80} level of N. In case of pooled data, N_{80} produced highest pod yield of 54.8 q ha^{-1} which was calculated to be 0.8, 2.9,6.8 and 15% higher than the pod yields obtained in N_{60}, N_{40}, N_{20} and N_0 levels of N, respectively there results according to Honda et al. (1994) and Sharma (2002). The pod yield was not influenced significantly by interaction effect.

Grain yield of succeeding wheat:

The data pertaining to grain yield of what under residual effect of pea treatments are presented in Table 3. Grain yield of what was obtained significantly maximum after the pea sowing on 30th September during first year and pooling while in second year, 10th October sowing remained at par with 30th September pea sowing. Both later peas sowing produce grain yield of succeeding wheat at par with each other. In pooled results, 30th September pea sowing produced maximum grain yield 36.6 q ha^{-1} of wheat which was found 3.0 and 5.2%

Table 3: Green pod yield of vegetable pea, grain yield of wheat and maize as affected by different treatments

Traetments	Green pod yield of Pea (q/ha)			Grain yield of wheat (q/ha)			Grain yield of maize (q/ha)		
	2004-05	2005-06	Pooled	2004-05	2005-06	Pooled	2004-05	2005-06	Pooled
Date of sowing									
30th Sept.	51.4	49.6	50.3	37.3	35.9	36.6	32.2	32.3	32.3
10th Oct.	52.9	51.3	52.1	36.0	35.1	35.6	32.3	32.3	32.3
20th Oct.	52.9	53.7	54.3	35.0	34.1	34.8	31.8	32.2	32.0
CD at 5%	1.1	1.2	0.7	1.2	1.1	0.7	NS	NS	NS
N levels (kg/ha)									
N0	48.3	46.8	47.6	34.3	33.9	34.1	31.9	32.4	32.1
N20	52.4	50.2	51.3	35.7	34.7	35.2	32.2	32.7	32.2
N40	54.1	52.3	53.2	36.2	35.3	35.8	32.3	32.3	32.3
N60	54.9	53.7	54.3	37.0	36.0	36.5	32.1	32.1	32.1
N80	55.0	54.5	54.8	37.3	36.9	36.8	32.2	32.5	32.3
CD at 5%	1.0	2.1	1.4	NS	NS	1.2	NS	NS	NS

higher than the grain yield recorded after pea sowings on 10th and 20th October, respectively. The grain yield of succeeding wheat crop increased numerically due to increase in residual N but margins of increase could not touch the level of significance in individual year while in pooled analysis differences became significant. The residue of N_{80} being at par with N_{60} and N_{40} level produced significantly higher grain yield of wheat than N_0 and N_{20} levels. There results supported the findings of Samre et al. (1989), Nayak et al. (1983). The interaction effect was not found significant.

Grain yield of Maize:

The grain yield of maize was not influenced significantly by any treatments factors applied to pea crop. Results remained similar during both years experimentation and also in pooled analysis.

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Journal of Rural and Agricultural Research Vol. 9 No. 2, 61-62 (2009)

Awareness/knowledge of Rural Women about "Total Sanitation Campaign"

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Abstract

The rural sector is home to 70 per cent of our people and nearly 80 per cent of our poor. The development in rural areas, however, has not kept pace with the overall progress in other facets of national life. India cannot achieve real development if majority of its people particularly live in an unhealthy and unclean surroundings due to lack of access to safe water and sanitation. Poor water and sanitation facilities have many other serious repercussions. Even today, nearly one third of the rural poor subsist in poverty and there remains an acute shortage of basic facilities such as housing, drinking water and roads in rural areas. Fond out awareness regarding "Total Sanitation Campaign" 400 rural women were randomly selected, 200 from Bikaner district (group A), and 200 from Nagore district (group B), from Rajasthan. The rural women were more aware about sanitation in group A, these women understood very well about sanitary practices and profit of programme for their family, as compare to group B.

Introduction

Total Sanitation Campaign (TSC) launched in 1999, has helped overcome some of these obstacles. Sanitation is one of the important aspects of life. Knowledge regarding health and correct sanitary practices is required for well being of all the family members. The housewife can make more effective contribution towards this. Hence, they need to acquire knowledge, awareness, skill and abilities in the area of sanitation. Training in this area will help the women to adopt better sanitary practices.

There are two main reasons for offering facilities to the population. The first one is to improve health; the second one is convenience and privacy. Both will help to improve the quality of life in the rural areas. There are a number of diseases related of unsanitary conditions, which commonly affect people in the rural areas. The major communicable diseases, which can be reduced by the use of proper sanitary facilities, are: cholera, typhoid and Para-typhoid fevers, dysentery and diarrhea as well as hookworm. Those most at risk from these diseases are children under five years of age. Their immune defenses are not fully developed and may be further weekend by malnutrition. Diarrhea is the major killer of children.

India cannot achieve real development if majority of its people particularly live in an unhealthy and unclean surroundings due to lack of access to safe water and sanitation. Poor water and sanitation facilities have many other serious repercussions. A direct link exists between water, sanitation and, health and nutrition and human well being.

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Methodology

The present study was conducted in eight villages of Bikaner and Nagore districts from Rajasthan. Total 400 rural women were selected from two groups, group A and group B. Group A was consisted of district where T.S.C. was fully operational and group B was having district where the T.S.C. was yet to gain the proper working. Dungargarh and Bikaner panchayat samities were randomly selected from Bikaner district and Mundwa and Nagore panchayat samities were selected from nagore district. The responses were recorded in a pre designed interview schedule.

Results and Discussion

Sanitation and hygiene plays very important role in life of women. By hygiene and sanitation women and their families could be protected dangers of dieses, clean and hygienic environment keep a way the dieses and keep home neat and clean.

Table 1 indicates that 92 percent of the respondents in group 'A' said that sanitation and hygiene required for betterment and healthy life in group A. 55 percent of the respondents from group B also said that sanitation required for betterment and healthy life because of in group 'A' women have awareness about hygiene and sanitation they also know that sanitation is helpful in keeping them disease free.

Regarding prevention from disease 91 percent respondents from group A and 60 percent from group B. Told about where as in group B 63 percent respondent's things that avoid pollution of water source by cleanliness of water source dieses could be avoided because insects, flies and mosquitoes could spread there by this. Personal comfort and convince comes at least that was 60 percent and 45 percent from both groups.

Over all picture shows that women in group 'A' have better knowledge than women in group 'B'.

Table 1: Distribution of the respondents on the basis of awareness regarding importance of sanitation and hygiene

S. No.	Item	Group 'A' N=20 F	%	Group 'B' N=200 F	%
1.	For betterment and healthy life	184	92	110	55
2.	Prevention from disease	182	91	120	60
3.	Personal comfort and convenience	120	60	90	45
4.	Dignity and privacy of women	180	90	106	53
5.	Avoid pollution of water source	175	87.5	126	63
6.	Hand washing after defection and before meal alone can reduce 60 percent of water and excreta dieses	180	90	110	55

Table 2: Distribution of the respondents on the basis of knowledge of objectives of T.S.C.

S. No.	Item	Group 'A' N=200 F	%	Group 'B' N=200 F	%
1.	Increase living standard of rural people	180	90	126	63
2.	Develop demand related to sanitation	176	88	128	64
3.	Extension of low cost technique of latrine	186	83	74	37
4.	Reduce Mortality rate	186	93	84	42
5.	Extend of sanitation facility	190	95	86	43

Table 3: Distribution of the respondents on the basis of awareness regarding functionaries of the programme at the village level

S. No.	Item	Group 'A' N=200 F	%	Group 'B' N=200 F	%
1.	Gramsevak	190	95	70	35
2.	Sarpanch	188	94	44	22
3.	Animator	120	60	40	20
4.	Volunteers	30	15	8	7

In group 'B' respondents were had much less awareness of objectives of T.S.C. as compared to group 'A', specially regarding extension of low cost techniques related mortality rate and extension of this sanitation facilities.

Table shows that women in group 'A' were more aware about functionaries of T.S.C. programme as compared to group 'B'. Concept in case of animator and volunteers where both the groups had little awareness.

Table 4: Distribution of the respondents on the basis of awareness regarding elements of T.S.C. programme

S. No.	Item	Group 'A' N=200 F	%	Group 'B' N=200 F	%
1.	Handling of drinking water	192	96	74	37
2.	Disposal of waste water	190	95	72	36
3.	Disposal of human excreta	194	97	84	42
4.	Disposal of garbage and animal excreta	196	98	80	40
5.	Home sanitation and food hygiene	198	99	78	39
6.	Personal hygiene	192	96	86	43
7.	Village sanitation	198	99	80	40

Regarding elements of T.S.C. presented table clearly shows that group A had highly awareness as compared to the group B in all the elements of T.S.C. Very low percentage of women in group 'B' had awareness regarding important elements related to health life taken up by T.S.C.

Conclusion

As regards awareness about T.S.C. were found more awareness in group A, group A was also aware about importance, objective and elements of T.S.C. as compare to group B. In group A very high majority of respondents were aware about the health and hygiene, disease, healthy food, cleanness of home, safe source of drinking water etc. as compare to group B. In group A women had awareness regarding sanitation, by sanitation women and their family could be protected of danger disease, clean and hygienic environment keep a way the disease and home neat and clean.

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Journal of Rural and Agricultural Research Vol. 9 No. 2, 63-65 (2009)

Economic Aspects of Marketing of Potato in Madhya Pradesh

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Introduction:

The Potato is one of the most important commercial vegetable crops grown and consumed almost all over the country. Potato is a tuber type plant, which requires high management practices for its cultivation. Potato is available and marketed round the year. The study of cultivation of this crop on commercial basis is restricted to Malwa Region of Madhya Pradesh. Bulk of marketing of this crop takes place through T-Chouthiram wholesale market, Indore followed by Mhow market in Indore District. Present study is, restricted to examine marketing of potato crop grown in Indore District and marketed through T-Chouthiram market Indore.

The specific objectives are:

1. To study the behavior of wholesale price of potato; and
2. To analyze price spread and functional analysis of marketing margins.

Material and Methods:

Indore district is purposively selected for the study. Indore Tahsil of Indore District where potato is cultivated intensively and commercially has been selected purposively. One potato-growing village is randomly selected and two villages adjacent to it are added up to form a cluster of three villages. Following the probability proportional to number, 60 sample farmers have been selected with the help of SRSWR method. In order to examine the monthly fluctuation in wholesale prices, price spared and marketing margin, one primary wholesale market (T-Chouthiram, Indore), one secondary wholesale market (New market T-Chouthiram, Indore) and two retail market (T-Chouthiram and Tilak Nagar market, Indore) are selected purposively. Selection of markets is based on the volume of potato transacted through be markets concerned. Forty, (40) producer- sellers coming to T-Chouthiram wholesale market, twenty (20) wholesalers (10 from each market) and twenty (20) retailers (10 from each market) have been randomly selected as market intermediaries. Pre-tested survey schedule has been used to collect data with the help of survey method. This study is related to the agricultural year 2005-06.

The following two marketing channels – Transacting major share of the total production of potato in Indore district are being studied:-

Channel-I: (60 % of the total production is transacted)

Producer-seller – Primary wholesale market (T-Chouthiram) – Secondary wholesale market (New market, T-Chouthiram, Indore) – Retail market (Tilak Nagar Market) – Consumers.

Channel-II : (30% of the total production is transacted)

Producer-seller – Primary wholesale market (T-Chouthiram) – Retail market (Tilak Nagar Market) – Consumers.

Results and Discussion :

Table 1 demonstrates monthly wholesale price of Potato grown in Indore tehsil of Indore District and sold at T-Chouthiram (Indore) wholesale market. The Table shows that Potato is available from the month of January to December in the market. It also reflects that maximum price was recorded in the month of December and minimum in the month of June. From the table it is also visualized that maximum prices are more than double than that of minimum prices at T-Chouthiram (Indore) market.

Table 2 presents price spread and marketing margin of potato sold through channel-I and channel-II. From table it is observed that producer's profit out of consumer's rupee ranges from 23.35 per cent to 47.66 per cent at minimum and maximum price levels respectively. Transport cost incurred by the producer-seller constitutes major share in marketing cost followed by packaging and loading and unloading at producer's level. It is observed that price increases from the month of June and lasts through December and then declines.

At T-Chouthiram wholesale market, packing loading and unloading and helping hands are the important items of marketing cost. No transport cost is incurred by the primary wholesaler as producer sellers directly sell their produce to T-Chouthiram market. Trader's profit at this level ranges from 4.70 at minimum price level to 11.79 per cent at maximum price level out of consumer's rupee.

At secondary wholesale market (New Market, T-Chouthiram Indore), noted items of marketing cost are packing, loading and unloading and transport. Trader's profit varies between 5.33 and 10.13 per cent of consumer's rupee at minimum and maximum price levels respectively.

At retailer's level (both at New Market, T-Chouthiram and Tilak Nagar Market), important items

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Table 1: Seasonal fluctuation in monthly wholesale prices of potato (2005-06)

Month	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Price range	11-14	10-12	8-12	8-10	7-10	6-8	7-8	8-10	10-11	10-12	12-13	12-15

Table 2: Price spread and marketing margin of the potato (2005-06)

S.No.	Item	Channel I Price level Maximum	Channel I Price level Minimum	Channel II Price level Maximum	Channel II Price level Minimum
1.	At producer level				
(a)	Cost of production	2.79(15.96)	2.79(35.41)	2.79(17.40)	2.79(37.30)
(b)	Cost of marketing	0.65(3.72)	0.57(7.23)	0.65(4.05)	0.57(7.62)
	i. Packing	0.13	0.12	0.13	0.12
	ii. Loading and unloading	0.13	0.11	0.13	0.11
	iii. Helping hands	0.09	0.09	0.09	0.09
	iv. Transport	0.17	0.15	0.17	0.15
	v. Commision and others	0.07	0.06	0.07	0.06
	vi. Storage and maintenance	0.05	0.04	0.05	0.04
(c)	Producer's profit	7.64(43.71)	1.84(23.35)	7.64(47.66)	1.84(69.52)
(d)	Price received by producer	11.08(63.39)	5.20(65.99)	11.08(69.12)	5.20(69.52)
2.	Primary wholesaler's level, T- Choutiram market, Indore				
(a)	Cost of marketing	0.60(3.43)	0.53(6.73)	0.60(3.74)	0.53(7.09)
	i. Packing	0.16	0.14	0.16	0.14
	ii. Loading and unloading	0.14	0.13	0.14	0.13
	iii. Helping hands	0.12	0.09	0.12	0.09
	iv. Transport	0.00	0.00	0.00	0.00
	v. Commision and others	0.08	0.07	0.08	0.07
	vi. Storage and maintenance	0.06	0.04	0.06	0.04
	vii. Spoilage	0.04	0.06	0.04	0.06
(c)	Wholesale's profit	1.60(9.15)	0.37(4.70)	1.89(11.79)	0.52(6.25)
(d)	Price received by wholesaler	13.28(75.97)	6.10(74.41)	13.57(84.65)	6.25(83.56)
3.	At secondary wholesaler's level, T- Choutiram market, Indore				
(a)	Cost of marketing	0.58(3.32)	0.48(6.35)		
	i. Packing	0.12	0.10		
	ii. Loading and unloading	0.10	0.09		
	iii. Helping hands	0.08	0.07		
	iv. Transport	0.09	0.08		
	v. Commission and others	0.07	0.06		
	vi. storage and maintenance	0.06	0.04		
	vii. Spoilage	0.06	0.04		
(b)	Secondary wholesaler's profit	1.77(10.13)	0.42(5.33)		
(c)	Price received by secondary wholesalers	15.63(89.42)	7.02(89.09)		
4.	at Retailer's level	T-Choutiram New Market, Indore		Tilak Nagar Market, Indore	
(a)	Cost of marketing	0.57(3.26)	0.52(6.60)	0.75(4.68)	0.73(9.76)
	i. Packing	0.10	0.11	0.13	0.13
	ii. Loading and unloading	0.14	0.14	0.15	0.14
	iii. Helping hands	0.12	0.11	0.11	0.09
	iv. Transport	0.00	0.00	0.169	0.18
	v. Commission and others	0.07	0.06	0.06	0.07
	vi. Storage and maintenance	0.06	0.04	0.04	0.05
	vii. Spoilage	0.08	0.06	0.07	0.07
(b)	Retailer's profit	1.28(7.32)	0.34(4.31)	1.71(10.67)	0.50(6.68)
(c)	Price received by retailer	17.48(100.00)	7.88(100.00)	16.03(100.00)	7.48(100.00)
5.	Marketing margin	14.69(84.04)	5.07(64.34)	13.24(82.60)	4.69(62.70)

Figures in parentheses indicate to the percentage to the total

Table 3: functional analysis of marketing margin of the potato crop (2005-06)

S.No. Item	Channel			
	I		II	
	Price level		Price level	
	Maximum	Minimum	Maximum	Minimum
1. Packing	0.51(3.47)	0.47(9.27)	0.42(3.17)	0.39(8.32)
2. Loading and unloading	0.51(3.47)	0.47(9.27)	0.42(3.17)	0.38(8.10)
3. Helping hands	0.41(2.79)	0.36(7.10)	0.32(2.42)	0.28(5.97)
4. transport	0.27(1.84)	0.23(4.54)	0.37(2.79)	0.32(6.82)
5. Commission and other charges	0.29(1.97)	0.25(45.93)	0.21(1.59)	0.20(4.26)
6. Storage and maintenance	0.23(1.57)	0.16(3.16)	0.15(1.13)	0.14(2.99)
7. Spoilage	0.18(1.23)	0.16(3.16)	0.11(0.83)	0.12(2.56)
8. Trader's profit	12.29(83.66)	2.97(58.58)	11.24(84.89)	2.86(60.98)
Total	16.69(100.00)	5.07(100.00)	13.24(100.00)	4.96(100.00)

Figures in parentheses indicate to the percentage to the marketing margin

of cost are packing, loading and unloading and helping hands. Transport cost is only incurred by the retailers following channel-II at Tilak Nagar retail market because the retailers of this market purchase the produce directly from T-Chouthiram wholesale market. But no transport cost is accounted for in the retailer's level at New Market, T-Chouthiram (Indore) i.e. channel-I because retailers of the market concerned collect and sell the potato in the nearby area. Higher cost of helping hands is due to the handling of potato from wholesale level to retail level. The table reveals that profit margin at retail level is higher in channel-II in comparison to channel-I but the converse is true in case of retail price. The reason may be attributed due to the fact the numbers of intermediaries functioning are more in channel-I in comparison channel-II in spite of the fact that intermediaries operating in channel-II have fetched higher profit.

Table 3 depicts functional analysis of marketing margin of potato sold through channel-I and channel-II. Table demonstrates that besides traders' profit packing, loading and unloading, and helping hands are the noted items of marketing cost. Transport is also a major item of cost at some levels. Trader's profit in both the channels at maximum price is about four times higher than that at minimum price. It is also clear that total cost of marketing varies with the variation in price level. This variation may also be due to change in time and location: At maximum price level trader accounted for 85 per cent of marketing margin of which more than 50 per cent are consumed by producer sellers. This clearly reflects imperfectness of marketing system.

Summary and Conclusion

The study revealed that Potato is available for all session. In the early months the price remains high, but low in latter months. Cost of cultivation is moderate. Producer seller accounts for more than 60 per cent of the consumer's rupee. Higher profit margins are related to the higher prices at all the trader's level. At producer seller's level, striking differences exists between profit at maximum and minimum price levels. Trader's profit comprises 58 to 85 per cent of the marketing margin. Packing, loading and unloading, helping hands and transport are the major items of marketing cost. Marketing margin is found to vary with the length of chain of market.

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Journal of Rural and Agricultural Research Vol. 9 No. 2, 66-69 (2009)

Yield enhancement through physiological traits under drought prone environment

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Abstract

In recent past, there has been a lot of progress in understanding the functional and structural changes in response to water deficit and the identification of potential drought tolerance characteristics which could improve crop performance in water limited environment. Traits, which could be beneficial over long time scale in dry environment, should include crop phenology, osmotic adjustment, rooting characteristics, and assimilate transfer from vegetative plant parts to grains. Where water remains in the sub-soil at maturity, a greater rooting depth should lead to improved yield stability. In oilseed brassica genotypes, the rooting depth at maturity showed significant positive association with number of siliquae per plant and biological yield under moisture stress conditions. The major yield benefits derived from osmotic adjustment in different crops lie in the maintenance of proper water supply from sub-soil during reproductive phase of growth, cooler canopy and continued growth processes under water deficit conditions. Remobilization of stem reserves between 20-30% in grain legumes (soybean, lupines), 40-70% in cereals and 20-24% in oilseed brassicas have been reported under water deficit conditions. Seed yield in wheat and chickpea also showed significant positive association to osmotic adjustment under water deficit condition.

Introduction

Rainfed lands in India are important today and will continue to be so in future. Currently about 63% of agriculture in India are rainfed. This area contributes nearly 44% food production and supports 40% of the human and 60% of livestock population. An understanding of constraint of water on yield and adaptation of plants to water deficits challenges both the breeder to develop a crop cultivar that will give a greater yield under water deficit conditions and the agronomist to ensure that the most efficient use is made of the available water. It has been argued that to improve grain yield of crops in a dryland area one must increase the water passing through the crop in transpiration (T), increase the water use efficiency (W) and /or increase the proportion of total dry matter going to grain (H). The first of these (T) is largely in the domain of the agronomist and the last two (W, H) are in the domain of the breeder. The development of water deficits leads to a wide range of responses by the plants. The many of these responses may be secondary arising as a result of primary process being affected directly in response to water deficit (Turner & Begg 1981). The crop productivity will depend on the development of leaf area to intercept radiant energy and the role of photosynthesis to convert it into dry matter. However, the distribution of assimilate within the plant will determine the proportion of the total that is harvested as economic yield. This paper briefly reviews the physiological aspects of crop improvement of rainfed crops in drought prone areas.

Crop improvement

In recent past, there has been a lot of progress in understanding the functional and structural changes in response to water deficit and the identification of potential drought tolerance characteristics which could improve crop performance in water limited environment (Singh & Chaudhary 1995). Deep rooting and greater osmotic adjustment have improved water acquisition, leaf and cuticular characters have been modified to conserve water, and earliness in the reproduction has been used to avoid terminal droughts. It now appears increasingly possible to improve the several useful determinants of yield (T, W, H) by genetic means using modern techniques of screening for putative traits and their incorporation under suitable agronomic background to develop water use efficient cultivars for dryland areas.

Potential Traits

which could be beneficial over long time scale in dry environment, should include crop phenology, osmotic adjustment, rooting characteristics, and assimilate transfer from vegetative plant parts to grains. The role of these potential traits in improving crop productivity in dryland areas is discussed here.

1. Crop phenology:

There is substantial genetic variability for crop phenology and its inheritance is also known in some

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cases. Modification of phenology so as to partially avoid critical stress periods represents the most successful way to increase yield, provided biomass is not sacrificed. Matching phenology with the environment may be achieved either by genetically modifying the crop through the manipulation of photoperiod or vernalization of sensitive/insensitive genes or by modifying management. Changing sowing time is useful management practice that may be required for some genotypes to avoid critical periods of stress or to maximize the environmental resource for the crop. Work in sorghum and maize is a good example of the use of plant phenology as an index of moisture stress (Blum, 1983). A short time interval between pollen shedding and silking is important for successful pollination in maize under water deficit conditions (Fischer 1996). In oilseed brassicas, the cv. RH 30 is shorter in duration, high yielder and has good response to varied situations of water availability in different seasons.

2. Rooting characteristics:

The depth of rooting is often cited as an important criterion because it has a major influence in determining the potential supply of water from the deep soil. Where water remains in the sub-soil at maturity, a greater rooting depth should lead to improved yield stability. Expression of phenotypic plasticity in root characteristics, i.e. the ability of genotypes to express different rooting depth in response to physical environment can be found for several crops in literature (Singh & Chaudhary, 1998). Table 1 revealed that the contrasting genotypes of different crops had a difference of 29-49 cm in the depth of rooting by the time of maturity (Singh & Chaudhary, 1998).

In oilseed brassicas and chickpea, there was consistent increase in the depth of rooting from germination to physiological maturity. However, in wheat only a few genotypes (WH 533 & WH 147) showed increase in the rooting depth from anthesis to physiological maturity (Singh & Chaudhary 1998). In oilseed brassica genotypes, the rooting depth at maturity showed significant positive association with number of siliquae per plant and biological yield under moisture stress conditions. Similarly in wheat genotypes in dry environment, rooting depth at jointing stage was positively correlated with the spike weight at anthesis and seed yield (Singh & Chaudhary 1998).

3. Osmotic adjustment:

Osmotic adjustment involves an increase in the number of solute molecules inside the cells in response to a decline in external water potential. This has effect of reducing outflow of water from the cell, thereby reducing loss of turgor and in turn allows turgor driven processes such as stomatal opening and expansion growth to continue progressively at lower water potentials (Morgan 1984). It has no adverse effect on water use efficiency, but contributes to grain yield by increasing the water extraction from sub-soil during reproductive phase of growth in several crops (Singh 1998) by either increasing or maintaining harvest index. Osmotic adjustment has inter linkages and association with several traditionally known dehydration avoidance and dehydration tolerance traits, and thus leads to the differences in yield by modifying various morpho-physiological processes involving both macro level (soil water use, survival of meristems, leaf characteristics, root extension etc.) and micro level (turgor, stomatal conductance, hormonal balance, integrity of membranes etc.) changes under water deficit conditions (Singh 1998). The major yield benefits derived from osmotic adjustment in different crops lie in the maintenance of proper water supply from sub-soil during reproductive phase of growth, cooler canopy and continued growth processes under water deficit conditions (Singh 1998: Table 2). Among the high (cv. RC 781, Prakash) and low (*cvs*. RIK, RH 7513) osmotic adjustment class of oilseed brassicas, the former extracted 30-40 mm more water below 60 cm soil depth than the latter group of genotypes (Singh *et al.* 1990). Also, medium osmotic adjustment class chickpea (*cvs*. C 214, G 130, H 208) absorbed 20-30 mm more water from sub-soil layers than the genotypes of low osmotic adjustment class (*cv*. P 324). Similar benefits of osmotic adjustment have also been reported in wheat and sorghum (Ludlow & Muchow 1990).

Table 1: Differences for rooting depth in the genotypes of oilseed brassica, chickpea and wheat under water deficit conditions (Singh & Chaudhary 1998)

Crops	Genotypes	Rooting Depth (cm)		Shoot Length (cm)
		Observed	Differences	
Oilseed Brassicas (Siliquae Formation)	RH 7513	108	49	107
	HC 2	157		105
Chickpea (Pod Formation)	E 296	74	29	32
	S 1	103		29
Wheat (Anthesis)	WH 147	89	47	75
	HI 1011	136		88

Table 2: Leaf relative water content (RWC) at critical value of leaf water potential (yw) and leaf osmotic potential (ys) and seed yield of oilseed brassica genotypes representing three osmotic adjustment classes under dryland conditions (Singh 1998)

Osmotic adjustment class	RWC (%) at -2.5 Mpa yw	RWC (%) at-3.0 Mpa ys	Seed yield (gm^{-2})
High	77.0	75.1	124.8
Medium	67.0	59.9	86.4
Low	60.0	46.8	58.8

4. Assimilate transfer to grain:

When water deficit occurs, and the current photosynthesis source is inhibited, the role of pre-anthesis photosynthates as a source for grain filling increases. The mobilization of reserves from vegetative parts into the growing grains can be seen as appreciable reduction in the shoot dry weight (stem, leaves, vegetative part of reproductive organs) following anthesis across varied genetic materials (Singh & Chaudhary 1995). Remobilization of stem reserves between 20-30% in grain legumes (soybean, lupines), 40-70% in cereals and 20-24% in oilseed brassicas have been reported under water deficit conditions (Turner & Begg 1981; Singh and Singh 1994). Chaudhary *et al.* 1992 demonstrated a substantial amount of assimilate transfer not only from the shoot but also from the roots to grains in wheat genotypes under moisture stress conditions. Similar results for assimilates transfer from vegetative plant parts to grains were recorded in oilseed brassicas (Singh 1996**:** Table 3). Therefore, there is a need to consider the translocation of assimilates to grains both from roots and shoot in the genotypes for improving productivity under moisture stress conditions.

Table 3: Mobilization of dry matter from root + shoot to seed in oilseed brassica under water deficit field conditions (Singh 1996)

Cultivars	Reduction /Increase (%) in biomass of vegetative plant parts
RH 785	-24.1
RH 786	-20.0
RH 30	-10.5
Parkash	-2.7
RH 7513	0.0
RC 781	19.2

Other traits:

Other traits which have their potential value in dryland area include canopy temperature, leaf water retention, transpiration efficiency, glaucousness, early vigour, threshing percentage in pearl millet (ratio of grain mass to panicle mass), number of second order branches and length of pod bearing branches in oilseed brassicas and chickpea, ear to stem ratio in wheat, ability to initiate pods despite drought in peanuts, leaf movement, developmental plasticity, photo-period sensitivity and a few other dehydration tolerance and avoidance characteristics (Singh *et al.* 1990; Ludlow & Muchow 1990, Singh & Chaudhary 1995; Boyer, 1996) could provide yield benefit in several crops under certain situations.

Yield responses:

The final test of genotypes containing drought resistant putative traits could be judged by their better yield performance in dry environment. On an average (mean of two seasons), the genotypes of medium and high osmotic adjustment classes gave 46.9% and 112.2% higher seed yield of oilseed brassicas than low osmotic adjustment class (Singh *et al.* 1990). Seed yield in wheat and chickpea also showed significant positive association to osmotic adjustment under water deficit condition (Singh 1998). Similar yield benefits were derived from sub-soil water use during reproductive phase of growth, transpirational cooling and leaf water retention as these characteristics highly correlated with the osmotic adjustment in oilseed brassicas, chickpea and wheat (Singh & Chaudhary 1998). Among these traits, the measurement of transpirational cooling (canopy minus air temperature difference) and leaf water retention are not only simple and rapid but have shown their potential value in breeding for improving drought tolerance in field crops.

Conclusions and Future Research Thrusts

In conclusion, the understanding of potential drought tolerant traits, their genetics and internal physiological consistency is essential for genetic improvement of drought tolerance in crop plants. However, still more work is required for (a) matching the degree of osmotic adjustment to maturity duration of genotypes for proper rationing of available water supply during crop life cycle, (b) to optimize root density/ root biomass for more allocation of assimilates to shoot for further improving the harvest index and productivity of dryland crops, and (c) in-depth studies to understand mobilization patterns of photosynthates both from roots

and shoot to grains for further improving the partitioning efficiency/productivity in dryland crops. There is also need for identification, evaluation and subsequent manipulation of genes and molecular markers controlling these putative traits and their adaptation responses under different situations of water availability.

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Journal of Rural and Agricultural Research Vol. 9 No. 2, 70-71 (2009)

Effect Of $AgNO_3$, $AI_2(SO4)_3$, NAA and Sucrose on the Vase Life of Gladiolus (Gladiolus grandiflours L.) cv. Lemoinei

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Introduction

Gladiolus (Gladiolus grandiflours L.) is a Queen of bulbous flowers, it is grown in many parts of the world as a cut flowers, garden display, maintaining ecological balance and checking pollution in the atmosphere, refresh mind of human beings. Flowers have become integral part of our trade. About 45% of world trade floriculture products goes to cut flower. The uses of floral preservatives are the most economical practical methods for extending post harvest life of gladiolus cut flower . The vase life of cut flower is influenced by constant water supply, checking of microbial growth presentation of ethylene formation and energy source. Several type of floral preservatives in the form of germicides, ethylene antagonistic and source of energy are in use to preserve the flower quality and extending post harvest longerity of cut flowers. Somnath and Dass (1999) reported that an ideal floral preservative should contain energy source and chemical having germicidal and germistatral effects. The vase life of flowers varies with the varieties. Different varieties perform differently under preservative treatments. The vase life of cut flowers is influenced by variety of factors like, climate, crop variety, harvesting time, post harvest handling etc. (Bhattacharjee 2000).

Material and Methods

An experiment was conducted in the laboratory of the Deptt. of Horticulture at Shri F.H.(P.G.) College, Nadhauli Kalan, Etah (U.P.) during Jan-Feb-2008. The experiment was laid out in Completely Randomized Design (CRD) with 3 replications. The experiment consisted of 4 treatments (Silver nitrate, Aluminium sulphate, NAA and sucrose) each at two different concentrations were tried as holding solution ($AgNO_3$ 30ppm and 40 ppm, $AI_2(SO_4)_3$ 400ppm and 600 ppm, NAA 100 ppm and 150 ppm, sucrose 2.5% and 4% and control). The cut spikes were kept in above mentioned holding solutions for post harvest life evaluation at ambient conditions, the study/observation recorded of different parameters like-water uptake, vase life, fresh weight change, percent of opened florets, rachis length, floret diameters, and floret length. Cut spikes were harvested at morning between 8 to 9 am at a stage when basal florets started showing colour at bud break. These were transferred to the conical flask (500ml capacity), containing 500ml capacity holding solution. The temperature of laboratory is maintained at 24 ± 1^0C and RH(Relative Humidity) 75 ± 4% for the vase life study of gladiolus cut spikes.

Results and Discussion :

Water uptake:

The water uptake approximately higher in $AgNO_3$ 30ppm followed by $AgNO_3$ 40ppm, NAA 100ppm and minimum was observed in $Al_2 (SO_4)_2$ (Table 1).

Vase life (days):

The vase life of cut spikes were recorded 10.34 days approximately in $AgNO_3$ 40ppm followed by $AgNO_3$ 30ppm, NAA 150 ppm while least observation recorded in control (Distilled water).

Fresh weight change (% of initial weight):

Table 2 revealed that $AgNO_3$ 30ppm increased the fresh weight change from 2nd day to 4th day and decrease from 6day to sequence in increasing rate over the control (Distilled Water) Marwe et al. (1984) similar result found.

Table 1: The effect of $AgNO_3$, $Al_2 (SO_4)_2$, NAA and sucrose on water uptake, vase life, oppened florets, ike and increase in rachies length gladiolus cut spike cv. Lemoinei

Treatments	Water uptake (gram/spike)	Vaselife (days)	Opened florets/spike (%)	Increase in rachis length (cm)
$AgNO_3$ 30 ppm	58.12±6.64	5.59±0.17	84.26±8.57	8.35±0.13
$AgNO_3$ 40 ppm	50.83±8.56	10.34±0.07	79.38±17.14	7.84±0.07
$Al_2 (SO_4)_2$ 400 ppm	41.88±13.17	6.53±0.17	53.45±2.43	4.87±0.08
$Al_2 (SO_4)_2$ 600 ppm	33.82±4.58	6.33±0.08	75.95±4.48	5.14±0.04
NAA 100 ppm	47.59±1.96	9.02±0.01	79.01±2.89	7.42±0.06
NAA 150 ppm	39.30±4.89	9.17±0.05	80.43±5.66	7.57±0.18
Sucrose 2.5%	47.49±2.01	8.70±0.13	82.82±4.59	7.27±0.09
Sucrose 4.0%	46.63±2.04	8.34±0.08	80.47±4.75	8.58±0.27
Control (Distilled water)	34.41+4.23	5.70+0.23	69.46+3.95	4.43+0.17
CD at 5%	13.081	0.264	15.184	0.286

Table 2: The effect of $AgNO_3$, $Al_2(SO_4)_2$, NAA and sucrose on diameter (cm) and length (cm) of opened pair of florets of gladiolus cut spike cv. Lemoinei

Treatments	Diameter (cm) of opened pair of florets			Length (cm) of opened pairs of florets		
	First fully	Third fully	Last fully	First fully	Third fully	Last fully
$AgNO_3$ 30 ppm	12.47±0.35	11.14±0.07	10.92±0.08	10.08±0.06	9.99+0.05	9.92+0.06
$AgNO_3$ 40 ppm	9.38±0.09	8.54±0.19	7.77±0.17	8.18±0.05	8.08±0.06	7.92±0.06
$Al_2(SO_4)_2$ 400 ppm	6.32±0.10	6.25±0.08	5.71±0.22	7.74±0.18	7.43±0.08	7.07±0.06
$Al_2(SO_4)_2$ 600 ppm	8.50±0.16	7.73±0.16	6.75±0.15	7.93±0.06	7.67±0.22	7.37±0.12
NAA 100 ppm	9.73±0.17	8.74±0.21	7.72±0.18	9.91±0.08	9.73±0.15	9.46±0.25
Sucrose 2.5%	9.74±0.17	8.74±0.18	7.53±0.28	8.74±0.05	8.99±0.05	8.88±0.11
Sucrose 4.0%	10.22±0.14	9.76±0.19	8.70±0.21	8.33±0.02	8.20±0.18	8.02±0.02
Control (Distilled water)	9.72±0.20	8.13±0.09	6.25±0.08	7.12±0.02	7.02±0.06	6.91±0.08
CD at 5%	0.392	0.304	0.632	0.437	0.249	0.271

Percent of opened florets/spike:

The floral preservative, $AgNO_3$ 30 ppm was recorded better result for fully opening of florets followed by sucrose 2.5% and 4% and minimum result found in $Al_2(SO_4)_3$ 400ppm, Want and Gu (1985) found similar result with 5% sucrose $AgNO_3$ 50ppm + 8-HQS+300ppm+acidifier.

Rachis length (cm):

Floral preservative, sucrose 4% was recorded to be almost better result for increasing in spike length on last day in vase. Singh (2006) also found increase in spike length with application of 2% and 4% sucrose. The maximum florets size was recorded under the solution of $AgNO_3$ 30ppm and other floral preservatives also increase the diameter of opened pair of florets but in decreasing rate.

Length (cm) of First, Third and last fully opened pair of floret:

Length of First, Third and last florets were recorded approximately maximum in $AgNO_3$ 30ppm followed by NAA 100 ppm, NAA 150 ppm and minimum with control (Rogers,1973).

Conclusion:

On the basis of above mentioned result and discussion it may be concluded that $AgNO_3$ 30ppm, $AgNO_3$ 40ppm & sucrose 4% was most effective in promoting water uptake, vase life, fresh weight, maximum floret opening, rachis length, flower, diameter and floret length. Among all treatments ($AgNO_3$, $Al_2(SO_4)_3$, NAA. Sucrose and control (Distilled water), $AgNO_3$ at both concentrations increase the water uptake, vase life, fresh weight, maximum floret opening, flower diameter & floret length. Sucrose 4% increase rachis length as compared to NAA and control (Distilled water).

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Journal of Rural and Agricultural Research Vol. 9 No. 2, 72-74 (2009)

Problem faced by women in social forestry and their employment

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Abstract

Women play multiple roles for making balance at every aspect of their life like at family community, and for nation too. So the present study was conducted to analyse the problems and level of empowerment of women in social forestry. Primary data were collected through interview schedule in two nurseries namely; Double Pathak nursery, Agra and Budhia ka Tal Nursery, Etmadpur of Agra district during 2000-01 and percentage was used as statistical measure. The study shows that majority of women engaged in social forestry were facing various type of problems and their level of knowledge, skill and economic status was low. They had neither any decisions nor decision making powers with their husband. Therefore, Government should plan and execute programme in considering women and their socio-economic status, and should give more chances to contribute at every level of social forestry activities. This study will provide new ways of researchers; which are not studied in earlier studies.

Introduction

It is well known that women play a significant role in forestry. The three major activity performed by women under afforestration are nursery raising, tree planting and watering. Some women are involved and afforestration would have a positive impact on well being of rural women, afforestration through women's organization namely; Mahila Mandal has gathered momentum in afforestration in few areas. So a very urgent need of the hour in this respect is to review policies and establish plans to increase the proportion of women involved as decision makers, managers, planners, scientists and the technical advisor in the development and the implementation of policies/programmes for sustainable development of forestry and afforestration of the country. Therefore, keeping in view, the above facts into consideration, the present study was conducted to identified problems and empowerment of women as a result of social forestry.

Research Methodology

Exploratory type of research design was used in the present study. Agra division of the Uttar Pradesh was selected as the locale by using purposive sampling. Agra division comprises of seven districts, out of which, Agra district was selected purposively because the divisional forest range is located in Agra district. Agra district was divided into two areas: Agra Urban and Agra Rural. Agra rural was selected purposively. Agra rural comprises 15 blocks. Out of these blocks, Bichpuri block and Etmadpur block were selected randomly. There are thirteen nurseries under the social forest department but women involvement was confinement into 5 nurseries. Out of 5 nurseries, two nurseries namely; Double Phatak, Nusery, Agra and Budhia ka Tal Nursery, Etmadpur were selected. All 25 women working in these two nurseries were selected purposively. Primary data regarding problems and empowerment level of women as a result of social forestry were collected through interview schedule during 2000-01. Percentage was used as statistical measure.

Results and Discussion

Section A: Problem faced by women working in social forestry

The problems faced by respondents working in social-forestry were asked with the help of three questions and sampled women were classified on the basis of their problems which are given in Table 1.

Problems:

Out of the sampled women, 84 per cent were facing the problems and rest 16 per cent was not facing problems. Out of the sampled women facing the problem, 61.90 per cent respondents were having the problems related to their family and remaining 38.10 per cent women were facing the problem related to their officers/ employers.

Family problems:

Out of 21 surveyed women, 13 women were facing the family problems in their work of social forestry. Majority of respondents (84.62%) were facing the problems in their work because they have to look after their children along with their work. Only 7.69% women were facing the problems because of husband's non-cooperative attitude.

Problems with officers:

Out of 8 respondents who were facing the problem with their officer in work of social forestry, 50% of women were not getting the financial help from their

Table 1: Distribution of respondents facing the problems during social forestry

N = 25

Particulars	Classification	Respondents	
		Frequency	Percentage
Problems	Related to family	13	61.90
	Related to officers	8	38.10
	No problem	4	16.00
Family problems	Related to husband	1	7.69
	Related to children	11	84.62
	Other	1	7.69
Officers problem	Absence of financial help	4	50.00
	Other	4	50.00
Financial help	Received	1	4.00
	Not received	24	96.00
Employment security	Yes	4	16.00
	No	21	84.00

Table 2:Distribution of sampled women according to their knowledge about social forestry and its products

N = 25

Level	Classification	Respondents	
		Frequency	Percentage
Knowledge	Low	1	4
	Medium	15	60
	High	9	36
Skill	Low	15	60
	Medium	10	40
	High	-	-
Economic status	Low	10	40
	Medium	9	36
	High	6	24

officer and rest 50% were facing problems of their officer in their work of social forestry.

Financial help:

Out of total sampled women, 96% women were not getting the financial help from their officer of their work (employer) and only 4% of them were getting financial help from the officer at their work. It is probably due to the reason that the respondents (received financial help) were working in the office from last more than 25 years and their length of services of the remaining women engaged in social forestry work is less than 25 years.

Employment security:

Out of the total sampled women engaged in social forestry, 84% were not getting the employment security from their employer and only 16% of the women were getting employment security from their employer.

Section B: Level of empowerment of women as a result of social forestry

Level of empowerment was studied under four heads; knowledge, skill, economic status and decision making. Knowledge, skill and economic status of sampled women engaged in social forestry were analysed by asking question and appropriate score was given to each question and minimum and maximum scores were divided into three categories namely low, medium and high.

Knowledge level:

Sixty per cent sampled women engaged in social forestry were having medium knowledge. Further, 36% of women engaged in social forestry were having high knowledge and only 4% sampled women were having low knowledge about social forestry and its product.

Skill level:

Sixty per cent sampled women were low skilled. Further 40% sampled women were medium skilled, while there was no high skilled respondents engaged in social forestry and its operations.

Economic status:

Forty per cent respondents had low economic status by working in social forestry. Further 36% respondents had medium economic status and 24% respondents had high economic status by working in social forestry. Hoskin (1982) reported that women have been found greater ability to recognize tree products and use these to meet their survival needs. Among the tree products from woodland, fuel, food and fodder are the main products collected by women.

Related to number of children:

It is interesting to note that total sampled women

Table 1: Decision-making level of women in social forestry

N = 25

Decisions related to	Classification	Frequency	Respondents Percentage
Number of children	Yes	-	-
	No	25	100
Girl education	Yes	-	-
	No	25	100
Expenditure on family needs	Yes	5	20
	No	20	80
Family problems solution	Yes	4	16
	No	21	84
Motivators*	Family members	7	28
	Neighours	12	48
	Extension worker	2	8
	Other persons	6	24
	Self	1	4

were not taking decision related to number of their children. It shows that either husbands took decision or no-one took decision about number of children they suppose that it is gift of God.

Related to girl education:

Hundred per cent of surveyed women were not taking the decision about the education of the female children. The reason for not giving the education to their children is mainly the economic condition of the family and more number of children in their family.

Related to expenditure on family needs:

Out of the total women, 80% women were not taking decision on the expenditure of family needs. While only 20% respondents took decision about the expenditure of family needs. They took decision either in absence of male partner or male member.

Family problems solution:

Out of total respondents, 84% respondents were not given the importance in solving family problems and only in 16% cases, the view or ideas of the respondents were considered in solving the family problems.

Motivators:

Out of total respondents, 48% respondents were inspired by neighbors to work in social forestry. Further 28% respondents were inspired by family members, 24% respondents were motivated by other persons, 8% were motivated by extension workers and 4% were self motivated for working in social forestry's nursery.

Conclusion

Women have been playing a vital role in social as one of the wheels of family bullock cart in an attempt to develop family, society and country. In this relation women have to perform many roles in the society namely; domestic activities, engaged in cultivating the family farm production of traditional and knitting as unpaid labourers and community management activities. Women collect water, fuel wood and cut grass on common lands. It is the women who usually manage the communities resources which after go unrecognized. After giving so much to family, society and country, they are facing problems and their level of knowledge, skill and economic status is low. They are not a major decision maker and not even taking decision with their husband. So, there is great need to plan and implement programme for creating awareness about their rights among the women working in social forestry. Government/non-government organization should come forward to provide them financial help and employment security. So that they could be secure and give their full contribution.

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Journal of Rural and Agricultural Research Vol. 9 No. 2, 75-76 (2009)

Perception of tribal farmers towards farm programmes of Door Darshan

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Abstract

The study was conducted in Balaghat district of M.P. in year 2006-07 to know the perception of tribal farmers towards farm programmes of Doordarshan. Baihar and Paraswara blocks were selected purposively due to the tribal belt. Six villages were finally selected from the selected blocks. A list of T.V. owners and viewers were prepared and ninety respondents were selected for the study. The majority of viewers were found in medium perception category followed by low perception category and high perception category. The perception of farmers about farm programmes was found significant relationship with independent attributes like education, size of land holding, annual income, socio-economic status, extension participation, social participation and cosmopoliteness. The attributes namely age, size of family and occupation did not show any relationship with perception of farmers.

Introduction

Doordarshan is an important and popular mass media of communication in India. It broadcasts essential knowledge and information in order to estimate greater agricultural production. Agriculture being an important sector in the Indian economy provides not only farm income and employment, but also an important source of foreign exchange. Doordarshan as an important media of communication has greater role to play in the coming years in order to disseminate agricultural education to the farming community. Agricultural information is disseminated to the farmers through Krishi-darshan programme. The value of any programme can only be judge through audience perception and response. It was therefore, felt necessary to study the perception of Doordarshan viewers. With this view, the present study was undertaken with the following specific objectives.

1- To study the level of perception of farmers viewing the farm programme of Doordarshan.

2- To explore the relationship between perception of the farmers and selected attributes of the farmers.

Materials and Methods

The study was conducted in Balaghat district of M.P. Door Darshan Kendra, Balaghat cover all the blocks of the district. Out of 10 blocks, Baihar and Paraswara blocks were selected purposively due to the tribal belt. Three villages of each block i.e. 6 villages were finally selected for the study. A list of T.V. owners and viewers were prepared with the help of local leaders and people. After the preparation of list 15 respondents were selected in each village by using simple random sampling method. Thus, the total 90 respondents were selected for the study. Perception of farmers viewing farm programmes was studied as viewers' reaction by Wankhede and Khan (2005). In the present study, the responses of farm-programme viewer's were recorded by in the form of high, medium and low with score accorded 3,2 and 1 respectively.

Results and Discussion

Table 1 reveals that the level of perception of viewers of Krishi darshan programme. Majority of viewers (65.88%) were found in medium perception category and low perception category 24.45 percent and high perception category 10.00 percent.

Table 1: Perception of farmers viewing Krishi Darshan programme of Doordarshan.

S.No.	Level of perception	Frequency	Percentage
1	High	09	10.00
2	Medium	59	65.55
3	Low	22	24.45
	Total-	90	100.00

The relationship between dependent attribute and ten independent attributes of the farmers was determined and presented in Table 2. Namely age education, family size, size of land holding, occupation, social participation, annual income, socio-economic status, cosmopoliteness and extension participation and dependent variable perception of tribal farmers.

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Table 2: Correlation between perception of farmers and their selected attributes.

S.No.	Attributes	Correlation coefficient
1	Age	-0.05
2	Education	0.33**
3	family size	0.09
4	Size of land holding	0.31**
5	Occupation	0.12
6	Social participation	0.24*
7	Annual income	0.45**
8	Socio-economic status	0.42**
9	Cosmopoliteness	0.29*
10	Extension participation	0.44**

* Significant at 0.01 level of probability

Out of ten independent attributes education, size of land holding, annual income, socio-economic status, Cosmopoliteness, social participation and extension participation were found positively and significantly correlated with perception of farmers. The attributes namely age, size of family and occupation did not show any relationship with perception of farmers.

Conclusion

Doordarshan is an important and popular mass media in India. It is to provide essential knowledge and information about agriculture. The value of farm programme can only be judged through audience perception. The differential perception was observed of farm programme of Doordarshan. The perception of farmers about farm programmes showed significant relationship with independent attributes like education, size of land holding, annual income, socio-economic status, extension participation, social participation and cosmopoliteness.

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Journal of Rural and Agricultural Research Vol. 9 No. 2, 77-78 (2009)

Economics of food grains storage-an experience with the farmers of U.P.

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The crux of problem lies with the safe storage of food grains for the reasonable period of times undertaken by millions of rural families. The advancement in post harvest technology made it possible to preserve the food grains for few years with minimum losses. However, farm level storage remains still prone to attack of pest and disease.

The important question connected with the storage with the storage function is the extent of storage. No generalization can be made regarding storage profit, the case of each commodity must be decided on the cost : benefit ratio only through the field studies.

The present study based on sample survey conducted in Kerakat and Dobhi block of Jaunpur district of Uttar Pradesh. Total 141 farmers from 23 villages were selected and interviewed to study the relative economics of different storage structures adopted by farmers. The food grains covered under study are wheat, gram, maize, paddy and rice.

Results and Discussion

A. Storage Practices:

The result of study revealed bag and Kuthala system were used by majority of the farmers for storing the selected food grains. Bulk system was reported to be used to be storage of wheat , gram and paddy. `Bags in Straw' were used for storing wheat and gram. Use of metal bin was wheat and rice only. Tying system was invariably used for storing the maize cobs.

B. Estimation of Losses:

The present study covers only quantitative loss. Maximum losses were reported in bags system followed by Kuthala. Minimum losses wee observed in case of metal bins. It was observed that intensity of loss increases with increase in the period of storage in all the storage system for all food grains. It has been found that differences in losses of these food grains stored by using traditional method and modern method differs considerably.

C. Storage Costs:

Cost based analysis of different storage structure for different food grains revels the suitability of the structures in the following order. In parentheses there in cost in rupees on per quintal grain in that particular storage period.

a) Wheat

Bulk(Rs. 19.73)> Kuthala(Rs. 23.13)> Metals Bins (Rs. 24.55)> Bags in straw(Rs. 25.51)> Bags(Rs. 25.56)

b) Gram

Bulk(Rs. 45.51)> Kuthala(Rs.51.33)> Bags in Straw(Rs. 51.35) Bags(Rs. 54.47)

C) Maize

Tying(Rs. 15.05)> Kuthala(Rs.18.85)> Bags(Rs. 21.84)

d) Paddy

Bulk(Rs. 11.87)>Kuthala(Rs.13.71)>Bags(Rs. 17.41)

e) Rice

Kuthala(Rs. 19.20)>Metal bins(Rs. 21.29)>bags(Rs. 24.33)

The major conclusion of the above analysis are

i.) Cost of storing grains in 'bages' system is most expensive because of the cost of bags and relatively greater losses.

ii) Bulk method (where it was adopted) costs less than the others method of storage as huge amount was stored in bulk system, resulting in less per unit cost of storage.

iii) Tying system which was invariably used to store maize cobs is also less expensive system.

iv) The overall total storage cost increased with an increase in the period of storage.

D. Seasonal price variations and profitability of storage

Seasonal price variation refers to the fluctuations in the price over a given period of time. It is closely related with the storage profit.

Economic feasibility of the storage structures and profit per quintals of grains (presented in parentheses) was in the following order.

(a) Wheat

Bulk(Rs. 20.27)> Kuthala(Rs. 16.87)> Metals Bins (Rs. 15.48)> Bags in straw(Rs. 14.34)> Bags(Rs. 6.08)

b) Gram

Bulk(Rs. 76.49)> Kuthala(Rs.70.67)> Bgs in Straw(Rs. 70.65) Bags(Rs. 65.63)

C) Maize

Tying(Rs. 39.95)> Kuthala(Rs.36.15)> Bags(Rs. 24.16)

d) Paddy

Bulk(Rs. 12.13)>Kuthala(Rs.10.29)>Bags(Rs. 6.59)

e) Rice

Kuthala(Rs. 87.80)>Metal bins(Rs. 84.71)>bags(Rs. 82.77)

It is apparent from the above analysis that the variations in prices exceeds the storage cost for all the storage structures and for all the food grains.

Conclusions and suggestions

The finds of the study shows that farmers who save and store grains, for sale at a future date were found to be graining by with holding the produce from immediate sale irrespective of the type of storage structures in use and support for the expansion of India storage extension service but realizing the sizeable loss which occurs at farm level storage, it was felt that greater awareness should be created among the farmers and house wives that they are losing, lot of grains by way of insects, rodents and mould infestation.

Brief about storage structures

A. Bulk method: A bed of straw is prepare on the floor and upto a height against the wall so that the stored grain might not come in the contact of the floor or wall. The grain is then loosely spread over the bed.

B. Bags in straw method: In this method, bags with fall of grains are kept in layer with the alternate layer of straw to keep it safe from dampness and weevils also.

C. Beg method: This is most common storage system. Grains after filling in bags are generally stored in some apartment which are used for living purposes also. Perfect mobility is the main advantage of this system.

D. Kuthala method: Kuthalas are sort of home made soils and are made up of mud, chaff and animal dung. The soils is conical in shape with the base about one meter diameter and about one and half meter in height.

E. Metal bin: These structures are either of metal sheet or iron.

F. Tying method: In this system, maize was generally stored in form of cobs. Ears of cobs are tied to each other in twos or fours, hung on a rope preferably in warm place, such as kitchen where smoke or heat may keep away the insect.

Journal of Rural and Agricultural Research Vol. 9 No. 2, 79-82 (2009)

Comparative Study of Development of Eastern and Western Region of Uttar Pradesh

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Uttar Pradesh can be divided into four economic regions by grouping contiguous districts having more or less similar geographical are and climatic conditions, economic activity pattern, population density and agricultural conditions. These regions are eastern, western, bundelkhand and central. The western Uttar Pradesh is agriculturally prosperous, it is relatively industrialized and has been greater degree of urbanization as compare to eastern region. The present study aims to study the comparison of development between eastern and western region of Uttar Pradesh. The study comprises of agricultural indicators for the astern and western region of Uttar Pradesh, composite index of development and comparative position of roads for different regions of Uttar Pradesh which were based on literacy rate of females, per capita net product, no. of beds available in hospital per lakh of population and poverty at district levels.

1. Comparison of Agricultural Development in Eastern and Western Regions of Uttar Pradesh :

The Table 1 presents the comparison of different selected agricultural indicators for eastern region, western region of Uttar Pradesh and state as a whole.

The eastern region of Uttar Pradesh has an are of 90270 square km as compare to 79831 square km in western region. The population in eastern region accounted 6,92,88,524 person and 61036784 person in western region. The eastern region has a high density of population (765 per sq. km.) than in western region (788 per sq.km.). The sex ratio was found higher (923 female per 1000 males) in eastern region which is even higher than state average (898) and western region of Uttar Pradesh (864). Out of total working force available in the state, 43 and 34 percent were accounted for eastern and western region of Uttar Pradesh. Population provides the labour force for the development but may prove a drag on the economy if the non-working population grows beyond the resources available in the state. The average size of holdings was found higher (1.08 ha) in western region of Uttar Pradesh than in eastern Uttar Pradesh (0.71 ha), which is even below the state average (0.89 ha). More than 72 percent of the working force were found to be engaged in agriculture in eastern Uttar Pradesh as compared to western Uttar Pradesh (56.93 percent) as against the state average of 66 percent. It shows relatively heavier dependence of population on agriculture in eastern Uttar Pradesh. The net area sown in eastern Uttar Pradesh was 6246140 (000 ha.) as compared to western Uttar Pradesh 6094527 (000 ha.). The total irrigated are in eastern Uttar Pradesh was less (39,43,087 ha.) as compared to western Uttar Pradesh (50,11,685 ha.). The major source of irrigation was reported tubewell which irrigated 68.54 per cent land in eastern Uttar Pradesh and 74.40 per cent land in western Uttar Pradesh. As regards the intensity of cropping, which indicates the intensive use of land, the cropping intensity was found 146.85 percent in eastern Uttar Pradesh as compared to 149.49 percent in western Uttar Pradesh which is even higher in both the regions than state average 114.25 percent.

The fertilizer consumption (N.P.K.) was found 11,00,694 tonnes in eastern Uttar Pradesh than 13,59,945 tonnes in western Uttar Pradesh. The consumption of fertilizer was relatively more in western Uttar Pradesh than eastern Uttar Pradesh. Productivity of kharif crops was more in western region (18.24 q/ha.) than eastern region 16.54 q/ha.). The productivity of rabi crops was more in western region (30.55 q/ha.) than eastern region (19.62 q/ha.). Permanent pastures and other grazing lands were more in eastern Uttar Pradesh (19,679 sq. km.) than in western Uttar Pradesh (18,831 sq. km.). The fruit production (Mango, Guava, Papaya and Melon) were more in western region (14,97,960 metric tones) than in eastern region (6,26,854 metric tones). With regards to livestock position, eastern Uttar Pradesh accounts more cows, sheep's, poultry, goats, fish farmers except buffaloes than western Uttar Pradesh.

2. Comparison of Roads Availability in Eastern and Western Regions of Uttar Pradesh :

The roads are of paramount significance as means of transport. It makes possible the farmer's and industrialist's and the people access to markets, lead to considerable agriculture and industrial expansion. The comparative position of paved road in eastern region is the same at present as it was at the end of the second five-year plan as comparison to western region which is illustrated in Table 2. It is evident from the table that road mileage in the eastern region is not better than western region which is a disappointing situation. The length of surfaced road per lakh of population in (1991) in eastern region was 48.95 km as compared to Punjab it was 216.90 km. The quality of roads in this region is very inferior and maintenance is very poor. The infrastructural development like electricity, transportation, communication and health are the main organ for intensive development of the area, which need priority to policy maker and the government.

3. Composite Index of Development (CID):

The eastern Uttar Pradesh and Bundelkhand region are backward in comparison to western and central part of Uttar Pradesh. The eastern region is the bigger part of

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Table 1: Selected agricultural indicators for eastern, western region and Uttar Pradesh state

S.No. Particulars	Eastern U.P.	Western U.P.	Uttar Pradesh
1. Area (Square kilometres) in 2001	90270	79831	240928
2. Population	69288524	61036784	166052859
(a) Male (%)	53.25	53.66	52.67
(b) Female (%)	46.75	47.33	47.33
3. Density of population per sq.km.	768	765	689
4. Sex ratio (Female per 1000 male)	923	864	898
5. Total working force (in person)	43.09	34.41	54.18
6. In the total working force the percentage of			
(a) Cultivators	41.20	38.18	40.92
(b) Agricultural labour	30.98	18.75	25.11
7. Operational holdings			
(a) No. of operational holding	9021839	5750117	19220900
(b) Area of operational holdings	6386359	6221248	17153038
(c) Average size of holdings	0.71	1.08	0.89
8. Culturable weste land in (sq. km.)	155529	151303	571297
9. Net area sown (thousand ha.)	4838695	370304	1714381
10. Net area sown (in 000 ha.) in 2000-01	6246140	6094527	16801063
11. Percentage of irrigated land by different means (ha.)			
(a) Canals	27.21	18.43	25.42
(b) Tubewell	68.54	74.40	67.15
(c) Ponds, lackes and others	4.25	7.16	7.43
12. Fertilizer consumption (Kharif+ Rabi) in tonnes 2000-01			
(a) Nitrogen	812067	1042093	2206496
(b) Phosphate	250058	274183	662085
(c) Potash	38569	43669	93243
13. Cropping intensity	146.85	149.49	114.25
14. Grossed cropped area (ha.)	8771696	9110409	24236446
15. Kharif food grains (1998-99)			
(a) Area (ha.)	3762553	2566983	8074336
(b) Production (Metric tonnes)	6295358	4510996	13121717
(c) Productivity (q/ha)	16.54	18.24	16.25
16. Rabi food grains (1998-99)			
(a) Area (ha.)	4237214	3799627	11563798
(b) Production (Metric tonnes)	8825416	10312977	25612068
(c) Productivity (q/ha)	19.62	30.55	22.15
17. Permanent pastures and other grazing land (sq.km.) 1998-99	19679	18831	67240
18.Fruit production (Mango, Guava, Papaya, Melon) in M.T. 1997-98	626854	1497960	2504791
19. Rain fall 2001	800-1200	852	-
20. Live stock (1993)			
(a) Cow	11640868	5015831	23530178
(b) Buffaloes	5233761	9889525	19021602
(c) Sheep	1183140	367620	2044475
(d) Goats	5400460	3396492	12012268
(e) Poultry	5637773	2648528	9944328
(f) No. of family member of fish	1047368	236748	1626720

Source: Uttaranchal and Uttar Pradesh at a glance 2003, Jagran Research Centre, 2 Sarvodaya Nagar, Kanpur.

Uttar Pradesh on the basis of population and area. Table 3 explains the composite index of development of different regions of Uttar Pradesh for the three periods i.e. 1970-71, 1980-81 and 1990-91. The state planning institute, Lucknow has calculated CID for reach region selecting eleven indicators of development drawn mainly from agriculture, industry, economics, infrastructure and social services.

The table revealed that the CID of western and central region have first and second position and eastern Uttar Pradesh has third position on the basis of composite index of development. Among all the regions in Uttar Pradesh, Bundelkhand has got fifth position on development basis. In 1970-71 and 1980-81 the eastern region was on the second and fourth place in the ranking whereas in 1990-91, it had came in to third place.

Table 4 and 5 explained the human development index for different district of eastern and western Uttar Pradesh. This was prepared taking into account of literacy rate of female, per capita net product and number of bed available in hospital per lakh of population and poverty. Keeping in

Table 2: Comparative position of Roads

Region	Mileage/100 Sq. miles (1961)	Mileage/Lakh of population (1961)	Length of pucca road/1000 Sq. Km. of area (Km) 1996-97	Length of pucca road/Lakh population of area (Km) 1996-97
Western	15.1	18.1	349.50	50.83
Central	12.1	16.7	392.32	50.83
Eastern	13.1	15.4	332.84	48.95
Budelkhand	10.2	30.5	219.08	87.70
Hill district	10.2	64.2	263.26	208.67
Av. for the state	12.8	19.7	308.07	59.19

Source: Singh and Singh (1995)

Table 3: Comparision of regions of Uttar Pradesh using Composite index of development

Regions	Composite Index of Development 1970-71	1980-81	1990-91
Western	125.45(I)	133.45(I)	126.52(I)
Central	91.95(III)	99.95(II)	92.51(II)
Eastern	93.13(II)	87.33(IV)	90.38(III)
Bundelkhand	55.39(VI)	53.85(V)	54.86(V)
Uttarakhand	75.09(IV)	92.09(III)	86.03(IV)

Note: The number in brachet shows position of concern region on the basis of development

Source: Annual Plan, U.P. 1994-95, Vol. 1, p. 55, Planning Department, Lucknow.

Table 4: Classification of Districts of Eastern and Wesern Uttar Pradesh based on Humen Development index

High Human Development Index		Low Humen Development Index	
District	Region	District	Region
Agra	W	Muzzafarnagar	W
Bareilly	W	Ballia	E
Etawah	W	Mainpuri	W
Bijnaur	W	Rampur	W
Ghaziabad	W	Ghzipur	E
Allahabad	E	Azamgarh	E
Mathura	W	Sultanpur	E
Varanasi	E	Pratapgarh	E
Farrukhabad	W	Mirzapur	E
Gorakhpur	E	Bulandshahar	W
Shaharanpur	W	Basti	E
Merrut	W	Badaun	W
Pilibhit	W	Deoria	E
Aligarh	W	Etah	W
Shahjahanpur	W	Jaunpur	E
Faizabad	E	Gonda	E
Muradabad	W	Bahraich	E

Note: W = Western U.P. E = Eastern U.P.

Source: Planning Department, Uttar Pradesh Government, Lucknow

view the high index of development, only 17 districts viz. Allahabad, Varanasi, Faizabad and Gorakhpur comes in the high development, only 17 districts viz. Allahabad, Varanasi, Faizabad and Gorakhpur comes in the high development index in eastern Uttar Pradesh and 13 districts belong to high development index in western Uttar Pradesh. Rest of the districts in both the regions belonging to low development index. The western region is developed in all respects as compare to eastern region of particularly is a matter of great concern to planners, policy-decision maker and to political leader. A holistic approach should be launched to developed the inadequately developed region by developing agriculture, industry, trade and commerce through proper development of necessary infrastructure.

4. Causes for Disparities

The following reasons were identified for backwardness of eastern Uttar Pradesh as compared to western Uttar Pradesh.

A. The average size of holdings was found higher (1.08 ha.) in western region as compared to eastern region (0.71 ha.) which was even below the state average (0.89 ha.) which caused more dependence of population in agriculture resulting into low per capita land availability for cultivation and there by less production in eastern Uttar Pradesh.

B. The area irrigated by tubewell (74.40%), fertilizer consumption (N.P.K.), cropping intensity (149.49%), the productivity of food grains (kharif and rabi both), the fruit production was comparatively quite high in western region as compared to eastern Uttar Pradesh which caused low agricultural production hence low development of the region as a whole. The eastern region has greater dependence on traditional means of land cultivation, where as western region has comparatively more mechanized farming.

C. The composite index development which was prepared taking into account of the eleven indicators of development drawn mainly from agriculture, industry, economics, infrastructure and social services revealed that western region ranked first and eastern region ranked third which means eastern region is poorly lacking the infrastructural facilities and industry development etc.

D. The another cause for low development in eastern Uttar Pradesh was low net product per capita, less female literacy rate, bed available in hospital per lakh population were found low as compared to western region of Uttar Pradesh.

E. The total working force was found higher (43.09%) in eastern region than western region (34.41%). Due to lack of industry and other subsidiary enterprise in the eastern region, there is no scope for employment which caused

Table 5: Humen development index of different district of Western and Eastern Uttar Pradesh

District	Net product/capita 1993-94 (1980-81 price)	Female literacy rate 1991 (%)	Bed available inhospital/ per lakh population	Poverty Index-1	Poverty Index-2	Poverty Index-3	Average poverty Index	Humen develop-ment Index
Saharanpur	1832	28.10	53	0.63	0.63	0.38	0.55	0.45
Muzaffarnagar	1661	29.12	29	0.68	0.96	0.35	0.66	0.34
Merrut	1735	35.62	80	0.66	0.26	0.11	0.56	0.44
Ghaziabad	2088	38.81	35	0.56	0.88	0.00	0.98	0.52
Bulandsahar	1280	24.30	30	0.79	0.95	0.52	0.75	0.25
Aligarh	922	27.17	68	0.90	0.412	0.41	0.58	0.42
Mathura	1382	23.04	85	0.76	0.19	0.56	0.50	0.50
Agra	904	30.83	99	0.90	0.00	0.28	0.39	0.61
Mainpuri	879	35.05	27	0.91	0.97	0.13	0.67	0.33
Etah	891	22.91	26	0.91	1.00	0.57	0.83	0.17
Bijnaour	4002	26.47	26	0.00	1.00	0.44	0.48	0.52
Muradabad	2872	18.34	34	0.33	0.89	0.73	0.65	0.35
Rampur	2881	15.31	37	0.33	0.85	0.84	0.67	0.33
Bareilly	3324	19.85	70	0.20	0.40	0.68	0.42	0.58
Badaun	2501	12.82	31	0.44	0.93	0.93	0.77	0.23
Sahjahanpur	3021	18.59	33	0.29	0.90	0.72	0.64	0.36
Pilibhit	3855	17.22	33	0.04	0.90	0.77	0.57	0.43
Farrukhabad	2300	31.97	39	0.50	0.82	0.24	0.52	0.48
Etawah	2389	38.34	35	0.47	0.88	0.02	0.46	0.54
Allahabad	705	23.45	77	0.96	0.30	0.56	0.50	0.50
Varanasi	883	28.87	83	0.96	0.22	0.35	0.51	0.49
Mirzapur	1179	22.32	39	0.82	0.82	0.59	0.74	0.26
Jaunpur	576	22.39	29	1.00	0.96	0.58	0.83	0.17
Ghajipur	1867	24.38	28	0.62	0.97	0.51	0.72	0.30
Ballia	1665	26.13	36	0.68	0.86	0.45	0.66	0.34
Ghorakhpur	1472	24.49	75	0.74	0.33	0.51	0.53	0.47
Deoria	1954	18.75	27	0.60	0.99	0.71	0.77	0.23
Basti	1727	17.82	37	0.66	0.85	0.75	0.75	0.25
Azamgarh	1985	22.67	31	0.61	0.93	0.57	0.70	0.30
Faizabad	1844	22.97	46	0.63	0.73	0.56	0.64	0.36
Gonda	1590	12.58	33	0.70	0.90	0.93	0.84	0.16
Baharaich	1726	10.73	24	0.66	0.96	1.00	0.87	0.13
Sultanpur	1870	20.84	38	0.62	0.83	0.64	0.70	0.30
Pratapgarh	1578	20.48	43	0.71	0.77	0.65	0.71	0.29

unemployment in the region.

F. The eastern region of Uttar Pradesh possessing comparatively poor quality of roads than western region which caused to not access smoothly the farmer's with his produce to the market and also checks the industrial expansion.

Suggestions for development of the region:

On the basis of above discussion following suggestions was put forward for the development of the region-

Agriculture and industry demand more attention of planning department in the region. There is need for intensive agriculture to increase agriculture production per unit of land. The provision should be made so that the more credit available for the farmers to meet the expenses of agriculture operation. Reasonable facilities for the movement of men, material, messages and agriculture produce are an essential condition for development in the region. Provision of infrastructure services like electricity, transportation, roads, communication, telephone, tax, computer and health assumes special importance as an integral part of the accelerated development. There is need to check the labour migration by providing them all possible means to provide them gainful employment in the region. The region deserves more attention on education and human resource development.

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Journal of Rural and Agricultural Research Vol. 7 No. 2, 83-84 (2009)

Problems in Availing Benefits of Rural Development Programmes

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Abstract

The present study was conducted in Rampur district of Uttar Pradesh to highlight the problems faced by the rural poor in availing benefits of rural development prorammes. A sample of 275 rural poors (living below poverty line) was selected for the study from 3 least developed blocks of 12 Village Panchayats. Problems in availing benefits of rural development programmes reported by respondents included partial benefits, lack of awareness and detailed knowledge about different programmes, illiteracy, lack of wide publicity of programmes, biasness among development functionaries, unequal benefits among beneficiaries, lack of discussion with general farmers, delay in getting benefits, complex formalities/procedures, no training / follow up support and political interferences in implementation of programmes.

Introduction

Rural development is the most important challenge before the developing nations. In India, development of rural areas has seen the focus of planners and policy makers ever since pre-independence. There have been a multitude of rural development programmes of different nature which includes multipurpose programmes, target and area specific programmes and mono purpose rural development programmes. However, an overview of various developmental efforts revealed various missing links in their planning and implementation. Despite the series of development programmes, the much desired change among rural people did not happen in the country. The problem facing the rural people are many. Thus the present study was conducted in Rampur District of Uttar Pradesh to highlight the problems faced by the rural poor in availing benefits of rural development programmes.

Methods and Materials

The study was carried out in Rampur District of Uttar Pradesh. Rampur District of U.P. was selected purposively. There are six development blocks in Rampur District out of which three least developed blocks namely Shahabad, Milak & Suar were purposively selected on the basis of selected parameters such as weaker persons population, low level of literacy and un conducive means of transportation and communication. The entire block area was divided in four segments and from each segment one average Village Panchayat was selected. Thus, a total of twelve Village Panchayats were included in the present study for selecting the respondents. Census was conducted in each selected village panchayat i.e. house hold wise lists were prepared in each Village Panchayat. Further, from the list thus prepared weaker persons (living below poverty line) were identified and arranged according to the occupation and from each occupational group 30 per cent house holds were selected randomly. Hence, a sample of 275 respondents was selected for the study. The respondents were interviewed with the help of pre tested structured interview schedule developed for the purpose of study.

Results and Discussion

Respondents had been asked through open-ended question to enlist problems faced in availing benefits of rural development programmes. Data presented in Table 1 clearly revealed that majority reported partial benefits (72.00%) as major problem followed by lack of awareness about different programmes (65.91%), illiteracy (60.00%), lake of wise publicity of programmes (47.27%), lack of detailed knowledge (45.09%), biasness among development functionaries (40.00%), lack of transportation facilities (39.27%), unequal benefits among beneficiaries (38.18%), lack of discussion with general farmers (34.91%), delay in getting benefits (34.18%), complex formalities / procedures (33.09%), no training / follow up support (28.00%) and political interference in implementation (24.73%). These were substantiated by the cases too. The informants narrated their frustration with development bureaucracy. Instances of cheating and improper utilization of benefits were plenty. Above finding has been reported by many studies in past (1,2,3,4 & 5).

Conclusion

Problems in availing benefits of rural development programmes reported by respondents included partial benefits, lack of awareness and detailed knowledge about different programmes, illiteracy, lack of wide publicity of programmes, biasness among development

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Table 1 : Problems in Availing Benefits of Rural Development Programmes.
N = 275

Sources	Frequency	Percentage
Partial benefits	198	72.00
Lack of awareness about different Pgromgrammes.	184	66.91
Lack of detailed knowledge	124	45.09
Biasness among development functionaries	110	40.00
Unequal benefits among beneficiaries.	105	38.18
Lack of discussion with general farmers / People	96	34.91
Delay in getting benefits	94	34.18
Complex formalities / Procedures	91	33.09
No. training / Follow up support	77	28.00
Political interference in implementation	68	24.73
Illiteracy	165	60.00
Lack of transportation facilities	108	39.27
Lack of wide publicity of programmes.	130	47.27

functionaries, unequal benefits among beneficiaries, lack of discussion with general farmers, delay in getting benefits, complex formalities / procedures, no training / follow up support and political interference in implementation of programmes.

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Journal of Rural and Agricultural Research Vol. 7 No. 2, 85-88 (2009)

Effect of various coagulants and types of milk on chemical quality of paneer

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Abstract

Paneer, made from standardized buffalo (6% fat, 9% SNF), cow (4% fat, 8.5% SNF) and mixed milk (5% fat, 9% SNF) using two different coagulants, viz. citric acid and calcium lactate at 1 and 2% levels each and coagulated at 80° and 85°C, was analysed for total solids, fat, protein and ash contents. Acidity was also determined. Results suggested that buffalo milk paneer contained the highest total solids and fat contents, followed by mixed milk and cow milk paneer samples. Contrarily, the cow milk paneer elicited the highest protein and ash contents, while the buffalo milk paneer had the lowest content of these constituents. The cow milk paneer also had higher acidity than mixed milk or buffalo milk paneer. The type of coagulants used in preparation of different types of paneer as well as the coagulation temperatures had significant influence on chemical quality of paneer. In general, 2% concentration of coagulants and 85°C coagulation temperature had more marked effect.

Introduction

Paneer, a highly popular traditional Indian dairy product, is obtained by heat-and-acid coagulation of milk. The coagulation phenomenon involves formation of large structural aggregates of milk proteins in which milk fat and a small fraction of whey carrying soluble milk solids are contained while the major portion of whey separates from the coagulum. The solid mass resulting from fusing together under pressure of the coagulated lumps, is called paneer (Dharam Pal and Agrawala, 2007). Good quality paneer is characterized by white colour, sweetish to mild acidic, nutty flavour, spongy body and a close-knit texture. Paneer is highly nutritious and is used in preparation of several varieties of culinary dishes and snacks. The demand for value added products with paneer as base material is growing at a very fast rate particularly in towns and cities. There is a greater need to tap the market potential of paneer both for domestic consumption as well as export.

As the quality of paneer varies widely according to the milk used in its preparation, a systematic study was undertaken to assess the effect of various coagulants, its different concentrations and coagulation temperatures on chemical quality of paneer made from buffalo, cow and mixed milk to obtain a desired product with high nutritive value, excellent taste and frying characteristics.

Materials and Methods

Procurement of milk: The buffalo and cow milk were obtained from the University Dairy and standardized to 6.0% fat and 9.0% SNF, and 4.0% fat and 8.5% SNF, respectively. The mixed milk was prepared by mixing 50% each of buffalo and cow milk and standardized to 5.0% fat and 9.0% SNF for preparation of paneer.

Coagulants used:

Two coagulants, *viz*. citric acid and calcium lactate at one and two per cent concentration each were used for coagulating milk at two different temperatures, namely, 80° and 85°C for paneer production.

Preparation of paneer:

The product was prepared by the process suggested by Bhattacharya *et al*. (1971) and subsequently modified by Sachdeva (1983). The standardized cow, buffalo and mixed milk were heated to 100°C for 5 minutes and subsequently cooled to 80° or 85°C. Various coagulants at desired concentrations were added slowly with continuous agitation till clear whey separated out. The curd was left for 5-10 minutes in the whey and then drained through muslin cloth and pressed in a hoof at 2 kg/cm^2 pressure. Paneer block was dipped in chilled water for one hour and packaged in pre-sterilised LDPE sachets and stored at 5°C.

Chemical analysis of paneer: The total solids, fat, protein and ash contents as well as acidity of paneer were determined by methods described in BIS (1961) and BIS (1964).

Results and Discussion

The paneer samples prepared from different types of milk using citric acid and calcium lactate as coagulants at two coagulation temperatures were analysed for total solids, fat, protein and ash contents. The acidity of paneer

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was also determined. The results on total solids content of paneer have been recorded in Table 1.

Table 1: The effect of different types of milk, coagulants with concentration and temperature of coagulation on total solids content of paneer

	B_1	B_2	B_3	B_4	C_1	C_2	Mean
A_1	51.60	52.10	50.35	50.65	51.02	51.32	51.17
A_2	50.10	50.60	48.90	48.15	49.52	49.85	48.89
A_3	47.80	48.30	46.10	46.20	48.87	47.22	47.10
B_1					48.73	48.83	48.78
B_2					50.13	50.53	50.33
B_3					48.30	48.80	48.55
B_4					48.53	48.80	48.66
Mean					49.30	49.33	

A_1 Buffalo milk, A_2 Mixed milk, A_3 Cow milk, B_1 Citric acid (1%), B_2 Citric acid (2%), B_3 Calcium lactate (1%), B_4 Calcium lactate (2%), C_1 Coagulation temperature (80°C), C_2 Coagulation temperature (85°C)

	A	B	C	AB	AC	BC
SE(d)	0.05371	0.06202	0.04385	0.10742	0.07596	0.08771
CD at 5%	0.10799	0.12470	0.08817	0.21598	0.15272	0.17635

The results (Table 1) indicated that the maximum total solids content (51.17%) was found in paneer made from buffalo milk (A_1), followed by mixed milk samples (48.89%, A_2) and minimum (47.10%) in paneer from cow milk (A_3). The various coagulants and is concentrations also affected the total solids content in paneer. The total solids content was highest (50.33%) in paneer prepared with 2% citric acid, followed by 1% citric acid. Calcium lactate at 1 and 2% levels produced paneer with total solids content (48.55 to 48.66%) almost comparable with 1% citric acid. The coagulation temperature (80° or 85°C) did not markedly affect the total solids contents of paneer. Our results on total solids content of different types of paneer, *viz* buffalo, cow and mixed milk agree with the data reported by Desai (1988), Singh and Kanawjia (1988) and Roy (1991). All the samples of paneer from different milks were also in conformity with PFA requirement for paneer in respect to moisture (total solids) contents.

Fat content of paneer : The buffalo milk paneer elicited the highest fat content (26.40%), followed by mixed milk (24.28%) and cow milk (22.18%). The results in Table 2 further suggested that the coagulant citric acid at 2% concentration produced highest fat (25.25%) content in paneer followed by 1% citric acid (24.85%). Two per cent calcium lactate produced slightly higher (23.75%) fat content than 1% (23.31% fat). The coagulation temperature also affected the fat content. A little higher fat content (24.43%) was found in paneer made at 85°C (C_2) than at 80°C (C_1).

Table 2: The effect of different type of milk, coagulants with concentration and temperature of coagulation on fat content of paneer

	B_1	B_2	B_3	B_4	C_1	C_2	Mean
A_1	26.95	27.35	25.45	25.85	26.25	26.55	26.40
A_2	24.85	25.25	23.30	23.75	24.15	24.42	24.28
A_3	22.75	23.15	21.20	21.65	22.05	22.32	22.18
B_1				24.70	25.00	24.85	
B_2				25.10	25.40	25.25	
B_3				23.20	23.43	23.31	
B_4				23.60	23.90	23.75	
Mean					24.15	24.43	

A_1 Buffalo milk, A_2 Mixed milk, A_3 Cow milk, B_1 Citric acid (1%), B_2 Citric acid (2%), B_3 Calcium lactate (1%), B_4 Calcium lactate (2%), C_1 Coagulation temperature (80°C), C_2 Coagulation temperature (85°C)

	A	B	C	AB	AC	BC
SE(d)	0.03773	0.04356	0.03080	0.07543	0.05335	0.06160
CD at 5%	0.07585	0.08759	0.06193	0.15170	0.10727	0.12386

The results of present study on fat content of paneer from buffalo and mixed milk are in consonance with those of Rajorhia *e al.* (1984), Verma (1987) and Desai (1988). The cow milk paneer, on the other hand, contained a lower percentage of fat than either buffalo or mixed milk paneer (Singh and Kanawjia, 1988; Syed *et al.* 1992). The effect of coagulants and concentrations of coagulants have decided effect on composition and yield of paneer (Pal and Yadav, 1992).

Table 3: The effect of different type of milk, coagulants with concentration and temperature of coagulation on protein content of paneer

	B_1	B_2	B_3	B_4	C_1	C_2	Mean
A_1	18.70	19.40	18.10	18.80	18.65	18.85	18.75
A_2	20.20	20.90	19.60	20.80	20.15	20.60	20.35
A_3	21.70	22.40	21.10	21.80	21.45	21.65	21.75
B_1				20.10	20.30	20.20	
B_2				20.80	21.00	20.90	
B_3				19.50	19.70	19.60	
B_4				20.20	20.73	20.46	
Mean					20.15	20.43	

A_1 Buffalo milk, A_2 Mixed milk, A_3 Cow milk, B_1 Citric acid (1%), B_2 Citric acid (2%), B_3 Calcium lactate (1%), B_4 Calcium lactate (2%), C_1 Coagulation temperature (80°C), C_2 Coagulation temperature (85°C)

	A	B	C	AB	AC	BC
SE(d)	0.03399	0.03925	0.027875	0.066798	0.04807	0.0555
CD at 5%	0.06834	0.07891	0.05580	0.13667	0.09664	0.11159

Protein content of paneer:

The results on protein content (Table 3) indicted that cow milk paneer (A_3) contained highest percentage of protein (20.35), whereas the buffalo milk paneer (A_1) the lowest (18.75%). Further, the citric acid (B_2) at 2% concentration coagulant resulted in higher percentage of protein in paneer than 1% concentration of the same coagulant (B_1). Calcium lactate at 2% level (B_4) also produced higher protein content than its 1% counter part (B_3). Coagulation temperature also influenced the protein content of paneer, being a little higher (20.43%) in C_2 (85°C) than in C_1 (80°C). Our results on protein content of paneer made from buffalo, cow land mixed milk are fairly in agreement with those reported by Rajoria *et al.*, (1984), Sachdeva and Singh (1987) and Desai (1988). The protein content of mixed milk and cow milk paneer have been found to be higher than those of buffalo milk (Desai, 1988), possibly because of greater proportions of fat in the protein-fat aggregates in paneer, resulting from heat-cum-acid induced coagulation in paneer production (Gupta, 2002). The data on effects of various coagulants its concentration and coagulation temperature on protein content or contents of other chemical constituents of paneer made from different types of milk are meager (Yadav *et al.*, 2009) to substantiate the present data.

Table 4: The effect of different type of milk, coagulants with concentration and temperature of coagulation on ash content of paneer

	B_1	B_2	B_3	B_4	C_1	C_2	Mean
A_1	1.82	1.85	1.78	1.80	1.80	1.82	1.80
A_2	1.98	2.00	1.88	1.90	2.07	2.10	2.00
A_3	2.01	2.07	1.96	1.98	2.16	2.18	2.20
B_1				2.00	2.10	2.05	
B_2				2.05	2.15	2.10	
B_3				1.74	1.98	1.85	
B_4				1.85	1.95	1.90	
Mean					1.90	1.92	

A_1 Buffalo milk, A_2 Mixed milk, A_3 Cow milk, B_1 Citric acid (1%), B_2 Citric acid (2%), B_3 Calcium lactate (1%), B_4 Calcium lactate (2%), C_1 Coagulation temperature (80°C), C_2 Coagulation temperature (85°C)

	A	B	C	AB	AC	BC	
SE(d)	0.03299	0.03925	0.02774	0.06798	0.04806	0.0555	
CD at 5%	0.06834	0.07851	0.04580	0.13667	0.09664	0.0116	

Ash content:

Buffalo milk paneer (A_1) contained the lowest percentage of ash (1.80), while the cow milk paneer (A_3) the highest (2.20). The type of coagulant used in preparation of paneer had significant effect on ash content (Table 4). Two per cent citric acid produced higher ash content (2.10%) than 1% citric acid. Further, 2% calcium lactate also caused higher lash content (1.90%) than 1% calcium lactate (1.85%). The calcium lactate, in general, produced lower ash content than citric acid. However, no marked differences were observed in ash content of paneer prepared at either 85° or 80°C coagulation temperatures.

The values obtained for ash content of buffalo milk paneer agreed with those reported by Rajorhia *et al.* (1984), Sacdeva and Singh (1987), Divya Srivastava (2004) and Sweta Rai (2004). Published data on ash content of mixed milk paneer are meager. Sachdeva *et al.* (1991) have reported lower percentage of ash in cow milk paneer. Such variation may be due to difference in composition of milk, coagulants, its concentrations and temperatures of coagulation. At higher temperatures of coagulation, a greater proportion of soluble salts is incorporated in the protein-fat aggregates in paneer, causing an increase in its ash content.

Acidity of paneer: The cow milk paneer (A_3) contained the highest percentage of acidity (0.67), followed by mixed milk paneer (0.58) and buffalo milk paneer (0.48). The results in Table 5 further indicated that 2% citric acid caused higher acidity (0.66%) in paneer than 1% citric acid (0.61%). Calcium lactate at 2% level also caused higher acidity than its 1% concentration. Further, 85°C coagulation temperature also resulted in little higher acidity content in paneer than its 80°C counter part.

Table 5: The effect of different type of milk, coagulants with concentration and temperature of coagulation on acidity of paneer

	B_1	B_2	B_3	B_4	C_1	C_2	Mean
A_1	0.58	0.60	0.54	0.56	0.48	0.50	0.48
A_2	0.68	0.70	0.64	0.66	0.58	0.60	0.58
A_3	0.68	0.70	0.64	0.66	0.67	0.69	0.67
B_1				0.60	0.62	0.61	
B_2				0.65	0.67	0.66	
B_3				0.58	0.60	0.59	
B_4				0.60	0.62	0.61	
Mean					0.58	0.60	

A_1 Buffalo milk, A_2 Mixed milk, A_3 Cow milk, B_1 Citric acid (1%), B_2 Citric acid (2%), B_3 Calcium lactate (1%), B_4 Calcium lactate (2%), C_1 Coagulation temperature (80°C), C_2 Coagulation temperature (85°C)

	A	B	C	AB	AC	BC	
SE(d)	0.03399	0.03926	0.02775	0.06798	0.04807	0.0555	
CD at 5%	0.06834	0.05891	0.05580	0.13667	0.01664	0.1116	

Published data on acidity of paneer are scarce to substantiate results of present study. The variation in acidity of paneer samples made from different types of

milk is primarily due to differences in buffer capacities of various milk constituents in paneer, *viz*. protein, phosphates and citrates. The type of coagulant, its concentration and coagulation temperature also affected the acidity of paneer to notable extent.

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