Impact of Farmers' Training Programme on Scaling up of Water Productivity in Agriculture - An Analytical Study in Assam

Sundar Barman[1], Nivedita Doley [2] and Ramani Kanta Thakuria[3]

1. Asstt. Prof., Ext. Edu., 3. Chief Scientist, AICRP on WM, AAU, Jorhat, 2 District Expert, ASRLM, Assam

Corresponding author e-mail: sbarman72@gmail.com

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ABSTRACT

This study conducted in two districts of Assam viz., Jorhat and Golaghat. In order to assess the impact in terms of extent of adoption water management technologies recommended in the farmers' training programmes on Scaling up of Water Productivity in Agriculture (SWPA) and socio economic factors influence thereon. A purposive cum proportionate random sampling design was followed for selection of respondents. All total 150 farmers consisting of 75 trainee farmers of SWPA training programme and 75 non trainee farmers were selected as respondents from the two districts. The study revealed that the majority of the farmers were under young age category (below 35 years) with education up to High school level. The land holding and annual income of majority farmers of both groups were in between 1-2 ha and within Rs. 20,000 respectively. Majority of the respondents of both group (trainee:44%, non trainee: 48%) were not member of any orgnization. Low degree of commercialization and low risk taking ability were important characteristics of respondents. Moreover, small family (< 5members) is important characteristics for majority farmers of both group. The frequency of extension contact was both occasional and regular for majority farmers. Mmajority of trainee (73.33%) had medium level of adoption of recommended practices of water management followed by high level of adoption with 14.67 per cent of respondents. This indicates that the trainings could motivate the farmers for adopting the modern techniques in order to get more production and farm income per drop of water. The finding also indicates the difference in adopter proportion in case of trainee and non trainee about different water management practices of rice , pulse oilseed and vegetables. The multiple regression model with all variables produced R^2= 0.68, which indicates that the selected independent variables have 68 per cent influence on the extent of adoption of recommended practices and the 'F' value (15.46) was found to be significant. Training implementing agencies may organise specific training for small and marginal farmers by considering the socioeconomic factors for enhancing adoption of water management technologies. The State Department of Agriculture also needs to develop community irrigation facilities or provide subsidy for installation of irrigation infrastructure for small and marginal farmers

Key words: *Training; Adoption; Water management technologies;*

Agriculture is a critical sector of the Indian economy and forms the resource base for a number of agro-based industries and agro-services. It is the provider of food and nutritional security to billions of people. India's food security depends on an increase in the production of food. Priority issues before India that call for attention is to produce enough food for the increasing population. For this all the possible measures to increase productivity per unit of land will need to be adopted. A number of different factors can influence agricultural productivity. Factors like environmental conditions of soil, nutrients, water, pest, diseases and weather-related aberrations play a major role in guiding sustainable growth of agricultural production. Among these factors water has been prioritized to be the most crucial one. Among various sectors, Agriculture sector is the largest consumer of the available water accounting to 75 per cent of the available global water followed by industrial activities to 20 per cent and remaining 5 per cent is for domestic sector (Global Water Scenario : The Changing

Statistics). Plants need water continuously during their life. Both its shortage and excess affect the growth and development of a plant directly and consequently, its yield and quality. Inefficient use of water leads to inefficiency in use of all other resources/inputs like seeds, fertilizers, etc. Rain fed area presently constitutes about 65 per cent of the net cultivated area and these areas generally suffer low production. Adoption of appropriate technologies can make such areas productive and profitable but key concern is use of water management technologies either in irrigated or rainfed agriculture for enhancing and sustaining agriculture production. With this back drop, the ICAR launched a Pilot project on "Scaling up of Water Productivity in Agriculture (SWPA) for Livelihood". The objective of the programme was to bring awareness among farmers on the available technologies of water management for improving water productivity which in turn would improve the farm income and their livelihood. Under the project aall total 42 nos. of farmers training programmes were conducted by the AICRP on water management from 2008 to 2011. The present study was undertaken to assess the impact of farmers trainings. programme in terms of adoption of technologies recommended in the training programmes and to assess contribution of selected socio-economic, psychological and technological variables in explaining the variation of farmer's extent of adoption of recommended technologies.

METHODOLOGY

The study was conducted in two districts of Assam viz., Jorhat and Golaghat district. A total of 150 farmers were selected by following purposive cum proportionate random sampling technique as respondents consisting 75 trainees and 75 non trainees farmers. The data were collected through personal interview methods. In order to study relative contribution of independent variables in variation of adoption of technologies 10 nos. of socio economic characteristics of farmers were selected. Extent of adoption of recommended practices were measured by following formula.

$$E_A = \frac{E_{AS}}{E_{MPS}} \times 100$$

Where

EA =Extent of adoption

EAS =Actual scores obtained by the respondent

EMPS =Maximum possible score

In order to assess the influence of socio economic characteristics on adoption of technologies by the farmers multiple Regression analysis was computed by using following formula-

$$Y = a+b_1x_1+b_2X_2+\ldots\ldots\ldots\ldots b_kX_k$$

Y= dependent variables, a= Intercept, $X_{1\ldots\ldots}X_k$= Independent Variables, $b_{1\ldots\ldots\ldots}b_k$= Regression coefficient,

Other statistical techniques like mean, SD, frequency and percentage were used during analysis of data.

RESULTS AND DISCUSSION

Profile of the respondents: The profile of the trainee and non-trainee are given in Table 1. The majority of the respondents of the trainees and non-trainees belonged to young age category (below 35 years) i.e. 48 percent and 50.67 per cent, respectively. The young people are likely to adopt more and interested in having exposure through training on the modern agricultural technologies and practices. About 48 per cent of trainees and 44 per cent of non-trainees had been educated up to high school level followed by higher secondary level 32% trainees and 29.33% non-trainees and middle school level (10.67% trainees and 24% non-trainees). Low income, poor motivation from their family or self motivation, involvement in the farming activities etc. are the major factors for lower level of education of the respondents. Maximum number of the respondents (49.33% trainee, 42.67% non-trainee) were small farmer category (1.0- 2.0 ha), followed by 28 per cent trainee, 29.33 per cent non-trainee under semi-medium farmer category (2.0-4.0 ha). Most of the respondents in both trainee and non-trainee groups were involved in cultivation and skilled labour (44%) followed by only cultivation (33.33% trainee, 30.67% non- trainee), cultivation and business (14.67% trainee, 17.33% non-trainee), cultivation and service (5.33% trainee, 4% non-trainee) and cultivation and others (2.67 % trainee, 4 non-trainee). Majority of the respondents (44.00%) belong to the low income category. As regard to social participation maximum number of respondents (44.00%) had no membership in any organization due to more involvement in agricultural practices and lack of interest and motivation for getting involved in some social organizations. Majority of the respondents in both the groups (53.33% trainee, 50.67% non-trainee) belonged to small size of family (<5 member) category followed

by 44 per cent trainee and 48 per cent non-trainee under medium size of family (6 to 10 members). Respondents of both the groups were distributed in the low level of degree of commercialization (36% trainee, 41.33% non-trainee). The majority of trainee (49.33%) belonged to high level of risk bearing ability, while the majority of non-trainee (73.33%) belonged to low level of risk bearing ability.

Impact of training in the terms of extent of adoption of technologies recommended in the training programmes under SWPA: The Table 2 reveals that in case of rice the proportion of adopter was more in trainee than the non-trainee. More than 50 per cent adopters were found for 8 practices of rice in case of trainees while it was only 5 practices for non trainees with more than 50 per cent farmers. The eight practices were "High Yielding Varieties", "Time of sowing", "Irrigation in nursery bed", "Irrigation after disappearance of ponded water", "Irrigation upto 15 days before harvest", "Land preparation", "Bund making" and "Blocking of crab hole. Out of eight practices bund making and blocking of crab hole were practised as traditional practices in study area. In rest practices the proportion of adopter for trainees were found more as compare to non trainees. Similar findings were reported by *Sharma et al. (2000); Gopikrishna (1993)*.

In case of pulse crop the proportion of adopters of trainees was found more in selected cultivation practices of pulse crop as compare to non trainees farmers. 'recommended varieties' and 'time of sowing ' were adopted by considerable proportion of trainee farmers . On the other hand, percentage of non trainee farmers adopting recommended varieties of pulse were adopted by 34.67 per cent (Table 2). This indicates that recommended varieties of pulses were adopted by farmers of two districts.. Only few proportions (9.33%) of farmers adopted proper drainage measure and recommended drainage which was an important practice of pulse cultivation. This may be due to selection of upland soil for cultivation of pulse crop. The proportion of adopters in case of trainee farmers with respect to fertilizer application was 17.33 per cent only.

The proportional distribution of adopters in selected cultivation practices of rapeseed and mustard crop were higher in case of trainee as compare to the non trainee group. Out of five selected practices more proportion of adopter were found in two practices namely

Table 1. Profile of the trainee and non trainee group of respondents {N=150 (n_1=75, n_2=75)}

Category	Trainee	Non-Trainee
Age		
Young (Below 35 years)	36 (48%)	38 (50.67%)
Middle (35-50 year)	35 (46.67%)	33 (44%)
Old (Above 51 years)	4 (5.33%)	4 (5.33%)
Educational status		
Primary school level	1 (1.33%)	0 (0%)
Middle school level	8 (10.67%)	18 (24%)
High school level	36 (48%)	33 (44%)
Higher secondary level	24 (32%)	22 (29.33%)
Graduate and above	6 (8%)	2 (2.67%)
Operational land holdings		
Marginal farmers (Below 1.0 ha)	14 (18.67%)	20 (26.67%)
Small farmers (1.0-2.0 ha)	37 (49.33%)	32 (42.67%)
Semi medium (2.0-4.0 ha)	21 (28%)	22 (29.33%)
Medium (4.0-10.0 ha)	3 (4%)	1 (1.33%)
Occupation		
Only cultivation	25 (33.33%)	23 (30.67%)
Cultivation + skilled labour	33 (44%)	33 (44%)
Cultivation + business	11 (14.67%)	13 (17.33%)
Cultivation + service	4 (5.33%)	3 (4%)
Cultivation + others	2 (2.67%)	3 (4%)
Annual income		
Low (Up to Rs. 20,000)	33 (44%)	35 (46.67%)
Medium (Rs. 20,001 to 30, 000)	8 (10.66%)	3 (4%)
High (Rs. 30,001 to Rs. 50,000)	11(14.67%)	14 (18.66%)
Very high (<Rs.50, 000)	23 (30.67%)	23 (30.67%)
Social participation		
No membership	33 (44%)	36 (48%)
Membership in one organization	15 (20 %)	14 (18.67%)
Membership in 1 organization	6 (8%)	4(5.33%)
Office-bearer in organization	17 (22.67%)	18 (24%)
Office-bearer in <1organization	4 (5.33%)	3(45%)
Extension Contact		
Never	9 (12%)	14 (18.67%)
Occasionally	31 (41.33%)	36 (48%)
Regularly	35 (46.67%)	25 (33.33%)
Family size		
Small family (<5 member)	40 (53.33%)	38 (50.67%)
Medium family (6 -10 members)	33 (44%)	36 (48%)
Large family (>10 members)	2 (2.67%)	1 (1.33%)
Degree of commercialization		
Low	27(36%)	31(41.33%)
Medium	23 (30.67%)	19 (25.34%)
High	25 (33.33%)	25(33.33%)
Risk taking ability		
Low	30 (40%)	55 (73.33%)
Medium	8 (10.67%)	1 (1.335%)
High	37 (49.33%)	19 (25.34%)

Figure in parenthesis indicates percentage.

"recommended varieties" and "time of sowing" for both the group. This indicates that recommended varieties of rapeseed and time of sowing of crop were already adopted by farmers of study area. But, very less proportion of non trainee group of farmers adopted other cultivation practices as compared to trainee farmers. Only 10.67 per cent trainee farmers adopted recommended dose of fertilizers where as no one from non trainee farmers applied recommended fertilizers in oilseed crops (Table 2).

Distribution of respondents according to their overall adoption of recommended practices : The overall extent of adoption of majority of trainee (73.33%) had medium level of adoption of recommended practices followed by high level of adoption with 14.67 per cent of respondents while 100 per cent of the non-trainees had low level of adoption (Fig 1). The difference of adoption level between trainees and non trainees may be due to the impact of training programmes. The findings also indicate that training programme could able to motivate farmers for efficient use of water management related cultivation practices of selected crop.

Association and Contribution of selected socio economic variables with adoption behaviour of trainee: The correlation of independent variables with extent of adoption of water management technologies are depicted in Table 3 The variable "annual farm income"(r=0.64), "degree of commercialization" (r=0.59) and "risk bearing ability"(r=0.58) were moderately correlated with the extent of adoption of recommended practices in training. The findings are conformity with the findings of *Pandey (2000.* Annual farm income, risk taking ability and extent of commercialization are important characteristics of farmers for adoption of technologies. The variables 'occupational status' (r=0.34), 'extent of social participation' (r=0.42) and 'extension contact' (r=0.38) showed week positive and significant relationship with adoption of water management technologies. The similar findings reported by *Ramesh et.al (2008); Jadav et.al. (2004).* Likewise age had negative and week relation with extent of adoption. Similar findings were reported by *Choudhary et al. (2001); Singh et. al (2010).*

In order to assess the combine influence of selected significant independent variables on extent of adoption of recommended water management technologies multiple correlation was done. The Table 3 reveals that out of 9 independent variables found significant in

Table 2. Distribution of adopters of recommended practices of selected crops (N = 150)

Practices	Trainee	Non-Trainee
Rice crop		
High yielding varieties	68 (90.67)	39 (52.00)
Fertilizer doses	25 (33.33)	5 (6.67)
Time of sowing of seed	64 (85.33)	41(54.67)
Irrigation of nursery bed	42 (56.00)	13 (17.33)
No. of irrigation in nursery bed	32 (42.67)	0 (0.00)
Time of irrigation in nursery bed	35 (46.67)	16 (21.33)
Depth of irrigation	25 (33.33)	0 (0.00)
Irrigation after disappearance of pounded water	48 (64.00)	35 (46.67)
Irrigation up to 15 days before harvest	51 (68.00)	28 (37.33)
Land preparation	66 (88.00)	39 (52.00)
Bund making	75(100.00)	75 (100.00)
Blocking of crab hole	75(100.00)	75 (100.00)
Pulse crop		
Recommended Varieties	43 (57.33)	26 (34.67)
Fertilizer Doses	13 (17.33)	0 (0,00)
Time of sowing	32 (42.67)	20 (26.67)
Drainage facilities in pulses	7 (9.33)	0 (0.00)
Oilseed crop		
Recommended Varieties	45 (60.00)	35 (46.67)
Fertilizer application	8 (10.67)	0 (0.00)
Time of sowing of rapeseed-mustard	44 (58.67)	35 (46.67)
Ploughing for moisture conser-vation in rapeseed- mustard	34(45.33)	20 (26.67)
Irrigation in rapeseed-mustard	32(42.67)	16 (21.33)
Vegetable crops		
Recommended Varieties	50 (66.67)	28 (37.33)
Fertilizer Doses	0 (0.00)	0 (0.00)
Moisture conservation	75(100.00)	75 (100.00)
Irrigation	50 (66.67)	22 (29.33)
Time of irrigation	39 (52.00)	20 (26.67)

Figure in parenthesis indicates percentage

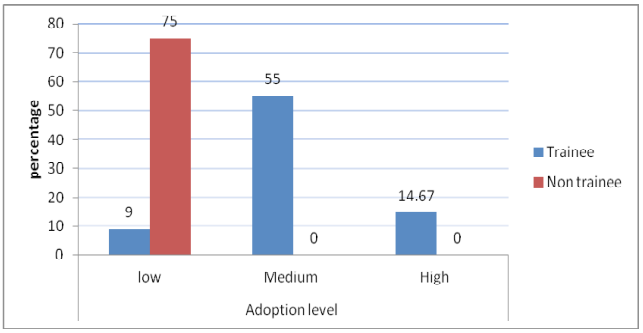

Fig1. Distribution of respondents according to adoption level

Table 3. Correlation of selected independent variable with the extent of adoption of recommended technologies

Variables	'r' values	Cal 't'
Age	-0.19164*	1.66829
Educational level	0.167411*	1.450835
Size of operational holding	0.268464**	2.38117
Occupational status	0.345118**	3.141718
Extent of social participation	0.429849**	4.06759
Extension contact	0.387815**	3.594833
Family size	0.018937	0.161827
Annual farm income	0.649209**	7.292622
Degree of commercialization	0.595838**	6.33895
Risk bearing ability	0.585478**	6.170465

(**) = Significant at 1% Level, (*) = Significant at 5% Level

Table 4. Contribution of selected socio-economic variables in variation of extent of adoption

Variables	(b)	t- value
Age	-0.089	0.138
Educational status	0.364	0.530
Size of land holding	0.646	2.633**
Occupational status	1.305	2.085**
Social participation	0.869	1.848*
Extension contact	0.894	0.990
Annual Farm income	5.824	2.628**
Risk bearing ability	1.970	2.731**
Degree of commercialization	0.050	1.854*

R^2=0.68 Adjusted R^2= 0.63 F=15.466

correlation analysis 5 variables have positive combined influence on the extent of adoption. The multiple regression model with all 9 variables produced R^2=0.68 adjusted R^2=0.63 which indicates that these 9 independent variables have 68 per cent effect on the extent of adoption of recommended practices and it was found statistical significant (F=15.46).

CONCLUSION

The proportion of adopters of water management technologies of selected crop are found more in case trainee as compare to non trainee farmers. The level of adoption of trainee farmers were more as compared to non trainee farmers which indicates importance of such training programme for enhancing adoption of water management technologies. But extent of adoption of technologies is influenced by mostly degree of commercialization, annual farm income, risk taking ability and social participation of farmers. In order to get better impact of future training programmes implementing agencies should consider these characteristics during selection of farmers for training programmes. The State Department of Agriculture should either develop community irrigation facilities or provide subsidy for installation of irrigation infrastructure for small and marginal farmers for facilitating the adoption process. Moreover, special training with appropriate water management technologies for small and marginal farmers is also urgent need for enhancing crop production as they are more vulnerable to climate change.

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