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Editorial

Maharashtra Society of Extension Education (MSEE) registered in 1982, has the foremost objective to publish the research journal. Accordingly, the society was publishing the journal entitled Maharashtra Journal of Extension Education. Since the year 2004 this journal has been renamed as Asian Journal of Extension Education.

The journal includes research articles from the researchers and extension workers in the field of extension education from various faculties of various institutes in the country. Extension education plays an important role not only in transfer of innovative technologies but also in developing appropriate methodology in the field of extension more suited for field application. The innovative research methods can be very well communicated for its application and use in further research by the extension fraternity. This can be achieved by publishing research articles.

Asian Journal of Extension Education is a very humble attempt to provide platform towards this goal of networking with the all extension professionals who could kindle the minds of their peers and young scientists through their research articles.

I have immense pleasure to present this 38th issue of Asian Journal of Extension Education for the year 2019. The Journal has received an encouraging response from all corners of the country. We have made an effort to encompass the best articles for the issue. Thanks are due to all the authors who have contributed for this issue.

I extend sincere thanks to Capt. Dr. L. B. Kalantri, Hon'ble President, Dr. D. M. Mankar, Vice President and Respected Member of Executive Body Dr. N. R. Koshti, Dr. N. V. Kumbhare for their constant inspiration, valuable guidance and concrete suggestions to maintain the quality of the journal.

I appreciate the tireless contribution of my colleagues and Joint-Secretary Dr. M. K. Rathod and Dr. S. D. More for their endless efforts in publishing this issue. I am confident that this issue of the Journal will be appreciated by the extension scientists, researchers, students and readers for its usefulness and contents. I solicit their suggestions for further enhancement of quality of the Journal.

Akola
Date: December, 2020

P. K. Wakle
Chief Editor

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RESEARCH ARTICLE

Women Participation in Dry Season Vegetable Farming in North-Western State, Nigeria

O. W. Kareem[1], L. L. Adefalu[2], P. B. Kharde[3] and Shitta-Bey S.[4]

1, 2 & 4. Department of Agricultural Extension and Rural Development, Faculty of Agriculture, University of Ilorin, Ilorin, Nigeria
3. Department of Extension Education, Mahatma Phule Krishi Vidyapeeth (Agriculture University), Rahuri – 413 722 District Ahmednagar, Maharashtra State, India
Corresponding author – kareem.ow@unilorin.edu.ng

ABSTRACT

Women are responsible for improving food Security of farm families and play a significant role in agricultural production but myriad of problems limited their active participation in the value chain. Multi-stage sampling technique was used to select 110 respondents from the study area. Well structured interview schedule was employed to elicit information from the respondents and data obtained were analysed using descriptive and inferential statistics. Results of the findings revealed that majority (74.5%) of the respondents were within age categories of 20-50 years with mean age of 37.25 years. Preponderance (61%) of the respondents was married and 44% had non-formal education. Higher percentage (54.5%) of the respondents had farming experience of above 10 years with an annual income of more than one hundred thousand naira. Less than average (45.5%) of the respondents had household size of 7-10 persons while farm size was not up to 1 hectare. Respondents' major source of information was women farmers group with little or no extension contact. The results further revealed high level of participation of women in planting of vegetable (MS=2.25). Thus, low participation was recorded in transportation (MS=1.77) and tillage (MS=1.78). Most vegetables grown by the respondents were carrots, spinach and tomato. Women farmers were constrained by many factors such as pest and diseases, long distance to market, inadequate irrigation facilities and poor credit facilities. However, farming experience, level of education and farm size were positively significant (p=0.05) with women's level of participation. The study therefore recommended that government should reach out to women farmers through extension agents for capacity building and advisory services where necessary and make provision for agric soft loans to scale up their vegetable businesses.

Keywords: Food security, Participation, Vegetable, Women farmers, Dry season

INTRODUCTION

Rural women play a significant role in Nigeria agriculture. In many countries, Women are responsible for improving food Security for their families and therefore, play a significant role in agricultural production (Agamu, 2006, Ahmed et al, 2012). Women are responsible for more than half of the world food production overall and produce 60% to 80% of foodstuffs in Africa (Damisa and Yahamma, 2007). In rural communities,

women could be described as the “engine” of the rural areas. They are engaged in the basic process of production without the use of modern sophisticated methods (Song and Hugging, 2002).

However, majority of the women in rural familiar are non-literates, unskilled and traditionally bound. Nevertheless, they contribute to agricultural activities performed by women which includes :weeding, sowing, and harvesting of food crops (Ogunbameru, 2001).In the northern part of Nigeria f example, women are responsible for the growing of crop such as maize ,millet ,sorghum ,groundnut, yam, cowpea and vegetables (Mosinabale, 2010).Also, in the eastern part of Nigeria Women are responsible for the growing of crops like cassava, cocoyam, maize and vegetables while the growing of yam (a principal crop) is somewhat reserved by men.

Women perform such works as hoeing, sowing, weeding, harvesting particularly in food crops. However, their efficiency in farming is low due to their low level of literacy and lack of skills. Despite women’s lack of skills, they are mainly responsible for the farming in their household. When women are too exhausted to work well, food production suffers, thereby contributing to hunger and malnutrition (Faraja, 2013).

Rural women are the main producers of staple crops as well as the production of secondary crops such as legumes and vegetables which are often grown in home gardens, provide essential nutrients and can only be the source of food during times of food shortage. Rural women are assuming a greater role in agricultural production yet their contributions remain largely overlooked in the development plans. Women remain largely unpaid for their domestic services; their household labour remains invisible in natural economics.

Vegetables are the edible portions of an herbaceous annual or perennial crop which could be either be served raw (green / fresh) or after a little cooking (Barley, 2010). Vegetables majorly planted in Nigeria include: Onion, okra, melon, carrot, cabbage, spinach, tomato, cucumber, pumpkin among others. The importance of vegetable as a major and efficient source of nutrient in African diet cannot be over stressed. Vegetables are nourishing foods because they contain a little of all the essential nutrients man needs, including protein, mineral, salt, sugar, aromatics, colouring agents, iron and essential oils that increase resistance to diseases in human (Enete and Okon, 2010). They further noted that vegetables are complementary foods of first order and much more important for human health than product of animal origin. Growing of vegetable could make an important contribution to the national food supply. Market gardening industry is a safeguard against the lowering of health standard necessary for productive output in an expanding economy (Okorji et al, 2012). During the rainy season, the production of vegetable is high resulting in saturation of the market, but during the dry season, thereby heading to a high price due to short supply. This seasonality has resulted in food insecurity which is a challenge to sustainable Food Production (Okunlola, 2009, Ibekwe and Adesope, 2010).

Statement of the Problem

In Northern Nigeria, 92% of women engaged in agriculture production, harvesting, post-harvesting operation as well as in livestock production (Agamu, 2006). The husband however, carried out only the decision making. Despite general role these women play in the economy, they have not been properly incorporated into full agricultural activities. There is increased evidence that women are still only marginal participants in and beneficiaries of development programs and policy goals. Women remain in disadvantaged positions in employment, trading, education, health and governance.

Women farmers face a lot of constraints that prevent their active participation in dry season vegetable farming such as pest infestation, insufficient irrigation facilities, small farm holdings, insufficient inputs, cultural beliefs and poverty. There is however, inadequate data on women participation in dry season vegetable farming and this has often misled policy makers not to have recognized the important role of women in actualization of food sufficiency in the country (FAO, 2000). There is therefore an urgent need to intensify production of vegetables in Kaduna and Nigeria in general especially during the dry season which is usually the period when demand for vegetables is more than the supply.

METHODOLOGY

Population for the study

The study population comprised all women vegetable farmers in Sabon Gari Local Government Area of Kaduna State.

Sampling Procedure and Sample Size

Multi-stage sampling technique was used to select the respondents. Purposive sampling was used to select five communities that have highest concentration of women vegetable farmers in the local government namely: Bomo, Chikaji, Basawa, Samaru and Paladan. Second stage involved random sampling of 22 respondents from each of the five selected communities. Sample size of 110 was used for the study.

Measurement of Variables

Independent variables Constraints to Participation of Women in Dry Season Vegetable Farming:

A three-point likert scale was used to measure the constraints to women participation in dry season vegetable farming. List of possible constraints was drawn, and respondents were requested to rate their level of severity on a scale of 1- 3 graduated as follows; Not a constraint=1, Severe=2, Very severe=3. Benchmark of 2.0 was used to identify serious constraints.

Dependent Variables

The dependent variable for the study was women's level of participation in dry season vegetable farming. This was measured using Yes/No responses. The Yes response attracts score of 1, while No response is equal to 0. Mean score of 2.0 and above was used to denote high participation and less than 2.0 was low participation.

Data Analysis

Descriptive statistics such as frequency distribution, percentages, mean

scores and ranking order was used to present the results. Spearman's Rank Correlation was used to test the hypothesis of the study.

RESULTS AND DISCUSSION

Table 1: Socio-economic characteristics of the respondents

Variable	Frequency	Percentage	Mean
Age (years)			
20-30	28	25.5%	
31-40	27	24.5%	37.25
41-50	27	24.5%	
51-60	19	17.3%	
Above 60	9	8.2%	
Marital status			
Single	27	24.5%	
Married	40	36.4%	
Separated	20	18.2%	
Divorced	12	10.9%	
Widowed	11	10.0%	
Level of Education			
Non formal	20	18.2%	
Primary	28	25.5%	
Secondary	45	40.9%	
Tertiary	17	15.4%	
Farming experience			
1-5 years	21	19.1%	3.0
6-10 years	29	26.4%	
Above 10	60	54.5%	
Household size			
1-3	11	10.0%	
4-6	27	24.5%	2.8
7-10	50	45.5%	
11-15	16	14.5%	
Above 15	6	5.5%	
Farm size			
<1 ha	62	56.4%	
2-3 ha	48	43.6%	1.57

Source: Field survey, 2019

As shown in table 1, majority (74.5%) of the respondents were within the age range of 20-50years while only (24.5%) of the respondents were above the age of 51years. Mean age of the farmers was 58.4 years. This implies that most of the respondents were in their active and productive age capable of participating in vegetable farming. This agrees with the findings of Amoah et al., (2014) who reported that rural women throughout the world are engaged in a range of productive activities essential to household welfare, economic and agricultural production, this is usually carried out within their productive ages.

The marital status of the respondents which was shown in the table indicated that majority (36.4%) of the respondents were married and 24.5% of the respondents were single. This could be associated with the responsibility of feeding and caring for the family which might have necessitated most of the married women to participate in vegetable farming in order to supplement some of the basic needs of the family. This corroborates the findings of FAO (2010) which reported that in many traditional African societies, the family task falls mainly on the women. Farming experience indicates that 54.5% of the respondents had more than 11 years of farming experience, 28.4% of them had 6-10years while 19.1% of the respondents had between 1-5years of farm experience. The average farming experience of women farmers was 3 years. This result shows that most of the respondents had long years of farming experience implying that

farmers are likely to make good decision that would increase their output and income. This finding is in tandem with the findings of Ayferam & Fisha (2015) that, the more experienced a farmer, the more efficient the farmer might be in the use of productive resources.

On farm size Table 1 reveals that 56.4% of the respondents had d" 1 hectare of farmland and 43.6% had farmland of over 2 hectares. This implies that vegetable farmers were operating at small scale and subsistence levels. Traditional and land administration system in Nigeria has made it very difficult for women to own farmland especially in the villages where land is acquired through inheritance. This confirms to the findings of FAO (2010) which stated that women farmers have small land to cultivate thus; their farms are very small with a corresponding low output. According to the level of education, 41.0% had secondary education, 26.0% had primary education, while 15.4% had tertiary education. This implies that most of the women had basic education and therefore were able to read, write, and comprehend basic instructions, so if they are visited by extension agents or have access to extension services, they can comprehend and adopts innovation that will enable them to participate better in vegetable farming. This agrees with the finding of Mahmud (2011), which reported that if females should have the same access to education as their male counterpart, agricultural production activities will be profitable for the women folk and by extension community as a whole.

4.2. Women's Level of Participation

Table 2: Level of women participation in Vegetable Farming

Farming Activities	Frequency	Percentage	Mean	Level
Irrigation	50	45.5%	2.22	High
Planting	60	54.5%	2.25	High
Weeding	47	42.7%	2.18	High
Harvesting	48	43.6%	1.72	Low
Fertilizer Application	45	40.9%	2.15	High
Chemical Application	48	43.6%	2.23	High
Transportation	50	45.5%	1.77	Low
Marketing	48	43.6%	1.77	Low
Land Tillage	49	4.5%	1.78	Low
Overall Mean			**2.1**	**High**

Source: Field survey, 2019

Table 2 shows women vegetable farmers' level of participation in the dry season vegetable farming activities. High participatory level was recorded by women which include: irrigation (MS= 2.22), planting (MS= 2.25), weeding (MS=2.18), fertilizer application (MS=2.15) and chemical application (MS=2.23), while the farming activities lowly participated by the women include: Harvesting (MS=1.72), Transportation (MS=1.77), land tillage (MS=1.78) and marketing (MS=1.77). This implies that women were actively involved in vegetable farming in the study area. The result agrees with the findings of Graham (2006), Akinfaye (2013) and Samantaray (2009), which reported that vegetable cultivation absorbs more women labour compared to other crops and that women

participated more in vegetable production than men in Osun state. The overall mean score shows that women participation in dry season vegetable farming was high.

4.3. Types of Vegetables Cultivated by the Respondents

Table 3: Types of vegetables cultivated by the respondents

Types of Vegetables	Strongly Agree	Agree	Undecided	Disagree	Strongly	Rank Disagree
Carrot	70(63.6)	34(31.0)	4(3.6)	1(0.9)	1(0.9)	I
Cabbage	13(11.8)	12(10.9)	30(27.3)	35(31.8)	20(18.2)	VII
Pepper	40(36.4)	18(16.4)	15(13.6)	22(20.0)	15(13.6)	V
Spinach	30(27.3)	62(56.0)	7(6.40)	3(3.0)	8(7.3)	II
Tomato	60(54.5)	20(18.2)	15(13.6)	9(8.2)	6(5.5)	III
Onion	22(20.0)	50(45.5)	20(18.2)	8(7.3)	10(9.1)	IV
Moringa	25(22.7)	10(9.1)	10(9.1)	28(25.5)	37(33.6)	VI

Source: Field Survey, 2019.

Table 3 shows the types of vegetables mostly planted in the study area. The findings reveal that majority (63.6%) of the respondents strongly agreed to have planted carrot, 56.0% agreed to cultivation of spinach while 54.5% strongly agreed to have cultivated tomato. Hence, cabbage was the least planted vegetable. This implies that carrot, spinach and tomato were the most consumed vegetables in the study area. The reason why women grow different varieties of vegetables to augment their income as it will also improve nutritional intake of local people. This result is in congruent with the findings of IFPRI, (2009), Kader (2002) which reported that vegetables are most appealing and affordable source of micro nutrients. Diet improvement increases productivity, reduces healthcare related cost and therefore raises the income of the poor. Also, vegetable production leads to greater household food and nutrition security, increases farm families access to vegetables and thereby contributing to higher income.

4.4. Constraints to Women Participation

Table 4: Constraints to women participation in dry season vegetable farming

Constraints	Not a constraint	Severe	Very severe	Mean
Pest and disease	25(22.7%)	35(31.8%)	50(45.5%)	2.23
Inadequate storage Facilities	36(32.7%)	45(40.9%)	29(26.4%)	1.94
Inadequate irrigation Facilities	37(33.6%)	42(38.2%)	31(28.2%)	1.95
Lack of credit facilities	35(31.8%)	47(42.7%)	28(25.5%)	1.94
Insecurity of the farm site	42(38.2%)	35(31.8%)	33(30.0%)	1.92

Poor transport network	33(30.0%)	50(45.5%)	27(24.5%)	1.95
Long distance to market	28(25.5%)	44(40.0%)	38(34.5%)	2.09
High cost of farm input	46(41.8%)	36(32.7%)	28(25.5%)	1.84
Inadequate farm land	44(40.0%)	38(34.5%)	28(25.5%)	1.85

Source: Field Survey, 2019

Table 4 shows the constraints to women participation in dry season vegetable farming. The study shows that majority (45.5%) of the respondents indicated that pest and disease was a very severe constraint, 31.8% of the respondents revealed that it was a severe constraint while 22.7% confirmed that it was not a constraint. Based on this result, it was deduced that pest and disease was a major constraint faced by vegetables farmers during farming period. There is every indication that vegetable farmers were constrained with lack of storage facilities, 40.9% of the respondents confirmed that it was severe and 32.7% claimed that it was not a constraint. Table 4 further shows other major constraints reported which were inadequate irrigation facilities, lack of credit facilities, insecurity of the farm site, poor transport network and long distance to market. This implies that women vegetable farmers had numerous problems, but provision of funds could solve more than half of the aforementioned problems (Adelami *et al.,* 2007).

4.5 Test of Hypothesis

H_{01}: There is no significance relationship between the socio-economic characteristics of the women vegetable farmers and their level of participation in dry season vegetable farming.

Table 5: Spearman's Rank Correlation Result

Socio economic Characteristic	Rho	Level of Women Participation	
		Sig (P Value)	Remarks
Age	0.141	0.162	Not significant
Farming	0.369	0.000	Significant
Experience			
Marital status	0.116	0.249	Not significant
Household size	0.024	0.813	Not significant
Level of education	0.257	0.010	Significant
Farm size	0.424	0.000	Significant

Source: Field survey, 2019

Spearman's correlation coefficient was used to examine the relationship between socio economic characteristics and level of participation of the women vegetable farmers in the study area. It was discovered that age, household

size and marital status had no significance correlation with the level of women participation such that the p values of their Rh_o are less than 5% alpha level. As shown in table 5, farming experience, level of education and farm size had positive significant relationship with the level of women participation. Farming experience had a correlation coefficient of 0.369 which means as farming experience increases, the level of women participation in vegetable farming increases. Level of education and farm size had Rh_o of 0.257 and 0.424 which indicates that as level of education and farm size increases, their levels of participation in vegetable farming during dry season equally increases.

CONCLUSION

The study concluded that the respondents were in their productive years to sustain the business of vegetable production. Most of women farmers were educated and experienced by having several years of growing different varieties of vegetables to augment their income and nutritional intake despite being ownership of small farm land. Their level of participation in dry season vegetable farming was high with high production of carrots, spinach and tomato than any other vegetables. Farming experience, educational level and farm size were positive and significant with women farmers' level of participation in dry season vegetable farming.

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RESEARCH ARTICLE

Influence of Agro-Ecological Zones on the Application of Extension Approaches

Ochola Washington Adede[1], D.O. Osewe[2], P.B. Kharde[3] and Portas Odula Olwande[4]

[1]Department of Agricultural Extension and Education, Kisii University, Kenya

[2]Department of Agricultural Economics and Rural Development, Maseno University, Kenya

[3]Department of Extension Education, Mahatma Phule Agricultural University, Rahuri, India

[4]Department of Animal Science, School of Agriculture and Food Security, MasenoUniversity, Kenya

Corresponding author email: woadede@gmail.com

ABSTRACT

The effectiveness of agricultural Extension approaches in improving farming practices among smallholderfarmersdepend on different aspects. This study assessed the influence of Agro Ecological Zones (AEZ) on implementation of agricultural extension approaches implemented by agricultural institutions among smallholder farmers.A cross-sectional survey thatcombines both quantitative and qualitative data collection methodologies wasused to gather relevant information on extension approaches used among the smallholder farmers in different Agro Ecological Zones (AEZ). The study sampled out 12 agricultural institutions operating within the six counties of the former Nyanza province: Kisii, Nyamira; Migori; Homa-bay; Kisumu and Siaya. A multi stage random sampling technique was used to identify a total sample size of 492 respondents comprising; 12 key informants, 120 agricultural extension personnel and 360 farming household heads. AEZ positively influenced the implementation; number of groups of persons participating in identifying the most dominant extension problem; those involved in coming up with the purpose; level of education of extension agents; reward to extension agents; the frequency of extension agents visit to farmers.Agro ecological zone negatively

extension agents representing a given number of smallholder households.

INTRODUCTION

In Kenya, Agriculture is the mainstay of the economy, contributing up to 26% of Gross Domestic Product (GDP) directly, and 27% indirectly through linkages with manufacturing, distribution and other service-related sectors (Kenya Institute for Public Policy Researh and Analysis (KIPPRA), 2013). The sector also accounts for 65% of Kenya's total exports and provides more than 18% of formal employment and more than 80% of informal employment is in the rural areas (Government of Kenya, 2009).

More than 80% of Kenya's population live in rural areas and entirely depend on rain-fed smallholder agricultural practices (Government of Kenya, 2012). This group of farmers accounts for 75% of total agricultural produce and 70% of total marketed produce in Kenya (Government of Kenya, 2009). Therefore, improving the productive capacity of these smallholder farmers through effective extension systems not only improves their food security and livelihood but also contributes towards national economic growth. There has been however, a decline in the productive capacity of the smallholder farmers in Kenya and the decline is attributed to ineffective smallholder extension services (FAO, 2012 and 2015). Agricultural extension can be defined as a service or system which assists farm people, through educational procedures, in improving farming methods and techniques, increasing production efficiency and income, bettering their standard of living and lifting social and educational standards (Evenson & Mwabu, 2001; Maunder, 1972). Agricultural extension not only provides smallholder farmers with information on improved and better farming systems, but also provides mentorship and guidance.

Smallholder farmers in Africa can be categorized depending on; the agro-ecological zones they operate in; their socio economic status in terms of capital invested and size of land owned; or annual revenue generated from farming activities. An Agro-Ecological Zone is a land resource mapping unit, defined in terms of climate, landform and soils, and/or land cover, and having a specific range of potentials and constraints for land use (FAO, 1996).Jaetzold, Schmidt, Hornetz, and Shisanya, (2009) identifies the essential elements used in defining the agro-ecological zonesas the temperature regime, growing period, and soil attributes.

Kenya is divided into seven major AEZs in terms of temperature regimes including Tropical Alpines (TA) Upper Highland (UH) Lower Highland (LH) Upper Midland (UM) Lower Midland lowland (LL) and Coastal Lowland (CL). Each of the seven AEZs are further divided into at least five sub-zones in terms of other climatic factors such as precipitation, growing period, land cover, soil type and landform.

In high potential areas, smallholder such as UH or LH farmers own and use less than one hectare of land, which may increase up to 10 ha or more in low potential semi-arid areas. They may also include livestock production of up to 10 animals (Salami, Kamara, & Brixiova, 2010). Smallholder farmers' production range from subsistence farming (those producing for family consumption) to those whose annual income from farming activities reach up to Ksh. 500, 000 in developed countries (Salami, Kamara, & Brixiova, 2010). Family is the main centre of operations, planning, decision-making and implementation in smallholder farming systems.

Although Kenya experienced improved growth of the agricultural sector after the year 2000 withthe formulation of the National Agricultural Extension Policy (NAEP) with the objective to support participatory and pluralistic approach to extension delivery (Muyanga & Jayne, 2008), thereby bringing on board many players. This sectorial growth

after 2000 does not match the growth of smallholder agriculture. The growth is attributed to highly commercialized agriculture in medium to large scale agricultural production while small holder agricultural production continues to decline (Salami et al., 2010).

On the other hand, the decline in the smallholder contribution to agricultural growth has been largely attributed to ineffective agricultural extension and innovation, climate change and variability, poor infrastructure, access to input and output markets, access to credit and agricultural financing, and land tenure and access (Salami et al., 2010). While focusing on the ineffective agricultural extension and innovation systems, it would be worthwhile discussing how the Kenyan extension system is applied under different Agro Ecological zones. This study therefore assessed the influence of AEZ on the implementation of agricultural extension approaches by various agricultural institutions.

METHODOLOGY

A cross-sectional survey that combines both quantitative and qualitative study approaches was used to gatherrelevant information on extension approaches as applied by various institutions in different AEZs.

The study was conducted within the geographical mandate area of 12 agricultural institutions located in six counties: Nyamira, Kisii, Homa-bay, Migori, Kisumu, and Siaya counties.These counties are located in south western part of Kenya. The area has a total population of 5,442,711 persons comprising of 1,186,398 households, with 43% of them living below poverty line as per the 2009 censors (Kenya National Bureau of Statistics (KNBS), 2010).

This study used a proportionate stratified random sampling method to select at least 12 institutions engaging in agricultural extension spread across the 6 counties. The agricultural institutions were grouped according to the agricultural extension approaches they use to disseminate the agricultural technologies. The agricultural extension approaches include: Commodity Extension Approach; Private -Profit Institutions; Farming Systems Research Extension Approach; Input Suppliers Approach; Project Extension Approach; Government Extension Approach. At least ten agricultural extension officers affiliated to each institution was randomly identified and interviewed. Three farmers affiliated to each agricultural extension officer were also randomly identified and interviewed. This brought a total of 30 farmers per agricultural institution. At least one key informant was identified from each agricultural institution resulting into a total of 12 key informants who were mainly the top managers of agriculture in the respective institutions. A total sample size of 492 respondents comprising; twelve key informants, 120 agricultural extension personnel and 360 farming household heads were interviewed. AEZ was not considered in the sampling frame, however the agricultural institutions, farmers and the extension agents were asked to indicate their AEZs.

Desk top reviews,key informant interviews and focus group discussions (FGDs) guidedby checklistswere used to gather qualitative data. Structured questionnaires wereused to collect quantitative data from 120 farming households. One FGD was organized involving the 10 extension workers, and another 2 FGDs made up of at least 10 smallholder farmers affiliated to each agricultural institution. A total of 36 FGDs (12 for extension workers and 24 for smallholder farmers) made up of at least 10 participants were conducted. Hence a total of 120 extension workers and 240 smallholder farmers took part in the FGDs.The studytriangulated the information collected from both the extension personnel and farming households by collecting information from the 12 key informants and Focus Group Discussion (FGD) organized for each group of farmers and extension agents from each agricultural institution.

Data was analyzed using both descriptive and inferential statistics. For inferential statistics, Analysis of Variance (ANOVA) was used to test significant differences at0.05. Where there was significance difference, Tukey post hoc test was used to distinguish the differences among groups of institutions implementing the extension approaches.

Findings

Difference in approaches as applied by

zones

The study found out that there were significant differences in the application of extension approaches by agricultural

Table 1.

ecological zones

Extension Approach Aspects	ANOVA	
	F	Sig.
Who were involved the identification of the Dominant problem to Which the approach is to be applied as a strategic solution	49.284	.000
Rate target group participation in coming up with purposes the Approaches are designed to achieve	10.367	.000
Who are involved in the extension programme planning	15.816	.000
Frequency of conducting the planning meetings	2.654	.023
The general level of education of extension agents involved in the extension programme	3.438	.006
How well the extension agents involved in the extension programme rewarded	4.785	0.0001
The distribution of the programme extension agents in the programme location	21.980	.000

Ratio of female to male extension agents	1.954	.085
Frequency in which the extension agents working in the programme transferred to different location	1.004	.415
frequency of refresher training to the extension agents working the programme	4.452	.001
level of funding available to achieve the set extension programme objectives	9.229	.0001
frequency in which the extension agents meet farmers	10.195	.000

Identification of the most dominant problem to be solved by the extension approach

Participation of different stakeholders in situations analysis, diagnosis, programme formulation, and priority setting enhances technology uptake and adoption. A research conducted byOladele, (2010)on Research-extension-farmers linkage system on banana and plantain (Musa spp.) in Nigeria,indicate that farmers productivity improved more when there was a joint problem identification.However, Various stakeholder participation in different stages of extension program development could be influenced by various factors such as socioeconomic variables and climatic conditions(Suvedi, Ghimire, & Kaplowitz, 2017). The study therefore looked at the influence of AEZ on level of participation of different stakeholders on problem identification.

Analysis using Tukey post hoc test on who participates in identifying the most dominant problem to which the approach is applied as a strategic solution by agro-ecological zone indicated that, at Lower Midland 3-5 AEZ, an average of two group of persons (institutional staff and farmers) were involved the identification of the most dominant problem to which the approach is applied as a strategic solution. While at the Upper Midland 1-2, institutional staff, farmers, Subject Matter Specialist (SMS) and other stakeholders were involved in identifying the most dominant problem to which the approach is applied as a strategic solution.

A further analysis using spearman rho correlation coefficient two tailed test indicate that there is a strong positive relationship (r_s=0.620, p value = 0.0001) between the Agro-ecological zone and number of group of participants involved in identifying the most dominant problem to which the approach is applied as a strategic solution. This means that the higher one get up the agro-ecological zone the more the number of the group of participants involved in identifying the most dominant problem to which the approach is applied as a strategic solution. This findings confirms the earlier finding by Ochola, Basweti, Ogendi, Onyango, & Ochola, (2014) on the level of participation of researchers, extension agents and farmers on on-farm research trails conducted in Kisii - Kenya, indicating a relationship between participation and agro-ecological zones.

Participants involved in coming up with purposes of the extension approaches

One of the key characteristics of an agricultural extension approach is the process of identifying the key extension purpose, of which the number of different stakeholders involved in the process is pertinent. As indicated earlier, participation of different stakeholders in the initial stages of extension program development, improves technology uptake and adoption. However, participationof these stakeholders could be influenced by various factors such as AEZ. The study analysed the influence of AEZ on the number of group of different stakeholders participating in identifying extension purpose.

A Tukey post hoc test result indicate that, extension approach as applied in the Lower Midland 1 AEZ, involved at least two groups of participants (farmers and institutional staff) in designing the extension purpose. While, extension approach as applied in the lower midland 3-4 involved an average of four group of persons (institutional staff, farmers, SMS, and other stakeholders) in designing the purpose of extension purpose.

Further analysis using spearman rho correlation coefficient (two tailed test) indicated that, there was a weak positive correlation (rs= 0.269, p value = 0.0001) between the mean number of groups involved in designing extension purpose and AEZs. This means that the higher the AEZ, the extension approach involves more groups of persons in designing extension purpose.

Participants involved in the extension programme planning

Success of any agricultural extension program is largely dependent on it program planning process. Involving different stakeholder during this crucial stage is as important as conducting the process. How the process is conducted and the number of groups of persons involved is used as a distinguishing feature of Agricultural extension approaches. The number of persons involved in the program planning process could be influenced by other factors such as AEZ. Therefore, the study analysed the influence of AEZ on the number of groups of persons involved in program planning process.

Tukey post hoc test on the number of groups of persons involved in planning extension program and extension approach as applied in different agro-ecological zones indicates that, extension approaches as applied in the Lower Midland 1 AEZ, involved an average of one group of persons (farmers or institutional staff) in extension programme planning. While the agricultural extension approach as applied in the lower midland 3-5 involved up to an average of four groups of persons in planning extension programme planning.

Further analysis using spearman correlation coefficient (two tailed) test resulted into a weak negative correlation (rs= -0.154, p value =0.0001). This Means that the average number of group of persons participating in program planning reduces as one move to higher AEZs. This is in line with the argument that farmer participation is influenced by their situation (Kumba, 2003). However, it conflict in the direction of the level

of farmers' participation. As most publications (Barrett et al., 2012; Moon, Marshall, & Cocklin, 2012; Ochola et al., 2014) indicate that the level of stakeholder participation in extension increases with the increase in farmers' situation, this finding provides the reverse. This could be unique because it singled out only stakeholder participation in planning process of agricultural extension program. Which according to Kiara, (2011)agricultural extension programs rarely involved different stakeholders including the target group in the early stages of extension programme planning.

Frequency of conducting extension programme planning meetings

Frequency of conducting extension program planning meetings is also a key factor in distinguishing extension approaches. More planning meetings provide the participants the opportunity to review the plans for better result delivery. The frequency of conducting planning meeting is dependent on several factors such as availability of all the stakeholders, socio-economic factors, institutional factors and many more. The study analysed the frequency of holding planning meetings as conducted in different AEZ.

Agricultural extension approaches were applied significantly differently (F= 2.654, p value 0.023) in different AEZs in terms of the frequency at which different stakeholder involved in the extension programs hold their planning meetings. Tukey post hoc analysis result indicate that extension stakeholders implementing extension approaches in upper midland 3-4 hold their planning meetings at least every six months which was significantly different with frequency at which extension stakeholders implementing extension approaches in lower highland AEZ, who hold their planning meetings at least annually or when it is very necessary. However, there was no significant difference in the frequency at which stakeholders in the other AEZs hold their extension programme planning meetings.

Analysis by spearman correlation coefficient result indicates that, there was no significant correlation (r_s= -0.036 p value =0.497) between the frequency of holding extension program planning meetings and AEZs. Meaning the frequency of holding extension program planning meetings does not follow any pattern in relation to AEZs.

General level of education of extension agents involved in the extension programme

Level of education of extension workers is considered to be one of the most important factors in determining the effectiveness of extension workers. The study analysed the education level of extension worker in different AEZs. There was a significant difference (F= 3.438, df = 119, p value = 0.006) on the general level of education of extension agents implementing extension approaches in different AEZs. Tukey post hoc analysis result indicate that, extension agents implementing extension approaches in the lower highland AEZ were significantly more educated than the extension agents implementing extension

approaches in Lower Midland 1 and Lower Midland 2 AEZs. Further interrogation revealed that, the extension agents in the high potential areas were able to upgrade their studies to meet the challenges they are exposed to daily and also that they were highly motivated by the farmers they interact with in the course of their work.

Analysis by spearman correlation coefficient (two tailed test) result indicates that, there was a weak positive correlation (rs =0.294, p value = 0.001) between the level of education of extension agents and AEZs they work in. this could also be explained by the fact that extension agents implementing agricultural extension approaches at higher AEZs are more motivated and face challenges that would motivate them to further their education. This finding is also supported by research conducted on Integrated Pest Management in Honduras byWyckhuys & O'Neil, (2007).

Institutional reward system for agricultural extension agents

Reward as been considered one of the most important factors influencing the productivity of extension agents or any other employee (Massingham & Tam, 2015). The other factor that could also influence the performance of agricultural extension agents is the farmers' response. Farmers in different AEZs could reward agricultural extension agents by responding differently to agricultural advice. The study therefore analysed the influence of AEZs on perceived rewards to agricultural extension agents.

There was a significant difference (F = 4.785, p value = 0.0001) on how the agricultural extension agents implementing extension approaches in different AEZs are rewarded. Tukey post hoc test result indicate that, extension agents implementing extension approaches in Lower Midland 2 AEZ is significantly rewarded lower that the agricultural extension agents implementing extension approaches in Upper Midland 3-4 and Lower HighlandAEZs.

Analysis using spearman correlation coefficient results indicate that, there is a week positive correlation (rs=0.200, p value = 0.0001) between the rewards for the extension agents implementing extension approaches and AEZs. That is the higher the AEZ the higher the reward. This confirms the earlier finding that extension agents implementing extension approaches in the Lower Highland are significantly more educated than those implementing the extension approaches in Lower Midland 1 and 2 AEZs. Further analysis using spearman correlation coefficient indicate that there is a weak positive correlation (r_s=0.229, p value = 0.0001) between levelof education of extension agents and their reward systems. It can therefore be argued that the extension agents implementing extension approaches are rewarded according to their level of education.

Distribution of the programme extension agents in the programme location

The work load of agricultural extension agents can be determined by the number of households they are supposed to reach. Others determine the work load in terms of the geographical area the extension agents are supposed to cover. However, the

population density of Kenya is largely dependent on AEZ.ANOVA result indicated a significant difference (F=21.980, p value = 0.0001) in the distribution of extension agent per given number of households by AEZs. A Tukey post hoc analysis indicated that, Upper Midland 3-4 and Upper Midland 1-2 had a significantly higher number of extension agent per given number of households compared to the other AEZs. Spearman correlation coefficient two tailed test result indicates a weak negative correlation (rs= -0.241, p value = 0.0001) between the Agro Ecological Zones and number of extension agent per given number of household. This means that the higher the AEZs the lesser the number of extension agents representing a given number of households. A further inquiry into the matter reveals that the extension agents are employed as per the region not the number of households covered. Population density of the households are higher at highAgro Ecological Zone, that means that a given area in terms of size in a higher AEZ will have more households than the same area in a lower AEZ(Kenya National Bureau of Statistics (KNBS), 2010).

Frequency of refresher training to the extension agents working the programme

ANOVA result indicates that there is a significant difference in the frequency at which extension agents implementing extension approaches in different AEZs are retrained (refresher trainings) (Table 1). A Tukey post hoc test results indicate that, extension agents implementing extension approaches in Upper Midland 1-2 are retrained significantly more frequently compared to extension agents implementing the extension approaches in Upper Midland 3-4, Lower Midland 3-5 and Lower Highland. Spearman correlation coefficient two tailed test indicate that, there was no significant correlation between the AEZs and the frequency of refresher training for agricultural extension agents implementing extension agents in the zones. This means that the frequency of refresher training provided to extension agents implementing extension approaches follow no pattern. The refresher trainings are provided to the extension agents when it necessary. This conflicts with the earlier findings that extension agents implementing extension approaches in higher AEZs are significantly more educated. However, it can be argued that more education of the extension agents implementing extension approaches in higher AEZs is absolutely their individual efforts to better themselves, while refresher trainings are organized by the institutions to improve service delivery.

Level of funding available for extension programs

As indicated in Table 1, the ANOVA result (F= 9.229, p value = 0.0001) indicates that there was a significant difference in the level of funding available to implement extension approaches in different AEZs. A Tukey post hoc test result indicates that, extension approaches as implemented in Upper Midland 3-4 had significantly lower funding available, than Lower Midland 1 with significantly moderate funding available and

Lower Highland with significantly higher funding available for the implementation of the extension approaches. Spearman correlation coefficient two tailed test indicates that, there was no significant correlation between the AEZs and funding available to implement extension approaches. This means that availability of funding do not depend on the AEZs.

Frequency at which the extension agents meet farmers

ANOVA result (F=10.195, p value =0.0001) indicates that, there was a significant difference in the frequency at which extension agents implementing extension approaches in different AEZs meet their farmers (Table 1). A Tukey post hoc analysis indicates that, extension agents implementing extension approaches in Lower Highland visited their farmers significantly more frequently compared to extension agents implementing extension approaches in the other AEZs. Analysis using spearman correlation coefficient two tailed test indicated that, there was a weak positive correlation (r_s=0.224, p value =0.0001) between the frequency at which extension agent visit their farmers and AEZ. This could mean that the extension agents in higher AEZs visit their farmers more frequently compared to extension agents implementing extension approaches in lower AEZs. This confirms the earlier results indicating that, more groups of persons participate in designing extension purpose in the higher AEZs compared to the lower AEZs. This supports the argument that there are more agricultural activities in the higher AEZs thus forcing the extension agents to be more visible compared to the lower AEZs (Agrell, Stam, & Fischer, 2004; Seo, 2014; GoK, 2006).

Difference in Improved Agricultural Practices by the Small holder Farmers by AEZs

The level at which the farming households were able to improve their agricultural practices was used to determine the performance of agricultural extension. ANOVA result (F=37.791, p value = 0.0001) indicate that there was a significant difference in the level of improved of agricultural practices by farmers in different AEZs (Table 2). This could mean that agricultural approaches as implemented by agricultural institutions in different AEZs resulted in the farmers improving their agricultural practices at different levels.

Table 2: ANOVA results of improved agricultural practices by farmers in different AEZs

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	641.828	5	128.366	37.791	.000
Within Groups	1202.436	354	3.397		
Total	1844.264	359			

A further analysis using Tukey post hoc test indicates that, farmers in Lower Highland, Upper Midland 3-4, and Upper Midland 1-2 improved their agricultural practices significantly more compared to farmers in Lower Midland 1. Smallholder farmers in Lower Midland 1 also improved their

farmers in Lower Midland 3-5 (Table 3).

Table 3: Tukey post hoc test result on

by small holder farmers in different AEZs

AEZ	N	Subset for alpha = 0.05		
		1	2	3
Lower Midland 3-5	40	3.825		
Lower Midland 2	70	4.029	4.029	
Lower Midland 1	90		5.022	
Upper Midland 1-2	80			6.813
Upper midland 3-4	40			7.100
Lower Highland	40			7.225
Sig.		.993	.063	.858

Influence of AEZs on the level of improved agricultural practices by small holder farmers

Spearmen correlation coefficient two tailed test was used to determine the correlation between the level of improved agricultural practices as implemented by small holder farmers and AEZs. The test result (r_s= 0.568, p value = 0.0001) indicates that, there was a significant positive correlation between AEZs and the level of improved agricultural practices as implemented by the farmers in these AEZs. This therefore means that the AEZs influenced the way the agricultural approaches were implemented which in turn influenced level of improved agricultural practices by the farmers in these AEZs. That is the higher the agro ecological zone the more the small holder farmers improved their agricultural practices.

CONCLUSION

It can therefore be concluded that, agro ecological zone influenced the way agricultural institutions implemented the extension approaches. Agro ecological zones positively influenced the implementation of the following aspects, number of groups of persons participating in identifying the most dominant extension problem; the number of groups of persons involved in coming up with the purpose of extension approaches; level of education of extension agents implementing extension approaches; level of reward provided to extension agents implementing the extension approaches; the frequency at which extension agents implementing extension approaches visit their farmers.Agro ecological zone negatively influence the number of groups of participants involved in extension programme planning and number of extension agents representing a given number small holder households.

Due to these influences on the implementation of extension approaches, agro ecological zones influenced the output of the extension approaches by influencing the level at which small holder farmers were able to improve their agricultural practices. The finding of this study could be related to finding of other studies on the effect of agro – ecological zones on agricultural productivity such asAlemu, Chairatanayuth, Vijchulata, &

Tudsri, (2006); Alene, Manyong, Tollens, & Abele, (2007); Evenson & Mwabu, (2001); Kaizzi, Ssali, & Vlek, (2006); Tian et al., (2014) Ochola et al., (2014).

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RESEARCH ARTICLE

Effectiveness of Whatsapp Group regarding Information Dissemination among the Farmers

Arpita Sharma

Assistant Professor, Deptt. of Agricultural Communication,

College of Agriculture, GBPUA&T, Pantnagar-263145.

ABSTRACT

Present research study was conducted to assess the effectiveness of WhatsApp group. Seven Whatsapp groups had been created in seven blocks of Udham Singh Nagar District under ATMA. In these groups, total 100 farmers were selected from the seven groups through PPS sampling method. Results depicts that majority of farmers were interested in the information regarding fisheries, Government issues and projects and Marketing network and channels. Majority of respondents reported that Information on Government Schemes for farmers were useful for them followed by Seed and fertilizer and Advanced agricultural practices related information. Majority of respondents reported that whatsapp messages for farmers are accurate, Easy language, Easy to Understandable, Easy to read, Timeliness and Message with photographs is easy to understand.

Key words: Whatsapp, farmers, group

INTRODUCTION

In, India today also farmers are facing several difficulties in accessing information for better farming. Presently new and innovative ideas are coming into existence but farmers are facing massive problems to increase the crop production. Information dissemination through traditional approach provides limited number of coverage. Past researches have shown that in this era WhatsApp is useful communication technology in transfer of agricultural technology as an effective tool for agricultural development. **(Jain *et.al.* 2018)**. Whatsapp is a new and innovative form of information dissemination source which covers lots of people in less time period. WhatsApp application has recently emerged as a substitute of SMS in developing countries. It includes a variety of functions such as sharing live location, files, video, audio and text messages to any part of the world. (**Shahid, 2018).**

According to **Singh *et.al.* (2019)** WhatsApp as an important mobile based application is rapidly becoming popular among masses even in rural India. WhatsApp as an important mobile based application is rapidly becoming popular among masses even in rural India. According to **Jain *et.al*. (2018)** Indian farming community is at present facing multitude of problems to maximize crop productivity. The use of information is wide and multifarious.

Thus, we can say that whatsapp is a best and cheap medium to provide right information to the farmers at right time. To provide the information among the farmers, need assessment, Utilization behaviour of whatsapp and content analysis is necessary.

Present research investigation was conducted with the objectives of (1) To study the information needs and knowledge enhancement level of respondents on whatsapp. (3) To study the use of whatsapp messages by the respondents. (4) To study the content analysis of whatsapp messages.

METHODOLOGY

The study was undertaken to assess the effectiveness of WhatsApp group. Seven Whatsapp groups had been created in seven blocks of Udham Singh Nagar District. These groups had been created under the ATMA project. This group comprised the farmers of different villages in blocks as well as scientist. Total 100 farmers were selected from the seven groups through PPS sampling method. Data was analysed through proper statistical tools.

Table 1: Information Needs of Farmers

Sl.No.	Type of Information	Number	Per Centage
1.	Sericulture	45	45
2.	Beekeeping	87	87
3.	Fisheries	95	95
4.	Organnic farming	89	89
5.	Pesticide, Disease control	76	76
6.	Mushroom cultivation	86	86
7.	Vermicomposting	67	67
8.	Community Science	45	45
9.	Marketing network and channels	91	91
10.	Soil Testing	24	24
11.	Horticulture	47	47
12.	Floriculture	58	58
13.	Hybrid varieties of crop	88	88
14.	Environment issues management	68	68
15.	Wild Life management	77	77
16.	Government issues and projects	94	94

Results depicts that majority of farmers were interested in the information regarding fisheries (95 per cent), Government issues and projects (94 per cent) and Marketing network and channels (91 per cent). Total 89 per cent respondents want information on organic farming and bee keeping (87 per cent) followed by Mushroom cultivation (86 per cent) and Hybrid crop varieties (88 per cent).

Total 77 per cent respondents want to know about wild life issues followed by Pesticide, Disease control (76 per cent) and 68 per cent respondents want to know how to manage Environment issues.

Table 2: Knowledge enhancement through Whatsapp

Sl No.	Category	Respondents	Per Centage
1.	Government Schemes for farmers	98	98
2.	Harvesting and storage	87	87
3.	Medicine, pesticides, and weedicide	89	89
4.	Seed and fertilizer	95	95
5.	Crop production	91	91
6.	Advanced agricultural practices	93	93
7.	Harvesting and storage	87	87

Majority of respondents (98 per cent) reported that Information on Government Schemes for farmers were useful for them followed by Seed and fertilizer (95 per cent) and Advanced agricultural practices related information (93 per cent). Total 91 per cent respondents reported that information provided on crop production is useful for them followed by Medicine, pesticides, and weedicide (89 per cent). Most of the respondents (88 per cent) reported that Agricultural technology related information is useful for them followed by Harvesting and storage (87 per cent).

Extent of utilization of WhatsApp messages

Table 3: Extent of utilization of WhatsApp messages by the respondents

Sl. No.	Statement	Respondents	Per Centage
1.	Benefitted from the information received	98	98
2.	Share the information with relatives and friends	97	97
3.	Usefulness of pictured information against written messages	90	90
4.	Started selecting weedicide according to the message sent on the basis of crop	94	94
5.	Started selecting pesticide & insecticides acc. to the message sent on the basis of crop	93	93
6.	Practiced seed treatment by the message sent	96	96

Majority of respondents (98 per cent) reported that farmers are getting benefit from the information received through whatsapp followed by share the information with relatives and friends (97 per cent). Majority of farmers (96 per cent) told that whatsapp is useful for practiced seed treatment by the message sent followed by Started selecting weedicide according to the message sent on the basis of crop (93 per cent).

Content Analysis of Whatsapp Messages

Table 4: Content Analysis of Whatsapp Messages

Sl. No.	Content Analysis of Whatsapp Messages	Respondents	Per Centage
1.	Accurate	97	97
2.	Timeliness	93	93
3.	Easy language	96	96
4.	Easy to Understandable	95	95
5.	Easy to read	94	94
6.	Message with photographs is easy to understand	93	93
7.	Queries answered by the scientists	73	73
8.	Information provides the solution of problems	67	67
9.	Influential information	79	79

Total 97 per cent respondents reported that whatsapp messages for farmers are accurate (97 per cent), Easy language (96 per cent), Easy to Understandable (95 per cent), Easy to read (94 per cent), Timeliness and Message with photographs is easy to understand (93 per cent). Total 73 per cent respondents reported that whatsapp messages provides the facality of queries answered by the scientists followed by Influential information (79 per cent) and Information provides the solution of problems (67 per cent).

CONCLUSION

Whatsapp is a tool of social media which provides the platform to farmers for sharing the knowledge and asking the queries with the scientists. This tool covers lots of farmers all around the World. Thus, large farming community can be covered by the Whatsapp. Present research study concludes that Whatsapp is an effective and powerful medium of information dissemination. Thus, we can conclude that whatsapp groups are effective to disseminate the information among the farmers.

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RESEARCH ARTICLE

Availability of Market and Constraints faced by Lac Producers in Production of Lac

Roshana Hukare[1], M. K. Rathod[2], A. S. Dere[3] and R. R. Dharade[4]

1, 3 & 4 PG student 2. Professor & Head, Extension Education Section
College of Agriculture, Nagpur 441110 (M. H.), India

Corresponding author e-mail: hukareroshana123@gmail.com

ABSTRACT

This study has been undertaken to identify the constraints faced by the Lac growers in the district for the year 2019-20. The Gondia district was selected purposively due to maximum area coverage under lac cultivation. It is observed that lac producers are selling their lac to the agents of registered traders situated at Chhattisgarh and Madhya Pradesh. It seems to be the exploitation of lac growers in the study area. This may be because of the restrictions of forest department for open trading of lac in the Maharashtra State. Lac producers in the study area were mostly facing the natural problems like insect pest attack and climatic factors. Low price of lac was also critical problem faced by lac producers due to the less registered traders in Maharashtra. Most of villages are near the forest area so that transportation facilities are also main problem for tribal community.

Keywords: Market availability, traders, lac cultivation, tribal, KVK

INTRODUCTION

Lac is a natural, renewable, bio-degradable, versatile and non-toxic resin produced by the colonies of a tiny insect known as *Laccifer lacca*. These insects thrive on the tender twigs of specific host trees viz., palas(*Buteamonosperma*),ber (*Zizyphus mauritiana*), kusum (*Schleichera oleosa*), *Ficus spp*. etc.Lac serves as an important source of income to more than one million tribal families in India as well as foreign exchange earner for the country.

It is a high remunerative crop, paying high economic returns to the farmers and also foreign exchange to the country through its export. Lac is mainly produced in India, Thailand, Indonesia, parts of China, Myanmar, Philippines, Vietnam, Cambodia etc. and India is the largest producer of lac in the world. Lac production is required by the lac based industries, lac traders, producers, entrepreneurs and exporters. The cultivation of lac on a large number of hosts of different kinds is collected by numerous small growers. The variations in the yield, depending on the type and size of the host, the cultivation practices and climatic conditions, pose serious difficulties in the estimation of production of this insect based crop. India is a major producer and exporter. India has been producing 15000- 20000 MT during the last one decade. India contributes about 60% followed by Thailand in world lac

trade. Jharkhand, Chhattisgarh, West Bengal, Maharashtra, Orissa and Andhra Pradesh are the lac producing states in the country. Lac cultivation is the traditional practice in the district. Since ancient period Gondia district is known for lac cultivation. Periodically the production declines and people from the district have stopped lac cultivation. The decline is due to lack of technical knowledge, marketing facilities etc. The tribal has also chopped down the trees which affected the lac cultivation. Forest department in collaboration with tribal development department has initiated the Lac production programme in forest area. Mainly the tribals are the focus for upliftment and also as source of livelihood for the tribals. Given huge prospects of lac-industry in Gondia district, this study has been undertaken to identify the constraints faced by the lac growers in Gondia district.

METHODOLOGY

The present study was based on the exploratory research design and carried out in Goregoan and Sadak Arjuni tahsils of Gondia district. This area is selected purposively because lac production especially in the forest side villages is predominant in this region because of ample availability of quality natural resources as a host plant. From each selected tahsils namely Goregaon and Sadak Arjuni, 6 villages were selected randomly according to number of trees holding and from each selected tehsils 10 growers who were producing lac on minimum 10 host trees were selected by random sampling method and thus total 120 lac producers were selected for the study. In this way 120 respondents were selected randomly from 2 tahsils of Gondia districts.

RESULTS AND DISCUSSION

Table 1. Distribution of respondents according to availability of market

Sl.No.	Market Availability	Respondents (n=120)		
1	Market for selling of lac	**To the agents**	**To the registered traders**	
		120(100)	00(0.0)	
2	Procurement	**Home purchase by agentby agent**	**Selling by farmer to distant agent**	
		60(50.00)	60(50.00)	
3	Distance of market/agent (km)	**5 to 10**	**11 to 20**	**> 20**
		48(40.00)	00(0.0)	12(10.00)
4	Type of market	**Monopoly**	**Oligopoly**	**Monopolistic**
		30(25.00)	29(24.17)	61(50.83)

(Figure in parentheses indicate percentage)

It is concluded from Table 1 that 100 per cent respondents have expressed that market is available for selling of their lac, but through the agents. No registered traders were available to sell the lac. Procurement of lac was conducted through the agents by home purchase as expressed by half of the respondents (50%). Remaining 50 per cent respondents were selling their lac to distant market or agents. About 40 per cent of respondents were selling to agent available at 5 to 10 km area while 10 per cent respondents were selling their lac to the agents available at distance of more than 20 km. It is also observed from Table 15 that half of the respondents (50.83%) had monopolistic type of market that means only one buyer was there. It causes more competition between respondents for selling of their lac. While 25 per cent respondents were using monopoly type of market it means they are the only seller of their villages so that they got more price to their lac. And 24.17 per cent of respondents had oligopoly type of market i.e. buyers and sellers are available locally but in very few numbers.

It clearly indicated that lac producers are selling their lac to the agents of registered traders situated at Chhattisgarh and Madhya Pradesh. It seems to be the exploitation of lac growers in the study area. This may be because of the restrictions of forest department for open trading of lac in the Maharashtra State.

Table 2. Distribution of respondents according to the constraints faced by farmers

Sl. No.	Constraints	Respondents (n=120)	
		Frequency	Percentage
A	**Natural Constraints**		
1	Insect/pest attack	109	90.83
2	Climatic factors	54	45.00
B	**Financial Constraints**		
1	Financial problems	36	30.00
2	Transportation charges	10	08.33
C	**Technical Constraints**		
1	Lack of knowledge about improved equipment's and its operation	51	42.50
D	**Situational Constraints**		
1	Lack of open trade market	100	83.33
2	Non availability of equipment's required for primary processing of lac	42	35.00
E	**Selling Constraints**		
1	Low price of lac	90	75.00
2	Price fluctuation	45	37.50
3	Lack of transportation facilities	20	16.67

F	Other constraints		
1	Lack of contact between KVK scientist and lac producers	65	54.17
2	More no. of mobile tower causes less lac production	70	58.33
3	Non-availability of market at taluka level	10	08.33

Natural constraints

Almost all of the respondents i.e. 90.83 per cent (Table 2) had expressed the constraints about insect/pest attack in which nearly 50 per cent damage occur from internal feeder Eublemma anabilis and other insect like rats, squirrels, monkey, some birds, etc. followed by 45 per cent respondents had constraints about climatic factors like excess heat, excess cold, storms, heavy rainfall, etc (Marothia 2007).

Financial Constraints

About 30 per cent of respondents had financial problem for various activities related to lac production. It could be the cause of less land holding and low price of lac followed by 8.33 per cent of respondents facing the problem related to transportation charges due to non-availability of market near villages.

Technical constraints

About 42.50 per cent respondents has expressed about lack of knowledge about improved equipment's and its operation to be used in lac production as they follow traditional method for lac production which leads to the lower production (Sujatha 2006).

Situational constraints

Lack of open trade market was the major situational constraint expressed by 83.33 per cent respondents. Lac producer in the Gondia district has to sell their produce to the agents which may lead to their exploitation. Another situational constraint was non-availability of equipments required for primary procession of lac (35%) viz. crusher, grader, winnower, washer etc. this could help the farmers to get the quality lac and will receive better price.

Selling constraints

75.00 per cent of respondents have expressed constraint about low price of lac due to non-registered traders in Maharashtra and low grade produce, followed by 37.5 and 16.67 per cent of respondents who were facing constraints about price fluctuation and lack of transport facilities, respectively. Price fluctuation occurs due to the marketing demand and delay in brood emergence.

Other specific constraints

Other constraints faced by lac producers were found that 54.17 per cent respondents has expressed constraints about lack of contact between KVK scientists and lac producers it may be the effect of location of KVK so far from villages and more contact with agriculture department than KVK followed by more number of mobile tower causes less lac production as perceived by 58.33 per cent respondents. Plausibly settlement of insect may not be

happened, there is not concrete reason that it is occur due to mobile tower but it may due to change in climatic condition followed by non-availability of market at taluka level (8.33%) due to astringent policies of state government and forest department traders are not keen to buy a license and mostly they prefer to go to other state. mobile tower causes less lac production as perceived by 58.33 per cent respondents. Plausibly settlement of insect may not be happened, there is not concrete reason that it is occur due to mobile tower but it may due to change in climatic condition followed by non-availability of market at taluka level (8.33%) due to astringent policies of state government and forest department traders are not keen to buy a license and mostly they prefer to go to other state.

CONCLUSION

It is concluded that 100 per cent respondents have expressed that market is available for selling of their lac, but through the agents. No registered traders were available to sell the lac. Lac producers in the study area were mostly facing the natural problems like insect pest attack and climatic factors. Low price of lac was also critical problem faced by lac producers due to the less registered traders in Maharashtra.

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RESEARCH ARTICLE

Gender issues in Rice Based Farming System in North Eastern Coastal Plain Zone of Odisha

Smruti Jhara Jena[1], Indira Priyadarsini Pattnaik[2], Kajal Srichandan[3] & Aditya Prasad Kanungo[4]

1 & 2 PG Scholar 3 Lecturer & 4 Professor, Department of Agricultural Extension and Communication, Institute of Agricultural Sciences,
Siksha O Anusandhan University Bhubaneswar, Odisha
Corresponding Author Email id: smrutijena39@gmail.com

ABSTRACT

Women participate in almost all the farming operations which have traditionally been left to women which are tedious, time consuming, labour intensive and involve more drudgery. The present study was undertaken in five villages namely Arjunpur , Nahanga, Amaria , Baghua and Dungura of Khaira block in Balesore district of Odisha with a view to study the socioeconomic profile, decision making behaviour of farm women and gender issue in the farming system with a sample size of 120 farm women as respondents. Both purposive and random sampling technique was followed for selection of district, block, villages and respondent farm women. The data were collected by personal interview method by using pretested interview schedule. The measure findings of the study revealed that majority (44.16%) respondents belonged to middle age group with primary school education (42%), nuclear family (86.66%), medium (58.34%) extension participations, medium (55.00%) level of innovativeness, medium (80.00%) level of scientific orientation and medium level (65.84%) of risk orientation. With regard to decision making behaviour 86.34percentage take joint decision with their husbands on different farm operations. The gender issues identified in order of importance were involvement in field cleaning(100%),weeding (100%), threshing(100%),cutting(100%),winnowing(100%),cleaning and storing (100%) by the farm women. With regard to livestock activities cleaning , collection of fodders and feeding fully (100%) was carried out by women farmers. In fishery 88% were involved in feeding the fishes. Though in respect of their activity involvement in farm sector and significant contribution, they have not been duly recognised and appreciate by their work, besides efficiency in farming especially in the areas of weeding , harvesting, and post harvest management practices. The planners policy makers and government agency may consider these important issues and take necessary step to conduct exposure visit , trainings in agriculture and allied sectors to enhance production , capacity building and to enable the farm women to play an influential role in rice based farming system as well as non farming sectors.

Keywords: Tedious, Farmwomen, Innovativeness, Decision making behaviour, Winnowing, Rice based farming

INTRODUCTION

In India women plays a vital role in agricultural operation starting from sowing of seeds to harvesting and marketing of the produce. Inspite of their active involvement and significant contribution in farm sector, they have not been duely recognised and appreciated for their work. Studies have found that 70-80 percent work is done by women in farm sector rice production they play a significant role which is of paramount importance. Women participate in almost all the farming operations which have traditionally been left to women and these are tedious, time consuming , labour intensive, and involve more drudgery. Against this background a study was undertaken entitled "Gender issue in rice based farming system in north eastern coastal plain zone of Odisha" with the objectives

- To study the socio economic profile of women involved in the rice based farming sector
- Decision making behaviour of farm women Gender issue in the farming system.

METHODOLOGY

The study was conducted in Noeth Eastern Coastal Plain Zone. Out of three districts namely Jajpur, Bhadrak and Balesore under North East coastal plain zone of Odisha, Balesore district was selected randomly for the study of Balesore district , Khaira block was selected randomly. Khaira block consist of 30 panchayats out of which 3 panchayats namely Bartana, Dungura and Palasa were selected randomly .From each selected panchayat 5 villages namely Arjunpur ,Amaria, Baghua, Nahanga, and Dungura were selected purposively, as these villages were dominated by rice based farming system ie: rice-animal husbandary-fishery. Proportionate random sampling followed for selection of women farmers involved in rice based farming sector. Total 120 farm women were selected as respondents of the study. The response of the selected respondents were obtained through a structured interview schedule specially developed for the purpose. The data was collected and were processed and analysed through suitable statistical tools viz frequency, percentage, mean score, standard deviation and rank.

RESULTS AND DISCUSSION

Table 1 Socio economic profile of the respondents (N=120)

Variables	Frequency (f)	Percent (%)
Age		
Young age(upto30 years)	53	44.16
Middle age(31-50 years)	31	25.84
Old age(Above50 years)	36	30.00
Education		
Illiterate	19	15.83
Can read and write	13	10.83
Primary school	51	42.00
High school	31	25.84
College and above	6	5.00
Family type		
Single	16	13.34
Nuclear	104	86.66
Extension participation		
Low(MS<10.66)	30	25.00
Medium (MS 10.66-23.71)	70	58.34

High(MS>23.71)	20	16.66
Innovativeness		
Low(MS<12.19)	34	28.34
Medium (MS 12.19-19.63)	66	55.00
High(MS>19.63)	20	16.66
Scientific orientation		
Low level (MS<36.31)	96	80.00
Medium level (MS 36.31-44.26)	18	15.00
High level(MS>44.26)	6	5.00
Risk orientation		
Low level (MS<20.39)	18	15.00
Medium level (MS 20.39-26.20)	79	65.84
High level (MS>26.20)	33	19.16
Land holding		
Upto 1 ha	39	32.50
1.1-2 ha	31	25.84
2.1-4ha	34	28.33
Above 4 ha	16	13.33
Annual family income		
Low (upto 50,000) (MS<13.12)	37	38.84
Medium (50,000-1lakh) (MS 13.12-20.64)	51	42.50
High (above 1 lakh) (MS >20.64)	32	26.66

It revealed from table 1 that majority (44.16%) respondents belonged to middle age group with primary level school education (42%), nuclear family system (86.66%), medium (58.34%) extension participation, medium (55.00%) innovativeness, medium (80.00%) scientific orientation, medium (65.84%) risk orientation, majority (32.50%) belonged to small land holding category up to 1ha with annual family income between Rs. 50,000 to Rs.100000(42.50%).

The findings depicted that most of the respondents belong to young age group and young age group people are more active and enthusiastic about their work and more prone to change.Majority farm women were upto primary level education which indicates the importance of women education instead of remaining illiterate. The nuclear family system might be due to the cultural change of the society. More than half of the respondents medium to high extension participation due to their connectivity with different extension activities conducted by various developmental organisations. Innovativeness the respondent better utilisation of resources and there constant contact with various departmental agencies. As most of the farm women are younger in age group with primary level of education therefore they are more oriented to scientific farming. The medium level risk orientation of the respondents might be due to the fact that right information, assured assistance and surety to get success in their present farming system which develops the risk taking behaviour of the respondents. Medium level family income of the respondent due to the fact that they are more engaged with rice based farming system and gets supplementary income from livestock and fishery. The findings are partly corroborated with the findings of Mishra, etal (2012), Sailaja etal (2008) and similar to the findings of Rao (2006)

TABLE- 2 Decision making behaviour of the respondents (N=120)

Categories	Frequency (f)	Percentage (%)	Rank
Self decision making	3	2.5	III
Depends on husband to take decision (Joint decision)	103	86.34	I
Husband+ Family members	14	11.16	II

Table 2 depicted that the majority of farm women (86.34%) take joint decision about their farming system followed by husband and family members (11.16%)and self decision (2.5%). This might be due to the fact that as agriculture is a vulnerable sector and to avoid risk in farming they prefer to take joint decision along with husbands or might be due to male dominated society. The findings are in conformity to the findings of Sharma et al (2012), Sailaja et al (2003)

TABLE 3- Involvement of farm women in different activities of rice based farming systems N=120

Sl. No.	Items/Activities	Frequency (f)	Percentage(%)	Rank
1	**Rice production**			
	Land preparation	–	–	–
	Nursery Management	80	66.66	II
	Sowing /Transplanting	120	100	I
	FYM/Fertilizer application	20	16.66	III
	Plant protection measure	–	–	–
	Weeding	120	100	I
	Harvesting /Cutting	120	100	I
	Winnowing	120	100	I
	Cleaning and storing	120	100	I
	Marketing	15	12.5	IV
2	**Animal Husbandry**			
	Cattle shed cleaning	120	100	I
	Feeding	120	100	I
	Cattle diseases management	18	15.00	III
	Fodder collection	120	100	I
	Marketing	35	29.16	II
	Preparing milk by products	120	100	I
3	**Fishery**			
	Pond management	35	29.16	III
	Feeding	105	88.00	I
	Netting	–	–	–
	Marketing	42	35.00	II

The table 3 indicated the involvement of farm women in different activities of rice based farming system i.e. in rice production – animal husbandry – pisiculture. In rice production activities it was observed that sowing, transplanting , weeding, harvesting/ cutting, winnowing, cleaning and storing sowed 100per-cent involvement of the farm women and ranked 1st in order of their involvement followed by nursery management (66.66%), FYM and fertilizer application (16.60%) and marketing of the produce (12.5%) which ranked 2nd , 3rd and 4th respectively. Under animal husbandry cattle shed cleaning , feeding ,fodder collection and preparation of milk by products showed 100 percent involvement of women and each ranked 1st followed by marketing (29.16%) and cattle diseases management which ranked 2nd and 3rd respectively in order of involvement. In fishery feeding is done by majority (88.00%) farm women followed by marketing (35.00%) and pond management (29.16%) which ranked 1st 2nd and 3rd respectively as per their involvement. The above table depicts that in rice based farming system ie: rice production – animal husbandry – fishery the farm women play a vital role along with their day to day other activities. The above findings Conformity with the observation of Sailaja et al (2003), Sharma et al (2012), Singh et al (2012) and Mishra et al (2012).

CONCLUSION

Women constitute about 50 per cent of country's population and they deserve all the right to be an inclusive part and have equal say in the decision making of the country but since age they are denied of the rightful position and forced to live as suppressed category in the society. The decades of negligence and suppression to women can be changed only through social political and technological empowerment of women in the country. Therefore regular and effective training and capacity building skill oriented programme may be provided to increase their motivation, scientific aspiration, innovativeness and risk bearing ability and to develop self confidence. Most importantly social support from family members, friends, and neighbourhood can help women to act more efficiently and powerfully in the agriculture and allied sectors to lead a better quality life. The policy makers and planners should focus on these to mitigate gender issues in agriculture and allied sectors.

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RESEARCH ARTICLE

Economic Analysis of Carp Culture: A Study from West Godavari

M. K. Das[1], H. K. De[2], G. Sreenivasulu[3] and S. Shasani[4]

ICAR-Central Institute of Freshwater Aquaculture, Bhubaneswar, Odisha- 751002

Corresponding author's E mail-bhuthnath@gmail.com

ABSTRACT

The present study was conducted in West Godavari district of Andhra Pradesh to analyze the cost and returns of composite carp culture. Data were collected from 102 fish farmers through personal interview. Farmers had an average pond area of 5.82 acre and mean fish yield was found to be 8.23 t/ha/yr. Rate of return on total investment (ROI) and Benefit-Cost ratio (B: C ratio)from grow out culture was worked out as 66.33%; 1.66 respectively. Supplementary feed constituted the maximum share (41.57%) in cost of production of fish followed by value of pond (21.45%). The farmers of the district are practicing intensive carp culture and are able to get a handsome production due to large land holdings and high level of use of inputs. The study implies that better adoption of technology by the farmers and input intensive cultural practices contributed to higher productivity as well as returns.

***Key Words**:* Composite carp culture, Economics, Benefit-Cost ratio, Rate of return on total investment

INTRODUCTION

Fisheries and aquaculture remain important sources of food, nutrition, income and livelihoods for hundreds of millions of people around the world (FAO, 2016). Presently India is the second largest fish producing and second largest aquaculture nation in the world after China. Inland fisheries and aquaculture constitute the main components of the fisheries sector in India from production point of view contributing 71% of total fish being produced in the country. The inland fishery has grown in absolute terms, but the development in terms of its potential is yet to be realized as the sector is extremely diverse and dynamic.The freshwater aquaculture has also emerged as a major contributor towards inland fish production with a share of 80% (DADF, 2019).More of fish food is being demanded over a period of time which has encouraged farmers to produce more aquaculture products to meet these demands (Kumar *et al.*, 2005).The consumption demand for fish is rising over a period of time primarily due to the growing population, expanding urbanization and changing food habits. In future, freshwater aquaculture sector holds the key as around 85 per cent of the additional food fish demand could be met from the freshwater sector. The research and technological development in the field of seed production, culture practices, feed development are driving this sector upwards.

The sector has been successful in utilizing many underutilized and degraded water bodies and ecosystem. Contribution of investment in the sector by the commercial farmers is significant. Despite past performance of the sector, there are ample of opportunities for doubling fish production by 2030 and quadrupling production by 2050 (CIFA, 2015).Foreseeing high potential, "Blue Revolution" has been initiated in the fisheries sector in order to focus mainly on increasing fisheries production and productivity from aquaculture and fisheries resources, both inland and marine with the objectives of ensuring food and nutritional security, generating employment and export earnings, ensuring inclusive development and empowering fishers and aquaculture farmers (DADF, 2019). The Union Government has also recently launched Pradhan Mantri Matsya Sampada Yojana to turn India in to a hot spot for fisheries and aquaculture product through appropriate policy, marketing and infrastructure support. Government of India has set a target of 22 MT fish production by the year 2024-25.

Andhra Pradesh is a state in the south-eastern coastal region of India. It is bordered by Telangana to the north-west, Chhattisgarh to the north, Odisha to the north-east, Tamil Nadu to the south, Karnataka to the west and the Bay of Bengal to the east. It has the second longest coastline in India after Gujarat, of about 974 km. Andhra Pradesh is the major producer of fish in India with the highest production of 34.49 lakh tones of which inland fish production has a share of 28.45 lakh tonnes i.e 82.5% (GOI, 2018).Being endowed with varied resource and potential, the state is able to provide vast opportunities in fisheries sector in general, freshwater sector in particular. Composite carp culture technology, the stocking of different carp species viz., catla, rohu and mrigal (Indian major carps) together with three other exotic carps viz., silver carp, grass carp and common carp having different feeding habits, is one of the most widely adopted technology in fish farming. Polyculture of compatible fish species is the most ecologically sound fish culture practice which facilitates efficient utilization of all ecological zones within the pond environment enhancing the maximum standing crop and the empowerment for rural youth, which in turn will enhance food and nutritional security (Prakash *et al*., 2018). Right from seed production to harvest, freshwater fish farming offers number of enterprises for the fish farmers as well as the rural youth. This study was conducted with an aim to estimate cost structure and returns of composite carp culture in West Godavari district of Andhra Pradesh.

METHODOLOGY

Study area

For the present study, West Godavari district of Andhra Pradesh was selected randomly. West Godavari district is one of the nine districts in the coastal region of Andhra Pradesh. The administrative headquarters of the district is situated at Eluru. As of 2011 census of India, the district has an area of 7,742 km^2 and a population of 3,936,966. It is bounded by Krishna district on the west, East Godavari district on the east, Bay of

Bengal on the south and the state of Telangana on the north. West Godavari district is well developed in fisheries with resources of fishery wealth in marine, brackish water, reservoir and inland fisheries. It is in fact the aqua hub of Andhra Pradesh. Kolleru Lake present in this district is one of the largest fresh water ecosystem in India providing a greater opportunity for expansion in fisheries sector. Blue revolution is well expressed in this district through a multi-pronged approach which includes the introduction of fast-growing, high-yielding species. For the year 2017-18 this district, achieved 1051754 tons of Fish production-GVA Rs.10088 crores. For the year 2018-19, a target was set for 11.50 Lakh MT with GVA of 15,000 crores. From the district four blocks namely Bhimadole, Bheemavaram, Narsapuram and Veeravasam block were selected after discussion with the fishery officials of the district. Selection of village and respondents was done through multistage random sampling. A total of 102 data were collected.

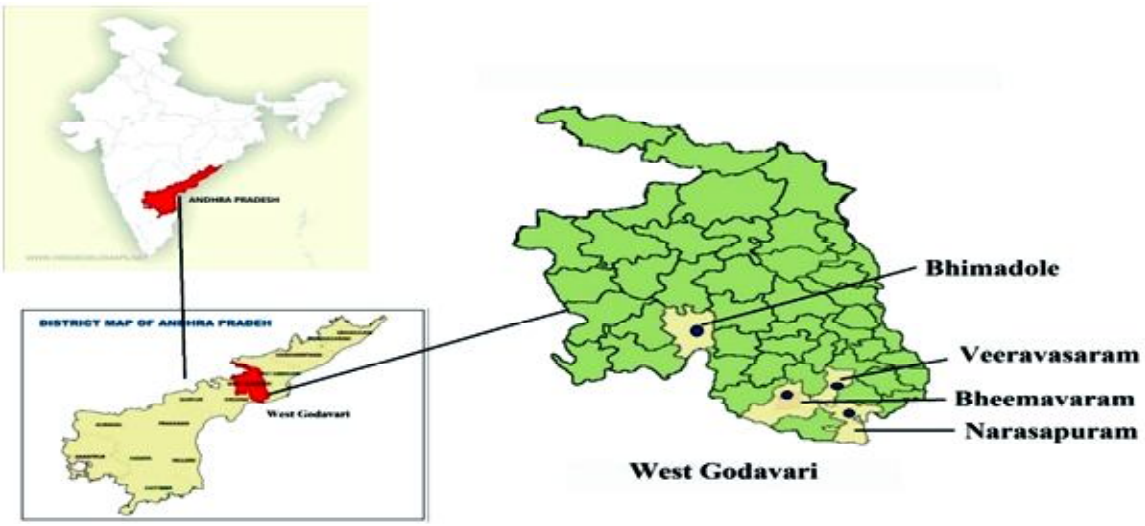

Fig. 1. Location of study area

Measurement and Scoring pattern of variables

For measuring the adoption level, a total number of 13 practices that constitute composite carp culture technology were selected. The farmers were asked to respond whether they adopt or do not adopt the practices. Score of 1 and 0 were assigned to adoption and non-adoption of the technology respectively. Therefore, maximum possible score was 13 for each respondent. From the adoption score of each of the respondent, adoption quotient was computed by using the adoption quotient formula developed by Pareek and Chattopadhyaya (1966). Accordingly, the following formula was used to calculate the general adoption level.

Adoption quotient = No. of practices adopted/ No. of practices advocated x 100

Thus, after computing individual adoption quotient scores, the respondents were grouped into three categories with mean and standard deviation as measure of

check. The three categories are- low (< Mean - SD), medium (Between Mean ± SD) and high(>Mean + SD).

Economic Model

This study has employed Gross Margin Analysis (GMA) tool to measure the profitability from the practice of composite carp culture. GMA is a vital tool in measuring the level of farm profitability. A Gross margin (GM) is the difference between Gross income (Total Revenue) earned by the fish farm and the total variable costs required to produce the output (Firth, 2002). The total revenue is the total output multiplied by price per unit of fish. The variable costs are those costs that vary in direct proportion to the level of production. The total variable cost includes costs on inputs such as: fertilizers, transportation, labour input, feeding cost and cost of other inputs like fingerlings etc. The above discussion can be represented in the following equation as follows:

GM = TR - TVC

Let us suppose, GM = Gross Margin;
TR = Total Revenue; TVC = Total Variable Cost; TFC = Total Fixed Cost; S = Selling Price per unit; Q = Quantity Produced & Sold; V = Variable cost/unit

The rate of return on total investment can also be calculated to know the profitability of the proposed scheme as follows:

ROI = (Net Margin/ Total Cost) * 100

Where Net Margin = Gross Margin – Non-operating Expenses

In the above formula Net margin is determined after paying non-operating expenses like interest on loan etc.

RESULTS AND DISCUSSION

Adoption level of the fish farmers

It is clearly depicted from table 1 that 73.53 percent respondents were found in the category of medium adoption whereas, 17.65 percent of them had a high level of adoption followed by low level of adoption (8.82%) of the recommended practices of composite carp culture technology. Socio-economic status, entrepreneurial interest, organized market are among the factors that determine growth and development of any sector. Aquaculture sector is not an exception. Fish farmers of West Godavari district reported to have obtained mean yield of 8.23 tonnes/ha/year from fish pond. The potential yield is 8 t/ha/yr. (ICAR, 2009) and field demonstration yields were obtained from the demonstration ponds under Fish Farmers' Development Agency is 3.0 t/ha/yr. (DADF, 2019). However, intensive carp culture systems have evolved with production level of 10-15 t/ha./yr. in few pockets in Andhra Pradesh, Punjab and West Bengal. Average yield realization of 8.23 t/ha/yr of the **respondents quite high** as compared to national average. This has become possible because of entrepreneurial interest, level of investment and use of advanced technology. Shivakumar *et al*., (2014) compared the production and economics of three types of fish culture methods namely commercial feed based culture system, conventional feed based

culture system and extensive method without feed. He found that highest production was recorded for commercial feed based culture system when compared to other two systems. The report also stated that more gross income was realised for commercial feed based system and the lowest was accounted for extensive method without feed, which clearly shows that the profit is more in commercial feed based system.

Table 1: Distribution of respondents based level of adoption (n=102)

Dependent Variable	Category	Frequency	Percentage (%)
Adoption level	Low (<52.27)	9	8.82
	Medium(52.27- 88.15)	75	73.53
	High (>88.15)	18	17.65

Economics of composite carp culture (1 ha of pond area), 2020

An economic analysis was done to analyze the expenditure pattern and profitability of composite carp culture technology. Cost of composite carp culture includes both operational as well as fixed cost. Here the operational cost includes the fish seed cost, cost of labour, maintenance, manures and fertilizers, lime, supplementary feed. Fixed cost includes the lease value of ponds and interest on fixed capital. The costs, returns and profit in composite carp culture were computed on per hectare basis and presented in Table 2.

Table 2: Economics of composite carp culture for 1 ha of pond area

Particulars	Amount (Rs.)
No. of respondents	102
Total Area (ha)	593.70
Avg. area (ha)	5.82
Lease (Rs)	118094.20
Pond prep (Rs)	53297.96
Seed cost (Rs)	50138.12
Lime (Rs)	3065.52
Inorganic fertilizers	DAP (Rs)	2814.03
	SSP (Rs)	2087.67
	Urea (Rs)	1868.25
Organic manure	Cow dung (Rs)	518.40
	Vermi compost (Rs)	538.99
	Poultry manure (Rs)	6842.60
	Additives (Rs)	11723.09
Feed	Pelleted feed (Rs)	86916.62
	Rice bran + oil cake (Rs)	141905.80
	Disease (Rs)	12839.99
Cost of Harvesting (Rs)		11672.56
Cost of Labour, maintenance & misc. (Rs)		46163.89
Total variable cost (Rs)		432393.49
Cost of production (Rs)		550487.69
Total production (Kg/ha)		8323.73
Total revenue (Rs)		915610.58
Gross Margin (Rs)		483217.09
Net Margin (Rs)		365122.89
Rate of return on total investment (ROI)		66.33
B:C ratio		1.66

From Table 2 it is evident that average area of the respondents was 5.82 acre. Average expenditure on lease value of pond, pond preparation, seed and lime were 118094.2, 53297.93, 50138.12 and 3065.52 rupees respectively. Expenditure on inorganic fertilizer and organic manure were 6769.95 and 19623.08 rupees respectively, which shows that use of organic manure like poultry manure and other additives, are mostly practiced by the farmers to fertilize the ponds rather than inorganic fertilizers. Expenditure on pelleted feed and Rice bran + oil cake was 86916.62 and 141905.80 rupees respectively. As the ponds are intensively cultured throughout the year disease is prevalent in the region and an average amount of Rs.12839.99 was spent for this. Average expenditure on harvesting and labour is 11672.56 and 46163.89 rupees respectively, which shows the involvement of higher labour force is due to larger land holdings. The cost of production per ha. was Rs 550487.69 and average production from grow out culture was 8.23 t/ha/yr. The ROI was found 66.33% whereas the B: C ratio was worked out 1.66. It indicates that the farmers are getting a significant return from composite carp culture. As the farmers of Andhra Pradesh operate large scale farms, the fishes were usually harvested at a time in bulk, segregated into different size groups and marketed to different states. Most of the harvested fish from Kolleru to Odisha, West Bengal, Assam, Tripura and other north-eastern states, besides Bangladesh and Gulf countries (Abraham *et al*., 2010). Hussain *et al.,* (2013) in their study observed that production of fishes and profitability is more than double in CFC (composite fish culture) over the local practice which is because of adoption of good management practices.

Percentage share of inputs in cost of production (n=102)

The share of various inputs in the variable cost was estimated. It is observed that (41.57%) constituted the maximum share towards the cost of production of fish. Other inputs in decreasing order of share were lease value of pond (21.45%), pond preparation (9.68%), seed cost (9.11%), cost of labour, maintenance and miscellaneous (8.39%), and organic fertilizer (3.56%). Disease and cost of harvesting contributed 2.33% and 2.12% respectively towards the production cost. The percentage share of inputs in cost of production is presented in Figure 2.

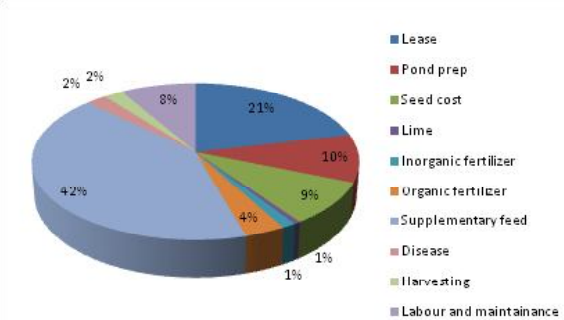

Figure 2. % Share in Cost of Production

CONCLUSION

The study revealed composite carp culture, as an economically viable option leading to impressive benefit-cost ratio. The farmers of the district are practicing it in an intensive way using all the necessary inputs. It is very interesting to know that the farmers are able to get a yield nearly equal to that of

research station. This may be due to the reason of adopting all the recommended practices of the technology. Besides meeting the demand of fish in the area, fish are also being exported outside of the state. With the flagship schemes like Blue revolution, PMMSY etc Govt. of India is extending enormous support for fisheries sector development, the fish farmers will utilize incentives/benefits to the maximum extent. Impressive returns from this venture will surely attract more unemployed youth thereby creating employment opportunities and income.

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RESEARCH ARTICLE

e-NAM wareness and Constraints faced by the Farmers in Marketing of Farm Produce

H. P. Sonawane[1], V. S. Shirke[2] and V. J. Tarde[3]

1. Associate Professor, 2.Director Extension Education& 3. Professor

1 & 3 Department of Agril. Extension & Communication, College of Agriculture, Pune, 2. MCAER, Pune

ABSTRACT

Agriculture marketing is administered by the States as per their agri-marketing regulations, under which, the State is divided into several market areas, each of which is administered by a separate Agricultural Produce Marketing Committee (APMC) which imposes its own marketing regulation (including fees). This fragmentation of markets, even within the State, hinders free flow of agri commodities from one market area to another and multiple handling of agri-produce and multiple levels of mandi charges ends up escalating the prices for the consumers without commensurate benefit to the farmer. NAM addresses these challenges by creating a unified market through online trading platform, both, at State and National level and promotes uniformity, streamlining of procedures across the integrated markets, removes information asymmetry between buyers and sellers and promotesreal time price discovery, based on actual demand and supply, promotes transparency in auction process, and access to a nationwide market for the farmer, with prices commensurate withquality of his produce and online payment and availability of better quality produce and at morereasonable prices to the consumer.

INTRODUCTION

In this century Information Technology drives prime attention because of its faster connectivityand easy access. Recognizing this fact Government of India and Department of extensioneducation connecting farmers to Digital platform. One of such connecting dot is e-NAM. NationalAgriculture Market (NAM) is a Pan-India electronic trading portal which networks the existingAPMC market to create a unified national market for agricultural commodities. The NAM Portalprovides a single window service for all APMC related information and services. This includescommodity arrivals & prices, buy & sell trade offers, provision to respond to trade offers, amongother services. While material flow (agriculture produce) continue to happen through market, anonline market reduces transaction costs and information asymmetry.

NAM addresses these challenges by creating a unified market through online trading platform,both, at State and National level and promotes uniformity, streamlining of procedures across theintegrated markets, removes information asymmetry between buyers and sellers and promotesreal time price discovery, based on actual demand

and supply, promotes transparency in auctionprocess and access to a nationwide market for the farmer, with prices commensurate withquality of his produce and online payment and availability of better quality produce and at morereasonable prices to the consumer.

Prime Minister Narendra Modi launched an electronic trading platform, the national agriculturemarker — e-NAM for farmers to sell their produce at 'Gramoday se Bharat UdayAbhiyan' inMhow, Madhya Pradesh (Source: PTI) on the occasion of 125th anniversary of B R Ambedkar.

1.1 Benefits of e-NAM

A national e-market platform for transparent sale transactions and pricediscovery initially in regulated markets. Willing States to accordingly enact suitable provisionsin their APMC Act for promotion of e-trading by their State Agricultural MarketingBoard/APMC.Liberal licensing of traders / buyers and commission agents by Stateauthorities without any pre-condition of physical presence or possession of shop / premises in themarket yard. One license for a trader valid across all markets in the State.

Improvement in the market fee collection by means of accounting all thetransactions that are taking place in the market. Reduction in manpower requirements astendering / auctioning process takes place through the system. Analysis and forecasting of thearrivals and prices. Availability of the activities of each APMC on the website directly. Therefore, the present study entitled, Awareness of farmers about e-NAM (National Agriculture Market was undertaken by following objectives.

OBJECTIVES

1. To study the Personal, Socio-economic and Psychological characteristics of respondent farmers trading at APMC, Ahmednagar.
2. To study the organizational and functional pattern of e-NAM.
3. To study the extent of awareness of respondent farmers regarding e-NAM.
4. To study the relationship between Personal, Socio-economic and Psychological characteristics of respondent farmers with their awareness regarding e-NAM.
5. To study the constraints faced by respondent farmers regarding trading activities of e-NAM and obtain suggestions for overcoming the constraints

METHODOLOGY

The present study was conducted in Ahmednagar district of Maharashtra during 2017-2018. This district was randomly selected because out of 35 operational APMC conducting e-NAM scheme, Ahmednagar APMC was with larger market (6059 farmers are registered at gate pass for e-trading and few participated) and near from Pune. Total 120 respondent farmers randomly selected for study and data were collected from respondents by conducting personal interview, Schedule which was pre tested before using it for the collection of data. The qualitative data were converted into quantitative form. The independent and

dependent variables were measured by assigning score.Keeping in view the objectives of study, the data were tabulated and analysed using appropriate statistical measures such as mean, standard deviation and association.

RESULTS

1. Profile characteristics of the respondents:

Majority of the respondents were middle aged (63.33%), with diploma or graduation level of education (47.14%), semi-medium land holding (55.83%), fair cropping pattern (45.83%), medium social participation (80.33%), annual income up toRs. 76,001 to Rs.3,90,000 (60.84%).Medium sources of information (85.83%), medium marketable surplus (75.00%), medium market orientation (55.83%), medium risk orientation(63.33%) and medium technosavviness (77.50%).

2. Organizational and functional pattern of e-NAM

Working within APMC,it functions through 6 stages i.e., gate entry, assaying, auction,sale agreement, payment and gate exit.Organizational pattern describes process flow within the system. Also working of its mobile application and Intra-APMC(Ahmednagar) working shows market is not connected all over India but working as computerized Intra-APMC trading. Thus, pattern shows e-NAM system studied is in transition phase of being fully operational.

3. Extent of Awareness of respondents about e-NAM scheme

The rate of adoption of an innovation is directly linked with level of knowledge of user about the same. Hence it was felt necessary to know the knowledge level of the respondents to understand all aspects of the technologies that were taught to them. In the present study, knowledge has been operationalized as the body of understood information possessed by the respondents on protected floriculture technology. The overall knowledge level and technology wise knowledge level of the respondents were studied and the findings were presented in this section.

Table 1: Distribution of the respondents according to their extent of awareness

Sr. No.	Extent of awareness (score)	Respondents (120)	
		Frequency	Per cent
1.	**Low (Upto 3)**	**68**	**56.66**
2.	Medium (4 to 13)	43	35.84
3.	High (above 13)	9	07.50
	Total	**120**	**100.00**
SD: 7.92		**Mean: 4.25**	

It was observed from the Table 1 that, majority of the respondents (56.66%) possessed low level extent of awareness about e-NAM scheme followed by medium (35.84) %) and high (7.50%) extent of awareness about e-NAM scheme. The results were similar to studies done by C.C.S National Institute of Agricultural Marketing (2011).

Table 2: Rank ordering of the statements according to extent of awareness of respondents about e-NAM scheme. (n=120)

Sr. No	Statements about e-NAM scheme:	Yes (%)	Partially (%)	No (%)	Total score	Mean score	Rank
1	Do you know about e-NAM scheme?	0 (0.00)	25 (20.83)	95 (79.16)	13 (100.00)	0.10	VI
2	Did you listen about e-Marketing?	97 (80.83)	23 (19.16)	0 (0.00)	109 (100.00)	o.89	I
3	When e-NAM scheme started?	0 (0.00)	10 (8.33)	110 (91.66)	5 (100.00)	0.04	VIII
4	Are you aware about the e-NAM portal?	0 (0.00)	0 (0.00)	120 (100.00)	0 (100.00)	0	IX
5	Have you visited this portal?	0 (0.00)	0 (0.00)	120 (100.00)	0 (100.00)	0	IX
6	Do you know portal is also available in Marathi?	0 (0.00)	0 (0.00)	120 (100.00)	0 (100.00)	0	IX
7	Portal gives day to day prices about different commodities	10 (8.33)	25 (20.83)	95 (79.16)	23 (100.00)	0.18	V
8	Have you participated in e-NAM awareness session?	0 (0.00)	20 (16.66)	100 (83.33)	10 (100.00)	0.83	III
9	Do you know farmer got MSP if participate in this scheme?	0 (0.00)	25 (20.83)	115 (95.83)	13 (100.00)	0.10	VI
About market:							
10	Do you know about different practices in market	90 (75.00)	30 (25.00)	0 (0.00)	105 (100.00)	0.87	II
11	Have you see computerization in market?	100 (83.33)	0 (0.00)	20 (16.66)	100 (100.00)	0.83	III
12	Do you know about e-trading which is practice in market?	0 (0.00)	40 (33.33)	80 (66.66)	20 (100.00)	0.16	IV
13	Do you know about other e-Marketing practices?	0 (0.00)	15 (12.50)	105 (87.50)	8 (100.00)	0.06	VII
About Other features of scheme:							
14	Through this scheme prices commensurate with quality, are you aware about this?	0 (0.00)	20 (16.66)	100 (83.33)	10 (100.00)	0.83	III
15	Commodity returns will directly transfer to bank account; do you know?	0 (0.00)	20 (16.66)	100 (83.33)	10 (100.00)	0.83	III
16	You can sell your produce to different market from any APMC by this scheme.	0 (0.00)	0 (0.00)	120 (100.00)	0 (100.00)	0	IX

*(Figures in parenthesis indicates percentage to total value of corresponding category of independent variable)

It was observed from the Table 2, rank ordering of statements on extent of awareness about that, majority of the respondents were listen about e-marketing (rank I) followed by awareness about different practices in market (II).while rank (III) shows those participated in awareness session know about different features of scheme like through this scheme prices commensurate with quality, Commodity returns will directly transfer to bank account and thus also seen computerization in market (rank III).followed by awareness about e-trading practices (IV), about portal gives day to day prices about different commodities(V).While next rank (VI) shows poor awareness about core information of scheme like name, knowledge that farmer got MSP if participate in this scheme, also poorly aware about other e-marketing practices (VII).When e-NAM scheme started, very little awareness about it (VIII). While rank(IX) shows little awareness about, e-NAM portal, availability of it inMarathi and so no one visits the portal. Also rank IX shows no awareness about 'you can sell your produce to different market from any APMC by this scheme'.

The ranking of statements on extent of awareness of the respondents about e-NAM scheme indicates that farmer well aware about computerization in market which is necessary for scheme but poorly aware about core functioning of scheme.

4. Constraints faced by respondent farmers regarding trading activities of e-NAM and suggestions for overcoming the constraints

4.1 Constraints faced by respondent farmers regarding trading activities ofe-NAM

An attempt was made to identify the problems faced by the farmers while getting aware about e-NAM scheme. Their responses were tabulated after calculating the frequency and percentage as shown in following table.

Table 3: Constraints faced by the respondent farmers

Sr. No.	Constraints	Frequency	Per cent
1.	Illiteracy of farmer towards e-Marketing channels.	108	90.00
2.	Appealing method of advertisement not used	101	84.16
3.	Local traders and extension workers not communicate it to the people.	103	85.83
4.	Relatives and friends unknown about the e-Marketing.	103	85.83
5.	Incomplete information about e-Marketing.	110	91.16
6.	Low frequency of advertisement.	90	75.00
7.	Awareness programme about scheme not carried out	110	91.16
8.	Lack of understanding the displayed content as it is in English.	28	23.33
9.	All traders not participated in scheme	110	91.16

It can be seen that major constraints faced by the farmers were: awareness programme about scheme not carried out, all traders not participated in scheme and incomplete information about e-Marketing (91.16%) followed by illiteracy of farmer towards e-Marketing channels (90.00), Local traders and extension workers not communicate to the people and Relatives and friends unknown about the e-Marketing (85.83%), Appealing method of advertisement not used (84.16%),Low frequency of advertisement(75.00),Lack of understanding the displayed content as it is in English (23.33%). Results were on lines with Tyngkan and Hehlangki(2018).

4.2 Suggestions made by respondents

Table 4: Suggestions made by the respondents to overcome the constraints:

Sr. No.	Suggestions	Frequency	Percentage
1	Awareness programme about scheme at APMC	118	98.33
2	Local traders and extension workers should communicate with farmers.	115	95.83
3	Advertisement through television and radio	115	95.83
4	Advertisement in farmer and trader organizations	110	91.16
5	Inclusion of all traders in scheme	113	94.16

The suggestions showed that 98.33 per cent respondents wanted Awareness programme about scheme at APMC followed by 95.83 per cent farmer suggested local traders and extension workers should communicate with farmers and advertisement through television and radio,Inclusion of all traders in scheme(94.16%), inclusion of all traders in scheme(91.16%).

Other suggestions for both awareness and improving organizational structure:

1) Farmers need to bring good quality products which will reduce the chance of rejection even after successful bidding.
2) Traders and farmers may be incentivized to participate in e-NAM system by way of reduction in APMC fees by 0.25-0.50% and grant of bonus by 0.50% of the gross value of produce sold respectively
3) Establishment of an apex body is advocated to control and regulate the activities of e-NAM.
4) APMCs should start providing small loans to encourage the farmers to participate in e-NAM and this will in turn also help them to get rid from the hand of moneylenders who use to exploit them.
5) The e-NAM software should be upgraded to prevent the glitches that use to happen during the bidding process.
6) Display should be in local language so the farmers properly understand them. The display also should be visible from a distance and of good quality.

7) Bank branches should be open on the premises of APMCs which in turn will help the farmers to get instant payments.
8) Facilities regarding grading, storage and assaying should be made prominent and improved from the present situation.
9) Print media and social media advertisements should be done to make more people aware of e-NAM system; specially the small and marginal famers.
10) Proper feedback system should be created to understand the problems faced by the farmers and traders which in turn will help to improve the e-NAM system.
11) Training should be conducted once in a month for farmers and traders to make them understand the working of e-NAM properly.
12) e-NAM bid price should begin with last day's highest selling price as the initial bid price which will help the farmers to get more price from open auction sale.
13) e-NAM bidding should be made mandatory to the local traders which will help to increase the trader participation and competiveness.
14) Number of single license holders should be increased and be made to participate in e-NAM to encourage local traders' participation.
15) More political and administrative support should be provided for successful implementation of e-NAM.

CONCLUSION

The ranking of statements on extent of awareness of the respondents about e-NAM scheme indicates that farmer well aware about computerization in market which is necessary for scheme but poorly aware about core functioning of scheme.The majority of respondent farmers showed that 98.33 per cent respondents required Awareness programme about scheme at APMC followed by 95.83 per cent farmer suggested local traders and extension workers should communicate with farmers and advertisement through television and radio, Inclusion of all traders in scheme (94.16%). The suggestions showed that 98.33 per cent respondents wanted Awareness programme about scheme at APMC followed by 95.83 per cent farmer suggested local traders and extension workers should communicate with farmers and advertisement through television and radio,Inclusion of all traders in scheme(94.16%), inclusion of all traders in scheme(91.16%).

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RESEARCH ARTICLE

Extent of Migration and Aspirations of Sugarcane Harvesting Labourers

A. M. Immanavar[1], G. K. Waman[2] and R. P. Khule[3]

1. Ex-Student, M.Sc.Agri., Dept of Extension Education, PGI, MPKV, Rahuri (M.S.)
2. Assistant Professor and T.O.,Directorate of Extension Education, MPKV, Rahuri (M.S.)
3. Technical Officer, Associate Dean, Lower Agril. Education, MPKV,Rahuri (M.S.)

ABSTRACT

The present investigation was conducted purposively in selected districts viz Solapur and Satara districts of Maharashtra state with the specific objectives viz., To study the extent of migration of sugarcane harvesting labourers and to study the aspirations sugarcane harvesting labourers. The finding of study revealed that nearly forty one percent of the respondents were migrated in within the district and adjoining district. A meager per cent of respondents were migrated in outside the district but within the state. Further, all most all i.e. cent per cent of sugarcane harvesting labourers have reported the reasons of migration were that no employment in village , to satisfy the family needs, except kharif season no work on the farm throughout the year and better wages given by the factory. Overall 95.00 per cent of the sugarcane harvesting labourers had aspirations of employment throughout the year, followed by educational facilities for the children's and majority of them had aspirations of special economic support by the government.

Key words: Migration, Aspirations, Labourers.

INTRODUCTION

Sugarcane is the most important cash crop in the state of Maharashtra. Sugar industry plays a pivotal role in the social change of the rural people. The production and processing of sugarcane is a major source of employment. On the other hand, sugarcane harvesting is a heavily labour intensive operation and thousands of labourers came from drought prone areas to work as sugarcane harvesting labourers for the requirements of their livelihood. When all options for livelihood cease, there is no alternative with them unless they migrate to other areas for their livelihood survival. The majority of the sugar factories are located in Western Maharashtra. The labourers typically migrate from dry land areas into the irrigated regions. The area under sugarcane cultivation as well as the production capacity has increased over the years. This directly relates to the increased demand for labourers since sugarcane harvesting is necessarily a manual job. The rural agricultural labourers are attracted towards this seasonal work in sugar factories due to the various pull factors like sometimes more

wages, regular seasonal work, attraction of sugarcane fodder tops and other facilities which offer better livelihood status than they get in their native places. These pull factors assists push factors like low income from agricultural, occasional draughts, low wages in agricultural work, indebtedness, illiteracy, social conflicts, poor housing conditions and very poor economic circumstances due to under and no employment but they having some aspirations . These push factors influence the contractual migration the harvesters from the villages towards factory site. In view of this, the present study was undertaken with the following objectives viz., To study the extent of migration of sugarcane harvesting labourers and to study the aspirations sugarcane harvesting labourers.

METHODOLOGY

The present study was conducted purposively in selected Solapur and Satara districts of Maharashtra state. The data were collected from limited operational area of Shriram Jawahar Co-operative Sugar Factory Ltd., Phaltan, Dist. Satara and Bhairavanath Sugar Works Ltd., (unit-3) Lavangi, Mangalwedha, Dist. Solapur. Sixty respondents from each factory ,thus total 120 respondents were randomly selected for the present investigation. The personal interview technique was used for collection of data. To find out the extent of migration, the respondents were classified into three groups with particular scores according to their extent of migration and aspirations were obtained by using open end question technique.

FINDINGS

A) Extent of migration of sugarcane harvesting labourers

Table - 1: Distribution of the respondents according to their extent of migration

Sr. No.	Category	Frequency (N=120)	Percent
1.	Within District	49	40.83
2.	Adjoining district	49	40.83
3.	Outside district but within the state	22	18.34
	Total	**120**	**100.00**

The data in Table - 1 revealed that nearly forty one percent of the respondents were migrated in within the district and adjoining district. Merely 18.34 per cent of respondents were migrated in outside the district but within the state. These findings were similar with the findings of Murty and Murty (1980) in that they found that, intra-district migration was much higher than the inter district and interstate migration. Venkaiah (1983) observed that the expansion of sugarcane cultivation encouraged the interstate and inter district migration of people.Further the information pertaining to the factors associated with the process of migration was collected. The results are presented in Table-2.

Table - 2: Distribution of the respondents according to factors associated with their migration

Sr. No.	Factors	Respondents(n=120)	
		Frequency	Percentage
1.	No employment in village	120	100.00
2.	To satisfy the family needs	120	100.00
3.	Except kharif season no work on the farm throughout the year	120	100.00
4.	Better wages given by the factory	120	100.00
5.	To raise status of the family in the society	119	99.16
6.	Because of rainfed area	109	90.83
7.	Non availability of irrigation facility throughout the year	74	61.66
8.	Because of small size of holding	71	59.16
9.	Because of large family	61	50.83
10.	Inadequate return from the farming	45	37.50
11.	For repayment of previous loans	11	9.16

It is observed from Table-2 that all most all i.e. cent per cent of sugarcane harvesting labourers have reported the reasons of migration were that no employment in village , to satisfy the family needs, except kharif season no work on the farm throughout the year and better wages given by the factory, followed by to raise status of the family in the society (99.16 %), because of rainfed area (90.83 %), non availability of irrigation facility throughout the year (61.66 %), because of small size of holding (59.16 %), because of large family (50.83 %), inadequate return from the farming (37.50 %) and for repayment of previous loans (9.16 %). These are the different factors associated with their migration.

B) Aspirations of sugarcane harvesting labourers

The information pertaining to the aspirations of respondents to overcome problems faced by the respondent sugarcane harvesting labourers were collected, tabulated and analyzed. The results are presented in Table -3.

Table -3: Distribution of the respondents according to their aspirations

Sr. No.	Factors	Respondents(n=120)	
		Frequency	Percentage
1.	Employment throughout the year	114	95.00
2.	Education for the children's	108	90.00
3.	Special economic support by the Govt.	69	57.50
4.	Irrigation facilities	64	53.33
5.	Life insurance	29	24.16
6.	Land for agriculture	31	25.83
7.	Loan with low interest rate	25	20.83

The data presented in Table-3 showed that overall 95.00 per cent of the sugarcane harvesting labourers had aspirations of employment throughout the year, followed by educational facilities for the children's (90.00 %), whereas 57.50 per cent of the respondents had aspirations of special economic support by the government. More than half (53.33 %) of the respondents had aspirations of irrigation facilities and 25.83 per cent of the respondents had aspirations of land for agriculture. Overall 24.16 per cent of the respondents had aspirations of life insurance, followed by 20.83 per cent of the respondents had aspirations of loan with low interest rate. These are the aspirations of sugarcane harvesting labourers from sugar factory and government. Sugarcane harvesting labourers expect that government and private sector should work with co-ordination to provide all the necessary facilities for the welfare of sugarcane harvesting labourers.

CONCLUSION

The results of study revealed that nearly forty one per cent of the respondents were migrated in within the district and adjoining district. Merely 18.34 per cent of respondents were migrated in outside the district but within the state and all most all (i.e.100.00 %) sugarcane harvesting labourers have reported the reasons of migration were that no employment in village, for to satisfy the family needs, except kharif season no work on the farm throughout the year, better wages given by the factory. It is concluded that lots of problems were faced by the sugarcane harvesting labourers and expected that government and private sector should work with co-ordination to provide all the necessary facilities and support for the welfare of sugarcane harvesting labourers.

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RESEARCH ARTICLE

Participatory Rural Appraisal (PRA): A Study of Strawberry Cultivation in Bhilar Village

Suyog S. Kolekar[1], Kumar V. Gurav[2] and Bharat T. Kolgane[3]

1. PG Student, 2. Associate Professor and Guide & 3. Professor of Extension Education
Extension Education and Communication department, RCSM, College of Agriculture Kolhapur, Maharashtra, INDIA

ABSTRACT

PRA is defined as a growing family of approaches and methods to enable local people to share, enhance, and analyse their knowledge of life and conditions, to plan, and to act. The purpose of this paper is to share the successful strawberry cultivation story of the said village with the Strawberry cultivators all over the world. PRA technique like group meetings, village assembly, problem priority chart, seasonal and change analysis, etc. were applied in the said village. In this present study, the Participatory Rural Appraisal (PRA) was conducted in 3 visits to the village which consisted of gathering preliminary information from the knowledgeable group of people to form an interview schedule to interview 120 farmers in the said village.

Keywords: Participatory rural appraisal, Strawberry, Bhilar.

INTRODUCTION

PRA is a rapid and easiest method to conduct an extension survey. It is one of the most effective tools which can be utilized to understand the technology adoption profile by the farmers and to get the first-hand information about their needs, resources available, priorities, problems and prospects. This process will help to understand technology dissemination process, rural development activities, credit and input supply system, etc1. In this report an attempt has been made to study and analyse the cultivation practises and problems of the strawberry cultivators in Bhilar village of Satara district, Maharashtra. The objective of the study is to provide an insight into successful strawberry cultivation and help the farmers to examine their problems.

Materials and Methods

Data recording and survey procedure

The data recording and survey foe PRA were carried out using 5 following important procedures:

A. Primary: On the spot visualization, Semistructural interview, Key informants' interview, Personal interview

B. Secondary data source from: Bhilar Gram Panchayat and Agro Organic India Farmer's Group.

RESULT AND DISCUSSION

Table 1 : Problem ranking of the respondents

Sr. no	Problem	Severity	Frequency	Relative Importance	Total	Rank
1	Shortage of irrigation water during summer season	4	4	5	13	II
2	High cost of manures and fertilizers	4	3	4	11	III
3	Lack of technical knowledge about dosesof manures fertilizers, pesticides and insecticides	3	2	4	9	V
4	Shortage of labour	5	4	5	14	I
5	High cost of insecticides and pesticides	4	5	4	13	II
6	Unavailability of cold storage facility near by the locality of the respondents	2	1	2	5	IX
7	Lack of knowledge about improved sustainable practices in strawberry cultivation	2	2	3	7	VI
8	Market rates are not known in time	2	1	4	7	VI
9	Lack of finance	4	4	5	13	II
10	Lack of technical knowledge about grading and packaging	1	1	4	6	VII
11	Lack of knowledge about biological control measures of insect pest and disease management	2	2	3	7	VI
12	Lack of training regarding technical things	3	2	5	10	IV

The study shows in table 1 that the severity of shortage of labor scores very high in the table. Secondly, the high cost of insecticides and pesticides is the problem that scores very high in terms of frequency. Thirdly, according to farmers, shortage of irrigation water during summer season, shortage of labor, lack of finance and lack of training regarding technical things score the highest in terms of relative importance.

According to the total scores given by farmers, overall, we can conclude that the problem of shortage of labour is the most important problem faced by the strawberry cultivators of the Bhilar village. It is followed by shortage of irrigation water in summer season.

Table 2 : Problem cause analysis

Sr. No.	Problem	Cause	Suggestions
1	Shortage of labor	1) Less labour available in mountainous regions. 2) Labour requirement for strawberry crop is considerably high.	1. Research in strawberry crop is not advanced. 2. Farmers should be provided with new developed technologies as soon as possible.
2	High cost of insecticides and pesticides	1) Wild animals like monkeys ruin the sweet corn crops and also strawberry. 2) Mother plant resistant to pest and diseases are not available.	1. Proper research should be done to provide better control of seasonal pest and diseases. 2. Agricultural department in village should provide enough help to farmers. 3. Government should import better mother plants and provide them to the farmers at suitable prices.
3	Lack of finance	1. High cost of manure, fertilizer, insecticide and pesticide. 2. Late disbursement of subsidies.	1. Subsidy for polyhouse should be given as soon as possible. 2. Efforts should be taken to give keep strawberry prices as constant as possible. 3. Efforts should be taken to control erosion and leaching losses due to heavy rains.
4	High cost of manure and fertilizer	1. Low quality of soil resources. 2. Low fertilizer efficacy	1. Fertilizer subsidies should be provided to farmers directly. 2. Research should be done to increase efficacy of applied fertilizers.

Role and preference of women of the respondent family in strawberry cultivation

The table 3 of the study tells us about the role of women in the strawberry cultivation. It consists of the scale for weightage to provide uniformity to the criteria according to the work. The major factor above is income which is same for women irrespective of the work to be done. Women score very high in training for weeding, harvesting and grading. Harvesting and grading are the most favoured work in strawberry cultivation, followed by weeding. Other major role women perform is in packaging which is ranked III in preferential ranking and IV is Planting of seedlings. Women prefer working in processing plants and pesticide application the least as it scores very low except in income.

Table: 3

Sr. no	Work	Preferential weightage factor						
		Income (10)	Time spent (6)	Laborious work (4)	Training (7)	Awareness (6)	Total	Rank
1	Working in nursery	5	2	4	3	3	**117**	**VI**
2	Planting	5	2	4	4	4	**128**	**IV**
3	Mulching	5	3	3	3	4	**125**	**V**
4	Irrigation	5	1	3	1	1	**81**	**IX**
5	Weeding	5	4	5	5	5	**159**	**II**
6	Fertilizer application	5	2	2	3	2	**103**	**VII**
7	Pesticide application	5	1	1	1	1	**73**	**X**
8	Harvesting	5	5	4	5	5	**171**	**I**
9	Grading	5	5	5	5	4	**171**	**I**
10	Packaging	5	4	5	4	4	**146**	**III**
11	marketing	5	2	3	2	2	**100**	**VIII**
12	Processing	5	1	1	1	1	**73**	**X**

Table 4 : Crop preference of the respondents for intercropping in strawberry

(N=120)

Sr. no	Crops	Food	Fodder/ fuel	Market value	Duration	Yield Certainty	Productivity	Total	Rank
1	French/ Green Beans	4	1	2	5	5	3	**20**	**III**
2	Sweet corn	1	4	4	4	2	2	**17**	**IV**
3	Vegetables	5	1	3	5	4	5	**23**	**I**
4	Onion/ Garlic	5	0	3	3	5	5	**21**	**II**

From rankings given by interviewed farmers in table 4 we can conclude that vegetables are the best intercrop for strawberry growers followed by onion and garlic. Also, it is observed that they can grow corn for fodder purpose but it has low yield certainty as well as productivity. French bean, onion and garlic has the highest yield certainty hence stands second in most preferred intercrop.

Preference ranking of respondents for inputs to increase crop production

According to the table 5, the farmers of Bhilar village consider drip irrigation as the most necessary input in strawberry cultivation (Rank - I) followed by use of mulch (Rank - II) and micro nutrients (Rank - III). Use of bio fertilizers is not preferred by the village farmers though it has good capacity to increase the yield, it isn't available easily and at affordable price to farmers. The same

case follows the use of sprayer as there are no credit facilities available for sprayers. Maximum credit facilities are available for polyhouse and heavy machinery but due to low ease of adoption it is ranked fourth by the farmers.

Table: 5

Sr. no	Statement	Inputs							
		Heavy machinery	Poly house	Micro-nutrients	Bio-fertilizer	Pesticides	Sprayer	Mulching	Drip Irrigation
1	Ease of adoption	2	2	5	3	3	4	5	5
2	Less labor cost	5	2	4	2	4	5	3	5
3	Availability of good prices	1	4	2	2	2	3	4	3
4	Credit facilities	5	4	2	2	2	2	1	3
5	Capacity to increase yield	2	4	5	4	4	3	4	5
6	Market Price	4	3	2	2	3	3	5	4
Total		**19**	**19**	**20**	**15**	**18**	**15**	**22**	**25**
Rank		**IV**	**IV**	**III**	**VI**	**V**	**VI**	**II**	**I**

Table 6 : Preference of respondents for Strawberry Variety (N=120)

Sr. no	Criteria	Name of Variety				
		Sweet Charlie	Nabila	Kamaroza	Winter Dawn	R1
1	Availability of propagating material	2	5	3	4	3
2	Taste	5	4	3	2	4
3	Attractiveness	3	5	4	3	4
4	Durability	3	5	5	3	4
5	Susceptibility to diseases and pests	2	4	3	4	3
6	Yield	4	5	2	5	4
7	Market demand	4	5	5	2	5
8	Suitable for Processing	4	4	3	4	4
Total		**27**	**37**	**28**	**27**	**31**
Rank		**IV**	**I**	**III**	**IV**	**II**

The table 6 indicates following results about various varieties cultivated in the Bhilar village:

I) Nabila: - Nabila variety has been scored best among the varieties grown in the village. Though it scores the highest in total, they score for tase is lower than sweet Charlie variety.

II) R1: - It is the newest variety introduced in the village. It has high market demand.

III) Kamaroza: - This variety scores average score in almost all criteria. It has the best feature of durability which is same as Nabila variety.

IV) Sweet Charlie: - This is considered an outdated variety by the farmers hence its propagating material isn't available easily. Though it is the tastiest variety among all the varieties, it is most susceptible for diseases and pests.

V) Winter Dawn: - The score of winter down variety are similar to sweet Charlie. It scores highest as in Nabila but since it has low taste and so low market demand it is set at end of the ranking.

Table 7 : Preference of respondents to marketing channels (N=120)

Sr. no	Statement	Marketing Channels				
		Local	Distant	Contractors	Export	Processing
1	Availability of transportation	5	4	4	1	4
2	Market information	5	3	3	2	4
3	Availability of good prices	2	4	4	5	3
4	Profit margin	4	4	3	3	3
5	Availability of marketing guidance	5	4	3	2	4
6	Need of special grading and packaging	3	4	5	5	1
7	Storage facilities	1	4	3	0	0
	Total	**25**	**27**	**25**	**18**	**19**
	Rank	**II**	**I**	**II**	**IV**	**III**

The table 7 shows that distant market is mostly preferred by the strawberry growers of Bhilar village. It has high score in all criteria except in market information which has medium score. Washi APMC is considered as distant market by the farmers. It is because this market provides the farmers with better prices.

Secondly, the farmers prefer local markets viz. local market of Bhilar as well as Wai, Panchagani and Mahabaleshwar markets. Though farmers get less prices for their produce from these markets, the transportation facilities, market information scores very high and profit margin scores high score.

CONCLUSION:

Form the above study we can conclude that even though the strawberry cultivation in Bhilar village is remarkably good the villagers still need support to increase their profits through strawberry farming. The technology, methods and cultivation practises are based on modern technology and can be used by other farmers all over the world to increase the strawberry cultivation. The study provides simple, first hand information from the strawberry cultivators in Bhilar village which helps them to produce a good quality strawberry fruit that has been acknowledged all over the world through geographical Indication (GI) tag.

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RESEARCH ARTICLE

Constraints Perceived by Participants of Skill Oriented Certificate Courses in Establishing Small Scale Enterprise Units

K. S. Purnima[1], A. Lalitha[2] and T. Srinivas[3]

1. Assistant Professor, Open & Distance Learning Centre,ANGRAU, A.P,
2.Scientist (Extension),Agricultural Information & Communication Centre, ANGRAU, A.P.,
3.Professor(Academic & education), Administrative Office, ANGRAU, A.P

Corresponding author email : purnimanaiduguntur@gmail.com

ABSTRACT

Skill development is an important dimension of Entrepreneurship.The Open and Distance learning centre established by Acharya N.G.Ranga Agricultural University in the year 2018 is using the distance learning medium for a few skill oriented certificate courses to facilitate entrepreneurship and self employment. The study focused on the effectiveness of newly initiated skill-oriented certificate courses offered through distance learning approachduring the year 2019-20 in imparting Knowledge and skills. 180 participants of three certificate courses- Bee Keeping, Mushroom Cultivation and Terrace Gardening, each of 3 months duration were randomly chosen and their perceived effectiveness of the distance learning courses was measured on the basis of 8 parameters such as Course content , Contact sessions , Resource person expertise , Duration of course , Communication pattern, Exposure visits / Practicals, New learnings gained and Course objectives achieved. Profile of the respondents who have undergone the certificate course programme was studied. The data was collected from respondents using structured Interview schedules and check lists. Effectiveness index was computed by summating the scores on all 8 parameters of distance learning. The findings of the study showed that 58.00 percent of respondents of Bee Keeping course perceived the courses to be effective followed by 32.00 percent of them as Highly Effective.60 percent of the respondents of Mushroom Cultivation course perceived high effectiveness and 40 percent medium effectiveness. While 55 percent of the respondents of Terrace gardening course perceived the course to be effective followed by 15 percent as ineffective. The constraint analysis of the respondents regarding establishing small scale units with the learnt skills indicated that majority of the respondents in the Bee Keeping and Mushroom Cultivation courses perceived Marketing and Finance as major constraints while that of Terrace gardening course revealed Availability of quality Inputs and Lack of technical skill as major constraints. The study implied to focus on these areas to improve course effectiveness.

Key words: Distance learning, contact sessions, certificate courses, skill orientation.

INTRODUCTION

Distance Education is a fast emerging, cost effective and is flexible medium to cater to the needs of manywho could not pursue conventional system of learning.In the last two decades many universities that offer distance learning in several countries have been established.

Government of India is also encouraging distance learning to make the masses educated.At present more than 200 universities/institutions, 15 Open Universities and some private institutions recognized by UGC are offering correspondence/open and distance courses in the country (Ashok K Gaba,2015).

Acharya N.G.Ranga Agricultural University has established the Open and Distance Learning Centre(ODLC) was established as a cost effective and learner oriented medium for imparting agricultural education to large number of aspirants throughout the state .The ODLC was started to advocate skill-based courses that focus on entrepreneurial skills for self-employment and income generation.

Open Distance Learning Centre established under the Faculty of Agriculture, ANGRAU in the year 2018 is offering Distance learning courses viz., certificate and Diploma courses for the benefit of various segments of the society who aspire for knowledge in Agricultural education, Entrepreneurship and Self- employment. Hence, it is important to study the effectiveness of certificate courses offered by ODLC in helping participants to take up small scale enterprise units in specific areas.

The present study was undertaken with the following objectives.

1) To study the profile of the respondents pursuing distance learning certificate courses ,
2) To assessthe perceived effectiveness of skill-oriented certificate courses, and
3) To analyse the constraints perceived by the respondents in starting small scale enterprise units

METHODOLOGY

Ex-post facto design was followed for the study. The study was conducted in Andhra Pradesh. A total number of 180participants who completed any one of the three certificate courses organized in the year 2019-20 (60 from Bee Keeping course, 60 from Mushroom Cultivation and 60 from Terrace Gardening course throughout the state) were selected randomly for the study. The participants who attended the courses at different study centres throughout the state were randomly selected from the total number of 254 enrolments. A pre-tested interview schedule was usedto collect data from the respondents. Selected characteristics of the respondents' viz. age, gender, education, farming experience, previous training undergone, information seeking behaviour, innovativeness, cosmopoliteness, and higher aspiration were considered as 0independent variables of the study.

Overall Effectiveness of distance learning courses was measured based on index computed using8 parameters such as Course content, Contactsessions, Resource person expertise, Duration of course,

Communication received, Course duration, Exposure visits / Practicals, Course objectives achieved and New learnings gained. The scores on all the parameters were summated and Effectiveness of the courses as perceived by the respondents was assessed. The respondents were further categorized into three groups based on their perceived effectiveness viz., Highly effective, Effective and Less effective.

Further,a constraint analysis was conducted to study the constraints perceived by the respondents in starting small scale units after undergoing the course. An interview schedule with 42 statements pertaining to 6 categories of constraints viz., Technological constraints, Managerial constraints, Physical/Input constraints, Psychological constraints, Financial constraints and Market related constraints was administered to the respondents. The constraints were ranked for each course separately based on the responses.

FINDINGS

1. Personal Profile of the Respondents

It is evident from the table that majority of the respondents were Young(43.00%) to middle aged (63.50%), male respondents (74%), Passed Matriculation (89.00%). Majority of them belonged to Backward category (43.00%) followed by General category (32.50%) and ST/SC Categories (25.00%). It is also observed from the table that majority of the respondents had no training in Agriculture (40.00%) or only short term training(51.00%) in related area andNo Farming Experience (45.00%). It could also be seen from the table.1 that majority of the respondents had medium to high scores with regard toCosmopoliteness (83.00%), Information seeking behavior (78.00%) and Higher aspirations (83.00%) whereas Low to medium on Innovativeness(80.00%). The results are in congruence with those of Spandana.(2016)

It could be inferred from the results that distance education is being aspired by all age groups who could not pursue beyond matriculation, who have had less training and less farming experience but who have high aspiration to take up new ventures/tasks and High Information seeking behaviourto learn new skills and techniques related to Agriculture. Distance education is also an opportunity for weaker sections to learn new Knowledge and skills and become innovative in their area of interest but there is a scope to include more female participants in the certificate courses as their participation was found to be significantly weak.

Table -1: Personal Profile of the Respondents.

N=180

Sl. No.	Characteristic	Category	Number	Percentage
1.	Age	Young (18-35)	77	43.00%
		Middle (35-50)	75	42.00%
		Old (50)	28	15.00%
2.	Gender	Male	134	74.00%
		Female	46	26.00%
3.	Social Category	General	58	32.00%
		Backward	77	43.00%
		Schedule caste	34	19.00%
		Schedule Tribes	11	6.00%
3.	Education	Below Matriculation	55	31.00%
		Matriculation	89	49.00%
		Graduate	31	17.00%
		Post graduate	5	3.00%
4.	Farming Experience	Short term (upto 5yrs)	46	26.00%
		Medium term (6-10 years)	21	12.00%
		Long term (> 10 years)	31	17.00%
		No Experience	82	45.00%
5.	Previous Training	No training	72	40.00%
	undergone	Short term training (less than 10 days)	92	51.00%
		Long term training	16	9.00%
6.	Occupation	Student	39	22.00%
		Farmer	58	32.00%
		Service (Govt/Private)	26	14.00%
		Self Employed	9	5.00%
		Others	48	27.00%
7.	Innovativeness	Low	64	36.00%
		Medium	80	44.00%
		High	36	20.00%
8.	Cosmopoliteness	Low	25	17.00%
		Medium	88	49.00%
		High	67	34.00%
9.	Information seeking	Low	40	22.00%
	behavior	Medium	82	46.00%
		High	58	32.00%
10.	Higher aspirations	Low	31	17.00%
		Medium	61	39.00%
		High	88	44.00%

2. Overall Perceived Effectiveness in the three skill-oriented courses.

It is observed from the table2 that 58.00 percent of the respondents who have completed the Bee Keeping certificate course perceived the course to be effective followed by 32 percent as highly effective while a meagre 10.00 percent perceived the courses to be less effective.The result is in accordance with that of Filiz and Mustafa (2012). The Bee Keeping course was more practical in nature with hands on experience to each and every participants. The respondents were exposed to various demounits and got opportunity to interact with large and small scale entrepreneurs in the field.Thus have expressed positively to the course.

In case of Mushroom Cultivation also high level of effectiveness (60.00%) was perceived while 40.00 percent were having medium level of effectiveness of the course. None of the respondents have expressed the course to be less effective again because of practical exposure gained, Inspiring exposure visits and hands on experiences.

Regarding the Terrace Gardening course, the results indicated that though 55percent of the respondents have rated the course to be effective 15 percent as Highly Effective.A considerable number have rated the course as less effective(30%). This may be because the participants though were exposed to many terrace and balcony gardens, they had less scope for upgrading their skills through direct involvement. As most of the participants were already practicing terrace gardening, they expected to gain in depth skills focus and new techniques in gardening.

Table- 2: Distribution of the respondents based on Overall Perceived Effectiveness in three skill-oriented courses.

N=180

Category	Bee Keeping (n=60)		Mushroom Cultivation(n=60)		Terrace Gardening(n=60)	
	Freq	Percentage	Freq	Percentage	Freq	Percentage
Less Effective (<70)	06	10.00%	0	0	18	30.00%
Effective (71-142)	35	58.00%	24	40.00%	33	55.00%
Highly Effective(>142)	19	32.00%	36	60.00%	9	15.00%

The findings indicate that majority of the respondents were satisfied with the course content , lectures , faculty and conduct of the course but have expressed to have more practical exposure in establishing small balcony gardens , Bee hive management , processing and value addition in Mushroom, Home composting etc. which was taught during the course but needed hands on experience and skill development to start small scale enterprises. This can be taken up in future courses.

3. Constraints perceived by the respondents in establishing small scale enterprise units

The constraints perceived by the respondents in establishing small scale units was categorized into five sub heads,scored and ranking was given.

Table 3 indicated that among the technological constraints top rank was given to Lack of practice of skill(53.33%) by Bee Keeping course respondents; Lack of technical guidance from experts after course completion(55.00%) was major constraint expressed by respondents of Mushroom cultivation course and Lack of hands on skill (73.33%) by respondents of Terrace Gardening course.

Regarding Managerial constraints the Bee keeping course(76.66%), Mushroom Cultivation course(93.33%) and Terrace gardening course(65.00%) respondents ranked Lack of previous experience as top constraint. Among Physical/Input constraints, the top constraint was perceived to be Not owning land (51.66%)by the Bee keeping course respondents while both Mushroom cultivation(90.00%) and Terrace Gardening course(73.33%) respondents perceived Poor Knowledge of quality inputs to be top constraint.

The table also showed that among Psychological constraints, the top constraint was perceived to be Dual responsibilities by the Bee keeping course respondents (80.00%) and Terrace Gardening courserespondents (43.33%) while Mushroom cultivation respondents perceived Fear of failure and Lack of motivation to start enterprise (93.33%) to be top psychological constraint. The findings are in line with that of Payal et al(2019)

Among Financial constraints the Bee Keeping course respondents(93.33%) ranked Inability to secure working capitaland Family financial needs take priorityas top constraints;Family financial needs take priority was also considered major financial constraint by respondents of Mushroom cultivation course(96.66%) and Terrace Gardening course(31.66%).The findings are in agreement with that of Sunita(2013).

The table revealed that among Market related constraints, the top constraint was perceived to be Lack of packing, transportation and storage facilities(96.66%) and No knowledge on Processing and value addition(96.66%) by the Bee keeping course respondents while Cent percent of Mushroom cultivation course respondents perceived No Knowledge of Processing and Value addition and No Knowledge on demand creation and Branding to be top constraints.Terrace gardening course respondents expressed no significant market constraint.

Table 3: Rank order of the constraints perceived by the respondents in establishing small scale units.

N=180

Sr. No.	Category	Bee Keeping (n=60)		Mushroom Cultivation(n=60)		Terrace Gardening(n=60)	
		f(%)	Rank	f(%)	Rank	f(%)	Rank
	Technological Constraints						
1.	Lack of adequate hands on skill	17(28.33)	IV	21 (35.00)	IV	44 (73.33)	**I**
2.	Lack of in- depth Knowledge about the enterprise in the course	11(18.33)	VI	16 (26.66)	V	26 (43.33)	III
3.	Lack of technical guidance from experts after course completion	21 (35.00)	III	33 (55.00)	**I**	28 (46.66)	II
4.	Complex procedural formalities in starting the enterprise	25 (41.66)	II	28 (46.66)	III	09 (15.00)	VI
5.	Lack of practice of skill	32 (53.33)	**I**	29 (48.33)	II	22 (36.66)	IV
6.	Low level of education in understanding techniques	14 (23.33)	V	08 (13.33)	VII	04 (6.66)	VII
7.	Lack of awareness of recommended procedures	09 (15.00)	VII	15 (25.00)	VI	17 (28.33)	V
	Managerial Constraints						
1.	Non availability of expert hand holding	19 (31.66)	V	18 (30.00)	V	31 (51.66)	II
2.	Lack of confidence in managing the enterprise alone	22 (36.66)	IV	41 (68.33)	IV	11 (18.33)	IV
3.	Non availability of skilled labour	06 (10.00)	VII	15 (25.00)	VI	-(0.00)	-
4.	High cost of labour	07 (11.66)	VI	14 (23.33)	VII	- (0.00)	-
5.	Poor support from family in enterprise management	37 (61.66)	II	43 (71.66)	II	04 (6.66)	V
6.	Lack of confidence in decision making	28 (46.66)	III	44 (73.33)	III	17 (28.33)	III
7.	Lack of previous experience	47 (76.66)	**I**	56 (93.33)	**I**	39 (65.00)	**I**
	Physical/Input Constraints						
1.	Non availability of input materials on time	27 (45.00)	II	52 (86.66)	**II**	11 (18.33)	VI
2.	High cost of inputs	22 (36.66)	III	36 (60.00)	III	28 (46.66)	II
3.	Poor information about input sources	06 (10.00)	VII	18 (30.00)	V	16 (26.66)	V
4.	Poor knowledge of quality inputs	11 (18.33)	V	54 (90.00)	**I**	44 (73.33)	**I**

5.	Not owning land for the enterprise	31 (51.66)	I	34 (55.73)	IV	10 (16.66)	VII
6.	Lack of maintenance of equipment/devices/material	09 (15.00)	VI	14 (23.33)	VI	17 (28.33)	IV
7.	Unfavorable climatic conditions	11 (18.33)	IV	14 (23.33)	VI	22 (36.66)	III
	Psychological constraints						
1.	Lack of motivation to start new enterprise	42 (70.00)	II	56 (93.33)	I	17 (28.33)	III
2.	Poor decision making skills	28 (46.66)	IV	44 (73.33)	IV	17 (28.33)	III
3.	Poor risk taking ability	32 (53.33)	III	49 (81.66)	III	06 (10.00)	V
4.	Poor cooperation from family, friends and peers	32 (53.33)	III	52 (86.66)	II	11 (18.33)	IV
5.	Fear of failure	26 (43.33)	V	56 (93.33)	I	19 (31.66)	II
6.	Social customs and beliefs	18 (30.00)	VI	32 (53.33)	V	04 (6.66)	VI
7.	Multiple/Dual responsibilities duties	48 (80.00)	I	52 (86.66)	II	26 (43.33)	I
	Financial Constraints						
1.	Inability to secure working capital	56 (93.33)	I	50 (83.33)	III	09 (15.00)	IV
2.	Complex procedures in obtaining loan	41 (68.33)	III	39 (65.00)	VI	04 (6.66)	VI
3.	Lack of awareness on subsidies	33 (55.00)	V	41 (68.33)	V	16 (26.66)	II
4.	Lack of security(properties/assets) to obtain loans	39 (65.00)	IV	43 (71.66)	IV	05 (8.33)	V
5.	Untimely loan disbursal	21 (35.00)	VI	29 (48.33)	VII	04 (6.66)	VI
6.	Poor management of finances	44 (73.33)	II	51 (85.00)	II	10 (16.66)	III
7.	Family financial needs take priority	56 (93.33)	I	58 (96.66)	I	19 (31.66)	I
	Market related constraints						
1.	No knowledge of marketing channels/networks	39 (65.00)	IV	58 (96.66)	II	02 (3.33)	-
2.	Long distances of the market	28 (46.66)	V	52 (86.66)	V	-(0.00)	-
3.	Lack of timely market information	11 (18.33)	VI	47 (78.33)	VI	02 (3.33)	-
4.	Lack of Packing, transportation and storage facilities	58 (96.66)	I	54 (90.00)	IV	- (0.00)	-
5.	Poor assessment of customer needs	44(73.33)	III	57(95.00)	III	-(0.00)	-
6.	No knowledge of Processing and value addition	58 (96.66)	I	60 (100.00)	I	- (0.00)	-
7.	No knowledge of demand creation and Branding	49 (81.66)	II	60 (100.00)	I	- (0.00)	-

The findings in table 3 implied that Market related constraints were found to be significant for Bee Keeping course respondents and Mushroom Cultivation course respondents followed by Financial constraints. Whereas respondents of Terrace gardening course expressed Physical or input constraints followed by Technological constraints as major. This was because both bee keeping and Mushroom cultivation were viewed as income generating enterprises where marketing and finance are essential aspects. Terrace gardening is more of a personal hobby or interest and thus quality inputs and adequate technical skills play an important role in maintaining the terrace gardens.

CONCLUSION

The study revealed that a large number of individuals are aspiring for Agricultural education through distance medium as it is an emerging technology and is becoming widely used in universities and institutions around the globe making education more personalized and accessible. The constraint analysis by the respondents for starting an enterprise also highlighted the key areas to be focused in the certificate courses such as Marketing channels/networks, Financial institutions, support services by Govt and more emphasis on hands on skill. In future, introduction of more Skill oriented courses will help many aspirants to seek Self-employment through entrepreneurship.

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RESEARCH ARTICLE

Entrepreneurial Behaviour of Trained Mushroom Growers

Priya J. Rajgolkar[1] and U. D. Jagdale[2]

1. PG student, College of Agriculture, Pune, MS (India) 2. Assistant Professor, Department of Agril. Extension and Communication, College of Agriculture, Pune, MS (India).
Corresponding author email : uttamdjagdale@gmail.com

ABSTRACT

The present study was conducted in Western Maharashtra. Data were collected personally from 60 farmers from 7 districts viz., Pune, Kolhapur, Satara, Sangli, Solapur, Ahemadnagar and Nashik to study the entrepreneurial behaviour of trained mushroom growers.The findings of the research revealed thatmore than half (53.33 per cent) of the respondent had medium level of achievement orientation,followed bymore than half (51.67 per cent) of respondents had high degree of risk orientation, more than half (58.33 per cent) of the respondent had medium level of market orientation and more than half (56.67 per cent) of the respondents had medium level of overall entrepreneurial behaviour.The study noticed that mushroom growers had a high degree of risk orientation. It is, therefore, necessary to work with the individuals who have medium and less degree of risk orientation in order to educate and motivate them to undertake mushroom production.

Keyword: Entrepreneurial behaviour

INTRODUCTION

Mushroom production is important not only from nutritional and medicinal point of view but for export and recycling of agro-based waste. Mushroom cultivation in India is cheap due to diverse agro-climatic condition suitable for growing different mushrooms. At present, the total mushroom production in India is approximately 1.13 lakh metric tonnes. In India, three types, namely button, oyster and paddy straw mushroom are extensively cultivated on commercial scale. All India Co-ordinated Project on Mushroom which is run by Mahatma Phule Krishi Vidyapeeth, Rahuri at College of Agriculture, Pune with the objectives to develop production technology of different types of mushroom,to popularize mushroom cultivation and producing training facilities and technical supports in terms of providing spawn to the farmers. Objective of the study is to study entrepreneurial behaviour of trained mushroom growers.

METHODOLOGY

The present study was conducted in Western Maharashtra consisted of 7 districts viz.,Pune, Kolhapur, Satara, Sangli, Solapur, Ahemadnagar and Nashik. With the help of All India Co-ordinated Project on Mushroom, detailed information of mushroom growers was collected. Then by adopting randomized method of sampling, 60 growers were selected for the study from Western Maharashtra.

RESULTS AND DISCUSSION

1. Entrepreneurial behaviour of trained mushroom growers

Table1: Distribution of the respondents according to entrepreneurial behaviour

Sr. No.	Entrepreneurial behaviour	Respondents (n=60)	
		Number	Percentage
1	Low (Up to 16)	11	18.33
2	**Medium (17 to 20)**	**34**	**56.67**
3	High (21 and above)	15	25.00
	Total	**60**	**100.00**

Mean = 18.88 S.D. = 2.16

Table 1 shows that more than half (56.67 per cent) of the respondents had medium level of entrepreneurial behaviour, followed by 25.00 percent respondents had high and 18.33 per cent had low level of entrepreneurial behaviour. Thus, this indicates that mushroom growers had medium level of entrepreneurial behaviour as taking mushroom production as a side business and most of them were enthusiastic in adopting new practices. This findings were similar with Solanki (2003).

1.1 Achievement motivation

Table 2: Distribution of the respondents according to achievement motivation

Sr. No.	Motivation	Respondents (n=60)	
		Number	Percentage
1	Low (Up to 5)	13	21.67
2	**Medium (6 to 8)**	**32**	**53.33**
3	High (Above 8)	15	25.00
	Total	**60**	**100.00**

Mean = 7.48 S.D. = 1.58

The data presented in table 2, revealed that more than half (53.33 per cent) of the respondent had medium level of achievement orientation, followed by high (25.00 per cent) and low (21.67 per cent) level of achievement motivation. From the table, this indicates that mushroom growers had medium level of achievement motivation due newness to this technology and less experience. The findings were similar with Kumar (2011).

Table 3: Statement-wise distribution of the respondents according to achievement motivation

Sr. No.	Statement	Agree		Disagree	
		Number	Per cent	Number	Per cent
1	In accomplishing a task, I like to do it much better than other mushroom entrepreneurs or to finish it before time	31	51.67	29	48.33
2	My desire is to be an average mushroom entrepreneur or a successful mushroom entrepreneur	26	43.33	34	56.67
3	I feel my success depends upon my hard work in mushroom enterprise or upon my parents and relatives	18	30.00	42	70.00

4	I like to earn more profit or to satisfy my minimum needs	32	53.33	28	46.67
5	After 10 years, I will be a well known mushroom entrepreneur or my status will be same	43	71.67	17	28.33

1.2 Risk orientation

Table 4: Distribution of the respondents according to risk orientation

Sr. No.	Rick orientation	Respondents (n=60)	
		Number	Percentage
1	Low (Up to 3)	10	16.66
2	Medium (4 to 5)	19	31.67
3	**High (Above 5)**	**31**	**51.67**
	Total	**60**	**100.00**

The above table 4, revealed that more than half (51.67 per cent) of respondents had high risk orientation, followed by 31.67 per cent for medium and 16.66 per cent for low level of risk orientation. The findings were similar with Tamilselvi and Vasantkumar (2008).

Table 5: Statement-wise distribution of the respondents according to risk orientation

Sr. No.	Statement	Agree		Disagree	
		Number	Per cent	Number	Per cent
1	Rather than taking risk by using mushroom species, mushroom entrepreneur should go for use of different mushroom species	60	100.00	00	0.00
2	Generally those mushroom entrepreneurs are economically wise who take high risk	51	85.00	09	15.00
3	Entrepreneur should use new technology in their enterprise after successful use of that technology	48	80.00	12	20.00
4	Even though use of complete new technology in mushroom enterprise is risky, it is advisable	53	88.33	07	11.67
5	Mushroom enterprise should be planned considering current status of market	46	76.67	14	23.33

1.3 Market Orientation

Table 6: Distribution of the respondents according to market orientation

Sr. No.	Market orientation	Respondents (n=60)	
		Number	Percentage
1	Low (Up to 6)	10	16.67
2	**Medium (7 to 8)**	**35**	**58.33**
3	High (Above 8)	15	25.00
	Total	**60**	**100.00**

The data presented in table 6 revealed that more than half (58.33 per cent) of the respondent had medium level of knowledge of market orientation, followed by high (25.00 per cent) and low (16.67 per cent) level of knowledge of market orientation. The results were similar to those done by Rathod (2012).

Table 7 : Distribution of the respondents according to market orientation

Sr. No.	Statement	Agree		Disagree	
		Number	Per cent	Number	Per cent
1	Selling without intermediaries	58	96.67	02	3.33
2	According to quality grading	60	100.00	00	0.00
3	Fresh/ Dry	60	100.00	00	0.00
4	More price in urban market than rural	60	100.00	00	0.00
5	Marketing place				
	a.Local market	60	100.00	00	0.00
	b.Hotels	27	45.00	33	55.00
	c.Other	22	36.67	38	63.33
6	Selling through				
	a.Directly	60	100.00	00	0.00
	b.Agent	14	23.33	46	76.67
7	Byproducts prepare	05	8.33	55	91.67

CONCLUSION

More than half of the respondent had medium level of achievement orientation, high degree of risk orientation and medium level of market orientation. Hence, majority of the respondents had shown medium level of overall entrepreneurial behaviour. The study noticed that mushroom growers had a high degree of risk orientation. It is, therefore, necessary to work with the individuals who have medium and less degree of risk orientation in order to educate and motivate them to undertake mushroom production.

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RESEARCH ARTICLE

Adoption level of Recommended Paddy Technologies among Tribal Farmers in Narmada District

V. K. Poshiya[1], M. V. Tiwari[2], P. D. Verma[3] and N. N. Tale[4]

1. Assistant Professor, TWTC, Dediapada NAU, Narmada, Gujarat, 2. Scientist ,KVK, NAU, Narmada, 3. Senior Scientist and Head (Ext.Edu), KVK NAU, Narmada, 4. Assistant Professor, Agril. Extension College of Agriculture, Karad

ABSTRACT

Adoption is a mental process of an individual; it is a decision of full use of an innovation as the best course of action available. The study was conducted in Narmada districts of South Gujarat during the year 2019-2020. The primary data was collected from 100 respondents by following personal interview method and using structured interview schedule. After the analysis of the collected data it was observed that, majority of the respondents (46.00%) were under medium level of adoption category with regards to adoption of individual practices, majority of the respondents (93.00%) have adopted the recommended Method of transplanting, followed by recommended time of harvesting (91.00%). Less than 42.00 percent of respondents adopted Disease and Pest management (45.00 %). Keeping this in view present study was conducted to know about the extent of adoption of recommended paddy cultivation practices by tribal farmers.

Key words : Adoption, Paddy, Recommended technologies, South Gujarat

INTRODUCTION

Narmada district is a tribal dominated district with 78 % tribal population. The 89.6 % of the population resides in the villages and depends on Agriculture. The district is blessed with fairly good amount of well distributed rainfall varying from 800 to 1100 mm. The district has 44.36 % cultivable land with 39.36 % irrigated land. The major crops of the district are Cotton, Gram, pigeon pea, Paddy and Maize, Paddy growers this area are depending on only monsoon rainfall. The literacy rate of man and women is very poor and unaware new agricultural practices. However, recent studies have shown that majority of paddy growers' adoption level was medium (Sasane et al. 2012). Other studies suggest wider scope for increasing production and productivity, by increasing the level of adoption of improved technologies. The present study was undertaken to study the level of adoption of recommended paddy production technologies in paddy growers of Narmada District.

OBJECTIVE

1. To study the personal profile of selected paddy growers in Narmada District.
2. To find out the extent of adoption regarding recommended paddy production technologies in paddy growers of Narmada District.

METHODOLOGY

The present study was conducted in Narmada district of Gujarat State as it is the jurisdiction of KVK, Dediapada. there are Total Ten adopted villages namely; kham, Almavadi, Tabda, Gopliya, Kunbar, Sorapada, Panchpepri, Kel, Bordifali, Mahupada in which KVK,Dediyapada had under taken extension activities. Out of these adoptive villages in which area under GNR-2 and Purna variety of Paddy crop highest were selected for study. Ten of farmers (Paddy growers) were from each selected villages as were selected as respondents. Thus, sample size was 100 respondents. Data were collected from the respondents through a well structured interview schedule by employing face to face interview. Level of adoption was measured by adoption quotient, comprising the paddy technologies recommended by Navsari Agricultural University.

FINDINGS AND DISCUSSION

1. Socio-economic profile of the respondents

Socio-economic status of the respondents is an important and integral part of any social science research. The profile study reveals that, half of the respondents (71.00%) belonged to middle age category, majority of the respondents (35.00%) had education up to the secondary level of education, (35.00 percent) of them had medium (1.1 to 2 ha) land holding, majority of the respondents(27.00 per cent) tribal hilly area occupied to farming + Animal husbandry with more than 50.00 percent respondents belonged to medium categories in following variables, risk preference (63.00%), Economic motivation (60.00%), Scientific Orientation (51.00%), social participation (64.00%), Attitude of Paddy growers (53.00%)

2. Extent of adoption regarding recommended paddy production technologies in paddy growers

For the study an operational measure for adoption of Paddy production recommended Technologies were constructed based on the Recommended Paddy cultivation practices. A list of 63 items was selected for each practice was administered in the form of questions to the respondents to obtain the response from respondents. The answers to questions were quantified by giving one score to fully adopted and zero score to not adopted one. After computing level of adoption score of the respondents were grouped in to low, medium and high categories based on percent of score & no of respondents.

Table-1: Adoption level of Paddy growers about Paddy recommended Technologies (n=100)

Sr. No.	Adoption	No. of respondents	Percentage
1.	Low level of Adoption (up to 20.79 score)	23	23.00
2.	Medium level of Adoption : (20.80 to 41.58 score)	46	46.00
3.	High level of Adoption (above 41.58 score)	31	31.00
	Total	**100**	**100.00**

The data Presented in Table-1 indicated that the Total of the respondents, 46.00 percentage had Medium level adoption of Paddy recommended Technologies while 31.00 percentage of respondents had high level of adoption and only (23.00 percentage) of the respondents had level of low adoption about Paddy recommended Technologies.

Table. 2: practice wise adoption of recommended Paddy Production Technologies (n = 100)

Sr. No	Recommended practices	Number	Per cent
1.	Land leveling	89	89.00
2.	Paddling	86	86.00
3.	Selection of variety	87	87.00
4.	Selection of certified seed	78	78.00
5.	Seed rate	68	68.00
6.	Seed treatment	63	63.00
7.	Sowing time of seed	61	61.00
8.	Seed bed preparation	72	72.00
9.	Age of seedling	58	58.00
10.	Fertilizer management for seedling	74	74.00
11.	Weed management for seedling	80	80.00
12.	Time of transplanting	90	90.00
13.	Method of transplanting	93	93.00
14.	Row spacing	60	60.00
15.	Seedling spacing	76	76.00
16.	Fertilizer management in transplanted paddy	85	85.00
17.	Weed management in transplanted paddy	79	79.00
18.	Water management in transplanted paddy	66	66.00
19.	Pest management	45	45.00
20.	Disease management	42	42.00
21.	Time of harvesting	91	91.00
22.	Method of harvesting	83	83.00
23.	Removing of paddy straw from the field	65	65.00
24.	Removing of paddy residue from the field	52	52.00

After analyzing overall adoption, further the adoption of individual recommended practices of paddy cultivation by respondents was studied. It brought more clarity in understanding the least adopted and highly adopted practices. Table 2 reveals that the practice “Recommended method of Transplanting” was adopted by (93.00 %) of respondents, it was expressed by farmers that the recommended Japanese method of transplanting for suitable increasing paddy productivity (91.00 %) as followed by “recommended Time of harvesting fornext

planning of Pre-Rabi crops. Majority Less than (42.00 %) of respondents adopted Disease management as followed by (45.00 %) Pest management practices for control of pest &diseases in paddy cultivation in field.

CONCLUSION

Findings of the study presented above can be concluded that the majority of the respondents were with medium level of personal profile socio economic tribal farmers with Majority (93.00%) of the respondents were have adopted the recommended Method of transplanting, followed by recommended time of harvesting (91.00%) Medium level of overall adoption of improved paddy cultivation practice like Land leveling, Paddling, Fertilizer management in transplanted paddy, Selection of variety were Practices wise adoption of recommended Paddy Production Technologies.

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RESEARCH ARTICLE

Constraints and Suggestions made by Villagers about Drought Management Schemes in Satara District

A. M. Awaghade[1], K. V. Gurav[2] and B. T. Kolgane[3]

1. M.Sc. Student, 2. Associate Professor, 3. Professor,
RCSM College of Agriculture, Kolhapur

ABSTRACT

The study was conducted during the year 2019-20 in the Satara district of Maharashtra state.The present investigation "Attitude of Villagers towards Drought Management Schemes in Satara district." 10 respondents from each village were selected. Data were collected by personally interviewing 140 villagers with the help of specially designed interview schedule.The statistical tools such as frequency, percentage, mean, standard deviation and Karl's pearson correlation coeffiecient were used for grouping the data.The important constraints in Magel Tyala Shettale Yojana reported by the respondents were did not get enough subsidy (91.42 per cent), beneficiaries does not get the subsidy on time (76.42 per cent) and taking advantage of the farm pond scheme is more complicated (69.28 per cent). The major constraints in Jalyukta Shivar Yojana reported by villagers were construction under the scheme is not as per the requirement of villagers (87.14 per cent), lack of time to time guidance (70.71 per cent), the dams work under this scheme not up to the mark (67.85) and inadequate training to villagers regarding scheme (51.42 per cent). also major constraints in Paani foundation reported by villagers were lack of public participation (30.71 per cent), lack of money to construct water storage structure (28.00 per cent) and inadequate training to villagers (5.00 percent).The important suggestions made by farmers to overcome constraints in Magel Tyala Shettale Yojana are government should increase subsidy amount and provide subsidy to farmers on time (92.85 per cent), need of guidance by extension personnel about this scheme (82.14 per cent), government should simplify the procedure to get easily benefit of this scheme (57.14 per cent).

Key Words : Constraints and Suggestions, Drought Management Schemes

The major suggestions made by villagers about Jalyukta Shivar Yojana are there is necessary to watch work of this Scheme seriously by the implementing authority (94.28 per cent) and the constructed dams should be repaired every year (85.00 per cent). Also major suggestions made by villagers to overcome constraints about Paani Foundation are the government should help with financial support to villages for conducting Paani Foundation work (96.42 per cent).

INTRODUCTION

Wateris a precious resource on the earth surface but the distribution of water is uneven on the earth surface. 97.39 per cent water is stored in the oceans. Only 2.61 per

cent is fresh water in available on the earth. Out of that 0.59 per cent located in the ground, lakes, rivers. The entire survival is depends on the small amount of fresh water. Satara district is situated in the Western part of Maharashtra State. The government as well as NGO's launched water conservation programmes. Government implement Drought Management Schemes in man and khatav tahsils. The major efforts were taken by "Jalyukta Shivar Yojana" and "Magel Tyala Shetatale" schemes of State government and "Paani Foundation" which is Private NGO for drought management in Man and Khatav tahsils of Satara District.

The main purpose of the Drought Management Scheme are storage of water and create awareness about utilization of water in farm, increase water holding capacity, increase construction as well as storage capacity of water resources and participation of villagers about tree plantation and water utilization. But some practical constraints faced by the villagers during adoption of Drought Management Schemes.This indicates that there is urgent need to know their existing knowledge level, for deciding the future strategy in respect of promoting the Drought Management Schemes. In view of this the study was conducted with objectives to know the level of knowledge of villagers about the Drought Management Schemes.

METHODOLOGY

The study was undertaken in Satara district from Maharashtra state. Man and Khatav tahsils were selected on the basis of low rainfall and implementation of Drought Management Schemes. Data were collected from 140 respondents from 14 villages of these two tahsils. Frequency, percentage, mean, standard deviation and Karl's pearson correlation coeffiecient these statistical tools were used to analyze the data. Responses regarding knowledge of villagers about Drought Management Schemes were recorded with the help of structured interview schedule. Total score for awareness was calculated for each respondent and on the basis of score obtained they were categorized into three categories using mean and standard deviation. The same was analyzed and presented in the following tables.

RESULT & DISCUSSION

Constraints Faced and Suggestions to overcome the constraints.

Table 1. Constraints faced by the villagers about the implementation of Drought Management Schemes

Sr. No.	Constraints	Respondents(N = 140)		Rank
		Frequency	Percentage	
A.	**Magel Tyala Shettale**			
1	Taking advantage of the farm pond scheme is morecomplicated	97	69.28	**IV**

Sr. No.	Constraints	Respondents(N = 140)		Rank
		Frequency	Percentage	
2	Lack of guidance from time to time whiletaking advantage of the farm pond scheme	111	79.28	II
3	The beneficiaries does not get the subsidyfrom the farm pond scheme on time	107	76.42	III
4	Farmers did not get enough subsidy underthe farm pond scheme	128	91.42	I
B.	**Jalyukta Shivar Yojana**			
1	Lack of time to time guidance	99	70.71	II
2	Inadequate training to villagers regardingScheme	72	51.42	IV
3	The dams work under this scheme is not upto the mark	95	67.85	III
4	The construction under the scheme is not asper the	122	87.14	I
	requirements of the villagers			
C.	**Paani Foundation**			
1	Inadequate training to villagers regardingScheme	07	5.00	III
2	Lack of money to construct water storageStructure	28	20.00	II
3	Lack of public participation in the scheme	43	30.71	I

A. Magel Tyala Shettale

From table 1 it is observed that majority (91.42 per cent) farmers having "farmers did not get enough subsidy under the farm pond scheme" followed by 79.28 per cent respondents having constraints of "lack of guidance from time to time while taking advantage of the farm pond scheme", 76.42 per cent respondents having constraints that they does not get the subsidy from the farm pond scheme on time." and 69.28 per cent respondents having constraints of "Taking advantage of the farm pond scheme is more complicated."

B. Jalyukta ShivarYojana

From table 1 it is observed that majority (87.14 per cent) villagers having constraints of "The construction under the scheme is not as per the requirement of the villagers." followed by 70.71 percent respondents having constraints of" lack of guidance time to time.", 67.85 per cent respondents having constraints of "The dams works under this scheme not up to the mark." and 51.42 per cent respondents having constraints of "Inadequate training to villagers regarding schemes."

C. Paani Foundation

From table 1 it is observed that majority (30.71 per cent) number of villagers having constraints of "Lack of public participation in the scheme." followed by 28.00 per cent respondents having constraints of "Lack of money to construct waterstorage structure." And5.00 per cent respondents having constraints of "Inadequate training to villagers regarding scheme."

Table 2. : Suggestion made by villagers to overcome the constraints in implementing Drought Management Schemes

Sr. No.	Suggestion	Respondents(N = 140)		Rank
		Frequency	Percentage	
A	**Magel Tyala Shettale**			
1	There is need of guidance by extension personnel about MagelTyalaShettale scheme	115	82.14	Ⅱ
2	Government should simplify the procedure for getting benefit of this scheme easily	80	57.14	Ⅲ
3	Government should increase subsidy amount and provide subsidy to farmers on time	130	92.85	Ⅰ
B.	**Jalyukta Shivar Yojana**			
1	It is necessary to watch work of this Scheme seriously by the implementing authority	132	94.28	Ⅰ
2	The constructed dams should be repaired every year	119	85.00	Ⅱ
C.	**Paani Foundation**			
1.	The government should help with financial support to villages for conducting Paani Foundation work	135	96.42	Ⅰ

A. Magel Tyala Shettale

It is observed from Table 2 that majority (92.85 per cent) respondents were having suggestions of "Government should increase subsidy amount and provide subsidy to farmers on time" followed by 82.14 per cent respondents were having suggestion of "There is need of guidance by extension personnel about Drought Management Schemes." and 57.14 per cent respondents were having suggestion of "Government should simplify the procedure for getting benefit of this schemeeasily."

B. Jalyukta ShivarYojana

It is observed from Table 2 that majority (94.28 per cent) respondents were having suggestions of "There is necessary to watch work of this Scheme seriously by the implementing authority." Followed by 85.00 per cent respondents were having suggestion of "The constructed dams should be repaired every year."

C. Paaani Foundation

It is observed from Table 2 that 96.42 per cent respondents were having suggestions of "The government should help with financial support to villages for conducting Paani Foundation work."

CONCLUSIONS

The important constraints in Magel Tyala Shettale Yojana reported by the respondents were did not get enough subsidy (91.42 per cent), beneficiaries does not get the subsidy on time (76.42 per cent) and

taking advantage of the farm pond scheme is more complicated (69.28 per cent). The major constraints in Jalyukta Shivar Yojana reported by villagers were construction under the scheme is not as per the requirement of villagers (87.14 per cent), lack of time to time guidance (70.71 per cent), the dams work under this scheme not up to the mark (67.85) and inadequate training to villagers regarding scheme (51.42 per cent). also major constraints in Paani foundation reported by villagers were lack of public participation (30.71 per cent), lack of money to construct water storage structure (28.00 per cent) and inadequate training to villagers (5.00 per cent).

The important suggestions made by farmers to overcome constraints in Magel Tyala Shettale Yojana are government should increase subsidy amount and provide subsidy to farmers on time (92.85 per cent), need of guidance by extension personnel about this scheme (82.14 per cent), government should simplify the procedure to get easily benefit of this scheme (57.14 per cent). The major suggestions made by villagers about Jalyukta Shivar Yojana are there is necessary to watch work of this Scheme seriously by the implementing authority (94.28 per cent) and the constructed dams should be repaired every year (85.00 per cent). Also major suggestions made by villagers to overcome constraints about Paani Foundation are the government should help with financial support to villages for conducting Paani Foundation work (96.42 per cent).

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RESEARCH ARTICLE

Problems in Turmeric Cultivation and Marketing Pattern of Turmeric Growers

Suraj Dhande[1], R. P. Mandve[2], R. M. Hukare[3], A. S. Dere[4] and S. A. Mahajan [5]

1, 3, 4 & 5 PG student 2. Assistant Professor of Extension Education Section, College of Agriculture, Nagpur 441110 (M. H.), India

Corresponding author e-mail: surajdhande4@gmail.com

ABATRACT

The present study on "Entrepreneurial behaviour of turmeric growers" was conducted in Vidarbha region of Maharashtra with sample size of 120 farmers from 15 villages. Data were collected by personally interview schedule. The data collected were carefully examined, classified, quantified and tabulated. Frequencies, percentage, mean, standard deviation and correlation were employed for interpreting the results. In case of the problems face by the turmeric growers majority of respondents 91.66 per cent faced the problem of labour rank as a Istfollowed by high labour wages (75.00%), Unavailability of market (58.33%), irregular supply of electricity (45.00%), and they were ranked as IInd, IIIrd, and IVth, respectively. In case of the marketing pattern Majority (85.33%) of the turmeric growers sold their produce through directly to consumer, followed by to middle man or retailer at the farm (82.5%), 70.83 per cent of respondents had stored the rhizomes as a seed for next year planting for self or sell.The main sources of market information were middle man and retailer (79.17%).

Key words: Turmeric cultivation, marketing pattern, Constraints.

INTRODUCTION

Turmeric is native of India and china. The word turmeric is derived from the French word 'Terre-merite' meaning merit of the earth. Its botanical name is *Curcuma longa* L. and belongs to family Zingeberaceae, it is also known as 'Indian Saffron' is an herbaceous perennial plant growing up to the height of 60 – 90 cm with short stem. The plant is propagated from rhizomes. The leaves are long, broad lanceolate and bright green. The flowers are pale yellow and born on dense spikes. The pseudo stem are shorter than leaves. The rhizomes were ready for harvesting about 7 to 9 months after planting.

India is popularly known as the "Spiced Bowl of the World" as a wide variety of spices with premium quality grown in a country since ancient times. Turmeric is very important spice in India. Its active ingredient is curcumine. Indian turmeric is considered to be the best in the world due to presence of high curcumine content. Turmeric contains up to 5.00 per cent essential oil and up to 5.00 per cent curcumine, a polyphenol.

As a medicine turmeric has been used in Ayurvedic system of medicine in India from times immemorial. It is claimed to

be a stomaching tonic, blood purified, antiseptic, antacid, antiperiodic and carminative. It is used medically for extended application and taken internally as a stimulant. It also used in cosmetic industries. In India companies like Godrej, vicco are engaged in manufacturing different new products from turmeric like soaps, antiseptics, cosmetics, etc. Turmeric or Haladi powder boiled in milk along with small quantity of black paper may be taken two-three times a day for sore throat, cough, cold and other acute respiratory infection. Further, clean white cloth dyed in turmeric and dried in sun can be used for wiping sore eyes thus, cures eye infection. Further, it is also regarded by the Hindus as sacred item for use in ceremonial and religious function. A few years ago, India got the patent of turmeric due to strong evidences, ancient literature and references available with our country about the turmeric.

METHODOLOGY

The present study was carrying out in Wardha district of Maharashtra State. For the present study the exploratory design of social research was used. In Wardha district there are 8 tehsils, out of which five tehsil namely, Samudrapur, Hinganghat, Wardha, Deoli and Arvi were selected on the basis of number of respondents cover.From each of selected tehsils 3 villages were randomly selected, thus in 15 villages were selected for the study. From all the selected villages 8 farmer from each village were selected randomly and was treated them as respondents under present study, Hence total 120 respondents was selected for the study.

RESULT AND DISCUSSION

Table 1: Distribution of respondents according to problems faced by turmeric growers in turmeric cultivation.

Sl. No.	Problems	Frequency (n=120)	Percentage	Rank
1	Labour problems	110	91.66	I
2	High labour wages	90	75.00	II
3	Unavailability of market	70	58.33	III
4	Irregular supply of electricity	54	45.00	IV
5	Inadequate water supply during summer	26	21.66	V
6	Non availability of fertilizer at required time	25	20.83	VI
7	Costliness of fertilizer	17	14.66	VII
8	Lack of storage facilities	8	6.66	VIII
9	Non availability of Plant protection chemicals	4	3.33	IX
10	Expensive nature of Plant protection chemicals	3	2.5	X

It was observed from Table 1 that, great majority of respondents 91.66 per cent of respondents face the problem of labour rank as a Istfollowed by high labour wages (75.00%), Unavailability of market (58.33%), irregular supply of electricity (45.00%), and they were ranked as IInd, IIIrd, and IV^{th,}, respectively.

The other problems faced by the respondents were inadequate water supply during summer (21.66%), non-availability of fertilizer at required time (20.83%), lack of storage facilities (6.66%), Non availability of Plant protection chemicals (3.33%), Expensive nature of Plant protection chemicals (2.5%) and they were ranked as VthTo Xth, respectively. The similar findings were reported by Ovhar and Dhenge (2014). This might be due to the turmeric comes for harvesting at a same time and for harvesting required lots of labour due to this there was labour problem and to overcome this problem labour increase their wage

Table 2: Distribution of respondents according to marketing pattern of turmeric growers.

Sl. No.	Mode of marketing	Frequency	Percentage
1	Directly to consumer	103	85.33
2	To middle man or retailer	99	82.50
3	Storage of rhizomes as a seed for self	85	70.83

Table 2 revealed the pattern of marketing followed by turmeric growers. Majority (85.33%) of the turmeric growers sold their produce through directly to consumer, followed by 82.50 per cent of the respondents to middle man or retailer at the farm, 70.83 per cent of respondents had stored the rhizomes as a seed for next year planting for self.The above mode of marketing trend might be due small quantity of turmeric produce had sold directly to consumer and remaining quantity to middle man and retailer it was due to the medium area under turmeric cultivation.

Table 3: Distribution of respondents according to sources of market information

Sl. No.	Sources of Market Information	Frequency	Percentage
1	News paper	34	28.33
2	Personal visiting market	53	44.16
3	Radio	6	5.00
4	Television	16	13.33
5	Turmeric growing farmer	40	33.33
6	Middle man and retailer	95	79.17

Table 3 revealed the sources of market information for the turmeric growers. The main sources of market information were middle man and retailer (79.17%), Personal visiting market (44.16%), turmeric growing farmer (33.33%), newspaper (28.33%) television (13.33%) and radio (5.00%). The similar findings were reported by Thakare (2013).The above source of marketing trend might be due to the majority of the respondents had sold their produce directly to middleman and retailer and they provide them market information regarding price.

CONCLUSION

In case of the problems face by the turmeric growers majority of respondents 91.66 per cent faced the problem of labour rank as aIst. In case of the marketing pattern

majority (85.33%) of the turmeric growers sold their produce through directly to consumer.

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RESEARCH ARTICLE

Knowledge of Recommended Cultivation Practices of Black Gram (*Vigna mungo L.)*

R. G. Patil[1], S. A. Gawande[2], S. N. Suryawanshi[3], R. T. Katole[4], Y. B. Shambharkar[5] and P. M. Todasam[6]

1.M.Sc.(Agri.) student, 2, 3 & 5 Assistant Professor 4. Associate Professor and 6.Senior Research Assistant, Department of Extension Education, Dr. P D KV, Akola

ABSTRACT

The present study on "knowledge of recommended cultivation practices of black gram" was purposively conducted in three Panchayat Samities of Akola district of Maharashtra state in the year 2018-19. Results obtained after analysis have been summarized as below.

Findings of relational analysis revealed that, sources of information was positively and highly significantly correlated with the knowledge of black gram growers about recommended cultivation practices. The variables namely age, education, occupation, land holding, annual income, area under black gram, social participation, economic motivation and risk orientation were positively and significantly correlated with the knowledge of recommended cultivation practices of black gram. The variable insurance availed was negatively and non-significantly correlated with the knowledge of black gram growers about recommended cultivation practices.

INTRODUCTION

India is the largest producer (25.00 % of global production), consumer (27.00 % of world's consumption) and importer (14.00 %) of pulses in the world. Pulses account around 20.00 per cent of area under food grains and contribute around 7.00-10.00 per cent of total food grain production in the country. Madhya Pradesh, Maharashtra, Rajasthan, Uttar Pradesh and Karnataka are the top five pulses producing states. Productivity of pulses is 764 kg/ha. (www.icrisat.org).

Black gram popularly known as Urd bean, Urid or mash is an important pulse crop in India. Black gram (*Vigna mungo (L.) Hepper*) reported to be originated in India. It belongs to family *Leguminoceae* with chromosome no.2n=22. It is the main source of protein, amino acids in vegetarian diet. It contains about 24-26 per cent protein, 56 per cent carbohydrates and 2 per cent fat. It is rich source of calcium, iron and niacin. Pulses have good ability to fix atmospheric nitrogen and improve the soil fertility. They are mostly useful as fodder and concentrates in cattle feed. Because of the special features of pulses they are mostly used as green manure.

Grains of black gram are most important product which is consumed in the form of dal (whole or split, husked and un-husked) or parched. It is the chief constituent of papad and also used to prepare a delicious

curry. It is prescribed as medicine in both internally and externally in paralysis and infection of the nervous system.(Hulagur *et al.*, 2018)

METHODOLOGY

An exploratory design of social research was used for the present investigation. Out of seven Panchayat Samiti in Akola district, three talukas namely, Akola, Murtizapur and Akot were purposively selected for the study on the basis of maximum area under black gram cultivation. A sample of 10 black gram growers from each village was selected purposively considering the higher area under this crop. Thus, a sample of 120 black gram growers was selected purposively from the four villages of selected three Panchayat Samiti. The data was collected using the interview schedule.

Knowledge of the respondents about recommended cultivation practices of black gram was measured on the basis of Dr. PDKV, Akola recommended cultivation practices of black gram. The present study was undertaken with the following objectives

1. To study the personal, socio-economic, communicational and psychological characteristics of respondents
2. To study the knowledge of respondents about recommended cultivation practices of black gram
3. To find out relationship of respondents and their knowledge of cultivation practices of black gram
4. To identify the constraints faced by the farmers in adoption of recommended cultivation practices of gram

RESULT AND DISCUSSION

The findings of the study as well as relevant discussion have been summarized under the following heads

Profile of black gram growers

The selected characteristics of black gram growers have been summarized in Table 1.

Table 1 : Distribution of profile of black gram growers

Sr. No.	Profile of blafck gram growers		Frequency	Percentage
1	Age	Young	30	25.00
		Middle	84	70.00
		Old	06	05.00
2	Education	Illiterate	00	00.00
		Primary school	09	07.50
		Middle school	43	35.83
		Secondary school	40	33.34
		Higher secondary school	21	17.50
		College and above	07	05.83

Sr. No.	Profile of blafck gram growers		Frequency	Percentage
3	Occupation	Agriculture + labour	09	07.50
		Agriculture	83	69.16
		Agriculture + allied occupation	16	13.34
		Agriculture + business	08	06.67
		Agriculture + services	04	03.33
4	Land holding	Marginal	11	09.16
		Small	44	36.67
		Semi-medium	59	49.17
		Medium	06	05.00
		Large	00	00.00
5	Annual income	Up to Rs. 1,14,000	08	06.67
		Rs. 1,14,001 to Rs. 2,28,000	52	43.33
		Rs. 2,28,001 to Rs. 3,42,000	38	31.66
		Rs. 3,42,001 to Rs. 4,56,000	13	10.84
		Above Rs. 4,56,000	09	07.50
6	Area under	Up to 0.70 ha.	38	31.66
	black gram	0.71 ha to 1.40 ha.	71	59.17
		Above 1.40 ha.	11	09.17
7	Sources of information	Low	20	16.66
		Medium	79	65.84
		High	21	17.50
8	Insurance availed	Yes	22	18.33
		No	98	81.67
9	Social participation	Low	22	18.33
		Medium	81	67.50
		High	17	14.17
10	Economic motivation	Low	21	17.50
		Medium	91	75.83
		High	08	06.67
11	Risk orientation	Low	13	10.83
		Medium	88	73.33
		High	19	15.84

From Table 1, it has been observed that majority of the respondents (70.00%) were from middle age i.e. between 36 to 50 years of age. The old age farmers did not take initiative in adoption of recommended cultivation practices. Similar findings were reported by Dayal and Mehta (2015), Raut (2018), Dhorey (2019)

From Table 1, it has been observed that maximum percentage of the respondents adopting recommended cultivation practices had formal schooling up to middle school level (35.83%). These findings supported the observations of Kadam *et. al.*(2014), Lohare (2017) and Mane (2018).

From Table 1, it has been observed that, 70.00 per cent (i.e. 69.16%) of the respondents had agriculture as their occupation. These findings are in line with the observations of Thakare (2013), Shweta (2014) and More (2016).

From Table 1, it has been observed that , respondents in majority (49.17%) belonged to semi-medium category of land holding. This findings therefore, supports findings of Kadam et. al.(2014), Dayal and Mehta (2015) and Mane (2018).

The distribution of the farmers according to their annual income presented in Table 1. It was concluded that majority of the respondents (43.33%) possessed annual income Rs. 1,14,001/- to Rs. 2,28,000/-.

From Table 1, it has been observed that maximum percentage of the respondents i.e. 59.17 per cent had 0.71 ha. to 1.40 ha area under black gram cultivation.

From Table 1, it has been observed that majority of the respondents (65.84%) were mediocre in respect of use of information sources. These results were similar to the results obtained by Thombre *et. al.* (2014), Lohare (2017) and Raut (2018).

From Table 1, it has been observed that majority (81.67%) of the respondents had not availed insurance. Similar findings were observed by Mote *et. al*. (2017).

From Table 1, it has been observed that majority (67.50%) of the respondents were included in the medium level of social participation. These findings are in line with the observations of Mane (2012), Thakare (2013) and Mane (2018).

It leads to conclude that higher percentage of black gram growers (75.83%) had medium level of economic motivation. These findings were confirmed by the observations Tembhurne (2016), Rathod (2017), Raut (2018), Mane (2018), and Dhorey (2019).

It leads to conclude that higher percentage of black gram growers (73.33%) had medium level of risk orientation category. These findings were confirmed by the observations of Mane (2012), Mane (2018) and Dhorey (2019).

Knowledge

The distribution of respondent according to knowledge in Table 2 indicates that, majority (78.33%) of the respondents possessed medium level of knowledge about recommended cultivation practices of black gram. As much as 17.50 per cent had high and 04.17 per cent of them belonged to low level of knowledge about recommended cultivation practices of black gram.

The above findings are in consonance with the findings of Zunjar (2011), Mane (2012), Khare (2013), Chandawat *et al.* (2014), Lohare (2017) and Abha Tiwari (2019).

Table 2. Distribution of respondents according to their knowledge about recommended cultivation practices of black gram

Sr. No.	Knowledge	Respondents (n=120)	
		Frequency	Percentage
1	Low	05	04.17
2	Medium	94	78.33
3	High	21	17.50
	Total	**120**	**100.00**

Table 3 : Distribution of respondents according to their practice wise knowledge about recommended cultivation practices of black gram

(n=120)

Sr. No.	Recommended Black gram Cultivation practices	Respondents	
		Frequency	Percentage
1.	Land preparation	120	100.00
2.	Sowing method	114	95.00
3.	Sowing time	97	80.83
4.	Seed rate	91	75.84
5.	Varieties	78	65.00
6.	Spacing	74	61.67
7.	Seed treatment	42	35.00
8.	Recommended FYM dose	42	35.00
9.	Recommended fertilizer application	53	44.17
10.	Irrigation application at critical stages	46	38.34
11.	Weed management	108	90.00
12.	Plant protection	79	65.84
13.	Harvesting	114	95.00
14	Yield	120	100.00

A detail probing about practice wise knowledge possessed by the respondents in the Table 3 revealed that, in case of land preparation and yield, overwhelming cent per cent of respondents (100.00%) had complete knowledge followed by great proportion of respondents (95.00%) possess knowledge about sowing method and harvesting. With regards to knowledge about weed control, it was found that, higher percentage of respondents (90.00%) had knowledge about weed management. It was found that, higher percentage of respondents (80.83%) had knowledge about sowing time for black gram cultivation. It is interesting to note that, overwhelming majority of respondents (75.84%) had knowledge about seed rate for black gram cultivation.

It was found that, 65.84 per cent of the respondents had knowledge about plant protection, whereas 65.00 per cent of the respondents had knowledge about recommended varieties of black gram and 61.67 per cent of the respondents had knowledge about the spacing to be maintained for black gram cultivation. Near about half of the respondents (44.17%) had awareness knowledge about recommended fertilizer application. A few respondents (38.34%) had the knowledge about critical growth stages of irrigation and 35.00 per cent of them had knowledge about seed treatment and farm yard manure application dose. Thus we can conclude that, the respondents were having good knowledge level with regard to recommended cultivation practices of black gram.

Relation analysis

Relationship of selected characteristics of respondents with their Knowledge

The coefficient of correlation of knowledge with profile of the respondents has been furnished in Table 4.

Table 4: Coefficient of correlation of selected characteristics of the respondents with their knowledge

Sl. No.	Variables	'r' value
1	Age	0.2266*
2	Education	0.2064*
3	Occupation	0.2211*
4	Land holding	0.2160*
5	Annual income	0.2269*
6	Area under black gram	0.2108*
7	Sources of information	0.2419**
8	Insurance availed	-0.0102^{NS}
9	Social participation	0.1910*
10	Economic motivation	0.2269*
11	Risk orientation	0.2036*

** - Significant at 0.01 level of probability
*- Significant at 0.05 level of probability
NS - Non significant.

The correlation coefficients of knowledge of black gram growers towards recommended cultivation practices with independent variables have been depicted in Table 4.

It could be seen from the Table 24 that among the selected variables, sources of information was positively and highly significantly correlated with the knowledge of black gram growers about recommended cultivation practices. The variables namely age, education, occupation, land holding, annual income, area under black gram, social participation, economic motivation and risk orientation were positively and significantly correlated with the knowledge of recommended cultivation practices of black gram. Therefore, the null hypothesis was rejected for these variables.

Whereas, the variable insurance availed was negatively and non significantly correlated with the knowledge of black gram growers about recommended cultivation practices. Therefore, the null hypothesis is accepted for this variable.

CONSTRAINTS

In the present study constraints referred to problems or difficulties faced by the respondents in adoption of recommended cultivation practices of black gram. The relevant data in this regard has been depicted in Table 26.

Table 26. Distribution of respondents according to the constraints faced during black gram cultivation

Sl. No.	Constraints	Respondents (n=120)		Ranks
		Frequency	Percentage	
1.	Unavailability of seeds and fertilizers in time	52	43.34	VII
2.	High prices of improved seeds	80	66.67	III
3.	Delay in sowing due to monsoon prolong	58	48.33	VI
4.	Lack of knowledge about seed treatment	51	42.50	VIII

Sl. No.	Constraints	Respondents (n=120)		Ranks
		Frequency	Percentage	
5.	Unawareness about benefits due to seed treatment	59	49.17	V
6.	Non availability of farm yard manure	64	53.34	IV
7.	High cost of pesticides and insecticides	98	81.66	I
8.	Unavailability of labourers	85	70.83	II

It was observed from the Table 26 that, majority of respondents (81.66%) faced the constraints such as high cost of pesticides and insecticides and rank as Ist , followed by unavailability of labourers (70.83%), high prices of improved seeds (66.67%) and they were ranked as IInd and IIIrd.

The other constraints faced by the respondents were non availability of farm yard manure (53.34%), unawareness about benefits due to seed treatment (49.17%) and delay in sowing due to monsoon prolong (48.33%) and they were ranked as IVth, Vth and VIth respectively.

Also, unavailability of seeds and fertilizers in time (43.34%) and lack of knowledge about seed treatment (42.50%) these are the constraints faced by the farmers and ranked as VIIth and VIIIth

CONCLUSION

The findings of correlation analysis revealed that characteristics such as sources of information was positively and highly significantly correlated with the knowledge of black gram growers about recommended cultivation practices. The variables namely age, education, occupation, land holding, annual income, area under black gram, social participation, economic motivation and risk orientation were positively and significantly correlated with the knowledge of recommended cultivation practices of black gram. Whereas, the variable insurance availed was negatively and non- significantly correlated with the knowledge of black gram growers about recommended cultivation practices and majority of respondents (81.66%) faced the constraints such as high cost of pesticides and insecticides

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RESEARCH ARTICLE

Constraints faced and Suggestions made by the Farmers for improving Result Demonstrations for White Grub Management in Sugarcane

P. G. K. Reddy[1] and Kumar Vishnu Gurav[2]

1 M. Sc. Agri. Student, 2. Associate Professor of Agril. Extension and Principal,
Shahu Agriculture Technical School, Kasaba Bawada, Kolhapur-416003, (M.S.) India
Corresponding Author E mail: kumargurav11@gmail.com

ABSTRACT

The study was conducted during the year 2018-19 in the Kolhapur district of Maharashtra state. The present investigation "Utility of Result Demonstrations for White Grub Management in Sugarcane" was conducted in Karveer, Kagal, Panhala, Gaganbawada, Shahuwadi, Shirol, Radhanagari and Chandgad tahsil of Kolhapur district. one village from each tahsil and 15 respondents from each village were selected. Data were collected by personally interviewing 120 Sugarcane growers with the help of specially designed interview schedule. Collected data were analyzed with the help of suitable statistical methods. the analysis of the result showed that The important constraints reported by the respondents were high labour wages for farm operations (63.33 per cent), non availability of improved implements on hired basis (43.33 per cent), timely application of *metarhizium* is not done (40.83 per cent), using of bio control agents gives late results (35.83 per cent), timely monitoring is not done by experts (32.50 per cent).

The important suggestions made by farmers to overcome constraints are proper followup should be maintain after demonstrations (71.66 per cent), Inputs must be available at peak season (55.83 per cent), Improved implements should be made available on hired basis and subsidies should given by government (54.16 per cent), Quick result showing white grub controlling agents should be invent (38.33 per cent),multilocational demonstrations should be organize at cluster villages (26.66 per cent).

Key words: Constraints and Suggestions, Result Demonstration, White Grub Management, Sugarcane.

OBJECTIVE

To explore the constraints faced and obtain suggestions to overcome the constraints during Result Demonstrations for White Grub Management in Sugarcane.

INTRODUCTION

Sugarcane is considered as one of the important commercial crops in India and tropical countries and it is main source of sugar for hundreds of years for the whole world. The Sugarcane contributes 70 per

cent of the world total sugarcane production. The contribution of sugarcane in India is 47.74 lakh ha area with 3550.90 lakh tons of production and 27.25 million tons sugar production with an average yield of 74.4 tons per ha. India ranks 2nd in area and production after Brazil. Maharashtra is second to Uttar Pradesh in area with it´s production as 177.06 million tons and 83.13 million tons respectively (Anonymous, 2017). In Maharashtra sugarcane is growing on the area of 9.02 lakh ha with annual production of 678.63 lakh tons and productivity is 75.23 tons per ha (Anonymous, 2018). The Kolhapur, Satara, Sangli, Ahmednagar, Pune, Nashik and Solapur are the major sugarcane growing districts of Maharashtra. White Grubs have become increasingly difficult pest in Kolhapur region particularly on the banks of rivers due to monoculture. The several tactics have been adopted for the management of White Grub like cultural, mechanical, biological, chemical and integrated methods. The control of White Grub becomes difficult because the lack of control over damage. Adult collection and insecticidal application are major tactics of management against White Grub. The success of these tactics is governed by the seasonality of adults and the susceptibility stage of the grub. A Pest management strategy is mainly depending on the use of highly poisonous chemical pesticides which is practically difficult and associated with high cost, environmental pollution and pesticide residue.

Therefore, keeping this in view, result demonstrations were conducted on White Grub management by using bio control agent *Metarhizium anisopliae* under RKVY Scheme by Regional Extension Centre, RCSM College of Agriculture, Kolhapur in 2012-13. The result demonstrations have remained an effective medium of extension, since 1928, when royal commission on agriculture in india emphatically started that agriculture researchers may be of use to the cultivators, their results must be given to him in a form in which they become a part of his ordinary practices.

METHODOLOGY

The present study was undertaken in Kolhapur district of Maharashtra state on the basis of Regional Extension Centre, Kolhapur conducted the Result Demonstrations for White Grub Management in Sugarcane. A list of farmers received from Regional Extension Centre, Kolhapur office in which There are 8 tahsils in kolhapur district they are *viz*. Karveer, Kagal, Panhala, Gaganbawada, Shahuwadi, Shirol, Radhanagari and Chandgad tahsil were selected for study. From each tahsil 1 village were selected, from each village 15 respondents were selected. The data was collected personally with the help of structured interview schedule as per the method given. The same was analyzed and presented in the following tables.

RESULTS AND DISCUSSIONS

Constraints Faced and Suggestions made by Farmers during Result Demonstrations.

Table 1 : Constraints Faced by Farmers during Result Demonstrations

Sr. No.	Constraints	Respondent (N = 120)		Rank
		Frequency	Percentage	
1	High labour wages for farm operations.	76	63.33	I
2	Non availability of improved implements on hired basis.jtgg	52	43.33	II
3	Timely application of *Metarhizum* is not done.	49	40.83	III
4	Use of bio control agents gives late results.	43	35.83	IV
5	Timely monitoring is not done by experts.	39	32.50	V

The Data presented in table 1 is that majority (63.33 per cent) of the Sugarcane growers were stated high labour wages for farm operations followed by non availability of improved implements on hired basis (43.33 per cent). While, 40.83 per cent of the respondents faced the problem of timely application of *Metarhizium* is not done. 35.83 per cent of the respondents faced the problem using of bio control agents gives late results. Whereas, 32.50 per cent of the respondents faced the problem of timely monitoring is not done by experts.

Table 2 : Suggestion made by farmers to overcome the constraints

Sr. No.	Suggestion	Respondent (N = 120)		Rank
		Frequency	Percentage	
1	Proper followup should be maintain after Demonstrations	86	71.66	I
2	Inputs must be available at peak seasons.	67	55.83	II
3	Improved implements should be made available on	65	54.16	III
	hired basis and subsidies should given by government.			
4	Quick result showing white grub controlling agents should be invent.	46	38.33	IV
5	Multilocational Demonstrations should be organize at cluster villages.	32	26.66	V

The Data presented in table 2 is that majority (71.66 per cent) of the respondents suggested that Proper followup should be maintain after demonstrations, 55.83 per cent of the respondents suggested that Inputs must be available at peak season, 54.16 per cent of the respondents suggested that Improved implements should be made available on hired basis and subsidies should given by government, 38.33 per cent of the respondents suggested that Quick result showing white grub controlling agents should be invent, 26.66 per cent of the respondents suggested that multilocational demonstrations should be organize at cluster villages.

CONCLUSIONS

It can be concluded that, high labour wages for farm operations (63.33 per cent), followed by non availability of improved implements on hired basis (43.33 per cent) and timely application of *Metarhizium* is not done (40.83 per cent). whereas, (71.66 per cent) of the respondents suggested that Proper followup should be maintain after demonstrations followed by Inputs must be available at peak season (55.83 per cent) for better White Grub Management in Sugarcane.

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RESEARCH ARTICLE

Knowledge of Recommended Cultivation Practices of Gram (*Cicer arientinum* L.) by the Farmers

S. T. Kavhar[1], R. T. Katole[2], S. A. Gawande[3], D. K. Nemade[4] and A. S. Gomase[5]

1. M.Sc.(Agri.) student, 2 Associate Professor, 3 & 4 Assistant Professor and
5. Senior Research Assistant, Department of Extension Education, Dr. P D KV, Akola

ABSTRACT

Agriculture being one of the major sector associated with country's population has attracted much attention since independence. India grows a variety of pulse crop under a wide range of agro-climatic conditions and has a pride of being the world's largest producer of pulses in the world. India is the largest producer of pulses in the world with (24.00%) share in the global production.

Practice wise Knowledge of respondents (100.00%) had knowledge about land preparation, followed by (98.33%) and (97.50%) of respondents aware about harvesting and sowing time, respectively. Whereas, fertilizer application, (48.33%) seed treatment, and (43.33%) had knowledge about recommended FYM application , respectively.

In case of Knowledge, variable like education, land holding, annual income, area under gram, sources of information Innovativeness of the respondents positively and significantly correlated with knowledge. The relationship was significant at 0.01 per cent level of probability and economic motivation significant at 0.05 per cent level of probability, hence null (Ho) hypothesis in this case is rejected. However, age was found to be negatively non significant and source of irrigation and insurance availed are non significant with the knowledge of farmers.

The findings pertaining the constraints faced by farmers in adoption of recommended cultivation practices of gram, were majority of (56.67%) respondents faced the low market prices of gram, (53.54%) lack of knowledge about seed treatment, (48.33%) high labour wages, (39.17%) non availability of labour and crop damaged by wild animal (35.00%).

INTRODUCTION

Agriculture being one of the major sector associated with country's population has attracted much attention since independence. India grows a variety of pulse crop under a wide range of agro-climatic conditions and has a pride of being the world's largest producer of pulses in the world. India is the largest producer of pulsesintheworld with (24.00%) share in the global production.

Gram (*Cicer arientinum* L.) is leguminous pulse crop which belongs to *Leguminasae* family. It important pulse crop from nutrition point of view. Pulses are main source of protein in vegetarian diet. Legume has unique role in human and animal nutrition as well as in improvement of soil fertility by improving physico chemical and biological properties of soil.

Gram is commonly known by various names in different states of India such as

chana, chickpea, harbara, chhole and bengal gram. The name chana has been mostly derived from sanskrit word 'chanakam' or 'chennuka'. The most common Indian name is gram. Gram contains (21.10%) protein, (61.50%) Carbohydrates and (2.4-5.0%) Fats. Besides its contain Iron, Calcium, Niacin in sufficient quantity and also contain Malic acid and Oxalic acid.

It is used for human consumption as well as for feeding to animals. It is eaten both whole fried or boiled and salted or more generally in the form of the split pulse which is cooked and eaten. Both husks and bits of the 'dal' are valuable cattle feed. Fresh green leaves used as vegetables (sag). The grains are also used as vegetables (chhole). Chick pea flour (besan) is used in the preparation of various types of sweets. Gram is considered to have medicinal effects and it is used for blood purification.

Objectives

1. To study the profile of farmers
2. To study the knowledge of farmers about recommended cultivation practices of gram
3. To study the relationship of selected characteristics of farmers with their knowledge of recommended cultivation practices of gram
4. To identify the constraints faced by the farmers in adoption of recommended cultivation practices of gram

METHODOLOGY

An exploratory design of social research was used in the present study. Present study was conducted in Amravati district of Maharashtra state considering maximum area under gram.Amravati district comprises of total 14 talukas out of them Amravati and Bhatkuli talukas were purposively selected for present study.Twelve respondents were selected from each village by random sampling method, making a sample size of 120 in total.

RESULTS AND DISCUSSION

The study was made with reference to age, education, land holding, annual income, area under gram, sources of information, source of irrigation, insurance availed, innovativeness, economic motivation and the results have been furnished as follows

Profile of black Gram growers

The selected characteristics of gram growers have been summarized in Table 1.

Table 1 : Distribution of profile of Gram growers

Sr. No.		Category	Respondents (n=120)	
			Number	Percent
1		Age (Years)		
	i)	Young (Up to 35)	33	27.50
	ii)	Middle (36-50)	61	50.83
	iii)	Old (Above 50)	26	21.67

Sr. No.		Category	Respondents (n=120)	
			Number	Percent
2		**Education**		
	i)	Illiterate (No schooling)	2	01.67
	ii)	Primary school (Up to 4th std.)	12	10.00
	iii)	Middle school (5th to 7th std)	19	15.83
	iv)	High school (8th to 10th std.)	53	44.16
	v)	Higher secondary (11th to 12th)	26	21.67
	vi)	Graduation (Above 12th)	8	06.67
3		**Land holding (ha)**		
	i)	Marginal (Up to 1.00 ha)	13	10.83
	ii)	Small (1.01 to 2.00 ha)	39	32.50
	iii)	Semi-medium (2.01 to 4.00 ha)	53	44.17
	iv)	Medium (4.01 to 10.00 ha)	12	10.00
	v)	Large (Above 10.00 ha)	3	2.50
4		**Annual income (Rs.)**		
	i)	Up to Rs. 50,000	08	6.67
	ii)	Rs. 50,001 to 1,00,000	27	22.50
	iii)	Rs. 1,00,001 to 1,50,000	33	27.50
	iv)	Rs. 1,50,001 to 2,00,000	34	28.33
	v)	Above Rs. 2,00,000	18	15.00
5		**Area under Gram**		
	i)	Small (Up to 1.00 ha)	57	47.50
	ii)	Medium (1.01 to 02.00 ha)	44	36.67
	iii)	Large (Above 2.00 ha)	19	15.83
6		**Sources of information**		
	i)	Low (Up to 17.62)	27	22.50
	ii)	Medium (17.63 to 26.16)	76	63.33
	iii)	High (Above 26.16)	17	14.17
7		**Sources of irrigation**		
	i)	No source	11	09.17
	ii)	River	15	12.50
	iii)	Well / Tube well	84	70.00
	iv)	Canal	06	05.00
	v)	Farm ponds	04	03.33
8		**Insurance availed**		
	i)	Yes	89	74.17
	ii)	No	31	25.83

Sr. No.		Category	Respondents (n=120)	
			Number	Percent
9		**Innovativeness**		
	i)	Low (Up to 9.56)	24	20.00
	ii)	Medium (9.57 to 14.44)	78	65.00
	iii)	High (Above 14.44)	18	15.00
10		**Economic motivation**		
	i)	Low (Up to 15.97)	26	21.67
	ii)	Medium (15.98 to 22.91)	55	45.83
	iii)	High (Above 22.91)	39	32.50

Age is normally an indicator of the maturity, experience and depth of knowledge. Hence, it has been considered in the present study. The age wise distribution of respondents has been presented in Table 1, it has been observed that majority (50.83%) of respondents were in middle age category i.e. between 36 to 50 years, The above findings are in accordance with the observations of Bansal (2015).

Education has been considered as one of the important variable with help of which the social change can be achieved. The education of the respondents was studied and the results have been presented in the Table 1.Thus, it is observed that higher proportion of respondents had education 44.16 per cent up to high school level. The above findings are in accordance with the observations of Mane (2001) and Ramteke (2001).

Land holding was observed as an important variable of the farming occupation. Thus, it is concluded that (44.17%) respondents are found in semi-medium land holding category, followed by 32.50 per cent small land holding category. The findings are similar with Surve (2014).

Annual income provides the availability of the capital for farming. The result obtained has been presented in the following Table 1.Thus, it is concluded that (28.33%) respondents belonged to Rs.1,50,001 to Rs.2,0,000 of annual income category. These finding were supported by Khare (2013).

The observations regarding area under gram cultivation of the respondents were shown in Table 1.Thus, nearly fifty per cent (47.50%) of the respondents had small area (Up to 01.00 ha) under gram cultivation. These Study was supported by Kharat (2012) and Surve (2014).

The data from Table 1, indicates that use of various sources of information by the farmers about recommended cultivation practices of gram.Thus, it is concluded that majority of the respondents (63.33%) had medium level of sources of information. These findings were supported by Divakar (2011).

The sources of irrigation are quite useful to increase the productivity, majority of the respondents 70.00 per cent had well/ tube well as a source of irrigation. The similar findings also found by Gavade (2013) and

Ghube (2014) and The distribution of the respondents according to Insurance availed is shown in Table 1, it is observed that majority of (74.17%) respondents had Insurance availed .

The distribution of the respondents according to their innovativeness is shown in Table 1, it is elicited that majority of 65.00 per cent respondents were observed in medium level of innovativeness, and in case of economic motivation majority 45.83 per cent of respondents had medium level of economic motivation. It is inferred from above findings are line with Tripathi (2006).

Knowledge

Knowledge possessed by farmers about recommended cultivation practices of gram was studied and the results has been presented in Table16.

Table 2: Distribution of the respondents according to their knowledge about recommended cultivation practices of gram

Sl. No.	Recommended practices	Knowledge (n=120)	
		Frequency	Percentage
1.	Land preparation Ploughing once in 3 year and 1-2 harrowing	120	100.00
2.	Types of soil required (Sandy loam to clay loam or black	108	90.00
	cotton soil)		
3.	Sowing method : Drilling	107	89.17
4.	Sowing time (15 Oct. to 15 Nov.)	117	97.50
5.	Seed rate: 70-85 kg/ha	75	62.50
6.	Varieties (JAKI-9218,Vijay, Chafa, PDKV-Kanchan)	64	53.33
7.	Spacing : 30 cm x 10 cm	74	61.67
8.	Seed treatment :Trichoderma (4g/kg seed) +	58	48.33
	(Rhizobium 25g/kg seed) + PSB (25g/kg seed)		
9.	Recommended FYM application (5-10 ton/ ha)	52	43.33
10.	Fertilizer application (25:50:30 N:P:K kg/ha)	61	50.83
11.	Irrigation application at critical stages	84	70.00
12.	Weed management (1-2 Hoeing, 1-2 Hand weeding)	81	67.50
13.	Plant protection : Disease and Pest control	83	69.17
14.	Harvesting	118	98.33

The data in table 2, indicate that cent per cent of respondents (100.00%) had knowledge about land preparation, followed by (98.33%) and (97.50%) of respondents aware about harvesting and sowing time, respectively. However (90.00%) had knowledge about types of soil required, (89.17%) sowing method, (70.00%) irrigation application at critical stages, (69.17%) and (67.50%) respondents had knowledge about plant protection and weed management practices, respectively. Whereas, (62.50%) had knowledge about seed rate, (61.67%) spacing, (53.33%) varieties, (50.83%) fertilizer application, (48.33%) seed treatment, and (43.33%) had knowledge about recommended FYM application , respectively.

Table 3: Categorization of respondents according to their knowledge about recommended cultivation practices of gram

Sl. No.	Level of knowledge	Respondents (n=120)	
		Frequency	Percentage
1	Low (Up to 54.65)	24	20.00
2	Medium (54.66 to 84.79)	68	56.67
3	High (Above 84.79)	28	23.33
	Total	**120**	**100.00**

Mean = 69.72 SD = 15.00

The data with regard to level of knowledge possessed by the farmers about recommended cultivation practices of gram in Table 3, it is indicate that majority (56.67%) of respondents were in medium level of knowledge, (23.33%) respondents possessed high level of knowledge and (20.00%) respondents possessed low level of knowledge.

Thus, majority (56.67%) of respondents, were in medium level of knowledge. These finding of the present study are in the line with Khare (2013).

Relation analysis

Relationship of selected characteristics of respondents with their Knowledge

The coefficient of correlation of knowledge with profile of the respondents has been furnished in Table 4.

Table.4: Coefficient of correlation of selected variables of the respondents with their knowledge

Sl. No.	Variables	' r ' values
1.	Age	-0.1154
2.	Education	0.3424**
3.	Land holding	0.3321**
4.	Annual income	0.2760**
5.	Area under gram	0.2516* *
6.	Sources of information	0.2643* *
7.	Source of irrigation	0.1543NS
8.	Insurance availed	0.1147NS
9.	Innovativeness	0.3819**
10.	Economic motivation	0.2466*

** Significant at 0.01% level of probability, * Significant at 0.05% level of probability,
NS- Non-significant

It was observed from the Table 4, that, education, land holding, annual income, area under gram, sources of information Innovativeness of the respondents positively and significantly correlated with knowledge. The relationship was significant at 0.01 per cent level of probability and economic motivation significant at 0.05 per cent level of probability, hence null (Ho) hypothesis in this case is rejected. However, age was found to be negatively non significant and source of irrigation and insurance availed are non significant with the knowledge of farmers hence null (Ho) hypothesis in this case is accepted.

CONSTRAINTS

Table 19 : Constraints faced by farmers in adoption of recommended cultivation about practices of gram

Sl. No.	Constraints	Frequency (n=120)	Percentage	Rank
A	**Production constraints**			
1.	Non availability of inputs	36	30.00	VIII
2.	Non availability of irrigation facilities	12	10.00	X
B	**Economical**			III
1.	High labour wages	58	48.33	III
2.	High cost of inputs	46	38.33	V
C	**Technical**			
1.	Lack of knowledge about seed treatment	64	53.54	II
2.	Non availability of recommended varieties	25	20.83	IX
3.	Lack of knowledge about plant protection measures	44	36.66	VI
D	**Situational**			
	Non availability of labour	47	39.17	VII
E	**Market**			
	Low market prices of gram	68	56.67	I
F	**Other**			
	Crop damaged by wild animal	42	35.00	VII

To identify the constraints faced by the farmers in adoption of recommended cultivation practices of gram is one of the objectives of present study. The constraints circumstances or causes which prohibit or restraint the farmers in adoption of recommended cultivation practices of gram.

It is observed that from Table 22, first rank quoted that majority of (56.67%) respondents faced the constraints of low market prices of gram, (53.54%) lack of knowledge about seed treatment it is second rank, (48.33%) high labour wages, (39.17%) non availability of labour and (35.00%) crop damaged by wild animal. Further (38.00%) respondents faced the constraints of high cost of inputs, (36.66%) lack of knowledge about plant protection measures, (30.00%) non availability of inputs (20.83%) non availability of recommended varieties and (10%.00) non availability of irrigation facilities, respectively. These finding are similar to Mane (2001) and Deshmukh (2006).

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RESEARCH ARTICLE

Prospects of Kagzi lime cultivation

M. K. Zinjade[1], B. T. Kolgane[2] and K. V. Gurav[3]

1. PG Student, 2. Associate Professor and 3. Guide
Extension Education and Communication department, RCSM,
College of Agriculture Kolhapur, Maharashtra, INDIA

ABSTRACT

The present investigation "Problems and Prospects of Kagzi lime Cultivation" was conducted in Karmala, Madha and Barshi tahsil of Solapur district. Four village from each tahsil and 10 respondents from each village were selected. Data were collected by personally interviewing 120 Kagzi lime growers with the help of specially designed interview schedule. Prospects of Kagzi lime cultivationmajority (59.16 per cent) of the Kagzi lime growers had medium level of prospects in Kagzi lime cultivation and (30.00 per cent) respondents had low level of prospects, whereas about (10.83 per cent) respondent had high level of prospects in Kagzi lime cultivation.

Key Words: Prospect and Kagzi lime cultivation

INTRODUCTION

Kagzi lime (*Citrus aurantifolia Swingle*) belongs to family Rutaceae, originated in India. It is commercially grown in tropical and subtropical region of India. Kagzi lime is the third most important fruit after Mandarin and Sweet orange and India ranks fifth among major lime producing countries (Anonymous 2001). Maharashtra state is leading in acid lime cultivation. Kagzi lime is principle citrus fruits grown commercially in vidarbha and marathwada regions. One of the most important citrus fruit as a major source of vitamin "C" and acetic acid, grown throughout the world.

In India, it is grown in the states of Andhra Pradesh, Karnataka, Maharashtra, Punjab, Rajasthan, Gujarat, Bihar, Assam and Himachal Pradesh. In India, Kagzi lime is grown on an area of 295.6 ha with a production of 2629.2 tons with an averages productivity of 8.9 tons/ha. Kagzi lime occupies an area of 41.5 ha with production and productivity of 166.6 tons and 4 tons/ha respectively in Maharashtra (Anonymous 2010). In Maharashtra, state Parbhani,Osmanabad, Jalna, Aurangabad, Ahmadnagar, Pune, Solapur, Jalgaon, Buldhana and Akola districts are under a Kagzi lime cultivation. Kagzi lime in India, is one of the most predominant lime cultivars of commercial importance. In this region, many Citrus species originated and later dispersed to leading citrus growing countries of the world. Meghalaya is the major state in both area and production in the northeast (Singh 2001).

Improved varieties of Kagzi lime viz. Pramalini, Vikram, Sai Sarbati, Phule Sarbati and Balaji have been introduced in Maharashtra state. The fruits of Kagzi lime are available at throw-away prices due to glut

in the market in themonths of August and September. The citrus are not just known for its high vitamin "C" content; these are also a good source of beta carotene, a powerful antioxidant to check free radical damage, magnesium for blood pressure, potassium for cardio vascular health, and thiamin for converting food to energy (Anonymous 2009). Processing industries have a special place in view of serious transport and communication bottleneck. High degree of perishablility of certain fruit, particularly those locally produced, grown in abundance in the remote and inaccessible centre of region warrant scientific post harvest management and processing to contribute to high value of product. Proper marketing arrangement for fresh horticultural produce fail to provide practicalsolution of disposal of entire produce. To this, one may add the marketable surplus in shape of low grade produce, over ripe and under ripe fruits.Windfall and drops and bulky produce which was kept for processing in order to avoid spoilage and accompanied by economical losses.

Therefore, there is a need for reducing the post harvest losses in order to increase the quantity and quality of food supply system. So there is great chance to enhance the horticultural industry in country.

METHODOLOGY

The study was conducted during the year 2019-20 in the Solapur district of Maharashtra state. The present investigation "Problems and Prospects of Kagzi lime cultivation.'' in Solapur district was conducted in three tehsil of Solapur district i.e. Karmala, Madha and Barshi in that 4 villages from each tahsil and 10 respondents havingKagzi lime growers with 4-5 years old orchards and having minimum area 0.4 ha. Frequency, Percentage, mean and standard deviation these statistical tools were used to analyze the data.

The Schedule consisted 14 items like Better economic returns in comparison to other fruit crops, High nutritious value of fruit, high price, suitable for agro-processing, etc. Responses were obtained on 3 point continuum scale as Agree , Undecided and Disagree and scores were given 3, 2 and 1. After that frequency was multiplied with the score (3, 2 or 1).Data was analysed with Frequency and percentage.

RESULT & DISCUSSION

1. Prospects of Kagzi lime cultivation

Table 1. Distribution of respondents according to Prospects of Kagzi lime cultivation.

Sr. No.	Statements	A	UD	DA
1.	Kagzi lime cultivation is farmers friendly and easy to produce.	115 (95.83%)	03 (2.50%)	02 (1.66%)
2.	Water saving crop.	110 (91.66%)	03 (2.50%)	07 (5.83%)
3.	Better credit facilities are available at present.	22 (18.33%)	97 (80.83%)	01 (0.83%)
4.	Better input facilities are available.	28 (23.33%)	91 (75.83%)	01 (0.83%)

Sr. No.	Statements	A	UD	DA
5.	Suitable for agro-processing.	15 (12.50%)	115 (95.83%)	00 (00.00%)
6.	High nutritious value of fruit.	28 (23.33%)	89 (74.16%)	03 (2.5%)
7.	Status in village.	41 (34.16%)	52 (43.33%)	27 (22.50%)
8.	Better marketing facilities are available.	53 (44.16%)	67 (55.83%)	00 (00.00%)
9.	Better economic returns.	59 (49.16%)	57 (47.50%)	04 (3.33%)
10.	Better technical support is available.	31 (25.83%)	87 (72.5%)	02 (1.66%)
11.	Demand is increasing day by day of fruits.	42 (35.00%)	69 (57.50%)	09 (7.50%)
12.	High prices of fruits.	15 (12.50%)	35 (29.16%)	70 (58.33%)
13.	Better export facilities are available.	00 (00.00%)	88 (73.33%)	32 (26.66%)
14.	Govt. provide subsidy for cultivation of Kagzi Lime through NHM.	05 (4.16%)	106 (88.33%)	09 (7.50%)

(The figures in the parent thesis indicates percentage)

A- Agree, UD- Undecided, DA- Disagree

From table1, it is revealed that majority of respondents were agreed with the statements such as,Kagzi lime cultivation is farmers friendly and easy to produce. (95.83 per cent),followedbyWater saving crop. (91.66 per cent), Better economic returns. (49.16 per cent), Better marketing facilities are available. (44.16 per cent), Demand is increasing day by day of fruits. (35.00 per cent), Status in village. (34.16 per cent),Better technical support is available. (25.83 per cent) only prospect likeBetter export facilities are available. (0.00 per cent) agreed by respondents, likewise other prospects agreed by respondents.

In case of undecided prospects above data revealed that majority of respondents were undecided with the statementssuch as, Suitable for agro-processing. (95.83 per cent), Govt. provide subsidy for cultivation of Kagzi Lime through NHM. (88.33 per cent), Better credit facilities are available at present. (80.83 per cent), Better input facilities are available. (75.83 per cent), High nutritious value of fruit. (74.16 per cent), Better export facilities are available. (73.33 per cent), Better technical support is available. (72.50 per cent), likewise other prospects undecided by respondents.

About some prospects respondents disagree such prospects are, High prices of fruits. (58.33 per cent), Better export facilities are available. (26.66 per cent), Status in village. (22.50 per cent), likewise respondents disagree in case of other some prospects.

Table 2. Distribution of the respondents according to Porspects of Kagzi lime cultivation. (N=120)

Sr. No.	Prospects level	Respondent	
		Number	Percentage
1	Low (upto 30)	36	30.00
2	Medium (31 to 33)	71	59.16
3	High (34 andabove)	13	10.83
	Total	**120**	**100.00**

Overall prospects of Kagzi lime cultivation, The results related to overall prospects of Kagzi lime cultivation contained in Table 2. represented that (59.16 per cent) of the respondents perceived medium prospects of Kagzi lime cultivation, whereas (30.00 per cent) of respondents perceived low prospects of Kagzi lime cultivation and (10.83 per cent) respondents perceived high prospects of Kagzi lime cultivation.

CONCLUSION

It was observed that majority of the Kagzi lime growershad medium level of prospects in Kagzi lime cultivation. Considering the condition of the crop in the area it is clear that this crop thrives well in the condidition and provides farmers with better opportunities to earn profits. All the factors necessary for the cultivation of crop are easily available and minimum as compared to other crops.

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RESEARCH ARTICLE

Growth status of Adolescent Girls from Gond Madia Community of Gadchiroli District, Maharashtra, India

Yogita K. Sanap[1], Ujwala S. Sirsath[2] and Premalata M.Chandan[3]

[1]yogi.active@gmail.com, [2]ussirat@gmail.com and [3]pm.chandan5@gmail.com

ABSTRACT

The term 'adolescence' represents a hyperanabolic phase of growth, mediated by hormonal factors and characterised by peak velocities of growth (Gopalan, 1989). It is also a crucial phase of growth since it offers the second and last chance for the catch up with the growth in the life cycle of girls. Nutritional requirements of teenagers are, therefore high because of the large growth spurt in both linear and body cell mass. Thus nutritional pattern in these years any be considered to be significant pattern in these years may be considered to be significant as it influences growth and reproductive maturation (Charistakis, 1973).

Comparative assessment of body weight of adolescent girls of Gond-Madia tribe of Gadchiroli District. It was observed that average body weight of girls belonging to age groups 13, 14 and 15 years was 28.0±6.5 Kg, 32.1±5.8 Kg and 31.5±6.8 Kg respectively, whereas that of girls belonging to age groups 16, 17 and 18 years was 33.0±7.0 Kg, 36.7±6.3 Kg and 38.6±6.2 Kg respectively. Furthermore, the comparative assessment of the average body weight of adolescent girls with that of their desired standard body weight (as per ICMR) indicated that girls belonging to all age groups were significantly ($P < 0.05$) underweight (with the deficit being 28.9 to 38.7% from the desired body weight). Thus, the data clearly shows inadequate nutrient intake by these girls.

Key words : Adolescent girls, Gond-Madia, tribe, body weight.

INTRODUCTION

The term 'adolescence' represents a hyperanabolic phase of growth, mediated by hormonal factors and characterised by peak velocities of growth (Gopalan, 1989). It is also a crucial phase of growth since it offers the second and last chance for the catch up with the growth in the life cycle of girls. Nutritional requirements of teenagers are, therefore high because of the large growth spurt in both linear and body cell mass. Thus nutritional pattern in these years amy be considered to be significant pattern in these years may be considered to be significant as it influences growth and reproductive maturation (Charistakis, 1973). Studies by pioneer nutritionists have disclosed the fact that the adolescent girl in India suffers from gross nutritional inadequacies (Subapriya and Premakumari, 1998; Sarupriya and Mathew, 1988). On the basis of available data on growth of adolescent girls, it is clear that a remarkable per cent of adolescents is found to have a low body weight and less height as compared to their respective standard values (Sarupriya and Mathew, 1988; Gupta et al.,

1990; Raman, 1990), Research in Baroda and Elsewhere in India indicates that economically. Disadvantaged adolescent girls suffer from height and weight deficits and micronutrient deficiencies of iron and vitamin A (Kannani, 1994).

METHODOLOGY

Adolescence a period of transition between childhood and adulthood it is a significant period of human growth which occurs with unique changes during this phase of life. The health of adolescence scattered global attention in the past decade In terms of the gender-related development index, India ranks 99 among the 130 countries included in the index (UNDP 1995).

The study adopts an analytical research design with sample survey approach. Beginning with the research questions that emerged after the review of literature on remittances, thestudy focuses on to the objectives, the theoretical framework and the operational definitions of key terms used in the study. Then unfolds the research design of the study.

In the present study, a careful collection of facts was undertaken by the researcher to ensure the validity of the facts. Wherever, possible, the data for the same variable was recorded from more than one source. This allowed the careful scrutiny of the recorded data, which would give more appropriate results. The present study was carried out in three steps involving reconnaissance, data collection and analysis, followed by interpretation of statistics.

Proper sampling and analytical techniques are important aspects of any investigation under which a large number of sample population is expected to statistically treat as such these two aspects of the methodology are complementary in nature and ultimately control the utility of investigation. The present investigation was aimed to study the nutritional status of adolescent girls of Gond - Madia community. Survey was conducted to collect the data. This study was carried out with following objectives

1.1. Objectives of Study

1. To elicit information regarding profile of adolescent girls of GondMadia community of Gadchiroli district.
2. To study the dietary habits of adolescent girls of GondMadia community of Gadchiroli district.
3. To know the prevalence of any specific health problem among adolescent girls of GondMadia community of Gadchiroli district.

1.2. Selection of Sample

The study was conducted on Adolescent girls of age 13-18 years.

1.3. Sample size

In the present study 500 subjects of age groups 13-18 year were selected.

1.4 Research Methodology

The basic assumption that is central to sciences that distinguish them from medieval learning is that: Truth about the world can be known through sensory

observation. Thus the scientist seeks his truth by observing the world rather than by waiting for revelations. The veracity of this knowledge lies in the fact that it is supported by sensory observation. But our senses can sometimes deceive us. Scientists adopt certain procedural steps that seek to reduce such a possibility. These acts of procedural steps constitute the Scientific Method. Furthermore, the data was analyzed using appropriate statistical tests.

1.5. Collection of Data:

The information required for the study was collected by using primary as well as secondary source of information

1.5.1. Primary data collection

The primary data collection in view of the objectives of the study involved preparation of research instrument (interview schedule). Though development and measurement of research constructs is neither simple nor straightforward, instrumentation techniques are available that allows us to construct research instruments that constitute acceptable levels of reliability and validity. The process of developing the research instrument for this study was based on generally accepted psychometric principles of instrument design, and was carried out according to the standard methodology.

1.5.2. Interview Schedule/Questionnaire Development

Interview schedule/Questionnaire is typically used for feedback research to determine the current status or "situation," or to estimate the distribution of characteristics in an industrial population. Developing an interview schedule/ questionnaire is one of the most critical stages in the survey process. Much of interview schedule / questionnaire construction is common sense, but there are intricacies with which survey authors should be familiar. It is common sense to require that the concepts be clearly defined and questions unambiguously phrased; otherwise, the resulting data are apt to be seriously misleading. To overcome this problem, a series of draft questions were written covering all the objectives of the study. The present study is aimed to understand the insights pertaining to present status of nutritional problems of adolescent girls in Gond – Madiacommunity of Gadchiroli District. Hence, in view of the above, this research instrument has been developed to assess the status of nutritional problem of adolescent tribal girls.

Care was taken so that

- Each question should relate directly to the study objectives
- Every respondent should be able to answer every question (unless instructed otherwise).
- Each question was phrased in such a way so that all respondents interpret it the same way.
- Each question was framed in such a way that it should provide answers to what is needed to be known and not what would be nice to know.

1.5.3. Main parts of a interview schedule

Introduction

The beginning of all interview included an introduction of the topic that was enticing and clearly stated the purpose of research. The introduction also included instructions about completing the interview schedule.

Question types

Based on the objectives, questions/ statements were framed such that each statement would yield Single response. Main content of the interview schedule/ questionnaire are as follows-

A) General information :

Which included the name, age, sex, address, education, marital status, Family Type, employment of parents, family income and number of family members .

B) Anthropometric measurements :

Nutritional anthropometry is concerned with the measurement of the variation of the physical dimensions. The physical dimensions of the body are influenced by nutrition.

There have been notable studies to find out the measurements that would faithfully indicate the trend of growth. Growth can be described in terms of large, general measurements of height and weight and also in terms of various parts of the body. According to Jellife (1996) weight and height are considered to be the most sensitive parameters and most practical for the monitoring of individual. With age, the body develops in all three dimensions and hence no single anthropometric measurements can give accurate results.

1) Height(cm) :-

The height of an individual is made up of four components; legs, pelvis, spine and skull. While for detailed study of body proportions all these measurements are required in field of Nutritional Anthropometry. Usually the total height(or length) is measured.

Height is measure of linear growth of body; its deficit is considered to be indicator of chronic nutritional deprivation. To measure height of the subjects a measuring tape was fixed vertically on a smooth wall perpendicular to the ground. Care was taken that the floor area was even and not rough. The subjects were asked to remove their shoes and stand with centre of the back touching the scale, with the feet parallel and heels, buttocks shoulders and back of the head touching the wall. The head was held comfortably erect, with arms hanging at the side on to of the hair at right angle to the tape and the height was read to the nearest 0.5 cm(Gopaldas and Sheshadri 1987, Jelliffe et al 1966)

2) Weight (kg) :-

Body weight is a fundamental component of nutritional assessment because it is an indirect marker of protein mass and energy stores. Serial measurements of weight as in indicators of charges in nutritional status than a single measurement at a point of time (Bamji et.al.1999). Weight is the anthropometric measurement most use.

Weight estimation can be made on isolated occasions as in many surveys, repeated intervals under special conditions or in longitudinal studies. These serial measurements give a better index of actual growth or growth failure.

Weight may measure by a portable platform weighing balance with zero adjustment. The accuracy of machine was checked regularly at intervals. The subjects were made to stand comfortably and steadily on the machine without shoes. Weight was recorded to the nearest 0.25 kilogram.(Gopaldas and Sheshadri 1987, Jelliffe 1966)

4. Age of the Adolescent Girls

Ageing is an important part of all human societies reflecting the biological changes that occur, but also reflecting cultural and societal conventions. Ageing is among the largest known risk factors as well as the predictor for many health related aspects of the human. By considering the above importance of age this factor was selected in present study and the results are shown below in the **Table 1**

Table 4.1: Distribution of the girls with respect to their age

Age of Girls	No. of Girls	Percent	Cumulative Percent
13	96	19.2	19.2
14	95	19.0	38.2
15	87	17.4	55.6
16	98	19.6	75.2
17	65	13.0	88.2
18	59	11.8	100.0
Total	**500**	**100.0**	

Table. 4.1. shows age wise distribution of girls. It was apparent from the information that 19.6% girls were 16 year old, whereas 19.2% girls were 13 year old. Furthermore percentage of girls belong to age group 14 year, 15 year, 17 year and 18 year was 19%, 17.4%, 13% and 11.8% respectively. Hence it is apparent from the information that majority of girls selected in the study were 16 year old.

- **Religion:**All the study participants were Hindu
- **Caste:**All the study participants belonged to Gond-Madia Community
- **Type of Family:**Almost all the study participants belonged to Nuclear type of family

4.2. Family Income

Average household income can be used as an indicator for the monetary well-being of a country's citizens. Mean or median net household income, are good indicators of standard of living, because they include only disposable income and acknowledge people sharing accommodation benefit from pooling at least some of their living costs. For these reasons this factor was included in the study and the results are shown in following **Table4.2**.

Table 4.2: Distribution of the girls with respect to their family's income

	No. of Study Participants	Percentage	Cum. Freq.
Less than 5000/-	433	86.6	86.6
5001 to 10,000/-	61	12.2	98.8
Above 10,000/-	6	1.2	100

Table 4.2. illustrates information regarding family income of study participant girls. It was apparent from the information that family income of 86.6% girls was less than Rs. 5000 whereas family income of 12.2% girls was Rs. 50001 to 10,000. In addition to this

family income of 1.2% girls was above Rs. 10,000. Hence, it is evident from the study results that family income of significantly high percentage of girls is less than Rs. 5000.

4.3. Monthly Income

Table 4.3: Information regarding monthly family income of study participants

	N	Mean	± SD	Min.	Max.
Monthly Income (Rs.)	500	4102.6	±2653.7	400/-	30000/-

Table 4.3. shows information regarding monthly family income of study participants. It was evident from the information that average monthly income of study participants was Rs. 4102±2653.7 (varied between Rs. 400 and Rs. 30000 per month).

4.4. No. of Family Members

Family size has implications on quality of life including health, nutrition, educational attainment of children, social status of families as well as their ability to adequately cater for the needs of their families. A small family size of not exceeding 6 (parents inclusive) is believed to aid adequately catering for the needs of its members. Such a small family is able to enjoy the necessities of life with the choice to afford and enjoy identifiable luxuries of life. A large family size rather comes with some adverse implication such as poor health, low incomes and status, low levels of education, pressure on environmental resources due to overexploitation and poor childcare and nutrition. In view of the above, family size of the adolescent girls was determined in the study, and the results are shown in **Table 4.4**

Table 4.4: Distribution of the girls with respect to number of family members

	Frequency	Percent	Cumulative Percent
Three	66	13.2	13.2
Four	107	21.4	34.6
Five	148	29.6	64.2
Six	110	22.0	86.2
Seven	43	8.6	94.8
Eight	26	5.2	100.0
Total	**500**	**100.0**	

Table 4.4. shows distribution of girls with respect to number of family members in their family. It was apparent from the information that 29.6% girls have five members in their family whereas 22% girls have six members in their family. Furthermore percentage of girls having four, three, seven and eight family members was 21.4%, 13.2%, 8.6% and 5.2% respectively. Hence it is evident from the study results that majority of girls have five members in their family.

4.5. Education of Adolescent Gond-Madia Girls

Education plays an important role in shaping an individual's life. The level of education helps people not only helps him/her to earn recognition and respect in the society but also good quality of life. Undoubtedly education is both socially & personally an indispensible part of human life. However, the inequalities in the standards of education are still a major issue that needs to be solved as early as it could be. The importance of education is our life cannot be ignored at any cost. Education is the only way to get knowledge. Hence the factor was selected and the results are presented as follows.

Table 4.5: Education of adolescent girls

Std./ Class	No. of Girls	Percent	Cumulative Percent
4th	2	0.4	0.4
5th	3	0.6	1
6th	23	4.6	5.6
7th	64	12.8	18.4
8th	109	21.8	40.2
9th	91	18.2	58.4
10th	99	19.8	78.2
11th	56	11.2	89.4
12th	53	10.6	100
Total	**500**	**100.0**	

Table 4.5 elucidates information about education of girls selected in the study. It was apparent from the information that 21.8% girls were studying in 8th std. whereas 19.8% girls were studying in 10th standard. Moreover percentage of girls studying in 9th, 7th, 11th and 12th std. was 18.2%, 12.8%, 11.2% and 10.6% respectively whereas percentage of girls studying in 6th, 5th and 4th std. was 4.6%, 0.6% and 0.4% respectively. Hence it is evident from the study results that majority of girls are studying in 8th standard.

4.6. Occupation of parents

Table 4.6: Occupation of the parents of adolescent girls

Occupation	No.	Percentage
Business	4	0.8
Farmer	478	95.6
Labour	14	2.8
Servant	4	0.8
Total	**500**	**100.0**

Table 4.6. demonstrates information regarding occupation of parents of adolescent girls selected in the study. It was evident from the information that parents of 95.6% adolescent girls were farmer, whereas parents of 2.8% adolescent girls were labour. Moreover parents of 0.8% girls each were servant and doing business. Thus it is apparent from the study results that parents of substantially high percentage of adolescent girls were farmers.

4.7. Monthly Income (Rs.) of parents

Table 4.7: Monthly income of the parents of adolescent girls

Monthly Income (Rs.)	No.	Percentage
Less than 2000 (Rs.)	65	13
2000 to 4000 (Rs.)	284	56.8
4000 to 8000 (Rs.)	118	23.6
8000 to 15000 (Rs.)	30	6
Above 15000 (Rs.)	3	0.6
Total	**500**	**100.0**

Table 4.7 shows information regarding monthly income of parent of adolescent girls selected in the study. It was apparent from the information that monthly income of parents of 56.8% adolescent girls was Rs. 2000 to 4000, whereas monthly income of parents of 23.6% girls was Rs. 4000 to 8000. Furthermore parents of 13% adolescent girls have monthly income less than Rs. 2000, whereas monthly income of parents of 6% girls was Rs. 8000 to 15000. However; parents of 0.6% girls have monthly income above Rs. 15000. Hence it is apparent from the study results that parents of majority of adolescent girls have monthly income Rs. 2000 to 4000.

years was 141.3±7.9cm, 143.0±6.3cm and 149.6±40.5cm respectively (**Fig. 4.1**). Subsequent to this, the standing height values observed for the girls belonging to different age groups was compared with the standard values (as given by Indian Council of Medical Research i.e. ICMR). The results of this comparative analysis showed that there is significant (P <0.05) difference in the standing height of the girls belonging to Gond-Madia community from that recommended by ICMR. Noticeably, girl of all the age groups appear to be stunted with the negative deviation in the observed standing height from the desired height being 9 to 13% in different age groups. Hence, it is concluded that the standing height of the adolescent girls belonging to Gond-Madia tribe is remarkably less than the desired standing height (which also indicates desirable growth).

4.8.2 Body Weight of the Adolescent Girls belonging to Gond-Madia Tribe of Gadchiroli district

Table 4.8.2 : Comparative assessment of body weight of adolescent girls

Age Group	N	Mean	SD	S.V.	% Deficit	Min.	Max.	MD	't'	P
13	96	28.0	±6.5	44.0	36.2	17	46	15.9	23.77	<0.05
14	95	32.1	±5.8	48.0	33.0	20	45	15.8	26.26	<0.05
15	87	31.5	±6.8	51.5	38.7	20	48	19.9	27.06	<0.05
16	98	33.0	±7.0	53.0	37.7	20	50	20.0	28.06	<0.05
17	65	36.7	±6.3	54.0	31.9	23	50	17.2	21.88	<0.05
18	59	38.6	±6.2	54.4	28.9	25	53	15.7	19.37	<0.05

SD-Standard Deviation; **S.V.**- Standard Value; **Min**-Minimum; **Max**.-Maximum; **MD**-Mean Difference, **'t'**- 't' Value; **P**- P Value

Table 4.8.2 shows results of comparative assessment of body weight of adolescent girls of Gond-Madia tribe of Gadchiroli District. It was observed that average body weight of girls belonging to age groups 13, 14 and 15 years was 28.0±6.5 Kg, 32.1±5.8 Kg and 31.5±6.8 Kg respectively, whereas that of girls belonging to age groups 16, 17 and 18 years was 33.0±7.0 Kg, 36.7±6.3 Kg and 38.6±6.2 Kg respectively (**Fig. 4.8.2**). Furthermore, the comparative assessment of the average body weight of adolescent girls with that of their desired standard body weight (as per ICMR) indicated that girls belonging to all age groups were significantly (P <0.05) underweight (with the deficit being 28.9 to 38.7% from the desired body weight). Thus, the data clearly shows inadequate nutrient intake by these girls.

The growth and development of the human beings is often indicated by the anthropometric measures such as height and weight. As earlier reported by Bhasin et al., (1990), body weight and height are the two prominent anthropometric measurements that are commonly used to evaluate growth and nutritional status of an individual. In view of this, the results obtained in this study show that the important growth indicators like (height and body weight) of the adolescent girls belonging to the Gond-Madia tribe are

not as per expectations (vis-à-vis ICMR standards for height and weight). Our results are congruent to those reported earlier by Sarupriya and Mathew (1988), who determined the height and weight of tribal adolescent girls (of 16 and 18 years of age) of Gogunda village of Rajasthan. However, there appears to be difference in our results and that reported by Gopalan and Styanarayana (1989), which can be attributed to the fact that their samples (adolescent girls) were selected from the major cities of India namely Delhi, Bombay and Coimbatore. The adolescent girls from these cities have better height and body weight than that recorded with the girls of Gond-Madia tribes. Similarly, the height and weight of adolescent girls (of 16 and 17 years of age), belonging to low and affluent income groups of Coimbatore were recorded by Subapriya and Premakumari (1993), which also incidentally are better than that observed with the adolescent girls of Gond-Madia tribes.

CONCLUSION

In case of girls, achievement of optimal growth during adolescence is of highest importance, especially in view of maintaining sound health in future life. Growth monitoring by anthropometric measurement during this period, is not only an important health indicator but also a predictor of various morbidities in the community. Hence, the results obtained in this study clearly indicate an urgent need for intervention by the Government as well as Non-Government Organizations with respect to the nutrition of adolescent girls of Gond-Madia community of Gadchiroli.

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RESEARCH ARTICLE

Adoption of Protected Cultivation Technology by Capsicum Growers

P. B. Kharde[1], S. A. Wankhade[2] and G. K. Waman[3]

1. Professor of Agril. Extension (CAS), 2. Post Graduate Student, Department of Agril. Extension and Communication, 3. Assistant Professor of Agril. Extension
Mahatma Phule Krishi Vidyapeeth, Rahuri

ABSTRACT

Capsicum (*Capsicum annuum* L.) is one of the most popular and highly remunerative annual herbaceous vegetable crops. The present study was conducted in Rahata and Rahuri tahsils of Ahmednagar district where capsicum is extensively grown under protected cultivation. A sample of 120 farmers having area of capsicum under polyhouse or shadenet house was selected by purposive sampling method. Majority of capsicum growers were using sawtooth type polyhouse for growing capsicum, drip irrigation system and followed fertigation management. The study pointed a gap in adoption of some of the protected cultivation technologies of capsicum by the respondents. These include the important technologies like use of circulating fans, fogging system for maintaining climate control and mist cooling system. This adoption gap among the capsicum growers needs to be focused by extension agencies for awareness through mass media and field visits. Thus, higher adoption of these crucial aspects of protected cultivation technology of practices in capsicum is very much essential.

INTRODUCTION

India is the second largest producers of vegetable crops in the world. However, its vegetable production is much lesser than the requirement if balanced diet is provided to every individual. Greenhouse is the most practical method of achieving the objectives of protected agriculture, where natural environment is modified by the use of sound engineering principles to achieve optimum plant growth and yield (more produce per unit area) with increased input use efficiency. The green house covered with simple plastic sheet is termed as poly house. Tomato, capsicum and cucumber are the most extensively grown vegetables under protected cultivation. The states that have consistently expanded the area under protected cultivation are Andhra Pradesh, Gujarat, Maharashtra, Haryana, Punjab, Tamil Nadu and West Bengal. Maharashtra and Gujarat had a cumulative area of 5,730.23 ha. and 4,720.72 ha., respectively (Singh Balraj, 2014). Capsicum (*Capsicum annuum*) also known as bell pepper or sweet pepper is one of the most popular and highly remunerative annual herbaceous vegetable crops. India contributes one fourth of world production of capsicum with an average annual production of 0.9 million tons from an area of 0.885 million ha. with a productivity of 1266 kg per ha. (Anonymous, 2005).

Capsicum is extensively cultivated in most of the districts of Maharashtra. However, the large scale cultivation of capsicum is concentrated in Satara, Nasik and Ahmednagar districts. Quality production of capsicum is the need of the day. The use of protected vegetable cultivation can increase production as well as productivity per unit of land, water, energy and labour. So this study was planned to determine the adoption of protected cultivation technology by capsicum growers and to study the relationship between various characteristics of capsicum growers with their adoption of protected cultivation technology.

METHODOLOGY

The Ahmednagar district was purposively selected for the present study because it is one of leading districts in capsicum production in Maharashtra. The study was conducted in Rahuri and Rahata tahsils of Ahmednagar district having maximum area under protected capsicum cultivation. A sample of 120 protected capsicum growers constituted the sample for the present study. The Ex-post facto design of social research was used for the present investigation. Keeping in the view the objectives of the study a structured interview schedule was prepared. The data were collected by using the personal interview method. The collected data were classified, tabulated, analyzed by using frequency, percentage and Karl Pearson's correlation coefficient was used for studying the relationship of selected characteristics of capsicum growers with their knowledge and adoption of protected cultivation technology.

RESULTS AND DISCUSSION

Adoption of protected cultivation technology by capsicum growers

The term adoption was operationalized as the continuous use of protected cultivation technology of capsicum by the respondents. The distribution of respondents by their adoption of protected cultivation technology for capsicum production is presented in Table 1.

Table 1 Distribution of capsicum growers by their adoption of protected cultivation technology

Sr. No.	Statements	Adoption (N=120)		
		Complete No.(per cent)	Partial No.(per cent)	No No.(per cent)
A	**Protected cultivation structure**			
1	Polyhouse	79(65.83)	21(17.50)	20(16.67)
2	Shadenet house	76(63.33)	17(14.17)	27(22.50)
B-I	**Type of polyhouse - On the basis of Shape**			
1	Even type	66(55.00)	18(15.00)	36(30.00)
2	Uneven span type	00(0.0)	00(0.0)	120(100.00)
3	Ridges and Furrow type	41(34.17)	27(22.50)	52(43.33)
4	Sawtooth type	101(84.17)	11(9.17)	08(6.66)
5	Quonset	17(14.17)	30(25.00)	73(60.83)

II	**Based on covering material**			
1	Plastic film greenhouse	120(100.00)	00(0.0)	00(0.0)
C	**Polyhouse construction related aspects**			
1	Location	66(55.00)	26(21.67)	28(23.33)
2	Topography of land	65(54.17)	19(15.83)	36(30.00)
3	Climate	64(53.33)	33(27.50)	23(19.17)
4	Labour supply	75(62.50)	41(34.17)	04(3.33)
5	Accessibility of the site for market	81(67.50)	25(20.83)	14(11.17)
6	Orientation	75(62.50)	37(30.83)	08(6.67)
D-I	**Climate Control-Conservation of heat energy**			
1	Maintaining air space between two coverings	46(38.33)	26(21.67)	48(40.00)
2	Installation of windbreaks outside the greenhouse	42(35.00)	00(0.0)	78(65.00)
3	Installation of fans for air	25(20.83)	15(12.50)	80(66.67)
II	**Equipment for moisture controlled**			
1	Watering of path in greenhouse	114(95.00)	03(2.50)	03(2.50)
III	**Cooling system**			
1	Exhaust fan in end wall	09(7.50)	30(25.00)	81(67.50)
2	Mist cooling	12(10.00)	11(9.17)	97(80.83)
3	Circulating fans	16(13.33)	10(8.34)	94(78.33)
4	Fogging system	47(39.17)	00(0.0)	73(60.83)
IV	**Humidity**			
1	Hygrometer	51(42.50)	07(5.83)	62(51.66)
E	**Package of practices of capsicum**			
I	**Capsicum variety** Indra, California, Wonder, Master	83(69.17)	00(0.0)	37(30.83)
II	**Type of soil**			
1	Well drained, pH 6.0 to 7.0	106(88.33)	00(0.0)	14(11.67)
2	Electrical conductivity less than 1	104(86.67)	00(0.0)	16(13.33)
III	**Growing Media 3:3:3:1** Red soil : FYM : Sand : Rice : Husk	120(100.00)	00(0.0)	00(00)
IV	**Specification of bed**			
	Bed width at top 90cm Bed with at bottom 100cm Bed height 45cm Distance between two rows 50 cm	120(100.00)	00(0.0)	00(00)

V	Basal dose after bed preparation: SSP 2.5 kg and neem cake 50 kg per 10m^2.	116(96.67)	00(0.0)	04(3.33)
VI	**Sterilization of media**			
	Use 7.5 to 10 lit. formalin acid in 10lit. of water for 100 m^2 area of the greenhouse or @ Basamid 30-40g/m^2	120(100.00)	00(0.0)	00(0.0)
VII	**Plant spacing** : 60×45 cm (3.70 plants/m^2)	107(89.17)	06(5.00)	07(5.83)
VIII	**Plastic mulching**			
	Plastic polyethylene mulch	120(100.00)	00(0.0)	00(0.0)
IX	**Irrigation system**			
1	Drip irrigation	120(100.00)	00(0.0)	00(0.0)
2	Hand water supply	00(0.0)	00(0.0)	120(100.00)
3	Atomized irrigation system	00(0.0)	00(0.0)	120100.00)
X	**Supporting System :** After 30 days of transplanting , 3 to 4 branches of plant should be tied with the help of *sutali* or nylon ropes	120(100.00)	00(0.0)	00(0.0)
XI	**Pinching :** Leaving 3-4 branches with 5-6 nodes, tip shoot is cut-off after 3 to 4 weeks of planting. Among new growth 50% branches should be pinched. Disbudding of side buds should be done initially.	75(62.50)	05(4.17)	40(33.33)

XII **Fertigation management** :The water soluble fertilizers are applied at alternate days through the drip irrigation as below

	Crop Stage	**N**	**P_2O_5**	**K_2O**	**Ca**	**Mg**			
	(kg/ha/alternate day)								
1	Upto flowering	8	2.8	4.0	2.8	0.2	117(97.50)	0(0.0)	03(2.50)
2	After flowering	6	3.0	15	3.0	0.3	105(87.50)	06(5.00)	09(7.50)

XIII Plant Protection : Following pesticides/fungicides are used by the farmers

	Pest/ Diseases	Control Measures	Concentration per litre			
1	Aphids	Nuvan Confidor	1.5ml 0.5ml	70 (58.33)	15 (12.50)	35 (29.17)
2	Flower bud maggot	Desis Rogor	0.5ml 2.0ml	76 (63.33)	9 (7.5)	35 (29.17)
3	Fusarium wilt	Drenching of Bavistin/ Dithane M-4	0.5gm 2.0gm	89 (74.17)	00 (0.0)	31 (25.83)

XIV	**Harvesting :** After getting green colour (60-70 days after transplanting) on fruit, the fruits are harvested			120(100.00)	00(0.0)	00 (0.0)
XV	**Good quality capsicum**					
	Fruit weight (gm)	**Grade**	**% / Yield**			
1	200-250	A^+	20%	103(85.80)	13(10.80)	04(3.33)
2	150-200	A	40%	101(84.16)	09(7.50)	10(8.33)
3	100-150	B	20%	90(75.00)	15(12.50)	15(12.50)
4	50-100	C	20%	81(67.50)	25(20.80)	14(11.66)

The data in Table 1 revealed that 65.83 per cent and 63.33 per cent respondents had complete adoption of polyhouse and shadenet house, respectively. Regarding type of polyhouse according to their shape 84.16 per cent, 55.00 per cent, 34.17 per cent and only 14.17 percent respondents had complete adoption of sawtooth type, even type ridges and furrow and quonset type, respectively. Based on covering material 100.00 per cent respondents had complete adoption of plastic film greenhouse. Regarding polyhouse construction related aspects 67.50 per cent, 62.50 per cent, 62.50 per cent, 55.00 per cent 54.17 per cent and 53.33 per cent respondents had complete adoption of accessibility for market site, labour supply, orientation, location, topography and climate, respectively. In respect of climate control aspect only 38.33 per cent respondents had complete adoption of maintaining air space between two coverings, 35.00 per respondents had complete adoption of installation of windbreaks outside the polyhouse and 20.83 per cent respondents had complete adoption of installation of fan for air. Regarding cooling aspects majority of the respondents (95.00 %) had complete adoption of watering path in polyhouse. No adoption regarding other cooling systems like mist cooling (80.83 %), circulating fans (78.33 %), exhaust fans (67.50 %) and fogging system (60.83 %) was observed.

In respect of package of practices of capsicum 69.17 per cent respondents had complete adoption of varieties like Indra, California, Wonder and Master. Respondents had complete adoption of type of soil and electrical conductivity. Complete adoption of other practices like growing media, specification of bed, sterilization of media, supporting system, plastic mulching, drip irrigation system and timely harvesting of capsicum was reported by cent per cent respondents. Regarding other aspects there was complete adoption of basal dose (96.67 %), plant spacing (89.10 %) and pinching of leaves (62.50 %). Fertigation management was completely adopted by majority of respondents.

As regards to pest and pathogen control 74.17 per cent, 63.33 per cent and 58.33 per cent had complete adoption regarding control measures against fusarium wilt, maggot and aphids, respectively. Majority of the respondents i.e. 85.80 per cent, 84.16 per cent 75.00 per cent and 67.50 per cent had complete adoption of grade A^+, A, B and C grades, respectively. The above findings are

similar in line with those of Kharat (1996), Waykar (2013) and Yamgar (2013).

Level of adoption of capsicum growers regarding protected cultivation technology

The adoption score of individual capsicum growers was the criteria for classifying them in three categories *viz.,* low, medium and high levels of adoption. The distribution of capsicum growers according to adoption level is given in Table 2.

Table 2 : Distribution of capsicum growers by their level of adoption regarding protected cultivation technology

Sr. No.	Adoption level	Frequency (N=120)	Percent
1.	Low (Upto 75)	20	16.17
2.	Medium (76 to 96)	75	62.50
3.	High (97 and above)	25	20.83
	Total	**120**	**100.00**

It was observed from Table 2 that the highest percentage of capsicum growers was in the medium level of adoption group (62.50 %), while, 20.00 per cent were observed in high adoption level category. Whereas, 16.17 per cent of capsicum growers were observed in low adoption level group. These findings are in line with those of Koli (20 03), Jadhav (2009) and Waykar (2013).

CONCLUSION

The study pointed a gap in adoption of some of the protected cultivation technologies of capsicum by the respondents. These include the important technologies like use of circulating fans, fogging system for maintaining climate control and mist cooling system. This adoption gap among the capsicum growers needs to be focused by extension agencies for awareness through mass media and field visits. Thus, higher adoption of these crucial aspects of protected cultivation technology of practices in capsicum is very much essential.

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RESEARCH ARTICLE

Correlates of Paddy Growers with their Perception

Arjun Dere[1], R. P. Mandve[2], R. M. Hukare[3], R. R. Dharade[4] and S. S. Hingonekar[5]

1, 3 & 4 PG student 5. Ph.D Student and 2. Assistant Professor of Extension Education Section, College of Agriculture, Nagpur 441110 (M. H.), India

Corresponding author e-mail: arjundere20596@gmail.com

ABSTRACT

This study has been undertaken to study the perception of paddy growers towards SRI method of paddy cultivation for the year 2019-20. The Gondia district was selected for the study. Age, land holding, farming experience, source of information, economic motivation, innovativeness and risk orientation were significant and positively correlated with the perception of respondents towards SRI method of paddy cultivation at 0.01 level probability. Education and annual income was significantly and positively correlated with the perception of respondents towards SRI method of paddy cultivation at 0.05 level.

Keywords: Perception, SRI method, paddy growers, paddy cultivation

INTRODUCTION

Rice (*Oryza sativa* L.) is the foremost staple food for more than 50% of the world's population. It is estimated that by the year 2025, the world's farmers should be producing about 60% more rice than at present to meet the food demands of the expected world population at that time. Irrigated rice production is the largest consumer of water in the agricultural sector, and its sustainability is threatened by increasing water shortages(Bouman et al., 2005). India has the world's largest area devoted to rice cultivation, and it is the second largest producer of rice after China. India provides around 21 per cent of global rice production from its 28 per cent of the world's rice area. Over half of its rice area is irrigated, contributing 75 per cent of the total production. Notably, this area also consumes 50-60 per cent of the nation's finite freshwater resources. To improve resource use efficiency, it will be necessary to address the growing concerns regarding water scarcity, higher fertilizer costs, and negative environmental impacts due to the increasing use of agrochemicals for rice production. In such a situation, the System of Rice intensification (SRI), which is a low-cost and high yielding system, might be a sustainable alternative to conventional paddy production(Tsujimoto et al., 2009).

The system of rice intensiûcation (SRI) originated in Madagascar and was ûrst synthesized in 1983 by Father Henri de Laulanie, a French Jesuit priest(Stoop et al, 2002; Uphoff, 2007). SRI is a set of improved rice management practices based on several core components with some adjustments to local conditions. The generic agronomic practices for growing transplanted rice, i.e., raising a nursery, transplanting, irrigation,

weed management and nutrient management, are all there in SRI, but there are striking changes made in the way that these are carried out. SRI typically involves the early transplanting of one or two seedlings (less than 15 days old) per hill, spacing them widely apart (more than 20×20 cm) and subjecting them to alternate wetting and drying (AWD).

METHODOLOGY

The present study was based on the exploratory research design and carried out in Goregoan and Sadak Arjuni tahsils of Gondia district. From the each tehsils six villages were selected on the basis of area under SRI method of Paddy cultivation. From each village 10 respondents were selected purposively thus forming a total sample of 120 paddy growers. In this way 120 respondents were selected randomly from 2 tahsils of Gondiadistricts. Data were collected from the respondents by the personal interview method. Arithmetic mean, standard deviation, correlation coefficient, statistical techniques were used in the present study for analysis of data.

RESULTS AND DISCUSSION

Table 1. Distribution of respondents according to profile of farmers

Sl. No.	Variables	Frequency	Percentage
1.	**Age**		
	Young (up to 35 years)	14	11.66
	Middle (36 to 50 years)	57	47.50
	Old (51 and above)	49	40.84
2.	**Education**		
	Illiterate	3	02.50
	Primary school (1st to 4th std)	23	19.16
	Middle school (5th to 7th std)	16	13.33
	Secondary school (8th to 10thstd)	39	32.52
	Higher secondary school (11th to 12thstd)	30	25.00
	Undergraduate (12+3/ 12+4/ 12+5)	7	05.83
	Post Graduate (UG+2)	2	01.66
3.	**Farming experience**		
	Low (Up to 25 years)	25	20.83
	Medium (26 to 45 years)	74	61.66
	High (Above 45 years)	21	17.51
4.	**Annual income**		
	Low (Up to Rs.1,00,000)	97	80.83

	Medium (Rs.1,00,001 to 2,00,000)	17	14.17
	High (Above Rs.2,00,000)	6	05.00
5.	**Land holding**		
	Marginal (up to 1.00 ha)	49	40.83
	Small (1.01 to 2.00 ha)	53	44.16
	Semi-medium (2.01 to 4.00 ha)	17	14.16
	Medium (4.01 to 10.00 ha)	1	00.85
	Large (Above 10.00 ha)	0	00.00
6.	**Area under paddy cultivation**		
	Small (Up to 0.5 ha)	15	12.50
	Medium (0.6 to 2.27 ha)	90	75.00
	Large (Above 2.27 ha)	15	12.50
7.	**Social participation**		
	Low (Up to 1)	62	51.66
	Medium (2 to 4)	45	37.50
	High (Above 4)	13	10.84
8.	**Extension contact**		
	Low (Up to 4)	46	38.33
	Medium (5 to 7)	65	54.16
	High (Above 7)	9	07.50
9.	**Source of information**		
	Low (Up to 10)	23	19.16
	Medium (11 to 14)	85	70.84
	High (Above 14)	12	10.00
10.	**Innovativeness**		
	Low (Up to 21)	24	20.00
	Medium (22 to 25)	89	74.16
	High (Above 25)	7	05.84
11.	**Economic motivation**		
	Low (Up to 20)	35	29.16
	Medium (21 to 23)	81	67.50
	High (Above 23)	4	3.34
12.	**Risk orientation**		
	Low (Up to 20)	30	25.00
	Medium (21 to 25)	75	62.50
	High (Above 25)	15	12.50

It is evident from Table 1 that age of the farmers indicated that 47.50 per cent respondents belonged to middle age group. It was found that 32.52 per cent of the respondents were educated up to secondary school level. Majority of the respondents (61.66%) had medium level of farming experience. majority of the respondents (80.83%) had low annual income. majority of the respondents (44.16%) had small size of land holding.About 75 per cent of the paddy growers had medium size of area under paddy cultivation. 51.66 per cent of respondents had low level of social participation.Majority of the respondents (54.16%) had medium level extension contact. 70.84 per cent of respondents had medium level of source of information. majority of paddy growers (74.16%) had medium innovativeness. majority of paddy growers (67.50%) had medium economic motivation. majority of paddy growers (62.50%) had medium risk orientation.

Table 2. Distribution of the respondents according to overall perception towards SRI method of paddy cultivation.

Sl. No.	Perception of the respondents	Respondents (n=120)	
		Frequency	Percentage
1.	Low (Up to 68)	24	20.00
2.	Medium (69 to 75)	87	72.50
3.	High (Above 75)	9	07.50
	Total	**120**	**100.00**

Mean=71.21

It could be observed from Table 2, that majority (72.50%) of the paddy growers had medium level of perception about SRI method of paddy cultivation, followed by 20.00 per cent in low and 07.50 per cent in high level, respectively. These findings were similar with the findings of Biswas and Nath (2013) and Narbaria *et al.* (2015).

Table 3. Correlation coefficient of the selected characteristics of the respondents with their perception towards SRI method of paddy cultivation

Sl. No.	Variables	Perception 'r' values
1	Age	0.2602**
2	Education	0.1935*
3	Land holding	0.2730**
4	Area under paddy	-0.3029**
	cultivation	
5	Farming experience	0.2679**
6	Annual income	0.2237*
7	Social participation	0.1523
8	Extension contact	0.2834**
9	Source of information	0.2550**
10	Innovativeness	0.2323**
11	Economic motivation	0.3540**
12	Risk orientation	0.2469**

*** Significant at 0.01 level of probability*

** Significant at 0.05 level of probability*

On critical examination in Table 3 reveals that amongst the personal, socio-economic, communication and psychological characteristics of respondent paddy growers age, land holding, farming experience, source of information, economic motivation, innovativeness and risk orientation were significant and positively correlated,

whereas, area under paddy cultivation are correlated as negatively significant with the perception of respondents towards SRI method of paddy cultivation at 0.01 level probability. Whereas the education and annual income was significantly and positively correlated with the perception of respondents towards SRI method of paddy cultivation at 0.05 level probability. Hence, null hypothesis (H_0) regarding these variables was accepted, for these variables stating that there is significant relationship between these variables with perception of paddy growers towards SRI method of paddy cultivation.These findings are in conformity with the findings of Joshi (2016), Mohite (2016), Dharmendra (2016), Kurmi (2018), Kudale (2019) and Shinde (2019).

The remaining characteristic such as social participation were non-significantly correlated with the perception towards SRI method of paddy cultivation. Hence, null hypothesis (H_0) regarding these characteristics was rejected and stating that there is no significant relationship between these characteristics with perception of paddy growers towards SRI method paddy cultivation. These findings are similar to the findings of Dharmendra (2016) and Kurmi (2018).

CONCLUSION

Age, land holding, farming experience, source of information, economic motivation, innovativeness and risk orientation were significant and positively correlated with the perception of respondents towards SRI method of paddy cultivation at 0.01 level probability. Education and annual income was significantly and positively correlated with the perception of respondents towards SRI method of paddy cultivation at 0.05 level.

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RESEARCH ARTICLE

Entrepreneurial Behaviour of Members of FPO from Western Maharashtra

Swati Khandave[1], M. B. Gund[2] and R. B. Borse[3]

1. Associate Professor of Agril. Extension and communication, College of Agriculture, Kolhapur.
2 & 3. Assistant professor *College of Agriculture, Kolhapur*
Corresponding Email-Swatim912@gmail.com

Abstract

To compete in national and international markets, agriculture needs to function with entrepreneurial approach. In Indian agricultural context, majority of the farmers fall into small and marginal farmers category operating at subsistent level. Limited business negotiating skills, low percentage of entrepreneurs, inaccessibility to the markets, price fluctuations, unorganized farming sector *etc.* led to more competitive and unstable environment for them. Considering these facts, Govt. of India has initiated a movement of organising these farmers into groups in the form of Farmer Producers Organisations (FPOs).This pathway provided wide scope for developing skills and entrepreneurial qualities among them.An attempt was made to study the entrepreneurial bahaviour of the members of FPO.

Major three talukas viz.,*Khed*, *Junnar* and *Purandar of* Pune district from Western Maharashtra and five,four and two FPOs engaged in vegetable production were selected respectively by using multistage sampling procedure. Further,10 per cent of sample was drawn from each FPO by proportionate sampling method, constituting total sample of 200 respondents. The data were collected through pre tested, well structured personal interview schedule and then analyzed.

Study revealed that market orientation (7.44), decision making ability (6.99), economic motivation (6.42), risk orientation (6.09), planning ability (5.81), self confidence (4.66), scientific orientation (4.45), innovativeness (2.28),communication skills (1.59) achievement motivation (1.09) were the identified major indicators with their respective scale values contributing towards entrepreneurial behavior and majority (86.50 per cent) of the respondents were found with medium to high entrepreneurial behaviour index (EBI).

Key words: FPO:Farmer Producers' Organisation, EBI: Entrepreneurial Behaviour Index

Introduction

Entrepreneurship contributes for development of a country in several ways, *viz.* assembling and harnessing various inputs, bearing the risks, innovating and imitating the techniques of production to reduce the cost and increase its quality and quantity, expanding the horizons of the market etc. It is suggested that for competing in national and international markets, agriculture needs to function with entrepreneurial approach. Development as

well as strengthening of small and micro enterprises especially in agricultural and allied agricultural sectors in rural areas to promote agri entrepreneurs is important for Indian economy. Formation of member-based Farmer Producer Organisations (FPOs) is one such effort to tackle the present agriculture situation. The purpose of mission is to collectivize farmers, especially small and marginal producers, at various levels across several states. (Anonymous, 2013). As per Agriculture Census, 2010-11, total operational land holdings in the Maharashtra state is 1.3698 crore. Out of it, 78.60 per cent of operational holdings belong to marginal and small farmers. Maharashtra is one of the leading states in formation of FPOs with total 595 FPOs registered till 2017.Working in an organisation provides wide scope for development of entrepreneurial qualities among the small and marginal farmers. An attempt has been made to study the Entrepreneurial behaviour of members of Farmer Producers' Organizations from Pune District of Western Maharashtra.

MATERIALS AND METHODS

In present investigation, entrepreneurial behavior of member farmer is operationalised as cumulative outcome of selected main indicators for running their enterprise successfully. Multistage sampling procedure was followed for selection of study area. Pune district from Western Maharashtra was purposively selected based on maximum number of FPOs in first stage. Considering area under vegetable and number of FPOs working in vegetable production and marketing, three talukas viz., *Khed, Junner and Purander* of Pune district were selected in second stage and organizations engaged in vegetable production were selected in third stage. Total eleven FPOs were purposively selected and 10 per cent of sample was drawn from each selected FPO by proportionate sampling method comprising total 200 respondents. In order to measure the entrepreneurial behavior of the member farmer, major indicators of entrepreneurial behaviour were identified after reviewing the related literature and consulting with the experts. On the basis of normalized rank order method as recommended by Guilford (1954), the rank values for the main indicators were computed. Statements were prepared and finalised under each identified major indicator based on past review and discussion with committee members. Entrepreneurial behavior of the members was measured with the help of scale developed under the study. Entrepreneurial Behavior Index (EBI) of each member was calculated and members were classified into three categories on the basis of mean (X) and standard deviation (S.D.)

$$EBI = \frac{\Sigma \text{ Score obtained for the indicator} \times \text{Scale value of the indicator} \times 100}{\Sigma \text{ Maximum score for the indicator} \times \text{Scale value of the indicator}}$$

Findings

Entrepreneurial behaviour is the cumulative function of many interrelated components which are interdependent and combinely decide the action. The classification of the respondents was made on the basis of their score obtained for each indicator. The data regarding this aspect are presented in Table1.

Table 1: Distribution of the respondents according to their entrepreneurial behaviour index and share of each indicator to EBI

Sr. No.	Indicators	Category	Distribution		Share of each indicator to EBI	Rank Assigned	Scale value
			Frequency	Per Cent			
1.	Market orientation	Low (below 30.67 E.B.I.)	30	15.00			7.44
		Medium (30.67 to 38.76 E.B.I.)	140	70.00			
		High (above 38.76 E.B.I.)	30	15.00	34.72	I	
		$\bar{X}$ = 34.72	S.D. = 4.05		C.V.% = 11.66		
2.	Decision making ability	Low (below 25.08 E.B.I.)	43	21.50			6.99
		Medium (25.08 to 33.0E.B.I.)	139	69.50			
		High (above 33.00 E.B.I.)	18	9.00	29.04	III	
		$\bar{X}$ = 29.04	S.D. = 3.96		C.V.% = 13.64		
3.	Economic motivation	Low (below 23.32 E.B.I.)	32	16.00			6.42
		Medium (23.32 to 31.22 E.B.I.)	142	71.00			
		High (above 31.22 E.B.I.)	26	13.00	27.27	IV	
		$\bar{X}$ = 27.27	S.D. = 3.95		C.V.% =14.48		
4.	Risk Orientation	Low (below 21.47 E.B.I.)	45	22.05			6.09
		Medium (21.47 to 29.58 E.B.I.)	121	60.50	25.53	V	
		High (above 29.58 E.B.I.)	34	17.00			
		$\bar{X}$ = 25.53	S.D. = 4.05		C.V.% = 15.86		
5	Planning ability	Low (below 20.44 E.B.I.)	37	18.50			5.81
		Medium (20.44 to 25.8E.B.I.)	119	59.50	23.14	X	
		High (above 25.83 E.B.I.)	44	22.00			
		X=23.14	S.D. = 2.70		C.V.% = 11.67		
6	Self confidence	Low (below 28.09 E.B.I.)	46	23.00			4.66
		Medium (28.09 to 35.82 E.B.I.)	114	57.00	31.96	II	
		High (above 35.82 E.B.I.)	40	20.00			
		$\bar{X}$ = 31.96	S.D. = 3.87		C.V.% = 12.11		
7	Scientific orientation	Low (below 22.10 E.B.I.)	37	18.50			4.45
		Medium (22.10 to 27.97 E.B.I.)	118	59.00	25.04	VI	
		High (above 27 .97 E.B.I.)	45	22.50			
		$\bar{X}$ = 25.04	S.D. = 2.94		C.V.% = 11.74		
8	Innovative-ness	Low (below 20.66 E.B.I.)	28	14.00			2.28
		Medium (20.66 to 26.30 E.B.I.)	148	74.00	23.48	IX	
		High (above 26.30 E.B.I.)	24	12.00			
		$\bar{X}$ = 23.48	S.D. = 2.82		C.V.% = 12.01		
9	Commu-nication skills	Low (below 20.93 E.B.I.)	29	14.50			1.59
		Medium (20.93 to 27.17 E.B.I.)	138	69.00	24.05	VIII	
		High (above 27.17 E.B.I.)	33	16.50			
		$\bar{X}$ = 24.05	S.D. = 3.12		C.V.% = 12.97		
10	Achievement motivation	Low (below 21.82 E.B.I.)	27	13.50			1.09
		Medium (21.82 to 26.84 E.B.I.)	144	72.00	24.33	VII	
		High (above 26.84 E.B.I.)	29	14.50			
		$\bar{X}$ = 24.33	S.D. = 2.51		C.V.% = 10.32		

It is clear from the data presented in Table 1. that more than two third of the respondents (70.00 per cent) had medium level of market orientation and 34.72 per cent share in EBI and nearly three forth (74.00 per cent) had possessed medium innovativeness with 23.48 per cent share. This might be due to the perishable nature of vegetables, price fluctuations enabled them to take risk, also their young age made them receptive to new changes. Similar observation was reported by Taufiq (2011) and Avhad *et al.* (2015).

Data pertaining to economic motivation and achievement motivation states that majority members (71.00 and 72.00) had possessed medium level of economic and achievement motivation with 27.27 and 24.33 per cent share respectively in EBI. The results are in confirmity with Thakare (2013). The probable reason for such findings might be that members are motivated through organization for getting fair economic returns to their produce.

With regards to decision making ability and communication skills nearly equal per centage (69.50 and 69.00 per cent) of members had medium level qualities with 29.04 and 24.05 per cent share respectively in EBI. As mostly members are from young age category with higher secondary and college education and social participation might have helped for developing decision making ability. Similar findings are reported by Thakare (2013).

Data further stated that nearly 60.00 per cent of the members possessed medium risk orientation, planning ability, scientific orientation and self confidence. Whereas share of self confidence is high 31.96 per cent in EBI. Organizational support, exposure experience gained might have motivated them to take risk and enterprise effectively and scientifically. Similar results are reported by Ashok kumar (2011), Patel (2013).

Based on the share of each indicator in contributing towards entrepreneurial behavior index (EBI), rank has been assigned to each indicator ,data pertaining to this stated that market orientation, self confidence, decision making, economic motivation secured I,II,III and IV rank respectively.While planning ability, risk orientation, scientific orientation, achievement motivation, communication skill, innovativeness were ranked in ascending order with V,VI,VII VIII,IX and X ranks respectively.

CONCLUSION

Study can be concluded that majority of the members of organisations had possessed medium to high entrepreneurial behavior. Thus, organisation helped the members to develop entrepreneurial qualities and manage their enterprise more efficiently on economic point of view. Out of all major indicators, members rated market orientation, self confidence, decision making ability, economic motivaton were the important one required for developing entrepreneurship .

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RESEARCH ARTICLE

Correlates of Profile of the Paddy Growers with Knowledge and Adoption of Integrated Nutrient Management

Subham Chandangiriwar[1], Y. B. Shambharkar[2], S. N. Gajghate[3] and Swati Gawande[4]

1. M.Sc. Scholar, 2 & 4 .Assistant Professor, Department of Extension Education,

Dr. PDKV, Akola 3.Assistant Professor, College of Agriculture, Mul Mroda Dist: Chandrapur

ABSTRACT

Study entitled "Adoption of Integrated Nutrient Management Practices by paddy Growers" was undertaken in Gadchiroli district in Vidarbha region of Maharashtra state. Ex-post facto research design was used for the same. The farmers growing Paddy since last three years consecutively were identified and from each selected village. Paddy growers as respondents were selected randomly to constitute sample size of 120 respondents. The data from paddy growers was collected by personal interview method.

Results of correlation analysis revealed that age, education, land holding, availability of inputs, mass media exposure, extension contact, scientific orientation and economic motivation had positive and highly significant correlation with knowledge. Also, age, education, land holding and availability of inputs had positive and highly significant correlation with adoption. Whereas area under paddy were found to be non-significantly correlated with adoption of Integrated Nutrient Management practices by paddy growers

INTRODUCTION

Rice (*Oryza sativa L.)* is one of the most important cereal crops in India. Globally, India ranks first in rice area and second in rice production after China. Within the country, rice occupies one-quarter of the total cropped area that contributes about 40 to 43 per cent of total food grain production and continues to play a vital role in the national food. Area under rice cultivation in India was 43.19 million hectares, production of 110.15 million tonnes with productivity of 2550 kg per hectare during 2016-17. In Maharashtra rice is second important crop of the people, which is grown over an area of 1.42 million hectares with an annual rough rice production of 2.66 million tonnes (2017-18). The average productivity of the state is 1.87 tonnes per hectare. Maharashtra ranks 13th place in rice production in country. In Vidarbha region paddy crop is grown mostly in considerable area of about 0.74 million hectares. In Vidarbha region Gadchiroli, Bhandara, Gondia, Chandrapur and some parts of Nagpur and Wardha are the prominent district of paddy cultivation. The area under paddy cultivation in Gadchiroli district is about 1.83 lakh hectares (2018-19). There is need to increase the productivity of paddy for improvement of financial status of farmers.

The reasons for low productivity are fluctuation in the rainfall pattern, improper management of recourses (like soil, water and nutrient management), faulty plant protection techniques and weak extension link denying improved technology to paddy growers who continue to follow traditional methods and also due to improper nutrient management in paddy crop.

There are various improved cultivation practices recommended namely, sowing time, seed rate, soil preparation, spacing, seed treatment, varieties, fertilizer application, irrigation, intercultural operations, pest and disease management, harvesting etc. In addition to this, there are certain integrated nutrient management practices which includes use of organic manures, inorganic fertilizers and bio-fertilizers, so as to improve soil fertility and increase soil productivity which is ecologically safe.

Importance of organic manuring in Indian agriculture has been known since ancient times. It is also well known that; bulky organic manures are beneficial in improvement and maintenance of soil productivity. Intensive cropping and use of chemical fertilizer in different parts of world was resulted in the deterioration of soil fertility.

The concept of integrated nutrient management is the continuous improvement of soil productivity on long term basis through appropriate use of fertilizers and organic manures including green manures and their scientific management for optimum growth, yield and quality of different crops and cropping systems in specific agro-ecological situations.

In agriculture, today there is a wide gap between demand (requirement) of nutrients (NPK) for derived food production and supply of nutrients through supplementary and complementary use of organic and biological sources of nutrients in Integrated Nutrient Management systems. The use of organic manures, crop residues, microbial fertilizers and green manuring are all becomes more essential because of limited availability of chemical fertilizer and their higher prizes.

By knowing the importance of Integrated Nutrient Management, it should be adopted by the farmers in judicious manner. “Adoption is a decision to make full use of an innovation as the best course of action available.”

Integrated Nutrient Management consists of the use of both organic manures and inorganic manures and bio-fertilizers, practices that meet current and future societal needs for food, for ecosystem service, for healthy lives and that do so by maximizing the net benefit to society when all costs and benefits of the practices are considered. Thus, for sustainable agriculture integrated nutrient management is must.

METHODOLOGY

Locale of the study

The present investigation was carried out in Chamorshi, Armori and Dhanora talukas of Gadchiroli district which is located in eastern Vidarbha region of Maharashtra State. The Gadchiroli district was selected purposively as it is a paddy growing as well

as one of the most backward districts in Maharashtra State.

Research Design: An exploratory research design of social research was used in the present study.

Sample and sampling procedure

The sampling plan adopted for this research has been described under subheads

Selection of tahsil and villages

In Gadchiroli district there are total 12 taluka out of which consecutive three talukas namely Chamorshi, Armori and Dhanora talukas of Gadchiroli were selected on the basis of maximum area under paddy cultivation.

List of Paddy growing villages was obtained from Taluka Agriculture officer of concerned taluka and four villages from each taluka were selected randomly, based on maximum area under paddy crop. The selected villages were Wakadi, Mudaza Bk, Shivni, Dongargaon Bk, Kunghada, Bhadbhidi, Talodhi, Navegaon, Karwafa, Khutgaon, Pandharsada, and Chatgaon

Selection of respondents

From each selected village, list of paddy growers was obtained from Talathi of concerned village and 10 paddy growers were selected randomly based on maximum area under paddy crop to constitute sample size of 120 paddy growers from 12 villages of three talukas.

RESULTS AND DISCUSSION

Table 1. Correlates of knowledge of integrated nutrient management practices by paddy growers

Sr. No.	Characteristics	Correlation coefficient
1	Age	0.3739**
2	Education	0.6196**
3	Land holding	0.6242**
4	Annual income	0.2230*
5	Area under paddy crop	0.0419NS
6	Availability of inputs	0.5202**
7	Mass media exposure	0.2801**
8	Extension contact	0.3729**
9	Scientific orientation	0.3691**
10	Economic motivation	0.4201**

* Significant at 0.05 level of probability
** Significant at 0.01 level of probability
NS Non-significant

The correlation coefficient of personal, communication and psychological characteristics of paddy growers with knowledge were worked out and presented in Table 1.

The variables namely age, education, land holding, availability of inputs, mass media exposure, extension contact, scientific orientation and economic motivation had established highly positive significant relationship with knowledge of Integrated Nutrient Management Practices of Paddy at 0.01 level of probability.

It could be seen from the results of relational analysis in Table1 that, the independent variable, area under paddy did not show any significant relationship with

knowledge. It is therefore null hypothesis for this variable has been accepted.

These findings are in line with the findings of Pranita Pada (2012), Dhenge (2013) and Jadhav (2015) to some extent. They reported that age, education, land holding, availability of inputs and scientific orientation are significantly related with the knowledge of paddy growers about improved practices of paddy cultivation.

Table 2. Correlates of adoption of integrated nutrient management practices by paddy growers.

Sr. No.	Characteristics	Correlation coefficient
1	Age	0.5319**
2	Education	0.7698**
3	Land holding	0.7831**
4	Annual income	0.2050*
5	Area under paddy crop	0.0552NS
6	Availability of inputs	0.7453**
7	Mass media exposure	0.1985*
8	Extension contact	0.2019*
9	Scientific orientation	0.1855*
10	Economic motivation	0.1925*

* Significant at 0.05 level of probability
** Significant at 0.01 level of probability
NS Non-significant

It could be seen from the results of relational analysis in Table18 that, the independent variables viz., age, education, land holding, availability of inputs are significantly related with the adoption of paddy growers about integrated nutrient management practices at 0.01 level of probability. The relationship of mass annual income, media exposure, extension contact, scientific orientation and economic motivation was found to be positive significant with adoption of integrated nutrient management practices by paddy growers at 0.05 level of probability.

It could therefore be inferred from these results that with the increase in age, education, land holding, availability of inputs, mass media exposure, extension contact, scientific orientation and economic motivation there was an increase in adoption of integrated nutrient management practices of paddy by paddy growers.

These findings are in line with the findings of Jadhav (2015) to some extent, they reported that age, education, land holding and mass media exposure are significantly related with practices in paddy production technology and adoption of integrated nutrient management respectively.

CONCLUSION

From the findings of the relational analysis it is concluded that in case of knowledge the independent variable, area under paddy did not show any significant relationship with knowledge. It is therefore null hypothesis for this variable has been accepted. Whereas, in case of adoption it could therefore be inferred from these results that with the increase in age, education, land holding, availability of inputs, mass media exposure, extension contact, scientific orientation and economic motivation there was an increase in adoption of integrated nutrient management practices of paddy by paddy growers

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RESEARCH ARTICLE

Radio Listening Behaviour of Farm Women towards Community Radio Station Programmes

P. D. Limbhore[1], G. K. Waman[2] and P. B. Kharde[3]

1. Ex- student , M.Sc.Agri., Dept. of Extension Education, PGI, MPKV, Rahuri - 413 722
2. Assistant Professor of Agril. Extension, Directorate of Extension Education, MPKV, Rahuri
3. Officer Incharge, Communication Centre, MPKV, Rahuri – 413722

gkwaman2014@gmail.com

ABSTRACT

The present investigation was conducted in Rahata and Rahuri tahsils of Ahmednagar district as per the coverage of the PIRENS Community Radio Station (CRS). The study revealed that majority of the respondents belong to young aged group, educated upto secondary school level, medium size of family, farm related operation i.e. dairy poultry / sheep and goat is main occupation, having marginal land holding, medium annual income, medium social participation, medium extension participation, participated in different CRS events, medium level of media utilization, whereas, the farm women had medium listening behavior towards the Community Radio Station programmes.

INTRODUCTION

Communication is essential for social change and development. The quickest way to change the mind set'' of traditional society is through mass media. Among all mass communication media directed towards the farm population, radio perhaps is the most competent and has tremendous capacity to communicate the ideas with immediacy and continuous flow. Its listenership is therefore much broader than the readership of newspaper and television viewers particularly in developing countries like India where literacy rate is still low. It affords a unique advantage of receiving transmission through low cost, battery operated portable receiving sets. Engaging communities in communication would help to bridge the digital divide. It will also go a long way in ensuring the participation of rural and urban communities in decision making so that they can become informed citizens and participate equally in development programmes. If we have to move towards social inclusion and removal of inequality, we have to move towards providing access to information to people and empower communities. Poverty, hunger, lack of primary education, gender inequality, high child and maternal mortality cannot be challenged and tackled unless we bring effective partnerships with the local community for social change so that Community Radios become an instrument of positive social change. The wealth of songs, stories and folk music in our country could be very well preserved through Community Radios.

METHODOLOGY

The present study was conducted in the periphery of Community Radio Station (CRS) centre established in PIRENS Krishi Vigyan Kendra, Babhaleshwar, Ahmednagar district. According to the coverage of the PIRENS Community Radio Station, the Rahata and Rahuri tahsils were selected. Total 10 villages from both tahsils were selected on the basis of coverage of PIRENS Community Radio.

A purposive random sampling procedure was used for selection of respondents. A list of 150 farm families who possesed radio set sand those who listened CRS programmes in each selected villages through using mobiles, FM set etc. was given by the representatives of CRS, PIRENS.

Keeping in the view the objectives of the study a structured interview schedule was prepared. After finalizing the research design and interview schedule, the data were collected by using the personal interview method. Collected data were classified, tabulated, analyzed by using frequency, percentage and correlation coefficient.

FINDINGS

1) Profile of Community Radio women listeners

The profile of Community Radio women listeners are presented in Table 1 as below.

Table 1: Distribution of community radio women listeners according to their profile

(N=150)

Sl. No.	Category	Respondents	
		Frequency	Percentage
1.	**Age**		
1.	Young (upto 35 years)	87	58.00
2.	Middle (36 to 55 years)	58	38.67
3.	Old (56 and above)	05	03.33
2.	**Education**		
1.	Illiterate	02	01.34
2.	Pre-Primary and primary education (1st to 7th standard)	29	19.33
3.	Secondary school (8th to 10th standard)	72	48.00
4.	Higher secondary school (11th to 12th standard)	30	20.00
5.	Graduation (13th & above)	17	11.33
3.	**Size of family**		
1.	Small Size (up to 5)	75	50.00
2.	Medium Size (6 to10)	60	40.00
3.	Large Size (11 & above)	15	10.00
4.	**Occupation**		
1.	Farm related operations i.e.dairy/poultry/sheep and goat	145	96.67
2.	Farming	03	02.00
3.	Processing business	02	01.33
5.	**Size of Land holding**		
1.	Marginal (upto 1.00 ha)	93	62.00
2.	Small (1.01 to 2.00 ha)	49	32.67
3.	Semi medium (2.01 to 4.00 ha)	07	04.66
4.	Medium (4.01 to 10.00 ha)	01	00.67
6.	**Annual income**		
1.	Low (Upto Rs. 26,497 /-)	42	28.00
2.	Medium (Rs.26498/- to Rs. 116321/-)	85	56.67
3.	High (Rs.116322/- & above)	23	15.33

7.	**Social participation**		
1.	Low (upto 5)	47	31.33
2.	Medium (6 to 10)	96	64.00
3.	High (11 and above)	07	04.67
8.	**Extension participation**		
1.	Low (upto 5)	64	42.70
2.	Medium (6 to 11)	70	46.60
3.	High (12 and above)	16	10.70
9.	**Media participation**		
1.	CRS events(competitions/	56	37.30
	medical camps, etc)		
2.	Live-phone in programmes	38	25.30
3.	CRS arranged programmes	27	18.00
	(health school, exhibitions)		
4.	Trainings	16	10.70
5.	In programmes production	13	08.70
	(idea, script, recording)		
10.	**Media utilization**		
1.	Low (upto 7)	22	14.67
2.	Medium (8 to 12)	95	63.33
3.	High (13 and above)	33	22.00

It was observed from Table-1 that more than half (58.00 %) of the respondents were from the young age group, followed by 48.00 percent of were educated upto secondary school (8th to 10th standard), one half (50.00 %) belonged to the category of small size of family (upto 5 members), almost 96.67 per cent of the listeners had farming as the main occupation and farm related operations i.e. dairy/poultry/ sheep and goat farming as a subsidiary source of income, 62.00 percent of them had marginal land holding (upto1.00 ha), 56.67 per cent had medium annual income (between Rs. 26498/- to Rs 116321/-), 64.00 per cent of respondents had medium level of social participation, 46.60 per cent of respondents had medium level of extension participation, more than one third (37.30 %) of respondents participated in different CRS events conducted through "*Niroginari Kutumbtari* " programme (competitions/medical camps, etc.) and more than half (63.33 %) of respondents had medium level of media utilization.

2) Listening Behaviour of Farm Women

The Listening Behavior of Farm Women is depicted in Table 2 as below.

Table 2. Distribution of farm women according to their listening behaviour towards CRS programmes

(N=150)

Sl. No.	Listening Behavior	Respondents	
		Frequency	Percentage
1.	**Channels used for listening radio**		
1.	Commercial FM	09	06.00
2.	Ahmednagar Station (101 MHz)	18	18.00
3.	CRS (KVK PRAVARA)	150	100.00
2.	**Different medium used for listening CRS**		
1.	Transistor	59	39.34
2.	Mobile	60	40.00
3.	Car stereo	06	04.00
4.	FM	25	16.66
3.	**Place of listening the CRS programme**		
1.	Home	82	54.70
2.	Farm	21	14.00
3.	At work place	18	12.00
4.	Neighbours house/friend	29	19.30
4.	**Time spent for listening of CRS programme**		
1.	Upto 1 hr	77	51.33
2.	2 hrs	53	35.34
3.	3 hrs and above	20	13.33

5.	Regularity of listening CRS programme		
1.	Daily	75	50.00
2.	Weekly	47	31.30
3.	Fortnightly	15	10.00
4.	Occasionally	13	08.70
6.	**Most preferred time for listening CRS by the respondents**		
1.	At morning	48	32.80
2.	At afternoon	58	38.70
3.	At evening	39	26.00
4.	At night	05	03.30
7.	**Attention while listening the CRS programme**		
1.	Partial attention	109	72.67
2.	Full attention	41	27.33

1. Channels used for listening radio

It was revealed that from Table-2 that all respondents used to listen CRS (KVK PIRENS), while, 18.00 per cent of the respondents listened Ahmednagar station (101 MHz) and 6.00 per cent listeners listened commercial FM.

2. Different mediums used for listening CRS

It was observed from Table-2 that more than one third (40.00 %) of the respondents used mobile for listening radio, 39.34 per cent of the respondents used transistor for listening radio, while, 16.66 per cent and 4.00 per cent of the respondents utilized FM and Car stereo for listening radio.

3. Place of listening the CRS programme

It was observed from Table-2 that majority (54.70 %) of the community radio listeners were listening the CRS programmes at home, while, 19.30 and 14.00 percent of the listeners were listening it at neighbour's or at friend's home and farm, respectively. Only 12.00 per cent of the respondents listened radio at their work place.

4. Time spent for listening of CRS programmes

It was seen from Table-2 that majority (51.33 %) of community radio women listeners listened to the programmes upto one hour, while, 35.34 percent of them listened for two hours and only 13.33 per cent listened for three hours.

5. Regularity of listening CRS programmes

It was observed from Table-2 that one half i.e. 50.00 percent of the respondents listened CRS programmes daily, followed by 31.30 per cent, 10.00 per cent and 8.70 per cent of the respondents listened CRS programmes weekly, fortnightly and occasionally, respectively.

6. Most preferred time for listening CRS by the respondents

It was observed from Table-2 that 38.70 per cent of the respondents listened the CR programmes at afternoon session followed by 32.80 per cent of the respondents listened at morning time, while, 26.00 per cent and 3.30 percent of the respondents listened these programmes at evening session and night session, respectively.

7. Attention while listening the CRS programmes

It was seen from the Table-2 that majority (72.67 %) of the community radio listeners had partial attention towards the programmes, while, 27.33 per cent listeners had full attention.

The data on the respondents overall Listening Behavior of CRS programmes is revealed in Table 3 below.

Table 3. Distribution of respondents according to their overall Listening Behaviour of CRS programmes

(N=150)

Sl. No.	Listening Behavior	Respondents	
		Frequency	Percentage
1.	Low (Score Upto 7)	23	15.33
2.	Medium (Score 8 to 11)	95	63.33
3.	High (Score 12 and above)	32	21.34

It is evident from Table-3 that majority (63.33 %) of the farm women listeners were having medium listening behaviour, followed by high (21.34 %) and low (15.33 %) listening behaviour.

CONCLUSION

Radio is an avenue for participatory communication and is the tool relevant in both economic and social development. Radio provides information worldwide and entertainment needs of people also have played a very important role in creating awareness among rural people where most people can't read or write, but can speak and listen. The study indicated that majority respondents belonged to young age group, educated upto secondary school level, medium size of family, farm related operations i.e. dairy / poultry / sheep and goat is main occupation, marginal land holding, had medium annual income, medium social participation, medium extension participation, participated in different CRS events and medium level of media utilization. The majority of farm women respondents were having medium listening behaviour towards community radio station programmes.Therefore, it implied that the programme implementation agencies may consider these characteristics while constructing audience segmentation for different Community Radio programmes for targeting farm women.

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RESEARCH ARTICLE

Potato Growers' Awareness and Adoption of University Recommendations

Jyoti Walke[1], V. J. Tarde[2], Sangita Salke[3] and U. D. Jagdale[4]

1. Dr. Jyoti P. Walke. Sr. Res. Asstt. Department of Agricultural Extension Communication
2. Dr. Tarde V.J. Professor (CAS), Dept. of Agril., 3. Smt.Sangita Salke. Jr. Res. Asstt., Dept. of Agril.
4. Dr. Jagdale U.D. Assistant Prof. Dept. of Agril. Extension & Communication, College of Agriculture, Pune

Corresponding author e-mail : jyotipwalke@gmail.com

ABSTRACT

Potato is one of the main commercial crop grown in the country. In the era of modern agriculture, it has been observed that the diversification from cereals to crop like potato gives more returns for the farmers. The study was conducted to know the awareness and adoption of the university potato recommendations by the potato growers. The data was collected from 130 potato growers from Khed and Ambegaon tehsils of Pune district. Half of the rabi and karif respondents had farming and farming + subsidiary occupation and belonged to small land holding. Nearly two third of the rabi and kharif growers had irrigated +rainfed land and irrigated land respectively with river and well as the major source of irrigation. Both kharif and rabi potato respondents had medium innovativeness, medium economic motivation, medium risk orientation and medium scientific orientation. It was observed that both rabi and kharif respondents had medium awareness and belonged to the category of low adoption regarding the recommendations. Lack of information and financial constraints were the major problems stated by the respondents.

Keywords: Potato recommendation, awareness, adoption and opinion

INTRODUCTION

Vegetable cultivation in India is quite ancient. India is the second largest producer of vegetables in the world, accounting for 10 per cent of the world's production. However, potato, onion, cabbage and cauliflower account for 60 per cent of the total production (Anonymous: eagri.org). A variety of vegetable crops like fruit vegetables, leafy vegetables, cole vegetable, bulb vegetables etc. are grown throughout India. Among different vegetables grown in India, potato crop has got special importance as vegetable and food crop and due to its use in preparation of more than 100 recipes. Potato is a native of South America continent, where it used to grow as a wild plant right from about 7000 to 9000 years ago. (Singh 2014). It is cultivated in India since last more than 300 years. During 2017-18 potato was exported to the tune of 3, 95,748.12 MT valuing Rs. 41182.50 lakhs. During 2017-18 potato was cultivated on 2141.7 thousand hectares with annual production of 51310 thousand metric tonnes and productivity was 24.00 tonnes/ha in India.

However, In Maharashtra, potato was cultivated on the area of 11.09 thousand hectares with the annual production of 259.22 thousand metric tonnes and productivity 23.38 MT/ha during 2017-18. (Anonymous 2018). Recent data indicates that the area under potato cultivation grew from 2.2 lakh hectares in 1949 to 21.8 lakh ha till 2020 and its production went up from 1.54 MT in 1949 to 52.5 MT. To meet the growing demand it is essential to raise the potato production by 89 percent till 2050 (Anonymous: NDTV budget 2020). In Maharashtra the productivity of Potato is less as compared to the states like West Bengal, Gujarat, Punjab, Haryana and Uttar Pradesh. Scientific production of crop is the vital aspect to improve the production potential. Mahatma Phule Krishi Vidyapeeth, Rahuri has made recommendations for improvement of production of potato crop. Hence, the research study was undertaken to know the awareness, adoption and opinion of potato recommendations by kharif and rabi potato growers.

METHODOLOGY

The study was undertaken in Pune district of Maharashtra state. Potato crop is cultivated in Pune district in both, kharif and rabi season. Considering the kharif and rabi area, Ambegaon and Khed tehsils were selected respectively and data was collected from total 12 villages. 65 respondents each for kharif and rabi potato were selected to form the sample size of 130 respondents. Statistical tools such as frequency, percentage, mean and standard deviation were used and on the basis of analysis the respondents were categorized.

RESULT AND DISCUSSION

Profile of potato growers

Result from table 1 indicates that equal per cent (50.77 per cent) of the rabi and kharif potato growers had farming and agri. + sub occupation. More than one-third of the rabi (35.38 per cent) and kharif (38.46 per cent) potato respondents belonged to agriculture +subsidiary and farming occupation, respectively. The percentage of respondents having agriculture with business and service is less. One-half (50.77 per cent) and three fifth (60.00 per cent) of the rabi and kharif potato respondents belonged to small land holding group, respectively. Equal per cent (27.69 per cent) of the respondents had up to 1.00 ha. of land. 15.38 per cent and 6.15 per cent of the rabi potato growers while 10.77 per cent and 1.54 per cent of the kharif potato growers belonged to semi-medium and medium land holding, respectively. None of the potato grower had land above 10.00 ha. Less than one-third rabi (63.08 per cent) and kharif (64.62 per cent) potato growers had irrigated+ rainfed and irrigated land, respectively. Just more than one-fourth (27.69 per cent) and less than one-tenth (9.23 per cent) of the rabi respondents had irrigated and rainfed land respectively.

It was further observed that river and well are the major source of irrigation for rabi (42.37 per cent) and kharif (51.67 per cent) potato respondents**.** More than half (52.31 per cent) and three fourth (75.38 per cent)

of the rabi and kharif potato respondent had medium innovativeness, respectively. Less than three-fifth of the rabi (72.31 per cent) and kharif (70.77 per cent) respondents had medium economic motivation. Rabi (67.69 per cent and 73.85 per cent) and kharif (58.46 per cent and 60.00 per cent) potato respondents belonged to medium risk orientation and medium scientific orientation, respectively.

Table 1. Distribution of the rabi and kharif potato respondents according to their characteristics

Sr. No.	Category	Rabi potato Respondents (N =65)		Kharif Potato Respondents (N =65)	
		Frequency	Percentage	Frequency	Percentage
I.	**Occupation**				
1.	Farming	33	50.77	25	38.46
2.	Agriculture+Subsidiary Occupation	23	35.38	**33**	50.77
3.	Agriculture +Business	08	12.31	04	6.15
4.	Agriculture +Service	01	1.54	03	4.62
	Total	**65**	**100.00**	**65**	**100.00**
II.	**Land holding**				
1	Marginal (Up to 1.00 ha.)	18	27.69	18	27.69
2	Small (1.01 to 2.00 ha.)	33	50.77	**39**	60.00
3	Semi-medium (2.01 to 4.00 ha.)	10	15.38	07	10.77
4	Medium (4.01 and 10 ha.)	04	6.15	1	1.54
5	Large (above 10 ha.)	0	0.00	0	0.00
	Total	**65**	**100.00**	**65**	**100.00**
III.	**Type of land**				
1	Irrigated	18	27.69	**42**	64.62
2	Rainfed	6	9.23	05	7.69
3	Irrigated +Rainfed	41	63.08	18	27.69
	Total	**65**	**100.00**	**65**	**100.00**
IV.	**Sources of irrigation**				
1	River	25	42.37	06	10
2	Well	13	22.03	**31**	51.67
3	River + well	12	20.34	13	21.67
4	Well + Canal+ River	9	15.25	02	3.33
5	Well+ Canal	—	—	04	6.67
6.	Bore well	—	—	01	1.67
7.	Canal	—	—	02	3.33
8.	Well +Pond	—	—	01	1.67
	Total	**59**	**100.00**	**60**	**100.00**

Sr. No.	Category	Rabi potato Respondents (N =65)		Kharif Potato Respondents (N =65)	
		Frequency	Percentage	Frequency	Percentage
V.	**Innovativeness**				
1.	Low (R- up to 02) (K- up to 01)	23	35.38	8	12.31
2.	Medium (R- between 3 to 4) (K- between 2-4)	34	52.31	49	75.38
3.	High (R &K - more than 4)	8	12.31	4	6.15
	Total	**65**	**100.00**	**65**	**100.00**
VI.	**Economic Motivation**				
1	Less (R & K- up to 18)	11	16.92	12	18.46
2	Medium (R&K - between 19 to 23)	47	72.31	46	70.77
3	High (R &K- more than 23)	7	10.77	7	10.77
	Total	**65**	**100.00**	**65**	**100.00**
VII	**Risk orientation**				
1.	Low (R-score up to 27) (K- up to 29)	8	12.31	16	24.62
2.	Medium (R-score between 28 to 37) (K- between 30-35)	44	67.69	38	58.46
3.	High (R-score more than 37) (K-35)	13	20.00	11	16.92
	Total	**65**	**100.00**	**65**	**100.00**
VIII	**Scientific Orientation**				
1.	Low (R- up to 39) (k up to 37)	4	6.15	14	21.54
2.	Medium (R- between 39 to 51) (K-3 between 8-48)	48	73.85	39	60.00
3.	High (more than 51) (K- more than 48)	13	20.00	12	18.46
	Total	**65**	**100.00**	**65**	**100.00**

R-rabi, K- kharif

Overall awareness of the respondents about the recommended practices of the potato crop

Table 2 reveals that both rabi and kharif (43.08 per cent and 61.54 per cent) potato respondents belonged to medium awareness group. 30.77 per cent and 26.15 per cent of the rabi potato respondents had low and high awareness, respectively while one- fifth (20.00 per cent) of the kharif potato respondents belonged to low awareness and 18.46 per cent of them had high awareness about recommendations made for potato crop. The findings are in contrast with Elizabeth and Dia (2009).

Table 2. Distribution of the respondents according to their overall awareness of potato crop

Sr. No.	Category	Rabi potato Respondents (N =65)		Kharif Potato Respondents (N =65)	
		Frequency	Percentage	Frequency	Percentage
1.	Low (R- upto 1, kharif- upto 2)	20	30.77	13	20.00
2.	Medium (R- between 2 to 5, K- between 3 to 6)	28	43.08	40	61.54
3.	High (R- more than 5, K- more than 6)	17	26.15	12	18.46
	Total	65	100.00	65	100.00

R-rabi, K- kharif

Overall adoption of the recommended practices of the potato crop

Table 3 indicates that more than half (53.85 per cent) of the rabi potato respondents had low adoption followed by medium (29.23 per cent) and high (16.92 per cent) adoption. 44.62 per cent of the kharif potato respondents belonged to the low adoption category while 40.00 per cent and 15.38 per cent of them belonged to the category of medium and high adoption category, respectively. The findings are in line with Singh *et al* (2010) and Senanayake *et al* (2015) and in contrast with the finding Mane *et al* (2017) and Sharif Uddin *et al* (2013).

Table 3. Distribution of the respondents according to their overall adoption of the recommended practices of potato crop

Sr. No.	Category	Rabi potato Respondents (N =65)		Kharif Potato Respondents (N =65)	
		Frequency	Percentage	Frequency	Percentage
1.	Low (R&K- up to 1)	35	53.85	**29**	44.62
2.	Medium (R&K- between 2 to 3)	19	29.23	26	40.00
3.	High (R&K- more than 3)	11	16.92	10	15.38
	Total	65	100.00	65	100.00

R-rabi, K- kharif

Recommendation wise awareness, adoption and opinion of the potato growers

Table 4 : Distribution of the potato respondents according to their awareness, adoption and opinion of the potato growers

Sr. No.	Recommendations	Awareness (N=65)		Adoption (N=65)		Opinion (Rabi respondents) (N=65)		Opinion (Kharif respondents) (N=65)	
		Rabi respondents	Kharif Respondents	Rabi respondents	Kharif Respondents	Agree	Somewhat agree	Agree	Somewhat agree
1.	It is recommended to cultivate potato cultivar `Kufri Surya` for higher Tuber yield in Rabi season in plain zone of Maharashtra.	32 (49.23)	--	16 (24.62)	--	08 (12.31)	07 (10.77)	--	--
2.	Dipping of potato seed Tubers (20 q/ ha) before planting in suspension of 100 Liters of water, 500 ml Acetobacter liquid formulation and 2. 5 kg Azatobacter before planting for 10 min. followed by spraying of liquid Acetobacter (1 lit/ 200 lit water/ha) one month after planting is recommended for increasing yield, higher monetary returns and to reduce 25% recommended dose of Nitrogen through chemical fertilizers	21 (32.30)	32 (49.23)	08 (12.31)	11 (16.92)	07 (10.77)	01 (1.54)	08 (12.31)	02 (3.08)
3.	The application of 10 t FYM ha^{-1} + nitrogen, Phosphorus and potassium as per yield targeting equations for 150 - 200 q ha^{-1} yield of Rabi potato is recommended for in ceptisols of Western Maharashtra **Fertilizer prescription equation** With FYM (20 t/ ha^{-1}): FN=1.21XT-0.32 XSN-0.81 XFYM; FP_2O_5 =0. 93 xT-5.61 xSP-0.75 x FYM; FK_2O = 1.18 xT-0.16 XSK-0. 76 xFYM Without FYM: FN=1.52 XT-0.40 XSN; FP_2O_5 =0.91 xT-5.53xSP; FK_2O =1.32 xT-0.17xSK Where, FN , FP_2O_5&, F K_2O are fertilizer N, P_2O_5&, K_2O in Kg ha^{-1} respectively. T is yield target in q ha^{-1} from 150 to 200 q for potato and SN, SP, & SK are soil available N, P & k in kg ha^{-1}, FYM in t ha^{-1}	34 (52.31)	--	21 (32.31)	--	09 (13.85)	08 (12.31)	--	--

<table>
<tr><td>4.</td><td>The following recommendation are made for control of jassids and white flies on potato; for the control of any above sucking pests on potato take first foliar spray of 240 sc spiromesifen 8 ml per 10 litre of water at 4th week after planting , second foliar spray of 25 WG thiamethoxam 3 gm per 10 lit. of water at the 6th week after planting and third foliar spray of 240 spiromesifen 8 ml per 10 lit. of water at 8th week after planting</td><td>41
(63.08)</td><td>41
(63.08)</td><td>24
(36.92)</td><td>19
(29.23)</td><td>07
(10.77)</td><td>16
(24.62)</td><td>06
(9.68)</td><td>09
(13.85)</td></tr>
<tr><td>5.</td><td>Planting of Rabi potato at 60 X 20 cm spacing on ridges and furrows adopting drip method of irrigation with lateral at 120 cm spacing and 100 per cent ETc water at alternate day is recommended in medium deep soils of Maharashtra for better yield & quality, efficient water use and higher economical returns.</td><td>21
(32.31)</td><td>--</td><td>16
(24.62)</td><td>--</td><td>07
(10.77)</td><td>06
(9.23)</td><td>--</td><td>--</td></tr>
<tr><td>6.</td><td>Application of recommended dose (120:80:120 NPK kg/ha) in water soluble form through drip in 11 weekly splits as per given schedule along with 3 foliar sprays of 2 % urea phosphate at 30, 45 and 60 DAP is recommended for efficient water and nutrient use and higher returns from rabi potato cultivated in medium deep black soils.
Fertilizer schedule
Per cent nutrients to be applied in 11 weekly splits
<table>
<tr><td rowspan="2">Sr. no.</td><td rowspan="2">Days after planting</td><td>N</td><td></td><td>P</td><td></td><td>K</td><td></td></tr>
<tr><td>%</td><td>Kg/ha</td><td>%</td><td>Kg/ha</td><td>%</td><td>Kg/ha</td></tr>
<tr><td>1</td><td>1-21 (3 equal weekly splits)</td><td>15</td><td>18</td><td>20</td><td>16</td><td>15</td><td>18</td></tr>
<tr><td>2</td><td>22-42 (3 equal weekly splits)</td><td>35</td><td>42</td><td>40</td><td>32</td><td>35</td><td>42</td></tr>
</table></td><td>12
(18.46)</td><td>--</td><td>06
(9.23)</td><td>--</td><td>03
(4.62)</td><td>01
(1.53)</td><td>--</td><td>--</td></tr>
</table>

	3	43-63 (3 equal weekly splits)	40	48	20	16	30	36							
	4	64-77/64-82(3 equal weekly splits)	10	12	20	16	20	24							
7.	Water application of 100 % ETc at 3-4 days interval with recommended dose (120:80:120 kg N, P_2O_5 &, K_2O/ ha) in form of water soluble fertilizer through micro sprinkler with 80% overlapping is recommended for optimum tuber yield and return from potato cultivation. The spacing between the nozzles of micro sprinkler there should be decided as per the following equation Radius for throw of micro sprinkler Spacing between nozzles = ---------- 0.80								15 (23.08)	17 (26.15)	07 (10.77)	09 (13.85)	04 (6.15)	02 (3.08)	04 (6.15)	02 (3.08)

Recommendation wise awareness, adoption and opinion of the potato growers

It is evident from Table 4 that just less than half (49.23 per cent) of the respondents were aware about recommendation of cultivar Kufri Surya of which 24.62 percent of them had adopted it. 12.31 per cent were agreed and 10.77 per cent were somewhat agree with the recommendation. 32.30 per cent and 49.23 per cent of the rabi and kharif potato respondents were aware about dipping of potato seed tubers in the suspension of water, acetobacter and azetobacter before planting. 12.31 per cent and 16.92 per cent of them had adopted it, respectively while 10.77 per cent and 12.31 per cent of the rabi and kharif potato respondents were agreed with it. More than half (52.31 per cent) of the respondents were aware about the application of fertilizer as per yield targeted equation of which 32.31 per cent had adopted it and 13.85 per cent were agreed with it.

Equal per cent (63.08 per cent) of both rabi and kharif potato respondents were aware about the recommendation made for control of jassids and white flies. 36.92 per cent and 29.23 per cent of them had adopted it while 10.77 per cent and 9.68 per cent were agreed with it, respectively. 32.31 per cent and 24.62 per cent of the respondents had awareness and adoption for planting of rabi potato under drip while 10.77 per cent and 9.23 per cent were agreed and somewhat agreed with it. 18.46 per cent of the respondents had awareness about application of recommended dose through drip and 9.23 per cent of them had adopted it. 23.08 per cent and 26.15 per cent of the rabi and kharif onion respondents were aware about water application through micro-sprinkler of which 10.77 per cent and 13.85 per cent had adopted it. Equal per cent (6.15 per cent) of them were agreed with it.

Constraints faced by the respondents in adoption of recommended production technology

Table 5 reveals that more than half (57.69 per cent) of the respondents reported lack of information as the major reason for the non adoption of recommended technology. Two-fifth (40.00 per cent) of the respondents stated the financial problem as their constraint. The other problems reported by the potato respondents were unavailability seed or tuber (24.62 per cent) and supply of seed by the companies (22.31 per cent). Difficulty in understanding of the scientific notions and lack of facilities were the problems faced by the 17.69 per cent and 14.62 per cent of the respondents, respectively. Fear of application of new technology was also reported as the constraint in adoption of recommendation by the 7.69 per cent of the respondents.

Table 5. Constraints faced by potato growers in adoption of recommendations

Sr. No.	Particulars	Potato respondents (130)	
		Number	Percent
1.	Lack of information	75	57.69
2.	Financial problems	52	40.00
3.	Unavailability of seed	32	24.62
4.	Lack of understanding	23	17.69
5.	Supply of seed by companies	29	22.31
6.	Lack of facilities in the vicinity	19	14.62
7.	Fear of application of new technology	10	7.69

Suggestions given by the respondents

Table 6 reveals that equal percent (50.00 per cent) of the respondent suggested that timely information and knowledge of the recommendations should be provided and information should be made available at local level or at their field only. 47.69 per cent and 40.00 per cent of them suggested for availability of planting material in the vicinity and timely availability of inputs, respectively. Other suggestions made by the respondents include financial support (30.00 per cent), less technology cost (20.77 per cent), visit of experts to field (17.69 per cent), service of agri- polyclinics and mobile vans in the vicinity (10.00 per cent) and discussions on new technology in *gramsabha* (7.69 per cent).

Table 6. Suggestions given by respondents

Sr. No.	Particulars	Potato respondents (130)	
		Number	Percent
1.	Timely information and knowledge of recommendations should be provided	65	50.00
2.	Financial support should be given	39	30.00
3.	Availability of recommended seed/planting material in the vicinity	62	47.69
4.	Information should be made available at local level/ in the field	65	50.00
5.	Timely availability of inputs	52	40.00
6.	Technology cost should be less	27	20.77
7.	Visit of experts to farmers' field	23	17.69
8.	Service of agril. polyclinics and mobile vans should be made available in the vicinity	13	10.00
9.	New agril. technology should be discussed in *gramsabha*	10	7.69

CONCLUSION

It is observed that there is less awareness among the potato growers regarding different university recommendations made for potato crop except control of pest and recommended variety. Also the adoption of the recommendations made for potato crop is less. This might be due to more influence and frequent contact of private companies in the potato track. To increase the awareness and adoption it is recommended that State Department of Agriculture shall organize awareness campaign and conduct the result demonstrations on the farms of progressive farmers to improve awareness and adoption of recommendations for potato crop in consultation with agricultural university.

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RESEARCH ARTICLE

Revolutionary Boom in Farming Community of Wardha District by cultivating Oyster Mushroom

Ujwala S. Sirsat[1], Yogita K. Sanap[2], Premalata M. Chandan[3]

College of Forestry, Dr.PanjabraoDeshmukh Krishi Vidyapeeth, Akola[1]
College of Agriculture, Dr.PanjabraoDeshmukh Krishi Vidyapeeth, Akola[2]

[1]ussirsat@gmail.com,[2]yogi.active@gmail.com, and [3]pm.chandan5@gmail.com

ABSTRACT

Oyster mushroom cultivation is a agro based, low cost income generating activity. It enhances the family income as well as the family nutrition. Moreover it is an eco friendly venture as it includes the judicious use of agro waste medium for cultivation. The utilized urea enriched medium is used as compost back in the fields so everything is utilized rather wasted. Inspired by the mushroom production programme on media the farmers ofWardha district were desperate and keen to seek the information about mushroom cultivation and its marketing aspects.

With this broad and earnest vision, Krishi VigyanKendra ,Wardha , Maharashtra imparted skill based trainings to 180 farmers in batches including rural women and rural youths. The training encompassed Oyster Mushroom Production Technology with a perspective to motivate them for homestead cultivation for income generation, to create awareness about its nutritional and medicinal values, to develop entrepreneurial skills without displacement from their original occupation and to orient them with post harvest and processing technology of mushrooms.

Apart from the practical demonstrations, venture visits and interaction with successful entrepreneurs, the KVK also equipped them with the innovative interventions of Dr. PanjabraoDeshmukh Agriculture University, Akola (M.S.) viz; Mixed straw media, the Mini Solar Tunnel Dryer and the standard procedure of mushroom powder. A post evaluation on knowledge gained by participants on mushroom cultivation in training showed a significant increase of 65-100 % . Eventually 27 farmers were motivated to venture into small scale mushroom productionand captured a sustainable heights in the district with an increase in family income by 60-80%.

Key words : Oyster Mushroom, Agro-waste medium, Production technology, Entrepreneurial skill.

INTRODUCTION

Wardha District of Maharashtra state has basically agriculture oriented economy where cotton, soybean, pigeon pea , sorghum, wheat and chickpea are the major crops. However, 85 per cent of the productive farming land ismainly under the small and marginal farmers resorting to average income generated from age old traditional farming practices. Agro based income

generating activity can augment the current scenario of rural community. Mushroom cultivation is considered to provide security to marginal farmers by doubling their income.The educated unemployed rural youth can productively venture into such low cost occupation grown as an indoor crop, by utilizing vertical space and obtaining more productivity per unit area. This is proven by the revolutionary change in the local and retail markets of Wardhadistrict . The markets never before are now seen flourished with fresh oyster mushrooms as well as processed mushrooms and its value added products. A part of this oyster mushroom boom can be attributed to the consistent efforts of KVK in developing such mushroom entrepreneurs.

Krishi Vigyan Kendra, Selsura, Wardhaunder the jurisdiction of Dr. Panjabrao Deshmukh Agricultural University, Akola, Maharashtra had createdawareness on mushroom cultivation among rural people through mass media, which enabled farmers & youthsto contact KVK for training ofmushroom cultivation. Thus, the KVK aimed at facilitating thetrainees on mushroom production technologyand entrepreneurship development. With this broad and earnest vision, Krishi VigyanKendra ,Wardha , Maharashtra imparted skill based trainings to farmers in batches including rural women and rural youths from 2015 to 2018.About, 180 trainees were trained on essential aspects of oyster mushroomcultivation.

Need and objectives

Oyster mushroom cultivation is a agro based, low cost income generating activity. It enhances the family income as well as the family nutrition. Mushroom cultivation is an eco friendly venture as it includes the judicious use of agro waste medium for cultivation. Cultivation of oyster mushroom with agricultural residues, such as rice and wheat straw is a value added process to convert these materials into human food (Pokhrel et al. 2013).

The utilized urea enriched straw medium is used as compost back in the fields as soil conditioner (Sonali D. Randive. 2012). So everything is utilized rather wasted. Mushroom cultivation can directly improve livelihoods through economic, nutritional and medicinal contributions. (VeenaSahi et al. 2018).

Mushrooms are good source of proteins, B-complex vitamins (Niacin, Riboflavin and Thiamine), Vit-C & D, Folate and minerals including potassium ,phosphorous, calcium, magnesium, iron and copper (Qumio J. H. et al. 1990).Mushroom cultivation can help reduce vulnerability to poverty and strengthens livelihoods through the generation of a fast yielding and nutritious source of food and a reliable source of income (Rachna et al., 2013). It is an indoor crop, grown independent without sunlight and do not require fertile land and can be grown on small scale as it does not include any significant capital investment (Chadda and Sharma, 1995).

The training encompassed Oyster Mushroom Production Technology with a perspective to motivate the farmers for homestead cultivation for income generation, to create awareness about its nutritional and medicinal values, to develop entrepreneurial skills without displacement from their original

occupation and to orient them with post harvest and processing technology of mushrooms. With this broad objective, the present study was designed to evaluate the impact of Entrpreneurial trainings on Mushroom cultivation held at Krishi Vigyan Kendra, Selsura,Wardha.

MATERIALS AND METHODS

Statistical Analysis

Socio economic profile of the respondents wasevaluated using simple statistical tool viz.,frequency and percentage.Knowledge test of participants regardingdifferent sub components of mushroomcultivation was evaluated by conducting pre andposttest.

Pre and post evaluationtest was conducted for the participants using20 structured questionnaires. One and zeroscore was assigned for the correct andincorrect responses respectively and themaximum attainable score was 20 and convertedin percentage.Overall knowledge of the respondents wascalculated using Paired t-test.Adoption status, problems faced in mushroomfarming and Economic status of therespondents was evaluated using simplestatistical tool viz., frequency and percentage.

RESULTS AND DISCUSSION

Socio economic profile

Out of 180 participants, a sample of 50trainees actively participated in the trainingwere selected. 41 trainees representeddifferent blocks of Wardha district and 9were from other districts of Maharashtra.

The distribution of respondents based on socioeconomic profile is given in table 1. (n= 50).Training participants were young (62%), medium aged (32%) and 6 % were more than 50 years age. Among them 56% were male and 44% female.64% of them were married.The education level was quite highas majority of the trainees (66%) studiedabove matriculation. Most of the participantswere from rural and agricultural background with joint family. Few (12%) had a gross income of more than Rs1,00,000. (Figures in parenthesis are inpercentage and rounded off to the nearestwhole number.

Table.1 Socio economic profile of the respondents participated in the training (n= 50)

Sr. No.	Characteristic	Frequency	Percentage
1	Age		
	Young (less than 30 years)	31	62
	Medium (31-50 years)	16	32
	Old (more than 50 years)	03	06
2	Sex		
	Male	28	56
	Female	22	44
3	Marital Status		
	Unmarried	18	36
	Married	32	64
4	Education		
	Illiterate and primary	03	06
	Upto Matriculation	14	28
	Above matriculation	33	66
5	Family Type		
	Joint	09	18
	Nuclear	41	92
6	Family background		
	Rural	39	78
	Urban	11	22

Sr. No.	Characteristic	Frequency	Percentage
7	Family Occupation		
	Agriculture	36	72
	Other	14	28
8	Annual Income		
	Low (less than Rs.50,000)	34	78
	Medium (50,000 to 1,00,000)	10	20
	High(above Rs.1,00,000)	06	12
9	Mushroom production experience		
	low	46	84
	Medium	4	8
	High	1	2
10	Mass media participation		
	low	2	4
	medium	7	14
	high	41	82

From table 1, it is inferred that a typicaltrainee was a young, married, educated, lowannual income, from joint family with agriculturaland rural background, having noexperience in mushroom cultivation and werekeen to adopt mushroom cultivation foradditional income.

Formative evaluation

Knowledge gain

Different topics (Praveen Kumar et al., 2018)in the training covering the types ofmushrooms, nutritive aspects of mushrooms,raw materials availability, substratesterilization, cultivation, crop protection,harvesting, post-harvest management,marketing and economics were framed into 20 structured questionnaires to incorporate the pre and post test.

One and zero score wasassigned for the correct and incorrectresponses respectively and the maximumattainable score was 20. Gain in knowledgewas reflected in terms of difference betweennumber of trainees giving correct responsesbefore and after the training programme.

Paired t-test was applied to measure theimpact of training with respect to their overallknowledge level of the trainees.

Table.2. Gain in knowledge after acquiring training with respect to different operations

Sr. No	Pariculars	Pre-evaluation score out of 20	Post evaluation score out of 20	Improvement in knowledge score out of 20
1	Types of mushrooms	4 (20)	19 (95)	15(75)
2	Nutritive value of mushroom	3 (15)	17 (85)	14 (70)
3	Availability of spawn	0 (0)	18 (90)	18(90)
4	Sterilization of substrate.	0 (0)	20 (100)	20(100)
5	Moisture content	22 (10)	18 (90)	16(80)
6	Temperature to be maintained	4 (20)	18 (90)	14(70)
7	Spawning method	2 (10)	19 (95)	17(85)
8	No of holes per bag	0 (0)	20 (100)	20(100)
9	Sterilization of unit	0 (0)	17 (85)	17(85)
10	Mycelium growth	0 (0)	19 (95)	19(95)
11	Fruiting period and stages	0 (0)	19 (95)	19(95)

Sr. No	Pariculars	Pre-evaluation score out of 20	Post evaluation score out of 20	Improvement in knowledge score out of 20
12	Harvesting methodology	3 (15)	18 (90)	15(75)
13	Preservation method	2 (10)	16 (80)	14(70)
14	Pests& Disease management	4 (20)	17 (85)	13(65)
15	Recommended daily intake	4 (20)	17 (85)	13(65)
16	Marketing channels	6 (30)	20 (100)	14(70)
17	Awareness and availability of loan and subsidy from government			0 (0) 19
(95)	19(95)			
18	Income	0 (0)	19 (95)	19(95)
19	BC Ratio	0 (0)	19 (95)	19(95)
20	Value addition to mushrooms	4 (20)	17 (85)	13(65)
	Statistical Analysis			
1	Mean	9.5	91.5	
2	N	20	20	
3	Standard Deviation	9.85	5.87	
4	t value	28.61**		

(% in parenthesis and **significant at p <0.01 with df = 19)

The data in table 2 pertains to pre and posttraining mean knowledge scores of theRespondents with respect to mushroomcultivation practices. The pre training meanknowledge score of various practices rangedfrom 0 to 6 out of 20 and that of post trainingmean knowledge score of various practicesranged from 16 to 20 out of 20. It is evidentthat more number of trainees were able to givecorrect responses on various mushroomcultivation practices after attending thetraining programme.

Overall knowledge gain

From table 2, the arithmetic mean of pretrainingtest was 9.5 and increased to 91.5after training with the variance of 97.11 and34.47 respectively. The t values of differencebetween pre and post training meanknowledge score of all the practices ofmushroom cultivation were significant ($p<0.01$).Post evaluation scores of gain in overallknowledge about various practices indicate65-100 % improvement in their knowledge.

The results showed that, before training,the trainees were less aware with respect totheir knowledge and understanding about themushroom cultivation aspects. But after training, there was significant increase in theknowledge level of trainees. All the traineeshad positive change in the level of knowledge after the training. Gain in knowledge about various mushroom practices was alsoreported by Goelet al., 2013, Singh and Singh(2016).

Impact Evaluation

The Impact Evaluation is summative in nature.Adoption status of thetrainees was considered as the indicator for theimpact evaluation.

Adoption status

Table.3 Adoption of mushroom cultivation by the trainees (n= 50)

Sr. No.	Category	Frequency(n)	Percentage(%)
1	Sustained adopters	27	54
2	Discontinued adopters	13	26
3	Non-adopters	10	20

Table.4 Problem faced in adoption of mushroom cultivation (n=50)

Sr. No.	Problem	Sustained Adopters	Discontinued Adopters	Non-adopters
1	Lack of proper infrastructure	—	—	10(20)
2	Non availability/ poor quality of spawn	10(20)	9(18)	—
3	Non- remunerative	17(34)	4(8)	—

(% written in parenthesis)

Adoption status of mushroom cultivation wasstudied to know the impact of vocationaltraining programme and was measured interms of sustained adopters, discontinued adopters andnon-adopters of mushroom cultivationenterprise.

From the table 4, it is indicated that80 percent – of the trainees had adoptedmushroom farming where as 20 percent didnotadopt. Singh and Singh ,2016 reported highnumber of non-adopters in mushroomcultivation vocational training programme ofKVK. But in this study, the sustained adopters were maximum similar to the report of GurramRanjitha et al. 2018.

Problems inmushroom farming are presented in table 4.It can be observed that various problems facedby mushroom growers were non remuneratiyeprice (42%), non-availability or poor qualityof spawn (38%) lack of proper infrastructure(20%). Jahanet al., 2010 and Singh and Singh2014 also reported the problems of nonavailabilityor poor quality of spawn and lackof assured marketing.

Economic benefits

Table.5 Income of mushroom cultivation enterprise in proportion to family income (n=27)

Sr. No.	Increase in Household income (%)	Frequency (n)	Percentage (%)
1	05-10	2	7
2	10-25	2	7
3	25-40	3	11
4	40-60	8	30
5	60-80	12	45

From the table 5, 45 % of sustained adoptershad increased their family income by 60-80% followed by 30% who increased their family income by 40-60%. The impact evaluation results show that the vocational training programmes conducted are augmenting the family income substantially.

The average mean figures of their unit performance during a span of 8 months revealed that the oyster mushroom production was 3.0 tons with a gross income of Rs.1.8 lacs, with due expenditure of Rs. 0.76 lac fetching a net profit of Rs. 1.04 lacs by individual venture.

CONCLUSION

Wardhawas not known formushroom cultivation prior to 2015. The dedicated persuasion of farmers in mushroom production, value addition and marketing skills endowed them with doubling their family income. Further grabbing the buy-back policy of well established mushroom entrepreneurs, exploring the e-market sites of India Mart and Maha Agro ensured them for firm financial decisions. Further local retailing of packaged fresh and dried mushrooms and value added products, also active participation of farmers in district and state level agriculture exhibitionsshowcasing produce strengthened their identity as oyster mushroom entrepreneurs.

Eventually with consistent technical support of Krishi VigyanKendra ,Wardha and active indulgence and cognizance of Agriculture Technology Management Agencies, Superintending District Agriculture Officer for media propagation turned these farmer's fate to fame.

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RESEARCH ARTICLE

Constraints Faced by the Trained Mushroom Growers

Priya J. Rajgolkar[1] and U. D. Jagdale[2]

1. PG student, College of Agriculture, Pune, MS (India) 2. Assistant Professor,

Department of Agril. Extension and Communication, College of Agriculture, Pune, MS (India).

(Corresponding author email :uttamdjagdale@gmail.com)

ABSTRACT

The present study was conducted in Western Maharashtra. Data were collected personally from 60 farmers from 7 districts viz., Pune, Kolhapur, Satara, Sangli, Solapur, Ahemadnagar and Nashikto study the entrepreneurial behaviour of trained mushroom growers.Findings of the association analysis revealed that variables viz. age, education, land holding, size of family, annual income, knowledge, training received and experience in mushroom enterprisewere significantly associated with entrepreneurial behaviour. However, family occupation, sources of information and social participation were non-significantly associated with entrepreneurial behaviour of trained mushroom growers.Major constraints faced by trained mushroom growers viz.,non-availability of proper market channels (96.67 per cent) followed by temperature maintenance problem (91.67 per cent), no supply of loans from banks (88.33 per cent), lack of availability of writing materials (83.33 per cent), short day training and lack of availability of good spawn at nearest place (75.00 per cent). Suggestions obtained from trained mushroom growers like large majority (91.67 per cent) of respondents wanted fixed market, followed by majority (86.67 per cent) of respondents wanted loan facilities through banks, 85.00 per cent respondents wanted proper training programmes, fixed market rate (83.33 per cent), availability of popular literature (80.00 per cent), availability of straw (75.00 per cent), availability of quality spawn (71.67 per cent) and experts guidance (66.67 per cent).

Keyword: Constraints, Suggestions

INTRODUCTION

Mushroom production is important not only from nutritional and medicinal point of view but for export and recycling of agro-based waste. Mushroom cultivation in India is cheap due to diverse agro-climatic condition suitable for growing different mushrooms.In India, three types, namely button, oyster and paddy straw mushroom are extensively cultivated on commercial scale. All India Co-ordinated Project on Mushroom which is run by Mahatma PhuleKrishiVidyapeeth, Rahuri at College of Agriculture, Pune with the objectives to develop production technology of different types of mushroom,to popularize mushroom cultivation and producing training facilities and technical supports in terms of providing

spawn to the farmers. Objectives of the study are to study association between personal, socio-economic and psychological characters and entrepreneurial behaviour of trained mushroom growers and constraints faced by trained mushroom growers and suggestions obtained from them.

METHODOLOGY

The present study was conducted in Western Maharashtra consisted of 7 districts viz.,Pune, Kolhapur, Satara, Sangli, Solapur, Ahemadnagar and Nashik. With the help of All India Co-ordinated Project on Mushroom, detailed information of mushroom growers was collected. Then by adopting randomized method of sampling, 60 growers were selected for the study.

RESULTS AND DISCUSSION

Table 1: Association between profile of respondents and their entrepreneurial behaviour

Sr. No.	Independent variables	Calculated Chi-square value
1	Age	19.48*
2	Education	19.64*
3	Land holding	16.51*
4	Size of family	13.15*
5	Family occupation	3.93^{NS}
6	Annual income	11.60*
7	Sources of Information	3.06^{NS}
8	Social participation	1.54^{NS}
9	Knowledge	11.88*
10	Training received	10.08*
11	Experience in mushroom enterprise	15.41*

* = Significant at 5.00 per cent level

NS = Non- significant

Findings of the association analysis revealed that variables viz. age, education, land holding, size of family, annual income, knowledge, training received and experience in mushroom enterprisewere significantly associated with entrepreneurial behaviour. However, family occupation, sources of information and social participation were non-significantly associated with entrepreneurial behaviour of trained mushroom growers.

1. Constraints faced by trained mushroom growers :

Table 2 : Constraints faced by trained mushroom growers : (N=60)

Sl. No.	Constraints	Respondents	
		Frequency	Percentage
1	Non-availability of proper market channels	58	96.67
2	Temperature maintenance problem	55	91.67
3	No supply of loans from banks	53	88.33
4	Lack of availability of writing materials	50	83.33
5	Lack of availability of good spawn at nearest place	45	75.00
6	Short day training	45	75.00
7	Market is long distance	40	66.67
8	Lack of availability of storage houses	30	50.00
9	Higher rate of spawn	27	45.00
10	Higher rate of packing material	26	43.33
11	Higher rate of labours	25	41.66

12	High transportation charges	25	41.66
13	Lack of availability of skilled labour	22	36.67
14	Lack of availability of proper place	20	33.33
15	Irregular electricity supply	20	33.33
16	Lack of availability of water	15	25.00
17	Higher rate of chemicals	15	25.00

It can be seen that major constraints faced by the mushroom growers were: non-availability of proper market channels (96.67 per cent) followed by temperature maintenance problem (91.67 per cent), no supply of loans from banks (88.33 per cent), lack of availability of writing materials (83.33 per cent), short day training and lack of availability of good spawn at nearest place (75.00 per cent), the long distance of market (66.67 per cent).

Lack of availability of storage houses (50.00 per cent), high rate of spawn (45.00 per cent), higher rate of packing materials (43.33 per cent), high transportation charges and higher rate of labours (41.66 per cent), lack of availability of skilled labour (36.67 per cent), lack of availability of proper place and irregular electricity supply (33.33 per cent), lack of availability of water and higher rate of chemicals (25.00 per cent) were the constraints faced by trained mushroom growers.

3. Suggestions obtained from trained mushroom growers to overcome it :

Table 3: Suggestions obtained from trained mushroom growers to overcome the constraints

(n = 60)

Sl. No.	Statements	Respondents	
		Frequency	Percentage
1	Fixed market should be provided	55	91.67
2	Loan facilities should be extended through banks	52	86.67
3	Training should be given for more periods	51	85.00
4	Market rate should be fixed	50	83.33
5	Popular literature on mushroom should be available	48	80.00
6	Straw should be made available	45	75.00
7	Quality spawn should be made available	43	71.67
8	Experts should visit mushroom production unit for guidance	40	66.67

The suggestions showed that large majority (91.67 per cent) of respondents wanted fixed market. The majority (86.67 per cent) of respondents wanted loan facilities through banks, 85.00 per cent respondents wanted proper training programmes, fixed market rate (83.33 per cent), availability of popular literature (80.00 per cent), availability of straw (75.00 per cent), availability of quality spawn (71.67 per cent) and experts guidance (66.67 per cent).

CONCLUSION

1. The study revealed that a very few of the mushroom growers had received credits facilities through banks. Therefore, it is

suggested that various financial institutes and banks like NABARD, co-operative societies, etc. should provide adequate loan facilities to the mushroom growers. Extension agencies should arrange to provide subsidy facilities to the mushroom growers for mushroom production.

2. The study noticed that mushroom growers had reported and complained about low market rate for mushroom. It is, therefore, suggested that marketing federation should fix market price of mushroom based on its quality and should purchase it from producers at reasonable rates.

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RESEARCH ARTICLE

Constraints Experienced by the Soybean Growers in Adoption of Soyaben Production Technology in Maharashtra

S. K. Deshmukh[1] and G. Tamilselvi[2]

1. SMS (Agricultural Extension), KVK, Karda, Washim District, Maharashtra,
2. Professor, Agricultural Extension, Annamalai University, Annamalainagar, Tamilnadu.

Sudhir Keshavrao Deshmukh sms.skdeshmukh@gmail.com

ABSTRACT

The study was conducted in ten selected villages of Washim District of Maharashtra to study the constraints experienced by soybean growers in adoption of improved soybean production technologies.. A sample size comprised of 150 trainees and 150 non-trainees from the KVK operated villages. The results of the study revealed that the major situational and economic constraints experienced by both the trainee and non-trainee farmers were labour scarcity, high cost of inputs, non-availability of good quality seeds, failure of seasonal rainfall, severe pest and disease attack, inadequate credit facilities, high cost of labour, high cost of insecticide and higher rent for threshing machine. The technological constraints were faced by majority of the non-trainee farmers, whereas the same were faced by only a lesser proportion of the trainee farmers. As the trainees have undergone training on technological aspects on soybean production, they might have not experienced these constraints.

Keywords : Constraints, Adoption, Technologies and Soybean growers

INTRODUCTION

Soybean (Glycine max L. Merril) is the world's most important seed legume, which contributes to 25% of the global edible oil and about two-thirds of the world's protein concentrate for livestock feeding. In India, Soybean is cultivated in an area of 11.00 million ha and the production of 9.30 million tonnes with a productivity of 8.65 q / ha under rainfed crop system in Madhya Pradesh, Rajasthan, Karnataka, Chattisgarh and Telengana. There persist wide variation in the productivity ranging from 7.80 q / ha in Rajasthan to 11.25 q/ ha in Maharashtra primarily due to farm level inefficiencies. In Maharashtra, soybean is cultivated in an area of 3.73 million ha with production of 3.94 million tonnes and productivity of 11.25 q / ha with second rank in India (SOPA Databank, 2019). However, low productivity of the crop remains a major problem in soybean cultivation. This may be due to various technological, situational and economic constraints experienced by the soybean growers. Hence, the present study was attempted to study the constraints faced by the farmers in soybean cultivation.

Presently soybean is contributing 42 per cent share of total oil seed and 22 per cent to total oil production in the country. With increase in population the demand of edible

oil is increasing and 40% of the demand is being fulfilled by different oil seed crops and rest 60% demand is being made up by import. The cost of import of edible oil put a high pressure on our foreign exchange. Among all the oil seed crops, soybean is having the highest potential to meet the challenge of being self sufficient in production of edible oil. The national productivity of soybean (~1 ton/ha) is quite lower than the world average (2.76 ton/ha). Soybean is an introduced crop and very sensitive to photoperiod and temperature. Impact of climatic adversities in recent past had a severe impact to harvest soybean to its full potential even though improved and high yielding varieties are mostly grown in major soybean growing areas. Source : https:// iisrindore.icar.gov.in

METHODOLOGY

The study was conducted in Washim district of Maharastra state during 2018-19. A list of farmers attended training on improved soybean cultivation practices was obtained from KVK, Karda. Out of six taluks of Washim district, three taluks namely, Risod, Washim and Malegaon were selected as these taluks had highest number of trainees. Six villages from Risod, two villages from Washim and two villages from Malegaon were selected based on the availability of maximum number of trainees. The selected villages were Bhapur, Tandalwadi, Belkhed, Gobhani, Warud Tofa and Karda from Risod taluk, Shelgaon bagade and Tiwali from Malegaon taluk, Hiwara rohila and Sawargaon jire from Washim taluk. A sample size of 150 trainee farmers and 150 non-trainee farmers were selected from all these ten villages by following the proportionate random sampling technique. Thus a total of 300 farmers were selected for the study.

The trainee and non-trainee farmers were asked to reveal the various constraints faced by them in adoption of improved soybean production technology. The data were collected with the help of pre- tested and structured interview schedule by personal interview method. Percentage analysis was worked out to interpret the results.

RESULTS AND DISCUSSION

The results on constraints experienced by the farmers in adoption of recommended soybean cultivation practices are presented in following tables.

TECHNOLOGICAL CONSTRAINTS

Table 1: Technological constraints experienced by the farmers in adoption of soybean production technology

Sr. No.	constraints	Trainees (n=150)		Non-trainees (n=150)	
		Numbers	Per cent	Numbers	Per cent
1.	Inadequate knowledge on chemical and bio-fertilizer seed treatment	16	10.67	101	67.33
2.	Inadequate knowledge on herbicide	21	14.00	109	72.67
3.	Inadequate knowledge on pest and disease management	26	17.33	114	76.00
4.	Inadequate knowledge on manuring	17	11.33	98	65.33

Table 1 reveals that the technological constraints namely, 'inadequate knowledge on chemical and bio-fertilizer seed treatment' (67.33per cent), the finding is nearly similar with S. Medhi et.al.(2020) and N. R Medat et.al,(2016); 'inadequate knowledge on herbicide' (72.67 per cent), 'inadequate knowledge on pest and disease management' (76.00 per cent) The study similar with S.A. Jaybhay (2018) and 'inadequate knowledge on manuring' (65.33 per cent) were experienced by majority of the non-trainee farmers. Whereas, only a smaller proportion of the trainee farmers experienced the technological constraints. As the trainee farmers have undergone training on soybean production technologies, they might have acquired required knowledge on the technological aspects of soybean cultivation. This in turn would have enabled them to get rid of these constraints. On the contrary, as the non-trainee farmers have not undergone training on soybean cultivation, they would have not acquired adequate knowledge on these aspects and hence would have experienced these constraints. Similar findings were also reported by Singh et.al., (2012).

SITUATIONAL CONSTRAINTS

Table 2: Situational constraints experienced by the farmers in adoption of soybean production technology

Sr. No.	constraints	Trainees (n=150)		Non-trainees (n=150)	
		Numbers	Per cent	Numbers	Per cent
1.	Labor scarcity	124	82.67	138	92.00
2.	Non-availability of good quality seeds	116	77.33	132	88.00
3.	Non-availability of FYM	98	65.33	84	56.00
4.	Failure of seasonal rainfall	134	89.33	139	92.67
5.	Severe pest and disease attack	87	58.00	119	79.33

Table 2 shows that both the trainee and non-trainee farmers experienced the situational constraints namely 'labour scarcity' (92.00 per cent), 'non-availability of good quality seeds' (88.00 per cent), the finding is nearly similar with S. Medhi et.al.(2020) and N. R Medat et.al,(2016), 'non-availability of FYM' (65.33 per cent), the finding is similar with B U Dupare (2019) 'failure of seasonal rainfall' (92.67 per cent) and 'severe pest and disease attack' (79.33 per cent).

More than ninety per cent of the respondents expressed 'labour scarcity' (92.00 per cent) as their constraints. Soybean cultivation requires more number of labourers from sowing to harvesting operations. Many of the agricultural labourers were demanding higher wages irrespective of the nature of the work. Also, all of them would prefer to go for 100 days employment scheme implemented by the Government as they could get higher wages with minimum work. Hence labour scarcity arose as the major problem. This might have enabled majority of the respondents to report this as an important constraint.

Failure of seasonal rainfall' was expressed as a constraint by majority of the respondents (92.67 per cent). The farmers revealed that they depend mostly on seasonal rainfall for irrigation. But, for the past several years, the rainfall fails on the season and hence led to unassured irrigation. This in turn would have resulted in poor yield. This might be the possible reason for the reported constraint.

Non-availability of good quality of seeds was the constraint faced by 88.00 per cent of the respondents. Good quality seeds are must for getting high yield in crop cultivation. Most of the respondents are using the seeds harvested from their own field of sowing in the next season. Sometimes, the seeds are infected with fungus due to improper storage facilities. When these seeds are used for sowing that would result in poor germination, this might have enabled them to express the above mentioned constraint.

'Severe pest and disease attack' was the constraint experienced by 79.33 per cent of the respondents. Soybean crop is affected by pests like girdle beetle, pod borer and stem fly and diseases like yellow mosaic virus and root rot. The pest and disease infestation causes severe yield reduction in soybean and hence the farmers might have reported this constraint.

The constraint experienced by 65.33 per cent of the respondents was 'Non-availability of FYM'. Basal application of FYM was the practice adopted by all the farmers to ensure soil fertility and virulent crop growth. Nowadays, the cattle population in the villages has been drastically reduced due to many reasons and hence led to unavailability of FYM. So, the farmers could not get adequate quantity of FYM for application in their soybean fields.

ECONOMIC CONSTRAINTS

Table 3. Economic constraints experienced by the farmers in adoption of soybean production technology

Sr. No.	constraints	Trainees (n=150)		Non-trainees (n=150)	
		Numbers	Per cent	Numbers	Per cent
1.	High cost of inputs	121	80.67	138	92.00
2.	Inadequate credit facilities	101	67.33	124	82.67
3.	High cost of labor	136	90.676	139	92.67
4.	High cost of insecticide	92	61.33	128	85.33
5.	Higher rent for threshing machine	131	87.33	129	86.00

Table 3 shows that economic constraints namely, 'high cost of inputs' (92.00 per cent), the finding is similar with B U Dupare (2019) and SK Jamanal (2017) 'inadequate credit facilities' (82.67 per cent), 'high cost of labour' (92.67 per cent), 'high

cost of insecticide' (85.33 per cent) the finding is nearly similar with N. R Medat et.al,(2016) and 'higher rent for threshing machine' (86.00 per cent) were experienced by both the trainee and non-trainee farmers.

The important constraint expressed by majority of the respondents (92.00 per cent) was 'high cost of inputs'. This may be due to the increasing cost of inputs viz., seeds, fertilizers and pesticides etc., year by year. Whereas, the price of produce has not increased proportionality every year. Most of the respondents do not have adequate savings for purchase of inputs required for cultivation. They always depend upon private input dealers/commission agents and money lenders for financial assistance. By using this situation, these agencies exploit the farmers by selling inputs at high cost. This may be the reason for above reported constraints by the respondents.

High cost of labour was the another major constraint faced by majority of the farmers (92.67 per cent).The study similar with S.A. Jaybhay (2018) The farmers revealed that they had to pay more wages for the labourers irrespective of the work done due to scarcity of labour during crucial stages of cultural operations.

'Inadequate credit facilities' was the constraint expressed by 82.67 per cent of the respondents. The farmers could not avail of the credit facilities from banks because of its tedious and time consuming procedure. They could not borrow money from non-institutional sources because of higher interest rates.

High cost of insecticide was the constraint revealed by 85.33 per cent of the farmers. As the crop is infested by pests like girdle beetle, stem fly and pod borer and hence the farmers had to apply insecticides to control them. But the cost of plant protection chemicals are too high and hence the farmers could not afford the cost as revealed by them.

Majority of the farmers (87.33 per cent) expressed 'higher rent for threshing machine' as the constraint. The farmers could not hire threshing machines during peak harvest seasons and also had to pay higher rents for the machines they hired. This leads to increased production cost and resulted in poor net profit to the farmers. Similar findings were also reported by Deshmukh and Deshmukh (2013).

CONCLUSION

The results of the study revealed that the major situational and economic constraints experienced by both the trainee and non-trainee farmers were labour scarcity, high cost of inputs, non-availability of good quality seeds, failure of seasonal rainfall, severe pest and disease attack, inadequate credit facilities, high cost of labour, high cost of insecticide and higher rent for threshing machine. The technological constraints were faced by majority of the non-trainee farmers, whereas the same were faced by only a lesser proportion of the trainee farmers. As the trainees have undergone training on technological aspects on soybean production, they might have not experienced these constraints. The scientists from

agricultural universities, extension officials of KVK, extension workers from State Department of Agriculture and other officials concerned may have to take necessary efforts to help the farmers to overcome these constraints. The KVK may organise training programs on soybean production technology to all the farmers in the entire district so as to get rid of technological constraints.

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MAHARASHTRA SOCIETY OF EXTENSION EDUCATION

Regd. No. MAH -341982 (Nagpur)

C/O, Head, Department of Extension Education,

Dr. PDKV, Akola - 444 104 (M.S.), India

Email – ajeepune@gmail.com, Website : www.ajeeakola.in

EXECUTIVE BODY