Available Online at ESci Journals
International Journal of Agricultural Extension
ISSN: 2311-6110 (Online), 2311-8547 (Print)
http://www.escijournals.net/IJAE

IMPACT OF RESULT DEMONSTRATION ON SYSTEM OF RICE INTENSIFICATION (SRI) ADOPTION AMONG PARTICIPANT AND NON-PARTICIPANT FARMERS IN CHITWAN, NEPAL

Udit P. Sigdel, Durga Devkota, Narayan R. Joshi and Naba R. Devkota
Department of Agricultural Extension and Rural Sociology, Agriculture and Forestry University Nepal.

A B S T R A C T

Present study was conducted to assess the impacts of result demonstration on System of Rice Intensification (SRI) adoption in Chitwan, Nepal in 2011. The survey research design was used whereas purposive and cluster sampling was followed to collect the information. The study was conducted in Gunjanagar Village Development Committee (VDC) of Chitwan district which was purposively selected because of implementation of result demonstration by District Agricultural Development Office (DADO) Chitwan during 2009. A total of 176 respondents were identified including 6 demonstrator farmers, 124 participant farmers, and 46 non-participant farmers. A pre-tested and standard interview schedule was employed for household survey to collect primary information. The findings revealed that only six respondents had been continued to follow SRI. Improper implementation of demonstration, poor monitoring and evaluation, poor supply of information materials were the reasons to have low adoption of SRI among participant farmers. Lack of information, training, alternate SRI techniques and suitable land were the reasons to have low level of adoption of SRI among non-participants. Trainings conducted on SRI also did not have effective impact to improve the knowledge of the participant farmers. Relevant effective trainings on SRI, proper selection and prior supply of the informative materials enhance SRI to increase rice production in Chitwan district for both types of farmers.

Keywords: SRI, adoption, result demonstration.

INTRODUCTION:

This study is about the adoption of System of Rice Intensification (SRI) in Chitwan district. Various water-saving rice production systems have been developed so far e.g. aerobic rice culture, ground-cover rice production system, raised beds, alternate wetting and drying (Farooq *et al*., 2009). System of Rice Intensification (SRI) is one of the rice production techniques. SRI has emerged as an alternative to traditional way of flooded rice cultivation and is showing great promise to address the problems of water scarcity, high energy usage and increased use of chemical fertilizers in field. System of Rice Intensification (SRI) is a method that increases the productivity of rice by changing the management of plants, soil, water and nutrients (Satyanarayana *et al*., 2007). Agriculture, being the mainstay of the economy, provides a livelihood for almost 80 percent of the population and counts for 34.7 percent of GDP (MoF, 2013). Since the implementation of first five year plan 1956, agriculture has remained one of the top priorities in Nepal's developmental plan periods (MoF, 2013). Despite these efforts, the agricultural production has not increased significantly. The national average yield of rice was 1.97 mt/ha in 1984/85 which has increased only up to 2.91 mt/ha in 2008/09 and reduced to 2.72 mt/ha in 2009/10 (MoAC, 2011). Rice is one of the prominent cereal crops in Nepal which contributes almost one-fourth of the GDP (MoF, 2013). Henri de Laulanié is credited for the innovation of SRI practice with his 20 years of observation and experimentation (Uphoff, Kassam, & Stoop, 2008). SRI was promoted initially by a

* Corresponding Author:
Email: kashudit@gmail.com

Malagasy NGO - Association Tefy Saina (ATS) which was founded by Laulanié in 1990 (Stoop *et al.*, 2002; Uphoff *et al*., 2008). SRI is simply the methodology to increase the productivity of rice by changing the management of plants, soil, water and nutrients (Satyanarayana *et al*., 2004). Uphoff (2007) stated that SRI is not a technology; rather it is the set of insights and principle changes dealing with how rice can be grown most successfully with low cost. Principles of SRI as of Uphoff (2007) are described as; transplanting very young seedling, single planting, wider spacing, soil to be kept moist with intermittent flooding, aerating soil, use of organic fertilizers. Rate of SRI adoption is not impressive and is not diffusing as envisioned by extension service of Nepal even in locations where most of the socio-economic conditions, production facilities and technology requirements of SRI are relatively easier and more accessible and within the resources and abilities of the farmers. Despite being the main crop of Nepal, rice cultivation is becoming less profitable due to increasing price of inputs, water shortage, labor shortage and low level of returns. Chitwan is one of the major districts of rice production, but it also has not exploited the yield potential of the rice production and productivity. Country as a whole and chitwan in particular has not been found to get along the efficacy of most effective teaching methods of agriculture extension such as result demonstration. Works done on SRI promotion are further handicapped due to poor information management and proper documentation and its wider circulation. This study is, therefore attempted to have more systematic exploration of antecedent socio-economic and technological characteristics for SRI adoption and reasons for low adoption of SRI.

METHODOLOGY

Survey research design was used to conduct the research study. The study was conducted in 6 groups and the adjacent localities of the groups of Gunjanagar VDC of the Chitwan district, Nepal which was purposively selected for the study because DADO, Chitwan implemented result demonstration on this particular VDC in 2009.

The total respondents were 176 consisting of 6 demonstrator farmers, 124 participant farmers from 6 groups and 46 non-participant farmers from adjacent localities of the groups. The farmers who have performed in the result demonstration programs were considered as demonstrator farmers and the farmers from the groups where result demonstration was carried out were considered as participant farmers and the farmers from the adjacent groups and the localities were considered as non-participant farmers. As the sampling was purposive and cluster, all the 130 members of the 6 groups were considered as the respondents for demonstrator and participant farmers and the non-participant farmers were selected by using simple random sampling from the adjacent localities of the groups where result demonstration was implemented.

The primary information was collected through house hold survey with the help of the structured and précised interview schedule. Likert scale and attitude scale were used to measure the knowledge, agreement and level of satisfaction of the respondents regarding SRI technique and attitude towards result demonstration program in the interview schedule. These data were supplemented and verified by the information collected through key informant's interview. Secondary information was collected through various publications of District Development Committee (DDC), DADO and relevant organizations. All the information received from field was thoroughly checked; codes were designed and the units were standardized wherever necessary before entering the information using Microsoft Excel and SPSS. Different descriptive and inferential statistics were used for the analysis. Chi square test was also performed wherever necessary.

RESULTS AND DISCUSSION

Personal characteristics of the respondents: Age, ethnicity, landholding, family size and level of education of the respondents were measured and categorized into three categories and sex of the respondents' was also measured.

Frequency distribution of the respondents' personal and social characteristics is contained in Table 1. About half of the respondents (52.84%) were between the age group of 36 to 55 followed by one third (35.8%) below the age of 36 years whereas very few of them (11.36%) were above 55 years group. Most of the respondents had pursued primary level of education followed by the School Leaving Certificate (SLC) and higher level of education.

Table 1. Frequency distribution of personal characteristics of the respondent.

Respondents' characteristics	Frequency	Percentage
Age (in years)		
Below 36	63	35.80
Between 36 to 55	93	52.84
More than 55	20	11.36
Level of education		
Up to primary	107	60.79
Up to SLC	57	32.39
More than SLC	12	6.82
Ethnicity		
Chhetri	15	8.52
Bhramin	129	73.3
Janajati	32	18.18
Land holding (in hectare)		
Less than 0.5	65	36.9
Between 0.5 to 1	91	51.7
More than 1	20	11.4
Mean	0.64 hectare	
Family size		
Less than 5 members	78	44.32
Between 5 to 7 members	93	52.84
More than 7 members	5	2.84
Sex		
Male	37	21.02
Female	139	78.98

Source: Field Survey, 2011

It was found that majority of the households were Bhramin (73.3 %) followed by Janajatis (18.18%) and Chhetri(8.52%). From the study it was found that the mean land holding size was 0.64 hectare. The 91 respondents had 0.5 to 1 hectare of land followed by less than 0.5 hectare of land with 65 respondents whereas 20 respondents' had more than 1 hectare of land. From the study it was found that the majority of the respondents (52.84%) had 5 to 7 family members followed by the respondents having less than 5 members in their family and the respondents having more than 7 members in their family. Further it was found that only one fifth respondents were male whereas 78.98 percent of the respondents were female because the result demonstration was implemented by targeting mostly female group.

Population characteristics of sampled households: Age, occupation and level of education of the family members' of the respondents were measured and categorized into three categories and sex of the family members was also measured. The frequency distribution of the family members of the respondents' personal characteristics is contained in Table 2. Most of the family members pursued up to primary level education followed by higher level and SLC. Majority of the members (72.2 %) were found below 36 years of age followed by between the age of 36 to 55 years (17.5%) whereas only 10.3 percent were above 55 years The numbers of male members were found higher than the female members in the study area. The major occupation of the family members in the study area was agriculture and livestock (36.4%) whereas 49.2 percent of the family members were student and very few of the members were involved in off-farm occupation.

Membership of the group: With the analysis it was found that 153 (86.9%) respondents were associated with locally organized group whereas 23 (13.1 %) respondents were not associated with groups and organizations.

Table 2. Frequency distribution of population characteristics of the sampled households.

Respondents' characteristics	Frequency	Percentage
Age (in years)		
Below 36	478	72.2
Between 36 to 55	116	17.5
More than 55	68	10.3
Level of education		
Up to primary	251	37.92
Up to SLC	187	28.25
More than SLC	224	33.84
Occupation		
Agriculture and livestock	241	36.4
Off farm occupation	95	14.4
Student	326	49.2
Sex		
Male	395	59.7
Female	267	40.3

Source: Field Survey, 2011

Training received on SRI: From the study it was found that only 38 respondents i.e. 21.6 percent of the total respondent has received SRI training whereas 138 respondents i.e. 78.4 percent did not received SRI training.

Satisfaction level on SRI training : Satisfaction level of the respondents on SRI training was categorized in five point scale of satisfaction i.e highly satisfied, much satisfied, just satisfied, unsatisfied, less unsatisfied and highly unsatisfied. The data showed that none of the respondents were found unsatisfied from the trainings received. Among 38 respondents who had received training on SRI, most of them (74%) were found much satisfied and only 5 percent respondents were highly satisfied and 21 percent respondents were just satisfied about the training received on SRI.

Respondents' knowledge on SRI: It was found that 46 (24%) respondents among 176 did not have any idea about SRI methods whereas the remaining 130 respondents heard little about SRI methods

Adoption of the SRI methodology: Among 176 respondents, 4.65 percent were found continuing SRI techniques whereas, remaining 170 respondents did not follow the SRI technique to adopt. The details of the adopters are presented in the Table 3.

Table 3. Detailed information of adopters.

SN	Sex	Age (years)	Education level	Occupation	Land (ha)	Family size	Membership of the group	Training received
1	F	51	Literate	Farming	0.66	4	Yes	Yes
2	F	35	Literate	Farming	1.3	4	Yes	Yes
3	F	35	SLC	Farming	0.66	4	Yes	Yes
4	F	28	Literate	Farming	1	9	Yes	Yes
5	F	60	Literate	Farming	1.3	4	Yes	Yes
6	F	28	Literate	Farming	1	6	Yes	Yes

Source: Field Survey, 2011

The study revealed that only 6 farmers were found continuing SRI. All the adopters had more than 0.5 hectare of land which supported them to take risk for innovation. Landholding was found to have positive influence on SRI adoption. Sarwar & Goheer (2007) also reported that with the increase in landholding, farmers have better choices to experiment with new technologies.

The results showed that middle aged farmers had more risk bearing capacity so they can adopt innovation. The results also corroborate with Marenya & Barrett (2007) as stated that with the increase in age; the physical

effort, health and incentive to invest in farm diminishes. Thangata & Alavalapati (2003) also reported that younger farmers have longer planning horizons and willingness to take more risks than older farmers. Negative sign on education level indicated that less educated farmers have more likelihood of adopting SRI techniques, however no significance has been found. The possible explanation could be well educated people are more focused on off-farm employment than farming activities.

All the adopters had membership of the organizations and had taken trainings on SRI which positively influenced the farmers for SRI adoption. Similar results have been found by many adoption studies (Adesina *et al*., 2000; Ntege-Nanyeenya *et al*., 1997; Sall *et al*., 2000; Tiwari *et al*., 2008; Zhou *et al*., 2008). Farmers' associations have better access to technical information and receive support from extension workers (Ntege-Nanyeenya, Mugisa-Mutetitka *et al*., 1997). Membership into farmers association allowed farmers' interaction to share their experiences about farming to the other farmers in the group, discuss the problems and explored new opportunities on farming which increases their confidence level towards SRI adoption (Tiwari *et al*., 2008). This study showed that membership can also significantly influenced to the adoption decision. Similar results have been found by Namara *et al*. (2003) who reported that participation in agricultural training programs significantly increased the SRI adoption. Among six SRI adopter farmers three were owner operator and three were tenants who had rented out their land. And the adopters were participated in the result demonstration implemented by DADO.

Reasons of not adopting SRI technique: Majority of the respondents were responded for not continuing SRI techniques. Reasons for not adopting SRI technique was measured in agreement level of the respondents on the various statements related with the SRI demonstration. The agreement level was given in three scales i.e. agree, indifference and disagree with the values of 1, 0 and -1 respectively. The frequency distribution was calculated and presented in the Table (4).

Table 4. Reasons for not adopting SRI technique.

Statement	Agree(1)	Indifference(0)	Disagree(-1)
Lack of enough information	112(65.88)	13(7.65)	45(26.47)
Due to newness of variety used	43(25.29)	93(54.71)	34(20)
Lack of training	120(70.59)	12(7.06)	38(22.35)
Lack of knowledge of alternate SRI	92(54.12)	57(33.53)	21(12.35)
Labour intensive	40(23.53)	101(59.41)	29(17.06)
Tedious to transplant and maintain spacing	63(37.06)	81(47.65)	26(15.29)
Maintaining water during puddling field for transplanting	51(30)	91(53.53)	28(16.47)
Tedious intercultural operations	54(31.76)	80(47.06)	36(21.18)
To maintain alternate wetting and drying	49(28.82)	93(54.71)	28(16.47)
Lack of suitable land	87(51.18)	82(48.24)	1(0.59)

Source: Field Survey, 2011 Figures in parentheses indicate percentage

Only 170 responses were recorded because of adoption of SRI by six farmers. Among the total responses majority of the respondents responded that there was lack of training, effective information on SRI, alternate nursery raising technique and the suitable land for SRI adoption. Difficulty of the production practices of SRI was not counted as reason for not adopting SRI by most of the respondents. Study revealed that being new methodology respondents were interested but lack of information became reason for not adopting.

Zheng et al. (2004) also supported that short supply of organic fertilizers, weeding and water management as the limiting factors for SRI adoption. Tech (2004) also reported the lack of water management facilities has been one of the major constraints for adoption of SRI in Cambodia. SRI practice requires intermittent flooding in the land. If the land has not sufficient irrigation facility, then it becomes difficult to practice.

Uphoff (2004) also reported that more investment is needed in water management for large scale adoption of SRI. Lack of relevant trainings is also the limiting factor for large scale SRI adoption.

CONCLUSION

The results of the study showed that sex, age of the farmers', landholding, trainings, and membership of the farmers' group and the higher education level are the

factors that has influence on SRI adoption. To enhance SRI methodology proper implementation of result demonstration with enough information materials supply is highly recommended. Appropriate communication materials should be used in different stages of adoption process. Relevant effective trainings on SRI and prior supply of enough informative materials enhance the SRI adoption.

REFERENCES

Adesina, A., Mbila, D., Nkamleu, G., & Endamana, D. (2000). Econometric analysis of the determnants of adoption of alley farming by farmers in the forest zone of southeast cameroon. Agriculture, Ecosystems & Environment, 255-265.

Farooq, M., Kobayashi, N., Wahid, A., Ito, O., & Basra, S. (2009). Strategies for producing more rice with less water . Advances in Agronomy , 351-536.

Marenya, P. P., & Barrett, C. B. (2007). Household-level determinants of adoption of improved natural resources management practices among smallholder farmers in western Kenya. Food Policy, 515-536.

MoAC. (2011). Statistical Information of Nepalese Agriculture 2009/10. Kathmandu: Ministry of Agriculture and Co-operatives: Government of Nepal.

MoF. (2013). Economic Survey: Fiscal year 2012/13. Kathmandu: Ministry of Finance: Government of Nepal.

Namara , R., Weligamage, P., & Barker, R. (2003). Prospects for adopting system of rice intensification in Sri Lanka. Colambo: IWMI.

Ntege-Nanyeenya, W., Mugisa-Mutetitka, M., Mwangi, W., & Verkuijl, H. (1997). An assessment of factors affwcting adoption of maize production technologies in Iganga district, Uganda. Iganga: CIMMYT.

Sall, S., Norman , D., & Featherstone, A. (2000). Quantitaitve assessment of improved rice variety adoption:the farmer's perspective . Agricultural Systems , 129-144.

Sarwar, M., & Goheer, M. (2007). Adoption and impact of zero tillage technology for wheat in rice-wheat system-water and cost saving technology . Punjab: Ministry of Agriculture, India.

Satyanarayana , A., Thiyagarajan, T. M., & uphoff, N. (2004). Abstract on opportunities for water saving with higher yied using the system of rice intensification. Killikulam: Tamil Nadu Agricultural University, India.

Satyanarayana, A., Thiyagaraian, T. M., & Uphoff, N. (2007). Opportunities for water saving with higher yield from the system of rice intensification. Irrigation Science, 99-115.

Stoop, W. A., Uphoff, N., & Kassam, A. (2002). A review of agricultural research issues raised by the system of rice intensification from Madagascar: opportunities for improving farming systemes for resource poor farmers. Agricultural systems , 249-274.

Tech, c. (2011, July 22). Center for the study and development of Cambodian agriculture (CEDAC). Retrieved from Ecological system of rice intensification (SRI) impact assessment (2001-2003): http://ciifad.cornell.edu/sri/countries /combodia/cambimp-ascdc.pdf

Thangata, P., & Alavalapati, J. (2003). Agroforestry adoption in southern Malawi: in case of mixed intercropping of Gliriidia sepium and maize. Agricultural systems, 57-72.

Tiwari, K., Sitaula, B., Nyborg, I., & Paudel, G. (2008). Determinants of farmers' adoption of improved soil conservation technology in a middle mountain watershed of central Nepal. Environmental Management , 210-222.

Uphoff, N. (2004). System of rice intensification responds to 21st century needs . Rice today, 41-44.

Uphoff, N. (2007). System of Rice Intensification (SRI) to enhance both food aand water security. Food and water security , 40-45.

Uphoff, N., Kassam, A., & Stoop, W. (2008). A critical assessment of a desk study comparing crop production systems: the example of the system of rice intensification versus best management practice. Field crops research, 109-114.

Zheng, J., Xianjun, L., Xinlu, J., & Tang, Y. (2004). The system of rice intensification (SRI) for super-high yields in rice in Sichuan basin. Journal of Integrative agriculture , 110-1128.

Zhou, S. D., Herzfled, T., Glauben, T., Zhang, Y. H., & Hu, B. C. (2008). Factors affecting Chinesee farmers' decisions to adopt a water saving technology. Canadian journal of Agricultural Economics - Revue Canadienne Agroeconomie, 51-61.