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Item Analysis Methodology to Measure Knowledge of Farmer's on Eco-Friendly Farm Technology in Rice Cultivation

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ABSTRACT

The increased pressure to maintain high level of rice output for consumption has resulted in increased use of pesticides on rice fields which leads destruction of rice ecosystem. It has become imperative to develop an effective and holistic system of tackling pests to make it more environmental friendly, economically viable and socially acceptable to farmers which can be achieved through eco-friendly technologies, so it is very important to assess the knowledge level of stakeholders in eco-friendly rice farming in order to identify gap in adoption. Hence a study was designed to develop a standardized test using test construction methodology adopting item analysis procedure, pilot tested with 26 farmer members from non-sample area. The final test consisted of 21 questions having difficulty index value in the range of 20 to 80 and discrimination index value above 0.10 was retained and used to measure the knowledge of stakeholders in eco-friendly rice farming.

Key Words: Eco-friendly Farm Technology, Farmers Field School, Knowledge Test.

INTRODUCTION

Rice is the staple food for more than 65 per cent of the people in India and cultivated under diverse climatic conditions. It has been assumed that current level of production (104 MT) has to be raised to 110 MT by 2016-17 to meet the needs of increasing population. The high yielding varieties (HVYs) and fertilizer centred technologies at subsidized rates offered by the government led to increase in fertilizer consumption which posed a serious threat to the environment and resulted in affecting the ecosystem. The effect of prolonged and over usage of chemicals in crops production has resulted in human health hazards and pollution of environment and ground water.

At present, the issue is, whether to continue with the chemical inputs-based intensive technologies or to re visit to the traditional environment friendly farming practices like organic farming for sustainable production, income and socio-economic development of the farming community(Srinivas *et al,* 2014). Hence, it has become imperative to develop an effective and holistic system of tackling pests and diseases to make it more environmental friendly, economically viable and socially acceptable to farmers, which can be achieved through eco-friendly technologies.

Farmers field schools (FFS) are the major ways to promote this type of farming, as it involves more of skill based techniques which can be learned only through active participation in FFS. FFS is a non-formal learner centred educational process and promising extension method for popularising eco-friendly farm practices. Hence, it was felt important to assess the knowledge level of stakeholders in eco-friendly rice farming in order to identify gap in adoption. Therefore, a study was designed to develop a standardized test to measure the knowledge of stakeholders in eco-friendly rice farming.

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MATERIALS AND METHODS

A list of the farmer respondents participated in eco-friendly farm technology in rice promoted through FFS was obtained from the Programme Coordinator of KVK Palakkad. Five FFS and 20 farmers from each FFS, thus total sample size of 100 farmers was selected for the study. Knowledge level of respondents on eco-friendly farm technologies in rice was measured through the teacher made test as suggested by Anastasi (1961) and prepared based on the content on eco-friendly farm technologies in rice disseminated through FFS.

Accordingly 35 knowledge items representing the eco-friendly farm technology in rice were screened out and translated into local language. The selected knowledge items were tested in non-sample area with another FFS consisting of 26 farmer members for testing its reliability and validity. After testing the reliability and content validity, the test items were administered to 26 respondents to know the difficulty index following the items analysis procedure in order to ensure the construct validity. Thus the obtained construct was ready for measuring the knowledge of farmers on eco-friendly farm technology in rice cultivation.

Scoring pattern

The respondents were asked to indicate their responses to the items in relevant knowledge tests and the correct answers were assigned score '1' and incorrect answers '0'. The total knowledge score for each respondent was calculated by summing up the scores given for each item.

Difficulty Index (P)

The difficulty index indicates the extent to which an item is difficult. An item should not be so easy, that all persons can pass it, nor should be so difficult that none can pass it. The item difficulty index was worked out in this study as P; that is, the percentage of respondents answering an item correctly. The difficulty index was calculated by the following formula used by Smitha and Anilkumar (2011).

$$P = \frac{NC}{N} \times 100$$

Where, P = Difficulty index, NC = Number of respondents who answered correctly and N is total number of respondents.

The range is from 0 to 100 per cent, the higher the value, the easier the item. P values above 0.90 are very easy items and might be a concept not worth testing. P-values below 0.20 indicate difficult items and should be reviewed for possible confusing language or the contents needs re-construction. Optimum difficulty level is 0.50 for maximum discrimination between high and low achievers. For the present study the items with P values ranging from 20 to 80 were considered for the selection of items in the final knowledge test.

Item Discrimination

Item discrimination or the discriminating power of a test item refers to the degree to which success or failure on an item indicates possession of the ability being measured (Singh, 2013). It determines the extent to which the given item discriminates among examinees in the function or ability measured by the item. This value ranges between 0.0 and 1.00. Higher the value, more discrimination of the item is.

$$E^{1}/_{3} = \frac{(S1) - (S3)}{N/_{3}}$$

Where E- Discrimination Index, S1 and S3 are the frequencies of correct responses of the items in upper and lower groups of respondents respectively, N- Number of total respondents

The procedure involves the following steps:

1. Administration of the draft test on a non-sampled FFS population
2. Identification of upper 27 per cent and lower 27 per cent farmers having highest and lowest scores in rank order respectively on the total test.
3. Calculation of each item, of the proportion of the examinees attempting it correctly
4. The discrimination index (DI) was calculated by using above mentioned formula
5. The value of the discrimination index can range from -1.00 to +1.00.
6. Items having negative discrimination were rejected. Items having discrimination index

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Table I

Sr. No.	Item	Difficulty Index	Discrimination Index
1.	Bio control agent used for the control of paddy blast is ____(*Trichoderma*)	80.76*	0.11*
2.	How do we apply *Trichoderma* ____?(Seed treatment)	65.38*	0.69*
3.	What is the quantity of *Trichoderma* used for seed treatment is _____? (10g/kg seed)	23.07*	0.34*
4.	The quantity of *Trichoderma* used as seedling root dip is____ g/l of water (20g/l)	57.69*	0.11*
5.	*Pseudomonas* is used against for the control of ___? (Bacterial Leaf Blight)	34.61*	0.23*
6.	How can we apply *Pseudomonas*_____? (Seed treatment)	15.38	0.11
7.	The quantity of *Pseudomonas* used for seed treatment is _____g/kg seed (10 g/kg)	19.23	0
8.	What is the quantity of *Pseudomonas* used as root dip of seedlings is _____ g/l of water (250g/750ml)	26.92	0
9.	The quantity of *Pseudomonas* used as foliar is_____? g/l of water (20g/l)	61.53	-0.11
10.	Foliar spray of *Pseudomonas* is applied at the age of_____? (30-45 DAT)	7.69	0.11
11.	*Beauveria* is used for the control of _____? (Leaf roller)	34.61	-0.11
12.	The quantity of *Beauveria* used _____? (20g/l)	61.53*	0.46*
13.	Trichogramma cards are used for the control of _____? (Stem borer)	69.23*	0.34*
14.	How many Tricho cards or pieces are to be placed in an acre of rice fields _____? (5cc/ha)	61.53*	0.34*
15.	Pheromone traps are used effectively for the control of _____? (Yellow stem borer)	61.53*	0.46*
16.	How many Pheromone traps are to be placed in an acre of rice fields_____ ? (8/acre)	19.23	-0.11
17.	Mention one organic manure used in rice fields _____ (FYM)	96.15	0.11
18.	What is the quantity of organic manure that has to be applied in rice fields___? (5 t/ha)	53.84*	0.11*
19.	What do we apply to the soil when it is acidic_____? (Lime)	92.30	0.23
20.	What is the quantity of lime that has to be applied to a hectare/acre/cent ___? (600 kg/ha)	38.46*	0.34*
21.	Name one green-leaf manure used in rice cultivation _____? (*Daincha*)	96.15	0.11
22.	Mention any one natural enemy of insects commonly seen in rice fields____?(Spider)	76.92*	0.34*
23.	What is the use of summer ploughing in rice field's _____? (To kill insects)	80.76*	0.34*
24.	Why do we plaster and trim the bunds in the rice field's _____? (To kill grasshopper)	57.69*	0.11*
25.	When should be the Trichogramma released in rice fields ____? (30DAT)	11.53	-0.23
26.	What should be the frequency of the release of Trichogramma ____? (7 days interval)	34.61	-0.11
27.	Name a botanical pesticide effectively used in rice___? (Neem)	80.76*	0.34*
28.	Name a natural enemy commonly seen ___?(Damson fly)	61.53*	0.11*
29.	What is the insect-pest against which passing of rope is effective in the control of _____? (Leaf folder)	57.69*	0.57*
30.	How do we apply *Bauveria* _____? (Foliar spray)	76.92*	0.23*
31.	Which of the following enhances the fertilizer use efficiency in rice___? (PGPR)	73.07*	0.237*
32.	Light traps are used for monitoring ___? (Stem borer and leaf folder)	46.15*	0.34*
33.	The distance to be maintained for placing each Pheromone traps is_____? (60mt)	19.23	0.23
34.	Which is the major natural enemy of rodent population in rice fields___? (Snake)	96.15	0.11
35.	Name a microbial formulation effective against many diseases in rice__? (*Bacillus*)	30.76*	0.23*

*Mark indicates the items that are retained for the final study

above 0.10 were selected for final study (Barman and Kumar, 2010).

RESULTS AND DISCUSSION

By following the item analysis procedure, item difficulty index and discrimination index were computed and presented in table I

By calculating discrimination index and difficulty index value from the table I it was observed that the items that satisfied the values of difficulty index in the range of 20 to 80 and the discrimination index value above 0.10 were selected for final study. Accordingly 21 items were selected for the large scale application of the test.

CONCLUSION

The test developed was scientifically tested for its validity and hence, it can be very well used to measure the knowledge level of farmers on eco-friendly farm technologies related to rice farming in similar micro level conditions with necessary modification. The result obtained from the macro level population would help to derive appropriate strategy for technology innovation, refinement and dissemination with respect to eco-friendly technologies in rice farming.

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