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Comparison between Exponential Smoothing and Artificial Neural Network Price Forecast Model for Moong Crop in Sumerpur Market of Rajasthan

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Abstract

Forecasts of agricultural production and prices are intended to be useful for farmers, governments, and agribusiness industries. Moong is an important agriculture commodity especially for the state of Rajasthan. It is important to forecast its price, as this could help the policy makers in coming up with production and marketing plan to improve the economy as well as the farmers'welfare. In this paper, we take up time series modelling and forecasting of the moong price. The various forms of Artificial Neural Network (ANN) and Exponential Smoothing models (Single, Double and Triple) were employed to predict the future prices of moong in Sumerpur market. The performance of fitted models were examined by computing the various measure of goodness of fit, viz., Mean Absolute Deviation (MAD), Mean Standard Error (MSE) and Mean Absolute Percentage Error (MAPE). ANN model for moong were found to be the most appropriate model with MAD Value 11.25 , MSE value of 27205.92 and MAPE value 2.90 per cent. The validity of the forecasted price values of moong was checked by comparing them with their actual market price values during the post sample forecast period i.e. July 2012 to December 2012 for moong crops. The accuracy percentage between the forecasted and actual price value of moong were found to be 95 to 98 per cent. Our empirical results show that Artificial Neural Network Price Forecast time series models fit the price series well and they have correctly predicted the future trend of the price series within the sample period of study. Thus, it was the most representative model for the price forecast of moong in Sumerpur market of Rajasthan. The developed model can be used as a policy instrument for the producers and seller.

Key Word:- Forecast, Moong, Price, ANN, Exponential Smoothing

Introduction

India produces a quarter of the world's pulses and accounting for one third of the total acreage under pulses. Indians consume 30 per cent of the world's pulses but domestic production of pulses has not kept pace with population growth.

According to second advanced estimates of moong 2013-14 the total production . production under moong has increased by 7.56 per cent to 1.28 million tonnes compared to 1.19 million tonne in the previous year in India. The major moong producing states are Karnataka, Andhra Pradesh, Bihar, Rajasthan, Maharashtra, Tamilnadu, Assam, Kerala, Punjab, Madhya Pradesh and Uttar Pradesh.

In Rajasthan, moong is mainly grown in kharif season in most of the districts. According to second advance estimates of moong for 2013-14, area under moong has increased by 29.07 % to 10.19 lakh hectares as compared to 7.9 lakh hectares in the previous year. Likewise the production under moong has increased by 66.99 per cent to 3.9 lakh tonnes compared to 2.34 lakh tonne in 2012-13.

Inadequate market infrastructure and too many intermediaries between the producers and consumers lead to high marketing costs, resulting in lower share of producer in consumer's rupee. The lack of market intelligence about the potential markets and the pattern of arrivals and prices are important in regional and national markets further add to the woes of the farmers. Therefore, the need for proper market intelligence has been felt and voice raised from time to time by many scholars (Kallo and Pandey, 2002; Rai and Pandey, 2004; Singh *et al.*, 2004). The availability of market intelligence on aspects like potential markets, the quantum of market arrivals, prevailing and expected prices in different regional, national and international markets during different months of the year shall go a long way in mitigating many of these problems, not only that it shall help the farmers in adjusting their cropping pattern in a way, so that they could sell their produce at a time when the prices are reasonably high in markets.

Market intelligence is an essential function for the formulation of a sound price and trade policy and its successful implementation. The formulation

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of a sound price policy requires an analysis of long-term trends in the data on prices, arrivals, demand, supply and other information. Thus, market intelligence provides the necessary data for such an analysis and for an understanding of the behaviour of relevant factors; and helps in the evolution of a proper price policy.

Thus, Agricultural Market Intelligence is to help in getting higher net prices by producers besides increasing regional agricultural trade and food security by improving and linking the existing regional efforts to generate, disseminate, and make commercial use of market information for better scientific decision-making by farming community, traders, firms and researchers among different States.

Naturally forecasting is one of the main objectives of time series analyses having the art of saying that what will happen in the future rather than why ? There are various forecasting models in use now a days. Forecaster can choose his own method of forecasting based on his knowledge and available external information. As the process goes on, this procedure can be modified to address the present conditions and to satisfy the current situation. Different forecasting models may be fitted more or less equally well to the data, but they forecasts different future values. Unfortunately, there will be many occasions when analysts are not going to be certain which forecasting method or model is best one and there will be situations where it will appear that several models could do the job quite successfully. Even if we are certain of how to make a decision, we might work with different parameters and generate several forecasts, which will, again, raise the question of the best forecasts. Thus, it is very much needed that the forecaster should take care to the best possible because a large number of people are using such forecasts.

The study of behaviour and magnitude of the prices of moong is important for the farmers as it helps them in taking the decision pertaining to the time of sale of their produce. Traders may also plan their purchase and sale in accordance with the movement of prices over the months. Looking to the importance of price forecast to the producers in particular and traders, consumers and policy makers in general various price forecasting models were tried moong commodity in the study

Methodology

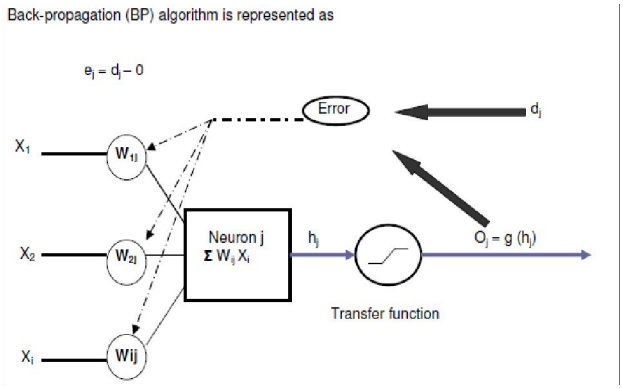
Sumrpur market was purposively selected for the price data as the market arrivals of moong were maximum in the state of Rajasthan. The various price forecasting models were tried to identify the most suitable model which suits to actual market price of moong. The data of moong prices in Sumerpur regulated market for the period Jan. 2002 to June, 2012 were utilized for model fitting and data for subsequent period i.e. from July 2012 to December 2012 were used for validation. The details of forecasting models are as follows:

Artificial Neural Network (ANN)

ANN is employed in case of homogeneous input data set. In the present study moong price is considered as homogeneous. After running ANN programme in MS Excel package, the input data set for individual selected species divided in to two parts namely training and testing data set. Moong price series from January, 2002 to June, 2012 was used as training data set in obtaining the output by neural network and the remaining data set (testing set) containing 18 points was considered for validation of the neural network. Different network structures were designed having different numbers of Neurons in the input and the hidden layer. The output layer had only one neuron which gave the forecasted index value. The first input node presented seasonal average price, the second node gave previous seasonal average price value as an input and likewise goes on and output layer for the next seasonal forecast value.

The back-propagation (BP) neural network learning methodology was used in obtaining the output. A subset of available average price data was used to construct the neural network. The network so constructed was trained using the training data set.

The overall errors were tracked until a minimum is obtained by altering the above mentioned parameters. The obtained minimum error was saved and this trained network was used in predicting future price value. The neural network producing minimum values of average absolute error was selected as best network and further used in one year ahead price forecasting of



Where,
X1, X2…Xi = inputs
W1, W2 …Wj = weights
hj = initial output
Oj = final output
dj = error at neuron j

In the above structure, actual moong price series (X1, X2…Xi) being connected to neuron *j* with weights (W1, W2…Wj) on each connection. The neuron sums all the signals it receives, with each signal being multiplied by its associated weights on the connection. This output *(hj)* is then passed through a transfer function, *g (h)* that is normally non-linear to give the final output or forecasted moong price (*Oi)*.

Exponential smoothing method for forecasting

If the weights for exponential smoothing are available, the calculation can be carried out simply by the formula

New Estimate = W (last measurement) + (1-W) (last estimate)

The term "last estimate" refers to the previous estimate made in the same way and "W' is called the smoothing factor at the start of series, any reasonable value can be choosen for the "last estimate term", it is quickly discounted by the method and any effects due to an error in the initial value quickly disappear. This system using a discounted average is referred to an exponential smoothing or adoptive smoothing.

Single exponential smoothing method

This method is also called as method of estimation of forecasts of single weight parameter. Under exponential smoothing equal weights have been given to all items, the weights assigned in geometric progression. Greater weights are assigned to recent observation and smaller weights are given distant observation.

In the present study MINITAB package was used to obtain value of appropriate value of W1.

Double Exponential smoothing method

This method is also called as trend adjusted exponential smoothing. Single exponential smoothing can be improved by the introduction of a second equation with a second smoothing constant/ second weight (W2) assuming moong price is influenced by the trend component and this represents the double exponential smoothing.

Triple exponential smoothing method:

To handle seasonality present in the time series data, the third parameter is added. Assuming moong price is influenced by seasonal factor, third equation being introduced along with new weight (W3) in order to take care of seasonality and to forecast moong price. The resulting set of equations is called the "Holt-Winters" (HW) method after the names of the inventors.

Selection of weights (W1, W2, W3)

Values of all three smoothing constant/weights were obtained by trial and error method. The moong price time series were analyzed by giving different weights and the best exponential model in each case wais selected, based on the minimum MAPE and MSD value under different weights.

Results and Discussion

Moong is mainly a kharif pulse crop in Rajasthan. Now zaid moong is also taken in the state. The monthly wholesale price series (Jan. 2002 to June, 2012) of moong from Sumerpur regulated market was used to predict the price forecast. The detailed results obtained from different price forecasting models are discussed as below:

Artificial Neural Network (ANN)

The proposed ANN model was applied to forecast the moong prices for Sumerpur regulated market. Different number of neural networks were tried for same data set and the best performing five networks from each data set was selected based on minimum average absolute error and higher R^2 (Table 1) and such networks were used for further analysis. In case of moong price forecasting, 87 data points were considered as training set and 18 data points were considered as testing set.

ANN5 method out of five models tried was found better fitted with R^2 equal to 0.96 and lowest average absolute error value of 123.53 with highest value of correlation coefficient (0.98) in Sumerpur market.

Table 1: Different neural networks model for forecast of moong price

Criteria	Neural Networks Model				
	ANN1	ANN2	ANN3	ANN4	ANN5
Average AE	133.81	162.44	140.1	133.93	123.53
R square	0.97	0.96	0.97	0.96	0.96
Correlation	0.98	0.98	0.98	0.98	0.98

Exponential Smoothing

Under exponential smoothing, the weights (W1, W2, and W3) were assigned in geometric progression. All three techniques (Single, Double and Triple) of exponential smoothing methods were considered for forecasting prices for selected moong commodity of Sumerpur regulated market and results are presented in Table 2.

Table 2: Different exponential smoothing model for forecast of moong price

Criteria	Exponential Smoothing Model		
	SES	DES	TES
MAPE	6.1	6.2	12
MAD	171.3	174.6	354
MSD	58170.6	59245.7	236311

SES= Single Smoothing Exponential
DES= Double Smoothing Exponential
TES= Triple Smoothing Exponential

It can be inferred that the SES model was the preferred model for forecasting moong price due to minimum value of MAPE (6.1), MAD (171.3) and MSD (58170.6) when compared to double exponential and triple exponential Smoothing models.

The performance of ANN and Exponential moong price forecasting models was measured in terms of Mean Absolute Deviation (MAD), Mean Standard Error (MSE) and Mean Absolute Percentage Error (MAPE). The comparative performances of different models are presented in Table 3.

Table 3: Extent of Accuracy through Different Criterion

Criteria	SES	ANN5
MAD	1088.59	11.25
MSE	1461092.00	27205.92
MAPE	21.84	2.90

From the Table 3, it can be inferred that the ANN5 model was the preferred model for forecasting moong price due to the minimum values of MAD (11.25), MSE (27205.92) and MAPE (2.90) when compared to the SES model. The actual monthly wholesale prices of moong in Sumerpur market for July, 2012 to December, 2012 and the predicted values for these months through various models are presented in Table 4. In order to check the validity of these forecasted values, they were compared with the actual values of price of moong during the post sample forecast period i.e. from July-2012 to Dec.-2012. The accuracy percentages vary from 95.81 to 98.13% based on ANN 5 model. It was observed that the accuracy percentage out of different forecasting models, the prevailing market price of moong and based on ANN5 model was very close to actual value as compared to other predicted model prices. The accuracy percentage varied from 75.22 to 83.16 in case of SES model. This proved that the ANN5 model was the best fit model for forecasting the price of moong for Sumerpur market during the period under study.

Table 4: Forecast price of moong by different models (Rs./quintal)

Month	Actual Price	Price forecasted by SES	Price forecasted by ANN5
Jul-12	4656	3872.08(83.16)	4849.94(95.83)
Aug-12	4908	3872.08(78.89)	4999.77(98.13)
Sep-12	4826	3872.08(80.23)	4937.58(97.69)
Oct-12	5106	3872.08(75.83)	4984.09(97.61)
Nov-12	5148	3872.08(75.22)	4932.43(95.81)
Dec-12	5120	3872.08(75.63)	4992.67(97.51)

Figure in parentheses are the percentages of respective actual prices.

Thus, in present investigation a large scale comparison of different models has been done in order to know the best model for forecasting moong price. The comparison of all the three Exponential Smoothing and ANN models was carried out in the process based on the MAD,MSE and MAPE values which were considered to be least. ANN model for moong were found to be the most appropriate model with MAD Value 11.25 , MSE value of 27205.92 and MAPE value 2.90 per cent. The validity of the forecasted price values of moong was checked by comparing them with their actual market price values during the post sample forecast period i.e. July 2012 to December 2012 for moong crops. The accuracy percentage between the forecasted and actual price value of moong were found to be 95 to 98 per cent. It was observed that the ANN5 model was found to be the most suitable for forecasting the prices of moong commodity. This information can be used for further research in this area of price forecasting.

Policy Implications

- Ø Adequate and continuous efforts should be made to disseminate the market intelligence and market information, particularly of price forecast to help the stake holders.
- Ø Regular price forecast should be available to the stakeholders to take the appropriate decisions regarding buying and selling of moong commodity.

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Effect of levels of irrigation and crop geometry on quality of sugarcane under drip irrigation

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Abstract

A field experiment was conducted in Gang Canal Command area at 3"O" Srikaranpur, Sriganganagar during 2005-06,2006-07 and 2008-09 to find out optimum plant geometry of sugarcane through drip irrigation and to compare water use and water use efficiency in both the methods of irrigation. None of the quality parameters was influenced by different crop geometries in surface irrigation treatment. Only commercial cane sugar was significantly influenced by different crop geometries in drip irrigation. Single row planting at 75 cm & 90 cm gave significantly higher CCS (t/ha) than paired row planting at 120x60 cm but at par with paired row planting at 90x60 cm. Irrigation levels significantly influenced all the quality parameters except juice purity percent. The highest CCS in tones per hectare was recorded with drip irrigation at 100% PE which was at par with that obtained with drip irrigation at 80 % PE treatment but significantly higher than drip irrigation at 60% PE and surface irrigation treatments. The juice percentage was also highest with 100 % PE treatment but poll percentage; brix percentage and CCS (%) were highest with 80 per cent PE treatment. The mean data revealed that drip irrigation at 60, 80 & 100 % PE increased cane yield by 14.4, 26.4 & 44.6 per cent, respectively over the cane yield obtained with border strip irrigation. In addition to yield increase, the respective water saving was 32.9, 17.1 & 1.4 per cent. Drip irrigation also improved the quality of cane and the commercial cane sugar increased by 46.4, 35.8 and 15.1 per cent as a result of drip irrigation at 60, 80 and 100% PE, respectively over that obtained with conventional flood irrigation treatment.

Key words: Sugarcane, drip irrigation,crop geometry, quality

Introduction

India is one of the largest sugarcane producers in the world after Brazil. Sugarcane being an important cash crop, it ranks third in the list of most cultivated crops after paddy and wheat. Sugarcane is planted in both tropical and sub- tropical region of India with total production of 294.6 million tonnes and productivity of 66.8 tonnes per hectare (Singh *et al.*, 2013).About 80% percent of the total rainfall is received during three monsoon months (July-September) which too is highly unreliable and erratic. During rest of the period the crop performance is depend on irrigation. In irrigation northwest plain zone of Rajasthan sugarcane is a commercial crop. The most common practice of irrigation is border strip. Sugarcane requires 15-20 irrigation per annum for optimum growth and yield. Drip irrigation is high frequency irrigation method of supplying water directly to the root zone. The micro irrigation techniques have a major role to play in mitigating the water scarcity situation by enhancing the productivity of water in sugarcane in effective and scientific way (Ridge *et. al.*, 2000; Shinde and Jadhav 2001). Through adoption of drip farmers can get higher yield by providing congenial environment to the plant through maintaining optimum moisture regime throughout the growing period.

Materials and Methods

A field experiment was conducted in Gang Canal Command area at 3 "O", Srikaranpur, Sriganganagar during 2005-06, 2006-07 and 2008-09 in randomized block design with 3 replications. The treatments comprising of 4 crop geometries (single row planting 75cm, single row planting 90cm, paired row planting 60 cm x 90 cm, paired row planting 60 cm x 120 cm) and 4 irrigation levels (60, 80 and 100% of PE by drip system on alternate day, and border strip irrigation at IW/CPE 1.0 & irrigation water depth 7.5 cm). The soil was sandy loam in texture, low in organic carbon (0.35%), medium in available P_2O_5 (42 kg/ha) and high in available K_2O (410 kg/ha). The pH (1:2) and EC

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(1:2) of the soil were 8.05 and 0.21 dS/m, respectively. A uniform basal dose of 50 kg N, 40 kg P_2O_5 and 40 kg K_2O/ha was applied at planting. Rest N (100 kg/ha) was applied in 2 splits, one half each in May and June as top dressing. Sugarcane cv. CO 6617 was selected as the test crop.

Results and Discussion

Crop quality

Crop geometry under surface irrigation:

Under surface irrigation crop quality was not significantly affected by crop geometry during 2005-06 and 2007-08 (Table 1 & 2). However, during 2006-07, poll %, brix % and CCS % were significantly influenced by crop geometry. The maximum values of these parameters were found at 75 cm row spacing which were at par with those obtained at 90 cm single row spacing and 90x60 cm paired row spacing but significantly higher than 120x60 cm paired row spacing (Table 3). The pooled results of three years revealed that none of the quality parameters was influenced by different crop geometries in surface irrigation treatment (Table 4).

Crop geometry under drip irrigationí:

Only commercial cane sugar (CCS) was influenced significantly by crop geometry under drip irrigation during 2005-06 and 2006-07. The highest CCS of 11.57 t/ha during 2005-06 and 17.64 t/ha during 2006-07 was recorded with 75 cm and 90 cm row spacing, respectively. However, these treatments were at par with each other and 90 cm x60cm paired row spacing but significantly superior to that obtained at 120x60 cm paired row spacing. It is pertinent to mention here that the highest cane yield was also recorded with 75cm and 90 cm single row spacing during 2005-06 and 2006-07, respectively and the impact of cane yield has reflected in terms of commercial cane sugar yield. During 2007-08, none of the parameters was influenced by different crop geometries in drip irrigation.

The pooled data of three years revealed that only commercial cane sugar was significantly influenced by different crop geometries in drip irrigation. Single row planting at 75 cm & 90 cm gave significantly higher CCS (t/ha) than paired row planting at 120x60 cm but at par with paired row planting at 90x60 cm (Table 4).

Irrigation levels:

Irrigation levels significantly influenced all the quality parameters except juice purity during 2005-06. Drip irrigation at 100% PE recorded the highest CCS of 12.42 t/ha followed by 80% (11.62 t/ha) and 60%PE (8.97 t/ha). The lowest CCS of 8.40 t/ha was recorded under surface irrigation treatment. Under drip system, decreasing levels of irrigation increased baggase percentage and decreased juice (%). CCS and poll percent were significantly highest with 80 % PE. The quality of juice was poorest under surface irrigation treatments.

Irrigation levels significantly influenced the poll %, CCS % and CCS in tones per hectare during 2006-07. Drip irrigation at 100% PE recorded the highest

Table 1: Effect of crop geometry and drip irrigation on cane quality parameters (2005-06)

Treatment	CCS (t/ha)	Juice (%)	Baggase (%)	Poll(%)	Brix(%)	CCS(%)	Juice purity(%)
Crop geometry (surface)							
75 cm row spacing	8.68	35.30	64.70	13.17	15.97	8.79	82.50
90 cm row spacing	8.37	35.06	64.93	13.23	15.40	8.88	83.22
90cm X 60 cm paired row	8.52	34.10	65.90	13.13	15.83	8.79	83.07
120cm X 60 cm paired row	8.06	34.23	65.77	13.03	15.77	8.69	82.24
S. Em.±	0.51	0.49	0.49	0.29	0.36	0.32	2.59
CD at 5%	NS	NS	NS	NS	NS	NS	NS
Crop geometry (drip)							
75 cm row spacing	11.57	37.81	62.19	13.14	16.07	8.79	82.84
90 cm row spacing	11.49	37.01	62.99	13.21	15.92	9.11	84.68
90cm X 60 cm paired row	10.77	37.67	62.32	13.93	15.99	8.97	83.49
120cm X 60 cm paired row	10.18	37.07	62.93	12.96	15.99	9.04	83.90
S. Em.±	0.30	0.28	0.29	0.77	0.19	0.19	1.49
CD at 5%	0.86	NS	NS	NS	NS	NS	NS
Irrigation levels							
IW/CPE 1.0	8.40	34.67	65.32	13.14	15.89	8.74	82.76
100% PE (drip)	12.42	38.98	61.02	13.22	16.23	8.76	81.50
80% PE (drip)	11.62	37.16	62.83	13.93	16.49	9.42	84.58
60% PE (drip)	8.97	36.03	63.98	12.96	15.25	8.79	85.10
S. Em±.	0.26	0.25	0.25	0.15	0.16	0.16	1.29
CD at 5%	0.74	0.71	0.71	0.42	0.46	0.47	NS

Table 2: Effect of crop geometry and drip irrigation on cane quality parameters (2006-07)

Treatment	CCS (t/ha)	Juice (%)	Baggase (%)	Poll(%)	Brix(%)	CCS(%)	Juice purity(%)
Crop geometry (surface)							
75 cm row spacing	13.13	37.83	62.17	16.72	17.72	12.20	94.54
90 cm row spacing	12.21	39.53	60.47	16.14	17.35	11.78	93.08
90cm X 60 cm paired row	12.03	41.05	58.95	15.67	16.87	11.44	92.97
120cm X 60 cm paired row	10.82	38.29	61.71	14.56	15.17	10.63	96.20
S. Em.±	1.46	2.04	2.04	0.63	0.79	0.46	1.96
CD at 5%	NS	NS	NS	1.82	2.27	1.33	NS
Crop geometry (drip)							
75 cm row spacing	17.21	38.22	61.77	16.46	17.64	12.02	93.44
90 cm row spacing	17.64	37.74	62.26	16.30	17.05	11.89	95.72
90 X 60 cm paired row	16.68	40.07	59.93	16.37	17.19	11.95	95.26
120 X 60 cm paired row	13.68	39.46	60.54	16.31	17.42	11.91	93.69
S. Em.±	0.84	1.18	1.18	0.36	0.45	0.27	1.13
CD at 5%	2.43	NS	NS	NS	NS	NS	NS
Irrigation levels							
IW/CPE 1.0	12.05	39.17	60.83	15.77	16.78	11.51	94.20
100% PE (drip)	18.00	38.23	61.77	16.25	16.92	11.86	96.08
80% PE (drip)	16.16	40.25	59.75	16.92	17.95	12.35	94.39
60% PE (drip)	14.74	38.15	61.85	15.90	17.10	11.61	93.10
S. Ed.	1.11	1.56	1.56	0.48	0.60	0.35	1.49
CD at 5%	2.27	NS	NS	0.98	NS	0.72	NS

Table 3: Effect of crop geometry and drip irrigation on cane quality parameters (2007-08)

Treatment	CCS (t/ha)	Juice (%)	Baggase (%)	Poll(%)	Brix(%)	CCS(%)	Juice purity(%)
Crop geometry (surface)							
75 cm row spacing	6.10	34.57	65.43	13.20	15.47	8.97	85.30
90 cm row spacing	6.11	34.18	65.82	12.76	14.93	8.68	86.13
90cm X 60 cm paired row	5.52	33.82	66.18	13.10	15.77	8.78	82.93
120cm X 60 cm paired row	5.43	33.82	66.18	12.82	15.27	8.64	83.87
S. Em.±	0.42	1.21	1.21	0.54	0.45	0.48	2.78
CD at 5%	A NS	NS	NS	NS	NS	NS	NS
Crop geometry (drip)							
75 cm row spacing	7.56	35.93	64.07	13.07	16.54	8.86	78.98
90 cm row spacing	7.65	36.65	63.35	13.77	17.04	9.09	80.83
90 X 60 cm paired	7.07	36.32	63.68	13.34	16.40	8.84	81.17
120 X 60 cm paired	7.52	37.07	62.93	13.69	17.11	8.98	79.99
S. Em.±	0.24	0.70	0.70	0.31	0.26	0.28	1.61
CD at 5%	NS	NS	NS	NS	NS	NS	NS
Irrigation levels							
IW/CPE 1.0	5.79	34.10	65.90	12.97	15.36	8.77	84.56
100% PE (drip)	8.00	38.60	61.40	13.25	16.60	8.69	79.85
80% PE (drip)	7.86	36.53	63.47	13.93	17.10	9.48	81.36
60% PE (drip)	6.49	34.36	65.64	13.22	16.63	8.65	79.44
S. Ed	0.32	0.93	0.93	0.41	0.35	0.37	2.13
CD at 5%	0.65	1.89	1.89	0.84	0.71	0.75	4.34

CCS of 18.00 t/ha followed by 80% (16.16 t/ha) and 60%PE (14.74 t/ha). The lowest CCS of 12.05 t/ha was recorded under surface irrigation. The highest poll percentage and CCS percentage were recorded with 80% PE treatment which were at par with that of 100% PE treatment but significantly superior over rest of the treatments.

During 2007-08, irrigation levels significantly influenced all the quality parameters. The highest juice percent and CCS in tones per hectare were recorded

Table 4: Effect of crop geometry and drip irrigation on cane quality parameters (Pooled data of three years)

Treatment	CCS (t/ha)	Juice (%)	Baggase (%)	Poll(%)	Brix(%)	CCS(%)	Juice purity(%)
Crop geometry (surface)							
75 cm row spacing	9.30	35.90	64.10	14.36	16.39	9.99	87.45
90 cm row spacing	8.90	36.26	63.74	14.04	15.89	9.78	87.48
90cm X 60 cm paired row	8.69	36.32	63.68	13.97	16.16	9.67	86.32
120cm X 60 cm paired row	8.10	35.45	64.55	13.47	15.40	9.32	87.44
S. Em.±	0.80	1.25	1.25	0.49	0.53	0.42	2.44
CD at 5%	NS	NS	NS	NS	NS	NS	NS
Crop geometry (drip)							
75 cm row spacing	12.11	37.32	62.68	14.22	16.75	9.89	85.09
90 cm row spacing	12.26	37.13	62.87	14.43	16.67	10.03	87.08
90 X 60 cm paired	11.51	38.02	61.98	14.55	16.53	9.92	86.64
120 X 60 cm paired	10.46	37.87	62.13	14.32	16.84	9.98	85.86
S. Em.±	0.46	0.72	0.72	0.48	0.30	0.25	1.41
CD at 5%	1.33	NS	NS	NS	NS	NS	NS
Irrigation levels							
IW/CPE 1.0	8.75	35.98	64.02	13.96	16.01	9.67	87.17
100% PE (drip)	12.81	38.60	61.40	14.24	16.58	9.77	85.81
80% PE (drip)	11.88	37.98	62.02	14.93	17.18	10.42	86.78
60% PE (drip)	10.07	36.18	63.82	14.03	16.33	9.68	85.88
S. Ed	0.40	0.64	0.64	0.25	0.26	0.21	1.16
CD at 5%	1.22	1.93	1.93	0.75	0.80	0.65	NS

with drip irrigation at 100 % PE. The highest poll percent, brix percent and CCS percent were recorded with drip irrigation at 80% PE. The highest baggase percent and juice purity percent were recorded with surface irrigation treatment. The CCS in tones per hectare with drip irrigation at 100 % PE was at par with 80 % PE treatment but significantly superior over 60 % PE and surface irrigation treatment.

The pooled results of three years revealed that irrigation levels significantly influenced all the quality parameters except juice purity percent. The highest CCS in tones per hectare was recorded with drip irrigation at 100% PE which was at par with that obtained with drip irrigation at 80 % PE treatment but significantly higher than drip irrigation at 60% PE and surface irrigation treatments. The juice percentage was also highest with 100 % PE treatment but poll percentage, brix percentage and CCS (%) were highest with 80 per cent PE treatment. In view of yield, quality and water saving, irrigation in sugarcane at 80% PE has been found optimum irrigation schedule

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Enhancing Adoption of Eco-friendly Technology among Chilli Growers of Karnataka-India

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Abstract

The study was conducted in Chickmagalore and Kadur taluks of Chickmagalore District of Karnataka to find out the extent of adoption Eco-friendly technologies by chilli growers. The sample size of 50 Chill growers was drawn on proportionate random sample method. The study revealed that 64% i.e. majority of the respondents was in medium level adoption of eco friendly technologies.The results revealed that Number of Eco-friendly Technology adopted (IPM & INM) Farmers are 29(64%) with an average yield of 5260.34 Kg of green chilli Yield per acre with significant changes, compare to Number of Non INM Farmers; are 8(16%) with an average yield of 2287.50 Kg of green chilli Yield per acre and Number of Non IPM Farmers are 18(36%) with an average yield of 3969.44 Kg of green chilli Yield per acre. 64 % of the farmers adopted Eco-friendly Technology in chilli Crop resulted in preventing soil pollution, and other chemicals side effect on Microbes of Soil, and other useful insects. Harvested fruits are chemical free and consumer preference is high.

Key Words; INM, IPM, FYM, Weeding, Crop Rotation, Cropping System, Soil health,

Introduction

Vegetables constitute about 55 per cent of horticultural crop production in the country with a total production of 85 million tonnes which is estimated to cross 100 million tonnes in near future. Successful cultivation of vegetables is hampered due to the incidence of several insect pests. Cultivation of hybrids, improved varieties, intensive agronomic practices, off season cultivation and indiscriminate use of insecticides has changed the pest complex in these crops.

Chilli is considered as one of the commercial spice crops. It is the most widely used universal spice, named as wonder spice. Different varieties are cultivated for varied uses like vegetable, pickles, spice and condiments. In daily life, chilies are integral and the most important ingredient in many different cuisines around the world as it adds pungency, taste, flavor and color to the dishes. Indian chilli is considered to be the world famous for two important commercial qualities its colour and pungency level.

The largest producer of chillies in the world is India accounting for 11 lakh tons of production annually followed by China with a production of around 4 lakh tons. Mexico and Pakistan produces 3 lakhs tonnes each of chili every year.

In India, Chilli was grown on an area of 8.82 Lakh ha and annual production of 11.0 lakh tones and with an average productivity of 1200 kg/ha (Anon., 2002). Among Chilli producing states in the country Andhra Pradesh stands first in the list of leading chilli-producing states in India and also constitutes the maximum acreage for chilli cultivation in the country. It occupies 49% share in the Indian total production and produces around 2.7 lakh tons of chillies followed by Orissa (18%), Karnataka (15%), Maharashtra (6%), West Bengal (5%), Rajasthan (4%) and Tamil Nadu (3%) (www.ikisan.com).Karnataka state stands 3rd in contribution of Chilli production to country. We have different chilli varieties such as Byadagikaddi, Byadagidabbi, Guntur(G-4) , Pusa jwala, KDSC-1, etc. are cultivated by farmers.

The modern farming systems aim at maximizing production through the use of increased quantities of external inputs such as fertilizers and plant protection chemicals without due consideration to their ill effects. Consequently, the traditional agronomic practices such as green manuring, use of farm wastes either as such or after composting and other soil ameliorative measures have not become part of the farming

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systems. This has resulted in a slow but steady decline in the productive and productivity of the soil.The use of fertilizer and pesticides is increasing in the process of adopting high yielding varieties (HYV) and hybrids without giving attention towards proper dosages and methods of application and waiting periods. This is gradually leading to many hazardous effects on environment and human beings. These hazards are of different kinds with different intensity. There are many articles supporting the issue that the pesticide residues are found in every day diet and in the human body which may cause severe health hazards.

Eco-farming

Anonymous (1980) defined eco-farming as a production system, which precludes the use of synthetic fertilizers, pesticides, growth regulators and livestock feed additives. It rather relies upon crop rotation, crop residues, animal wastes, legumes, green manure, farm wastes, mechanical cultivation and biological pest management.

According to Swaminathan (1991), there are nine basic principles promoting ecological agriculture namely, land, water, energy, nutrient supply, genetic diversity, pest management, post harvest system, system approach, location specific research and development.

It refers to techniques or system of farming based on integral relationship with nature (Lampkin, 1990). The principle elements to be considered in eco-farming are, 1) Create a healthy soil 2) Make nutrient and energy flow in soil eco-system 3) Keep the biological life in the cycle and 4) Provide sustainable yield.

Many instances the dry chilli exports from Indian market were rejected because of pesticide residue problem. Hence, the need of the popularization of adoption Eco-friendly technologies by chilli growers is felt. The project was started with the special objective of educating chilli farmers of nine selected villages in Chickmagalore & Kadur Taluks of Chickmagalore district of Karnataka on IPM, INM, reduces the problem of chemical Fertilizers and pesticide residues in the harvested produce in turn prevent Soil pollution, safeguarding Soil Microbes and useful insects to maintain good ecosystem.

Research Methodology

A study on Enhancing Adoption of Eco-friendly Technology by Chilli Growers was conducted in two predominantly Chilli growing Taluks Chickmagalore and

Table 1: ICRISAT Hyderabad IPM module

Activity	Stage of crop	Management option
Seed treatment	Sowing time	Imidacloprid (Gaucho) @ 5 grams per kg seed
Management of sucking pests	Nursery	Imidacloprid @ 1 ml in 3-4 liters of water or fipronil @2 ml per liter.
Sowing trap crops	At the time of transplanting	Sunflower and marigold as border crop .
Installation of pheromone traps and bird perches	At the time of transplanting	Two traps per location for each species About 25 perches/ ha
Management of thrips in main crop	Transplanting to one month before harvest	Overhead irrigation with sprinklers wherever possible. Imidacloprid @ 1 ml in 3-4 liters of water or fipronil @ per Ltr of Water
Management of mites	In the nursery and main crop	Overhead irrigation with sprinklers wherever possible. Spray one of these chemicals once in the nursery and second time in the main crop – dicofol @ 5 ml per liter or wettable sul phur 3 grams per liter or Pegasis @ 1 gm per liter or Vertemic @ 0.5 ml per liter
Management of fruit borers	Flowering stage	Application of neem fruit powder extract @ 25 kg ha-1 NPV @ 500 LE/ha, Bt 4 ml per liter.
Management of pod borers	Fruiting stage	Setting poison baits for Spodoptera Spray indoxacarb @ 1 ml per liter or spinosad @ 0.3 ml per liter
Arresting immigrating Spodoptera	Crop maturity stage	Erecting polythene fence around the field (4 inches above ground)
Management of pod borers	During crop maturity	NPV @ 500 LE/ha, Bt (dipel @ 4 ml per liter) or spinosad @ 0.3 ml per liter
Anthracnose	Green fruit stage	Thiophonate methyl 1 g per liter /Mancozeb 2.5 g per liter / Tilt 1ml per liter / Antrcol 2g per liter
Powdery mildew	Flowering and fruiting Stage	Dinocap 1 ml per liter/ wettable sulfur 3g per liter

Kadur taluks of chickmagalore District in Karnataka from June 2013. The Training programmes and field advisory visits on INM, IPM, FYM, Weeding, Crop Rotation, Cropping System, Soil health, in Chilli was conducted in 9 villages of the two Taluks with 50 Chilli farmers. The selected farmers were briefed about, the Eco-friendly Technology and its importance in initial group meetings with the selected farmers. Continuous field visits was done by the Extention team. Regular feedback on progress of the crop, pest and disease incidence, Soil management was collected from the field. Regular interaction meetings were conducted with farmers to integrate appropriate IPM technologies into their existing cultivation practices.

IPM technology for Chili

The schedule for Integrated Pest Management in Chilli has been standardized at International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) Hyderabad. By following the IPM, the disease and insect pest incidence were reduced to negligible. The number of sprays of pesticides was reduced to about 4 (botanical+ chemical) as compared to 6 chemical sprays in non-IPM plots. Among various insect pests, thrips, aphids, mites and fruit borers in chilli, are of prime importance (Table 1).

Integrated Nutrient Management

Organic Fertilizers and Manures Organic fertilizers include both plant and animal bi-products. They are slow acting. Organic nitrogen fertilizers include oil cakes, fish manure, dried blood from slaughter houses etc., where as organic phosphorus from bone meal and organic potassium from cattle dung ash, wood ash, leaf mould, tobacco stems and water hyacinth.

Soil Fertility and its Importance

Soil fertility may be defined as the inherent capacity of soil to supply plant nutrients in adequate amount and in suitable proportion and free from toxic substances. There are two types of soil fertility viz.

A. Sampling area

Total Nine villages (Five Villages from Chickmagalore Taluk & Four Villages from Kadur Taluk) in Chickmagalore district where the project activities carried were purposively selected (Table 2).

B. Selection of the Respondents;

50 farmers from nine villages having 175.74 Acre cultivable land & growing Chilli in 111.03 Acre were selected.

C. Data collection tools and procedures

A questionnaire was developed for the purpose was used for the survey. The questions were asked in Kannada and were used for collecting responses from the project farmers. The data were collected from the respondents through personal interview with the help of interview schedule. Necessary precautions were taken to ensure that the questions in the schedule were unambiguous, clear, concise, complete, and comprehensive. The respondents were contacted in person mostly at the common place in the village.

D. Statistical Analysis

The data collected for the study was tabulated, processed and analysed using simple statistical tools like frequency and percentage.

Results and Discussion

Table 3 indicates that Number of IPM Farmers are 32(64%) with an average yield of 4904.68 Kg of green chilli Yield per acre, Number of Non IPM Farmers are 18(36%) with an average yield of 3969.44 Kg of green chilli Yield per acre, Number of INM Farmers; are 38(76%) with an average yield of 4703.94 Kg of green chilli Yield per acre, Number of Non INM Farmers; are 8(16%) with an average yield of 2287.50 Kg of green chilli Yield per acre and Number of IPM & INM Farmers are 29(64%) with an average yield of 5260.34 Kg of green chilli Yield per acre with significant changes.

But a drastic improvement (64 %) has been achieved in adoption of INM, IPM, Soil Health management technology through Adoption of Eco-friendly Technology once the farmers realized its importance in pollution, health hazards. This achievement could be possible because of the

Table 2: Sampling area

S No	Village/Taluk	Taluk	No. of Farmers	Total Cultivable Area (Acre)	Chilli Area(Acre)
1	Kunnalu	Chickmahalore	10	20.50	17
2	Sirabidagi	Chickmahalore	5	22.98	14
3	Uddeboranahally	Chickmahalore	5	15.35	9.20
4	Karisiddanahally	Chickmahalore	5	13.71	9.33
5	Kenganahally	Chickmahalore	5	11.36	7.30
6	Govindapura	Kadur	5	14.20	10
7	Chikkangla	Kadur	5	28.34	16
8	Shakunipura	Kadur	5	22	11
9	Yammedhoddi	Kadur	5	27.30	17.20
Total	9		50	175.74	111.03

Table 3: Economic improvement in Chilli cultivation through Eco-friendly Technology

S. No	Particulars	Non IPM farmer	IPM farmer	Non INM farmer	INM farmer	INM & IPM
1	No. of plant protection chemical sprays	06	4	6	4	4
2	Reduction in no. of chemical sprays	-	2	-	2	2
3	No. of biological sprays	0	1	-	1	1
4	No. of micronutrient sprays	0	1	-	3	3
5	Yield Kg per acre	3969	4904	2287	4703	5260
6	Cost of plant protection chemicals/acre	Rs 3750	Rs 2750	2500	4000	4000
7	Rate obtained per kg of Green Chilli	Rs 12	Rs 13	Rs 13	Rs 14	Rs 14
8	Total Revenue per acre	Rs 47633	Rs 63752	29731	65842	73640
9	Total cost per acre	Rs 40541	Rs 39693	Rs 25000	Rs 39693	Rs 40541
10	Net profit	Rs 7092	Rs 24059	Rs 4731	26149	33099
11	Benefit cost ratio	1.17	1.60	1.18	1.65	1.81

· Specific for the Red Chilli Kaddi variety grown during August 13 to April 2014,
· Economics have been worked out for the district of Chickmagalore

Development Activities of Extension Team.

It is evident from the table 3 the components of Eco-friendly Technology like reduction in chemical sprays, considerably reduction in the environmental pollution, health hazards and improves the marketability of the Green chilli achieving higher economic returns. Reduction in usage of chemicals, frequency of sprays and unnecessary usages of chemicals has been thoroughly communicated to the farmers to achieve more economic returns. As per the results Eco-friendly Technology adopted farmers could get Rs 1.81 for every rupee invested compared to only Rs 1.17 in case of farmers of Non IPM, Non INM. A considerable improvement in economic returns as well as awareness regarding hazardous chemicals among the farmers has been achieved in this project. This in turn a lesson for fellow farmers of same villages as well as neighboring district Chilli farmers.

Table 4: Farmers Participation in Trainings of Eco-friendly Technology on Chilli (N=50)

S. No.	1-2 times		More Than 2 times	
	Freq (n)	%	Freq (n)	%
1.	12	24	39	78

Table 4 Shows that 78 % of the farmers attended training on Adoption of Eco-friendly Technology more than 2 times that shows the interest.

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Impact of varietal and growth regulator treatments on morpho-physiological characters and quality of Mungbean (V*igna radiata* (l) wilczek)

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Abstract

A field experiment was conducted during summer season 2012 and 2013 at the research farm R.B.S. college Agra, U.P., to find out the effect of different levels of growth regulator on germination percent, germination energy, seed vigour and other characters of Pant mung-5, K-851,SML-668 and Pusa-9072 varieties of mungbean. The significant higher increment was observed in varieties Pant mung-5, P-9072, SML-668 and K-851 under 2,4-D treatments dose 10^{-3} in germination percent and plumule length and radical length in both the years. The maximum germination energy was recorded in varieties Pant mung-5 and K-851 under GA treatment dose 10^{-1}. The vigour index, number of seed pod^{-1} and 100 seed weight by all varieties gave superior results in both the years. All experimental varieties of mungbean under BA treatment at 10^{-1} dose reported highest plant height.

Key words : growth regulator, germination percent and seed vigor

Introduction

India is the largest pulses producing country in the world. Pulses are mainly grown in rain fed area. Mungbean (*Vigna radiata* L.) is considered as one of the most important pulse crop in India. It is important legume crop characterized by a relative high content of protein (22%) and short summer season crop. It is one of important pulse crop cultivated in India ranking third having about 70% of the world area and 45% of production. In India area occupied by mungbean is about 23.63 million ha with total production of 14.56 million tones but average productivity (625 kg/ha) is quite low. The various application of optimum quantity of growth regulators play an important role in high germination and vigor percent in mungbean (*Aldesuquy et.al.2007*) and (*Algan et.al.2011*). The remarkable research work has not been conducted under arid, semi arid and rain fed conditions to find out the proper doses of growth regulator application for getting high germination percent, vigour index and productivity in mungbean. Keeping in view the above facts the present study was under taken to find out the effect of application of growth regulator on germination, vigour, productivity and other characters in different varieties of mungbean viz.- Pant mung-5, K-851,SML-668 and Pusa-9072 under Agra region.

Materials and Methods

A field experiment was conducted during summer season 2012 and 2013 at the research farm R.B.S. college Agra, U.P., to find out the effect of four levels viz, control, 10^{-1}, 10^{-2}, $10^{-3}$of growth regulators on germination percent, germination energy, seed vigour and other characters of four varieties viz, Pant mung-5, K-851, SML-668 and Pusa-9072 of mungbean. Agra is situated at 27° 11'0" N and 78°1'0" E longitude at an altitude of 171m above mean sea level and has a subtropical climate with dry hot summers and cold winters. The mean maximum temperature during the hottest month (June) ranges between 41-48°C, while mean minimum temperature in the coldest months (December-January) ranges between 2-8°C. Of the average annual rainfall of 695 mm, about 88% is received between June and October and the rest during winters. The experimental design was factorial randomized block with three replications. Urea was the source of nitrogen and the source of sulphur was gypsum while triple super-phosphate was used as source of phosphorus but in case of Potash in soil was rich. The physiological parameters viz, Relative growth rate (RGR), Absolute crop growth rate (ACGR), Net assimilation rate (NAR) and Harvest index (HI) were calculated applying the formulae giving by (*Waston, 1952*). Observations were recorded time to time on germination percentage, germination energy, vigour index, radicle length, plumules length, plant height, number of seeds pod^{-1} and 100 seed weight. The data collected in the experiment for different characters were subjected to statistical test for significance and analysis of variance. Critical difference (CD) values at 5% probability level were computed for making comparisons between treatments. Association between

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yield and its contributing characters were determined by multiple correlations method and the dependence of yield on its important contributing morphological characters were also determined by the multiple regression method suggested by (*Cochran, and Cox, 1967*).

Results and Discussion

The results obtained in this study are presented and discussed as under.

Germination percent

The results presented in Table 1 showed that priming with growth regulator viz; TIBA and 2, 4-D significantly increased the germination percentage at initial stage in all the varieties as compared to other growth regulators. At lower concentrations of TIBA and 2,4-D the germination percentage was maximum. The maximum germination percentage (67.34) was recorded at in 10^{-3} doses of 2,4-D and the minimum germination percentage (35.34) was recorded in 10^{-1} BA. These findings are in concordance with the reports of (*Medhi et, al. 2005*) among all the four varieties of mung bean increase in seed germination with all the growth regulators over control. In present investigation all the four varieties and in both the years that 2,4-D at lower doses of 10^{-3} affected germination percentage, the maximum like TIBA at the some concentration and therefore it can be concluded 2,4-D and TIBA at lower doses act as promoters of germination percentage and act as growth promoters than retardants. Similar findings were reported by (*Medhi et. al.2011*). Who reported that the growth regulators. TIBA at lower doses act as promoter's germination percentage as compared to other growth regulators.

Germination energy

It is revealed from table 1 that the maximum germination energy was observed by the varieties of mungbean (SML-668, K-851, P-9072 and Pant mung-5) treated with GA at doses 10^{-3},10^{-1},10^{-2} and 10^{-1} in 2012 and 10^{-1},10^{-1}, 10^{-3} and 10^{-2} in 2013 respectively. The similar trend was observed by all varieties treated with BA doses 10^{-3}, 10^{-1}, 10^{-3} and 10^{-1} in 2012 and 10^{-2}, 10^{-1}, 10^{-1}, 10^{-1} in 2013 respectably. The application of IAA with dose 10^{-2} as seed treatment showed the better response by P-9072 and Pant mung-5 in 2012 and 2013. All varieties showed dose 10^{-1} of TIBA and 2,4-D is superior irrespective of germination energy among all doses in 2012 and 2013. The results are in agreement with those obtained by (*Devi, et al. 2012*).

Plumule length

In Table 1 it was observed that there was a significant increasment was observed in plumule length over control in TIBA and 2, 4-D at dose 10^{-3} in all varieties in both the years. In case of variety, SML-668 and K-851 at par in all doses of GA and IAA over control. The 2, 4-D treatment was found superior than TIBA in variety Pant mung-5 and P-9072 in both experimental years. The results are in conformity with the findings of (*Al-Delaimy, A. O. A 2013*). This behavior of the growth regulators was consistent for all varieties in both the years. It is therefore, concluded that the plumule length was increasing maximum by 2,4-D and TIBA as compared to GA, IAA and BA in that order and all the varieties responded more or less the same way. Similar findings were reported by (*Algan et, al. 2011*).

Radicle length

The results presented in Table 1 the lowest dose 10^{-3} of GA was significantly better in increasing the radicle length (18.33, 18.00cm) in variety SML-668 and (19.70, 19.72cm) in variety K-851 as compared to IAA in both the years. In variety SML-668 and K-851, BA showed the least increase in radicle length at all the doses, as compared to all other growth regulators. In Pant mung -5 and P-9072 the dose of 10^{-1} of both GA and IAA significantly increased the radicle length. However, the dose of 10^{-3} was as good as control whereas the 10^{-1} dose of GA and IAA were significantly better than control. It can be concluded that the treatment with 2, 4-D and TIBA at the highest dose was as good as control whereas at dose of 10^{-3} was significantly better in increasing the radicle length. A significant increment was recorded in case of 2,4-D and TIBA dose 10^{-3} the radicle length of varieties SML-668 and K-851 over control in both years. The radicles were stouter, stronger and thicker than the control and both GA and IAA affected treatments. This aspect had a great bearing on the health of the plants that were in generally healthier when treated with 2.4-D and TIBA in case of K-851. These results are in conformity with the findings of (*Aldesuquy et, al. 2007*) who also reported increase in radicle length with increase in doses of treatments.

Vigor index

It was observed in Table 2 that each growth regulator induced significant changes in vigour index and that each dose also made significant impact dose at all intervals induced the highest vigor index as compared to any other growth regulator at any dose, followed by 2, 4-D, it was TIBA again at 10^{-3} that induced the highest vigor index between various doses of TIBA and 2,4-D, each dose induced a significant impact over the other dose 10^{-1} being the lowest. The impact of 2,4-D (10^{-3}) and TIBA (10^{-3}) was significantly better than the control where all other growth regulator and the corresponding doses were inferior to the control except GA (10^{-3}) in 2012 in variety K-851. In case of varieties Pant mung-5 and P-9072, the response to the doses was reversed in case of both GA and IAA because the dose or 10^{-1} increased the vigor index. Where in varieties K-851 and SML-668 the response was exactly opposite that is the vigor index in case of BA, TIBA and 2,4-D, increase with the decreasing doses. Similar results were reported

Table 1: Effect of growth regulators priming on seed germination, germination energy and some other traits in mungbean in years (2012 and 2013)

Variety	Growth Regulators	Doses	Germination %		Germination energy		Plumule length (cm)		Radicle length (cm)	
			2012	2013	2012	2013	2012	2013	2012	2013
Pant mung-5	Control		65.3	55.3	400.0	817.0	17.3	18.6	15.9	15.6
	GA	10^1	55.3	53.3	1000	917.0	16.0	16.1	17.2	16.4
	GA	10^2	53.3	58.6	933.5	900.0	15.6	15.8	15.9	16.2
	GA	10^3	52.6	60.6	900.0	867.0	15.3	15.4	15.6	15.8
	BA	10^1	45.3	50.6	883.5	883.0	13.6	13.8	15.6	15.8
	BA	10^2	46.0	52.6	816.5	883.0	13.8	14.6	15.2	15.6
	BA	10^3	47.3	54.6	800.0	817.0	13.9	14.1	14.9	15.2
	IAA	10^1	51.3	52.6	833.0	867.0	14.8	14.9	17.1	16.2
	IAA	10^2	50.0	57.3	850.0	817.0	14.5	14.6	15.8	16.1
	IAA	10^3	49.3	59.3	833.5	816.0	14.1	14.7	15.5	15.7
	TIBA	10^1	54.6	55.3	933.5	850.0	16.9	17.0	12.3	13.7
	TIBA	10^2	58.0	58.6	866.5	850.0	16.9	17.0	12.4	13.5
	TIBA	10^3	63.3	60.6	867.0	833.5	17.4	15.5	12.6	13.1
	2,4-D	10^1	63.6	56.6	916.5	853.5	17.6	17.7	12.2	13.4
	2,4-D	10^2	56.3	59.3	850.0	817.0	17.9	18.1	12.3	13.6
	2,4-D	10^3	67.3	61.3	816.5	767.0	18.4	18.6	12.4	13.8
	CD at 5%		0.47	2.48	28.5	19.2	0.27	0.29	1.52	0.21
SML-668	Control		60.6	50.6	983.5	1083.5	17.6	17.7	18.2	17.7
	GA	10^1	55.3	45.3	1050.0	1150.0	17.5	17.6	18.2	17.6
	GA	10^2	58.0	43.3	1050.0	1117.0	17.6	17.7	18.2	17.7
	GA	10^3	60.0	41.3	1083.0	1165.0	17.7	17.7	18.3	17.7
	BA	10^1	50.0	38.0	933.5	1083.0	17.2	17.2	17.5	17.2
	BA	10^2	53.3	39.3	916.5	1067.0	17.3	18.4	17.6	18.4
	BA	10^3	55.3	41.3	983.0	1066.5	17.4	17.4	17.7	17.4
	IAA	10^1	57.3	44.6	1033.5	1133.0	17.3	17.3	18.0	17.3
	IAA	10^2	60.6	42.0	1033.5	1133.0	17.4	17.5	18.1	17.5
	IAA	10^3	62.0	40.6	1017.0	1100.0	17.5	17.6	18.2	17.6
	TIBA	10^1	58.0	45.3	1000.0	1200.0	17.5	17.6	18.3	17.6
	TIBA	10^2	61.3	46.0	1000.0	1167.0	17.7	17.2	18.3	17.2
	TIBA	10^3	97.3	48.6	900.0	1200.0	17.8	17.8	18.3	17.8
	2,4-D	10^1	96.6	50.6	983.5	1116.5	17.9	18.0	18.3	18.0
	2,4-D	10^2	97.3	51.3	1000.0	1150.0	18.1	18.2	18.4	18.2
	2,4-D	10^3	65.3	53.3	1016.5	1133.0	18.3	18.3	18.5	18.3
	CD at 5%		1.21	2.49	28.5	36.1	0.77	0.41	0.71	0.41
P-9072	Control		62.6	53.3	616.0	700.0	16.8	17.2	15.8	15.1
	GA	10^1	52.6	50.6	783.0	867.0	17.1	17.1	17.0	16.0
	GA	10^2	50.6	55.3	800.0	867.0	16.7	18.8	15.0	15.9
	GA	10^3	48.6	58.0	783.5	900.0	16.3	16.4	15.7	15.4
	BA	10^1	40.6	45.3	700.0	750.0	13.3	13.3	15.0	15.2
	BA	10^2	42.6	47.3	733.5	750.0	13.7	13.8	15.0	15.1
	BA	10^3	44.6	49.3	750.0	750.0	14.2	14.5	15.2	15.2
	IAA	10^1	49.3	48.0	716.5	833.0	14.6	14.6	17.1	16.2
	IAA	10^2	47.3	53.3	733.5	900.0	14.6	14.3	17.2	16.2
	IAA	10^3	46.0	57.3	700.0	866.5	13.5	13.6	17.0	16.1
	TIBA	10^1	55.3	55.3	767.0	833.0	17.2	17.4	13.0	14.1
	TIBA	10^2	56.6	57.3	733.5	850.0	17.4	18.0	13.4	14.4
	TIBA	10^3	58.6	59.3	666.5	817.0	18.2	18.3	13.5	14.6
	2,4-D	10^1	60.6	54.0	683.0	800.0	18.2	18.0	13.4	14.6
	2,4-D	10^2	63.3	58.0	666.5	750.0	18.5	18.8	13.4	14.4
	2,4-D	10^3	65.3	60.0	683.0	750.0	19.5	18.8	13.7	14.9
	CD at 5%		0.28	2.78	22.1	17.1	0.51	0.75	0.62	0.56
K-851	Control		62.6	46.6	1050.0	1033.0	19.5	14.7	20.2	20.3
	GA	10^1	58.6	40.6	1083.0	1050.0	19.2	19.3	19.5	19.6
	GA	10^2	60.0	38.6	1033.0	933.5	19.4	19.5	19.6	19.6
	GA	10^3	62.6	37.3	950.0	900.0	19.5	19.6	19.7	19.7
	BA	10^1	55.3	35.3	966.5	1000.0	18.8	18.8	18.9	18.9
	BA	10^2	60.6	36.6	950.0	967.0	18.9	19.0	19.2	19.2
	BA	10^3	60.6	38.0	950.0	967.0	19.1	19.1	19.3	19.3
	IAA	10^1	62.6	39.3	1133.5	1067.0	19.1	19.1	19.4	19.4
	IAA	10^2	63.3	37.3	1050.0	1000.0	19.3	19.4	19.4	19.5
	IAA	10^3	62.3	36.6	1000.0	950.0	19.5	19.5	19.5	19.5
	TIBA	10^1	63.3	40.6	933.0	1016.5	19.5	19.8	19.9	19.9
	TIBA	10^2	62.0	42.6	916.5	950.0	19.7	19.9	20.0	20.0
	TIBA	10^3	63.3	44.6	900.0	917.0	19.9	20.0	2.1	20.1
	2,4-D	10^1	64.6	45.3	1016.5	1000.0	19.7	19.9	20.2	20.5
	2,4-D	10^2	64.6	47.3	950.0	950.0	19.9	20.1	21.6	21.7
	2,4-D	10^3	66.6	49.3	933.5	916.5	20.1	20.3	21.8	21.9
	CD at 5%		2.41	2.02	2.41	34.7	0.62	0.38	0.72	0.11

Table 2: Effect of growth regulators priming on plant height, number of seeds per pod and some other traits in mungbean in years (2012 and 2013)

Variety	Growth Regulators	Doses	Vigor index		Plant height (cm)		No. of seeds per pod		100 seed weight (g)	
			2012	2013	2012	2013	2012	2013	2012	2013
Pant mung-5	Control		1516.5	1904.2	62.6	61.6	12.0	13.0	4.2	4.5
	GA	10^1	1481.8	1897.4	67.0	71.0	12.3	13.3	4.9	4.4
	GA	10^2	1425.1	1873.9	64.6	66.7	12.0	13.3	4.8	4.3
	GA	10^3	1371.7	1840.0	63.6	64.7	12.0	13.3	4.7	4.2
	BA	10^1	975.4	1709.8	70.3	76.3	12.6	13.7	4.3	4.9
	BA	10^2	1037.4	1735.4	68.8	72.8	12.3	13.3	4.2	4.7
	BA	10^3	1098.2	1791.1	66.6	69.7	12.0	13.0	4.0	4.0
	IAA	10^1	1173.6	1900.0	66.8	68.2	12.6	13.7	4.7	4.6
	IAA	10^2	1116.3	1888.4	65.3	67.4	12.3	13.3	4.5	4.5
	IAA	10^3	1046.4	1824.8	63.6	63.4	11.6	12.7	4.4	4.4
	TIBA	10^1	1470.4	1904.8	54.5	55.8	11.6	12.7	5.0	5.0
	TIBA	10^2	1519.7	1928.3	60.4	57.1	12.0	13.0	5.2	5.2
	TIBA	10^3	1640.7	1951.6	61.4	58.4	12.3	13.3	5.6	5.4
	2,4-D	10^1	1650.0	1931.2	58.9	53.9	11.6	12.7	5.0	4.8
	2,4-D	10^2	1702.0	1961.4	61.7	54.7	12.0	13.0	5.2	5.2
	2,4-D	10^3	1848.7	1994.3	62.6	60.6	12.3	13.4	5.4	5.7
	CD at 5%		28.5	38.4	2.77	2.33	0.94	0.94	0.06	0.37
SML-668	Control		1706.0	1557.0	32.6	34.7	10.2	11.3	5.2	5.4
	GA	10^1	1671.3	1397.4	44.8	51.8	10.3	11.4	5.6	5.8
	GA	10^2	1681.8	1335.5	42.8	50.8	10.0	11.1	5.2	5.2
	GA	10^3	1702.0	1295.3	39.3	42.3	9.9	11.0	4.9	4.8
	BA	10^1	1467.8	1029.4	41.0	48.0	9.7	10.8	4.2	4.7
	BA	10^2	1491.2	1051.0	38.4	41.4	9.6	10.7	4.0	4.3
	BA	10^3	1519.7	1125.2	30.2	31.2	9.5	10.6	3.8	4.0
	IAA	10^1	1568.4	1272.8	48.6	53.6	10.4	11.5	5.8	5.9
	IAA	10^2	1649.9	1208.4	40.4	44.4	10.0	11.1	5.0	5.0
	IAA	10^3	1673.2	1150.9	36.1	40.1	9.8	10.9	4.8	4.7
	TIBA	10^1	1673.2	1442.2	28.1	30.1	10.0	11.3	4.9	4.9
	TIBA	10^2	1703.0	1453.4	27.1	28.2	10.3	11.4	5.3	5.4
	TIBA	10^3	1732.6	1477.3	34.5	36.6	10.8	11.9	5.8	5.7
	2,4-D	10^1	1732.0	1588.5	25.1	26.2	10.3	11.4	5.0	5.0
	2,4-D	10^2	1766.7	1634.9	35.1	38.2	10.7	11.8	5.2	5.5
	2,4-D	10^3	1793.4	1729.6	31.9	33.9	10.9	12.0	5.4	5.8
	CD at 5%		33.9	37.8	2.72	2.02	0.91	0.91	0.06	0.24
P-9072	Control		1559.3	1859.1	58.3	58.3	12.3	13.4	4.5	4.4
	GA	10^1	1495.2	1876.8	60.7	62.7	13.0	14.0	4.4	4.5
	GA	10^2	1433.7	1880.0	60.0	61.1	12.6	13.7	4.3	4.4
	GA	10^3	1394.3	1809.5	59.1	60.1	12.3	13.4	4.1	4.3
	BA	10^1	941.9	1579.2	65.1	68.1	12.6	13.7	4.9	5.0
	BA	10^2	1002.7	1617.1	63.7	67.7	11.6	12.7	4.7	4.8
	BA	10^3	1084.8	1672.5	61.5	63.5	11.3	12.4	4.2	4.6
	IAA	10^1	1242.8	1898.1	62.1	65.2	13.0	14.0	4.5	4.5
	IAA	10^2	1197.6	1844.8	61.0	59.0	12.3	13.4	4.3	4.4
	IAA	10^3	1099.4	1782.7	57.6	56.7	11.6	12.7	4.2	4.3
	TIBA	10^1	1542.6	1811.5	52.5	52.5	12.0	13.0	5.0	5.0
	TIBA	10^2	1631.8	1851.8	54.5	53.5	12.3	13.4	5.2	5.7
	TIBA	10^3	1671.2	1897.2	56.1	54.1	12.6	13.7	5.4	5.9
	2,4-D	10^1	1674.3	1869.9	45.7	48.7	12.0	13.0	4.6	4.9
	2,4-D	10^2	1754.7	1915.2	48.6	50.6	12.6	13.7	5.2	5.2
	2,4-D	10^3	1799.0	1956.5	49.3	51.3	13.0	14.0	5.3	5.8
	CD at 5%		34.7	37.3	2.89	2.33	0.92	0.92	0.05	0.24
K-851	Control		1741.8	1624.5	45.4	51.4	11.2	12.3	4.3	5.0
	GA	10^1	1700.8	1399.5	63.2	67.3	12.7	13.2	5.3	5.3
	GA	10^2	1721.2	1320.9	60.2	64.3	11.8	12.9	5.0	5.1
	GA	10^3	1752.1	1266.9	54.1	56.2	11.4	12.4	4.7	5.0
	BA	10^1	1582.0	1089.4	58.3	60.4	11.4	12.5	4.8	5.0
	BA	10^2	1619.7	1114.7	61.5	64.5	11.2	12.3	4.4	4.6
	BA	10^3	1637.1	1141.3	49.1	54.2	11.3	12.2	4.1	4.1
	IAA	10^1	1682.7	1265.6	42.5	49.6	12.0	13.1	5.4	5.4
	IAA	10^2	1689.4	1210.9	40.6	43.7	11.2	12.3	4.9	5.3
	IAA	10^3	1706.8	1157.4	39.7	43.7	11.0	12.0	4.2	5.1
	TIBA	10^1	1737.6	1507.2	37.1	37.1	11.8	12.8	4.4	4.9
	TIBA	10^2	1766.7	1518.7	38.2	40.3	12.6	13.7	4.8	5.4
	TIBA	10^3	1786.5	1636.2	36.4	34.4	12.8	13.8	5.2	5.7
	2,4-D	10^1	1791.4	1597.5	37.0	36.0	11.9	12.9	4.6	5.0
	2,4-D	10^2	1818.9	1694.1	38.0	39.1	12.7	13.8	4.9	5.4
	2,4-D	10^3	1822.8	1767.3	38.4	42.5	12.9	13.9	5.1	5.6
	CD at 5%		26.4	28.3	4.86	4.79	0.87	0.86	0.04	0.24

by (*Ali et al. 2008*) who found that the plants would be vigorous and healthy which are obtained after the pre sowing seed treatment with 2,4-D and TIBA at lower doses.

Plant height

The data given in table 2 revealed that varieties P-9072 and Pant mung-5, plant height was increased maximum and significantly by BA at 10^{-1} dose. However the difference between GA, IAA and BA at 10^{-1} dose in increasing the plant height was significantly indicating thereby that the effect of all the doses was not similar. Some was the case for the other doses also. Infact 2,4-D and TIBA in variety Pant mung-5 also significantly decreased the plant height as compared to control or other growth regulator in both the years. The response of varieties Pant mung-5 and P-9072 was different than the varieties K-851 and SML-668 as there was significantly increase or decrease in both the years. In both the varieties SML-668 and K-851 at doses (control, 10^{-1},10^{-2},10^{-3}) and with all the growth regulators. GA and IAA at all doses significantly increased the plant height whereas TIBA and 2,4-D decreased the plant height significantly. Maximum decrease was induced by the 10^{-1} dose of both height minimum as compared to the other dose of the same growth regulators. BA at 10^{-1} dose increased the plant height significantly as compared to control and the other doses. These results confirm the findings of (*Devi et, al. 2012*).

Number of seeds pod^{-1}

The results concerning number of seeds pod^{-1} in four varieties of mungbean and all growth regulators, presented in table -2 mungbean varieties of K-851 and SML-668, TIBA and 2,4-D induced a significant increase in number of seeds pod^{-1} at dose (10^{-3}) whereas GA and IAA gave the same result at higher dose (10^{-3}). However the increase affected by TIBA and 2,4-D was significantly better than GA and IAA. The highest increase (13.97g) was found in 2013 at 10^{-3} in case of 2,4-D in general, the role of BA was similar to the higher dose of both TIBA and 2,4-D and the lower concentrations of both GA and IAA. In case of varieties Pant mung-5 and P-9072 the number of seeds pod^{-1} were better as compared to K-851 and SML-668. Each growth regulator, their doses and the interactions between the growth regulator and dose showed their significant impact on the number on seeds pod^{-1}, meaning thereby, that Pant mung-5 and P-9072 responded better than the K-851 and SML-668 in all the tested varieties, dose at 10^{-1} of GA and IAA and dose at 10^{-3} of TIBA and 2,4-D induced more number of seeds as compared to other doses. These results are in full agreement with those observations by (*Srimathi.et al. 2006*).

100 seed weight

The data given in table 2 revealed that the varieties K-851 and SML-668, there was significant impact of the growth regulators GA and IAA at dose of 10^{-1}, and TIBA and 2,4-D at 10^{-3} for inducing better 100 seed weight as compared to control. BA at all the doses of 10^{-3} had lower 100 seed weight as compared to control. Maximum 100 seed weight was noticed at all the doses of 2,4-D. The response of P-9072 was considerable better than the variety K-851 as in general the 100 seed weight was better. Even the response of BA at 10^{-1} and 10^{-2} doses was significantly better than the control in Pant mung-5 and P-9072 whereas such response was not observed in the varieties K-851 and SML-668. However, the maximum increase in 100 seed weight was induced by 2,4-D and TIBA.

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Effect of Mineral Supplement and Balance Concentrate Mixture on Milk Production and Reproduction Traits of Buffaloes under Rural Management Practices

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Abstract

An on-farm testing was conducted to assess the effect of mineral supplementation and balance concentrate mixture on production and reproduction traits of buffaloes under rural management practices. Buffaloes were categorized in to three groups, each group having five buffaloes. First group of buffaloes were taken as control group (buffalo owners practice) (T_1). The second group of buffaloes were fed balance concentrate mixture according to milk production @ 1 kg/2.5 litre milk/day (T_2) and third group were fed balance concentrate mixture according to milk production @1 kg/ 2.5 litre milk/day + 60 g mineral mixture/day (T_3) . Results of the trial reveal that overall milk production recorded were 7.67, 8.57 and 9.57 litre/day for treatment T_1, T_2 and T_3; respectively. Treatment T_3 had significant effect on milk production in comparison to treatment buffalo owners practice as well as T_2 and increased 1.9 litre milk yield (24.8 per cent) in comparison to control group (T_3). Regarding service period, the mean service period were 142.8, 127.5 and 118.6 days for treatment T_1, T_2 and T_3, respectively. Treatment T_3 decreased 24.2 (16.9 %) days and treatment T_2 decreased 15.3 days (10.7 %) service period in comparison to buffalo owners practice. Treatment T_3 had significant effect on service period over buffalo owners practice and T_2. The net profit from sale of extra milk were computed as Rs.7.60, 24.10 and B: C ratio 1:1.57 and 1:2.12 for the treatment T_2 and T_3, respectively. It can be concluded that mineral supplementation and balance concentrate mixture feeding according to milk production increases milk production and decrease service period in buffalo.

Key words: Balance concentrate mixture, Buffalo, Service period, Mineral mixture

Introduction

Buffalo is the major milk producing animal in our country (54 percent) with maximum share in world's population. Similarly, the district Sawaimadhopur has also highest buffalo population according to 18th livestock census (buffalo-251589 and cow-118405) in dairy animals which represents 68.0 per cent of the total dairy animals in the district.

Low milk yield, low growth rate and poor reproductive performance (anoestrus, seasonal breeder behavior and long inter-calving period) are major constraints of buffaloes [Qureshi *et al*. (2000), Sahoo *et al*. (2004) and Wynn *et al*. (2009)]. In India, the buffaloes are mainly fed cereal straws that are highly lignified and contain low content of both fermentable protein and carbohydrates. Inadequate and irregular availability of quality feedstuff and imbalance feeding are the main cause of poor performances of buffaloes. To increase the productivity of buffaloes, supplementation of nutrients, which can improve the utilization of poor quality roughages and fulfill the deficiency of nutrients, are essential as the feed utilization can be increased by supplementation of critical nutrients in ration (Sampath *et al*. 1995).

Long inter- calving period in buffaloes is another major problems in district. The ideal inter-calving period of buffalo is 12 to 15 months but it was observed 18 to 24 months in field condition. Generally, buffaloes may start cycle within three months of calving; if this period increases beyond three months then it called as post-partum anoestrus. Anoestrus is one of the most common cause of temporary infertility in buffaloes, leading to prolonged inter-calving period, delayed conception, reduction in milk yield, less number of calves and lactation in their life time, resulting financial loss to buffalo rears.

Most of the earlier studies to evaluate the impact of mineral supplementation and balance concentrate

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mixture were conducted in research station under controlled conditions. A bench mark survey was conducted to find out the causes of low milk production and long inter-calving period. When prioritize the cause of low milk production and long inter-calving; mineral deficiency, lack of balance concentrate mixture according to milk production and anoestrus were the major cause of the problems. Low milk production and anoestrus/ late pregnancy in buffalo occur mainly due to nutritional deficiency. Therefore, an on-farm testing (OFT) was designed to study the effect of mineral supplementation and balance concentrate on production and reproduction traits of buffaloes under rural management practices.

Materials and Methods

An on-farm testing was conducted on 15 newly calved buffaloes which parturition occurred 20 to 30 days before commencements of trial. The lactating buffaloes were almost same stage of lactation and preferably II to IV order of parturition were selected for the study. The trial was conducted for three consecutive years in three randomly selected villages. Buffaloes were categorized in to three groups, each group having 5 buffaloes. First group of buffaloes were taken as control group (buffalo owners practice) [T_1]. The second group of buffaloes were fed balance concentrate mixture according to milk production @ 1 kg/2.5 litre milk/day [T_2] and third group were fed balance concentrate mixture according to milk production @1 kg/ 2.5 litre milk/day + 60 g mineral mixture/day [T_3] .Trial was conducted for a period of three months during winter season (November to February). An on-campus training was conducted before start the trial of selected buffalo keepers for awareness. Management practices and fodder supplied to the buffaloes were same before and during the treatment. Wheat straw was fed as dry fodder and green fodder availability was limited. It was observed during the bench mark survey that on an average 2.5 Kg (1.5 to 3.0 Kg) concentrate mixture per day was fed to the milch buffaloes by the buffalo keepers. Daily milk yield of individual buffalo was recorded through milk recording index card by the animal owners and also by investigator at weekly interval for fair degree of precision. The buffaloes were closely supervised daily morning and evening by the buffalo owners for heat symptoms. The buffaloes detected in heat were conceived and date was noted. Statistical analysis was done as per Snedecor and Cochran (1968).

Results and Discussion

Daily milk production per buffalo were recorded and depicted in table-1. It revealed that overall milk production was 7.67, 8.57 and 9.57 liter/day for treatment T_1, T_2 and T_3, respectively. The data showed that treatment T_3 increased 1.90 litre milk production which was 24.8 per cent more in comparison to control group. It was observed that treatment T_3 had significant ($P<0.05$) effect on milk production. The treatment T_2 increased 0.90 litre milk yield (11.7%) but it was found non-significant with the control group. These findings are comparable with Makkar (2001) and Upreti *et al*. (2010).

The data presented in Table 2 indicates that the overall service period was 142.8, 127.5 and 118.6 days in treatment T_1, T_2 and T_3, respectively. Treatment T_3

Table 1: Effect of feeding practice on milk production of buffalo

Treatment	Year wise milk production/day				Per cent increase
	2011-12	2012-13	2013-14	Overall milk production	over control
T_1	7.68±0.29^{a}	7.42±0.37^{a}	7.90±0.19^{a}	7.67	-
T_2	8.44±0.70^{ab}	8.52±0.38^{ab}	8.74±0.36^{ab}	8.57	11.7
T_3	9.42±0.40^{b}	9.66±0.61^{b}	9.62±0.52^{b}	9.57	24.8
LSD (5%)	1.34	1.32	1.28		

Table 2: Service period of buffalo as influenced by feeding practice

Treatment	Year wise service period in days				Per cent decrease
	2011-12	2012-13	2013-14	Overall service period	over control
T_1	142.2±5.0^{b}	143.6±3.0^{b}	142.6±2.7^{b}	142.8	-
T_2	126.8±3.5^{ab}	127.0±3.4^{b}	128.8±3.2^{b}	127.5	10.7
T_3	117.0±2.5^{a}	119.0±2.4^{a}	119.8±2.4^{a}	118.6	16.9
LSD (5%)	12.2	7.7	8.4		

Table 3: Relative profitability of different feeding practices in buffalo

Parameters	Treatment T_1	Treatment T_2	Treatment T_3
Extra Milk Yield (Lit./day)	-	0.90	1.90
Extra Income from sale of milk/ day/ buffalo @ Rs. 24/lit	-	21.60	45.60
Feeding of mineral mixture/ day/ buffalo (gms.)	-	-	60
Cost of mineral mixture/ day/buffalo	-	-	3.30
Feeding of concentrate mixture /day/ buffalo (Kgs.)	2.50	3.50	3.80
Cost of concentrate mixture /day/ buffalo (Rs.) @ Rs. 14/ Kg.	35.00	49.00	53.20
Extra cost of concentrate mixture /day/ buffalo (Rs.) over control group (T_1)	-	14.00	18.20
Total cost of Treatment /day/buffalo (Rs.)	-	14.00	21.50
Net profit /day/buffalo	-	7.60	24.10
B:C Ratio	-	1:1.54	1:2.12

reduced 24.2 and 15.3 days service period in comparison to treatment T_1 and T_2. The treatment T_3 reduced 16.9 per cent service period and it had highly significant ($P<0.05$) effect in service period over control group but it was non-significant with treatment T_2. Treatment T_2 also reduced 15.3 days (10.7%) service period in comparison to buffalo owners practice but the effect was non-significant. The present findings are in conformity with the results of Mann *et al*. (2000) and Paul *et al*. (2002) who reported that mineral supplementation have positive effect on service period of buffaloes.

The data of economic analysis are presented in table-3. Data revealed that total cost of treatment/day/ buffalo were Rs. 14.00 and Rs. 21.50 for treatment T_2 and T_3, while the net profit/ day/ buffalo were Rs. 7.60 and Rs.24.10 for treatment T_2 and T_3; respectively in comparison to control group (T_1). The benefit cost (B:C) ratio were found 1.54 and 2.12 for treatment T_2 and T_3; respectively.

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Adoption dynamics of poultry entrepreneurs' in relation to poultry management practices

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Abstract

The scientific management and high breed have a great potential to increase the poultry production. The success of poultry technology program lies on the extent to which, the poultry entrepreneurs accept the technology. The present research was deigned to know the level of adoption of poultry management practices. The result of this study indicated that majority (70.00 per cent) of the poultry owner were found with medium level of adoption of poultry management practices. The level of adoption like record keeping, marketing, water management and feed management was high. The organizational participation, mass media exposure, extension contact, size of the poultry farm, knowledge about poultry management practices of the poultry entrepreneurs' were positive and significant correlated with their adoption level.

Key words: Poultry management, Dynamics, practice, Adoption

Introduction

Some challenges facing poultry farmers in Ghana as uncompetitive interest rate, lack of high subsiding cost of maize production and tariffs to enable poultry farmers to compete with influx of imported poultry products which threaten their jobs and employment generation for the youth (Altman, E. 1983 and Hall, 2004).

Most banks in the country are unwilling to finance poultry production. In the view of Derek Leebaert, (2005) the ADB is the main bank that has supported poultry farmers through the provision of credit and animal husbandry training. Even then, most small-scale poultry keepers have not received credit from the ADB as they fail to meet the benchmarks set for gaining access to credit (Modern Ghana News, 2010). A case in point is in the Ghana West Municipality of the Greater Accra region where the bank is able to provide long-term credit to farmers who have appropriate collateral that guarantees loan repayment whiles small-scale poultry farmers without land titles do not have access to loans from the bank (Derek Leebaert, 2005).

Considerable research is done in our country for development of poultry sector. Many scientists are working to evolve best strain, best feed, best precaution against various disease and best managerial practices. The scientific management and high strain have a great potential to increase the poultry production. However the success of poultry technology lies on the extent to which it poultry owners accept the technology. Poultry production is governed by various practices viz., improved breed, feed management, water management, lighting, culling, health care, rearing, summer and winter management, record keeping and marketing. To have the optimum yield, all these components must be rationally adopted. The wide gap exits between actual production and its potential production might be due to various factors but low extent of adoption of poultry technology is major one. Therefore, it is worthwhile to study the adoption dynamics of poultry entrepreneurs' in relation to poultry management practices. Keeping this in view, the present study was carried out with the following objectives:

1. To find out the extent of adoption of poultry management practices by the poultry owners'.
2. To find out the extent of practice wise adoption of poultry management practices,
3. To ascertain the relationship between adoption level and selected independent variables.

Methodology

The present study was undertaken in Anand district of Gujarat State. A random sample of total 110 respondents from thirty villages was selected. All the respondents were personally interviewed for the study, with the help of specially structured interview schedule. To develop an adoption index initially the poultry management practices were divided in to ten different practices by consulting the experts in the field as well as review of literature. The list of ten practices was then administered to experts to assign the weighatage to each practice making a total of 100. The opinion of

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30 experts who responded our efforts was considered for the development of an adoption index. The practice wise weightage was determined on the basis of mean response of experts and all the ten practices duly weighted by experts constituted the index.

Results and Discussion

A. Level of adoption

The data pertaining to level of adoption of poultry management practices are furnished in Table 1. The data clearly indicated that great majority (70.00 per cent) of the poultry owner were found with medium level of adoption of poultry management practices, followed 15.45 per cent with high and 14.55 per cent with low adoption level of management practices.

However, on an average the adoption of recommended poultry management practices was

B. Practice wise adoption

The data presented in Table 2 indicated that the practice wise level of adoption was found very high in the practices like marketing (I rank), water management (II rank), rearing (III rank), summer and winter management (IV rank).

C. Relationship with independent variables

The correlation coefficients of fourteen antecedent variables related to socio-economic, psychological and communicational attributes of respondents with their extent of adoption of watershed technologies (consequent variable) were computed and presented in Table.

The correlation coefficients of fourteen antecedent variables related to socio-economic, psychological and communicational attributes of respondents with their extent of adoption of watershed technologies.

An attempt was also made to find out the relationship between the adoption and selected independent variables (Table 3).

It is clear from the result of this study that variables, namely organizational participation, mass media exposure, extension contact, size of the poultry farm knowledge about poultry management practices were positive and significant relationship with the adoption level of the respondents. This may be due to fact that the higher knowledge of poultry management practices leads to high adoption of the technology, which in turn resulted in higher production.

The size of the poultry farm was significantly correlated with level of adoption of poultry management practices. The reason behind this might be that the size of the poultry farm is the main factor contributing to economic betterment of the farmers. The better economic conditions allow them to try and evaluate the practices at their farm, which ultimately leads to adoption of the poultry management practices. Organizational participation, mass media exposure and extension contact were also significantly correlated with level of adoption of poultry management practices.

Our findings are totally corroborated with Emmanuel, A. (2011) who reported risk management practice is one of the key components in a business set up. One cannot overlook such practices in the poultry industry which involves a lot of risk (such as diseases and other on for seen contingencies). The research results about respondents knowledge on risk management was not encouraging, there was an average score of 54.7percent. One would have loved to see a higher score in this knowledge area. The practices were even worse, responses from respondent on risk management practices as to whether they have insurance policy revealed that no farmer/entrepreneur have taken any insurance policy for his farm. In the same way only 23.4percent, 20percent and 24 percent have regular visit from the veterinary, buying feed from approved dealers and delegate authority to others respectively. Those who reported buying feed from approved source were mainly from the large scale farmers such as A M Unity farms.

Among total farmers, age, experience, and social participation correlated non-significantly with ICT utilization. Knowledge on poultry, poultry farm size, information seeking behavior, economic orientation, and achievement motivation, management orientation, scientific orientation and risk orientation correlated positively and significantly at 1% level of probability. The variables knowledge on ICT, socio economic status, rationality in decision making, were positively correlated with ICT utilization at 5% level of probability. Layer farmers: computed 'r 'values between independent variable viz. knowledge on poultry farming, poultry farm size, information seeking behavior,

Table 1: Distribution of the respondents according to their level of adoption of poultry management practices.

N =110

S. No	Adoption level	Number	Per cent
1	Low level (Below 44.29)	17	15.45
2	Medium level (In between 44.29 – 58.97)	77	70.00
3	High level (Above 58.97)	16	14.55
	Total	110	100.00

Table 2: Extent of adoption of different practices of poultry management practices

N = 110

S. No.	Name of the practices	Adoption level Low	Medium	High	Total score	Mean score	Rank
1	Improved breed	35(31.82)	67(60.91)	8(7.27)	193	1.75	IX
2	Feed management	32(29.09)	52(47.27)	26(23.64)	214	1.94	VII
3	Water management	22(20.00)	56(50.91)	32(29.09)	230	2.10	II
4	Lighting	30(27.27)	50(45.45)	30(27.27)	220	2.00	VI
5	Culling	12(10.91)	84(76.36)	14(12.73)	222	2.02	V
6	Health care	17(15.45)	86(78.18)	7(6.36)	210	1.91	VIII
7	Rearing	9(8.18)	99(90.00)	6(5.45)	225	2.05	III
8	Summer and winter management	9(8.18)	88(80.00)	13(11.82)	224	2.04	IV
9	Record keeping	65(59.09)	40(72.73)	5(4.54)	160	1.45	X
10	Marketing	1(0.91)	80(72.73)	29(26.36)	248	2.25	I

economic orientation, rationality

in decision making, achievement motivation, management orientation, scientific orientation, risk orientation with utilization of ICT tools were significantly related at 0.01 level of probability among layer farmers. Knowledge on ICT tools positively correlated at 5% level of significance. Age, experience in poultry farming, socio economic status and social participation were non-significantly correlated with ICT utilization among layer farmers.

Conclusions

It is evident from the result of this study that majority (70.00 per cent) of the poultry owner were found with medium level of adoption of poultry management practices. The level of adoption like record keeping, marketing, water management and feed management was high. The organizational participation, mass media exposure, extension contact, size of the poultry farm knowledge about poultry management practices were positive and significant correlated with the adoption level of the respondents.

Table 3: Correlation of independent variables with the level of adoption of poultry management practices

S. No.	Independent variables	r-value
1	Age	0.0421
2	Education	0.0693
3	Experience in poultry	0.1802
4	Training in poultry	0.1839
5	Caste	0.1569
6	Organizational participation	0.2268*
7	Mass media exposure	0.4079*
8	Extension contact	0.2284*
9	Occupation	0.1574
10	Size of the poultry farm	0.1880*
11	Annual income	0.1598
12	Scientific orientation	0.1808
13	Risk orientation	0.0368
14	knowledge	0.4569*

*= Significant at 0.05 level

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Physico – chemical quality of burfi and milk cake

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Abstract

The samples of burfi and milk cake sold in Agra city were analyzed for their physic - chemical quality. Control sample prepared in the laboratory were also examined for same characters. The control samples were superior to market samples in physico–chemical quality.

Key words: Burfi, milk cake, physico–chemical

Introduction

Burfi and Milk cake are important indigenous milk products quite popular in Northern India. Burfi, the most popular milk based confection prepared from khoa adding sugar and it normally contain considerable amount of milk solids. Other ingredients like coconut, pista, fruit and maka are incorporated into the product to cater special taste. Milk cake also prepared from khoa and sugar mixed, but a part of mass is caramelized more intensively and then layered between the less caramelized proteins of the product. The product occupies its importance both from dietary and economics point of view. Besides being, highly nutritive, these have pleasing, sweet taste and relished in every home. Yet, little work have been Done regarding to chemical quality of these products so far , keeping in view the importance of the products, attempts were made to examine the physical and chemical quality of market as well as control samples of burfi and milk cake.

Materials and Methods

1. Sensory quality

This quality of products was examined by a panel of judges drawn from the dept. who were well versed to examine sensory quality. The product was examined for colour, flavor and body & texture of the product.

2. Chemical quality

To evaluate the chemical quality of marketed and control samples of burfi and milk cakes, attempts made were as follows.

Collection of samples from markets

The samples of burfi and milk cake were collected from the markets of Agra city. The city was divided into two zones viz. zone I and zone II. The samples were collected in the clean sterilized and laboratory and subjected to examination and analysis. In case of delay, the samples were placed in refrigeration in the laboratory till taken up for analysis.

Collection of milk samples

To prepare control samples of burfi and milk cake, the samples of milk were collected in sterilized containers. The samples were collected from cows and buffaloes maintained at the college dairy farm. The milk samples were collected just after milking and analyzed for fat and SNF content and processed for the preparation of the burfi and milk cake.

Preparation of control samples

The control samples of burfi and milk cake were prepared in the laboratory by using standardized milk following the method as described by "Indian Standard, 5550 : (1970).

Analysis of market and control samples

The samples of burfi and milk cake collected from different zones of Agra city and prepared in the laboratory were analyzed as follow.

The titratable acidity of burfi and milk cake samples were determined according to IS : 1165-1967. Total solids and fat content were determined using to IS: 4079-1967. The sucrose content in samples was determined according to "LANE EYNON Volumetric method as described in IS 4079-1967. Moisture content was determined by deducting the total solids from 100. The samples were analysed for their ash and calcium contents using the standard methods of analysis (AOAC, 1955) and phosphorus content of Burfi and milk cake samples was determined using the method as described by Fiske and Subba Row (1925).

Results and Discussion

The results on sensory quality (physical) of burfi and milk cake are presented in Table 1. The colour of burfi and milk cake from market varied from white to light brown with burnt particles. The control samples

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Table 1: Sensory quality of burfi and milk cake

Products	Sample No.	Market			Control		
		Colour	Flavour	Body & Texture	Colour	Flavour	Body & Texture
Burfi	1.	White	Pleasant	Semihard	White	Pleasant	Semi Hard
	2.	White	Do	Hard	Do	Do	Do
	3.	Ligth brown	Do	Do	Do	Do	Do
	4.	Do	Pleasant cooked	DO	DO	DO	DO
	5.	Burnt Particles	DO	DO	DO	Pleasant cooked	Do
Milk Cake	1.	White	Pleasant	Hard	White	Pleasant	Semi Hard
	2.	Light brown	Do	Do	Dark Brown	Do	Granular
	3.	Dark brownish	Pleasant cooked	Semi – Hard	Dark brownish	Do	Do
	4.	Do	Do	Do	Do	Do	Do
	5.	Do	DO	Do	Do	Pleasant cooked	Do

Table 2: Chemical composition of burfi and milk cake (%)

Constituents (%)	Burfi		Milk Cake	
	Market (Mean ±SEm)	Control (Mean ±SEm)	Market (Mean ±SEm)	Control (Mean ±SEm)
Acidity	0.50 ± 0.036	0.23 ± 0.020	0.47 ± 0.034	0.27 ± 0.020
Fat	18.10 ± 0.712	25.20 ± 0.716	17.10 ± 0.660	28.60 ± 0.980
Total Solids	78.74 ± 0.952	70.00 ± 1.010	74.65 ± 1.134	71.85 ± 0.979
Moisture	21.31 ± 0.946	30.00 ± 1.010	23.35 ± 1.134	28.15 ± 0.979
Sucrose	33.10 ± 0.583	25.24 ± 0.851	33.44 ± 0.695	20.79 ± 2.067
Ash	3.63 ± 0.098	2.90 ± 0.144	3.84 ± 0.107	2.70 ± 0.192
Calcium	0.51 ± 0.118	0.67 ± 0.020	0.415± 0.141	0.65 ± 0.062
Phosphorus	0.23 ± 0.044	0.14 ± 0.007	0.22 ± 0.048	0.17 ± 0.013

had white colour and dark brown for milk cake. Similarly the flavor of burfi and milk cake varied from pleasant to cook of burnt flavor and control samples had pleasant flavor. Body and texture of burfi and milk cake from market varied from semi hard to hard body and coarse texture. The control samples had semi hard body and granular texture.

The results on chemical quality of burfi and milk cake are presented in Table 2. The acidity of market burfi and milk cake samples (0.50± 0.036 and 0.47 ± 0.34% resp.) was higher than that of control samples (0.23 ± 0.020%). These results are lower than those reported by Ghatak and Bandyopadhyay (1989). Fat content was lower in market samples (18.10 ± 0.712 % in burfi and 17.10 ± 0.66% in mi cake) than in control samples (25.20 ± 0.176% in burfi and 28.60 ± 0.980% in milk cake). These results are higher than those of ISI (1970) and Godeker et al., (1974). Total solids content in burfi (78.74 ± 0.952%) and milk cake (74.56 ± 1.134%) from market was higher than that in burfi (70.00 ± 1.010%) and milk cake (71.85 ± 0.979%) prepared in laboratory as control samples. Consequently the moisture content was lower in market samples. These observations are lower than those reported by ISI (1970) for burfi but are almost in fair time with those of Godeker et al., (1974). Sucrose content in burfi and milk cake from market (33.10 ± 0.583 % in burfi and 33.44 ± 0.695% in milk cake) was higher than that in control samples (25.24 ± 0.851% in burfi and 20.79 ± 2.067% in milk cake). These findings are lower in both the products than that reported by ISI (1970) and Godeker et al., (1974). Ash content in market samples of burfi (3.63 ± 0.098%) and milk cake (3.84 ± 0.107%) was higher than that in control samples of burfi (2.90 ± 0.144%) and milk cake (2.70 ± 0.192%). These results on market samples are in fair agreement with Ghatak and Bandyopadhyay (1989), but are lower in control samples (0.51 ± 0.118%) in burfi and 0.415 ± 0.141% in 0.062% in milk cake) than that in control samples (0.67 ± 0.020% in burfi and 0.65 ± 0.062% in milk cake). These data are lower in both type of samples than that reported by De (1988). Phosphorus content 0.23 ± 0.044% in burfi and 0.22 ± 0.048% in milk cake collected from market was higher than that in control samples (0.14 ± 0.0017% and 0.17 ± 0.048%

Table 3: ANOVA for various contents of Burfi & milk Cake

S. No.	Source of Varitaion	d.f	Acidity MSS	Acidity F-Value	Fat MSS	Fat F-Value	Total solids MSS	Total solids F-Value	Moisture MSS	Moisture F-Value	Sucrose MSS	Sucrose F-Value	Ash MSS	Ash F-Value	Calcium MSS	Calcium F-Value	Phosphorus MSS	Phosphorus F-Value
Burfi																		
1	Zone	2	0.162	25.00 **	92.466	11.957*	132.930	22.295*	132.020	22.336*	103.325	34.128*	0.991	13.032*	0.070	1.18NS	0.022	2.559NS
2.	Error	12	0.006		7.733		5.962		5.910		3.019		0.076		0.059		0.008	
Milk cake																		
1	Zone	2	0.107	18.952*	228.866	78.023*	21.387	2.885*	21.387	2.885NS	271.159	24.568**	2.191	17.356**	0.184	2.020NS	0.016	1.248NS
2.	Error	12	0.005		2.933		7.414		7.414		11.037		0.126		0.091		0.013	

resp. in burfi and milk cake). Published literature on this aspect is scanty.

Statistical analysis of data in Table 3 revealed significant ($p \leq 0.05$) difference in all constituents of burfi and milk cake from market and control samples, expect calcium and phosphorus content. These constituents did not differed significantly in these milk products.

The physical (sensory) and chemical quality of control samples f burfi and milk cake was superior in all respect to the product collected from market. A good quality product can be prepared using good quality milk and other raw material.

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Studies on drip irrigation, fertigation and spacing in Bt cotton

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Abstract

Three experiments were conducted to find out suitable crop geometry under drip irrigation, optimum irrigation schedule and optimum fertigation schedule for Bt cotton at Agricultural Research Station, Sriganganagar during Kharif 2009 to 2011. Paired row spacing of 60 X 120 cm & single row spacing of 90, 108 and 120 cm gave statistically at par seed cotton yield. When the row spacing of cotton was further increased to 135 cm, the yield of cotton was significantly reduced as compared to other closer row spacings tested in the study. The minimum drip cost was observed in paired row of 120 x 60 cm. Thus, 120 x 60 cm paired row spacing was found optimum for Bt cotton. The maximum seed cotton yield was recorded when drip irrigation was scheduled at 1.2 ETc, however, it was at par with seed cotton yield obtained at 1.0 ETc. Seed cotton yield at 0.8 & 0.6 ETc was significantly less than that of 1.0 & 1.2 ETc treatments. Thus, drip irrigation to Bt cotton at 1.0 ETc was found optimum. This treatment gave 31.0 % higher seed cotton yield and saved 32.9 % of irrigation water over conventional flood irrigation. The water expense efficiency was higher in the drip-irrigated treatments as compared to flood irrigation. The maximum water expense efficiency of 4.21 kg/ha mm was recorded at 1.0 ETc followed by 3.98 kg/ha mm at 0.8 ETc irrigation treatment with drip system. The maximum seed cotton yield was recorded at 120% RD of fertilizers, however, it was at par with 100% and 80% RD of fertilizer with 2% KNO_3 spray. Thus, 80% RD of NPK+ foliar spray of 2% KNO_3 at 90 and 105 DAS was found optimum for Bt cotton. This treatment gave 15.6 % higher seed cotton yield over conventional method of fertilizer application and irrigation. The maximum water expense efficiency of 3.95 kg/ha mm was recorded with120% of RD, followed by 3.87 kg/ha mm with100% of RD +2% KNO_3 as foliar spray at 90 & 105 DAS and 3.78 kg/ha mm with 80% of RD +2% KNO_3 as foliar spray at 90 & 105 DAS.

Key word : Bt cotton, drip irrigation, fertigation, crop geometry, yield, water use efficiency

Introduction

Cotton is the main Kharif crop in irrigated north-western plain zone of Rajasthan. The water requirement of cotton is the highest in comparison to other Kharif crops except paddy in this zone. This crop requires 700 to 900 mm water during its growth period. Time of the water application as well as its total requirement both are the important factors influencing crop production. Cotton is deep rooted crop and the time of application of first irrigation is very important from the point of view of its root development and subsequent water requirement. The first irrigation in American cotton is recommended at 30 to 35 days after sowing in this zone. Similarly, the last irrigation is recommended in the second fortnight of October. The application of irrigation at later stage results continuous growth and ultimately undeveloped bolls remains on the plants. The farmers of the zone grow cotton in limited area because of shortage of irrigation water. Land is not the constraint but water availability is the main constraint to increase the area under cotton in this zone. The introduction of Bt cotton in the zone further increased the productivity of cotton.

Drip irrigation can help to use water efficiently. Irrigation scheduling through drip can be managed precisely to meet crop water demands, holding the promise of increased yield and quality. A well-designed drip irrigation system looses practically no water to runoff, deep percolation or evaporation. Drip irrigation reduces water contact with crop leaves, stems, and fruit. Thus conditions may be less favourable for the onset of diseases. Agricultural chemicals can be applied more efficiently with drip irrigation. Since only the crop root zone is irrigated, nitrogen already in the soil is less

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subject to leaching losses, and applied fertilizer N can be used more efficiently. Nutrient applications can be better timed to meet plant needs. In the case of insecticides, less quantity is needed. These objectives can be achieved by following optimum irrigation & fertigation schedules for cotton by adopting efficient water application method. An effort has been made in the present investigation to generate information on optimum irrigation schedule, fertigation schedule & optimum crop geometry for drip irrigation in Bt cotton in irrigated North-western plain zone of Rajasthan.

Materials and Methods

The experiments on drip irrigation, drip fertigation & crop geometry in Bt cotton were conducted at Agricultural Research Station, Sriganganagar during kharif seasons from 2009 to 2011. The soil was sandy loam, low in organic carbon (0.20 %), medium in available phosphorus (34 kg P_2O_5/ha) and high in available potash (350 kg K_2O/ha) with a pH of 8.3. These experiments were laid out in randomized block design. Bt cotton (JKCH 1947) was taken as test crop. Drip lines having in line drippers at 30 cm distance with water discharge of 2 LPH were used in the study. In the experiment on crop geometry, five crop geometries (60 X 120 paired, 90, 108, 120 and 135 cm single row) for Bt cotton under drip irrigation system were tested to evaluate their performance. In paired planting drip line was placed between two lines and in single row plantings, drip line was placed along the line. In paired planting, drip running time was double than single row planting of 90 cm & in all other geometries water application was as per 100% area to make the water application uniform per unit area in all the crop geometries. Alternate day irrigation schedule was followed. In another experiment on irrigation scheduling four levels of drip irrigation (0.6, 0.8, 1.0, 1.2 ETc) with recommended practice of surface irrigation were tested for Bt cotton. Irrigation was applied on alternate day by drip irrigation as per treatment. In third experiment four fertilizer levels (120 % recommended dose of NPK, 100, 80 & 60% recommended dose of NPK + 2% KNO_3) for Bt cotton crop under drip irrigation system with control (recommended dose with flood irrigation) were evaluated. In this experiment water soluble fertilizer 0 : 52 : 34 N : P : K and urea were used for nutrient application. In all the drip treatments fertilizers were applied through drip in six equal splits at an interval of 15 days. In flood irrigation treatment nitrogen was applied in three splits (1/3 at sowing as basal, 1/3 at first irrigation and 1/3 at square formation) and full dose of phosphorus as single super phosphate and potash as muriate of potash as basal. Treatment wise yield, yield attributing parameters, water use and water use efficiency in all the experiments were recorded. The data were statistically analyzed and inferences were drawn accordingly.

Results and Discussion

Effect of planting method

Paired row spacing of 60 X 120 cm & single row spacing of 90, 108 and 120 cm gave statistically at par seed cotton yield (Table 1). When the row spacing of cotton was further increased to 135 cm, the yield of cotton was significantly reduced as compared to other closer row spacings tested in the study. Aujla *at al.*, (2005) reported superiority of paired planting in cotton than normal planting under drip irrigation at Bathinda in Punjab, however, Sidhpuria *at al.*, (2005) found planting of hybrid cotton at a spacing of 1 m x 1 m optimum under drip irrigation in loamy sand soil of Bawal, Haryana. The water expense efficiency (WEE) in the present investigation was also lowest at row spacing of 135 cm. The minimum drip cost was also observed in paired row of 120 x 60 cm. Thus, 120 x 60 cm paired row spacing was found optimum for Bt cotton in this zone.

Effect of drip irrigation

The maximum seed cotton yield was recorded when drip irrigation was scheduled at 1.2 ETc, however, it was at par with seed cotton yield obtained at 1.0 ETc (Table 2). Seed cotton yield at 0.8 & 0.6 ETc was significantly lesser than that of 1.0 & 1.2

Table 1: Effect of different crop geometry treatments on yield and water expense efficiency (average of three years)

Crop Geometry (cm)	Seed cotton yield (q/ha)	No of bolls/ plant	Plant population /ha	Totalwater use (mm)	WEE (kg/ha mm)
60 X 120X 60	30.85	70.10	17593	759	4.06
90 X 60	31.65	68.33	17562	759	4.17
108 X 60	31.36	73.23	14609	759	4.13
120 X 60	30.71	74.73	13102	759	4.05
135 X 60	26.42	74.75	11605	759	3.48
SEd	1.56	4.63	297	-	-
CD at 5%	3.41	10.08	647	-	-

Table 2: Effect of different irrigation treatments on yield and expense efficiency (average of three years)

Irrigation schedule	Seed cotton yield (q/ha)	No. of balls /Plant	Total water use (mm)	WEE(kg/ha mm)
0.6ETc	23.60	57.05	602	3.92
0.8ETc	26.26	60.20	660	3.98
1.0ETc	30.93	63.98	736	4.21
1.2ETc	30.96	63.51	802	3.86
Flood	23.61	55.17	978*	2.41
CD	1.57	7.93	-	-

* Including 25% conveyance losses

Table 3: Effect of different irrigation treatments yield and water expense efficiency (average of three years)

Treatments	Seed Cotton Yield (q/ha)	No of bolls/plant	Total water use (mm)	WEE(kg/ha mm)
120 % RD	29.96	65.87	759	3.95
100 % RD+2%KNO_3	29.40	64.08	759	3.87
80 % RD+2%KNO_3	28.72	64.92	759	3.78
60 % RD+2%KNO_3	24.44	58.25	759	3.22
Recommended Practice	24.85	55.24	1003*	2.48
SEd	0.67	4.32	-	-
CD	1.46	9.41	-	-

* Including 25% conveyance losses

ETc treatments. Thus, drip irrigation to Bt cotton at 1.0 ETc was found optimum. This treatment gave 31.0 % higher seed cotton yield and saved 32.9 % of irrigation water over conventional flood irrigation. The water expense efficiency was higher in the drip-irrigated treatments as compared to flood irrigation. The maximum water expense efficiency of 4.21 kg/ha mm was recorded at 1.0 ETc followed by 3.98 kg/ha mm at 0.8 ETc irrigation treatment with drip system.

Effect of fertigation

The maximum seed cotton yield was recorded at 120% RD of fertilizers, however, it was at par with 100% and 80% RD of fertilizer with 2% KNO3 spray (Table 3). Thus, 80% RD of NPK+ foliar spray of 2% KNO3 at 90 and 105 DAS was found optimum for Bt cotton. This treatment gave 15.6 % higher seed cotton yield over conventional method of fertilizer application and irrigation.

The maximum water expense efficiency of 3.95 kg/ha mm was recorded with 120% of RD treatment, followed by 3.87 kg/ha mm with 100% of RD +2% KNO_3 as foliar spray and 3.78 kg/ha mm with 80% of RD +2% KNO_3 as foliar spray. Reddy and Aruna (2010) reported that fertigation with 125 percent recommended dose of N and K applied 10 percent as basal and remaining 90 percent from 30-120 days in nine splits recorded higher *kapas* yield as compared to recommended manual fertilizer application under drip irrigation on Bt cotton (BG-I) in vertisols at Nandyal, Andhra Pradesh.

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Correlation studies in multi-cut forage sorghum under different environment

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Abstract

Correlation has been studied in various growth, quality characters and yield of multi-cut forage sorghum cultivars which were planted at two locations in a split plot design. The linear correlation study revealed positive and highly significant association between yield and growth/ quality components at both the locations. Highly positive and significant correlation(r= 1) was between crude protein yield and total N – uptake at both the locations. Among quality and growth parameters, significantly positive correlation was noticed at both the locations, except between crude protein/N content and plant height, L: S ratio, dry matter accumulation in third cutting at Lakhauti, dry matter accumulation and digestibility in first cutting at Pantnagar, when the positive correlation was not significant.

Keywords: Correlation, positive, quality, dry matter accumulation

Introduction

Fodder yield of sorghum is a complex cause of several effects and influenced by many components traits. The degree of associations among various components of yield and with yield ensures the importance of the specific components. Thus study of correlation provides an opportunity to assess the magnitude and direct of association of yield with its direct and indirect components. Which is essential for formulating an effective and efficient crop improvement. Direct selection for yield generally results in low genetic gain, thus knowledge of the correlation of component responsible for desired cause forms an integral part of the scheme. For this knowledge of components having significant positive correlation with yield and quality is essential. Not only the linear correlation between yield and its components themselves are essential. In view the present study was under taken to identify inter relationship of economic trait and their association with the yield of multi-cut forage sorghum under different locations.

Materials and Methods

The field experiments were conducted to evaluate suitable cutting interval and nitrogen level for multi-cut forage sorghum genotypes under different locations viz. Instructional Dairy Farm, Pantnagar and Amar Singh Post Graduate College, Lakhauti, Bulandshahr during *Kharif* season of 2010. The treatments, consisted of two genotypes (variety UTMC-532 and hybrid CSH-20 MF) and two cutting intervals (40 and 55 days) as main plot and four nitrogen levels (0, 50, 100 and 150 kg ha^{-1}) as sub plot treatments, were tested in a split plot design with four replications. The crop was sown in rows opened at 30 cm apart with a seed rate of 35 kg ha^{-1} in well prepared levelled land on April, 6 at Pantnagar and May, 9 at Lakhauti. The crop was fertilized with nitrogen (as per treatments), 60 kg P_2O_5 and 40 kg K_2O ha^{-1}. One fourth N and full dose of P_2O_5 and K_2O was applied as basal. Remaining nitrogen was applied into three equal splits by top dressing at 30 days after sowing, after first and second cut. Common harvest of the crop for green forage yield was taken at 55 days stage and other cuttings were taken as per treatments leaving a stem height of 8-10 cm for re-growth. At each harvest 500 g random fresh samples from each plot were taken to determine dry matter content, crude protein and digestible dry matter contents. At each harvest, yield attributes like plant height, stem diameter, L: S ratio and dry matter accumulation were recorded. Observations were recorded on plant height, stem diameter, L:S ratio, dry matter accumulation in plant, crude protein content, digestibility per cent, nitrogen content, green fodder and crude protein yield at all the three cuttings and total of these parameters were used for correlation study as per procedure given by Cochran and Snedecor (1994).

Results and Discussion

Growth parameter and fodder quality:

Estimates of correlation coefficients presented in table 1 revealed that all the growth parameters were significantly and positively associated with crude protein, digestibility and nitrogen content at all the cutting and total of cutting under Pantnagar

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Table 1: Correlation between growth and quality parameter of sorghum

Growth Parameters	Quality parameter (Pantnagar)											
	Crude protein (%)				Digestibility (%)				N-content (%)			
	1st H	2nd H	3rd H	Total	1st H	2nd H	3rd H	Total	1st H	2nd H	3rd H	Total
Plant height	0.857	0.897	0.858	0.910	0.846	0.894	0.917	0.901	0.853	0.905	0.857	0.909
Stem diameter	0.875	0.880	0.897	0.890	0.755	0.828	0.934	0.875	0.875	0.883	0.896	0.898
L:S ratio	0.899	0.778	0.919	0.926	0.794	0.811	0.941	0.911	0.902	0.783	0.918	0.927
Dry matter accumulation	0.763	0.788	0.817	0.781	0.603	0.775	0.866	0.749	0.761	0.790	0.815	0.787
Quality parameter (Lakhauti)												
Plant height	0.679	0.859	0.667	0.835	0.713	0.866	0.856	0.898	0.677	0.845	0.670	0.828
Stem diameter	0.901	0.794	0.726	0.870	0.895	0.802	0.841	0.901	0.900	0.795	0.724	0.863
L:S ratio	0.896	0.805	0.595	0.856	0.911	0.774	0.738	0.896	0.894	0.800	0.593	0.849
Dry matter accumulation	0.779	0.885	0.587	0.767	0.730	0.867	0.721	0.824	0.780	0.874	0.583	0.760

Table 2: Correlation between growth parameters, quality characters and yields

Parameters	Green fodder						Crude protein					
	Pantnagar			Lakhauti			Pantnagar			Lakhauti		
	1st H	2nd H	3rd H	1st H	2nd H	3rd H	1st H	2nd H	3rd H	1st H	2nd H	3rd H
Growth parameters												
Plant height	0.980	0.914	0.970	0.527	0.944	0.865	0.956	0.925	0.959	0.655	0.928	0.859
Stem diameter	0.963	0.986	0.912	0.960	0.843	0.926	0.967	0.963	0.949	0.947	0.853	0.941
L:S ratio	0.939	0.771	0.901	0.932	0.861	0.910	0.945	0.794	0.980	0.913	0.887	0.854
D M accumulation	0.923	0.970	0.977	0.912	0.948	0.943	0.911	0.954	0.961	0.877	0.949	0.903
Quality characters (%)												
Crude protein	0.867	0.892	0.720	0.912	0.968	0.716	0.951	0.924	0.919	0.979	0.971	0.852
Digestibility	0.839	0.885	0.798	0.901	0.977	0.758	0.861	0.918	0.928	0.958	0.966	0.845
Nitrogen content	0.866	0.896	0.718	0.911	0.960	0.710	0.949	0.925	0.918	0.979	0.965	0.846
N- uptake(kg/ha)	0.965	0.989	0.910	0.967	0.993	0.970	1.000	1.000	1.000	1.000	1.000	1.000

environment. Similar association was noticed under Lakhauti conditions except that plant height, L:S ratio, dry matter accumulation with protein and nitrogen content were significantly correlated. It suggests that in multi-cut fodder sorghum, it is possible to enhance quality of fodder at different cuttings by enhancing the growth parameters like plant height, stem diameter, L:S ratio and dry matter accumulation irrespective of differences in the environment. Higher leaf and stem ratio has been found to enhance quality characters of sorghum (Chaudhary, *et.al, 2007*& Rai, *et.al, 1980).*

Quality parameters and yield

The green forage and protein yield of multi-cut forage sorghum has been showed significant positive correlation with all the growth parameters and quality characters at all the cuttings irrespective of location (table 2). This also indicated that more fodder yield genetically depends on growth parameters. These results combo rate with findings of Sood and Ahluwalia (2003). A perfect significant positive correlation(r=1) was noticed between crude protein yield and total nitrogen uptake at both the location in all the harvests. This means that in multi-cut forage sorghum it is possible to combine high nitrogen uptake with high protein yield.

From the fore going discussion it can be concluded that the quality parameters and yield of fodder of multi-cut forage sorghum can be maximized by enhancing the growth parameters irrespective of regional differences. The crude protein yield can be maximized by producing more biomass with high nitrogen content.

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Effect of storage on chemical attributes of paneer spread

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A bstarct

Paneer prepared from standardised buffalo milk (6% fat and 9% MSNF) using 1% citric acid at 80°C coagulation temperature was used for making paneer spread by blending it with 10% whey and varying concentrations of salt (1.0, 1.5 and 2.0%) and preservatives (0.2% sodium benzoate or pot. metabisulphite). The product was assessed for chemical attributes when fresh (O day) and on 5, 10 and 20 days. The total solids (TS) content increased with increase in levels of salt added in fresh product (0 day). The preservatives had little effect on TS content. As the period of storage elapsed, the TS content increased in the product. However, the fat and protein contents decreased with increase in levels of added salt. With advancement in storage period, both fat and protein increased in the product, being highest on 20 days of storage. Preservatives had little effect. Contrarily, the ash content increased with increase in levels of added salt. During storage, the ash content increased consistently. The acidity of paneer spread was only slightly affected by added salt and preservatives. However, it increased, as the storage period advanced.

Key Words: chemical attributes, salts, preservatives, storage

Introduction

Mentioned in the Vedas, dating as far back as 6000 BC of India Subcontinent, paneer is a fresh cheese frequently used in South Asian cuisine similar to quesoblanco. Dairy products constitute a family of natural functional foods due to their established health related benefits. Nutritive value of paneer is very high, as it contains almost all the proteins and fats present in milk besides being a rich source of minerals, especially calcium and phosphorus and vitamins. Variety of culinary dishes and snacks are made from paneer, besides it direct consumption.

A spread has also been developed from paneer, which has a pleasant taste and preferred to other spreads due to its nutty flavour. Currently, two types of spread are mainly available in the market namely butter and cheese spread, which are used along with bread in the breakfast. Butter is avoided by obese persons or those suffering from coronary heart diseases due to its very high fat content. Cheese spread is suitable for consumers of all age groups but it is highly expensive. Contrarily, paneer spread is cheaper and equally nutritious. The authors have already reported methods of manufacture of paneer spread from buffalo milk (*Dwivedi etal.*, 2010b) and its sensory quality (Dwivedi etal., 2014). The present story communicates changes in chemical quality of paneer spread during storage at refrigeration temperature.

Materials and Methods

Prepration of paneer spread: The paneer prepared from standardised buffalo milk containing 6% fat and 9% MSNF using citric acid (1%) as coagulant at 80° C coagulation temperature was adjudged as the best quality paneer from stand-point of sensory attributes and chemical and microbiological qualities (Dwivedi etal, 2009; Dwivedi etal; 2010a). Hence, paneer made as above was only used for prepration of paneer spread.

The paneer blocks were sliced into small pieces and blended with 10% of whey water. Salt (1.0, 1.5, 2.0%) and preservative (sodium benzoate or potassium metabisulphite, 0.2% each) were added to the paneer mass and blended thoroughly to get a smooth paste like consistency. The product was packaged in polystyrene cups and stored at 5°C.

Chemical analysis of paneer spread: The total solids, fat, protein and ash content of paneer spread were determined by BIS methods (1961, 1964) while titratable acidity was estimated according to Rajorhia etal.(1984). Changes in chemical attributes were monitored on 0,5,10 and 20 days of storage of the product.

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Results and Discussion

Effect of storage period on changes in chemical quality of paneer spread was studied at predetermined intervals as delineated above.

Effect on total solids content

The results (Table 1) indicated that the total solids content increased with increase in levels of salt added in fresh paneer spread (0 day). The preservative added, sodium benzoate or pot. Metabisulphite had little effect on total solids content of the product. The highest increase was noted in paneer spread after 20 days of storage. Further, the highest total solids were found in products containing 3% salt and lowest in 1% salt added. The level of salt added and period of storage had significant (p0.01) effect on increase in total solids content.

Table 1: XYZ mean for total solids of paneer spread

		Z_1	Z_2	Z_3	Z_4
X_1	Y_1	38.20	39.50	41.10	42.70
	Y_2	38.30	39.50	41.20	42.90
X_2	Y_1	39.30	40.60	42.20	43.80
	Y_2	39.40	40.60	42.30	43.80
X_3	Y_1	40.30	41.40	43.10	44.50
	Y_2	40.20	41.40	43.10	44.60

X_1, X_2 and X_3 - 1, 2, and 3% salt; Y_1- sodium benzoate, Y_2 – pot. metabisulphite; Z_1, Z_2, Z_3 and Z_4, - 0, 5, 10 and 20 days of Storage.

Changes in fat content

The fat content of paneer spread decreased with increase in the levels of added salt in the product (Table 2). Fat content was maximum in products containing 1% salt and minimum in samples with 3% added salt. As the period of storage advanced, fat content increased in the product and consequently it was highest on 20 days of storage period (x_3, y_2, z_4). The preservative added had only little effect. The levels of added salt and period of storage had significant (p 0.01) effect on the fat content, while preservatives had insignificant effect.

Table 2: XYZ mean for fat of paneer spread

		Z_1	Z_2	Z_3	Z_4
X_1	Y_1	21.20	21.80	22.50	23.10
	Y_2	21.30	21.80	22.60	23.20
X_2	Y_1	20.90	21.50	22.20	22.80
	Y_2	21.00	21.50	22.30	22.90
X_3	Y_1	20.60	21.20	21.80	22.40
	Y_2	20.70	21.10	22.00	22.50

X_1, X_2 and X_3 - 1, 2, and 3% salt; Y_1- sodium benzoate, Y_2 – pot. metabisulphite; Z_1, Z_2, Z_3 and Z_4, - 0, 5, 10 and 20 days of Storage.

Effect on protein content

The protein content of paneer spread also decreased as the level of added salt increased in the sample (Table 3). Added preservatives had no effect on protein content. With advancement in storage period, the protein content of paneer spread increased, attaining its highest values on 20th day of storage period. The levels of salt added and storage period had significant ($p<0.01$) effect on protein content

Table 3: XYZ mean for protein of paneer spread

		Z_1	Z_2	Z_3	Z_4
X_1	Y_1	12.40	13.10	13.80	14.50
	Y_2	12.40	13.10	13.80	14.50
X_2	Y_1	12.10	12.80	13.50	14.20
	Y_2	12.10	12.80	13.50	14.20
X_3	Y_1	11.80	12.50	13.20	13.90
	Y_2	11.80	12.50	13.20	13.90

X_1, X_2 and X_3 - 1, 2, and 3% salt; Y_1- sodium benzoate, Y_2 – pot. metabisulphite; Z_1, Z_2, Z_3 and Z_4, - 0, 5, 10 and 20 days of Storage.

Changes in ash content

The total mineral (ash) content in the product increased with concentration of added salt. Preservatives had negligible effect. With increase in storage period (Table 4), the ash content increased but the magnitude of increase was much lower as compared to increase in total solids, fat and protein contents.

Table 4: XYZ mean for ash content of paneer spread

		Z_1	Z_2	Z_3	Z_4
X_1	Y_1	2.62	2.70	2.75	2.80
	Y_2	2.70	2.62	2.75	2.80
X_2	Y_1	3.32	3.40	3.45	3.50
	Y_2	3.32	3.40	3.45	3.50
X_3	Y_1	3.75	3.80	3.85	3.90
	Y_2	3.75	3.80	3.85	3.90

X_1, X_2 and X_3 - 1, 2, and 3% salt; Y_1- sodium benzoate, Y_2 – pot. metabisulphite; Z_1, Z_2, Z_3 and Z_4, - 0, 5, 10 and 20 days of Storage.

Changes in acidity of paneer spread

Acidity was only slightly affected by levels of added salt in the product (Table 5). It had slight depressing effect. Added preservative, sodium benzoate or pot. metabisulphite had negligible effect. However, as the period of storage elapsed, increase in acidity was noticeable in the product. The highest increase was recorded on 20th day of storage.

The results of present study on total solids, fat, protein and ash contents are in near agreement with

Table 5: XYZ mean for acidity of paneer spread

		Z_1	Z_2	Z_3	Z_4
X_1	Y_1	0.48	0.52	0.60	0.71
	Y_2	0.46	0.51	0.59	0.70
X_2	Y_1	0.45	0.51	0.58	0.69
	Y_2	0.45	0.50	0.57	0.68
X_3	Y_1	0.43	0.49	0.56	0.67
	Y_2	0.43	0.48	0.55	0.67

X_1, X_2 and X_3 - 1, 2, and 3% salt; Y_1- sodium benzoate, Y_2 – pot. metabisulphite; Z_1, Z_2, Z_3 and Z_4, - 0, 5, 10 and 20 days of Storage.

those repeated by Tewari and Sachdeva (1991). However storage related data are lacking to affirm the results of present study. As the period of storage advanced, there was consistent loss of moisture in the product which caused an increase in the total solids, fat protein and ash content, the pecent increase being lowest in the ash content. The acidity of product also followed a similar trend, but magnitude of increase was inhibited by added preservatives in the product. Preservatives had little effect on chemical constituents, though it extended the shelf life of product(Dwivedi *etal*., 2014)

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Adoption of improved agricultural practices by farmers

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Abstract

New Agricultural Technologies generated by the Agricultural Scientists of Indian Council of Agricultural Research, Agricultural Universities and Scientists of NGO's etc. are no use unless they are understood and put into practice by the farming community. The present study was conducted in Rampur District of Uttar Pradesh to find out to what extent the villagers are adopting improved agricultural practices in adopted village as compared to non-adopted village. Twenty farmers were selected randomly from each village. Two major crops i.e. paddy and wheat were selected for the adoption of improved agricultural practices among the farmers. The findings of the investigation revealed that adoption behavior of farmers with respect to improved agricultural practices was different from practice to practice and crop to crop in adopted and non-adopted villages.

Key Words : Adoption, Improved Agricultural Practices, Techno-extension Gap, Sources of Information

Introduction

There exists still a wide gap between the technology available at the research and its use in farmer's field. It is therefore highly important that the new technology generated should find immediate application on the farmers' field, so that so-called techno-extension gap is reduced to the minimum. The present study was conducted in Rampur District of Uttar Pradesh to find out to what extent the villagers are adopting improved agricultural practices in adopted village as compared to non-adopted village.

Methodology

The study was conducted in purposely selected Rampur District of Uttar Pradesh. Two villages were selected for the study. One Village (Brijpur) has been adopted as per village adoption Scheme of Krishi Vigyan Kendra (S.V.B.P. Univ. Of Agri. & Tech., Meerut) Rampur. The other village (Jadonpur) was taken to compare the adoption behavior of the farmers with adopted village. The farmers of these villages were respondents. Twenty farmers were selected randomly from each village. Two major crops (Paddy & Wheat) were selected for the adoption of improved agricultural practices among the farmers. The questionnaire were developed with the consultation of scientists, S.V.B.P. Univ. of Ag. & Tech., Meerut. It was tested and improved after discussion with the farmers. The data were analyzed using mean percentage.

Results and Discussion

Characteristics of respondents :

The characteristics of respondents in adopted and non-adopted villages are presented in Table 1. The table 1 shows no difference in characteristics of respondents with respect to age, education, occupation, land holding, family size and family type.

Table 1: Characteristics of respondents (%)

Factor	*Category*	Adopted Village	Non-Adopted Village
Age	Young (<35 Yrs.)	20	10
	Middle (35-50 Yrs)	50	55
	Old (>50 Yrs)	30	35
Education	Illiterate	50	55
	Up to Primary	30	25
	Up to Matric	15	15
	Above Matric	05	05
Occupation	Main (Agriculture)	80	75
	Secondary	20	25
Land Holding Size	Marginal	50	55
	Small	30	35
	Big	20	10
Annual Income	Low (<20000)	25	30
	Medium(20000-40000)	55	60
	High (>40000)	20	10
Family Size	Small (<5)	30	25
	Medium (5-8)	50	55
	Big (>8)	20	20
Family Type	Joint	40	45
	Nuclear	60	55

Sources of Information

It is obvious from the Table-2 that there were 11 sources of information for the farmers in both the villages. These are Fellow Farmers/Friends/Relatives, Shopkeeper, Radio, Extension Personnel, Demonstration, Meeting, Pamphlet, KVK Scientists,

Local Leaders, News Papers and Fair/Exhibition. There was distinct difference between adopted and non-adopted villages. It can be seen that KVK Scientists, Radio and Meeting were the major sources of agriculture technology for adopted village. In Non-adopted village, Extension Personnel Specially Gram Panchayat Vikas Adhikari, Shopkeeper and Fellow Farmers/Friends/Relatives were the sources of agriculture technology.

Table 2: Distribution of respondents according to the sources of information

S. No.	Sources	Adopted Village(%)		Non-Adopted Village (%)	
1.	Fellow Farmers/Friends/ Relatives	30		60	II
2.	Shopkeeper	25		40	III
3.	Local Leaders	20		30	
4.	Radio	60	II	30	
5.	Extension Personnel	40		70	I
6.	Demonstration	40		15	
7.	Meeting	50	III	25	
8.	Pamphlet	25		10	
9.	KVK Scientists	70	I	15	
10.	News Paper	5		—-	
11.	Fair/Exhibition	20		10	

Extent of adoption of improved agricultural practices

It is evident from the table 3, that the adoption of newly released high yielding varieties of crops i.e. wheat and paddy varies 60 to 70 per cent in adopted village, while it was 30 to 40 per cent in non-adopted village. Sowing of high yielding varieties at recommended time was adopted by a large number of farmers (80 to 90%) of these crops, while in non-adopted village it was far below (45 to 50%). The use of balanced fertilizer was encouraging in both the villages. In adopted village, the use of balanced fertilizer varied from 60 to 70 per cent for paddy & wheat crops. Similarly the adoption of balance fertilizer varied from 25 to 45 per cent in non-adopted villages. It was revealed that the adopted village was for ahead in application of insecticide/fungicides to the crop (25%). The use of herbicides was also encouraging in both the villages. In adopted village, the use of herbicides varied from 80 to 90 per cent for wheat and paddy crops. Similarly the use of herbicides varied from 60 to 65 per cent in non-adopted village. The above findings clearly show a wide gap in adoption of improved agricultural practices in adopted and non-adopted villages.

Table 3: Extent of adoption of improved agricultural practices among the farmers **(%)**

S.No.	Improved Practices	Crop			
		Wheat		Paddy	
		AV	NAV	AV	NAV
1.	Use of newly released high yielding varieties	70	40	60	30
2.	Sowing of varieties at recommended time	90	50	80	45
3.	Use of balance fertilizer	70	25	60	45
4.	Use of insecticides/fungicides	—-	—-	75	50
5.	Use of herbicides	80	60	90	65

AV – Adopted Village NAV – Non-Adopted Village

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Effect of sowing dates and varieties on yield attributes and yield of chickpea (*Cicer arietinum* L.)

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Abstract

A field experiment was conducted to study the effect of sowing dates and varieties on yield attributes and yield of chickpea under irrigated condition during rabi *2012-13 at College of Agriculture, Tikamgarh (Madhya Pradesh). The experiment was laid out in split-plot design with three replications consisted three sowing dates* viz., *October 25, November 14 and December 4 and three varieties* viz., *JG 322, JG 11 and JG 16 as main plot and sub-plot treatments, respectively. The crop sown on October 25 resulted into significantly more number of effective pods (plant^{-1}), more number of seeds (pod^{-1}), higher seed yield (kg ha^{-1}), higher biological yield (kg ha^{-1}) and higher straw yield (kg ha^{-1}) as compared to November 14 and December 4 sown chickpea crops. However, sowing dates were failed to influence the 100-seeds weight and harvest index (%) significantly. Among varieties, JG 16 exhibited significantly more number of effective pods (plant^{-1}), higher 100-seeds weight (g), higher seed yield (kg ha^{-1}), higher biological yield (kg ha^{-1}) and higher straw yield (kg ha^{-1}) followed by JG 11 and JG 322. Varieties were failed to influence the number of seeds (pod^{-1})and harvest index significntly.*

Key words: Chickpea**,** *Cicer arietinum* L., sowing dates, varieties, yield, yield attributes.

Introduction

Chickpea (*Cicer arietinum* L.) is a premier pulse crop of India grown in *rabi* season under various cropping systems. In India, it is grown on an area about 9.91 million hectares with an annual production of 8.22 million tonnes and average productivity is 895 kg ha^{-1} (Anonymous 2012). It is a rich source of protein (18-22%), carbohydrate (62 %), B-group vitamins, and certain minerals *viz.*, Ca, Fe etc. and vitamin C in green stage. Numerous environmental and genetic variables interact during the growing period of chickpea in determining its productivity. Among the various agronomic practices, sowing time is single most important factor influencing the yield of chickpea. Optimum sowing time of chickpea may vary from one variety to another and also from one region to another due to variation of agro-ecological conditions. Different planting dates subject the vegetative and reproductive stages of the plant to various temperature, solar radiation and day length (Yadav *et al*., 1999). Chickpea is usually sown between mid October to mid November. However, sowings are often delayed when grown in sequence with *kharif* crops. The exposure of crop to low temperatures during germination and seedling establishment and to high temperature during flowering and seed formation phases under delay-sown chickpea results in drastic reduction in yield. Yield loss in chickpea can vary between 30% and 60% depending on genotype, sowing time, location, and climatic conditions during sowing season. Some chickpea genotypes have capacity to tolerate drought and in that case sowing time can be delayed. However, earlier or late sowing caused drastic reduction in yield and net profit compared with timely sowing (Dixit *et al.*, 1993).

It is also a fact that specified genotypes does not exhibit the same phenotypic characteristics in all environmental conditions. Improved cultivar is also an important tool, which have geared production of mustard in many countries of the world. In addition to many other factors responsible for achieving higher yields, cultivars with higher yield potential and a wide range of adaptability to adaphic and climatic conditions is essential for increasing yield per unit area, ultimately boosting up total production. The chickpea genotypes differ in their yielding ability, this calls for a need to generate more information on the response of chickpea genotypes to the dates of sowing for greater yields in a given agro-climatic conditions. Hence, keeping in view of above facts, a field experiment was conducted to study the effect of sowing dates and varieties on

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yield attributes and yield of chickpea under irrigated condition at Tikamgarh district (Madhya Pradesh).

Materials and Methods

The field experiment was conducted at Research Farm, J.N.K.V.V., College of Agriculture, Tikamgarh (24° 43' N latitude and 78° 49' E longitude at an altitude of 358m above mean sea level), Madhya Pradesh during *rabi* 2012-13. The experiment was laid out in split-plot design with three replications. The main plot treatments consisted of three sowing dates *viz*., October 25, November 14 and December 4 and the sub-plot treatments consisted of three varieties *viz*., JG 322, JG 11 and JG 16. The soil of experimental field was clay to clay loam with pH 6.9, low in available nitrogen (265 kg/ha), rich in available P_2O_5 (25.7 kg/ha), medium in available K_2O (254 kg/ha) and carbon content (0.5 %). The full recommended doses of nitrogen (20 Kg N ha^{-1}), phosphorus (40 Kg P_2O_5 ha^{-1}) and potassium (20 kg k_2O ha^{-1}) were applied at sowing. The chickpea crop was sown in lines 30 cm apart drawn by *kudali* using a seed rate of 80 Kg ha^{-1}. All other agronomic and plant protection measures were applied as per recommendations. Yield attributes were recorded from the five plants sample collected at the time of harvest. The crop harvested from net plot area was threshed after 4-5 days of sun drying and the seed yield of net plot was then converted into kg ha^{-1}. Before threshing of the crop harvested from net plot, the sun dried whole plant samples (biological yield) were weighed and then converted into kg ha^{-1}. Straw yield is obtained by subtracting seed yield (kg ha^{-1}) from biological yield (kg ha^{-1}). The harvest index (HI) was calculated by diving the economic yield by biological yield.

Results and Discussion

The data pertaining to yield attributes and yield as influenced by sowing dates and varieties are summarized in Table 1. Crop sown on October 25 resulted into significantly more numbers of pod $plant^{-1}$ and numbers of seed pod^{-1} followed by November 14 and December 4 sown chickpea crops. This may be attributed to favourable environmental effect on plant growth and development under October 25 sown crop, which reflected into more number of pods $plant^{-1}$ and number of seeds pod^{-1}. Variation in sowing time beyond optimum was found to decrease the number of pods ($plant^{-1}$) and it was also reported earlier by Dixit *et al.* (1993). However, 100-seed weight among the different dates of sowing was not differed significantly. Similar non-significant seasonal effect on 100-seed weight was also reported by Chaitanya and Chandrika (2006) and Ahmed *et al*., (2011).

The significantly higher seed yield (kg ha^{-1}), straw yield (kg ha^{-1}) and biological yield (kg ha^{-1}) were recorded in October 25 sowing followed by November 14 and December 4. (Table 1). The higher seed yield (1715 kg ha^{-1}) produced by October 25 sowing might be attributed to improved yield attributing *i.e.*, number of pods ($plant^{-1}$) and number of seeds pod^{-1}. The favourable effect of early sowing (October 25) on sink component could be attributed to better development of the plants in terms of plant height and dry matter production (data not given) leading to increased bearing capacity due to optimum growth on account of favourable temperatures during early vegetative phase. Pezeshkpur *et al*. (2005) also agreed that early planting dates had higher yields of chickpea.

Consecutive 20 days delay in sowing from October 25 to November 14 and December 4 caused a loss in seed yield by 14.1% and 26.3%., respectively. The decrease in seed yield per hectare with delay in sowing occurred primarily due to the lower biomass build up which led to reduced bearing capacity owing to slower growth on account of lower temperatures during early vegetative growth phase and the overall shorter life span and reduced seed filling span and sink strength (pods number). The reduction in seed yield under delayed sowings due to shortening of life span coupled with lesser biomass production in chickpea crop had also been reported by Tobe *et al*. (2013). Ahmed *et al*., (2011) also reported earlier that total dry matter production decreased with delay in sowing which was reflected in grain yield. The drastic reduction in the seed yield (1264 kg ha^{-1}) under December 4 sowing could also be attributed to shortening of reproductive phase caused by forced maturity because of sudden rise in temperature during maturity phase. This resulted in lesser number of pods $plant^{-1}$, which ultimately decreased the seed yield (kg ha^{-1}).

The reduction in straw and biological yield under delayed sowing occurred primarily due to slower growth on account of lower temperature during early vegetative growth phase and the overall shorter life span of crop caused reduction biomass production. The earlier findings of Ahmed *et al*., (2011) corroborate these results. The harvest index among different sowing dates was not found significant. Similar results had also been reported by Fallah (2008) and Shamsi (2010).

Among different varieties, JG-16 produced significantly more number of pod $plant^{-1}$ and higher 100-seeds weight as compared to *cvs*. JG 11 and JG 322. However, number of seeds pod^{-1} did not differ significantly among different varieties. The differences in yield attributing characters of these varieties could be attributed to their genetic constitution. The differences in yield attributes of different chickpea varieties had also been well documented by Chaitanya and Chandrika (2006) and Sardar (2009), Similarly, JG 16 also produced significantly higher seed yield (kg ha^{-1}), straw yield (kg ha^{-1}) and biological yield (kg ha^{-}

Table 1: Effect of different treatments on yield attributes and yield of chickpea

Treatments	No. of pods (plant^{-1})	No. of seeds (pod^{-1})	100 seed weight (g)	Seed yield (kg ha^{-1})	Straw yield (kg ha^{-1})	Biological yield (kg ha^{-1})	Harvest index (%)
Sowing dates							
25th Oct. 2012	30.5	1.37	18.1	1715	2897	4612	32.4
14th Nov. 2012	24.7	1.23	17.6	1474	2521	3995	31.0
4th Dec. 2012	20.2	1.20	17.6	1264	2105	3369	31.1
S.Em±	0.3	0.05	0.23	39	68	70	1.3
CD at 5%	1.3	0.16	NS	159	274	284	NS
Varieties							
JG-322	23.3	1.20	15.6	1377	2383	3761	30.8
JG-11	24.5	1.27	18.0	1478	2428	3906	30.8
JG-16	27.6	1.33	19.8	1597	2712	4309	30.8
S.Em±	0.5	0.05	0.27	25	81	64	0.7
CD at 5 %	1.6	NS	0.89	79	253	199	NS

[1]) followed by *cvs*. JG 11 and JG 322. However, straw yield and biological yield between JG 11 and JG 322 were found non-significant. Cultivar JG 16 recorded 7.45% and 13.8% higher seed yield over *cvs*. JG 11 and JG 322, respectively. The higher seed yield in *cv*. JG-16 might be due to more number of pods plant^{-1} and 100-seeds weight. The lower seed yield (kg ha^{-1}) in *cv*. JG 322 might be due to lesser number of pods plant^{-1} and 100-seeds weight. The varietal differences in seed yield of chickpea had also been reported by Chaitanya and Chandrika (2006) and Shamsi (2010). The significant behavior of varieties in relation to seed yield could also be attributed to the differential trend in respect of biomass partitioning towards reproductive parts. Another probable reason for the significant difference in seed yield among the varieties could be due to fact that the varieties have different compensation mechanisms which affect the seed yield. The harvest index among different varieties was not found significant. The varietal differences in harvest index had also been reported by Kumari *et al.* (2012).

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MGNREGA: New Hope from NDA Government

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Abstract

MGNREGA is a right based approach for citizen of India. I gives right to work for livelihood. I has both positive and negative impacts in agriculture. Recently government has announced that NREGA should link with agriculture that is need of hours. It is necessary to regularised NREGA for better and efficient use of it in agriculture. We have tried to explain how government and farmers should work together for sustainable agriculture. The main objective of this article to link NREGA and agriculture with the consent of labour and farmers. This paper try to solve the present problems arises due to NREGA in agriculture sector. Discussion in paper is based on primary survey and observations from fields collected during May to August 2011 in Bundelkhand region, Uttar Pradesh. Government should also introduce FDI in agriculture sector more.

Key words: NREGA, agriculture, survey, FDI

Introduction

NDA government has come in power with various developmental schemes. Government seeks to link NREGS to agriculture that is new rays of hope for labours and farmers. These two active agents of agriculture can fill the gap between supply and demand of food in India. Due to bright light effects of urban areas, new generation is not interested to work in agriculture as they seems it is labourious and low status job. It indicates labour shortage in agriculture in the future. Mechanization is an alternate of labour but it has some limitations such as high cost of machineries, small landholdings, and high cost of maintenance during offseason. Food producers are decreasing day by day and consumers has increasing in higher rate, resultant of this increase prices of food items. In this grim situation government has given positive indication towards agriculture sector by proposing MGNREGA link to agriculture. We would be grateful if it is success. But, how NREGA links with agriculture is a matter of debate. We have some ideas on this issue are discussing forth.

MGNREGA workers should be available for agriculture work in the farmers' field. MGNREGA has positive and negative impacts on agriculture and rural households as on one hand earning of the labour/small farmers from MGNREGA are being used in agriculture and household expenditure and on the other it is responsible for the increasing wage rate in agriculture. MGNREGA gives equal opportunity to men and women in terms of work and wage rates. Women are happy with MGNREGA because of on time payment of wages, whereas in agriculture they get lower wages than men (*Sivanandan*, 2012). It has improved rural socio-economic conditions among landless and marginal farmers, as well as improved environmental related components. These components are water and soil conservation (*Tiwari, et al.*, 2011). Villages were using 75 per cent of their earnings from MGNREGA in improving irrigation and infrastructural facilities and have therefore increase land rent. Card holders have used their money to introduce chemical fertilizers and machinery in their fields.

The National Rural Employment Guarantee Act (now Mahatma Gandhi NREGA) was launched in 2005-06 for rural poor to provide 100 days of public works in 200 districts, and in 2008 all the districts of the country were covered under MGNREGA in three phases. Under this scheme a below poverty line (BPL) household head has one job card for 100 days in a year. This developmental programme has played a major role in the rural areas and has led to increased household income, empowerment of women through wage rates equal to their male counterparts, independence of labour from land owners for survival and given labour the right to job. If a job card holder is unable to get work within 15 days, the state government is entitled to pay unemployment allowance to the card holders.

Misra and Rani (2012) compiled the quantitative achievements of MGNREGA and these are- (i) 1200 crore person-days of employment has been generated; (ii) 85 per cent of households are being paid directly through bank/post office accounts; (iii) wage rate have gone up to Rs. 122 and 191 in Bihar and Haryana respectively; (iv) 51% of the card holders are SCs/

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STs and 33 per cent reserved for women in which 47 per cent of the women are card holder at present; (v) 146 lakh works have been taken up since the beginning of MGNREGA of which 60 per cent have been completed. Of these completed works- 19 per cent relate to rural connectivity, 25 per cent relate to water conservation and water harvesting, 14 per cent related to irrigation canals and renovation of traditional water bodies, 13 per cent relate to flood protection and drought proofing, 14% relate to work done on private lands which belong to small and marginal farmers, and SC/ST/BPL families.

Most of the MGNREGA work is agriculture related. Labour shortage in agriculture will lead to focus on technological advancement in agriculture which will in turn raise agricultural productivity. But, the key question here is whether advanced agricultural technology is at present accessible and feasible for the poor who are mostly marginal and small farmers. MGNREGA has increased farm income of the small and marginal farmers, because they have been able to increase input in their farms such as irrigation, fertilizer and hybrid seeds. But, medium and large farmers face low labour supply in agriculture, because of MGNREGA work as farmers are unable to provide the wage rates more or equal to MGNREGA.

Methodology

We have conducted the survey from May to August, 2011, in Banda and Hamirpur district of Bundelkhand region, Uttar Pradesh. We have found four main causes of agricultural labour shortage in the rural areas i.e., rural out-migration, MGNREGA work and its wage rate, lack of interest of rural youth in agriculture, and political influence on labour. The most affected farmers were the medium and large farmers, because they are not able to manage agriculture only with the help of family labour, because as they have large land holdings. Sometimes these farmers are unable to hire labour because of the unavailability of labour, even if they are ready to pay higher wage rates. The small and marginal farmers have managed labour from family members. Most of the MGNREGA household and migrant's households belong to the small and marginal farmers. Most of the farmers cannot perform harvesting, irrigation and weeding without hiring labour.

Results and Discussion

Agriculture sector is a labour engaging enterprise and it requires around 30 to 225 man-days per hectare depending on the type of crops cultivated (pulse to sugarcane). During the 19th annual conference of Agriculture Economic Research Association (AERA) 2011, at AAU, Jorhat, on "*Agriculture labour demand and Supply"* MGNREGA was discussed as being a rural labour bank. It was observed during our survey that farmers would like MGNREGA to be introduced and it should be involved in agricultural work in the farmer's field. The MGNREGA labour should be provided to the farmers at a subsidised rate. In our survey, we have found that most of the medium and large farmers were facing acute labour shortage in agriculture since 2005-06, when MGNREGA was introduced. They have reported that before MGNREGA, labour was willing to do any type of work at the wage rate of Rs. 60-80 per day, but now they were asking for wage rates (Rs. 150 to 200/day)more than the MGNREGA wage rate. In the rural areas, wage rates in general has increased due to the MGNREGA minimum wage rate, and the farmers were facing acute agricultural labour shortage during agricultural operations especially in the harvesting period, because, the farmers were unable to pay wages equal to the wages of MGNREGA. The farmers were also unable to pay the wage on daily basis. It seems that MGNREGA wage rate was has become the benchmark for wage rates in the rural areas. The labour does not prefer to work at wage rate which are lower than the MGNREGA wage and for work which was harder than MGNREGA work. During the off season when there is no MGNREGA work, labourers prefer to migrate to the urban areas to earn more money.

Though MGNREGA was introduced to check rural out-migration, it now seems that it has become the main cause of rural out-migration indirectly because of its wage rate and nature of its work. *Haque* (2011) has discussed that most rural youth were still migrating to urban areas in search of employment from both MGNREGA and non-MGNREGA households. Rural youth seems to regard agricultural work as strenuous and a low status job; and especially educated youths don't prefer agricultural work. Some of the rural youth state that agriculture is boring, low paid and requires hard work, and thus they prefer to move to urban areas.

As agricultural work cannot be pre-poned or post-poned and all the agricultural work in a season starts at the same time for each farmer. To be able to perform uninterrupted farming, the needy farmer should have assured agricultural labour supply on demand at a subsidised labour cost. In this situation, the MGNREGA labour is the best alternative to overcome labour shortage in agriculture. We have found that labourers don't prefer agricultural work in the fields/farms of the land owners. They either work under MGNREGA or migrate to urban areas. Labourers prefer MGNREGA work because of wage rate, timely payment, relaxation in work and short durations of work. Sometimes, farmers feel helpless and blame government policies. MGNREGA is beneficial for the poor on one side and on the other side it creates problems in agriculture for the large and medium

farmers. Thus, government should implement this development schemes in a balanced way. Therefore, MGNREGA labour should be regularised and the Panchayati Raj Institution should be authorised to distribute labour to the needy farmers on demand.

It is suggested in such a way that MGNREGA for agriculture work, the Panchayati Raj Institutions (PRIs), labours and the farmers should be on agreement. The farmers need labour during the peak period of agriculture, but not on a regular basis or per day. During the off-season of agriculture the MGNREGA job card holder should work in public works and during peak agricultural season the same card holder should work on farmers' field at the same wage rate. In MGNREGA for agriculture there should be 30-50 days more jobs per household per annum if needed, but not compulsorily. Thus, MGNREGA job card holders would get more than 100 days of work. Wages for the MGNREGA labour for agriculture would be paid by the farmers. However, the gestation period of agricultural input is longer and farmers may not be able to pay wage on the spot. In this case the Panchayat should pay the wages to the labour. When the farmers would be able to pay the wage amount the panchayat would collect it. In case the farmers are unable to pay the wage money to the panchayat, except in case of natural hazards, the panchayat would be authorized to take farmers land equal to the amount of the wage and that land can be leased out to other farmers or labour for a year. If the crops are lost due to natural hazards, government should pay or provide subsidy to the farmer.

According to the farmers' requirement, we propose that, the Panchayat should arrange the registration process and maintain records of MGNREGA job card holder/labour and of the farmers requiring labour. For registration, the farmers should show their land record documents and pay nominal charges for maintenance for a year. The farmer should also have to pay some money to the panchayat as security, depending on the number of labour demanded. The registered farmers should get a labour bank card. The Panchyat would then provide MGNREGA labour to the registered farmers under the agreement.

We have also observed that the agreement of MGNREGA for agriculture should not be static in nature, but should be need based and depend on the mutual understanding of the farmers and labours. Panchayat should play the role of a mediator only. In case the labour is not interested to work for any of the registered farmers' land, the panchayat should not be force the labour to do so, and similarly, if the farmer is not interested to hire any particular MGNREGA labour then the panchayat should not force the farmers to hire that labour too. Labour and farmers should be mutually interested to work for each other and should respect each other. Based on discussion with SCs youth, we have found that farmers (Landlord) should not be insult the labour in any form (physical, emotional, others) and according to the other caste farmers, labour should not leave the work till it is finished. Labour should be paid full wage for a day, if he/she has spent more than two hours in the field/house of the farmer, but, if the labour has left the work after two hours without the consent of the employer (farmer), the labour should not be eligible to get wages for that period of work. All labourers are hired for one day only and they are free to choose their employer again next day.

The farmers stated that they have witnessed sudden change in relationship among the labours and owners in the village since 2005-06, when MGNREGA was introduced. This feeling was more common among all the farmers. They felt that earlier people were helping each other all the time, but now for any work they have to pay charges, even if it is only an one or two hour work. It is natural that labours don't want to waste their time without money, because MGNREGA job card holders can earn Rs. 100-150 per three to four hours by digging pits size of 10 x 6 x 1 feet, but they cannot earn that amount of money from any other type of work in the village.

As farmers have revealed that they are unable to pay wages equal to the MGNREGA wage rate, the government should provide subsidies to the farmers. The MGNREGA minimum wage rate is Rs. 120 per day and it varies from state to state. During the survey, we found that farmers have paid more than MGNREGA wage during the peak period of agriculture



This picture is from Damoh District, MP, May 2014, Where MGNREGA work done



Road constructed Under MGNREGA, Damoh District, MP, May 2014


Bunding of rocky land in Damoh District, MP, May 2014

due to low labour availability in the village. Most of them reported that they have paid Rs. 50 to 80 more than the minimum wage to get labour. But, sometimes they did not get sufficient labour, even if they were willing to pay a higher amount. This situation indicates scarcity of labours in agriculture. The farmers were asked about the wage rate that how much minimum they are able to pay to the labour. They also reported that agriculture production has decreased drastically and agriculture is not profitable as it was earlier. Majority of the farmers reported that they were able to pay Rs. 60 to 80 per day. Thus, farmers agree that they can pay an average of Rs. 70/day and rest amount should be subsidized. Therefore, government should provide Rs. 50% as subsidies to hire MGNREGA labour. In this way farmers income can increase and financial burden of the government would be low. As farmers expressed that the MGNREGA labour should not be provided free of cost to the farmers, but they should be get subsidies. Otherwise government would face another financial burden as farmers would be discouraged from farming, which would not be fruitful.

According to the labourers, these 100 working days are not sufficient for the survival of a large family size. Hence labourers need more income from other work and are asking for more than 100 MGNREGA working days. The government can increase number of days of MGNREGA work. The MGNREGA working days are 100 days in a year and if it can be increased to more than 100 days (25-50 days more for agriculture) in a year it can become agri-MGNREGA. This strategy can be helpful to the labour for getting more than 100 days job in the village. Farmers may also be hire labour from the panchayat for other works, such as construction work at the same wage rate. Thus, number of working days would be increased without extra financial burden to the government. Farmer can get wage subsidies only for agriculture works and it will be monitored by the panchayat and the village development officer (VDO) and the agriculture extension officer (AEO) under the supervision of the district collector and MGNREGA officers. The registered farmers would be eligible to hire the MGNREGA labour. In this way labour and farmers would never be cheated in getting and delivering wages respectively.

The farmers asked that village panchayat should assure the farmers the availability of agricultural labour during the peak period, and should assure the labour jobs with full wages. In this way the farmers would overcome labour shortage problems and labour would get jobs in the same village and would not migrate. It will help agricultural growth and prosperity in the village. This model should be implemented as a pilot project in all the regions of India. We hope this would give fruitful results to the nation. Thus, MGNREGA should not be stopped but it needs modification and it would be implemented in a balanced way, such that agricultural operation is not affected.

Monitoring and Evaluation is a must in any development programme. Corruption and irregularity has been seen in the MGNREGA in the current and past year. This scheme requires strong monitoring and evaluation to control corruption and irregularity. In this proposed model panchayat, however, labour and farmer can make another informal agreement, and distribute money amongst them. For example, a farmer who has leased out his total land and is registered as a labour bank card holder according to the land records can ask the panchayat for MGNREGA labour, even though he is not a cultivator. In this way he can collect labour subsidy charge from the panchayat. So, only those registered farmers should be eligible who are cultivating land whether own land or leased in land. Similarly labour and farmers can make another agreement that is "*I would hire you and you would hire me*" even there is no need to hire labour. Therefore, monitoring and evaluation is a must for this programme to succeed. MGNREGA should be strengthened and should be better utilized. This system of utilizing MGNREGA workers into farmers' field would build a harmonious relationship between labour and land owner. Agriculture labour shortage problem will overcome.

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A test to measure knowledge about poultry management practices

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Abstract

Livestock cum poultry farming has ample scope to enhance the income and employment opportunities of the tribal women population in these areas. Due to lack of participatory mode of situational assessment, planning and implementation of development projects, such economic potentials are seldom exploited. The present study however, appraises the tribal women's knowledge of improved livestock and poultry farming practices in a selected tribal settlement in the Western Ghats. Initially a list of 80 items was prepared by reviewing the literature and after having discussions with the experts, for developing knowledge test. Highly significant bisrial correlation co-efficient ('r' bis) proved the validity of the items included in the test battery. These skills enable them to manage their profession, effectively facing with the changes in agribusiness environment and remain in the high competition of trade environment. Egg laying strains of chickens, the length of the upper beak distal from the nostrils which remains following trimming, should be 2 to 3 mm. Beak trimming of layer hens normally occurs at 1-day of age at the same time as the chick is being sexed and vaccinated. Both males and females were debeaked at 10-14 days of age at 12-14 weeks of age.

Key words: Employment, economic, sexed, vaccinated, agribusiness environment

Introduction

Poultry farming is an ancient business in India, but scientific up keep of poultry is very new. It has got economic, nutritional, industrial, recreative and researches importance. It also plays an important role to improve economy of the poultry owner. Various government and non-government organization have also recognized the importance of poultry farming as employment generating enterprise and are engaged in motivating more and more entrepreneurs to take up this enterprise. Any enterprise to run in profit requires good knowledge about varies activities to be taken up to run the enterprise and management of these activities better way. Knowledge plays an important role for achieving desired results. Knowledge according to High knowledge of poultry management practices would lead an individual towards an active participation in income generating activities. Considering this fact, it was worth to develop a test to measure the knowledge of poultry farmers regarding poultry management practices.

Studies indicate that the food of the most people of the world (especially, developing countries) is suffering from protein deficiency and since protein, especially animal protein, play important role in human nutrition, its quality and quantity must reach to ideal extent (Nikougoftar, 2003). Studies indicated that the distance of supply and demand is very high to provide the least needed animal protein. FAO had been recommended that the minimum protein which an individual must consume in a day is 65 g which from this 36g, that is 40% must provide through animal resources (Yusuf and Malomo, 2007). The consumption rate of animal protein is 22g/day in Iran and this rate is 30% less than the recommended rate by FAO.

Methodology

Efforts have been made to develop a standardized knowledge test with the help of which knowledge about poultry management practices of poultry farmers can be measured. Initially a list of 80 items was prepared by reviewing the literature and after having discussions with the experts, for developing knowledge test. Each item was given the score of 1 or 0 for dichotomized responses of correct or incorrect answers, respectively.

The collected items were administrated to the randomly selected 48 respondents from the area under study. The total score secured by an individual respondent of 80 items was the knowledge score.

After arranging the items in descending order on the basis of the total score obtained by the

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respondents, the respondents were divided into six equal groups each of eight. For the item analysis, the middle two groups were eliminated and the four extreme groups with high and low scores were kept. Selection of items for final format for the knowledge test was done on the basis of following criteria.

Item Difficulty Index-P

The index of difficulty was worked out as the percentage of the respondents answering an item correct the items with 'P' value (Item Difficulty Index) ranging from 10 to 90 were considered for final selection of the knowledge battery.

$$P = \frac{\text{No. of respondents answered correctly}}{\text{Total No. of respondents}} \times 100$$

Discrimination Index

The items with E1/3 values ranging from 0.20 to 0.80 were considered for final selection.

Discrimination index – E1/3

$$E\ 1/3 = \frac{(S_1 + S_2) - (S_5 + S_6)}{N / 3}$$

Where, S_1, S_2, S_5 and S_6 are the frequency of correct answer in the group G_1, G_2, G_5 and G_6 respectively.

N= Total number of respondents in item analysis sample

Biserial correlation

The biserial correlation (r bis) for each of the item was calculated and tested by using the formula given by Guilford.

Final format of the knowledge test for measuring poultry entrepreneurs' knowledge regarding poultry management practices

1. How much is the average egg weight?
2. Why Debeaking is carried out in birds?
3. How many times Debeaking is done in layer birds?
4. What is the feed consumption during 0-8 week's period in layers?
5. What is the feed consumption during 0-20 week's period in layers?
6. What is the feed consumption during 21-72 weeks period in layers?
7. Which materials are normally used as litter?
8. Can we house three layers in one cage?
9. Mention important precautions for the prevention of diseases in poultry birds?
10. Which are the symptoms of Marek's disease?
11. What is the age for first vaccination against Marek's disease?
12. Which are the symptoms of Ranikhet disease?
13. What is the age for vaccinations against Fowl pox disease?
14. Mentions the coccidiostat used to control the coccidiosis?
15. Give the crude protein and energy content of Starter chick mash (BIS standard).
16. Give the crude protein and energy content of Grower chick mash (BIS standard).
17. Give the crude protein and energy content of Layer chick mash (BIS standard).
18. Mention sources of calcium used in poultry feed? the symptoms of ranikhet disease?t marek' in poultry birds?dge regading poultry management practices

Reliability and validity of the test

To know the reliability of the knowledge test, the split halves method was used (r= 0.91). For testing the validity, the results of the biserial correlation (r bis) were considered. Highly significant bisrial correlation co-efficient ('r' bis) proved the validity of the items included in the test battery.

Results and Discussion

A whole large egg out of its shell weighs approximately 60g. Of this about 1/3 is the yolk and 2/3 was the white so one egg white will weigh approximately 40g. The weight was 63g and 73g (when in their shells) so there will be some variation between eggs.

The benefits of beak trimming were mainly welfare advantages, some of which directly relate to increases (or reduced decreases) in production. These included reduced feather pecking and cannibalism, better feather condition, less fearfulness and nervousness, less chronic stress, and decreased mortality. Birds was trimmed lower beak is somewhat longer than the upper beak. USA's UEP guidelines suggest that in egg laying strains of chickens, the length of the upper beak distal from the nostrils which remains following trimming, should be 2 to 3 mm. Beak trimming of layer hens normally occurs at 1-day of age at the same time as the chick is being sexed and vaccinated. Both males and females were debeaked at 10-14 days of age at 12-14 weeks of age. The feeds given to layer parents will be more or less similar to that of commercial layers in respect of major nutrients. Sometimes, N.D., I.B.D. and I.B. killed vaccines are repeated at 45 weeks of age in problematic areas, to increase the maternal acquired immunity in the chicks. Fowl cholera vaccine has to be given at about 10 weeks of age in endemic areas. Moreover, the flock has to be tested for *Mycoplasma* and *Salmonella* at around 16 weeks of age, to eliminate the positive reactors. The females will be fed a 18% protein and 3.0 to 3.5% calcium feed while the cocks with 13-14% protein and 1-1.5% calcium feed with higher levels (40mg/kg) of vitamin E; on other aspects, both

the feeds are comparable.

Poultry litter is used in confinement buildings used for raising broilers, turkeys and other birds. Common bedding materials include wood shavings, sawdust, peanut hulls, shredded sugar cane, straw, and other dry, absorbent, low-cost organic materials. Sand is also occasionally used as bedding. The bedding materials help absorb moisture, limiting the production of ammonia and harmful pathogens. The materials used for bedding can also have a significant impact on carcass quality and bird performance. The cage system of rearing birds has been considered as a super intensive system providing floor area of 450-525 sq. cm. (0.6 - 0.75 sq. feet) per bird. In cage the birds are kept in one, two or three per cage, arranged in single or double or triple rows.

Poultry can be affected by a variety of diseases and parasites, some of which are endemic to certain types of bird. You will need to introduce and maintain a strict hygiene programme to keep diseases out of poultry. As well as carrying out stringent hygiene and insecurity measures, you will need to carry out vaccination or medication strategies to prevent and/or control certain endemic diseases. The two most serious diseases that you must keep out of poultry flocks are Newcastle disease and avian influenza (bird flu). Other poultry diseases include chronic respiratory disease, fowl cholera, Salmonella, Campylobacter and internal parasites. Salmonella and Campylobacter, while highly contagious in poultry, are not necessarily life-threatening for fowl. These diseases can however cause serious illness in humans if they get into the food chain. Daily inspection of poultry by trained staff, in good lighting conditions, and independently of any automatic surveillance equipment, is the best method to prevent serious outbreaks of disease. Inspections will enable you to detect early signs of disease simply by noting changes in the behaviour and condition of individual hens.

Marek's disease is a highly contagious viral neoplastic disease in chickens. It is named after József Marek, a Hungarian veterinarian. Occasionally misdiagnosed as an abtissue pathology it is caused by an alphaherpes virus known as 'Marek's disease virus' (MDV) or *Gallid herpesvirus 2* (GaHV-2). The disease is characterized by the presence of T cell lymphoma as well as infiltration of nerves and organs by lymphocytes.[1] Viruses related to MDV appear to be benign and can be used as vaccine strains to prevent Marek's disease. For example, the related Herpes virus of Turkeys (HVT) causes no apparent disease in turkeys and continues to be used as a vaccine strain for prevention of Marek's disease (see below). Birds infected with GaHV-2 can be carriers and shedders of the virus for life. Newborn chicks are protected by maternal antibodies for a few weeks. After infection, microscopic lesions are present after one to two weeks, and gross lesions are present after three to four weeks. The virus is spread in danderfrom feather follicles and transmitted by inhalation.

Keep turkeys with chickens (this may help the chickens with Marek's, but can lead to black head disease in the turkeys). Vaccinate all chicks at 1 day old; keep chicks from exposure until immunity has developed, about 7 days. Cull affected birds. Some birds develop temporary paralysis that disappears after 1-2 days. They appear to return to normal, but frequently die from internal tumors a short time later.

Remarkable gross lesions are usually seen only with viscerotropic velogenic Newcastle disease. Petechiae may be seen on the serous membranes; hemorrhages of the proventricular mucosa and intestinal serosa are accompanied by multifocal, necrotic hemorrhagic areas on the mucosal surface of the intestine, especially at lymphoid foci such as cecal tonsils. Splenic necrosis and hemorrhage and edema around the thymus may also be seen. In contrast, lesions in birds infected with lo NDV strains may be limited to congestion and mucoid exudates seen in the respiratory tract with opacity and thickening of the air sacs. Secondary bacterial infections increase the severity of respiratory lesions.

Fowl pox is prevalent, chickens and turkeys should be vaccinated with a live-embryo or cell-culture-propagated virus vaccine. The most widely used vaccines are attenuated fowlpox virus and pigeon pox virus isolates of high immunogenicity and low pathogenicity. In high-risk areas, vaccination with an attenuated vaccine of cell-culture origin in the first few weeks of life and revaccination at 12–16 wk is often sufficient. Health of birds, extent of exposure, and type of operation determine the timing of vaccinations. Because the infection spreads slowly, vaccination is often useful in limiting spread in affected flocks if administered when <20% of the birds have lesions.

Monitored broilers were not treated with anticoccidial agents, but the achieved production results were nevertheless high. After 42 days of fattening in all cycles, the following results were recorded: mean production number 303; body weight 2.232 kg; feed conversion 1.70, mortality rate 1.17; culling 1.89 % with survival rate of 96.94%. Caecal coccidiosis as the cause was confirmed at necropsy.

This standard prescribes requirements, sampling and methods of test for chicken (Gallus domesticus) feeds. Chicken feeds shall be of the following six types: a) Broiler Starter Feed (BSF) — a ration to be fed to

chicks intended for meat production, up to the age of six weeks. Broiler Finisher Feed (BFF) — a ration to be fed to growing chickens, intended for meat production, from six weeks onwards. Chick Feed (CF) — a ration to be fed to chicks, not intended for meat production, up to the age of 8 weeks. Growing Chicken Feed (GCF) — a ration to be fed to growing chickens, from 8 to 20 weeks or until laying commences. Laying Chicken Feed (LCF) — a ration to be fed to laying birds from 20 weeks onwards or after laying commences. Breeder layer Feed (BLF) — a ration to be fed to breeding chicken.

Dietary energy content must be specified to maintain the proper ratio of protein to energy so that birds can consume an adequate amount of protein. The protein requirement or amino acid requirements can be defined accurately only in relation to the energy density. Also, the degree of fat deposition in meat producing birds can be affected by the relationship. Some combinations of fats and carbohydrates have a protein-sparing effect. Impossible to set the energy requirement in terms of unit/kg diet because birds adjust their feed intake to achieve the daily energy intake.

Some minerals such calcium and phosphorus are required in large quantities. For example, laying hens require between 3.5-4% calcium, 0.3-0.4% available phosphorus and 0.2% sodium in their diets for egg production. Other minerals, such as copper, iron, manganese, zinc, selenium, cobalt, iodine and molybdenum, are required in milligram quantities but deficiency of these minerals will lead to serious health problems in mild cases and death in severe cases.

Currently weak management of production factors and economic inefficiency of production enterprises is one of the agricultural problems. Incorrect using is related to low of information and technical skills of farmers. So, paying attention to farm management and recognition its restricting factors and providing suitable executive ways, will be a good way to change in production of agricultural products and ideal use of production factors (Yaaghubi, et al., 2009). Farms operators need to management skills to take correct decisions. These skills enable them to manage their profession, effectively facing with the changes in agribusiness environment and remain in the high competition of trade environment (AL-Rimawi et al., 2006).

Almost equal number of respondents belonged to the medium and low categories. Only a few had high level of knowledge. As communicated by the respondents, lack of awareness of scientific rearing practices was the major impediment in taking up income generating ventures in poultry farming. Similar finding was reported by Durgga Rani, 2004.

The literature also supports the findings of this study. (Mowaad M., 1992 and Umunnav et. Al, 2012) found that farmers who are exposed to more than one extension method had higher scores in knowledge gain rather than other farmers.

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Women enterpreneurs in Agra region of Western U.P.

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Abstract

Entrepreneurship amongst women has been a recent concern for all of us. One does not have to travel to understand the hidden entrepreneurial potential sirlials of women that gave gradually been changing with the growing sensitivity to their role and economic status of the society. Due to awareness of their existence right work situation, the entrepreneurial activities have become attractive to women. The present study indicates that the women entrepreneurs should be provided more attentions to become a successful entrepreneurs it also indicate that most of women preferred to do such business which would help them to be financially independent and to help their family business. Most of the entrepreneurs face many constraints. 90.69% of entrepreneurs revealed that the part of government was not adequate.

Key words: Entrepreneurship, entrepreneurial, women, business

Introduction

The concept of entrepreneurship has assumed prime importance both in research action for accelerating economic growth in developing country. It is now being increasingly recognized that the entrepreneurial development is an integral part of the strategy of industrial development. The entrepreneurship is often used as a broad definition for the process of starting and running one's own business, the term entrepreneur is increasingly been reserved for the type of individual who is highly determined confident, creative, self oriented personality, well in tune with the trends and who is able to translate a vision in to real business. These individuals are often viewed as reckless risk takers women entrepreneurs are the women are group of women who initiate and operate a business entrepreneurs. Govt. of India note women entrepreneurs as "an enterprise owned and controlled by women saving a minimum financial interest of 51% of capital and giving at least 51% of employment generated in the enter price to women.

In the process of developing women as entrepreneurs socioeconomic background plays important role. Women entrepreneurs are coming out as a distinct class on the industrial scene and their economic contributions being considered significant now in India. The potential of developing women as entrepreneurs is very high and so in the government policy many encouraging schemes are in existence in India for different target groups of women coming from different section of the society. It has been observed that the small business in the crafts segment offers the best opening for women entrepreneurs. Readymade garments and embroidery being virtually cottage industries operations, it can be natural extension for women to get into entrepreneurial activity in these areas. The problem or difficulty of a woman entrepreneur in that she is a woman. The attitude of society towards her and the constraints in which she has to live and work creates difficulties and problems at all levels, i.e. family support, training, banking, licensing, society and marketing. Women still suffer from male domination about their role and capacity. Keeping the above points into consideration, the present study was carried out with the following objectives:

1. To study the distribution of women entrepreneurs on the basis of different type of entrepreneurial activities.
2. To study situation in which a women as an independent economic agent is able to overcome the pressure exported by tradition.
3. To identify problems and constraints faced by women entrepreneurs and to analyze the causes of their relative success or failure in business.

Methodology

The present study was confined to Agra district of Uttar Pradesh. The numbers of small scales industries units have been started by several entrepreneurs. Quiets a few women are in this group. Though those has been an increase in the number of small industrial unit, but there is scope for more planned and systematic technical type of units and export oriented in small and the large scale sector. Keeping this in view Agra district of U.P. was selected for this study. The study was designed to cover 300 women entrepreneurs in Agra district operating small scale

commercial entrepreneurs. It is, therefore not easy to arrive at a general correlation between different variable applicable to all the industries. The women entrepreneur was chosen as a basic unit of inquiry for this study on three accounts. Firstly she, as compared to males, is a new entrant in to the field and her contribution to individual development has to be assessed. Secondly, her indirect contribution to women empowerment in general and as a model for others was to be studied. Thirdly, if women have to be brought in the main stream of entrepreneurial world, it is imperative to know the characteristics, challenges, motivation and perception of this prominent segment. The standard methods were employed to collect information regarding the organizations and institutions helping women entrepreneurs, such as district industrial centre Agra. In all there were 1475 women entrepreneurs running different type of small scale enterprises were randomly selected. The suitable questionnaire was prepared in the light of the objectives of the present study and the sample women entrepreneurs were interviewed. Each respondents was visited at best twice or thrice. The information was collected on several aspects of entrepreneurship as practiced by the respondent. The data was collected through primary and secondary sources to obtain the relevant basis of data organized. This provided the basis for conclusions being drawn and recommendations made in order to understand the problem in proper perspective, the discussions were made with several knowledgeable persons such as economist, bankers and government official connected with small scale industries, respective of women's organizations.

Results and Discussion

Most of the women entrepreneurs' preferred to do such business which would help them to be financially independents, would generate sufficient income for the family. Table 1 indicate that, out of 300 women entrepreneurs 14.33 per cent in manufacturing of candles, 12 per cent in embroidery work, 8% in manufacturing of polythene bags, 7% in dairy product, 6.33% in underwear's and undershirts same per cent in manufacturing of soft toys and backery products, namkeen, sweets and potato chips, cutting and tailoring, hatching of eggs, majority 83.67% of respondents were between 25-45 years. Majority 85.67% were educated up to matriculation.

The entrepreneurs had limited potential in providing gainfull employment. Financial help was provided mainly by government agencies (71%) followed by bank (22.8%). 79% of the responds acquired to training before starting their ventures. It was observed that 82.33% faced financial problems. 82% respondents preferred to establish their business near their homes. A significant portion 50% women faced negative attitude of society. 85.67% entrepreneurs faced the problem of marketing both row materials and finish goods about 90.67% women entrepreneurs reveled that the support on the part of govt. was not adequate which was highly demoralizing. 51.33% women entrepreneurs expressed that family constraints do not allow a women to be a successful entrepreneurs.

Table 1: Distribution of women enterpreneurs on the basis of different type of enterpreneurial activities

S. No.	Enterpreneurial activities	No. of respondents	%tage
1.	Readymade garments	43	14.33
2.	Hatching of eggs	18	6.00
3.	Leather purses, hand bags and leather garments	16	5.33
4.	Data processing	4	1.33
5.	Embroidery work	36	12.00
6.	Underwear and shirt	19	6.33
7.	manufacturing of brakery products namkin, sweets & potato chips	18	6.00
8.	Cutting and tailoring	17	5.67
9.	Manufacturing of candles	39	13.00
10.	Manufacturing of card board boxes	11	3.67
11.	Preparation of soft toys	9	6.33
12.	Manufacturing of polythene bags	24	8.00
13.	Manufacturing of carpets	6	2.00
14.	Dairy products	21	7.00
15.	Manufacturing of plaster of paris	6	2.50
16.	Beauty parlour	4	1.33
17.	Others	5	1.67

Table 2: Constraints for estabilishing of business by women enterpreneurs

S. No.	Problem faced by respondents	No. of respondents	%tage
1.	Row material (quaqlity, cost and time to obtain raw materials)	194	64.67
2.	Power and fuel	236	78.67
3.	Financial problems	247	82.33
4.	Transport	135	45.00
5.	Storage	127	42.33
6.	Labour	152	50.67
7.	Lack of awareness and guidance	159	53.33
8.	Marketing problems	257	85.67
9.	Competion	123	41.00
10.	Inadequate Govt. support	272	90.67
11.	Male domination	47	15.67
12.	Family/social constraints	154	51.33
13.	Negative activities of society	150	50.00
14.	Training	241	80.33
15.	Lack of mobility	246	82.33

Table 3: Distribution of respondet (300)

Age group			Educational qualification				Marital status		Work experience		Family type		Type of work ship		Size of employment		
<25 year	25-45 year	>45 year	Under matric	Matric	Graduate	PG &above	Married	Unmarried	Yes	No	Nuclear	Joint	Sole	Partnership	1-3	4-6	7-10
43 (14.33)	251 (83.67)	6 (2.00)	27 (9.00)	257 (85.67)	14 (4.66)	2 (0.67)	298 (99.33)	2 (0.67)	82 (27.33)	218 (72.67)	127 (42.33)	173 (57.67)	246 (82.00)	54 (18.00)	198 (66.00)	89 (29.67)	13 (4.33)

Most of respondents were married 99.33%. Over 72% had no work experience of the total respondents about 57.67% belonged to joint family Table 3). Majority (77.5%) of respondents originally came from business back ground. They were married into business family, having lived in business environment because it was easier for these women to take business rather than any other vocation. 82% were owner of their enterprise.

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Arresting slowdown in economy-strategies for turn around

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Abstract

The current scenario in India is not better than a sinking ship. The continuous fall in rupee, the slow growth rate of a decade and the inflation are signs to doming economy. The challenges in front of the Indian economy are many and needs to be worked upon immediately before it reaches a state of irreversibility. There are various ways of looking at India's present economic woes marked by a rapid fall in the value of the rupee caused by persistent inflation of the past few years and the high current account deficit (CAD) of about $85 billion (4.5% cent of GDP) which needs to be funded through uncertain capital inflows year year after year. The description of the present crisis by various economic and political analysts by itself tends to carry shades of ideological bias. Some well known economists on the right prefer to describe the external sector situation as worse than the 1991 economic crisis India had faced. This narrative suggests the 1991 crisis was marked by a severe, external sector crunch and it acted as a trigger for the big bang reforms of the early 1990s. This section believes that the present crisis may be worse than that of 1991 but the government this time round is much more complacent, and less inclined to implement drastic reforms to revive growth. The study was based on secondary data.

Key words: Current account deficit, GDP, Indian economy, economic crisis

Introduction

Of course, not everyone agrees with the narrative that the India of 2013 is worse than it was in 1991. Actually it is not. And more of the same kind of reforms is perhaps not the answer either. The world was very different in 1991 when western economies were still strong and looking outward, trying to deepen the process of economic globalization. Today, major OECD economies are looking much more inward than before, trying to fix their own domestic economic and polity. Emerging economies like India, which managed to avoid until 2011 the negative impact of the global financial crisis, began to dramatically slowdown after 2011. Most of the BRICS economies have lost over four per cent off their peak GDP growth rates experienced until 2010.

After 2010, excess global liquidity flowing from the West, the consequent high international oil and commodity prices fed seamlessly into India's domestic mismanagement of the supply of key resources such s land, coal, iron ore and critical food items to create a potent cocktail of high inflation and low growth, and a bulging CAD.

The key difference between 1991 and 2013 is the availability of global financial flows. In 1991, western finance capital had not significantly penetrated India. Now, a substantial part of western capital is tied to India and other emerging economies where OECD companies have developed a long- term stake. The broader logic of the global capital movement is that it will seamlessly move to every nook and corner of the world where unexploited factors of production exist and there is scope to homogenize the modes of production and consumption in a global template. This relentless process may indeed gather steam after the United States shows further signs of recovery.

The Indian economy suffered its words slowdown in almost a decade, with the country even facing the ignominy of a ratings downgrade, which was salvaged somewhat with some hasty but big-ticket reforms in the latter part of the year. A downgrade of India's sovereign rating, already a tad above unstable, would have dealt a further major blow to the economy by assigning junk status to the country's external borrowings.

This would have forced multinational corporations to freeze their capital flows, making foreign funds to withdraw from the country's capital markets and depreciating the rupee to a level that could have sent fuel prices to untenable levels. The perception of policy paralysis was sought to be changed with the Central Government pursing a series of reforms, notably on the initial steps to allow global chains like Wal-Mart, Carrefour, Tesco and JC Penny to set up shop in the country. It is now up to individual State Governments to follow suit though 13 out of 28 have said no.

An overview of the Indian Economy

The country's gross domestic product (GDP) growth fell to nine-year low of 5.3% in the January-March 2012 quarter. It improved marginally to 5.5%, but fell again to 5.3% in the July-September period. The average economic growth of 5.36% in the first three quarters of 2012 is sharply lower than the average

annual growth of 8.2% recorded in the past eight years.

It is a truth well acknowledged that ramp up in capital spending and infrastructure goes a long way in taking a country's growth to the next level. This was quite evident in India as well. Indeed, there were many reasons why India's GDP growth soared between 2003 and 2008. One of these was that capital spending by private firms rose in that period from 10% to 17% of GDP.

India's economy has slowed remarkably in the past two years-from 9.3% in FY11 to 5% in FY13, the weakest in a decade. This has raised marked concerns about a prolonged economic slowdown. With market concerns about high bank non-performing loans and limited room to ease interest rates, consensus expectations are for a sluggish growth outlook continuing in FY14.

Inflation adversely impacts the poor more than the rich or the middle classes and results in the indirect transfer of resources from the worse-off to the better-off sections of the population. When inflation is driven by high food prices as it has in India in recent years, the deleterious consequences are magnified since the economically underprivileged spend half or more of their incomes on food.

The gravity of any crisis facing a nation can often be judged by the one to which it is being compared.

In the US, the peak of the 2008-09 global financial crises saw references made to the Depression of the 1930s.

Over in Greece, the country debt problems in recent years triggered comparisons with Argentina's default back in 2001, which at the time was the biggest sovereign default in history.

In India's case, its recent economic issues have sparked talks of a repeat of the situation it faced in 1991, often considered its worst economic crisis.

The crisis saw its currency tumble and its foreign exchange reserves depleted. Things turned so bad that India eventually had to be rescued by the International Monetary Fund.

Growing Problems

One of the key areas of concern is India's burgeoning current account deficit, which hit a record high of 6.7% of gross domestic product (GDP) last year.

The Indian rupee has fallen more than 20% against the US dollar since the start of the year 2013. That has made India's imports more expensive and added to the country's economic problems. India's economy grew by 4.4% in the April-Jun quarter of 2013. The US economy expanded at an annualized rate of 2.5% in the second quarter.

2012 was a dull year property markets. Price appreciation in this year slowed with the top 7 cities witnessing a rise of only 1-3%.

India Gross Domestic Product (GDP) grew at 4.8% in the fourth quarter of FY13, marginally lower than an estimate of 4.9%. This is a marginal improvement over the Q3 GDP growth rate of 4.7%.

The GDP for the entire FY13 grew at 5%, which is a decade low number. The manufacturing sector of the economy grew at 2.6%.

India's economic growth was at 6.2% for the 2011-12 fiscal. It had grown by 5.4%, 5.2% and 4.7% in the first, second and third quarters, respectively, of 2012-13, according to data released by the Central Statistical Organizations (CSO).

During 2012-13, the sector under review grew by a meager one per cent compared to 2.7% in the previous fiscal. Mining and quarrying sector contracted by 3.1% during the fourth quarter of last fiscal, as against growth of 5.2% in output in the same period of 2012-13. The contraction in mining sector remained unchanged at 0.6% in 2012-13 over the previous fiscal. Farm sector output expanded by just 1.4% in January-March this year, as against 2% in the same quarter of 2011-12. The agriculture sector also grew at a slower rate of just 1.9% in 2012-13 compared to 3.6% in 2011-12.

Major Factors for Sudden Slowdown of Indian Economy are

1. Ineffective Monetary Policies

To treat the problem of inflation as largely a monetary policy issue and by placing a great onus on the Reserve Bank of India to curb inflation by containing liquidity, the government has simplistically followed textbook notions of checking "too much money chasing too few goods". Food inflation has been primarily driven by supply constraints.

2. Weakening Rupee

The depreciation in the value of the Indian rupee vis-a-vis the US dollar is a consequence not only of external factors but also of the country's imports growing faster than exports resulting in the trade deficit jumping by 56% between 2010-11 and 2011-12.

The deficit has sharply widened because imports-more than half of the country's import bill is accounted for by two items, crude oil and gold-are inelastic and export growth has been sluggish. India's export markets in the West have disappeared or shrunk drastically on account of the Great Recession while many of the country's exportable products are still not sufficiently competitive in Asian markets.

3. Oily Mess

The country's petroleum sector is in a state of chaos. It is claimed that petrol prices have been decontrolled but public sector oil refining and marketing companies like Indian Oil Corporation do not increase prices without a nod from the government.

4. Crony Capitalism

The ugly underbelly of the policies of economic liberalization followed over the last two decades has been crony capitalism at its worst. The most prominent of Indian industrialists have emulated some of the worst practices of Russian and Chinese oligarchs in the manner in which

they have successfully influenced government policies and systematically subverted the rule of law.

5. Misutilization of Natural Resources

The second-generation (2G) spectrum scam epitomizes the manner in which the Union government, which is supposed to act as a custodian of natural resources that belong to the people of the country, has failed to perform its functions in a prudential and impartial manner.

Instead of ensuring transparency in the manner in which natural resources are valued and allocated, government policies have been opaque and less than fair resulting in a plethora of allegations of corruption and nepotism.

6. Reluctant Regulation

The misutilisation of natural resources has been facilitated by reluctant regulators, who were typically former bureaucrats and who were often selected for their subservience to their political masters. From financial markets to electricity distribution, the government did not deliberately empower regulatory authorities in the wake of economic liberalization thereby offering wide windows of opportunity to crony capitalists to milk the system and earn super-normal windfall gains. The regulatory bodies became sinecures to park loyal babus after they retired.

The government did away with the Monopolies and Restrictive Trade Practices Commission with alacrity but failed to expeditiously empower the Competition Commission that could check abuses of market dominance.

7. Politics-Crime-Business Nexus

The combination of crony capitalism, reluctant regulation and misutilisation of natural resources has manifested itself in the ugly nexus among corrupt politicians, criminals and businesspersons. No one symbolises this nexus better than Gali Janardhana Reddy, former Minister for Tourism, Infrastructure Development and Youth Affairs in the government of Karnataka led by B.S. Yeddyurappa.

8. Political Paralysis

Instead of focusing on reforms for the health-care and education sectors and proper delivery of subsidies to assist the fourth of the country's population whose conditions are worse than those who live in Sub-Saharan Africa, the government has tried to bring about contentious policy changes-such as allowing foreign investments in multi-brand retail outlets-that elude a consensus within the ruling coalition, leave alone the entire political class.

9. Inflation Monster

Inflation has shot up to 8.43% in December as against 7.48% in November. Food inflation remains stubbornly high at 16.91%. Needless to say, markets have already felt jitters based on concerns emanating from this prime culprit.

Suggestions to Improve India's Economy

To revive growth in the short run, India must improve supply, which means shifting from consumption to investment. And it must do so by creating new, transparent institutions and processes, which would limit adverse political reaction. Over the medium term, it must take an axe to the thicket of unwieldy regulations that make businesses so dependent on an agile and cooperative bureaucracy.

To get through the situation following measures can be suggested-

1- Reduction in subsidies, insurance and pension sector reforms, implementing GST to restore growth and required states to come to an agreement.
2- Provide strong push to exports by widening the focus market and product scheme.
3- Focus on economic growth to attract investment.
4- Confidence building to prime requirement as present markets are nervous and fragile.
5- Bring back the lost competitiveness due to an appreciation of real effective exchange rate of rupee.
6- Increase oil imports from Iran which accepts total payment in rupees and who are large dollar buyers.
7- China is India's biggest trading partner, China alone accounts for half of non-oil trade deficit. This bilateral deficit can be an offset by capital inflows from China to India's infrastructure.
8- Sell gold bond with 5 year maturity which is an exact gold substitute.
9- Urgent need to preview manufacturing growth. Create right set of policies to improve technology and increase value addition within country, thus enabling reduction of imports and increase in exports and employment.
10- Government should change its policies from socialism to capitalism. Government should invest public's money only in items which are essential and leave the private sector take care of business. It should look forward for benefit of consumers and not become supplier.

We have an economist captaining the ship of democracy in India, he has in the past been at realm of affairs during the 1991 crisis. There is still hope as the fundamentals of our economy are strong but building on them needs more than will it needs deeds and sacrifices.

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Effect of N.P.K. and potting media on plant growth and spike yield of *Dendrobium Orchid* cv. Emma White Under Allahabad Agro-Climatic Condition

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Abstract

An experimental was laid out in the Complete Randomized Design (CRD) having 10 treatment and 3 replications. The treatment (T_9 10:30:30 NPK @ 0.3% Brick pieces + Gravel + Poultry manure) was found to be statistically significant over other treatment combinations, which recoded highest plant height (32.25cm), number of leaves (12.47), leaf area (42.58cm^2), number of new shoot per plant (5.25), shoot girth (3.25), root length (17.68cm), number of root per plant (26.58), total number of spike yield per plant (5.69), number of plant per spike (12.58), spike length (38.58cm), longevity of spike per plant (46.25cm). was recorded in treatment under shade net condition.

Key words: Plant height, spike yield, new shoots per plant, different potting media, N. P. K. and Shelf life in plant.

Introduction

Among all flowers, orchids are the most fascinating and beautiful creation. These extra ordinary plants belong to the family orchidaceae, which has about 35,000 species in 800genera. Orchids are grown all over the world ranging from Equator to Arctic Cirlce and from tropics to temperate regions with tropical amazon and Indo Malayan region considered as their main centers of origin. India is blessed with a wealth of orchid flora and about 1600 species are estimated to occur in our country (Maheswari, 1976), out of which 200 are found in South India especially in western Ghats and 600 in the North-eastern states. Dendrobium is the second largest genus, Which grows at altitudes ranging from sea level to 5000 m above MSL and in areas having as low as 60 cm to as high as 1100 cm annual rainfall with humidity more than 70 per cent.

Materials and Methods

This experiment was conducted in Floriculture Unit, Department of Horticulture, Allahabad School of Agriculture, S.H.I.A.T.S, Allahabad during 2012-2013. The experiment was laid at Complete Randomized Block Deign (CRD) with three replications. In total 10 treatments comprised of pot Effect of N.P.K. and potting media different level of each *viz.*($T_1$20:20:20 (NPK @ 0.3% Coconut fibre + FYM+ Wheat husk) ($T_2$10:30:20 NPK @ 0.3%)Charcoal + Coconut fibre + Brick pieces), ($T_3$15:15:15 NPK @ 0.3% Brick pieces + FYM + Leaf mould), ($T_4$20:15:15 NPK @ 0.3% Wheat husk + FYM + Gravel), ($T_5$20:10:20 NPK @ 0.3% Coconut fibre + Poultry manure + Brick pieces), ($T_6$19:19:19 NPK @ 0.3% Brick pieces + Rice husk + Charcoal), ($T_7$10:15:20 (NPK @ 0.3% FYM + Poultry manure + Brick pieces), ($T_8$20:10:10 NPK @ 0.3% Leaf mould + Gravel + Rice husk) and ($T_9$10:30:30 NPK @ 0.3% Brick pieces + Gravel + Poultry manure) with control (T_0 Rice husk + leaf mould + gravel were adopted. The plants are collecting from Sheel Bio-tech limited, Tughalakabad, and New Delhi-110019. shed net house, in perforated 12 inch earthen pots. The pots were placed over 5 cm sand surface. The growth and yield parameters for each treatments were observed in three plants selected by random sampling method. The data were statistically analyzed and critical differences were worked out at five percent level to draw statistical conclusions as suggested by Panse and Sakhatme (1978).

Results and Discussion

Emma white the maximum plant height (32.25cm) was recorded in T9 10:30:30 (NPK @ 0.3%) Brick pieces + Gravel + Poultry manure at 180DAP followed by T8, T6 and T7 and the minimum plant (27.38cm at 180 DAP) was recorded in T_0 Control Rice husk + leaf mould + gravel. Maximum plant height was observed when the fertilizer level in increased (Table 1). The results are corroborative with the findings in Cymbidium orchids as reported by

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Poole and Seeley (1978) and in Phalaenopsis by Grieshbach (1985) Whereas the Emma white the maximum number of leaves (12.47 at 180DAP respectively) was found in T9 10:30:30(NPK @ 0.3%)Brick pieces + Gravel + Poultry manure followed by T8, T6 and T7 and minimum number of leaves was recorded in T_0 Control Rice husk + leaf mould + gravel (10.25). Hersh (1997) reckoned that Dendorbium orchids showed an increased in number of leave when potted in Brick pieces + Gravel + Poultry. Whereas Emma white registered a maximum of T9 (10:30:30(NPK @ 0.3%)Brick pieces + Gravel + Poultry manure) (42.58) at 180DAP respectively followed by T8 (38.58), T7 (37.88) and T6 (35.35). while the minimum leaf area cm^2 was observed in T0 in Emma White Similar result was observed by Gelthing (1974) in Odontoglossum Hybrid, Grieshbach (1998) in Phalaenbopsis and Kim *et al.* (1996) in Cyrpipedium. Whereas Emma white the maximum Number of (5.25) new shoots was found in T9 10:30:30(NPK @ 0.3%) Brick pieces + Gravel + Poultry manure) followed by T8, T5, T4 and T6 the minimum number of (2.25) new shoots per plant was observed in T0 (Control Rice husk + leaf mould + gravel). Arumugan and Jawaharlal (2004) studies on media experiment on Dendrobium Hybrid founded that the coconut fibre as a growing medium had recorded positive result for plant height, number of shoots per plant. Dry matter production was high when plants were grown under rice husk medium. While Emma white the maximum shoots girth (3.25) was recorded in T9 (10:30:30(NPK @ 0.3%) Brick pieces + Gravel + Poultry manure) followed by T8, T4 and T6 the minimum (2.13) shoot girth was found in T0 (Control Rice husk + leaf mould + gravel). Mohapatra and Saravanan, (2006).The treatments were coconut coir, bhusa, rice husk, tile bits, charcoal, cow dung, brick pieces and groundnut shell. Gravel+ groundnut shell + cow dung recorded the highest shoot girth, were also greatest with gravel + groundnut shell + cow dung, followed by charcoal + coconut coir + cow dung. Coconut coir, gravel and cow dung were superior among the growing media. while the Emma white the maximum root length (17.68) was seen in T9 (10:30:30(NPK @ 0.3%) Brick pieces + Gravel + Poultry manure) followed by T8, T6, T7 and T4. Emma white which recorded a minimum (10.18) root length in T0 (Control Rice husk + leaf mould + gravel) Galdiano *et al.* (2012) the use of culture media produced with commercial fertilizers can represent a simple and low cost alternative for commercial orchid propagation when the number of roots, root length matter were evaluated. The simplified culture medium with fertilizer Peters Reg. 3 g L^{-1} presented results statistically different as for the number of roots, number of leaves, shoot length and shoot fresh matter and it can be recommended for *in vitro* growth of this ornamental orchid. Whereas Emma white the maximum of root per plant (26.58) was found in T9 (10:30:30(NPK @ 0.3%) Brick pieces + Gravel + Poultry manure) followed by T8, T7 and T6. it was lowest (19.25) Number of root per plant was recorded in T_0 (Control Rice husk + leaf mould + gravel). Kumar (1992) stated that *Dendrobium* hybrids potted in

Table 1: Effect of N.P.K. and potting media on plant growth and spike yield of *Dendrobium Orchid* cv. Emma White Under Allahabad Agro-Climatic Condition in 2012-2013

Treat-ments	Plant height (cm)	No. of leaves /plant	Leaf area (cm^2)	No. of shoot /plant	Shoot girth (cm)	Root length (cm)	No.of roots /plant	Total No.of spikeyield /plant	No. of florets /spike	Spike length (cm)	Longevity of spike /plant
T_0	27.38	10.25	25.25	2.25	2.13	10.18	19.25	3.25	10.25	27.25	35.58
T_1	29.82	10.38	27.03	2.91	2.33	12.24	20.91	4.25	10.58	29.91	37.25
T_2	29.47	10.36	26.50	2.58	2.33	11.79	20.25	3.80	10.47	28.58	36.58
T_3	29.86	10.36	27.31	3.25	2.47	12.95	24.25	4.47	10.58	30.91	38.58
T_4	30.69	11.25	29.98	4.58	2.68	13.52	24.25	4.58	11.58	32.25	40.58
T_5	29.91	10.80	29.05	3.91	2.57	12.95	23.58	4.36	11.25	31.58	39.25
T_6	30.85	11.47	35.35	3.58	2.63	15.81	25.25	5.36	11.80	36.58	43.58
T_7	30.74	11.36	37.88	2.58	2.74	14.80	24.58	5.25	11.69	33.58	41.91
T_8	31.75	11.58	38.58	4.91	3.12	16.42	25.58	5.36	12.25	37.58	44.25
T_9	32.25	12.47	42.58	5.25	3.25	17.68	26.58	5.69	12.58	38.58	46.25
F- test	S	S	S	S	S	S	S	S	S	S	S
S.Ed.(±)	0.380	0.361	0.130	0.061	0.060	0.056	0.159	0.080	0.122	0.306	0.306
CD(P=0.05)	0.805	0.766	0.275	0.130	0.127	0.119	0.338	0.169	0.260	0.649	0.649

charcoal medium followed by fern roots and rubber seed husk gave the best results with regard to growth and flowering. While Emma White the maximum total number of spike yield per plant (5.69) was found in T9 (10:30:30(NPK @ 0.3%) Brick pieces + Gravel + Poultry manure) followed by T8, T6, T7 and T5 the minimum (3.25) total number of spike yield per plant was found in T0 (Control Rice husk + leaf mould + gravel). Piyarat Saetang (1980) experiment conducted with *Dendrobium* hybrids, it was observed that coir substrate grown plants had the best growth and the best spike yield was obtained from plants potted in granulated stone .While Emma White the maximum Number of florets per spike (12.58) was found in T9 (10:30:30(NPK @ 0.3%) Brick pieces + Gravel + Poultry manure) followed by T8, T6, T7 and T5 the minimum (10.25) Number of florets per spike was found in T0 (Control Rice husk + leaf mould + gravel). Emma white registered a maximum spike length in T9 (38.58) which was statistically superior to next best treatment T8 (37.58) being on part with T6 (36.58). the minimum spike length (27.25) was recorded in T0. Where as emma white was recorded to be maximum (46.25) which was observed in treatment T9 while minimum longevity of spike yield was observed in T0 which registered (35.58). Bhattacharjee (1984) revealed that *Cattleya* orchid showed a maximum stimulation of spike length, maximum number of florets per spike and longevity of flower spike when it was potted in a medium containing hardwood charcoal.

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Comparative analysis of coriander (*Coriandrum sativum* L.) varieties for quality traits

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Abstract

Coriander varieties were assessed for quality traits viz., essential oil, non volatile ether extracts and crude fiber under south eastern Rajasthan conditions (Zone V). The variation observed among the varieties was significant for all the traits studied. Among all RKD-18 (Raj Pratap Dhania-1) was found to have high essential oil.

Keywords: Coriander, essential oil, crude fibre

Introduction

Coriander (*Coriandrum sativum* L.) is an important seed spice crop of Mediterranean origin widely cultivated in India for seed and leaf. Rajasthan is the major coriander producing state in the country. In Rajasthan, the south eastern humid plain zone (zone V) contributes about 98 percent of total coriander area and production. This implies that the agroclimatic conditions of this zone are particularly favourable for coriander production as the productivity of the crop in the zone is also higher than the state average. Kota (covered under zone V) is situated in between 25 11 N latitude and 75 54 longitude at 273 m altitude from mean sea level. It is covered under the humid south eastern plain zone (zone V) of Rajasthan. The rainfall varies from 650 mm to 1000 mm. The maximum mean daily temperature ranges from 24.5 C in the month of January and 42.6 C in May and minimum 10 C in January and 19.7 C in month of May. The predominant soil of the zone has black soils of alluvial origin with clay loam to clay in texture.

The aroma of coriander is due to the presence of aromatic volatile compounds. Nowadays demand for volatile oil in the international market is going on increasing. The advantage of use of volatile oil is that it is 100 times more concentrated than the spice powder and hence is required in very less quantity and secondly, the colour of the food products to which the volatile oil is added remains unaltered. The preparation of different value added products require different quality parameters in a definite proportion in the average composition of seed. Keeping the above facts in view, an attempt has been made in the present investigation to compare the different check varieties of coriander for quality parameters in order to find out the most suitable variety for the preparation of different value added products.

Materials and methods

In the present investigations, eleven varieties of coriander were studied for the quality estimates viz., essential oil, fixed oil and crude fiber. The crop was raised in the year 2009 at ARS, Ummedganj Agricultural University, Kota. Coriander crop was harvested when 50 % seeds turned yellow. Representative samples were taken from the lot for analysis. The seeds were dried in the shed till around 12 % moisture remained. Total essential oil was estimated using Klevenger apparatus designed for extraction of essential oil lighter then water (AOAC, 1955a). Total nonvolatile ether extract was estimated using soxhlet apparatus (AOAC, 1955b). The crude fibre was also estimated according to standard method (AOAC, 1955c)

Results and Discussion

According to national and international quality specifications of coriander, the seed should have a minimum of 0.3% of volatile oil on volume by weight basis, a maximum of 15% crude fiber and a maximum of 10% moisture. In the present investigation, the coriander varieties differed among themselves with respect to the different quality traits as shown in Table 1. The highest essential oil content was found in RKD – 18 followed by CS – 2 and RCr – 480 while it was lowest in CS – 6, Hisar Anand, RCr – 41 and RCr – 20 which were at par with each other. The oleoresin content was found to be highest in Hisar Anand followed by CS – 6 and RKD – 18 and lowest in Pant Haritima, RCr- 20 and RCr – 436. The crude fibre percent was highest in CS – 6, RCr – 728 and RCr – 41and lowest in RCr – 436, Hisar Anand and RKD – 18. The highest percent moisture was obtained in Hisar Anand, CS – 6 and RCr – 728 whereas; it was lowest in RCr- 41, RCr – 480, RCr – 20 and RKD – 18. The desirable quality parameters of coriander for preparation of value added products or its direct consumption as whole or in ground form particularly includes percent essential oil and oleoresin content. This implies that higher the percent of these important parameters, the superior will be the quality. Besides these, the percentage of crude fibre and moisture should be considerably less as these components interfere with the extraction of essential oil and oleoresin from the seed for

the preparation of value added products. In view of this, the coriander check varieties *viz*., RKD -18, Hisar Anand, RCr -480, CS -2 seems to be more suitable for processing for the development of value added products and establishment of industries thus, improving the rural economy.

Table 1: Essential oil, non volatile ether extract and crude fibre content in coriander genotypes/varieties

S. No.	Varieties	State	Essential oil %	Non volatile ether extract	Crude fibre
1.	RCr-41	Rajasthan	0.30	16.05	28.03
2.	RCr-20	Rajasthan	0.30	15.64	27.49
3.	RCr-480	Rajasthan	0.36	16.71	27.22
4.	RCr-436	Rajasthan	0.36	15.88	26.58
5.	RCr-728	Rajasthan	0.31	17.00	28.71
6.	CS-6	Tamil Nadu	0.30	18.03	29.41
7.	CS-2	Tamil Nadu	0.40	16.52	27.43
8.	CS-7	Tamil Nadu	0.40	16.89	27.43
9.	Hisar Anand	Haryana	0.30	18.22	26.61
10.	Pant Haritma	Uttar Pradesh	0.33	14.89	26.08
11.	RKD-18 (Pratap Raj Dhania-1)	Rajasthan	0.45	17.57	26.89
	CV		15.25	12.36	10.52
	CD		0.032	2.09	2.56

Similar studies were done by Alejandra *et. al*. (2002), they observed more stable concentration of major essential oil components in the European landrace compared to the Argentinean landrace. Suggesting, the variation in the oil composition related to the relative proportions of the constituents and not to the presence/absence of a particular component. Weather conditions significantly influenced the flavor *i.e.*, by altering the linalool and camphor in the experimental material and treatment. Location, fertilization, and weediness also affect the chemical profile. These results shows the relationship between some environmental factors and the essential oil composition, may be useful in the development of innovative strategies aimed to improve oil composition and to manage crop pests. Telci *et al*., (2006) also observed significant variation in the oil content between varieties, *i.e., microcarpum* had higher oil content. The compositions of the two varieties were quantitatively similar, although the linalool content was higher in *microcarpum* (6.35-71 %) that *vulgare* (42.1 – 52.7 %). They reported that ecological variation had a significant effect on the biomass and seed yields.

Lopez *et. al* (2007) concluded that phenotypic and biochemical characterization enables us to distinguish coriander accessions on the basis of their suitability for special uses. The accessions with high 1000 seed weight and short life cycle may be well suited for use of their fruit as a spice while the accessions with high overall essential oil content and intermediate life cycle exhibited the highest linalool yield per plant and may be more suitable for processing.

Asif *et. al*. (2013) reported significant variation in the chemical composition of the essential oil of five varieties from different origin of Bangladesh and owed this variation to the geographic divergence and ecological conditions. It is reported that the climate and weather conditions during the growth and more important that the nature of the soil with regard to the volatile oil content. Meena *et. al*. (2013) also reported that the genotype RKD-18 was superior to others in terms of seed yield, test weight, essential oil and also showed highest net return and B:C ration and, therefore, it is most suitable and profitable for the south eastern humid plains of Rajasthan. Our results are in conformity with the previous studies that the expression of performance of the varieties in terms of quantity (seed yield) and quality (essential oil content and its composition) is highly environmental sensitive and it depends on the different interaction of a particular genotype/variety with a particular environment. Coriander is a highly cross pollinated crop which is also reported to show significant G x E interactions, therefore, a single variety may not perform equally well in the all the environments. So a comparative study of the released varieties should be necessarily made before its general recommendation for a particular agroclimatic zone. On the basis of the present study, it can be concluded that RKD-18 (Pratap Raj Dhania-1) seems to one of the most suitable variety for the south eastern humid plain (zone V) of Rajasthan

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Risk management in agriculture in western part of Rajasthan

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Abstract

Inspite of tremendous progress made in the field of Agriculture since independence the risk factor continues to play an important role. This factor assumes greater importance in dry land farming areas. The western Rajasthan poses a typical picture due to low, erratic and unevenly distributed rainfall pattern and unavailability of alternative irrigation sources. The coefficient of variation of rainfall is 40 percent. In view of the above, performance of 6 Pearlmillet varieties was evaluated in two villages of Jodhpur district by randomly selecting 10 adopter and 10 non-adopter farmers. It was noticed that the wider row spacing technology recommended to the farmers resulted in conserving soil moisture, maintaining soil fertility, reducing plant protection expenditure to zero level and high B:C ratio. It is suggested that research efforts should be intensified to come out with more such technologies for the dry farming and rain fed areas.

Key words: Dry land farming, B:C ratio, soil fertility, soil moisture

Introduction

Indian agriculture has, since independence made rapid strides. In taking the annual food grain production from 51 million tonnes of the early fifties to 206 million tonnes at the turn of the century, it has contributed significantly in achieving self-sufficient in food and in avoiding food shortages in our country. The pattern of growth of agriculture has, however, brought in its wake, uneven development, across regions and crops as also across different sections of farming community and is characterized by low level of productivity and degradation of natural resources in some areas. Capital independency, lack of infrastructure support and demand side constraints such as controls on movement, storage and sale of agriculture products etc. have continued to affect the economic viability of agriculture sector. Consequently, the growth of agriculture has also tended to slacken during the nineties. Agriculture has also become a relatively unrewarding profession due to generally unfavorable yield and price structure causing abandoning of farming and increasing migration from rural areas.

About 68% Indian farmers and farm workers have been the backbone of Indian Agriculture. Despite having achieved national food security the well being of the farming community continues to be matter of grave concern for the planners and policy maker's in the country. Also the Government accords abiding importance to improving the quality of the country's land and soil resources.

Rajasthan is the largest state covering 10.4 percent of land mass of the country. The water resources endowment of the state is only one per cent of the available water resources in the country. The livestock population of the state is almost equal (5.4 crore) to the human population, which is also increasing fast with annual growth rate of 2.8 percent. The ground water resources is depleting fast in most areas in the state and declaration of dark zone is on the increase.

In this background, cost effective measures for development of agriculture have to be taken in Rajasthan. Accordingly, profarmer research programmes also need to be initiated and strengthened wherever necessary.

More than 70 percent of cultivated area in the state is rain fed. The western Rajasthan is the worst hit area because of very low and erratic rains in most years. Not only the crop yields are low but the problem of fodder is also very serious in this region. Bajra, guar and moth are the major Kharif crops grown in western Rajasthan. Selections of short duration drought tolerant varieties of crops are, therefore, necessary for successful crop production.

In the present study, an attempt was made to evaluate the impact of the on farm research for increasing the productivity of pearl millet in arid region of Rajasthan.

Materials and Methods

Selection of district

Jodhpur district was selected purposely because research in wider row spacing technique was conducted there.

Selection of Village

Two villages, one having adopter and other having non adopter of the technology were selected purposely.

Selection of Farmer

10 adopters and 10 non-adopters of the technology were selected randomly for the purpose of primary data collection.

In varietal trial, six varieties of pearlmillet namely HHB-67, ICMH-356, MH-169, RHB-121, ICTP-8203 and a local variety. Cluster bean variety RGC-936 and a local variety were selected for evaluating the performance of pearlmillet alone and also mixed with cluster bean during 2009-10. The research problem addressed and interventions made in the study were:

1. Rainfall in the zone is very scarce and uneven. Drought is common occurrence and chances of crop failure are very high in the area. An attempt is made to develop to drought resistance varieties of pearl millet and suitable agronomic practices to sustain productivity.
2. Evaluation of drought tolerant varieties for grain and fodder purpose.

· Evaluation of different techniques of moisture conservation and sustainable soil fertility maintenance.
· Selection of varieties suitable for intercropping/mixed cropping system.

Wider row spacing Techniques

Ridge and furrow making after 30 days of showing. Wider row spacing 60cm. instead of 30cm. As in traditional practices with 50% recommended dose of Nitrogen through fertilizer and 50% through organic manure showed superiority over farmers field. The following impact indicators were selected:

1. Crop Production

Grain yield and Fodder yield

2. Quality Improvement

Boldness of grain and Shinning

3. Soil Improvement

Soil fertility, Moisture conservation and Plant growth

Results and Discussion

Table 1 indicates that in varietal trial the variety ICMH-356 gave 75% more yield and 75% more fodder over local variety.

Table 1 : Evaluation of varieties for drought tolerance

Varieties	Grain yield (kg/ha)	Index	Fodder yield (kg/ha)	Index
HHB-67	1549	139.6	1977	115.2
ICMH-356	1708	153.9	2250	131.1
MH-169	1622	146.1	2035	118.6
RHB-121	1619	145.9	2301	134.1
ICTP-8203	1110	100.0	1716	100.0
Local	1380	124.3	1886	109.9

Table 2 indicates cost figures obtained from adopter of technology & non-adopters of technology depicts that the farmers can harvest around Rs. 4000/- additional income by investing nearly Rs. 500/- more on adopting new technology. By conserving soil moisture & maintaining soil fertility, no irrigation is required a key achievement of the study. No expenditure on plant protection in case adopter is the favourable impact of technology. 't' Test was used in order to adopter and non-adopter of the technology. The result indicate that adopter were highly significant on non adopter. B:C ratio calculated was 7.7:1.

Table 2: Evaluation of different techniques of moisture conservation and sustainable soil fertility maintenance

(In Rupees)

Particulars	Without technology	With technology	%change overwithout technology
Seed	116(3.56)	75(1.50)	-53.13
FYM	587(13.07)	834(16.67)	+42.05
Fertilizer	-	394(7.88)	+100
Plant protection	11(0.24)	-	-100
Irrigation	381(8.47)	-	-100
Human labour	1950(43.41)	2000(39.97)	+2.55
Machine cost	1404(31.25)	1700(33.98)	+21.09
Total cost	4493(100)	5003 (100)	+11.36
Output main product	5329.07	9370	+75.83
Output by product	1487	1900	+27.98
Total returns	6816	11270	+65.35
Net returns	2323	6267	+169.78

(Figures in parenthesis are the percentage of the total cost)

Table 3: Identification of cultivars for pearlmillet based mixed cropping system

Varieties	PM equivalent Yield	Index
Raj 171 + Local	3052	100.0
Raj 171 + RGC-936	3980	130.4
ICMH-356 + Local	3305	108.3
ICMH-356 + RGC-936	4199	137.6

Pearlmillet variety icmh-356 mixed with cluster bean variety RGC-936, gave higher grain yield. Cluster beans variety RGC-936 gave significant higher yield over local variety in both the pearl millet varietal combinations.

Table 4 indicates that as a consequence of adoption of technique, which encourages soil moisture conservation improves soil fertility. The response of the adopter clearly showed satisfaction. Adopter responded that there is a positive impact of the technology with respect to soil texture and moisture and it saves time and gives better quality of output. In term of scale of confidence in favor of impact, all the

above positive impacts were cited to be moderate and strong. This shows the level of scale factor and better prospects of technology in future.



Improved technology at Farmer field (60cm row spacing)

Table 4: Farmers observations about other impact of technology (in terms of scale 1 to 5)**

Indicators	Nature of impact*	In terms of scale
Soil texture/structure	+	3
Soil moisture	+	4
Other vegetations	NR	NR
Befits Complimentary	+	NR
Enterprises/resource use	NR	-
Product quality/nutritive value	-	3
(Other specify)	-	-

*impact as +(positive) – (negative) NR (Nil Response)
**1:Not at all, 2:Low, 3:Moderate, 4:Strong, 5:Very strong



Traditional practice at the farmer field (30 cm row spacing)

Table 5 indicates that the adopters were in the positive opinion that within the period of five years almost all the farmers will adopt the technology. The technology being better not only in term of yield improvement but also of better quality.

Table 5: Farmers opinion about future potential of the new technology

S. No.	Parameters	Percent
1.	Yield improvement	15-20
2.	Quality improvement	10
3.	Extent of adoption (area ha)	107318
4.	Probability of success of the technology	100
5.	Maximum adoption of the technology (Years)	5

Table 6: Constraints of technology adoption (in terms of scale 1 to 5)

Indicators	In terms of scale
A. Farm resources	
Availability of human labor	4
Irrigation water supply	5
Availability of cash/credit	4
Other specify	-
B. Technology	
Lack of proper information	1
Supply of new input/equipment	1
Soil moisture	1
Crop residue management	1
Risk of revenue loss/low yield	1
Other specify	-

Table 6 indicates three main problems related to farm resources identified by the adopters in the area namely in adequate labor availability, insufficient irrigation water and lack of credit/cash facility.

On the other hand due to good field work and efficient networking of scientists, no technology constraints was opined by the farmers. All the sample farmers were of the opinion that they were well informed about the technology with adequate input supply. With efficient soil moisture conservation and crop residual management, risk of revenue loss/low yield was nil.

On the basis of farmers response it can be observed that a very efficient technology was available which may yield good result in short span of time.

Conclusions and suggestions

The western Rajasthan is the worst hit area because of very low and erratic rain in most years. The coefficient of variation of rainfall is 40 percent. Thus the crop production is very risky and unsustainable. The technique of sowing pearl millet in wider row spacing not only provides sustainable grain production along with fodder production also, this technology is low input and affordable by the farmers of the area. Thereby risk may be reduced by adoption

of this technology. Thus crop in these fragile areas is assured and certain. This technology may also be used in other crops to get assured production. It is suggested that research efforts should be intensified to come out with more such technologies for the dry farming rain fed areas.

Despite technological and economic advancements, the condition of farmers continues to be unstable due to natural calamities and price fluctuations. National Agriculture Insurance Scheme covering all farmers and all crops throughout the country with built in provisions for insulating farmers from financial distress caused by natural disasters and making agriculture financially viable will be made more farmer specific and effective .

The central government will continue to discharge its responsibility to ensure remunerative prices for agricultural produce through announcement of minimum support prices policy for major agricultural commodities the food nutrition and other domestic exports requirements of the country will be kept in view while determining the support prices of different commodities. The price structure and trade mechanics will be continuously reviewed to ensure the favorable economic environment for the agricultural sector and to bring about an equitable balance between the rural and urban incomes.

The government will enlarge the coverage of future markets to minimize the wide fluctuations in commodities prices as also for hedging their risks. The endeavor will be to cover all important agricultural products under future trading in course of time. Reclamation of degraded and fallow lands as well as problem soils will be given high priority to optimize their productive use.

Integrated and holistic development of rain fed area will be promoted by conservation of rain water by vegetative method on water shed basis and augmentations of biomass production through agro and farm, forestry with the involvement of the water shed community. Management of grazing land will receive greater attention for augmenting availability of animal feed and fodder. Long term prospective plan for sustainable rain fed agriculture through water shed approach will be vigorously pursued for development of two-thirds on India's cropped area which is dependent on rains.

Rational utilization and conservation of the country's abundantly water resources will be promoted. Conjunctive use of surface and groundwater will receive highest priority. Special attention will be focused on water quantity and the problem of receding ground water level shed in certain areas as a result of over exploitation of underground aquifers proper on-farm management of water resources for optimum use of irrigation potential will be promoted. Use of insitu moisture management techniques such as mulching and use of macro overhead pressured irrigation systems like drip and sprinkler and green house technology will be encouraged for grater water use efficiency and improving productivity, particularly of horticultural crops. Emphasis will be placed on promotion of water harvesting structures and suitable water conveyance system in the hilly and high rainfall area for rectification of regional imbalances. Participatory community relation management will be encouraged.

The history and traditional knowledge of agriculture related to organic farming, soil moisture conservations techniques, preservation and processing of foods for nutritional and medicinal purposes is one of oldest in the world. Concerted efforts will be made to pool distill and evaluate traditional practices, knowledge and wisdom to harness then for sustainable agricultural growth.

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Frontline Demonstrations (FLD) : A bridge of Commutation on Knowledge and Productivity enhancement of Blackgram (Urdbeen) in Shahjahanpur district of U.P.

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Abstract

The study clearly revealed that demonstration at farmers' field resulted in more knowledge of improved package of practices by farmers. More number of farmers can be benefited by conducting need based front line demonstration. Thus it could be concluded that the frontline demonstration would be bridge of communication, exiting huge extension and technological gap by showing the scope of blackgram (Urdbeen) productivity enhancement at farmers' fields and resulted in more knowledge to the farmers. More numbers of farmers benefited by conducting need based frontline demonstration. The maximum increase in productivity was recorded in 100% RDF of NPK + 25 kg per ha Sulphur, though it was comparable with the blackgram (Urdbeen) productivity only through recommended dose of NPK. Pant Urd 35 and Pant Urd 31 were found better in term of blackgram productivity against local check T9. The technology index illustrates the achievability of the demonstration technology at farmers' field. More will scope of the technology demonstrated in yield enhancement with lower value of technology index. The average value of technology indexes were estimated 52 percentages under nutrient management and 32 percentages under improved varieties of blackgram (Urdbeen) in both the Kharif season 2010 & 2011. The technology index displays the likelihood of technology demonstrated which result in blackgram productivity enhancement through technological intervention made to lessen the yield gap in blackgram (Urdbeen).

Key worlds: Technological gap, frontline demonstration, blackgram, productivity

Introduction

India is producing 14.76 million tons of pulses from an area of 23.63 million hectare, which is one of the largest pulses producing countries in the world. However, about 2-3 million tons of pulses are imported annually to meet the domestic consumption requirement. Thus, there is need to increase production and productivity of pulses in the country by more intensive interventions. The productivity of Blackgram (Urdbeen) in India is presently very low due to the technological gaps in adoption of improved technologies and other socio economics factors. Blackgram (Urd) grain yield can be increased by demonstrating improved agro techniques at the farmers' fields with active participation of farmers with technical experts. Keeping the importance of blackgram (Urdbeen) in Shahjahanpur, the KVK, Shahjahanpur conducted Frontline demonstration on improved agro technologies of Blackgram crop in scientific manner at farmers' fields during Kharif season in the year 2010 and 2011.

Methodology

Farmers' operational areas of Krishi Vigyan Kendra, Shahjahanpur were selected as per guide lines of Front Line Demonstrations to KVK by Zonal Project Coordinator of Zone IV. Accorddingly the FLDs under blackgram (Urd) crop laid out in villages; namely Seharamau Daxini, Dhakiya Hamid Nagar, Dilawarpur, Raghwapur Khurd and Mohmmadpur. The knowledge level of the farmers in these five villages was also estimated by taking random sample of 20 farmers each village. Thereby sample included 100 numbers of farmers in the study. The farmers were asked to reply questions about the improved agro techniques including the high yielding varieties of black gram (Urdbeen). The score so obtained under various questions were summed up. On the basis of the the total score obtained, respondents were categorized in to three classes *i.e.* low, medium and high level of knowledge.

The participating farmers were provided with all advance technical know how about advanced cultivation of blackgram (Urdbeen). Also KVK Scientist visited regularly to the demonstration fields and continuously guides the farmers. These varieties were also utilized for collection of feedback information for more improvement in technology transfer

programmes. Field days and group meetings were also organized at the demonstration sites to provide the opportunities for other farmers to witness the benefits of demonstrated technologies. The data on blackgram (Urdbeen) productivity (q/ha) were collected from the demonstration and control plots (Farmers practice) for further analysis. The critical inputs were duly supplied to the farmers by KVK. Data were collected from the fields of FLDs farmers and analysed to compare the yields of farmers' field and FLDs field. The technology gap, extension gap and technology index were estimated by formulae provided by Samui *et al*. 2000.

Technology gap = Potential yield – demonstration yield

Extension gap = demonstration yield – farmers practice yield (control)

$$\text{Technology index} = \frac{\text{Potential yield} - \text{Demonstration yield}}{\text{Potential yield}} \times 100$$

Results and discussion

1. Knowledge level of advanced agronomic practices of Blackgram (Urdbeen)

To know the need of the technological intervention the knowledge level of the farmers in five villages were estimated from 100 farmers 20 from each village. Over all Maximum number of farmers fall in category of medium level knowledge, while very few were with high knowledge level (Table 1). Thus need was felt to introduce latest varieties and nutrient management in front line demonstration programme in the five villages. FLD is good extension tool to demonstrated impact of new agro technique to the farmers.

Table 1: Overall knowledge level of farmers in respect of cultivation of Blackgram (Urd), N= 100

Category of knowledge levelr	Score range	No. of farmers	%tage of espondents
Low	30-35	36	36
Medium	36-54	49	49
High	55-75	15	15

2. Front Line Demonstration on improved nutrient management on blackgram (Urdneen) productivity:

Front line demonstrations on nutrient management were conducted with 100% NPK nutrient supply through as recommended fertilizer dose of NPK through chemical fertilizer, 100 % of recommended NPK along with 25 kg sulphur, 100 % of recommended NPK + 10 t/ha FYM and no nutrients supply at all under control respectively during Kharif 2010 and 2011 at Seharamau Daxini and Dilawarpr villages.

The maximum increase productivity (70%) was recorded in 100% of RDF of NPK + 25 kg/ha Sulphur, though it was comparable with the productivity (52%) under recommended dose of NPK fertilizer only through chemical fertilizesr and RDF + FYM. Farmers' feed backs were also positive about effect of sulphur with recommended dose of NPK nutrients on quantity and quality of blackgram (Urdbeen) under 100 percent NPK dose + 25 kg/ha sulphur. The highest communication gap (4.40) reduced by using 100 % RDF of NPK + 25 kg/ha Sulphur and the lowest technology index (19) was observed in 100 % RDF of NPK + 25 kg/ha Sulphur. The technology index varied from19 to 52 percentage under various improved nutrient management technique (Table 2)

3. Front Line Demonstration on improved varieties on blackgram (Urdbeen) productivity:

Pant urd 35, pant urd 31, shekhar urd 1 and Narendra urd 1 were found better in term of blackgram productivity against local check variety of urd T9 at Seharamau Daxini, Dhakiya Hamid nagar, Dilawarpur, Raghwapur Khurd and Mohmmadpur villages. Increase productivity in blackgram (Urdbeen) was observed from 40-62 per cent in above said villages. Pant Urd 35 exceptionally well over control variety T9 and Narendra Urd 1. The Highest technology communication gap and lowest technology index were observed in Pant Urd 35 over Pant Urd 35, Shekhar 1, Narendra Urd 1 and Local check, respectively. Yadav *et al*., 2007 also highlighted the impact of FLD in convincing (communicating method) the farmers for adoption of improved techniques for enhancing the

Table 2 : Demonstration on improved nutrient management of blackgram (Urdbeen) at five villages during Kharif 2010 and 2011.

Component of FLD	Variety	No. of Demo-nstration	Area (ha)	Productivity (ha) ± SE	Increase in productivity (%)	Technology gap	Communication/ Extension Gap	Technology index
RDF(100% NPK)	PU 35	10	4.0	9.50±3	52	3.65	3.25	28
100% NPK+S (25 kg/ha)	PU 35	12	4.8	10.65±2	70	2.50	4.40	19
RDF + FYM (10 t/ha)	PU 35	14	5.6	9.25±2	48	3.90	3.00	30
Control	PU 35	14	5.6	6.25±5	-	6.9	-	52
Potential Yield with all inputs	PU 35	5	2.0	13.15±2				

Table 3 : Performance high yielding varieties of blackgram (Urdbeen) under FLD.

Variety	No. of Demonstration	Area (ha)	Productivity (ha) ± SE	Increase in productivity(%)	Technology gap	Communication/ Extension Gap	Technology index
PU 31	10	4.0	9.50±3	46	3.65	3.00	28
PU 35	10	4.0	10.50±2	62	2.65	3.75	20
Shekhar 1	5	2.0	9.25±3	44	3.90	2.75	30
Naredra Urd 1	5	2.0	9.10±3	40	4.05	2.60	31
Local (T9)	10	4.0	6.50±6	-	6.65	-	51
Potential yield with all inputs			13.15±2				

pulse productivity.

importance of extension techniques for communicating to the farmers about the improved agro techniques for enhancing the productivity. The technology index illustrates the achievability of the demonstrated technology at farmers' fields and 20 to 51 percentages (Table 3) for varieties, respectively. However, the average value of technology indexes were estimated 32 percentages under nutrient management and 16 percentages under improved varieties of blackgram in both the years.

Conclusion

Very few farmers had the knowledge of improved practices of pulse cultivation. The farmers need to be made well aware about the improved package of practices including high yielding varieties. The maximum increase in productivity was recorded in 100% RDF of NPK + 25 kg per ha Sulphur, though it was comparable with the blackgram (Urdbeen) productivity only through recommended dose of NPK. Pant Urd 35 and Pant Urd 31 were found better in term of blackgram productivity against local check T9. The technology index illustrates the achievability of the demonstration technology at farmers' field. More will scope of the technology demonstrated in yield enhancement with lower value of technology index. The average value of technology indexes were estimated 52 percentages under nutrient management and 32 percentages under improved varieties of blackgram (Urdbeen) in both the Kharif season 2010 & 2011. The technology index displays the likelihood of technology demonstrated which result in blackgram productivity enhancement through technological intervention made to lessen the yield gap in blackgram (Urdbeen).

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Disaster management –An overview of people's perception

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Abstract

The eastern part of Odisha is vulnerable to disasters like flood and cyclone causing huge loss to the people. A study was undertaken with 80 affected people from 10 villages of 5 Gram Panchayats for altering their perception to disaster management. It has been observed that the people of the area should inform the details of information sufficiently ahead of the flood and cyclone. People must be made conscious about preserving safe drinking water, usable assets, materials for temporary shed and essential medicines. The government functionaries have to strengthen in selecting safety place for rehabilitation, stocking essential medicines and adequate arrangements for rescue and shifting of affected people immediately. Immediate action need to be taken for restoration of transport and communication system with all sanitation measures. People must be trained to develop their capability towards preparedness and mitigation measures.

Keywords: Disaster, Management, People, Flood, Cyclone

Introduction

India is the seventh largest country in the World and highly prone to disasters. The country is susceptible to all types of disasters i.e. earthquakes, drought, flood, cyclone, sunami, landslides, desertification etc. In India, 70 percent area is drought prone, 60% earthquake, 12% flood and 8% cyclone prone area. Disasters usually play with the lives of millions of people. The huge loss occurred by disaster had shaken our concern about disaster. The eastern part of Odisha is vulnerable to floods and cyclones and these are the natural phenomena occurring at regular interval. The perception and impacts of disasters experienced by the people over the years indeed help them for gaining increased predictive power for which people can take management strategies to break the cycle of disasters and its damage, reconstruction and repeated damage. On the basis of the above facts, an attempt has been made to assess the efficiency of the affected people in managing disasters.

Materials and methods

The study was undertaken in Pattamundai block of Kendrapara district in Odisha vulnerable to flood and cyclone. Eight farmers each from 10 villages of 5 Gram panchayats were selected randomly as the respondents for the study making total sample size of 80. Information was collected personally through a semi-structured schedule pre-tested earlier. Collected data were put in to statistical analysis to reveal the results.

Results and Discussion

People of Pattamundai block are usually affected by flood and cyclone and habituated with the disaster. Opinion of the respondents about the systems of occurrence of disaster revealed from Table-1 that majority of the respondents had stated that high depression (73.50%), continuous heavy rain (71.25%) and cloudy weather(67.50% were the systems for the occurrence of disaster always. Good percentage of respondents also stated about the occurrence of disaster by visualizing ITK which they experienced. It is therefore stated that the respondents had good experience about the climatological systems for occurrence of flood and cyclone.

Information is transmitted through different media to appraise people about the occurrence of disaster and taking precautionary measures. It is observed from Table-2 that majority of the respondents had stated that they are always getting information on the occurrence of disasters from electronic media like television and radio (51.25%), friends and relatives (62.50%). Similarly, 52.50% of the respondents stated for getting information sometimes from local leaders about occurrence of disaster. Though mixed responses were obtained on print media like news papers, bulletins etc. but the mean score value indicated as the important source. Voluntary organizations also taking active part in disaster management but 62.50% of the respondents were never getting information about the occurrence of disaster. The findings therefore reveal that the respondents are not getting information always from any of the source as mentioned in the table, but friends and relatives followed by electronic and print media

Table 1: System of occurrence of flood and cyclone

S.No.	System	Always(%)	Sometimes(%)	Never (%)	Mean score	Gap(%)
1.	Cloudy weather	67.50	32.50	0.00	2.68	10.67
2.	Continuous heavy rain	71.25	28.75	0.00	2.71	9.67
3.	High depression	73.50	26.50	0.00	2.74	8.67
4.	Visualizing ITK	42.50	32.50	25.00	2.18	27.33

Table 2: Source of information about occurrence of flood and cyclone

S.No.	System	Always(%)	Sometimes(%)	Never (%)	Mean score	Gap(%)
1.	Print media	46.25	41.25	12.50	2.34	22.00
2.	Electronic media	51.25	38.75	10.00	2.41	19.67
3.	Public relation department	42.50	32.50	25.00	2.18	27.33
4.	Local Leaders	27.50	52.50	20.00	2.08	30.67
5.	Friends and relatives	62.50	22.50	15.00	2.48	17.33
6.	Voluntary Organizations	10.00	27.50	62.50	1.40	53.33

were the better source of information about occurrence of disasters.

The people of the affected area should get the information sufficiently ahead of the occurrence of the disaster so that they can take precautionary measures for preparedness and mitigation. As observed from Table-3, majority of 68.75% had stated for getting information only one day before of the occurrence of disaster. Unless the affected people receive information sufficiently ahead, they cannot get sufficient time for taking preparatory and mitigation measures as one day is not adequate enough for taking precautionary measures.

Table 3: Time of getting information on flood and cyclone

S.No.	Time of occurrence	Frequency	Percentage
1.	One day before	55	68.75
2.	Two days before	16	20.00
3.	Three days before	9	11.25

Sufficient information about the occurrence of floods and cyclones need to be transmitted to the people to take preparatory measures by assessing its intensity. Opinion of the respondents reveal that (Table-4) majority of the respondents strongly agreed for not giving sufficient information and insufficient attempt for ensuring food security(60.00%), insufficient planning for rehabilitation(58.75%) and information not received by all the people(55.00%). Similarly, majority of the respondents also agreed for other aspects as mentioned in the table. It is therefore suggested that, the stakeholders involved in disaster management should analyze all these aspects and take appropriate measures for better warning system about occurrence of flood and cyclone.

Precautionary measures are always advisable for the management of disasters particularly flood and cyclone. Each affected family should have taken adequate precautionary measures for mitigation of the disasters. The data in (Table-5) reveal that majority of the respondents were always taking precautionary measures on safe storage of food grain(66.25%), collection and storing of cattle feed(57.50%), safe storage of valuable assets (56.25%), temporary shifting of domestic animals (53.76%) which are essential. Majority of the respondents were taking also precautionary measures sometimes on preserving ready to eat food materials (53.75%), preservation of safe drinking waters (55.00%) and safe storage of usable materials (58.75%). Mixed responses were obtained on collection of materials for temporary shed, collection of fuel for cooking food and collection of common medicines for health and hygienic purpose which are equally important. Taking mean score value and percentage of gap, it is suggested that the organizations working in the area have to convince the affected people for preserving safe drinking water, safe storage of usable materials, collection of materials for temporary shed and collection of common medicines for health and hygienic purpose as precautionary measures against flood and cyclone in addition to other measures taken by them.

Odisha State Disaster Management Agencies are working for both pre and post disaster management activities. Precautionary measures taken by the govt. reveal that (Table-6) majority of 58.75% of the respondents had stated for stocking food materials for people and domestic animals. Mixed responses were obtained on other aspects as mentioned in the table. Considering mean score value and gap percentage, it

Table 4: Extent of information on occurrence of flood and cyclone

S.No.	Information	Strongly agree (%)	Agree (%)	Disagree (%)	MeanScore	Gap (%)
1.	Sufficient information not given	60.00	36.25	3.75	2.56	14.67
2.	Not covering all the people	55.00	45.00	0.00	2.55	15.00
3.	No information about alternative measures	27.50	58.75	13.75	2.14	28.67
4.	Casual approach	30.00	52.50	17.50	2.13	29.00
5.	Insufficient planning for rehabilitation	58.75	30.00	11.25	2.48	17.33
6.	Insufficient attempt for ensuring food security	60.00	30.00	15.00	2.40	20.00

Table 5: Precautionary measures taken by the people.

S.No.	Measure	Always (%)	Sometimes (%)	Never (%)	Mean score	Gap (%)
1.	Safe strong of food grains	66.25	33.75	2.50	2.61	13.00
2.	Preserving ready to eat food materials	41.25	53.75	5.00	2.36	21.33
3.	Collection and storing of cattle feed	57.50	33.75	8.75	2.49	17.00
4.	Preservation of safe drinking water	27.50	55.00	17.50	2.10	30.00
5.	Safe storage of valuable usable materials.	13.75	58.75	35.00	1.94	35.33
6.	Safe storage of valuable assets.	56.25	41.25	2.50	2.54	15.33
7.	Temporary shifting of domestic animals	53.75	25.00	21.25	2.33	22.33
8.	Collection of materials for temporary shed	15.00	45.00	40.00	1.75	41.67
9.	Collection of fuel for cooking food	43.75	41.25	15.00	2.29	23.67
10.	Collection of common medicines	10.00	55.00	35.00	1.75	41.67

Table 6: Precautionary measures taken by Government.

S.No.	Measure	Always (%)	Sometimes (%)	Never (%)	Mean score	Gap (%)
1.	Safety place for rehabilitation	30.00	27.50	42.50	1.88	37.33
2.	Stocking food materials for people land domestic	58.75	30.00	11.25	2.48	17.33
3.	Stocking essential medicines	26.25	40.00	33.75	1.93	35.67
4.	Stocking material for temporary shed	30.00	38.75	31.25	1.99	33.67
5.	Arrangement for rescue	42.50	37.50	20.00	2.23	25.67
6.	Arrangement for health care	27.50	35.00	37.50	1.90	36.67

is suggested that the State Govt. should think favourably for stocking essential medicines both for people and domestic animals, arrangement for physicians for health care of people and domestic animals during disasters on immediately after disaster, stocking materials for temporary shed along with safety place for rehabilitation and well arrangements for temporary shifting before disaster as well as rescue operations during disaster.

Post disaster management is also essentially required for renovation and restoration of essential assets. It is reaction of the people towards post disaster management approaches taken by the State Govt. functionaries. It is observed from Table-7 that mixed responses were obtained towards various post disaster management approaches except vaccination to people and animals where 50.00% of the respondents opined favourably. As significant percentage of gap observed, it is suggested that the state govt. need to further strengthen the approaches such as adequate supply of food materials, immediate restoration of transport and communication system, hygienic and sanitation measures and temporary shed for rehabilitation in the village to safe guard the assets of the people immediately after occurrence of flood and cyclone.

Socio-economic variables of the people many a times influence in increasing disaster management efficiency. It is observed from Table-8 that education, social participation, sources of information and annual family income influence the capabilities of the respondents in management of disasters. It is therefore suggested that timely and adequate information about occurrence of disasters, capacity building of the people on disaster management will definitely help the people

Table 7: Post disaster management support by Government

S.No.	Support	Always (%)	Sometimes (%)	Never (%)	Mean score	Gap (%)
1.	Vaccination to people and animals	50.00	37.50	12.50	2.38	20.67
2.	Adequate supply of food materials	43.75	45.00	11.25	2.33	22.33
3.	Immediate restoration of transport system	43.75	47.50	8.75	2.35	21.67
4.	Restoration of electricity and telephones	31.25	43.50	25.00	2.06	31.33
5.	Temporary shed for rehabilitation in the village	32.50	45.00	22.50	2.10	30.00
6.	Hygiene and sanitation measure	30.00	45.00	25.00	2.05	31.67

Table 8: Influence of Socio-economic variables on disaster management

S. No.	Variable	'r' value	't' value
1.	Age	0.180	1.616
2.	Education	0.381	3.632**
3.	Holding size	0.138	1.230
4.	Social participation	0.237	2.154*
5.	Sources of information	0.249	2.271*
6.	Annual family income	0.267	2.448*

**Significant at 0.01 level
*Significant at 0.05 level

in preparedness and mitigation of disasters.

The findings of the study conclude that, the people of the flood and cyclone affected area should inform the details of the disaster sufficiently ahead. The people must be made conscious towards preserving safe drinking water, usable assets, materials for temporary shed and common medicines in addition to other safety measures usually done by them. The govt. functionaries have to strengthen the precautionary measures towards selecting safety place for rehabilitation, stocking essential medicines and arrangements for health care to both people and domestic animals, stocking materials for temporary shed and adequate arrangements for rescue and shifting affected people immediately. Besides, immediate action to be taken for restoration of transport and communication system, temporary shed for rehabilitation in the village to safe guard the assets by the affected people and taking all hygienic and sanitation measures. The people may be trained to develop their capability towards preparedness and mitigation measures.

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Synergistic effect of chitosan and *Trichoderma viride* against *C. paradoxa*, the causal agent of pineapple disease in sugarcane

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Abstract

Pineapple disease is one the major disease in sugarcane. Normally chemical pesticides and fertilizers are used for controlling this disease but they have negative consequences on soil and plant in long run. In this disease we have tried to show that biological agents can be used successfully to reduce the effect of C.paradoxa *on sugarcane. We have used chitosan and* Trichoderma viride *against C.paradoxa, the causal agent of the pineapple disease in sugarcane. It was observed that chitosan and* Trichoderma viride *could control the growth of* C.paradoxa *up to 84%.*

Keywords- chitosan; *Trichoderma viride; C.paradoxa*; pineapple disease; potato dextrose agar

Introduction

Sugarcane is one of the most important commercial crops of the tropical and sub-tropical countries in the world. It contributes nearly 70% of the world's sugar production. Sugarcane is prone to more than 150 diseases caused by many fungal bacterial, viral, phytoplasma, nematode pathogens as well as abiotic factors right from planting to harvest. Since, sugarcane is vegetatively propagated (*i.e.,* through setts) and more than a yearlong crop, there are more chances of it being exposed to these pathogens. They are estimated to cause a loss of 10-25 per cent annually throughout the world, amounting to millions of loss of dollars (Mohan Raj *et al*, 2002). In India about 100 diseases of sugarcane have been reported so far. One of the disease affecting sugarcane production is the Pineapple Disease caused by *Ceratocystis paradoxa*. The disease was first reported from Java (Indonesia) by Went, who named it the Pineapple disease because the affected setts emit a smell resembling that of the mature pineapple fruit, which is due to ethyl acetate formed by metabolic activity of the pathogen. The disease has been reported to cause 15-20 per cent losses in sett germination and 10-15 tons losses per hectare in yield in India. The disease are both sett borne and soil borne affecting germination at early stages of planting and enters stalk pieces cut for seed through the cut ends of the seed pieces and can reduce cane yield by 31-35 %. Pineapple disease primarily affects sugarcane setts in the 2-3 weeks of sugarcane planting, fungus affects sugarcane planting mainly through the cut ends and from there spreads rapidly through the parenchyma, the parenchyma then breaks down and the interior of the setts become hollow and blackened. Setts affected by pineapple disease may decay before buds germinates or young shoots may die back shortly after emergence.

Pineapple disease can result in crops having a patchy, uneven appearance. When severe, the disease may seriously reduce the germination over large areas. *Ceratocystis paradoxa* occurs mainly in heavy textured soil and in poor drainage fields and it reduces the germination by 47% if left untreated. *C. paradoxa* is white in color in its early stages and later it turns to dark brown, it has round or oval spores... Bio-control of plant pathogen involves the use of biological processes to reduce the inoculums density of pathogen and to maintain their soil population below the disease threshold level. This reduces crop losses while interfering minimally with the ecosystem and damaging the environment. Bio-control measures are the best measure that can be taken to control pineapple disease of sugarcane. *Trichoderma* is a biological microorganism for controlling the soil borne plant pathogens and has been considered natural and environmentally acceptable alternative to the existing chemical treatment methods (Baker and Paulitz, 1996). The antagonistic activity of *Trichoderma* species against plant pathogen has been studied extensively (Sabalpara *et al*, 2009; Charati *et al*, 1998; Rangeshgwan and Prasad, 2000; Burns and Benson, 2000; Ushamalini *et al* 1997; Pandey and Upadhyay, 1999; Calistru, *et al*., 1997; Etabarian, 2006; Hjeliord, *et al*., 2001). *Trichoderma* inhibits the growth of other fungi by producing some antibiotics that penetrates into pathogen and release some enzymes that directly attack other fungi, thereby controlling disease. It is usually green or greenish brown in color. Chitosan have been

indicated for the preservation of foods juices and other material from microbial deterioration due their action against different groups of microorganisms, such as bacteria, fungi and yeast. Chitosan significantly affected both growth and toxin production at higher concentrations. In this study we have focused on observing the synergistic effect of Trichoderma and chitosan against *C.paradoxa*.

Methodology

Isolation of C. pardoxa

1. Diseased setts (pineapple) of sugarcane collected from various fields were brought to the laboratory and washed thoroughly in running tap water.
2. These diseased specimens were blot dried and cut with sharp sterilized blade into small bits (5mm) keeping half healthy and half diseased portion intact.
3. These pieces were surfaces sterilized with 0.1% aqueous solution of mercuric chloride ($HgCl_2$) for one minute and then washed by giving three changes with sterile distilled water to remove traces of mercuric chloride, it was then blot dried.
4. The surface sterilized diseased pieces were then inoculated on the solidified and cooled PDA (Potato dextrose Agar) medium in petri plates under aseptic conditions of Laminar-air-flow cabinet.
5. Inoculated plates were then incubated in BOD incubator at 28 ± 2^0C temperature. Seven to ten days after incubation, the well-developed mycelial growth free from any contaminant was obtained.
6. Following single hyphal-tip technique, the fungus was transformed/sub-cultured aseptically onto the PDA slant in test tubes.
7. Through frequent sub-culturing, the fungus was purified and pure culture was maintained on agar slants in test tubes stored in refrigerator for further studies.

Isolation of Trichoderma viride

For isolation of Trichoderma species soil samples were taken, sample I was diluted 10^5 times then 0.5ml of dilution was taken from each tube and was inoculated. All the plates were incubated for 5 days, after 5 days we checked for the pure culture, pure culture was again inoculated on PDA medium for better growth and purification.

Comparison of the growth of *C. paradoxa* on addition of chitosan, acetic acid and derivatives of chitosan in media

- PDA was prepared by adding 3.9gms of PDA and 1gm agar to 100ml of d/w
- Similarly PDA media with six different concentration of chitosan/acetic acid i.e. 5%,7.5%,10%,15%,20% and 25% were prepared, each having 3.9g of PDA,1g agar and 95ml,92.5ml,90ml,85ml,80ml,75ml of d/w respectively
- Each media was autoclaved for 15minutes at 121^0C
- Media was poured into petriplates, plates were kept for some time so that media may get solidify
- After solidification *C. paradoxaa* was inoculated on each plate
- Plates were kept for 7 days to record the observation.

Comparison of *Trichoderma* spp. and *C. paradoxa* on media with different concentration of chitosan or acetic acid

- 100ml PDA was prepared by adding 3.9gms of PDA and 1gm agar to 100ml of d/w
- Similarly PDA media with six different concentration of chitosan/acetic acid i.e. 5%,7.5%,10%,15%,20% and 25% were prepared, each having 3.9g of PDA,1g agar and 95ml,92.5ml,90ml,85ml,80ml,75ml of d/w respectively
- Each media was autoclaved for 15minutes at 127^0C
- Media was poured into petriplates, plates were kept for some time so that media may get solidify
- After solidification *C. paradoxa* and *Trichoderma* spp. were inoculated on each plate by cork borer method. They are inoculated on the opposite sides of the plate with 2mm gap from the edge
- Plates were kept for 7 days to record the observation

Results and Discussion

Present studies on the pineapple (*Ceratocystis paradoxa*) of sugarcane (*Saccharum officinarum*) were undertaken on the aspects *viz*., isolation, effect of chitosan, derivatives of chitosan and acetic acid and bio agents like *Trichoderma* spp. The results obtained on all these aspects are being presented in the following paragraphs.

Effect of different concentration of chitosan against Ceratocystis paradoxa

A total of six concentration of chitosan were used in the experiment. Results (Table 1) revealed that all the concentration of chitosan tested exhibited a varied range of radial mycelial growth of the test pathogen (PLATE I), depending upon their concentrations used and it was decreased with increase in concentrations of the chitosan tested.

The result (Table 1 and Fig. 1) indicated that the chitosan concentration of 25 ml/ ltr. of water significantly reduced the mycelium growth (MG) of 3rd and 7th day. The observed growth was 9.00 mm on 3rd day and 41.67 mm on 7th day, mean mycelium growth was 25.33 mm and control's growth was 88.33 mm and 90.00 mm on day three and seventh respectively. However, the highest per cent inhibition of mycelium growth was recorded for 25 ml/ ltr. of water (71.25 %).

Table 1: Effect of different chitosan concentration against *Ceratocystis paradoxa*

Treatment	Treatment Details	MG of 3rd days (mm)	MG of 7th days (mm)	Mean (mm)	% Inhibition of 3rd days	% Inhibition of 7th days	Mean (mm)
T-1	5 ml chitosan/ ltr. of water	86.00	90.00	88.00	2.75	0.00	1.37
T-2	7.5 ml chitosan/ ltr. of water	59.00	89.00	74.00	33.07	1.11	17.09
T-3	10 ml chitosan/ ltr. of water	52.00	89.00	70.50	41.07	1.11	21.09
T-4	15 ml chitosan/ ltr. of water	34.00	87.67	55.83	61.44	2.59	31.97
T-5	20 ml chitosan/ ltr. of water	24.67	77.00	50.83	72.09	12.22	42.15
T-6	25 ml chitosan/ ltr. of water	9.00	41.67	25.33	89.80	53.70	71.75
T-7	Control	88.33	90.00	89.16	0.00	0.00	0.00
	S.E. ±	2.52	2.15	-	2.20	1.83	-
	C.D. @ 5%	7.65	6.54	-	6.67	5.52	-

Table 2: Effect of different concentration of acetic acid against

Treat-ment	Treatment Details	MG of 3rd days (mm)	MG of 7th days (mm)	Mean (mm)	% Inhibition of 3rd days	% Inhibition of 7th days	Mean (mm)
T-1	5 ml AA / ltr. of water	46.33	65.00	55.66	17.08	27.78	22.43
T-2	7.5 ml AA/ ltr. of water	41.83	53.33	47.58	25.06	40.74	32.90
T-3	10 ml AA/ ltr. of water	35.00	49.67	42.33	37.67	44.81	41.24
T-4	15 ml AA/ ltr. of water	17.00	53.33	35.16	69.03	40.74	54.88
T-5	20 ml AA/ ltr. of water	8.67	33.33	21.00	84.30	62.96	73.63
T-6	25 ml AA/ ltr. of water	8.00	14.67	11.23	86.43	83.70	85.06
T-7	Control	61.33	90.00	75.66	0.00	0.00	0.00
	S.E. ±	5.04	3.14	-	8.62	2.18	-
	C.D. @ 5%	15.31	9.53	-	26.16	7.55	-

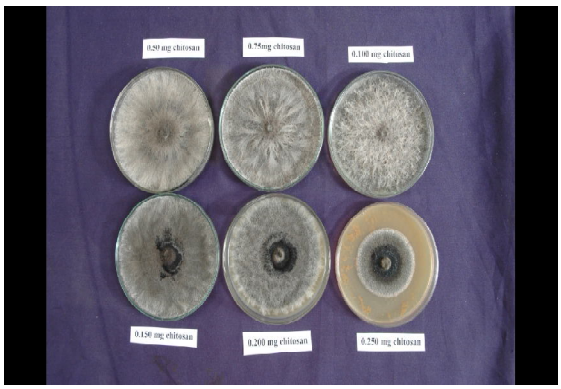


Fig. 1: Effect of chitosan against *C. paradoxa* after 7th days of inoculation

Effect of different concentration of acetic acid against C.paradoxa

A total of six concentration of acetic acid were used in the experiment. Results (Table 2) revealed that all the concentration of acetic acid tested exhibited a varied range of radial mycelial growth of the test pathogen (PLATE III), depending upon their concentrations used and the growth was decreased with increase in concentration of the acetic acid.

The result (Table 2 and Fig. 2) indicated that the acetic acid concentration of 25 ml/ ltr. of water significantly reduced the mycelium growth (MG) of 3rd days and 7th days i.e. 8.00 mm and 14.67 mm, also mean 11.23 mm and control 61.33 mm and 90.00 mm respectively. However, the highest per cent inhibition mycelium growth was recorded in 25 ml/ ltr. of water (85.06%). The synergistic effects (Table 4 and Fig. 4) of acetic acid and *Trichoderma* spp. against *C. Paradoxa* the lowest mycelium growth were recorded in treatment of 25 ml/ ltr. of water in 3rd and 7th days observation (9.00 mm and 15.00 mm) and control (50.33 mm and 89.33 mm respectively). However, the highest percent inhibition mycelium growth was recorded in 25 ml/ ltr. of water (83.63 %).

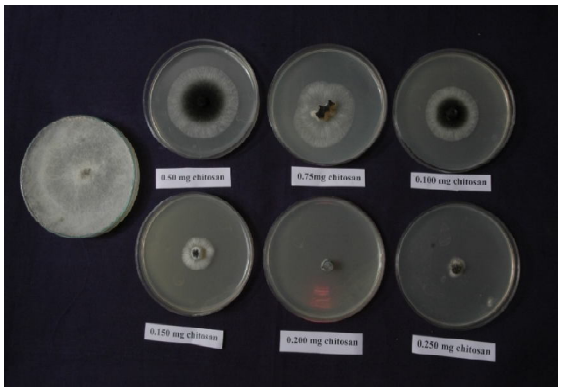


Fig. 2: Effect of acetic acid against *C. Paradoxa*

Table 3: Synergistic effects of chitosan and *Trichoderma* against against*Ceratocystisparadoxa*.

Treat-ment	Treatment Details	Mycelium Growth(mm)	%Inhibition of MG(mm)
T-1	5 ml chitosan/ ltr. of water	86.00	3.72
T-2	7.5 ml chitosan/ ltr. of water	85.33	4.49
T-3	10 ml chitosan/ ltr. of water	67.33	24.60
T-4	15 ml chitosan/ ltr. of water	54.00	39.56
T-5	20 ml chitosan/ ltr. of water	36.00	59.68
T-6	25 ml chitosan/ ltr. of water	14.00	84.34
T-7	Control	89.33	0.00
	S.E. ±	2.22	2.39
	C.D. @ 5%	6.75	7.26

Synergistic effect of chitosan and Trichoderma

Same procedure as given above was followed except acetic acid was replaced with chitosan and Trichoderma. Chitosan and Trichoderma were placed opposite to each other on a plate and it was observed that the synergistic effect was greater than the individual effects. 84.34 percent inhibition of mycelial growth was observed Table 3 and Fig. 3.

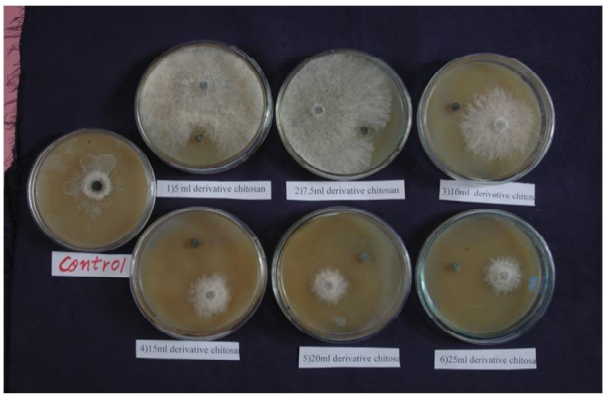


Fig. 3: Synergistic effect of chitosan and *Trichoderma* against *C. Paradoxa*

Synergistic effect of acetic acid and Trichoderma *against* C. paradoxa *7th day*

Pineapple disease is mainly controlled by chemical pesticides and fertilizers all around the world but these chemical pesticides and fertilizers have negative impact on soil, hence, nowadays focus has been shifted to biological control of the disease. For biological control, *Trichoderma* spp. is used by various scientists for the control of this disease. *Trichoderma* spp. is used in combination with *some* individual species of the soil fungi *viz Aspergillus awamori, A. niger, Gliocladium virens, Penicillium citrinum, Trichothecium sp, Trichoderma glaucum, T. harzianum.* It happens because *Trichoderma* does not allow other fungi to grow, it acts as a parasite on other fungus thereby checking their growth. The colony interactions between the pathogen and the soil fungi were assessed and it was found that biological agents control the growth of *C. paradoxa* up to significant levels, porter (1924) and Diekinson and Broadman (1971). The mycelium of *T. koeningii, Gliocladium virens and T. viride were* found growing over the pathogen. The antagonistic properties of different species of *Aspergillus, penicillium, Trichothecium* and *Trichoderma* against different pathogens have also been reported. In this study we have used 1% chitosan in combination with *Trichoderma viride, Trichoderma viride* grew over *C. paradoxaa*. Chitin and chitosan are naturally occurring compounds that have potential in agriculture with regard to controlling plant diseases. These molecules display toxicity and inhibit fungal growth and development. They have eliciting activities leading to variety of defence responses in plants. So in this study we have used chitosan in combination with *Trichoderma viride* against *C. paradoxa* and we found better inhibition of the growth of *C. paradoxa.* It was noted that *C. paradoxa* grew at a faster rate in absence of *Trichoderma* and chitosan. *C. paradoxa* in the presence of chitosan and in the absence of

Table 4: Synergistic effects of acetic acid against against*Ceratocystis paradoxa*

Treat-ment	Treatment Details	MG of 3rd days (mm)	MG of 7th days (mm)	Mean (mm)	% Inhibition of 3rd days	% Inhibition of 7th days	Mean (mm)
T-1	5 ml AA/ ltr. of water	36.67	43.33	40.00	51.43	26.29	38.86
T-2	7.5 ml AA/ ltr. of water	30.67	37.67	34.17	57.77	38.67	48.22
T-3	10 ml chitosan/ ltr. of water	21.67	33.33	27.50	62.66	56.49	59.57
T-4	15 ml AA/ ltr. of water	18.67	31.33	25.00	64.87	62.81	63.84
T-5	20 ml AA/ ltr. of water	12.33	22.00	17.16	75.35	75.52	75.43
T-6	25 ml AA/ ltr. of water	9.00	15.00	12.00	83.22	82.02	82.63
T-7	Control	50.33	89.33	69.83	0.00	0.00	0.00
	S.E. ±	1.63	2.43	-	1.75	2.48	-
	C.D. @ 5%	4.95	7.39	-	5.31	7.55	-

Trichoderma also grew at a moderate rate and covered most of the portion of a 90 mm plate. Plate with least concentration of chitosan i.e. 5ml showed maximum growth and minimum growth was observed in the plate with highest concentration of chitosan i.e. 25ml of chitosan. Growth of *C. paradoxaa* was least when both chitosan and *Trichoderma* acted against it. Least growth was seen when grown in higher concentration of chitosan in PDA along with *Trichoderma*. Even *Trichoderma* could not grow to its extent in higher concentration of chitosan i.e. 20 ml and 25 ml chitosan showed very less growth of *Trichoderma* and neglible growth of *C. paradoxa*. Thus for efficiently controlling the growth of *C. paradoxa* 20 to 25ml of chitosan and *Trichoderma* can be used (Table 4).

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Attitude of Urban and Rural Grandparents towards Girl Child in Bikaner District

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Abstract

A study was conducted in Bikaner panchayat samiti. For selection of samples, from each village or ward 20 male and 20 female would be parents were selected randomly. 5 male and 5 female parents and 5 male and 5 female grandparents were selected purposely to getting total sample size of 240. The study revealed that the household responsibilities are the primary roles of women and from the very beginning of the family to the international boundary women's decision making power has under recognized. In both urban and rural area attitude towards girl education is significantly associated with the respondents' education whereas in urban area attitude towards girls career was significantly associated with age and mass media exposure of respondents.

Key words: Panchayat samiti, mass media, respondents, urban and rural

Introduction

Birth of female child is perceived as a curse with economic and social liability. In each corner of India, girls face discrimination, they often receive less food than boys, have less access to schooling and unlike boys they are made to do long hours of labour beginning at a tender age. The reasons for the discrepancy include among other things, harmful attitude and practices, son preference, child marriages, discrimination against girls in food allocation and other practices related to health and well being. Girls are often treated as inferior and are socialized to put themselves last, thus undermining their self-esteem and it initiates a lifelong downward spiral of deprivation and exclusion from the social mainstream. Old-age security is an important motive for the preference for male children in many countries in the world, and the force of this bias can weaken if it becomes more common for women to take up.

Research Methodology

The present study was conducted in Bikaner district. Descriptive research design was used for conducting the present study, keeping in mind purpose of the study interview schedule (attitude scale) developed by Singh (2013) was used for data collection. There are income-receiving employment. Also, a general rising of the status and standing of women in social perception can have a significant impact on the way female children are viewed and treated. Keeping above in view the present paper has assessed the intergenerational attitude towards girl child in Bikaner district. The present study was designed with the following specific objectives:

Six panchayat samities in Bikaner district. Out of which one Panchayat Samiti viz., Kolayat Panchayat Samiti was selected randomly. One ward from each zone i.e. east and west zone of Bikaner city was selected .For this selection of rural respondents Kolayat Panchayat Samiti was selected randomly. Out of 229 villages of Kolayat Panchayat Samiti, two villages Chandasar and Kotra were also selected randomly by chit method. Thus, total two villages were selected for the present investigation.

For selection of urban respondents Bikaner city was selected. Bikaner city was divided into four zones like East, West, North and South. Two zones east and west was selected randomly. From selected zone one ward selected by chit method. Ward No. 52 from east zone and Ward No. 16 from west zone were included. Thus, two wards were selected from Bikaner city. For the selection of rural and urban respondents a comprehensive list of respondents was taken from anganwadi/help of ward member. From each village/ ward 20 male and 20 female would be parents selected randomly. In most of the families parents and grandparents live together in a family, so 5 male and 5 female parents and 5 male and 5 female grandparents were selected purposely from same families to get reliable information at a time, hence total sixty respondents from each village /ward were selected randomly by using chit method. Thus, total 240 respondents were selected for present investigation (120 rural and 120 urban respondents). Interview method was used to collect data from the respondents. For this rapport was first established by informal discussion with the respondents. Respondents were

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interviewed individually at their homes. After collection of the data from 240 respondents, coding was done and then data were compiled and tabulated for analysis and interpretation in light of the objectives of study.

Results and Discussion

Attitude of urban and rural grandparents towards girl child

Data presented in Table 1 depicts that majority of the grandparents had favourable attitude towards education (50.00% male and 55.00% female), health and nutrition (55.00% male and 60.00% female), personality development (60.00% male and 50.00% female) followed by unfavourable attitude. Regarding saving and deposit 70.00 per cent male and 65.00 per cent female respondents had favourable attitude. As far as attitude towards career, household responsibilities, social obligation, media exposure and sex preference was concerned majority of the female respondents had unfavourable attitude to favourable attitude. Similar, findings have also been reported by Ababa (2008) and Tenzim (2011), who found that household responsibilities are the primary roles of women and from the very beginning of the family to

Table 1: Distribution of grandparents on the basis of their attitude towards girl child (N = 40)

S. No.	Categories	Urban		Rural		Total	
		Male	Female	Male	Female	Male	Female
1.	Education						
	Unfavourable	2 (20.00)	3 (30.00)	3 (30.00)	5 (50.00)	5 (25.00)	8 (40.00)
	Favourable	5 (50.00)	6 (60.00)	5 (50.00)	5 (50.00)	10 (50.00)	11(55.00)
	Most favourable	3 (30.00)	1 (10.00)	2 (20.00)	0 (0.00)	5 (25.00)	1 (5.00)
2.	Career						
	Unfavourable	4 (40.00)	6 (60.00)	4 (40.00)	7 (70.00)	8 (40.00)	13 (65.00)
	Favourable	5 (50.00)	2 (20.00)	5 (50.00)	3 (30.00)	10 (50.00)	5 (25.00)
	Most favourable	1 (10.00)	2 (20.00)	1 (10.00)	0 (0.00)	2 (10.00)	2 (10.00)
3.	Household responsibilities						
	Unfavourable	3 (30.00)	5 (50.00)	7 (70.00)	8 (80.00)	10 (50.00)	13 (65.00)
	Favourable	7 (70.00)	4 (40.00)	1 (10.00)	2 (20.00)	8 (40.00)	6 (30.00)
	Most favourable	0 (0.00)	1 (10.00)	2 (20.00)	0 (0.00)	2 (10.00)	1 (5.00)
4.	Decision making						
	Unfavourable	5 (50.00)	4 (40.00)	5 (50.00)	5 (50.00)	10 (50.00)	9 (45.00)
	Favourable	4 (40.00)	4 (40.00)	4 (40.00)	5 (50.00)	8 (40.00)	9 (45.00)
	Most favourable	1 (10.00)	2 (20.00)	1 (10.00)	0 (0.00)	2 (10.00)	2 (10.00)
5.	Health and nutrition						
	Unfavourable	2 (20.00)	2 (20.00)	4 (40.00)	2 (20.00)	6 (30.00)	4 (20.00)
	Favourable	6 (60.00)	5 (50.00)	5 (50.00)	7 (70.00)	11 (55.00)	12 (60.00)
	Most favourable	2 (20.00)	3 (30.00)	1 (10.00)	1 (10.00)	3 (15.00)	4 (20.00)
6.	Personality development						
	Unfavourable	2 (20.00)	4 (40.00)	2 (20.00)	3 (30.00)	4 (20.00)	7 (35.00)
	Favourable	5 (50.00)	4 (40.00)	7 (70.00)	6 (60.00)	12 (60.00)	10 (50.00)
	Most favourable	3 (30.00)	2 (20.00)	1 (10.00)	1 (10.00)	4 (20.00)	3 (15.00)
7.	Social obligation						
	Unfavourable	3 (30.00)	4 (40.00)	6 (60.00)	8 (80.00)	9 (45.00)	12 (60.00)
	Favourable	7 (70.00)	5 (50.00)	4 (40.00)	2 (20.00)	11 (55.00)	7 (35.00)
	Most favourable	0 (0.00)	1 (10.00)	0 (0.00)	0 (0.00)	0 (0.00)	1 (5.00)
8.	Saving and deposit						
	Unfavourable	2 (20.00)	0 (0.00)	1 (10.00)	2 (20.00)	3 (15.00)	2 (10.00)
	Favourable	6 (60.00)	7 (70.00)	8 (80.00)	6 (60.00)	14 (70.00)	13 (65.00)
	Most favourable	2 (20.00)	3 (30.00)	1 (10.00)	2 (20.00)	3 (15.00)	5 (25.00)
9.	Media exposure						
	Unfavourable	4 (40.00)	4 (40.00)	7 (70.00)	6 (60.00)	11 (55.00)	10 (50.00)
	Favourable	4 (40.00)	5 (50.00)	2 (20.00)	3 (30.00)	6 (30.00)	8 (40.00)
	Most favourable	2 (20.00)	1 (10.00)	1 (10.00)	1 (10.00)	3 (15.00)	2 (10.00)
10.	Sex preference						
	Unfavourable	4 (40.00)	5 (50.00)	5 (50.00)	7 (70.00)	9 (45.00)	12 (60.00)
	Favourable	6 (60.00)	5 (50.00)	4 (40.00)	3 (30.00)	10 (50.00)	8 (40.00)
	Most favourable	0 (0.00)	0 (0.00)	1 (10.00)	0 (0.00)	1 (5.00)	0 (0.00)
11.	Mobility						
	Unfavourable	3 (30.00)	4 (40.00)	5 (50.00)	5 (50.00)	8 (40.00)	9 (45.00)
	Favourable	4 (40.00)	5 (50.00)	3 (50.00)	3 (30.00)	7 (35.00)	8 (40.00)
	Most favourable	3 (30.00)	1(10.00)	2 (20.00)	2 (20.00)	5 (25.00)	3 (15.00)

Table 2: Association of independent factors of the grandparents with attitude towards girl child

Particulars	Age	Education Respondents	Family Type	Mass Media	Family Income
		Urban			
Education	0.97	6.40*	0.36	0.97	0.36
Career	6.27*	1.41	3.35	6.27*	0.18
Household respondents	3.75	0.42	1.9	3.75	0.82
Decision making	2.1	0.02	0.95	2.1	0.97
Health & Nutrition	0.23	6.27*	1.28	0.23	3.73
Personality development	2.1	3.75	2.1	2.1	0.97
Social obligation	1.28	3.35	2.23	0.97	0.23
Saving deposit	6.27*	6.27*	7.62**	3.35	0.82
Media exposure	2.1	1.41	0.16	4.48*	2.1
Sex preference	3.74	1.6	0.74	3.75	0.42
Mobility	0.97	1.98	3.75	2.1	1.28
		Rural			
Education	3.35	5.80*	0.36	0.82	0.97
Career	1.28	0.21	0.24	0.18	0.97
Household respondents	0.21	2.41	0.03	2.41	0.23
Decision making	3.75	1.9	1.9	1.9	0.42
Health & Nutrition	0.97	0.36	5.80*	4.44*	0.18
Personality development	0.05	0.21	0.21	3.39	0.05
Social obligation	1.28	0.05	0.03	2.41	1.41
Saving deposit	0.23	0.03	2.41	3.6	0.63
Media exposure	6.27*	6.27*	0.97	3.35	2.1
Sex preference	3.35	2.41	0.18	1.41	0.02
Mobility	0.18	1.9	2.13	1.9	0.42

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

the international boundary women's decision making power has under recognized.

Association between the attitude of urban and rural grandparents with selected independent variables

Table 2 indicates that in both urban and rural area all the selected independent variables age, respondents' education, family type, family income and mass media exposure were not significantly associated with attitude towards household responsibility, decision making, personality development, social obligation, sex preference and mobility. The above findings are in line with the results of research conducted by Singh (2013), who reported that age, respondent education, family size and family income were not found significantly associated with household responsibilities, Personality Development, social obligation, sex preference and mobility.

In urban area grandparent's attitude towards saving and deposit was significantly associated with age, respondents' education and family type where as in rural area it was not associated because attitude of rural grandparents is not affected from experience with age, having good education and having nuclear or joint families.

It was further indicated that in rural area attitude towards media exposure was significantly associated with age and respondents education whereas in urban area media exposure was significantly associated with use of mass media by the respondents.

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Wardrobe of male teaching professionals

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Abstract

Clothing is one of the basic needs of human being. Clothing is one means of value expression used by individuals, families and society as a whole. Each individual develops a self concept based largely on interaction with other people. All through life, individuals choose clothing that will obtain a positive reaction from the other people. A study was conducted to know variety of clothing present in men's wardrobe. One hundred twenty male teaching staff member were selected as sample by stratified random sampling technique from four different colleges. A self structure questionnaire was used as tool for survey. All male's outfits divided into six categories i.e., casual, formal, winter, groom, night and sport wear category. The respondents selected were divided into below 40 years and above 40 years of age. The result revealed that all respondents had readymade garment in their wardrobe. Home made clothing articles included sweater, cardigan from winter, and pajama from night clothing. Respondents of both age groups had tailor made formal and groom clothing.

Keywords: Men's wear, Wardrobe, Classification of men's wear.

Introduction

There are three basic human needs, in which clothing is the most important one. In the traditional society very little emphasis was laid on clothing aspect. The people in the past were not personality conscious and used to wear clothes to protect the body against the natural climatic extremities like cold, rain and heat etc.

Clothing is one means of value expression used by individuals, families and society as a whole. The person adopts those values approved by the larger society and transmits them to the child through the socialization process.

The consumption of textiles in any country is largely determined by the culture or mode of living. The needs that people will depend upon their point of view, attitude and general way of living. Changing life style, technological developments in textiles and international trade has brought about change in the clothing preferences of today's consumers. Factors such as age, sex, occupation and economic level determine the standards in dress for an individual at any given in the life cycle.

Keeping in view above points in the mind the present study was conducted to know garment prevailing in men's (male teaching professionals) wardrobe of different age group.

Methodology

One hundred and twenty male teaching staff member of G.B. Pant University of Agriculture and Technology, Pantnagar, Uttarakhand were selected as respondents for the present study. Stratified random sampling technique was followed for selection of the sample. Thirty staff members selected from each college of Agriculture, Veterinary and Animal Science, Basic Science and Humanities (CBSH) and Technology. Among one twenty respondents, fifty per cent were below the age of forty and fifty per cent were above forty years of age.

Survey method was used for data collection and a self structure questionnaire was used as a tool. The respondents were personally contacted at their places and were explained the purpose of the study to get the accurate information.

Questionnaire has two parts. Part A of questionnaire dealt with general information of the respondents including name, designation, age, education, family type and monthly income. Part B of questionnaire included specific information related to different types of garments they have, in this all male's outfits divided into six categories i.e., casual, formal, winter, groom, night and sport wear category. Each category had three column i.e., home made, tailor made, ready made garment. Questionnaire was pre-tested for checking the accuracy and adequacy of Questionnaire. After pre-testing, questionnaires were suitably modified and finalized to collect the desired information. Collected data analyzed by using frequency and percentage.

Results and Discussion

The information regarding general information is given in Table 1. The data reported in table shows the distribution of respondents according to their education, family type and monthly income. It is clear from table that maximum numbers of respondents were possessing doctorate degree in their specific fields irrespective of their age group. Only one respondent above 40 years of age had education up to Master's level.

It was found that more than 50 per cent of respondents had nuclear type of family irrespective of their age group. Twenty per cent of respondents below 40 years of age and 33.33 per cent respondents above 40 years of age had joint family. It is also clear from data in table that maximum (95%) number of below 40 years of age respondents had monthly income less than Rs. 50,000 while maximum (76.67%) number of respondents above 40 years of age had monthly income above Rs. 70,000 per month.

Table 1: Distribution of respondents according their general information N=120

S. No.	Variable	Age of respondent			
		Below 40 years		Above 40 years	
		Frequency	%	Frequency	%
1	Education				
	Masters	21	35	1	1.67
	Doctorate	39	65	59	98.33
2	Family Type				
	Nuclear	48	80	40	66.67
	Joint	12	20	20	33.33
3	Monthly Income				
	Below Rs. 50,000	57	95	10	16.67
	Rs. 50,000-70,000	2	3.33	4	6.67
	Above Rs. 70,000	1	1.67	46	76.67

Table 2, furnishes information regarding men's casual clothing present in the wardrobe. It is clear from data in table that maximum respondents below the age of 40 years possessed readymade T-shirts (90%) followed by jeans (81.67%) and (80%) tailor made shirts.

Majority of respondents above 40 years of age had readymade T-shirt (81.67 per cent), followed by readymade shirts (75%) and tailor made shirts (66.67 per cent), in their wardrobe. None of respondents had homemade and tailor made T- shirt in their wardrobe.

Data regarding distribution of respondents according to men's formal wear present in their wardrobe are given in Table 3. It is clear from the table that maximum number of users i.e., below 40 and above 40 years of age had 93.33 per cent and 81.67 per cent readymade formal trousers compared to 61.67 per cent and 73.3 per cent who had tailor made trousers respectively, in their wardrobe.

Majority of the respondents had tailor made suits and readymade blazers in their wardrobe irrespective of their age groups. Majority of respondents below 40 years of age had readymade shirts in their wardrobe and least number of respondents had tuxedos in their wardrobe. None of the respondents had homemade formal wear.

Table 4 furnishes information regarding distribution of respondent's according to winter clothing present in their wardrobe. It is clear from the table that sweater and cardigan were the two winter home made clothing present in the wardrobe of the both type of respondents. All the respondents had readymade sweaters irrespective of their age group in their wardrobe. Nearly fifty per cent of the respondents had both tailor made and readymade coats irrespective of their age groups.

Maximum respondents had readymade jackets present in their wardrobe followed by blazers irrespective of their age group. Tailor made sweater, cardigan, thermal wear, sweatshirts were not present in the wardrobe of both the group of respondent but they had readymade garment in above categories.

Table 2: Distribution of respondents according to men's casual clothing present in their wardrobe N = 120

S. No.	Garment	Type of casual wear/Age group							
		Tailor made				Readymade			
		Below 40years		Above 40Years		Below 40years		Above 40years	
		F	%	F	%	F	%	F	%
1	Shirts	48	80.00	40	66.67	40	66.67	45	75.00
2	Jeans	5	8.33	5	8.33	49	81.67	33	55
3	Bermuda shorts	0	0	1	1.67	35	58.33	16	26.67
4	T-shirts	0	0	0	0	54	90.00	49	81.67
5	Kurta Pyajama	24	40	33	55	20	33.33	28	47.67

Where: F= Frequency, % = Per cent

Table 3: Distribution of respondents according to men's formal wear present in their wardrobe N=120

S. No.	Garment	Type of Formal wear/Age group							
		Tailor made				Readymade			
		Below 40years		Above 40Years		Below 40years		Above 40years	
		F	%	F	%	F	%	F	%
1	Trousers	37	61.67	44	73.33	56	93.33	49	81.67
2	Suits	41	68.33	45	75	22	36.67	23	38.33
3	Blazers	4	6.67	10	16.67	40	66.67	31	51.67
4	Tuxedos	1	1.67	2	3.33	9	15	7	11.67
5	Shirts	40	66.67	38	63.33	54	90	47	78.33

Where: F=Frequency, %=Per cent

Table 4: Distribution of respondents according to men's winter clothing present in their wardrobe N=120

S. No.	Garment	Type of winter wear/Age group											
		Homemade				Tailor-made				Readymade			
		Below 40years		Above 40years		Below 40years		Above 40years		Below 40years		Above 40years	
		F	%	F	%	F	%	F	%	F	%	F	%
1	Sweater	24	40	27	45	0	0	0	0	60	100	60	100
2	Coat	0	0	0	0	29	4833	36	60	31	51.67	33	60
3	Overcoat	0	0	0	0	2	3.33	0	0	14	23.33	21	35
4	Waistcoat	0	0	0	0	3	5	2	3.33	9	15	7	11.67
5	Cardigan	2	3.33	5	8.33	0	0	0	0	16	26.67	17	28.33
6	Jacket	0	0	0	0	0	0	2	3.33	58	96.67	55	91.67
7	Blazers	0	0	0	0	4	6.67	6	10	43	71.67	35	58.33
8	Thermal wear	0	0	0	0	0	0	0	0	39	65	35	58.33
9	Sweatshirt	0	0	0	0	0	0	0	0	30	50	19	31.67
10	Achkan	0	0	0	0	0	0	1	1.67	0	0	0	0

Where: F=Frequency, %=Per cent

Table 5: Distribution of respondents according to men's groom wear clothing present in their wardrobe N=120

S. No.	Garment	Type of Groom wear/Age group							
		Tailor made				Readymade			
		Below 40years		Above 40Years		Below 40years		Above 40years	
		F	%	F	%	F	%	F	%
1	Kurta Pyajama	21	35	22	36.67	14	23.33	21	35
2	Wedding suit	36	60	23	38.33	17	28.33	25	41.67
3	Sherwani/ Achkan	13	21.67	9	15	18	30	5	8.33

Where: F=Frequency, % = Per cent

Distribution of respondents according to the grooms wear present in their wardrobe is given in Table 5. Respondents below 40 years of age had maximum (60%) tailored made wedding suits followed by tailored made kurta pyajama (35%), readymade sherwani 30 per cent and readymade wedding suit 28.33 per cent in their wardrobe. Respondents above 40 years of age had maximum readymade wedding suits (41.67%), followed by tailor made wedding suits (31.33%), tailor made kurta pyajama 36.67 per cent in their wardrobe. Maximum number of respondents above 40 years of age had tailor made sherwani (15%) in their wardrobe. Only one respondent above 40 years of age had achkan in his wardrobe as groom wear. None of the respondents had home made kurta pyajama, wedding suit and sherwani.

Result of the survey regarding Men's night wear present in the wardrobe of the respondents is reported

Table 6: Distribution of respondents according to men's night wear present in their wardrobe N=120

S. No.	Garment	Type of Night wear/Age group											
		Homemade				Tailor-made				Readymade			
		Below 40years		Above 40years		Below 40years		Above 40years		Below 40years		Above 40years	
		F	%	F	%	F	%	F	%	F	%	F	%
1	Pyajama	5	8.33	4	6.67	27	45	34	56.67	26	43.33	34	56.67
2	Night suit	0	0	0	0	8	13.33	10	16.67	39	65	37	61.67
3	Bermuda shorts	0	0	0	0	0	0	0	0	1	1.67	0	0
4	Track suit	0	0	0	0	0	0	0	0	1	1.67	0	0

Where: F = Frequency, % = Per cent

Table 7: Distribution of respondents according to men's sport wear present in their wardrobe N=120

S. No.	Garment	Type of Readymade sport wear/Age group			
		Below 40 years		Above 40 years	
		Frequency	Per cent	Frequency	Per cent
1	Track suit	57	95	49	81.67
2	Bicycle shorts	19	31.67	11	18.33
3	Jogging shorts	31	51.67	17	28.33
4	Polo shirt	18	30	6	10
5	Swimwear	15	25	9	15

in the Table 6. Only one respondent below 40 years of age had readymade bermuda short and track suit in his wardrobe. Maximum respondents above 40 years of age had both tailor made and readymade pyajamas in their wardrobe (56.67%) followed by respondents of below 40 years of age who had maximum tailor made pyajama (43.33%) and least (8.33%) home made pyajamas in their wardrobe. None of the respondents had home made night suit, bermuda shorts and track suit, tailor made burmuda short and track suit in their wardrobe.

Table 7 gives data regarding respondent according to men's sport wear in their wardrobe. Maximum number of respondents below 40 year of age had readymade track suit (95%) followed by jogging shorts (51.67%) in their wardrobe. Majority of respondent above 40 years of age had readymade track suit (81.67%) in their wardrobe. Maximum number below 40 years of respondents had polo shirts in their wardrobe as compared to above 40 years of age respondents. Both the categories of the respondents did not had homemade and tailor made sport wears. There is difference in number of respondents having tracksuit in their wardrobe may be due to the reason that above 40 years of age group respondents are less active and participate less in sports activities. They also told that they went for readymade garments as it difficult to get fabric of sports material in the market and get it stitched from the tailor as it requires different type of sewing machine which is not commonly seen in tailor shop.

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Availability and utilization of bank's credit on the farms in Etah district of U.P.

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Abstract

The present study was conducted in Etah district of U.P. The 225 borrowers of Canara Bank was selected from 8 selected villages. The number of cases in small, medium and large farm size groups came to 159, 44 and 22 respectively which were selected randomly. The data revealed that maximum number of cases availed crop loan for seed and fertilizer. The number of cases utilized crop loan came more in case of fertilizer followed by seed. The study also shows that term loan was maximum utilized for development of irrigation structure on the farms which is the bank need for agricultural development.

Key words: Crop loan, Production credit, Term Loan, Investment credit

Introduction

Increasing demand for agricultural credit in the context of new strategy and urgency for meeting it adequately, led to an important shift in agricultural credit policy viz., adoption of multi agency approach. Several credit agencies are in fray and have come in big way to help the farmers to adopt modern farm technology by extending them the required credit facilities. According to the latest Five Year Plan, there has been significant increase in institutionalizing the rural credit and over 30% of the borrowings by cultivators were from institutional sources. A substantial step up in the institutional credit will be necessary as the programmes of intensive agriculture, involving use of costly materials and labour inputs will require massive credit support. There has been a increase in the requirement of credit in agriculture for enhancing the agriculture production which is essential to meet the food requirement of increasing population both for production credit as well as investment credit. Thus there is a need to finance agriculture by institutional agencies. After nationalization, the banks are financing agriculture in vigorous ways. Therefore, the present study was conducted to know the availability and utilization of credit from the banks on the farms.

Methodology

The present study was confined to Etah district of U.P. out of 8 blocks, four blocks named Awagarh, Nidholi Kalan, Shitalpur and Sakit were covered under the study. Out of four blocks, two villages in each were selected for the present study. The list of the borrowers of Canara Bank which is the lead bank of the district was prepared for each selected village; the whole number of borrowers was divided in to their farm size groups. The total numbers of borrowers in each farm size group was 225 i.e. 159 in small, 44 in medium, and 25 in large farm size group were selected for the present study. The data were collected by personal interview method for the year 2009-10.

Results and Discussion

The table 1 shows the number of cases and amount of crop loan availed from the bank. The table shows that out of 225 cases under study, 181 cases availed crop loan. The number of such cases in different farm size groups came to 124, 39 and 18 in

Table 1: Amount of crop loan availed by the respondents (borrowers) under different farm size group

S. No.	Group of loan availed	Small		Medium		Large		Total	
		No.	%	No.	%	No.	%	No.	%
1.	No. of respondents availed loan upto Rs 25000/-	66	53.23	13	33.33	6	33.33	85	46.46
2.	No. of respondents availed loan Rs25000 to 50000/-	30	24.19	10	25.64	5	27.78	45	24.86
3.	No. of respondents availed loan Rs.50000 to 75000/-	28	22.58	10	25.14	4	22.22	42	23.21
4.	No. of respondents availed loan above Rs 75000/-	-	-	6	15.39	3	16.67	9	4.97
	Over all	124	100.00	39	100.00	18	100.00	181	100.00

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Table 2: Showing the number of respondents utilized crop loan for different purposes under different farm size group

S. No.	Utilization of crop loan	Small		Medium		Large		Total	
		No.	%	No.	%	No.	%	No.	%
1.	No. of cases availed crop loan	124	68.51	39	21.55	18	9.94	181	100.0
2.	No. of respondents utilized loan for seed	100	45.45	20	41.67	12	44.44	132	44.75
3.	No. of respondents utilized loan for fertilizer	20	54.55	28	58.33	15	55.56	163	55.25
4.	Total	220	100.0	48	100.0	27	100.0	295	100.0
5.	No. of respondents utilized loan for more than one purpose	96	77.42	9	23.08	9	50.00	114	62.00

Table 3: Showing number of respondents availed term loan for different purposes under different farm size group

S. No.	Term loan availed for different purposes	Small		Medium		Large		Total	
		No.	%	No.	%	No.	%	No.	%
1.	No. of respondents availed loan for Tubewell/Pump set	50	92.59	9	75.00	4	57.14	63	86.30
2.	No. of respondents availed loan for Tractor/other imlements	4	7.41	3	25.00	3	42.86	10	13.70
3.	Total No. of respondents	54	73.97	12	16.44	7	9.59	73	100.00

Table 4: Showing the extent of term loan availed by different number of respondents under different farm size group

S. No.	Group of loan availed	Small		Medium		Large		Total	
		No.	%	No.	%	No.	%	No.	%
1.	No. of respondents availed loan upto Rs 50000/-	25	46.30	4	33.33	1	14.29	30	41.10
2.	No. of respondents availed loan Rs75000 to 100000/-	20	37.03	3	25.00	2	28.57	25	34.25
3.	No. of respondents availed loan Rs100000 to 200000/-	5	9.26	2	16.67	1	14.29	8	10.95
4.	No. of respondents availed loan Rs200000 to 400000/-	4	7.41	3	25.00	3	42.86	10	13.70
	Total No.of respondents	54	100.00	12	100.00	7	100.00	73	100.00

small, medium and large farm size groups, respectively. The table further reveals that overall 85 farmers availed loan upto 25000 rupees, 45 farmers availed loan more than 25000 to 50000 rupees, 42 farmers availed loan more than Rs 50000 to 75000 and only 9 farmers availed loan more than 75000 rupees. It indicates that with increase in loan amount the number of cases availed loan decreases.

The Table 2 shows that overall 163 (55.25 per cent) farmers utilized crop loan for fertilizer purpose and 132 cases (44.75 per cent) utilized loan for seed only while the 114 cases (62.96 per cent) utilized loan for seed as well for fertilizer purposes. The table indicates that maximum number of farmers utilized loan for fertilizer purpose followed by seed purpose. Thus seed and fertilizer both essential inputs for raising the production on the farms.

The Table 3 shows that out of 73 cases availed term loan, 54 cases were in small farm size, 12 cases were in medium size and 7 cases were in large farm size group. The table further reveals that 63 cases availed loan for tubewell/pumpset and 10 cases availed loan for purchase of tractor and other implement of irrigation structure on the farms. Since the irrigation is the backbone of agriculture.

Table 4 reveals that the total number of cases availed term loan came to 73, out of which 54 cases were in small farm size, 12 cases were in medium size and 7 cases were in large farm size group. The overall number of cases availed term loan upto Rs 50000 came to 30 (41.10%), the number of cases availed loan Rs 50000 to Rs 100000 came to 25 (34.25%), the number of cases availed loan Rs. 100000 to Rs 200000 came to 8 (10.95%) and number of cases availed loan Rs 200000 to Rs 400000 came to 10 (13.70%). It indicate that maximum number of cases availed loan upto Rs. 50000 in all farm size groups. Out of 73 cases availed loan upto Rs. 400000.

The Table 5 shows that overall 63 cases utilized loan for development of irrigation struture i.e. installation

Table 5: Showing the nature of assets formed trough term loan utilization by the respondents under different farm size groups

S. No.	Size of holding	Assets formed by the respondents		Total
		Tubewell/Pump set	Tractor/Other implements	
1.	Small	50 (92.59)	4 (7.41)	54 (100.00)
2.	Medium	9 (75.00)	3 (25.00)	12 (100.00)
3.	Large	4 (57.14)	3 (42.86)	7 (100.00)
Over all		63 (80.30)	10 (13.70)	73 (100.00)

Note: Figures in parentheses inicate percentage

of tubewell and purchase of pumpset while 10 cases utilized the loan for purchase of tractor. The table further reveals that maximum percentage i.e. 92.59, 75.00 and 57.14 per cent farmers developed their irrigation structure in small, medium and large farm size groups, respectively. The percentage of farmers utilized term laon for tractor came to 7.41, 25.00 and 42.86 per cent respectively on small, medium and large farm size groups.

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Attitude of selected respondents towards smokeless chullta

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Abstract

Energy used for cooking accounts for over 70 per cent of the total energy consumption of the agricultural sector in India. Biomass fuel form such as wood. Crop residues and dry animal dung have traditionally been used for cooking and heating. by burning them in either open or shielded cooking devices to produce heat energy. Fixcessive depletion of biomass energy resources has resulted in several ill-consequences including acute shortage of cooking fuel in several parts of the country. During the last few decades, there has been a growing necessity for consuming biomass fuel, by increasing the heat utilization efficiency of the cooking devices in which they are burnt.

Key words : Attitude, Biomass, Cooking devices, Crop residues

Introduction

More than 90 per cent of the total household energy in rural areas is consumed in the kitchen (Pathak and Salariya, 1980). The traditional methods of cooking, traditional designs of chulhas and inefficient burning of available fuel have aggravated the problem of fuel shortage. Traditional method of cooking involving burning of fuel in open tire is very inefficient since only 5 to 10 per cent of the potential energy in the fuel wood is utilized in the cooking process. The problem of scarcity of fuel can be overcome to some extent by installing improved cook stoves in the houses of rural fanilies. These cook stoves have higher efficiency (15 to 25 per cent) and make the cooking area smoke free and clean.

Methodology

The study was conducted in Kanpur district. Two blocks namely Kalyanpur and Sarsaul %%,:re randomly selected. Ten villages were randomly selected from each block. 100 respondents were selected in this study. Dependent and independent variables were used such as age, education, caste attitude, adoption etc. The statistical tools were used such as mean percentage etc.

Results and Discussion

It means that women when become middle aged. they generally get involved in work be it of household or of out side. Women of this group effectively engaged themselves in income generating work so that they can supplement family income (Table 1).

Seventy foue per cent women respondents were used smokeless chulha, while 22.0 per cent respondents were used traditional chulha. Maximum

Table 1 Age-wise distribution of respondents

Age-group	Frequency	Per cent
20-30	10	10.0
30-40	56	56.0
40-50	24	24.0
50 & abov	10	10.0
Total	100	100.0

Table 2: Distribution of respondents according to use type of chulha

Type of Chulha	Frequency	Per cent
Smokeless chulha	74	74.0
Traditional chulha	22	22.0
Gas stove	4	4.0
Total	100	100.0

Table 3: Distribution of respondents according to use type of chulha

CSA chulha	Frequency	Per cent
Mohani	27	36.49
Sohani	21	28.37
Udai	20	27.03
Priya Agni	6	8.12
Total	74	100.00

4.0 per cent women respondents were used gas stove chulha (Table 2).

The Table 3 indicate that 36.49 per cent women respondents were used Mohini CSA chulha and 28.37 per cent respondents were used Soltini CSA chulha. 27.03 per cent women respondents were used Uday CSA chulha and minimum 8.12 per cent respondents were used Priya Agni CSA chulha (smokeless).

Table 4: Distribution of women respondents according to view about smokeless chulha

About smokeless chulha	Frequency	Per cent
Very good	44	44.0
Good	27	27.0
Comfortable	29	29.0
Uncomfortable	-	-
Total	100	100.0

Table 4 indicate that Forty four per cent women respondents were given very good opinion about smokeless chulha and 29.0 per cent respondents were given comfortable opinion about smokeless chulha.

Conclusion

So. it is imperative that these traditional chulhas be replaced by more fuel efficient devices with a view to conserve fuel wood. improve health and hygienic conditions reduce drudgery of women and improve overall quality of life and lead to "a better and happier" life.

Recommendation

1. Motivational and persuasive campaign should be organized in order to create awareness among rural masses about smokeless chulha technology.
2. The fuel problem can be solved in use of different types of smokeless chulha. The use of smokeless chulha will be solving to some extent the energy crisis.

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Assessment of Knowledge level of the sugarcane growers

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Abstract

The present study was conducted in Bijnore and Meerut district of western Uttar Pradesh during the year 2007-08. To know the knowledge level of the sugarcane growers, the study reveals that most of the sugarcane growers were having good knowledge with respect to land preparation practices for sugarcane cultivation. Most of the marginal, small and big farmers were having fair knowledge, while medium farmers had good knowledge about high yielding verities of sugarcane. All categories of the farmers were having good knowledge about time of showing of sugarcane crop besides marginal farmers. About methods of showing plant spacing in sugarcane all categories farmers were having good knowledge. Knowledge about use of fertilizers & manure all categories farmers were having good knowledge besides medium farmers. All categories farmers were having good knowledge about methods of fertilizers application sugarcane crop. Knowledge about number of ir4rigation in sugarcane crop marginal & small farmers were having poor & fair knowledge and medium & big farmers have good knowledge. In case of intercultural operation marginal, small farmers were having poor knowledge and medium, big farmers had good knowledge. Maximum medium and big farmers were having good knowledge about use of plant protection measures in sugarcane crop, while marginal and small farmers had poor knowledge about it.

Key words : Sugarcane growers and their knowledge

Introduction

Sugarcane is an important cash crop of India as well as of the World which is reflected with its cultivation in about 77 Countries World over, India is the largest producer of sugarcane after brazil. The production of sugarcane 273.39 million tones during the year 2009-10 with an area of 4.4 million hectare and leading state of India is Uttar Pradesh. Uttar Pradesh which has the largest area under sugarcane, had an increase of about 18% last one decade. These are the facts which indicate that given the price attraction, the growers in the south where yield levels are also high, would go a long way to take up this crop, compared to sub-tropical belt, in spite of higher prices, there has been not much increase in the area. Keeping in view our aim to assessment of knowledge level of the sugarcane growers.

Research Methodology

For this study two districts namely Bijnore and Meerut were selected purposively. From each district two blocks were selected randomly. The total four blocks were considered for the study and two villages were purposively selected from each block, than thirty respondents from each village were selected purposively. Thus the total sample size was of 240 respondents for the investigation. The data were analyzed, tabulated and find out the percentage.

Results and discussion

Here deals with knowledge level of sugarcane practices in respect to improved sugarcane farm practices that exist among marginal, small, medium and big farmers. It is depicted from table 1, that the maximum 65.15 percent marginal farmers were having good knowledge, while 1970 and 15.75% marginal farmers were have fair and poor knowledge about land preparation practice for sugarcane cultivation, respectively. In case of small farmers 70.42% were having good knowledge, followed by 16.90 and 12.68% respondents have fair and poor level of knowledge.

In case of medium farmers 72.58 percent respondents were having good knowledge, while 16.13 and 11.29% were having fair & poor knowledge. In case of big farmers a very high majority i.e. 82.93 percent have good knowledge in land preparation, while only 9.75 percent respondents having fair and 7.32% respondents had poor knowledge regarding land preparation practices. Thus it is clear from the above table that most of the farmers of all categories were having good knowledge about land preparation.

As regards the awareness about high yielding variety, a majority of the respondent 53.03 percent

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Table 1: Level of knowledge of farmers about land preparation

Level of knowledge	Knowledge score	Marginal Farmers (66) No.	Percent	Small farmers (71) No.	Percent	Medium farmers (62) No.	Percent	Big farmers (41) No.	Percent
Poor	1-3	10	15.75	9	12.68	7	11.29	3	7.32
Fair	3-6	13	19.70	12	16.90	10	16.13	4	9.75
Good	7-10	43	65.15	50	70.42	45	72.58	34	82.93

Table 2: Level of knowledge of farmers about high yielding varieties

Level of knowledge	Knowledge score	Marginal Farmers (66) No.	Percent	Small farmers (71) No.	Percent	Medium farmers (62) No.	Percent	Big farmers (41) No.	Percent
Poor	0-4	18	27.27	23	32.39	20	32.26	11	7.32
Fair	4-8	35	53.03	32	45.07	18	29.03	18	63.41
Good	8-12	13	19.70	16	22.54	24	38.71	12	29.27

Table 3: Level of knowledge of farmers about time of sugarcane sowing

Level of knowledge	Knowledge score	Marginal Farmers (66) No.	Percent	Small farmers (71) No.	Percent	Medium farmers (62) No.	Percent	Big farmers (41) No.	Percent
Poor	1-2	18	27.27	15	21.13	9	14.52	4	9.76
Fair	3-4	27	40.91	20	28.17	15	24.19	7	17.07
Good	5-6	21	31.82	36	50.70	38	61.29	30	73.17

marginal farmers were having fair knowledge, while 27.27 percent and 19.70 percent marginal farmers have poor and good knowledge about high yielding verities of sugarcane crop respectively. Among small farmers 45.07 percent were having fair knowledge, followed by 32.39 percent poor & only 22.54% had good knowledge. In case of medium farmers 38.71 percent were having good, followed by 32.26 percent poor and 29.03 percent had fair knowledge. In case of big farmers maximum 63.41 percent were have fair knowledge, followed by 29.27% have good and the remaining 7.32% had poor knowledge in high yielding varieties. In overall most of the marginal, small and big farmers were having fair knowledge about high yielding of sugarcane, while medium farmers and good knowledge about high yielding of sugarcane (Table 2).

It is depicted from table-3, that the maximum 40.91 percent marginal farmers were having fair knowledge about time of sugarcane showing. While remaining 31.82 and 27.27 percent marginal farmers have good and poor level of knowledge about time of sugarcane sowing respectively. In case of small farmers mostly 50.70 percent were having good knowledge but 28.17 percent and 21.13 percent respondents have fair and poor level of knowledge. In case of medium farmers 61.29 percent respondents were having good knowledge, followed by 24.19 percent have fair and the remaining 14.52 percent farmers had poor knowledge regarding time of sugarcane sowing. In case of big farmers a very high majority i.e. 73.17 percent have good knowledge in time of sugarcane sowing. While only 17.07 percent respondents have fair and 9.76 percent had poor knowledge regarding time of sugarcane sowing.

Knowledge regarding method of sowing, it was found that maximum 48.49 percent marginal farmers were having good knowledge, 27.27 percent have poor and the remaining 24.24% had fair knowledge regarding 33.80, 16.90% have fair and poor knowledge respectively. Among medium farmers 53.22% were having good knowledge, followed by 32.26 percent fair and the remaining 14.52 percent had poor level of knowledge. In case of big farmers maximum 48.78 percent were having good knowledge the remaining and 39.02 percent, 12.20 percent found in fair and poor knowledge in the sugarcane cultivation (Table 4).

Among the different categories of the farmers, the level of knowledge about plant spacing in sugarcane cultivation was worked out. The findings indicates in (Table 5), the maximum 63.42 percent of big farmers were having good level of knowledge, while, 24.38 percent and 12.20 percent have fair and poor knowledge respectively. Among marginal farmers, a maximum of 43.94 percent were having good, followed by 33.33 percent fair and 22.73 percent had poor knowledge. In case of small farmers 52.11 percent were having good knowledge, followed by 29.58 percent have fair knowledge and the remaining 18.39

Table 4: Level of knowledge of farmers about method of sowing

Level of knowledge	Knowledge score	Marginal Farmers (66) No.	Percent	Small farmers (71) No.	Percent	Medium farmers (62) No.	Percent	Big farmers (41) No.	Percent
Poor	1-3	18	27.27	12	16.90	9	14.52	5	12.20
Fair	4-6	16	24.24	24	33.80	20	32.26	16	39.02
Good	6-8	32	48.49	35	49.30	35	53.22	20	48.78

Table 5: Level of knowledge of farmers about plant sapacing in sugarcane

Level of knowledge	Knowledge score	Marginal Farmers (66) No.	Percent	Small farmers (71) No.	Percent	Medium farmers (62) No.	Percent	Big farmers (41) No.	Percent
Poor	0-2	15	22.73	13	18.39	9	14.52	3	12.20
Fair	3-4	22	33.33	21	29.58	8	12.90	4	24.38
Good	5-6	29	43.94	37	52.11	45	75.58	34	63.42

Table 6: Level of knowledge of farmers about use of fertilizer and manure

Level of knowledge	Knowledge score	Marginal Farmers (66) No.	Percent	Small farmers (71) No.	Percent	Medium farmers (62) No.	Percent	Big farmers (41) No.	Percent
Poor	1-4	43	65.15	39	54.93	21	33.87	15	36.59
Fair	4-8	15	22.73	17	23.94	26	41.94	12	29.26
Good	8-12	09	13.64	15	21.13	15	24.19	14	34.15

percent had poor knowledge. In case of medium farmers 72.58 percent were having good knowledge, followed by 14.52 percent have poor knowledge and the remaining 12.90 percent had fair knowledge about the plant spacing in sugarcane cultivation.

As regard use of fertilizer and manure practice in sugarcane cultivation in concerned, among the marginal farmers 65.15 percent were having poor knowledge. In case of small farmers 54.93 percent were having poor knowledge about use of fertilizer & manure in sugarcane cultivation, followed by 23.94 were having fair knowledge and the remaining 21.13 percent had good knowledge about use of fertilizer manure in sugarcane cultivation.

In case of medium farmers 41.94 percent were having fair knowledge, 33.87% poor and the remaining 24.19 percent had good knowledge. Among the big farmers 36.59% were having poor knowledge, followed by 34.14% have good knowledge and the remaining 29.26% had poor knowledge about use of fertilizer manure in sugarcane cultivation (Table 6).

The data presented in table 7, that the maximum 50.00 percent marginal farmers were having good knowledge, while remaining 30.30 percent and 19.70 percent have fair and poor knowledge about method of fertilizers application in Sugarcane crop respectively. In case of small farmers 78.42 percent were having good knowledge about methods of fertilizer application in sugarcane cultivation, followed by 15.49 percent have poor knowledge and the remaining 14.09 percent and fair knowledge regarding methods of fertilizer application in sugarcane cultivation.

In case of medium farmers 72.58 Percent were having good knowledge, but 17.74% and 9.68 percent respondents have fair and poor knowledge. In big farmers a very high majority i.e., 85.37 percent have good knowledge in method of fertilizers application, while only 9.76 percent have fair and 4.88 percent sugarcane have poor knowledge regarding method of fertilizer application in sugarcane cultivation. Thus, it is clear from the above table that majority of the big farmers were having good knowledge about method of fertilizers application in sugarcane cultivation.

The data presented in table 8, indicate that maximum 37.88 percent marginal farmers were having poor knowledge regard number of irrigation in sugarcane cultivation, followed by 33.33% have fair and the remaining 28.79% had good knowledge. In case of small farmers 35.22% were having fair knowledge. In poor & good knowledge found to have good knowledge about number of irrigation in sugarcane cultivation, followed by 19.51 and 12.20% found to have fair, poor knowledge respectively.

As regards the awareness about intercultural operation presented in table 9, reveals that the majority of respondents 45.45 percent marginal farmers having poor level of knowledge. While remaining 34.85 per cent and 19.70 per cent marginal farmers have fair

Table 7: Level of knowledge of farmers about methods of fertilizer application

Level of knowledge	Knowledge score	Marginal Farmers (66) No.	Percent	Small farmers (71) No.	Percent	Medium farmers (62) No.	Percent	Big farmers (41) No.	Percent
Poor	1-2	13	19.70	11	15.49	6	9.68	2	4.88
Fair	3-4	20	30.30	10	14.09	11	17.74	4	9.76
Good	5-6	33	50.00	50	78.42	45	72.58	35	85.37

Table 8: Level of knowledge of farmers about number of irrigation in sugarcane cultivation

Level of knowledge	Knowledge score	Marginal Farmers (66) No.	Percent	Small farmers (71) No.	Percent	Medium farmers (62) No.	Percent	Big farmers (41) No.	Percent
Poor	1-3	25	37.88	23	32.39	15	24.19	5	12.20
Fair	4-6	22	33.33	25	35.22	18	29.03	8	19.51
Good	7-9	19	28.79	23	32.39	29	46.78	28	68.29

Table 9: Level of knowledge of farmers about intercultural operation

Level of knowledge	Knowledge score	Marginal Farmers (66) No.	Percent	Small farmers (71) No.	Percent	Medium farmers (62) No.	Percent	Big farmers (41) No.	Percent
Poor	1-3	30	45.45	24	33.80	15	24.90	9	21.95
Fair	3-4	23	34.85	26	36.62	18	29.03	13	31.71
Good	5-6	13	19.70	21	29.58	29	46.78	19	46.34

Table 10: Level of knowledge of farmers about plant protection measures

Level of knowledge	Knowledge score	Marginal Farmers (66) No.	Percent	Small farmers (71) No.	Percent	Medium farmers (62) No.	Percent	Big farmers (41) No.	Percent
Poor	0-5	28	42.42	32	45.07	81	29.03	6	14.63
Fair	6-10	27	40.90	26	36.62	21	33.87	12	29.27
Good	10-15	11	16.68	13	18.31	23	37.10	23	56.10

and good knowledge about intercultural operation of sugarcane cultivation respectively. Among small farmers 36.62 per cent were having fair knowledge, followed by 33.80 per cent having poor and the remaining 29.58 per cent had good level of knowledge. In case of big farmers maximum 46.34 percent were having good knowledge followed by 31.71 percent have fair and the remaining 21.95 per cent poor knowledge about intercultural operation in sugarcane cultivation.

The data presented in table 10, reveals that 42.42% marginal farmers were having poor knowledge about plant protection measures, followed by 40.90% were have fair and the remaining 16.68 per cent had good knowledge. In case of medium farmers 37.10% were having good knowledge about plant protection measures, followed by 33.87% have fair knowledge and the remaining 29.03 percent had poor knowledge.

In case of small farmers 45.07 percent were having poor knowledge about the plant protection measures, followed by 36.62 percent have fair knowledge and data remaining 18.31 percent had poor knowledge. In case of big farmers 56.10 percent were having good knowledge about plant protection measures, followed by 29.27 percent have fair knowledge and the remaining 14.63 percent had poor knowledge about plant protection measures.

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Impact of cooking methods on nutritional value of food

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Abstract

National health lies on the hands of women engaged in preparation of varieties of cooking dishes, the good nutritive value of food helps to the children, adult, youth, young, middle and old group of people to maintain good health. In this research paper authors have tried their best to suggest the rural mass regarding various methods of cooking helpful to the people to get nutritive food required to run good health. The research work was conducted in Kanpur district, covering two blocks namely Kalyanpur and Sarsaul and ten villages. Under each village 15 household women were selected randomly. The primary data was collected with the help of pre-tested instrument (well structured) interview schedule. The collected data was pooled, classified, tabulated and analysed using percentage, X^2 and correlated coefficient. The outcomes of the study clearly reveals that most of the respondents are in habit to use roasting regularly. They roast potato and and use tandoor for chapatti. Poaching, baking, stewing, grilling were less used by landless, marginal and small because the equipments are costly and they were unaware. The women belonging to medium income group preferred stearing and boiling most. The use of good method of cooking depends on education and income of the family. The first rank was given to boiling of vegetables, cereals and pulses so that harmful substances like insecticides, pesticides are killed and did not produce ill effect on human health.

Key words: Household women, correlated coefficient, insecticides, pesticides

Introduction

Food preparation is an important step in meeting the nutritional needs of the family and methods of cooking is a part of food security. By understanding the cooking methods enables one to choose the correct method for specific foods, the various methods of cooking have a direct impact on the outcomes of the finished dish. Cooking the correct method not only affects the flavour of foods, but also texture, appearance, quality and nutritional value meant for good health. Different cooking methods have different impact on the nutritive value of food. The most important for cooking methods are; dry heat, moist heat and combination of heat. Dry heat methods are; dry heat, moist heat and combination of heat. Dry heat methods cook the goods with hot air or fat (santeing, pan-frying, deep frying grilling, broiling, roasting, baking); moist heat cooking methods cook the food with liquid, usually water, stock or stream (poaching, simmering, boiling, steaming) and combination cooking methods use, as the name suggests, a combination of dry heat and moist heat methods (braising and stewing) by understanding the cooking methods enables one to choose the correct method for specific foods the various methods of cooking have a direct impact on the outcome of the finished dish. Keeping in view of the importance of the above facts, the present study was designed with specific objective to analyse the impact of cooking methods on nutritional value of foods.

Materials and Methods

The present study was conducted in Kanpur district of Uttar Pradesh. Two blocks namely Kalyanpur and Sarsaul and ten villages were selected randomly. Under each village fifteen (15) household women were selected randomly. The primary data was collected with the help of pre-tested instrument (well structured) interview schedule. The data (primary) were collected, pooled, classified, tabulated, and analysed with the help of percentage, X^2 and correlation coefficient.

Results and Discussion

Impact of cooking methods on nutritional value of food :

Table 1 indicates and method of cooking followed by the women respondents according to land holding. The roasting and frying method were adopted by respondents in all land holding category whereas baking, poaching stewing and grilling were adopted by majority of women respondents in small and large land holding category. Baking, poaching, stewing and grilling were the costly cooking methods and these were used by respondents whose monthly income was about Rs.10000/= and above.

The results clearly reveal that all types of respondents (landless, marginal, small and large landholder respondents) were using roasting regularly.

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They roast potato an use tandoor for chapatti. Poaching, baking, stewing, grilling were less used by landless, marginal and small because the equipments are costly and they were unaware.

Table 1: Use of cooking methods by the farm women in different holding size

Method of cooking	Landless	Marginal	Small	Large
Roasting	10(6.7)	14(10.7)	22(14.0)	13(8.7)
Frying	13(8.7)	15(10.0)	24(16.0)	11(7.3)
Steaming	2(1.3)	19(12.7)	24(16.0)	14(9.3)
Boiling	14(9.3)	18(12.0)	18(12.0)	12(8.0)
Baking	2(1.3)	3(2.0)	8(5.3)	14(9.3)
Poaching	-	2(1.3)	5(4.0)	13(8.7)
Stewing	3(2.0)	3(2.0)	5(3.3)	12(8.0)
Grilling	1(0.7)	3(2.0)	6(4.0)	11(7.3)

Table 2: Method of cooking according to monthly income of farm women

Method of cooking	Monthly income			
	Upto Rs 3000	Rs 3001- Rs 6000	Rs 6001- Rs 9000	Rs 9000 & above
Roasting	12(8.0)	15(10.0)	20(13.3)	12(8.0)
Frying	10(6.7)	13(8.7)	20(13.3)	20(13.3)
Steaming	3(2.0)	20(13.3)	19(12.7)	15(0.0)
Boiling	18(12.0)	18(12.0)	16(10.7)	10(6.7)
Baking	-	3(2.0)	8(5.3)	16(10.7)
Poaching	-	-	5(3.3)	15(10.0)
Stewing	2(1.3)	1(0.7)	4(2.7)	16(10.7)
Grilling	-	1(0.7)	4(2.7)	16(10.7)

Table 3: Method of cooking according to education

Method of cooking	Education					
	Illiterate	Can read only	Primary	Secondary	High School	Intermediate
Roasting	9(6.0)	4(2.7)	12(8.0)	11(7.3)	11(7.3)	12(8.0)
Frying	12(8.0)	6(4.0)	12(8.0)	10(6.7)	13(8.7)	10(6.7)
Steaming	8(5.3)	3(2.0)	11(7.3)	10(6.7)	12(8.0)	13(8.7)
Boiling	10(6.7)	4(2.7)	12(8.0)	12(8.0)	12(8.0)	12(8.0)
Baking	1(0.7)	1(0.7)	2(1.3)	2(1.3)	6(4.0)	15(10.0)
Poaching	-	-	-	-	3(2.0)	12(8.0)
Stewing	-	-	1(0.7)	2(1.3)	6(4.0)	14(9.3)
Grilling	-	-	-	1(0.7)	5(3.3)	15(10.0)

(Figures in parentheses denote per cent value)

Table 2 shows that in the method of cooking according to monthly income of women respondents, methods of cooking, roasting, frying, steaming and boiling were used in all four income category whereas baking, poaching, stewing and grilling were used by women respondents who earned Rs.9000/= and above because these methods were expensive not able to used by lower category of women. The women belonging to medium income group (Rs.3000- 6000) preferred steaming and boiling most.

Table 3 shows that in the method of cooking used by women respondents according to education,

Table 4: Rank wise contribution of cooking methods

Method of cooking	Score	Rank
Roasting	1.98	II
Frying	1.98	II
Steaming	1.11	V
Boiling	2.02	I
Baking	1.90	III
Poaching	0.82	VII
Stewing	1.21	IV
Grilling	1.00	VI

High school and above educated women used all the various methods of cooking whereas primary and secondary educated women did not use poaching and grilling method of cooking, Illiterate and can read only women respondents used boiling, frying and roasting method of cooking. The respondents having intermediate qualification used baking, steaming and grilling which is (10.0, 9.3 and 10.0%). There is different relation in between the use of these methods and variable (income and education).

Table 4 shows that in the rank wise distribution of methods of cooking respondents given first rank to boiling method and second rank to frying and roasting methods. Other cooking methods like grilling, steaming and poaching were used by respondents to lower rank because these methods were adopted by higher income group and large land area of respondents. First rank was given to boiling because TV and programmes of state government stress hard the villagers to boil vegetables, cereals, pulses so that harmful substances like insecticides, pesticides are killed and did not produce ill effect on human health.

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A Comparative study: labels on readymade garments with standards

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Abstract

The primitive people made their clothing from the skin of animals and bark of trees etc., but it change with time, during industrial revolution many machines were invented which increased the production of fabric and garments. Varieties of fabric are available in the market at different selling prices with new weave, composition of fibers, colours and finish etc., so consumers are confused. In this situation label help them in identifying the nature and quality of garments. In the present study comparative study was conducted, in which label present in men's readymade garments compared with labels mandatory according to FTC (Federal Trade Commission) and Textile (consumer protection) Regulation 1988. The data of the study was subjected to statistically analysis by using frequency and percentage. Results showed that dry cleaning instructions and company name were found on man's formal, winter and groom wear. Content and country of origin label was not found on maximum number of garments.

Keywords: Label Standard, Label on garment, Textile regulation, Textile label

Introduction

In absence of labels on fabrics it is difficult to judge the quality and wearing cost of garments. In order to have assurance of quality of manufactured goods it is necessary to have definite specifications of material, construction and workmanship. This statement would be accepted by manufacturer, retailer and consumer, alike. There are four distinct theories for the most effective means of furnishing information to the consumer through the labeling of textiles, namely: informative labeling, the use of brand names, grading and certification.

Thus, some clothing goods manufacturers provide labels as an aid consumers in identifying the quality of the product and care instruction for them in an appropriate manner so as to retain their claimed characteristics for a reasonable period of time. Many regulation are being formulated by various government for accomplish the standard. The present study was planned with objective to evaluate the labels resent on men's garments with the FTC (Federal Trade Commission) and Textile (consumer protection) Regulation 1988.

Methodology

The fifteen branded showrooms were selected as sample for this study, which were involved in the sale of readymade men's wear. A self structure interview schedule was prepared for this study by researcher with the help of subject matter specialist.

Schedule had two parts. Part A of schedule dealt with label of federal trade commission, which included care label instructions, fiber content, country of origin and company name. The part B of the schedule consist label of textile (consumer protection) regulation 1988; which consisted of question related to name and address of manufacturer, description of cloth, wash care label, month and year of packaging, composition of cloth/fiber content, size. Investigator compared the labels present on different categories of garments with standard by visiting the showroom and noted down the reading. The reading were analyzed and tabulated. The statistical measures used for the analysis were frequency and percentage.

Results and discussion

Evaluation of existing labels on readymade garments with standard

In India as such there are no specific standards regarding type of labels to be attached on readymade garments. In the present study, evaluation of existing labels was done as for Federal Trade Commission (FTC) standard regarding Textile Labelling and Textile (Consumer Protection) Regulation, 1988 of India regarding labelling on cloth. The number of garment compared are same as number of brands selling those garments. The result of the study are presented in Table 1-4.

Table 1 gives information regarding evaluation of labels existing in men's casual clothing with those of standards. It is clear from the Table that label of garment (shirt, jeans, bermuda and t-shirt) when compared with FTC standard, it was found that all the garments had care labels related to washing by hand/ machine, ironing and company name. Fiber content

Table 1: Evaluation of labels existing in men's casual clothing with standards

S.. No	Attributes	Type of garment							
		Shirts N=13		Jeans N=12		Bermudashorts N=10		T- Shirt N=12	
		F	%	F	%	F	%	F	%
1	Federal Trade Commission/Care labels instructions								
	Washing by hand/ machine	13	100	12	100	10	100	12	100
	Bleaching	12	92.31	12	100	09	90.00	11	91.67
	Drying	12	92.31	12	100	09	90.00	12	100
	Ironing	13	100	12	100	10	100	12	100
	Warning	0	0	0	0	0	0	0	0
	Dry cleaning	0	0	0	0	0	0	0	0
	Fiber content	04	30.77	06	50.00	02	20.00	04	33.33
	Country of origin	06	46.15	03	25.00	04	40.00	07	58.33
	Company name	13	100	12	100	10	100	12	100
2	Textile (Consumer Protection) Regulation, 1988								
	Name and address of manufacturer	13	100	12	100	10	100	12	100
	Description of cloth	0	0	0	0	0	0	0	0
	Wash care label	13	100	12	100	10	100	12	100
	Month and year of packaging	13	100	12	100	10	100	12	100
	Composition of cloth /fiber content	04	30.77	06	50.00	02	20.00	04	33.33
	Size	13	100	12	100	10	100	12	100

Where: F= Frequency, % = Per cent N=Total number of showrooms

Table 2: Evaluation of existing labels on men's formal clothing with standards

S. No.	Attributes	Type of garment							
		Trouser N=8		Blazers N=10		Suits N=6		Shirts N=9	
		F	%	F	%	F	%	F	%
1	Federal Trade Commission/Care labels instructions								
	Washing by hand/ machine	08	100	0	0	0	0	07	77.78
	Bleaching	07	87.50	0	0	0	0	07	77.78
	Drying	08	100	0	0	0	0	07	77.78
	Ironing	08	100	01	10.00	06	100	07	77.78
	Warning	0	0	0	0	0	0	0	0
	Dry cleaning	0	0	10	66.67	06	40.00	02	13.33
	Fiber content	01	12.50	05	50.00	02	33.33	03	33.33
	Country of origin	02	25.00	01	10.00	0	0	05	55.55
	Company name	08	100	10	100	06	100	09	100
2	Textile (Consumer Protection) Regulation, 1988								
	Name and address of manufacturer	08	100	10	100	06	100	09	100
	Description of cloth	0	0	0	0	0	0	0	0
	Wash care label	08	100	10	66.67	06	40.00	07	77.78
	Month and year of packaging	08	100	10	100	06	100	09	100
	Composition of cloth /fiber content	01	12.50	05	50.00	02	33.33	03	33.33
	Size	08	100	10	100	06	100	09	100

Where: F= Frequency, % = Per cent N=Total number of showrooms

and country of origin labels were present in less than fifty per cent in each catagories. Whereas, when compared with to Textile (Consumer Protection) Regulation, 1988, it was found that all the aspects were covered in label present on garment except that of fiber content.

Data related to evaluation of existing labels in men's formal clothing with standards are given in Table 2. It is evident from the table that all the garments had labels related to wash care instruction and company name irrespective of type of formal garment when compared with FTC and Textile (Consumer Protection)

Table 3: Evaluation of labels in men's winter clothing with standards

S. No.	Attributes	Type of garment															
		Sweater				CoatN=2		WaistcoatN=3		CardiganN=6		SweatshirtN=9		BlazerN=7		JacketN=11	
		Full N=11		Half N=10													
		F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
1	Federal Trade Commission/Care labels instructions																
	Washing by hand/ machine	10	90.909	09	90.00	0	0	02	66.67	05	83.33	09	100	0	0	02	18.18
	Bleaching	10	90.909	09	90.00	0	0	02	66.67	05	83.33	09	100	0	0	01	9.09
	Drying	10	90.909	09	90.00	0	0	02	66.67	05	83.33	09	100	0	0	01	9.09
	Ironing	10	90.909	09	90.00	0	0	02	66.67	05	83.33	09	100	0	0	01	9.09
	Warning (twist)	04	36.36	04	40.00	0	0	01	33.33	01	16.67	01	11.11	0	0	0	0
	Dry cleaning	01	6.67	01	10.00	02	100	01	6.67	01	6.67	01	6.67	07	46.67	10	66.67
	Fiber content	09	81.818	09	90.00	0	0	01	33.33	05	83.33	09	100	05	71.43	05	45.45
	Country of origin	04	36.363	04	40.00	02	100	0	0	02	33.33	02	22.22	02	28.57	04	36.36
	Company name	11	100	10	100	02	100	03	100	06	100	09	100	07	100	11	100
2	Textile (Consumer Protection) Regulation, 1988																
	Name and address of manufacturer	11	100	10	100	02	100	03	100	06	100	09	100	07	100	11	100
	Description of cloth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Wash care label	10	90.909	09	90.00	02	100	02	66.67	05	83.33	09	100	07	100	10	90.90
	Month and year of packaging	11	100	01	10.00	02	100	03	100	06	100	09	100	07	100	11	100
	Composition of cloth /fiber Content	09	81.818	09	90.00	0	0	01	33.33	05	83.33	09	100	05	71.43	05	45.45
	Size	11	100	01	10.00	02	100	03	100	06	100	09	100	07	100	11	100

Where: F= Frequency, % = Per cent N=Total number of showrooms

Table 4: Evaluation of existing labels in men's groom and sport wears with Standards

S. No.	Attributes	Type of garment							
		Groom Wears				Sport Wears			
		Wedding suit N=2		Sherwani N=1		Tracksuit N=2		Jogging shorts N=2	
		F	%	F	%	F	%	F	%
1	Federal Trade Commission/care labels instructions								
	Washing by hand/ machine	0	0	0	0	2	100	2	100
	Bleaching	0	0	0	0	01	50	0	0
	Drying	0	0	0	0	02	100	02	100
	Ironing	0	0	0	0	02	100	02	100
	Warning	0	0	0	0	0	0	0	0
	Dry cleaning	02	100	01	100	0	0	0	0
	Fiber content	0	0	01	100	01	50	01	50
	Country of origin	0	0	0	0	01	50	01	50
	Company name	02	100	01	100	02	100	02	100
2	Textile (Consumer Protection) Regulation, 1988								
	Name and address of manufacturer	02	100	01	100	02	100	02	100
	Description of cloth	0	0	01	100	02	100	02	100
	Wash care label	02	100	01	100	02	100	02	100
	Month and year of packaging	02	100	01	100	02	100	02	100
	Composition of cloth /fiber content	0	0	01	100	01	50	01	50
	Size	02	100	01	100	02	100	02	100

*Where: F= Frequency, % = Per cent *N=Total number of showrooms

Regulation, 1988. Information regarding fiber content and country of origin was seen minimum in formal trousers and suits. Fifty per cent of blazers had labels related to fiber content irrespective of standard.

Results of evaluation of labels in men's winter clothing with standard is given in Table 3. It can be envisaged from the table that all men's winter clothing had labels related to wash care pertaining to washing by hand/machine, bleaching, drying and ironing. The instructions related to wash care were given maximum in case of sweaters either full or half followed by waist coats. Cardigans and blazers did not had a wash care label, as they had labels related to dry cleaning. When compared with Federal Trade Commission and Textile (Consumer Protection) Regulation, 1988 the information related to fiber content was seen less.

Table 4, gives the information related to evaluation of label presented on men's groom i.e., wedding suit and sherwani and sport wear which included track suit and jogging shorts with standard. It can be inferred from the table that when compared with Federal Trade Commission (FTC) & Textile (Consumer Protection) Regulation, 1988 standard. The wedding suit did not had fiber content label. Label's related to country of origin was not seen which is required as per standards. It is also evident from the table that labels existing in men's sport wear i.e., track suits and jogging shorts had labels related to wash care instruction and company name as per standards. The labels related to fiber content and country of origin were seen of fifty per cent track suits and jogging shorts were according to standard of FTC and Textile (Consumer Protection) Regulation, 1988.

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A comparative study- impact of nutrition education on dietary fibre knowledge in urban and rural women of Nainital district

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Abstract

The present investigation was undertaken with the objective to assess the nutrition status and to provide education material (viz.Booklet and entitled Aahar Fibre, Fibre Ka Swasthya Jeevan Me Yogdan) to urban and rural women and to assess it impact in terms of knowledge scores. A total of 100 subjects out of 50 from urban and 50 from rural women (aged 20-55 years) were selected from Haldwani Block of Nainital District in Uttarakhand. Gain in knowledge in terms of percentage increases in knowledge score of urban was more than rural women. It was found that nutrition status of urban women was better than rural women and the booklet used for imparting nutrition education was effective among both the subjects.

Key words: Dietary Intake, Dietary Fibre, Anthropometry, Clinical Assessment, Nutritional Adequacy

Introduction

The nutritional and health status of women is of great concern in the contemporary world because the multiple role played by women given rise to serious health and nutritional problems. The importance of nutrition education as a mean for improving the nutritional status of the country has been increasingly realized. Education for women is the best way to improve the health, nutrition and education status of a household that constitute a micro unit of a nutritional economy. Dietary fibre is a necessary component of human diet and the knowledge about fibre in the light of its health benefits can lead to reduction in the number of diseases. Fibre or roughage as it also known as carbohydrates and is found naturally in plant. Nutrition education as an education measure for inducing desirable behavioral changes for ultimate improvement in the nutritional status of individual to learn about the essential of nutrition for health and to take improve the quality of their diets.

Keeping the above factors in view the present study has conducted with the following objectives:

1. To assess the nutritional status of urban and rural women.
2. To assess the knowledge related to dietary fibre among urban and rural women.
3. To analyze the impact of nutrition education on nutrition knowledge of urban and rural women.

Materials and Methods

The present study was conducted in Haldwani block of Nainital district Uttarakhand. Total 100 samples of women were randomly selected from urban (50 each) and rural (50 each) of Haldwani block. The study was conducted during March- April 2013. The entire study was carried out in two phases. In phase 1 general information about anthropometry measurements, clinical measurements, nutrition knowledge test were taken and booklet containing "Importance of Dietary fibre" was distributed among women. In Phase II after the interval of 15 days, again same knowledge test was taken by questionnaire methods were related to dietary fibre. Well structured interview schedule questionnaire was prepared. The Performa consists of questions related to socio-economic details, food frequency intake and dietary fibre knowledge.

Anthropometry measurements include height and weight of subjects .Clinical assessment was done by recording the nutritional deficiency signs and symptoms on skin, eyes, hair, tongue, lips, nails etc.

Results and Discussion

1. General profile

General profile of the subjects was taken including family type, family size, food habits, education status of women, occupation of male head member, occupation of women, income as depicted in Table 1.

The study shows that the percentage of most of families were of nuclear type .The percentage of nuclear families was 74 and 78 among urban and rural women respectively. Literacy rate among urban was higher than rural women i.e. 60% and 70%.

Table 1: General profile of urban and rural women (percent of subjects)

S. No.	Particulars	Urban woman (N=50)	Rural woman (N=50)
1.	Age (year)		
	20-25	6	6
	25-30	16	22
	30-35	14	26
	35-40	16	10
	40-45	14	14
	45-50	34	18
	50-55	-	4
2.	Family type		
	Nuclear	74	78
	Joint	26	22
3.	Family size		
	1-4	48	36
	5-8	48	60
	>8	2	4
4.	Food habits		
	Vegetarian	28	48
	Non-vegetarian	72	52
5.	Educational status of woman		
	Illiterate	-	-
	Primary	2	22
	Secondary	8	8
	High school	18	22
	Intermediate	12	18
	Graduation	60	30
6.	Occupation of male head member		
	Service	66	44
	Business	34	4
	Labour	-	-
	Farmers	-	52
7.	Occupation of woman		
	Service	22	-
	Business	6	-
	Labour	-	-
	Farmers	-	6
	House wife	72	94
8.	Income		
	Class-I	50	20
	Class-II	38	22
	Class-III	12	58
	Class-IV	-	-
	Class-V	-	-

Table 2: Distribution of urban and rural women according to Body Mass Index (BMI) (percent of Subjects)

S. No.	Nutritional status	Urban woman (N=50)	Rural woman (N=50)
1.	Severe	2.0	4.0
2.	Moderate	2.0	4.0
3.	Mild	2.0	4.0
4.	Low weight normal	8.0	4.0
5.	Normal	32.0	28.0
6.	Obese grade - I	32.0	22.1
7.	Obese grade - II	22.0	12.1

2. Assessment of Nutritional Status:

Anthropometry methods for nutrition status assessment are particularly used in circumstances, where chronic imbalances of protein and energy are likely to exist. Body Mass Index (BMI) provides a reasonable indication of the nutritional status of adults. BMI has good correlation with fatness and may also be used as an indicator of health risk. On the basis of BMI, the subjects was categorized into those having severe , moderate and mild malnutrition , normal and obese category as depicted in Table 2. There was little difference in the percentage of BMI of both the subjects (urban and rural women)

3. Dietary Information regarding frequency of consumption of foods by both the subjects

Frequency of consumption of foods among urban and rural women (percent of the subjects) was presented in Table 3 and 4. In Table 3 and 4 food items with their daily, twice a week, monthly, frequently intake was given. Frequency of consumption of cereals, pulses, green leafy vegetables, fruits, nuts and oilseeds, spices and condiments, meat/fish and poultry products. It was found that cereals, pulses, nuts and oilseeds, spices and condiments and milk and milk products were consumed daily while the consumption of other food groups vary from twice/a week ,weekly frequently and never. Consumption of fruits was found less by rural women due to lower economic reason.

Table 3: Consumption frequency of foods among urban women (percent of subjects)

S. No.	Food items	Daily	Twice a week	Weekly	Frequently	Monthly	Never
1.	Cereals	100.0	-	-	-	-	-
2.	Pulses	98.0	2.0	-	-	-	-
3.	Leafy vegetable	28.0	22.0	44.0	6.0	-	-
4.	Root and tubers	22.1	6.0	52.0	20.0	-	-
5.	Nuts and oilseeds	98.0	-	-	2.0	-	-
6.	Spices and condiments	100.0	-	-	-	-	-
7.	Meat, fish, and poultry products	-	6.0	46.0	2.0	20.0	24.0
8.	Milk & milk products	100.0	-	-	-	-	-
9.	Fruits	50.0	2.0	24.0	14.0	30.0	30.0

Table 4: Consumption frequency of foods among rural women (percent of subjects)

S. No. Food items	Daily	Twice a week	Weekly	Frequently	Monthly	Never
1. Cereals	100.0	-	-	-	-	-
2. Pulses	60.0	4.0	34.0	-	-	-
3. Leafy vegetable	26.0	16.0	28.0	2.0	-	8.0
4. Root and tubers	12.0	8.0	78.0	-	-	2.0
5. Nuts and oilseeds	100.0	-	-	-	-	-
6. Spices and condiments	100.0	-	-	-	-	-
7. Meat, fish, and poultry products	-	-	22.0	28.0	28.0	50.0
8. Milk & milk products	100.0	-	-	-	-	-
9. Fruits	6.0	-	10.0	12.0	12.0	68.0

Table 5: Prevalence of clinical signs and symptoms among urban and rural women (Percent of subjects)

S. N0.	List of proteins, vitamins and minerals deficiency	Percentage of subject suffering from deficiencyurban women(N=50)	Percentage of subject suffering from deficiencyrural women(N=50)
1	Vitamin – A		
	Night blindness	18	14
	Bitot spots	16	8
2	Calcium		
	Osteoporosis	46	48
3	Vitamin – C (Scurvy)		
	Weakness	42	50
	Dry skin	22	18
	Bleeding gums	30	34
	Teeth loose	40	42
4	Vitamin B_1 (Thiamine)		
	Knee jerk	44	32
	Ankle jerk	50	32
	Anorexia	32	42
	Weakness & pain of legs (Calf muscles)	38	42
5	Vitamins B_2 (Riboflabin)		
	Chelosis	16	22
	Angular stomatis	10	24
	Burning of feet	60	52
	Scaliness of skin	26	40
6	Vitamin B_3 (Niacin)		
	Dermatitis	24	50
	Dementia	32	24
	Diarrhea	5	10
7	Vitamins B_6 (Pyridoxine)		
	Weakness	40	52
	Loss of sleep	28	36
8	Vitamin B_{12} (Cobalamine)		
	Heart burn	46	42
	`Depression	20	28
	Mental confusion	8	20
9	Iron		
	Fatigue	46	60
	Dullness and pale skin	16	30
	Spoon shape Nails	36	42
10	Iodine		
	Goiter	-	1
	Weight gain	16	12
	Wrinkled	26	16
	Lethargic	16	26

4. *Clinical Assessment:*

Clinical examination is an important practical method for assessing the nutritional status of a community. The assessment of nutritional status of women were examined for over signs of malnutrition such as muscle wasting, angular stomatitis, bleeding gum, dermatitis, paleness of skin etc. prevalence of clinical signs and symptoms among urban and rural women(percent of the subjects) was representing in Table 5. The perusal of Table V clearly depicts lists of proteins, vitamin and mineral deficiency including vitamin A, vitamin D, Vitamin C (Scurvy), Vitamin B_1 (Thiamine), Vitamin B_2 (Niacin), Vitamin B_6(Pyridoxine), Vitamin B_{12} (Cobalamins), Iron and Iodine. Deficiency of Vitamin C, Vitamin B, Iron, Calcium, was found in both the subjects.

5. *Impact of assessment of Nutrition Education*

The impact of Nutrition education material viz. booklet was assessed on the knowledge of urban and rural women. The impact of booklet on knowledge level of urban and rural women at pre- exposure and post- exposure stage. At pre- exposure level the knowledge average scores percentage of urban and rural women was 54.35±3.26 and 68.10±2.22. After the distribution of booklet, the knowledge level of both the subjects was tested again on same test and average score percentage of urban and rural women was found to be increasingly significantly 89.74±1.62 and 70.84±6.24. It was observed that the percentage gain in knowledge after 15 days by urban women was 28.9 percent and rural women were 26.8. Table 6 shows the data of gain in nutrition knowledge of urban and rural women.Co-relation analysis revealed that gain in knowledge of urban and rural women was positive co-related with education of women.

Table 6: Pre-exposure, post exposure and gain in knowledge after 15 days by urban and rural women (percent of subjects)

Groups	Pre-exposure	Post-exposure	Gain in knowledge after 15 days
Urban women	62.4	90.9	28.9
Rural women	60.7	87.5	26.8

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