Adoption level, attitude and constraints in the implementation of Rice Integrated Pest and Disease Management (IPDM) Module

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ABSTRACT

An impact analysis was taken up for the field demonstrated rice integrated pest and diseases management (IPDM) module in the Madurai East block of Tamil Nadu. The practice-wise adoption, change in the attitude of the farmers and the constraints faced were investigated. Though the level of adoption had increased with favourable attitude the various constraints expressed by the farmers have to be solved for sustained adoption of this technology. Conducting more local demonstrations along with regular monitoring of trained staff will overcome the bio-physical and personal constraints and in turn will increase the adoption and confidence level among the farmers. The contented farmers are also sure to disseminate the information from farmer to farmer in their own villages. Rice IPDM module promoted a shift from the present inorganic chemical reliance to the bio-intensive organic IPDM, accordingly lowering the production costs at farm level will be ensured. Farmers must also re-assign to mechanized rice cultivation and develop cooperative ethics in the minds of people. Rice IPDM is sure to reduce environmental pollution; improves soil and water quality; reduce farmers and consumers risks from pesticide poisoning and related hazards; ecologically sustainable by conserving natural enemy species, biodiversity and genetic diversity and ultimately raise the socio-economic status of the rice growers.

Key words: IPDM, Practice-wise adoption level, attitude, constraints

Rice is the most important and extensively grown food crop in India and it is the staple food for more than half of the world population. The major constraints in rice cultivation as perceived by the rice growers include insufficient irrigation water, insect/disease outbreaks and poor soil health. Farmers are inclined only to pesticides as a sole means to tackle the accelerating pest and disease incidents. Indiscriminate use and sub-lethal dose of pesticides, improper pesticide combination and spray not directed to target site *etc*., have complicated the crop protection. An economical and more environmental friendly alternative for rice growers would be adoption of Integrated Pest and Disease Management (IPDM). Integrated pest management is a "common sense approach" that combines several known techniques to reduce and maintain pest populations and maintain them below levels causing economic injury in a way that avoids harmful side effects (Magenya, 1997). In recent years, low external inputs

and non-chemical alternatives; have been viewed as technology options that could help to create sustainable systems and decrease / avoid the needs for expensive and undesirable chemical inputs. Alternative agriculture has argued for an economically viable production to be viewed in the context of a healthier, environmentally friendly, sustainable agriculture and the need for investment in low external input and non-chemical alternatives that include farmer empowerment. In general, IPDM technologies are not accepted by all the farmers at a time and also to full extent. In this context field demonstration of IPDM was taken up in the Madurai East block and impact analyses on practice-wise adoption, change in the attitude of the farmers and the constraints faced were analysed in the study. Field demonstration on rice IPDM was taken up in the east block of Madurai district in Tamil Nadu during *Kharif* and *Rabi* 2013 as per the crop production guide (2012). Four villages *viz*., Arumbanur, Thuyyaneri,

Ailangudi and Pattanam were selected and the rice IPDM was demonstrated from seed sowing to seed harvest. Rice IPDM module was compared against the farmer's practices. The IPDM demonstration enabled the farmers to understand why they apply particular inputs at specific times during the year and encouraged a targeted approach with fewer negative financial and environmental side effects. Learning by doing has been shown to effectively improve knowledge uptake (Ajayi *et al.,* 2008; Olanya *et al.*, 2010; Snapp *et al.,* 2002).

After the completion of the demonstration, 10 farmers from each village were selected at random and through personal interview the data on adoption level was collected. From the collected data the practice-wise adoption level of rice IPDM before and after demonstration was calculated.

A total of 200 farmers who were trained during the field day of rice IPDM demonstration at the four selected villages constituted the respondents. To measure the degree of the farmers like or dislike for the integrated pest and disease management practices in paddy, an attitude scale was constructed following the method of equal appearing scale interval developed by Thurstone (1946). Finally, five statements were selected to constitute attitude items. The scale was administered in a five point continuum strongly agree, agree, undecided, disagree and strongly disagree. Favourable statements (statement 3, 4 and 5) to the objective integrated pest and disease management practices were considered and scored in the following pattern strongly agree, agree, undecided, disagree and strongly disagree and received the scores 5,4,3,2 and 1 respectively and for those items that were negative (statements 1 and 2) to the objective integrated pest and disease management practices the scoring process was reversed. All the scores obtained by individual farmers were summated in order to yield an attitude scores for the individuals concerned. The maximum score was 25 and minimum score was 5.

The farmers adopting the IPDM practices are facing lot of limitations which prevent them from the adoption of the technology. Ten farmers from each village who were under guidance during IPDM demonstration for the entire crop period were selected at random. The constraints faced by them were collected by using a semi structured interview schedule and ranking was done.

The extent of adoption of the various IPDM components among the trained farmers had showed a significant increase subsequent to the rice IPDM demonstration than measured prior to demonstration. The adoption level of cultural practices in insect pest management showed only a gradual increase of 1.21 to 1.89 times after the rice IPDM demonstration (Table 1). It is because most of the farmers are already adopting them.

With regard to wider spacing, use of weedicides, alternate wetting and drying and use of bio-fertilizers showed a steep increase of 97.50, 75.00, 92.50 and 95.00 per cent respectively in the adoption level after the rice IPDM demonstration (Table 1). Similarly in the use of bio-control agents and pheromone traps, the adoption level ranged between 65.00 and 92.50 per cent after the rice IPDM demonstration.

Technologies that have confirmable results and cheaper are more rapidly adopted than those that are capital intensive. It is in line with the findings of Ejembi *et al.,* 2006. According to Guest *et al.*, 2010, participatory approach is a continuous two-way learning approach, in which farmers, extension staff and researchers together investigate, analyse and evaluate technologies, and direct future research opportunities. In this study, the IPDM technology was delivered to the farmer in their own field with regular follow up visits to make sure the practices are being adopted properly.

From the observation, it could be found that only 22.0 per cent of the farmers had more favourable attitude towards the integrated pest and disease management practices. However, 63.50 per cent had favourable attitude. On overall analyses, 85.50 per cent of the farmers had favourable to more favourable attitudes Table 2. The favourable attitude expressed by the majority of trained farmers was mainly due to the knowledge on the detrimental effects in the indiscriminate use of chemicals in agriculture, human health, soil environment and their own experiences.

The bio-physical constraints encountered by the trained farmers are given in the Table 3. The first serious constraint was untimely and inadequacy of water supply experienced by 65.0 per cent of the trained farmers. It was followed by unmanaged weed growth which was experienced by 50.0 per cent of the trained farmers.

Table 1. Practice-wise adoption level of rice IPDM before and after demonstration

IPDM components	Adoption level (%)	
	Before demo	After demo
1. Cultural practices		
a. Summer ploughing	47.50	90.00
b. Puddling, plastering, levelling	82.50	100.00
2. Agronomic practices		
a. Varietal selection	30.00	100.00
b. Seed rate	32.50	87.50
c. Wider spacing	2.50	97.50
d. Weed management		
(i) Weedicide	5.00	75.00
(ii) Conoweeder	0.00	40.00
e. Water management		
(i) Submergence at critical stage	35.00	87.50
(ii) Alternate wetting and drying	12.50	92.50
f. Fertilizer management		
(i) Organic source of nutrient	32.50	92.50
(ii) Recommended dose of application	35.00	90.00
(iii) Neem coated Urea	15.00	80.00
(iv) Use of Bio fertilizers	12.50	95.00
3. Biocontrol agents		
(i) *T.japanicum*	5.00	70.00
(ii) *T.chilonis*	0.00	75.00
(iii) *Pseudomonas*	10.00	92.50
(iv) Encouraging Native Natural enemies	15.00	82.50
4. Behavioural methods		
(i) Light trap	0.00	2.50
(ii) Pheromone trap for Yellow Stem Borer	0.00	65.00

The third constraint faced by the trained farmers was the occurrence of pest and disease at a particular time (40%) and the occurrence of more than one pest at a time (35%) ranked as 4th constraint. Non-availability of organic manures was expressed by 17.5 per cent of the farmers was ranked as fifth bio-physical constraint.

Among the four personal constraints pointed out by the farmers, 55.0 per cent of farmers experienced difficulty in adapting to the long schedule of IPDM as a major constraint, followed by difficulty in remembering ETL (42.5 per cent), lack of knowledge to identify natural enemies (15.0 per cent) and lack of knowledge to identify insect pest and disease (12.5 per cent).

Table 2. Categorizing the respondents attitude towards rice IPDM

Score	Frequency	Percentage	Category
11-15	29	14.5	Less favourable
16-20	127	63.5	Favourable
21-25	44	22.0	More favourable

Socio-economic constraints encountered by trained farmers are given in Table 3. Majority of the farmer's experienced labour scarcity (75.0 %) as their primary constraint followed by high cost of labour (57.5 %). While the non-remunerative market price (47.50 %), high cost of inputs (45.00 %) and high cost of cultivation (32.5 %) were ranked third, fourth and fifth respectively. IPDM trained farmers were fairly aware that adoption of IPDM practices requires cooperation from a rice farmer in a village to take up synchronised sowing of a selected variety and collective pest management measures. About 30.0 per cent of them reported this as constraints.

Technological constraints faced by the trained farmers were lack of IPDM with few components, lack of simple ETL, requirement of more time to combat the pest and difficulty in monitoring light trap to the tune of 55.0, 40.0, 30.0 and 17.5 per cent, respectively.

From this study, the adoption level attitude of the farmers and the nature of constraints faced by the

Table 3. Constraints in the adoption of rice IPDM technology

Particulars	No. of positive respondents	Percentage (%)	Rank
Bio-physical constraints			
a. Occurrence of Insect Pest & Disease	16	40.0	III
b. Occurrence of more than one pest	14	35.0	IV
c. Untimely & inadequacy of water	26	65.0	I
d. Non-availability of organic manure	7	17.5	V
e. Unmanaged weed growth	20	50.0	II
Personal constraints			
a. Difficulty in remembering ETL	17	42.5	II
b. Lack of knowledge to identify Insect Pest & Disease	5	12.5	IV
c. Lack of knowledge to identify natural enemies	6	15.0	III
d. Difficulty in adopting to the long schedule of IPDM	22	55.0	I
Socio – economic constraints			
a. Labour scarcity	30	75.0	I
b. High cost of labour	23	57.5	II
c. High cost of inputs	18	45.0	IV
d. High cost of cultivation	13	32.5	V
e. Lack of cooperation	12	30.0	VI
f. Non-remunerative market price	19	47.5	III
Technological constraints			
a. Lack of IPDM with few components	22	55.0	I
b. Lack of simple ETL	16	40.0	II
c. Requirement of more time	12	30.0	III
d. Difficulty in monitoring light trap	7	17.5	IV

farmers in adoption of rice IPDM have been pooled. Though the level of adoption has increased with favourable attitude, the various constraints expressed by the farmers have to be solved for sustained adoption of this technology. Conducting more local demonstrations, so that farmers learn by doing along with regular visits of trained staff will overcome the bio-physical and personal constraints and in turn will increase the confidence level among the farmers. The satisfied farmers are also sure to disseminate the information from farmer to farmer in their own villages and nearby villages.

Rice IPDM module promotes a shift from the present inorganic chemical reliance to the bio-intensive organic IPDM, thus lower production costs at farm level is ensured. Farmers must also re-assign to mechanized rice cultivation and develop cooperative ethics in the minds of people. Rice IPDM is sure to reduce environmental pollution; improves soil and water quality; reduce farmers and consumers risks from pesticide poisoning and related hazards; ecologically sustainable by conserving natural enemy species, biodiversity and genetic diversity and ultimately raise the socio-economic status of the rice growers.

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