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IMPACT OF RKVY- RAFTAAR ON FARMERS' KNOWLEDGE AND ADOPTION OF INTEGRATED FARMING SYSTEM: AN EXPERIENCE FROM ASSAM, INDIA

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ABSTRACT

The present study was conducted during 2023 in three districts of Jorhat, Sivasagar and Golaghat of Assam to determine profile characteristics, knowledge and level of adoption of recommended practices of paddy-poultry-piggery and fishery integrated farming system and variance in the level of knowledge and extent of adoption between trained farmers under RKVY- RAFTAAR and untrained farmers. The results highlighted that trained and untrained farmers are having similar profile characteristics in terms of age, annual income, farming experience, market accessibility, farm machinery and implement possession, risk orientation and innovativeness. Majority of the trained farmers had a medium level of knowledge and extent of adoption in paddy, poultry, piggery and fishery units, where as in case untrained farmers majority had low level of knowledge and adoption. The mean knowledge and adoption scores were found higher for trained farmers as compared to untrained farmers. The difference of mean score in knowledge and adoption was statistically significant with t value 13.74 and 18.35 respectively. Structured training programme are crucial for enhancing farmers' knowledge and adoption of Integrated Farming Systems (IFS), while untrained farmers rely mainly on partial information diffusion with limited practice. Massive training programme with wider coverage and policy support are important for scale up adoption of IFS adoption among farming communities.

Key words : Integrated Farming System, Knowledge, Adoption, RKVY-RAFTAAR.

Introduction

Integrated farming system (IFS) is the best approach of farming to increase production in the same area, without an increase in the land area. It works as a system of plays a vital role to sustain production, income generation, and environmental security and meeting consumer demand, is the only alternative for the small and marginal farmers (Meshram *et al.*, 2020). A sustainable integrated farming system provided maximum return and employment. It is clear that small and marginal farmers thrive by adopting IFS through efficient recycling of residues and sustain nutritional security, fodder security, economic security and finally social security (Goverdhan *et al.*, 2020). By considering the importance of an integrated farming system in farmer's livelihood security, Assam Agriculture University established model

integrated farms at Krishi Vigyan Kendra's (KVKs) or farmers' fields under Rashtriya Krishi Vikas Yojana (RKVY)- Remunerative Approaches for Agriculture and Allied Sectors Rejuvenation (RAFTAAR) and skill base trainings were conducted for enhancing knowledge and adoption of suitable IFS in their farm. Based on farm situation and resource availability Assam Agricultural University recommended different IFS model for enhancing livelihood of farmers. So, an attempt was made to find the impact of the established IFS units on the level of knowledge and extent of adoption of farmers.

Materials and Methods

The research design is an experimental design with untrained farmers as control unit and trained farmers as an experimental unit. For the study in Assam state, three

districts- Jorhat, Sivasagar and Golaghat were selected purposively based on the number of trainings and beneficiaries. From each district 30 trained farmers from each district were selected randomly from a comprehensive list of trained farmers who were participated in the IFS training programme conducted during 2018-20. From each district 10 nos. of untrained farmers were selected randomly by using matched sampling technique as control group. Thus, a total of 120 respondents were selected for the study. The IFS unit considered for the study is Paddy-poultry-piggery and fishery, since this unit is common among three KVKs and a greater number of trainings are conducted.

A structured schedule was developed as a main tool for data collection. A set of 12 independent variables and 2 dependent variables were selected for the study. The profile characteristics were measured with the score given and analysed by using mean and standard deviation. In order to measure the level of knowledge farmers in specified IFS model, a set of 38 statements were selected for four different components of IFS model after judges' opinion. Score of 1 and 0 was given for every correct and incorrect statement, thus score for knowledge level of farmer ranges from 0-38. For measuring adoption level of IFS 32 practices of the four components namely paddy, poultry, piggery and fishery were considered after review of literature and expert opinion. For adoption of each practice score was assigned as '1' and '0' for not adoption. Thus, adoption score for a farmer ranges from 0-32. Based on mean and SD, the respondents were categorized into low, medium and high. Appropriate statistical methods are used for analysis and interpretation of data.

Results and Discussion

Profile characteristics of trained and untrained farmers

Table 1 shows the analysis of the profile characteristics of the trained and untrained farmers. The minimum age of trained and untrained farmers is 26 years, whereas the maximum age of trained farmers is 57 and untrained farmers is 59 years. The mean and SD of trained farmers is 42.35 and 8.15, respectively. The mean and SD of untrained farmers is 42.56 and 10.39. This may be due to the fact that young age people are migrating from villages to other places for job or career enhancement and old age people are too weak to do farming and retiring and farmers of middle age are enthusiastic and are having moderate experience in farming and have more efficiency than the older and younger ones. The findings are in line with the finding of Dabhi *et al.* (2018), Meshram *et al.*

(2020) and Saha *et al.* (2010).

In case of education, the minimum level of education of trained and untrained farmers is 0 and maximum level is 9. The mean and SD of trained farmers is 4.83 and 2.28. The mean and SD of untrained farmers is 4.16 and 2.42. Education is one of the important factors which influence the knowledge of individuals. The importance of formal and higher education for one's development in present day's competitive world is realized by the farmers. Many educational programmes are undertaken by the government to create awareness about the need of education in life. Involvement of educated farmers is very limited, this may be due to overall educational level of farmers in our country is low because of their financial status, they can't offer higher education. The findings are in line with findings reported by Meshram *et al.* (2020).

The trained and untrained farmers have similar level of minimum income Rs.75000, whereas the maximum income level is Rs. 900000 and Rs. 400000 for trained and untrained farmers respectively. The mean income of trained farmers is Rs. 435411.11 and untrained farmers is Rs. 228500. The SD of trained and untrained farmers is 181972.76 and 105937.11 respectively. One of the reasons might be due to the selection of trained and untrained farmers by using matched sampling technique, both groups had same trend in income distribution. It can also be observed that percentage of trained farmers belonging to high income level is more compared to untrained farmers, reason might be due to the adoption of scientific practices by trained farmers. The findings are in line with the findings of Uddin *et al.* (2015), Dabhi *et al.* (2018), Meshram *et al.* (2020) and Dhavale *et al.* (2021).

The minimum and maximum years of experience of trained farmers is 12 and 38 years and in untrained farmers it is 12 and 34 years. The mean and SD of trained farmers is 26.46 and 5.64 and untrained farmers is 25 and 5.97. The farming experience may be one of the important components which help the farmers for the decision-making ability in choosing the type of enterprise or crop to be grown. Since majority of the trained and untrained farmers belonged to medium age, they started farming from young age, therefore most of farmers had medium level of farming experience. The findings of the study are in line with the findings of Balamurgan (2017), Dhavale *et al.* (2021), Ugwumba (2010) and Dabhi *et al.* (2018).

The minimum and maximum land holding of trained and untrained farmers is 1 and 5. The mean and SD of trained farmers is 2.02 and 1.15 and untrained farmers is

Table 1 : Profile characteristics of trained and untrained farmers n=120.

S. no.	Independent variables	Trained farmers				Untrained farmers			
		Min	Max	Mean	SD	Min	Max	Mean	SD
1	Age (years)	26	57	42.35	8.15	26	59	42.56	10.39
2	Education (score)	0	9	4.83	2.280	0	9	4.16	2.42
3	Annual income (Rs.1000)	75	900	435.41	181.97	7.50	400.00	228.00	105.93
4	Landholding (ha)	1	5	2.02	1.15	1	5	2.13	1.25
5	Experience (year)	12	38	26.46	5.86	12	34	25	5.97
6	Resource recycling (No)	0	5	3.07	1.09	0	5	1.16	2.15
7	Farm machinery and implement possession (No)	3	9	5.57	1.46	3	9	5.66	1.70
8	Credit orientation (No)	1	4	2.01	1.14	1	4	2.96	1.32
9	Market accessibility (No)	1	5	2.36	1.34	1	5	2.50	1.47
10	Extension contacts (No)	7	12	9.70	1.40	7	12	9.73	1.38
11	Risk preference (No)	14	27	19.67	2.73	14	24	18.46	3.17
12	Innovativeness (No)	10	23	18.16	3.39	9	23	15.46	3.32

Table 2 : Level of Knowledge of trained and untrained farmers on components of IFS unit.

Components of IFS unit	Trained farmers (%) n=90			Mean score	Untrained farmers (%) n=30			Mean score	t _{stat}
	Low	Medium	High		Low	Medium	High		
Paddy	4.44	53.33	42.22	11.21	56.66	40.00	3.33	8.43	8.07*
Poultry	5.55	71.11	23.333	6.78	60.00	33.3	6.66	5.2	7.74*
Piggery	11.11	65.55	23.33	6.67	53.33	46.66	3.33	5.4	6.09*
Fishery	13.33	65.55	20.00	7.57	50.00	43.33	6.66	6.3	5.76*
All components	5.55	63.33	31.11	32.25	66.66	26.66	6.66	25.33	13.74*

*Significant at 0.05% t_{tab} value = 1.98

2.13 and 1.25. This result may be due to the fact that land holding distribution is matching with the general trends in the country that 80% of the land holding in the country are small and medium size. The possible reason that could be attributed to this may be that agriculture was found to be the main occupation of the family who has inherited it from their ancestors and almost all depend on their land for living in case of both trained and untrained farmers. The findings of the study conducted by Meshram *et al.* (2020) are in line with the results of the present study.

The minimum and maximum resource recycles of trained and untrained farmers is 0 and 5. The mean and SD of trained farmers is 3.07 and 1.09. The mean and SD of untrained farmers is 1.16 and 2.15. One of the reasons might be due to the fact that trained farmers have more knowledge and information on how to reuse the resources present in the farm compared to untrained

farmers. Another reason might be due to the presence of isolated units, farmers are not able to practice resource recycling. The findings of the study conducted by Ponnusamy *et al.* (2017), Morya (2015), Shekinah *et al.* (2007) are in line with the results of the present study.

The minimum and maximum number of implements possessed by trained and untrained farmers is 3 and 9. The mean and SD of trained is 5.57 and 1.46 and untrained farmers is 5.66 and 1.70. This may be due to the reason of modern mechanization which reduced the time of work and also during the period of lack of labour availability and high wages to labours. The findings of the study conducted by Islam *et al.* (2015), Meshram *et al.* (2020), are in line with the results of the present study.

In credit availability, trained and untrained farmers had availability from 0 to 5. The mean and SD of trained farmers is 2.01 and 1.14 and untrained farmers is 2.96

and 1.32. One of the reasons might be due to farmers who have undergone trainings will be presented with certificate, which helps them to get credit easily from institutional sources (commercial banks and cooperative societies). In case of untrained farmers due to no training the farmer's source is to get credit from non-institutional sources (money lenders and relatives and friends) who are easily accessible and trust worthy. The results of the study are in line with the findings of Deka *et al.* (2017) and Meshram *et al.* (2020).

In case of market accessibility, the accessibility for trained and untrained farmers ranges from 1 to 5. The mean and SD of trained farmers is 2.36 and 1.34 and untrained farmers is 2.5 and 1.47. The possible reason might be due most of the trained and untrained farmers were paddy cultivators and hence visited markets once in a month to buy inputs like seeds, fertilizers, pesticides and to gather market information. And the products from other components like livestock are mostly used for house consumption purpose or in most cases the marketing agent visit the farmers and sell the produce in the market. The findings were in line of Shwetha (2012) and Argade (2014).

In case of extension contact, trained and untrained farmers the minimum and maximum contact ranges from 7 to 12. The mean and SD of trained farmers is 9.7 and 1.40 and untrained farmers is 9.73 and 1.38. The reason for this might due to the establishment of KVK's at district level, respondents might have close contact with KVK scientists. In case of trained farmers, they are gathering information about IFS units and follow up activities whereas untrained farmers gather information about their area of interest like schemes, subsidies, this might be due to the reason why trained and untrained farmers had same level of extension contact. This result is in line with the results of Kumar *et al.* (2015), Dhavale *et al.* (2021) and Dabhi *et al.* (2018).

In risk preference, the risk preference of trained farmers ranges from 14 to 27 and untrained farmers ranges from 14 to 24. The mean and SD of trained farmers is 19.67 and 2.7 and untrained farmers is 18.46 and 3.17. It could be due to the reason that most of the trained and untrained farmers are early majority, who adopt the technology after believing that the technology adopting brings him success. Whereas, the farmers belonged to high-risk preference are innovators, who adopt the technology immediately without knowing the success rate and farmers belonging to low-risk preference are late majority and laggards, who risks to adopt the technology in the last. It may also due to the reason that farmers think growing two or more crops

reduces the hazard of loss and they also think that taking risk helps them to gain profit. This result is in line with the results of Pradhan *et al.* (2021), Verma *et al.* (2016), Goswami and Samajdar (2016) and Dabhi *et al.* (2018).

The innovativeness of trained farmers ranges from 10 to 23 and untrained farmers is 9 to 23. The mean and SD of trained farmers is 18.16 and 3.39 and untrained farmers is 15.46 and 3.32. This might be due to the fact that most of the trained and untrained farmers prone to learn new ways of farming and improved cultivation practices. It may also due to the reason that since majority belonged to medium level of risk preference, hence majority of them also have medium level of innovativeness. Untrained farmers had most innovativeness than trained farmers this may be due to the difference in the sample size. The studies of Vishvanath *et al.* (2009), Pradhan *et al.* (2021) and Dabhi *et al.* (2018) supports the present study findings.

Knowledge level of trained and untrained farmers on components of IFS units

Table 2 reveals the level of knowledge of trained and untrained farmers in different components of selected IFS unit. It can be concluded that majority of the trained farmers had medium level of knowledge on recommended practices in paddy (53.33%), poultry (71.11%), piggery (65.55%) and fishery (65.55%) and in untrained farmers majority had low level of knowledge (56.66%, 60%, 53.33% and 50%), one of the reasons may be due to the trainings received by trained farmers helped them to gain knowledge on IFS units, whereas in untrained farmers due to lack of trainings they have low level of knowledge. It can also be observed that other untrained farmers had medium and high level of knowledge this may be due to flow of information from trained farmers or from other sources to untrained farmers. The t_{stat} value (8.07, 7.74, 6.09 and 5.76) which is calculated for each component is greater than the t_{tab} value (1.98), which can be inferred as, there is statistically significant difference in the level of knowledge on components of IFS unit of trained and untrained farmers. The findings are in line with the findings reported by Prabhu *et al.* (2020), Meena *et al.* (2009) and Parvez *et al.* (2013).

However, the comparative analysis of trained and untrained farmers across different units of IFS including paddy cultivation (Fig. 1), poultry farming (Fig. 2), piggery (Fig. 3) and fishery (Fig. 4) reveals a pattern that trained farmers demonstrate significantly higher knowledge level recommended management practices. In every evaluated parameter (such as disease and pest management, feed

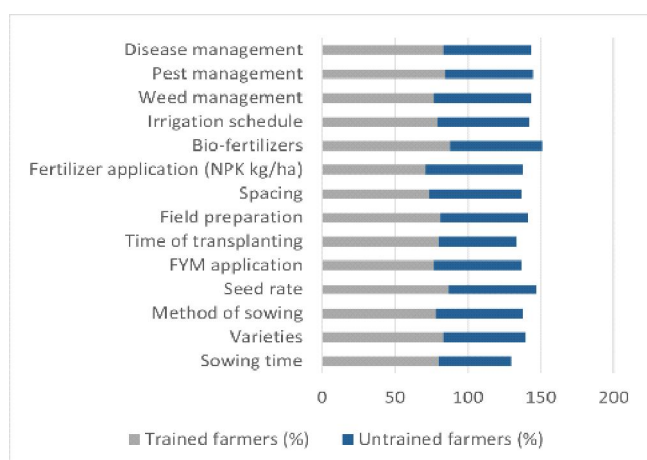


Fig. 1 : Percentage of Respondent according to knowledge on Paddy cultivation.

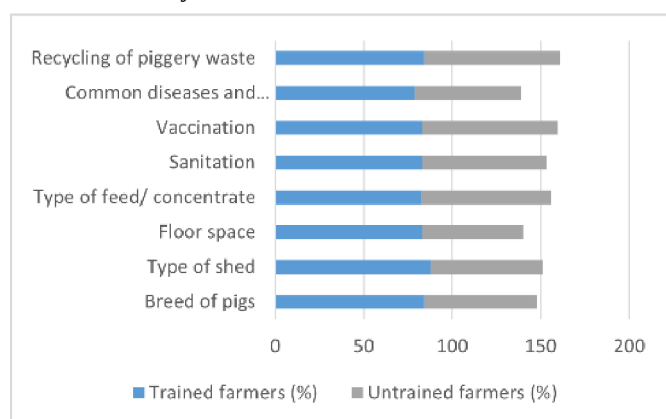


Fig. 3 : Percentage of Respondent according to knowledge on Piggery Farming.

selection, stocking density, floor space, and waste recycling), trained farmers outperform their untrained counterparts. These results underscore the substantial impact of formal training on the awareness and behaviour of farmers within integrated farming systems, highlighting its crucial role in promoting the effective adoption of scientific agricultural practices and improved resource management.

Extent of adoption of components of IFS units by trained and untrained farmers

Table 3 provides the data about the extent of adoption of trained and untrained farmers in different components of selected IFS unit. It can be concluded that majority of the trained farmers had high extent of adoption of recommended practices of paddy (53.33%), medium level of adoption in poultry (58.88%), piggery (48.88%) and fishery (60%) and in untrained farmers majority had low level of adoption (76.66%, 73.33%, 73.33% and 76.66%), this may be due to the trainings and level of knowledge of trained farmers which motivated them to adopt IFS unit, whereas in case of untrained farmers due to lack of

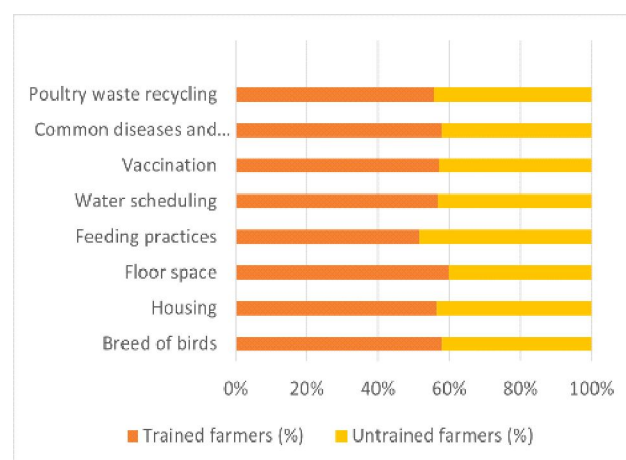


Fig. 2 : Percentage of Respondent according to knowledge on Poultry farming.

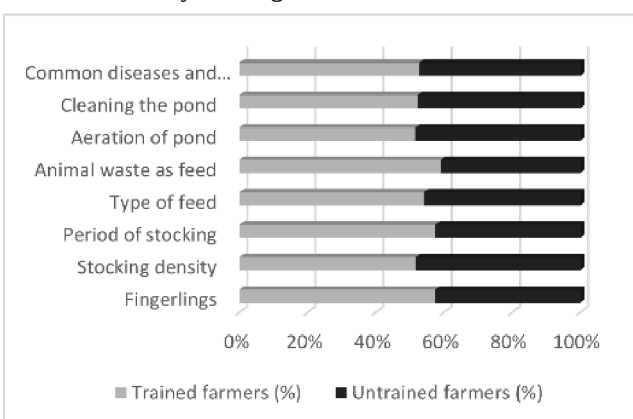


Fig. 4 : Percentage of Respondent according to knowledge on Fishery practices.

trainings and lack of knowledge they are not interested in adopting IFS unit. The t_{stat} value (18.13, 7.68, 7.17 and 8.23) which is calculated for each component is greater than the t_{tab} value (1.98), which can be inferred as, there is significant difference in the extent of adoption of components of IFS unit by trained and untrained farmers. The findings are in line, with the findings reported by Sakib and Afrad (2014), Singh and Varshney (2010), Kumari *et al.* (2020) and Rao *et al.* (2021).

Moreover, farmers who have undergone formal training reflects much higher levels of adoption of recommended practices in all aspects be it in paddy cultivation (Fig. 5), poultry production (Fig. 6), piggery (Fig. 7) and fishery (Fig. 8). This consistent gap between trained and untrained groups highlights the transformative impact that targeted training programs can have on agricultural livelihoods. A potential reason for this disparity might be due to attended trainings, trained farmers had more knowledge on IFS units and thus creates interest to adopt IFS units, which is lacking in case of untrained farmers.

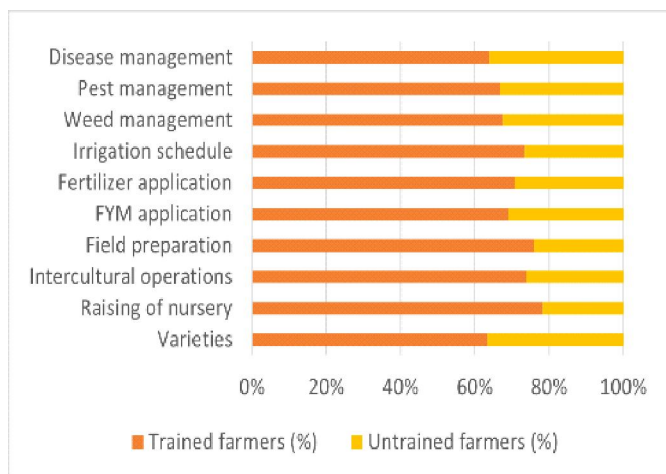


Fig. 5 : Percentage of Respondent according to adoption of Paddy cultivation.

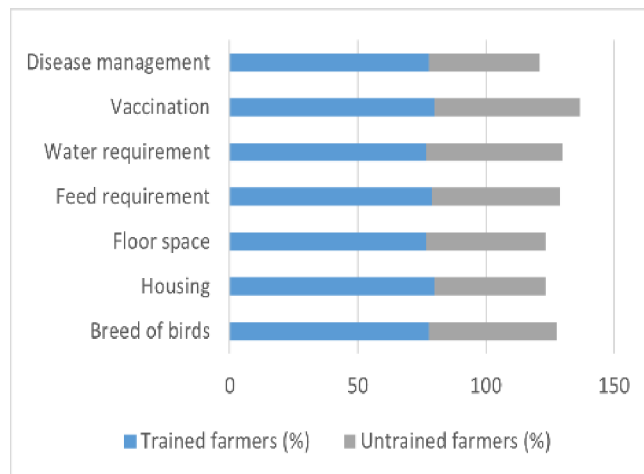


Fig. 6 : Percentage of Respondent according to adoption of Poultry farming.

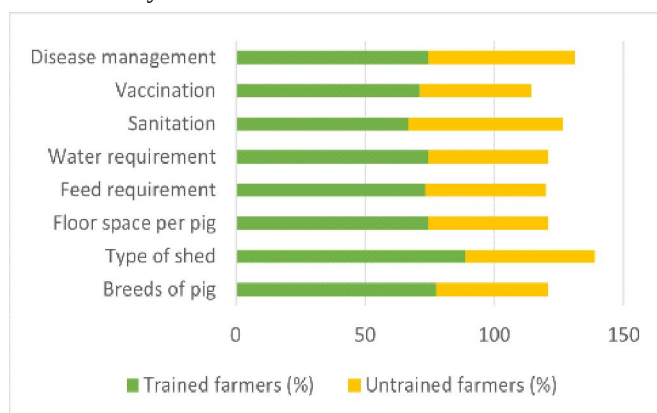


Fig. 7 : Percentage of Respondent according to adoption of Piggery farming.

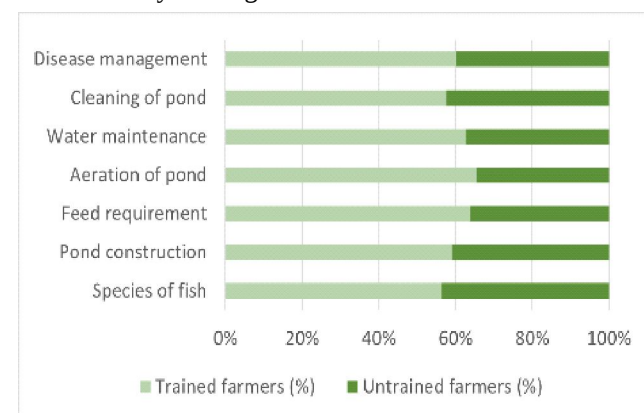


Fig. 8 : Percentage of Respondent according to adoption of Fishery practices.

Table 3 : Extent of adoption of components of IFS unit by trained and untrained farmers.

Components of IFS unit	Trained farmers (%) n=90			Mean score	Untrained farmers (%) n=30			Mean score	t _{stat}
	Low	Medium	High		Low	Medium	High		
Paddy	3.33	43.33	53.33	8.33	76.66	16.66	6.66	3.56	18.13*
Poultry	17.77	58.88	23.33	5.47	73.33	23.33	3.33	3.43	7.68*
Piggery	15.55	48.88	35.55	6.01	73.33	16.66	10.00	3.93	7.17*
Fishery	14.44	60.00	25.55	5.65	76.66	16.66	6.66	3.66	8.23*
All components	6.66	67.77	25.55	25.655	70.00	20.00	10.00	14.6	18.35*

*Significant at 0.05% t_{tab} value = 1.98

Conclusion

The study concluded that the trainings helped the farmers to increase the level of knowledge and extent of adoption of trained farmers in the area. Whereas in case of untrained farmers, who didn't receive information has some knowledge due to diffusion of information from trained farmers to untrained farmers. Even though untrained farmers had knowledge about the IFS, majority

of them were not adopting the practices as suggested. The study concludes that there is a positive impact of IFS units on the level of knowledge and extent of adoption of IFS model. Structured training programme are crucial for enhancing farmers' knowledge and adoption of Integrated Farming Systems (IFS), while untrained farmers rely mainly on partial information diffusion with limited practice. Therefore, expanding training coverage, strengthening farmer-to-farmer extension, and providing

supportive policies are essential to scale up effective adoption of IFS models.

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