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Adoption of Scientific Farm Innovations Towards Enhancing Nutritional Security in Selected Areas of Kalimpong, West Bengal

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ABSTRACT

Among the four pillars of nutritional security *viz.* food availability, access, utilization, and stability, first one is the most important pillar. Agricultural technologies have a special role in developing countries, boosting the growth of the agricultural sector, hence driving the overall growth and lowering food prices. Agricultural technologies can also directly contribute to alleviate food insecurity: they can improve crops productivity allowing for higher production both for self-consumption and for increased household income, reduce risks of crop failure in case of physical shocks, such as drought or floods. In this backdrop, the present study was undertaken in Kalimpong Hills of West Bengal to assess the adoption level of agricultural technologies. Education being the most dominating factor towards adoption of farm innovations, the present study also analyzed the association of education with adoption of innovation. The study revealed that the farmers of Kalimpong hills adopted different production technologies with varied levels. It was also found that literacy level has profound effect on adoption of different scientific farm innovations.

Key Words: Adoption, Agricultural innovations, Education, Food security, Hill farming.

INTRODUCTION

Food security is to ensure that all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life (FAO, 1996). Among the most important causes of food insecurity, extended periods of poverty and lack of adequate productive or financial resources are the most severe, especially in rural areas of developing countries (Barrett, 2010). About the productive resources, agricultural technologies have a special role in developing countries, boosting the growth of the agricultural sector, hence driving the overall growth and lowering food prices. In developing countries, multidimensional welfare impacts are expected through adoption of improved varieties, including poverty reduction, food security enhancement, and better nutrition outcomes. At the farm household level, welfare impacts of agricultural technologies primarily occur through adoption, a decision made by the farmer. Agricultural technologies can also directly contribute to alleviate food insecurity: they can improve crops productivity allowing for higher production both for self-consumption and for increased household income (Kassie *et al*, 2012), and can reduce risks of crop failure in case of physical shocks, such as drought or floods (Hagos *et al*, 2012).

Scientific research in agriculture is moving fast and generating numerous new innovations for addressing the farm situations. Numbers of institutional and non-institutional communication sources are actively engaged in transmitting this technical know-how to the farmers. Despite all these efforts, it has been estimated that only 26

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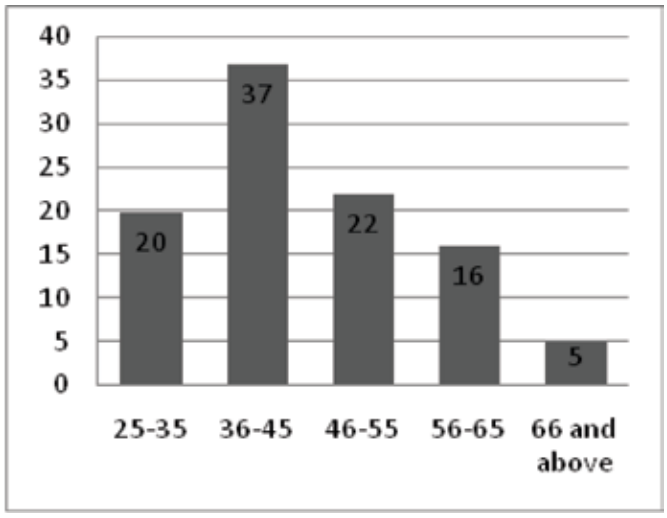
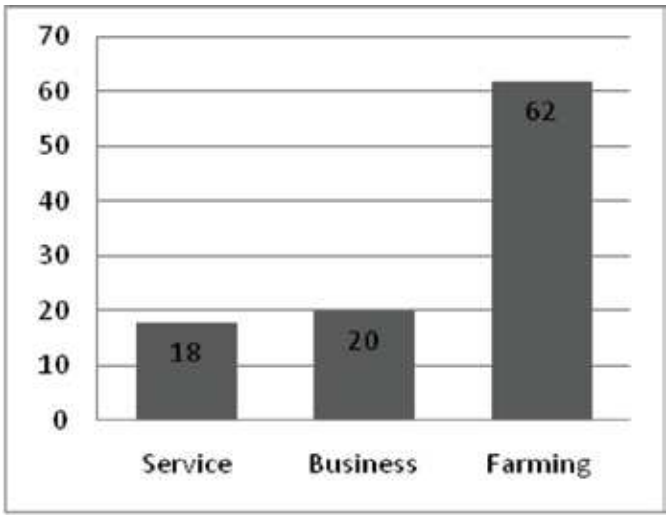
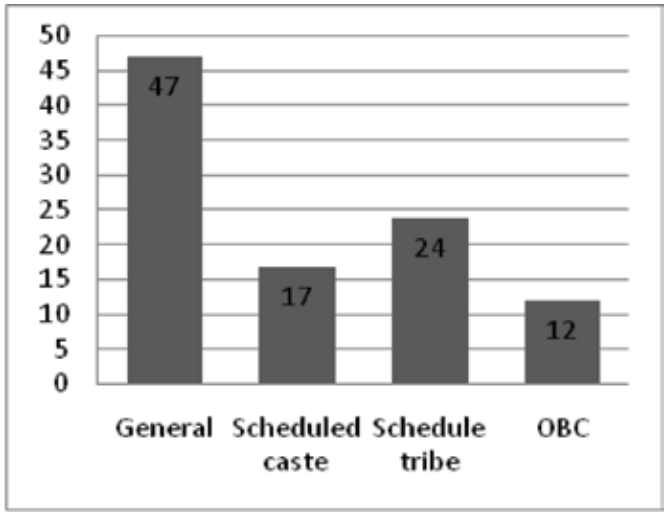


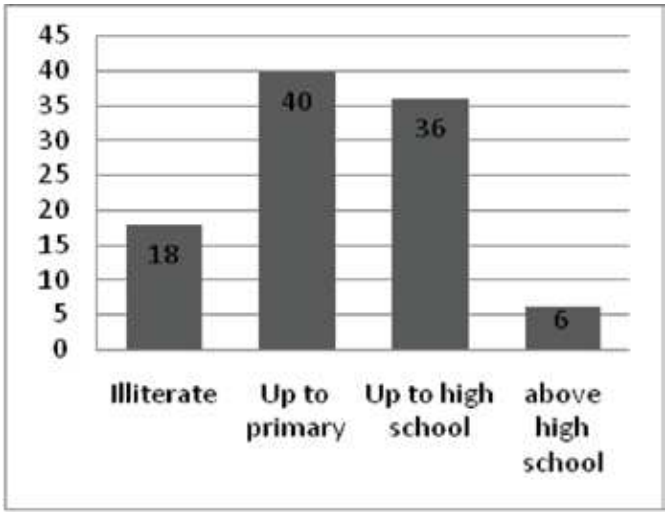
A. Age



B. Occupation



C. Caste



D. Formal Education

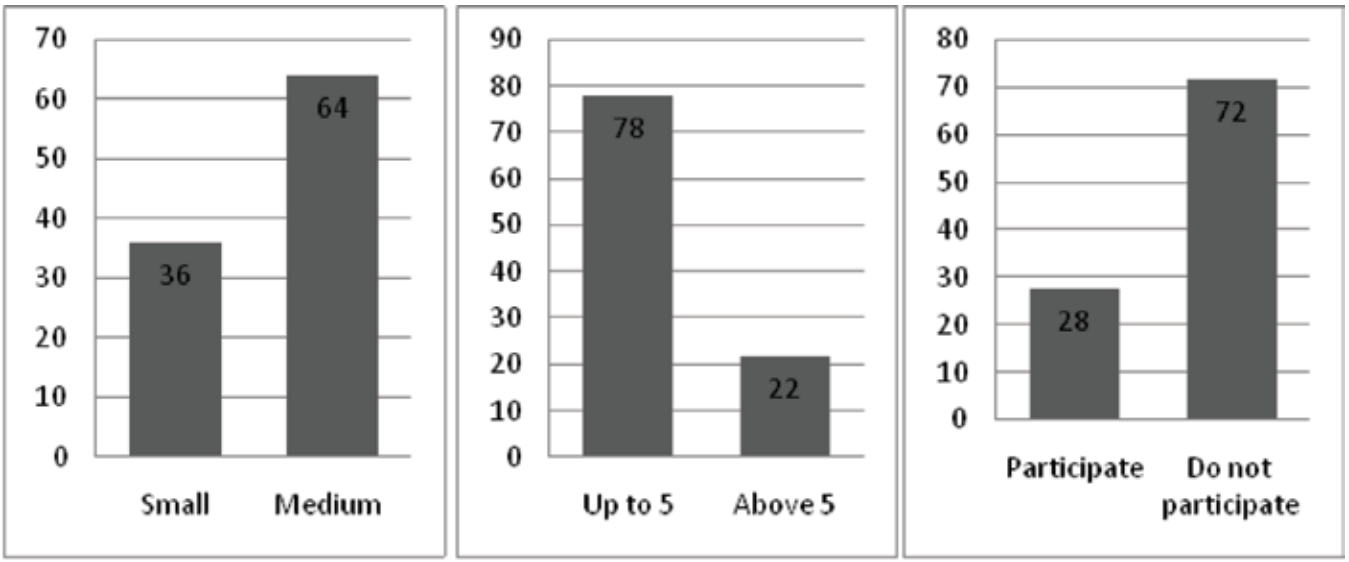
Fig.1. Socio-economic profile of respondents

per cent of the available technology have been adopted so far. It has been found in this connection that knowledge gained through word-of-mouth communication cannot be retained much longer to put in actual practice. A literate farmer is less prone either to fall back on his memory or depend on the advice of his fellow member at the proper time for application of improved technology. Instead, he would be inclined to consult the literature and then act accordingly (Lepcha, 2015).

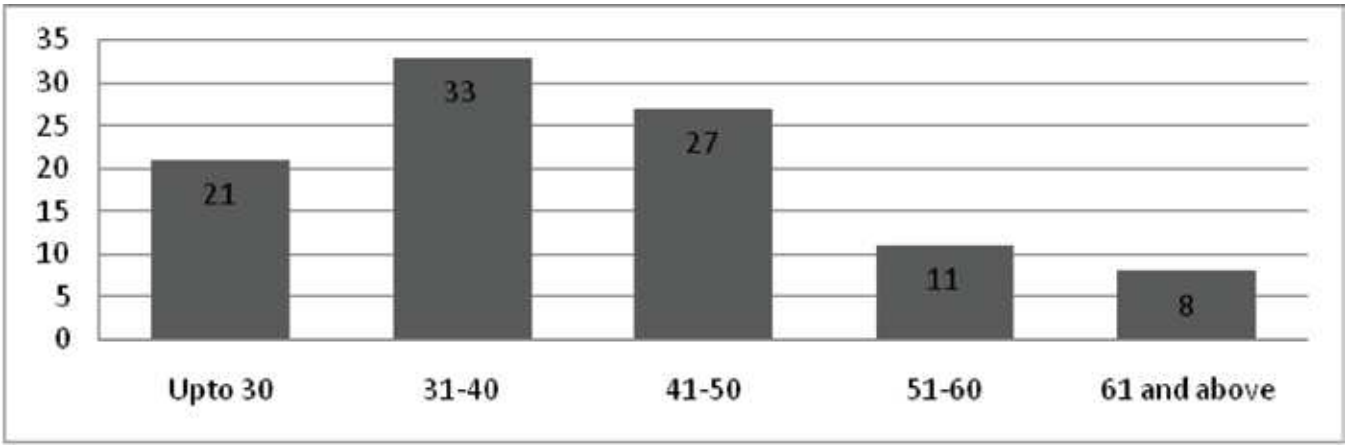
With this backdrop, the present study was undertaken in Kalimpong Hills of West Bengal to assess the adoption level of agricultural technologies (scientific farm innovations) and its association with education level of farmers.

MATERIALS AND METHODS

The study was conducted in four villages selected randomly in the Kalimpong -I block of undivided Darjeeling district during the year 2015. Twenty five farmers from each of the four selected villages were randomly selected, hence the total number of farmers were 100. The data were collected through a structured interview schedule by individual interview.



E. Occupation F. Family size G. Social participation



H. Yearly income (expressed in thousands)

Fig.2. Socio-economic profile of respondents

Level of adoption of different production technologies were assessed through Adoption Index (AI) and Overall Adoption Index (OAI). The expression for AI and OAI are as follows:

$$Adoption Index(AI) = \frac{n}{N}$$

Where, n = number of farmers adopted the technology and N = total number of farmers

and,

$$Overall\ Adoption Index(OAI) = \frac{\sum_{i}^{k} = ni}{k, N}$$

Where, ni = number of farmers adopted the ith technology; k = total number of technology and N = total number of farmers

To assess the association between adoption and education $\chi 2$ (Chi-square) were calculated as:

$$\chi^2 = \sum \frac{(fo - fe)^2}{fe}$$

Where,

f_o = observed frequency, and
f_e = expected frequency calculated

Table1. Adoption levels of improved agricultural technologies. N=100

Technology	Adopter class	Frequency				Adoption Index	Chi-Square (p-value)
		Illiterate	Up to primary	High school	Above high school		
Quality seed (HYVs)	Adopter	7	20	31	6	0.64	31.22; p<0.001
	Non-adopter	11	20	5	0		
Seed treatment	Adopter	10	16	16	5	0.47	7.15; p>0.41
	Non-adopter	8	24	20	1		
Nursery management	Adopter	9	16	21	5	0.51	7.34; p>0.39
	Non-adopter	9	24	15	1		
Method of sowing	Adopter	6	19	18	4	0.47	2.69; p>0.91
	Non-adopter	12	21	18	2		
Method of irrigation	Adopter	10	14	19	4	0.47	4.59; p>0.70
	Non-adopter	8	26	17	2		
Commercial manures	Adopter	4	12	18	5	0.39	14.71; p<0.04
	Non-adopter	14	28	18	1		
Fertilizers	Adopter	5	16	22	6	0.49	14.36; p<0.05
	Non-adopter	13	24	14	0		
Plant protection chemicals	Adopter	4	15	22	5	0.46	16.60; p<0.03
	Non-adopter	14	25	14	1		
Post harvest measures	Adopter	9	16	17	4	0.46	1.89; p>0.96
	Non-adopter	9	24	19	2		
Overall adoption Index = 0.48							

(Figures expressed in percentage)

RESULTS AND DISCUSSION

Socio-economic profile of the respondents

Socio-economic profiles are depicted in Fig.1 (A to D) and Fig.2 (E to H). Figures are giving information about the respondents' age, education, caste, major occupation, land holding, family size, income and social participation.

It was seen that majority of the respondents (37%) were under the age group between 36 – 45 yr and only 5 per cent were under the age group between 66 and above. Sixty two per cent of total respondents were engaged in farm practices and rest 18 and 20 per cent were in different services (govt./non govt.) and business respectively. Among all the respondents, 47 per cent belonged to general category, whereas scheduled cast (SC), scheduled tribe (ST) and other backward castes (OBC) were 17 to 24 per cent and 12 per cent, respectively. A good many number of families (64%) was having medium sized operational holding whereas 36 per cent were under small holding category. The study areas were dominated by small families with 5 or less number of family members (78% of total) and only 22 per cent families had family members of more than 5. It is a matter of concern that only 28 per cent of families were engaged with social organizations or groups (SHGs or Farmers' club). Eight per cent families crossed Rs. 60,000/- income per annum. The whole group was dominated by low education group with more than 50 per cent respondents having no formal education or only up to primary level of education.

Adoption levels of agricultural technologies

The data (Table1) presented the adoption levels of different agricultural technologies. To know the association between adoption and education

the adopters are distributed according to formal educational class. It was observed that only quality seed viz. the high yielding varieties and nursery management practices could cross the 50 per cent earmark of adoption rate (Index value = 0.64 & 0.51 for quality seed & nursery management, respectively) ranking first and second in respect level of adoption among all the technologies. Commercial manures i.e. vermi-compost or other types were least adopted by the Kalimpong farmers (Index value = 0.39). Others levels were 0.49 for fertilizers, 0.47 all for seed treatment, improved method of sowing and improved method of irrigation, whereas 0.46 both for plant protection chemicals and post harvest measures. The Overall Adoption Index (value = 0.48) depicts a moderate level of technology adoption.

It was also revealed (Table 1) that there was an association between adoption level and education in case of quality seed, commercial manures, fertilizers and plant protection chemicals with p-value <0.05 in all cases. So, it can be said that there was an increase in adoption with the increase of education among the farmers. However, non-significant relationships between the literacy level of the farmers and adoption were also found in case of seed treatment, nursery management, method of sowing, method of irrigation and post harvest measures in all these cases. Although, it is contradictory to general trend of education vs. adoption, but in the present case, it may be that the educated farmers are although eager to adopt these technologies but they may not have training facilities or financial capacity or awareness to adopt these technologies. These findings were in agreement with those reported by Sharma (2016).

Perceived constraints towards adoption of technologies

It was observed (Table 2) that the land topography was the most severe constraint faced by the farmers towards adoption of technology. Eighty seven per cent of total respondents were facing this problem. Hill areas had very steep to terrain type of topography which may hinder to cultivate. lack of scientific knowledge, financial scarcity, transportation and marketing were also considered as potential constraints towards adoption of technology. Hill farmers rely mostly on family labour for cultivation, so, it was perceived as a moderate level of constraint by them.

Table2. Extent of constraints faced by the hill farmers (N=100)

Sr. No.	Constraint	Percent farmers
1.	Land Topography	87
2.	Lack of scientific knowledge	72
3.	Financial	70
4.	Transportation and marketing	69
5.	Labour	53

CONCLUSION

The study revealed that the farmers of Kalimpong hills adopted different production technologies with varied levels. It was evident from the study that literacy level has profound effect on adoption of different scientific farm innovations. So, it is suggested that to enhance household nutritional securities, farmers should be encouraged to adopt new agricultural technology.

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