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Knowledge, Adoption and Managerial Perspectives of Banana Growing Communities in Durg, Chhattisgarh, India

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ABSTRACT An investigation was carried out in two selected blocks (Dhamdha and Berla) of Durg district to assess the knowledge, adoption and management practices performed by banana growers. The study comprised of 150 respondents who were randomly selected and interviewed through well-structured questionnaires. The findings revealed that majority (70%) of the farmers had medium level of overall knowledge regarding recommended banana production technologies. In context of practice-wise knowledge it was found that most of the farmers had low knowledge level and majority (70%) of respondents had medium adoption of recommended technologies. High level of adoption was reported for practices like propagation method (82.67%), cutting-pruning and stacking (64.67%), irrigation management (59.33%) and selection of varieties (57.33%). Extension personnel and agriculture scientist might have enhanced production of banana through regular visit, training and guidance to farmers.

INTRODUCTION

In India, Horticulture contributes 29.65 percent to gross domestic products (GDP) from 13.5 percent area out of the 18.5 percent contribution from Indian agriculture to GDP and has proved beyond doubt its potentiality for gainful diversification (Sujatha et al. 2012). Economic gains are progressively becoming knowledge based activities and are getting globalized faster which can be achieved through adopting advanced technologies (Kakodkar 2017). One of the significant developments is that horticulture has moved from rural confine to commercial production, and this changing scenario has given a boost to the horticulture industry. Cultivation and utilization of horticultural crops play a key role in raising prosperity of India and is linked with the health and happiness of its people (IIHR 2014). Bananas play important role in socio-economic and cultural life of rural community in addition to its economic value, nutritional value and the diverse uses of the fruits (Hapsari 2011; Hapsari et al. 2015, 2017). Several initiatives taken by the government and other stakeholders also have made a great impact on the development of horticulture in terms of increased production, productivity and also availability of horticultural crops. The Department of Agriculture, Cooperation and Farmers Welfare (DAC and FW) of the Ministry of Agriculture and Farmers Welfare (MoA and FW) is the nodal department for overviewing horticulture development in the country. It implements different programmes through the Departments of Horticulture in all the states and provides the leadership to coordinate activities for the promotion of horticulture (Ministry of Agriculture and Farmers Welfare, Government of India 2016).

Many horticulture programmes as in operation and significant developments in produce/products and exports have taken place. National Horticulture Mission has created awareness across India, which has provided an insight into horticulture-led transformation. National Horticulture Board continues to play a significant role in developing post-harvest infrastructure and promoting commercial horticulture in the country. Under the National Horticulture Mission, banana production technology is being disseminated in Durg district of Chhattisgarh state, especially in Dhamdha, Berla, Patan and Durg blocks. As per the Horticulture Department, 858 ha are targeted for banana planting. Already, 150 ha area of banana planting has been covered in Saja, Dhamdha, Durg and Patan block of Durg district. This scheme is running progressively in Durg district. The fruit growers of Chhattis-

garh are taking keen interest in banana farming using tissue cultured banana. Tissue culture banana technology has shown that while increase in yields especially on small-scale farms has been substantial, adoption rates are still low (Muyanga 2009). In the new practices and technology developed by scientific organization, it has been observed that either the same has not extended among the farming community or unwillingness of the farmers to adopt this technology (Waman et al. 2006). In Chhattisgarh state, the yield of banana crop is not upto the recommended level, the low level of yield is reflected due to the delay in adoption in banana cultivation (Poonam and Sarkar 2015). In the light of this, the researcher was motivated to assess the knowledge and adoption of recommended banana cultivation technologies among banana farming community of Durg district of Chhattisgarh state.

METHODOLOGY

The study was carried out in the Durg district of Chhattisgarh. In Chhattisgarh, Durg district is situated in the south-western part of the plain region of the state and characterised by hilly belts towards south followed by south-west and north-west which is represented by rich forest and mineral resources. Among the 12 blocks of Durg district, 2 blocks, that is, Dhamdha and Berla were selected purposively, because the maximum numbers of farmers of these blocks are involved in banana cultivation. A list of villages where maximum banana growers are residing was obtained from the horticulture department officials and five villages were randomly selected from each block (from the list of villages). Thus, total 10 villages (Ahiwara, Banburad, Bagdumar, Nandani, Aheri, Sodh, Patharpunj, Silghat, Devri, Matia) were selected for the study.

A list of banana growers of the selected 10 villages was obtained from RHEO/ADO (Hort) and 15 banana growers were randomly selected (from the given list) from each selected village. Thus, total 150 banana (15 x 10) growers were considered as respondents for this study. The dependent variable adoption behaviour of banana growers towards recommended banana production technologies was operationalized as the degree of use of recommended practices which was released by Indira Gandhi Krishi Vishwavidyalaya, Raipur. Totally 18 questions were finalized. English and English (1950) defined knowledge as a body of understood information by an individual or by a culture. In the present study, awareness knowledge was studied and the study was confined, to the technical information possessed by the respondents about recommended banana production technology. Based on thorough review of literature and discussion with experts, 13 independent variables were identified for inclusion in the study. These independent variables represented socio-personal, socio-economic, socio-psychological, communicational, technological variables (Fig. 1). The data were collected with a well-structured and pretested interview schedule. Thus, the data collected in various aspects were compiled and analysed.

RESULTS AND DISCUSSION

Wide variations were seen in the pre-hypothetical framework and post observation of the study due to differentiation in qualitative and quantitative attributes of the banana growing communities in the concerned study sites (Figs. 1 and 2).

Level of Knowledge of the Banana Growing Communities

The data presented in Table 1 indicate that majority (70.67%) of the respondents had medium level of knowledge regarding recommended banana production technologies, whereas eighteen percent and 11.33 percent of the respondents had low and high level of knowledge, respectively. Adequate knowledge of any improved practice is a pre-requisite for its adoption. Research studies established that knowledge of an innovation would lead to its eventual adoption. The results expressed by the respondents regarding knowledge about recommended banana production technologies was at medium

Table 1: Distribution of respondents according to overall level of knowledge regarding recommended banana production technologies (n=150)

Knowledge level	*Frequency*	*Percentage*
Low (upto 34 score)	27	18.00
Medium (35-43 score)	106	70.67
High (above 43 score)	17	11.33
Total	150	100.00
$\bar{X}$= 38.04 S.D=4.85		

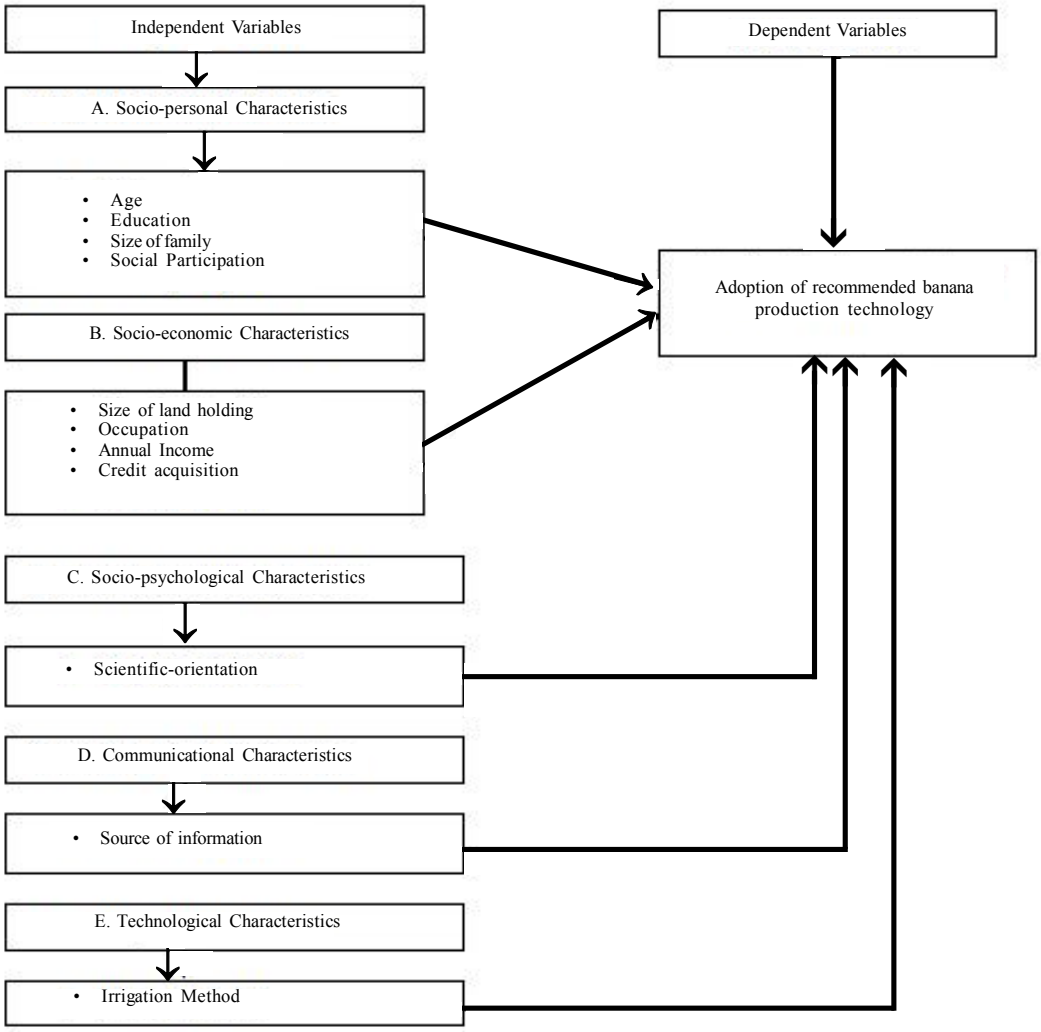

Fig. 1. Conceptual model of study
Source: Author

and low level to a greater extent. The reasons for the above results could be the better level of formal education of the respondents. It was found that more than one-third (38%) of the respondents were educated upto higher secondary level and 28.67 percent were educated upto high school level. Sixty-two percent belonged to middle age group which indirectly helps in experience gain. Utilization of mass media, participation in extension activities and contact with extension agency might have contributed to knowledge level of the respondents. These findings were well supported by earlier reports on adoption of scientific banana farming which have reflected that information and knowledge are key determinants towards adoption (Aitchedji et al. 2010; Katungi and Akankwasa 2010; Kabunga et al. 2011). The information and knowledge in this aspect can be obtained both from formal and informal sources. The social institutions/organizations facilitate key platform and opportunities for learning, sharing the information, knowledge to interact and were found to promote the adoption level of scientific banana

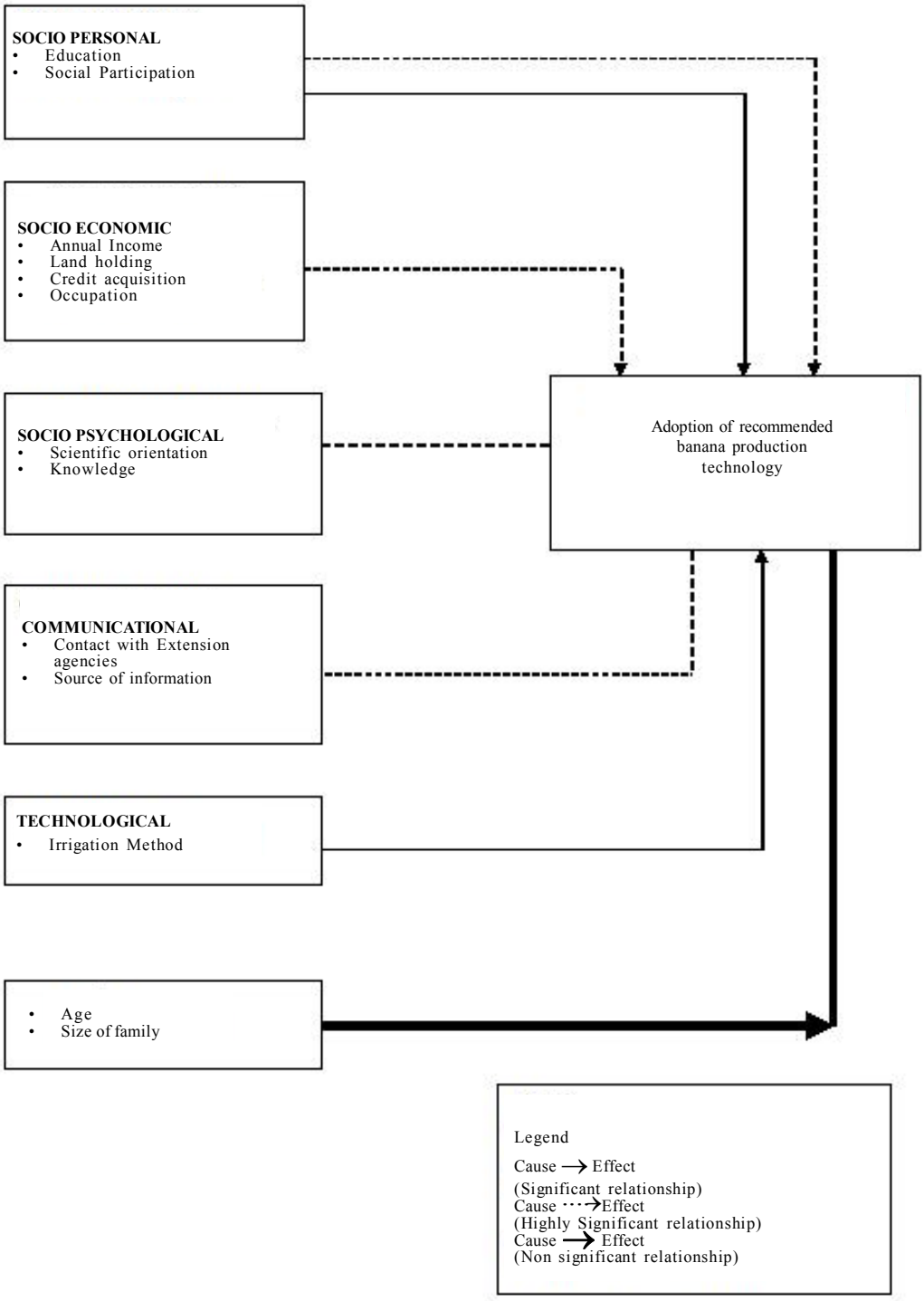

Fig. 2. Empirical model of the study
Source: Author

farming (Katungi 2007; Aitchedji et al. 2010; Katungi and Akankwasa 2010). As per Dzomeku et al. (2010), most of the community based organizations were significantly generate externalities by dissemination of scientific information and knowledge. The technological perceptions of farmers determined and influenced the decision level towards adoption (Katungi 2007; Dzomeku et al. 2010).

The findings were in conformity with the finding of Farooq (1994) that majority of the farmers (52.80%) had possessed medium level of knowledge followed by 33.6 percent and 13.6 percent having high and low level of knowledge about banana cultivation practices. He also found that twenty-six percent of the banana growers had formal education upto high school level and majority of respondents belonged to old age group with long farming experience. Waman et al. (2006) noticed that majority (90%) of banana farming community had high knowledge while only small fraction (10%) of sampled farmers had average knowledge regarding scientific banana production. It also concluded that higher the education and more extension contact, more would be the knowledge about banana production technology. The knowledge level of banana growers recorded positive relationship with age, education, family size, land holding, annual income, farming experience and experience of banana cultivation (Badgujar and Borole 2015).

Practice-wise Knowledge Level

The data presented in Table 2 reveals that the respondents had high level of knowledge regarding selected practices of banana production technologies like propagation method (79.33%), cutting-pruning and stacking (64.67%), irrigation management (59.33%), selection of varieties (57.33%), selection of land (56%), preparation of land (48.67%), source of planting material (30.67%), drainage management and time of harvesting (24.67%), identification of insect and their control and planting method (19.33%), yield (q/ha) (16%), application of manure at the time of field preparation (13.33%), fertilizer application (12.66%), manure application (10.66%), identification of diseases and their control (6%). None of respondents had high level of knowledge about storage of banana.

Practice-wise knowledge were very imperative to boost up the production and productivity of crops which fetches higher economic gain to the growers. However, in the concerned sites most of the respondents have some specific knowledge of selected practices during the various phase of the crop growth and development. These findings showed that more intensive efforts are required from the government agencies, co-operative societies, extension workers and scientists to make joint venture efforts re-

Table 2: Distribution of respondents according to their practice-wise knowledge level as recommended banana production technologies

Recommended bananaproduction technologies	*Knowledge level*		
	Low f (%)	*Medium f (%)*	*High f (%)*
Selection of land	8 (5.33)	58 (38.67)	84 (56.00)
Land preparation	22 (14.67)	55 (36.66)	73 (48.67)
Use of manure at the time of field preparation	93 (62.00)	37 (24.67)	20 (13.33)
Selection of varieties	14 (9.33)	50 (33.33)	86 (57.34)
Propagation method	7 (4.67)	24 (16.00)	119 (79.33)
Source of planting material	26 (17.33)	78 (52.00)	46 (30.67)
Planting method	18 (12.00)	103 (68.67)	29 (19.33)
Manure application	52 (34.67)	82 (54.67)	16 (10.66)
Fertilizer application	58 (38.67)	73 (48.67)	19 (12.66)
Irrigation management	13 (8.67)	48 (32.00)	89 (59.33)
Drainage management	41 (27.33)	72 (48.00)	37 (24.67)
Cutting-pruning and stacking	5 (3.33)	48 (32.00)	97 (64.67)
Identification of insects and their control	54 (36.00)	67 (44.67)	29 (19.33)
Identification of diseases and their control	78 (52.00)	63 (42.00)	9 (6.00)
Time of harvesting	27 (18.00)	86 (57.33)	37 (24.67)
Yield (q/ha)	32 (21.33)	94 (62.67)	24 (16.00)
Storage	138 (92.00)	12 (8.00)	00 (0.00)

f- Frequency; (%) - Percent

garding storage, usage of banana, use of manure at the time of field preparation, identification of diseases and their control etc.

Scale of Adoption among the Community

It is very implicit from the data displayed in Table 3 that high level of adoption by the banana growers was reported in practices like propagation method (82.67%), cutting-pruning and stacking (62%), irrigation management (58%), selection of varieties (56.67%), selection of land (46.67%) preparation of land (36%), source of planting material (30.67%), time of harvesting (22%), drainage management (16.67%), identification of insect and their control (15.33%), planting method (12.67%), yield (q/ha) (12%), application of manure at the time of field preparation (11.33%), fertilizer application (10.67%), manure application (9.33%), identification of diseases and their control (4%). None of respondents had high adoption of storage and usage of banana. This might be due to easy availability of inputs and better socio-economic status as well as adequate knowledge about these particular practices. Extension personnel and agriculture scientist might have enhanced this through regular visit, training and guidance.

In case of medium level of adoption category it was found that majority of the respondents (78%) had adopted planting method up to medium extent followed by yield (q/ha) (60%), time of harvesting (56.67%), source of planting material (54.67%), drainage management (51.33%), selection of land and manure use (48%), fertilizer use (47.33%), preparation of land (46%), identification of insect and their control (44%), identification of diseases and their control (40%), selection of varieties (35.33%), cutting-pruning and stacking (34.67%), irrigation management (31.33%), use of manure at the time of field preparation (23.33%), propagation method (14%), respectively, and none of the respondents had medium level adoption of storage and usages of banana. The probable reasons for medium level of adoption may be lack of detailed and in-depth knowledge about banana production technology. The lack of knowledge might have resulted in lack of interest and conviction. There is a need to modify the attitude of the respondents through proper guidance, persuasion and conducting skill oriented demonstrations on different aspects of banana production technology on farmer's field to show their effectiveness in fruit production to the farmers.

From the data presented in Table 4 it is revealed that out of the total respondents' majori-

Table 3: Distribution of respondents according to their practice-wise extent of adoption of recommended banana production technologies (n=150)

Recommended banana production technologies	*Extent of adoption*		
	Low *f (%)*	*Medium* *f (%)*	*High* *f (%)*
Selection of land	8 (5.33)	72 (48.00)	70 (46.67)
Preparation of land	27 (18.00)	69 (46.00)	54 (36.00)
Use of manure at the time of field preparation	98 (65.33)	35 (23.33)	17 (11.34)
Selection of varieties	12 (8.00)	53 (35.33)	85 (56.67)
Propagation method	5 (3.33)	21 (14.00)	124 (82.67)
Source of planting material	22 (14.66)	82 (54.67)	46 (30.67)
Planting method	14 (9.33)	117 (78.00)	19 (12.67)
Manure application	64 (42.67)	72 (48.00)	14 (9.33)
Fertilizer application	63 (42.00)	71 (47.33)	16 (10.67)
Irrigation management	16 (10.67)	47 (31.33)	87 (58.00)
Drainage management	48 (32.00)	77 (51.33)	25 (16.67)
Cutting-pruning and stacking	5 (3.33)	52 (34.67)	93 (62.00)
Identification of insect and their control	61 (40.67)	66 (44.00)	23 (15.33)
Identification of diseases and their control	84 (56.00)	60 (40.00)	6 (4.00)
Time of harvesting	32 (21.33)	85 (56.67)	33 (22.00)
Yield (q/ha)	42 (28.00)	90 (60.00)	18 (12.00)
Storage	150 (100.00)	00 (0.00)	00 (0.00)

f- Frequency; (%) - Percent

ty (70%) of them had average adoption level towards scientific banana cultivation whereas sixteen percent and fourteen percent of them had low and high levels of adoption, respectively. Medium to high adoption may be due to the fact that the respondents were educated, possessed large land holdings, belonged to higher income group, had better utilization of information sources such as friends, agricultural magazines, progressive farmers, newspaper, T.V, etc., used drip irrigation method for banana production and had better orientation towards scientific technologies. Kabunga et al. (2012a, 2012b) analyzed the adoption of tissue culture (TC) bananas, which is a relatively knowledge-intensive technology. Although many farmers are aware of TC, they lacked the skill in adopting it successfully. As a result, the adoption rates remain relatively low.

Table 4: Distribution of respondents according to overall extent of adoption of recommended banana production technologies

Extent of adoption	*Frequency*	*Percentage*
Low (upto 31 score)	24	16.00
Medium (32-40 score)	105	70.00
High (above 40 score)	21	14.00
Total	150	100.00
X= 35.79 S.D=4.34		

Low level of adoption by banana growers regarding selected practices of recommended banana production technology were storage and usage of banana (100%), use of manure at the time of field preparation (65.33%), identification of diseases and their control (56%), manure use (42.67%), fertilizer use (42%), identification of insect and their control (40.67%), drainage management (32%), yield (q/ha) (28%), time of harvesting (21.33%), preparation of land (18%), source of planting material (14.66%), irrigation management (10.67%), planting method (9.33%), selection of varieties (8%), selection of land (5.33%), propagation method and cutting-pruning and stacking (3.33%). These findings showed that more intensive efforts are required from the government agencies, co-operative societies, extension workers and scientists to make joint venture efforts regarding storage, usage of banana, use of manure at the time of field preparation, identification of diseases and their control etc.

Similar result was reported by Bennur et al. (2015) in study of adoption of banana farming practices and constraints of growers in Gulbarga district of Karnataka that is, most of the farmers (45.83%) belonged to medium level of adoption followed by 33.33 and 20.83 percent belonging to low and high level of adoption category respectively. The adoption decisions are influenced by the availability of labour, technology package, site conditions along with banana farming system. The level and intensity of adaptation of new technology should be compatible with socio-economic conditions and social needs (Kakodkar 2017) which can enhanced through participatory approach which comprised of research and development and indigenous knowledge (Hapsari 2011; Jogo et al. 2013; Hapsari et al. 2015, 2017).

Managerial Perspectives Related to Scientific Banana Cultivation

The findings depicted in Table 5 reveals that the variables social participation and irrigation method were found positively and significantly related with adoption at 0.05 percent level of significance. The significant relationship shows that when the level of the above variables viz., social participation and irrigation method increases then the level of adoption towards scientific banana cultivation will increase. However, the variables such as capital, education, social participation and other attributes of infor-

Table 5: Correlation analysis of independent variables with adoption of recommended banana production technology

Independent variables	*Coefficient of correlation "r" value*
Age	NS
Education	0.8475**
Size of family	NS
Social participation	0.1837*
Land holding	0.5428**
Occupation	-0.3590**
Annual income	0.6662**
Credit acquisition	0.5596**
Contact with extension agencies	0.6176**
Source of information	0.3291**
Scientific orientation	0.6213**
Irrigation method	0.2015*
Knowledge	0.9585**

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

mation were found positively and significantly correlated with adoption ($p<0.01$). Previous reports on adoption of banana production technologies reflected that adoption decisions by respondents depend on farmer's economic status, technological attributes, organisational attributes in addition to approach of information dissemination (Aitchedji et al. 2010; Katungi and Akankwasa 2010; Kabunga et al. 2011). Occupation has significant negative correlation towards scientific adoption of banana cultivation ($p<0.01$) while age and size of family were found to have non-significant relationship with adoption. The above results showed that when the socio-economic status, social participation, knowledge and information sources, etc. of banana growers increases then the scale of adoption towards scientific banana farming practices with technological intervention of the respondents correspondingly increase. Furthermore, when farming community are involved in more occupational activity then the rate of adoption correspondingly decreases.

On analyzing the data it was found that overall level of knowledge regarding recommended banana production technology, it was found that around eighty-eight percent respondents had medium to low level of adoption towards scientific banana cultivation. Therefore, there is ample scope for the extension personnel to make extra effort in this field by means of extension method like farmer's trainings, field visits, result and method demonstration, farmer's day, farmers fair, exhibition etc. which will help the banana growers in enhancing their knowledge regarding recommended banana production technology. Education influences the capacity of a farmer to acquire and synthesize information and knowledge about the problem and technologies which is critical for technology adoption (Katungi 2007). Similarly, Aitchedji et al. (2010) and Kabunga et al. (2011) have reported that cultivation experience positively determines the adoption level by respondents towards scientific banana farming technologies.

The findings of the study indicated that majority of the banana growers were in medium range category in respect of their adoption of scientific banana production. Therefore, it is suggested that there is an urgent need to increase the adoption of scientific banana cultivation, by proper utilization of sources of information and extension contacts. Exhibition, *kisan mela* and training programme should be conducted in different aspects of banana production technology by the concerned agencies. From the results of correlation and multiple regression analysis it can be concluded that if the level of knowledge of banana growers regarding recommended banana production technology is expanded, the extent of adoption will also increase. Waman et al. (2006) also said that higher education level of respondents leads towards high social participation which enhances the knowledge and adoption level of scientific practices of banana cultivation. It is needful to improve their education and knowledge level through providing education and training, skill, demonstrations, fieldtrips and proper technical guidance. The skill demonstrations on use of various practices of banana crop may therefore be helpful in increasing the adoption towards scientific practices of banana cultivation.

CONCLUSION

This study drew following major conclusions that adoption of improved banana production technology is influenced by a wide range of socio-personnel, socio-economic and technological factors. It is important to understand the result of these factors in order to ensure the development of appropriate technologies for banana production, promotion and for the higher economic gain. There is an urgent need to improve their education and knowledge level through providing education and training, skill, demonstrations, field-trips and proper technical guidance. The skill demonstrations on use of various practices of banana crop may therefore be helpful in increasing the adoption of scientific banana farming. Banana farming is much more profitable than paddy crop and this triggering an expansion in commercial banana cropping in the Durg District.

RECOMMENDATIONS

The baseline data on actual level of adoption of banana farming pattern or practices in India is not easily available; still, the data available has attracted attention of policymakers and efforts are being made by governmental organizations to promote banana acreage and productivity. The findings of the study showed that majority of the banana growers came under medium level of adoption category; they were not using recommended technology fully. It is nec-

essary to convince the banana growers with the help of various extension efforts and organization of demonstrations on improved technologies, uses of information sources in time and contact with other developmental organizations for providing the facilities and proper guidance and on improving storage and usage of banana, identification of diseases and their control, manure and fertilizer application as well as enhancing knowledge of technology through providing training, demonstrations, field-trips and proper technical guidance.

Most of the variables of the study were significantly affecting the level and depth of adoption. Extension personnel contacts, sources of information, social participation, credit acquisition and scientific orientation of farmers should be increased more to improve farmer's knowledge and skills in terms of recommended banana production technology. The results from the analysis offer unique policy-relevant insights on the importance of effective information in conditioning the intensity as well as the depth of recommended banana production technology adoption. Recognizing the need for a faster development of rural sector for the overall healthy development of the nation, several countries have adopted appropriate policies for the purpose. Apart from the agricultural-based income, efforts have been made for improvement of rural sector by developing agricultural and allied businesses. High cost of tissue culture banana plants and its inadequate availability were the main constraints reported by the banana growers. Therefore, the State Department of Horticulture, National Horticulture Mission, Department of Biotechnology, College of Agriculture and Private Agencies including voluntary organization working in horticulture sector should plan a strategy to mitigate this constraint and ensure the availability of tissue culture banana sapling at reasonable rates and in sufficient quantity to further popularise banana cultivation among the farmers and there is also need of farmer-market linkages for improving knowledge, adoption and management of banana farming which also persuade the social and economic growth of banana growers community of Chhattisgarh.

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