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Construction of Knowledge Test to Measure the Knowledge of Agriculture Officers on IPM, INM and IWM Practices

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ABSTRACT

Due to the non-availability of a standardized scale to measure farmer's the Knowledge of Agriculture officers on IPM, INM and IWM Practices, it was thought necessary to construct a test for the purpose and an attempt has been made to develop a test for measuring Knowledge of Agriculture officers on IPM, INM and IWM Practices. Pertinent items were collected covering all aspects of IPM, INM and IWM Practices. After getting jury opinion on the items of test index of item difficulty, index of item discrimination and index of item validity were worked out. To administer the knowledge test a respondent is given one mark for each correct answer and zero mark for each wrong answer. Twenty eight statements were finally selected from 46 statements.

KEYWORDS : Knowledge test, Agricultural Officer, IPM, INM, IWM

Introduction

The knowledge is operationalised for the present study as "the level of information possessed on integrated pest management, integrated nutrient management and integrated weed management by the agriculture officers.

A knowledge test was developed with 28 items to Measure the Knowledge of Agriculture officers on IPM, INM and IWM Practices. Each item is measured on two point continuum. i.e. Correct and incorrect with '1' and '0' respectively. The maximum and minimum scores to be obtained are 28 and 0 respectively.

The details of the construction and standardization of this knowledge test is given below.

Methodology

Collection of items

Initially 75 items were collected focusing on various aspects of organic cotton cultivation practices. Experts in the field of Agronomy and Agricultural entomology were consulted to collect the above 75 items .After screening, fine tuning and editing based on the opinion of the concerned scientists 46 items were remained. The 46 items were subjected to item analysis to screened some more items based on the opinion of the respondents (other than the final sample) in sample area.

Item analysis

The item analysis was carried out in terms if three indices that is item difficulty index and item Discrimination index and point biserial correlation. The index of item discrimination provides information on how well an item discriminates in agreement that is whether an item really discriminates well informed respondent from poorly informed respondent. Whereas item difficulty index indicates the extent to which an item was difficult. The point biserial correlation provided information on how well item measures or discriminates in agreement with the rest of the test.

Pretesting of the items was done as suggested by Gonard (1948). The items were revised and administered to 30 respondents selected for the purpose of pretesting in controlled situation.

Item Difficulty Index (P)

The 46 items were administered to 30 non sample respondents with two point response continuum. The scores allotted were one for correct response and zero for incorrect response. After computing the total score obtained for each of the 30 respondents on 66 items, they were arranged in order from highest to lowest. Based on which the 30 respondents were then divided into six equal groups. These groups were labelled as G_1, G_2, G_3, G_4, G_5 and G_6 with 5 respondents in each group. For the purpose of item analysis, the middle two groups G_3 and G_4 were eliminated keeping only four extreme groups with high and low scores. (Bloom *etal.*1956)

The index of difficulty was worked out as the percentage of the respondents answering an item correctly. The items with 'p' values ranging from 30 to 70 were considered for the final selection of the knowledge test battery.

Item Discrimination Index (E 1/3)

The item discrimination index indicated by "E 1/3" which is calculated by the formula.

$$E\ 1/3 = \frac{(S1 + S2) - (S5 + S6)}{N/3}$$

Where S1, S2 and S5, S6 are the frequencies of correct answers in the groups G1, G2 and G5 and G6 respectively. 'N' is the total member of respondents of the sample selected for the item analysis that is 30.

The discrimination index varies from 0 to 1. The items with discrimination index ranging from 0.30 to 0.80 were selected for the final test.

Point Biserial Correlation (r_{pbis})

The main aim of calculating point biserial correlation was to work out the internal consistency of the items i.e. the relationship of the total score to a dichotomised answer to any given item. In a way, the validity power of the item was computed by the correlation of the individual item of preliminary knowledge test calculated by using the formula suggested by Garret (1966).

$$r_{pbis} = \frac{MP\text{-}MQ}{SD} \times \sqrt{pq}$$

r_{pbis} = Point biserial correlation.

MP = Mean of the total scores of the respondents who answered the item correctly.

$$MP = \frac{\text{Sum total of x y}}{\text{Total number of correct answers}}$$

MQ = Mean of the total scores of the respondents who answered the item incorrectly.

$$MQ = \frac{\text{Sum total of x - Sum total of x y}}{\text{Total number of wrong answers}}$$

SD = Standard deviation of the entire sample.

P = Proportion of the respondents giving correct answer to the item.

$$P = \frac{\text{Total number of correct answers}}{\text{Total number of respondents}}$$

O = Proportion of the respondents giving incorrect answer to the item

(or) Q = 1-P

X = Total score of the respondent for all items.

Y = Response of the individual for the items i.e. (Correct = 1; Incorrect = 0)

XY = Total score of the respondent multiplied by the response of the individual to the item. i.e. (Correct = 1; Incorrect = 0)

Items having significant point biserial correlation either at 1 per cent (or) 5 per cent level was selected for the final test of the knowledge.

Representativeness of the Test
Care was taken to see that the test items selected finally covered the entire universe of respondent's knowledge on IPM, INM and IWM practices.

Total items selected
Out of 50 items, 45 items were finally selected based on

- Items with difficulty level indices ranging from 30 to 70.
- Items with discrimination indices ranging from 0.3 to 0.7.
- Items having significant point biserial correlation either at 1 per cent or 5 per cent level.

Items have 0.70 and 0.30 as correct proportion. The average of these proportions is equal to (0.70 + 0.30)/2 = 0.50.

Thus, the finally selected knowledge test items comprised of 3 types of questions viz true / false, multiple choice and direct questions totalling to 46 items to measure the knowledge on IPM, INM and IWM practices. The selected items with P, E1/3 and Rpbis values are appended (table 1).

Test-Retest Reliability
The test was administered to 30 respondents separately with an interval of 15 days. The two sets of knowledge scores obtained by the farmers were correlated. The correlation co-efficient (r=0.74) was highly significant indicating a high degree of dependability of the instrument for measuring knowledge of the Agriculture officers.

Validity
The validity of the test items was tested by the method of point biserial correlation (rpbis). The items with highly significant correlation coefficients either at 1 per cent (or) at 5 per cent level indicated the validity of the items of the knowledge test designed to measure the knowledge of the Agriculture officers on IPM, INM and IWM Practices.

Content Validity
The content validity of the knowledge test was derived from a long list of test items representing the whole universe of latest IPM practices in cotton crop collected from various sources as discussed earlier. It was assumed that the score obtained by administering the knowledge test of this study measures what was intended to measure.

Thus the knowledge test developed in the present study measures the knowledge of organic cotton and conventional cotton farmers as it showed a greater degree of reliability and validity.

Scoring Pattern
The selected knowledge test items were arranged under different types as Correct/in correct, multiple choice and fill up the blanks. The correct response to each test item was given a score of 'one' and incorrect response a score of 'zero', that the knowledge score of a respondent is the summation of scores of correctly answered items out of total test items. The possible knowledge score ranged from 0 to 46.

Administration of the test
The final knowledge test with 46 items was administered agriculture officers. The responses in the form of correct or in correct answers were recorded. The correct answer was assigned a weightage of 'one' and the incorrect with 'zero'.

Categorisation
Based on the knowledge scores obtained both the organic and conventional respondents were grouped in to following 3 categories by using class interval technique. The class intervals were calculated based on maximum and minimum obtained scores.

Table 1 : Respondent in four extreme groups

S. No.	Frequencies of correct answer of respondents in four extreme groups				Difficulty index	Discrimination index	Rpbis
	G-1	G-2	G-5	G-6			
1*.	5	5	4	2	76	0.4	0.4036
2*.	5	5	4	4	80	0.6	0.3651
3*.	5	4	2	2	73	0.5	0.3787
4.	5	5	4	4	80	0.6	0.2968NS
5*.	5	4	3	3	76	0.3	0.3543
6*.	5	5	3	3	80	0.4	0.4433
7*.	5	5	3	2	73	0.3	0.4037
8.	5	5	3	4	80	0.3	0.2693NS
9.	5	4	4	4	73	0.1	NC
10*.	5	4	4	2	76	0.3	0.4179
11*.	5	5	3	3	76	0.4	0.5070
12.	5	5	3	4	76	0.3	0.2008NS
13.	5	4	3	4	76	0.3	0.2884NS
14*.	5	4	3	2	73	0.4	0.3871
15*.	5	5	3	2	70	0.5	0.4565
16.	5	4	5	4	80	0.0	NC
17*.	5	5	3	2	73	0.5	0.3609
18*.	5	5	3	2	73	0.5	0.43695
19.	2	1	0	2	16	0.1	NC
20*.	5	5	3	3	73	0.2	0.7194
21*.	5	3	4	2	73	0.2	0.3704
22*.	5	5	3	3	73	0.4	0.4037
23.	5	4	4	3	86	0.2	NC
24.	2	2	1	0	16	0.3	NC
25.	0	2	0	1	16	0.1	NC
26*.	5	5	2	3	80	0.5	0.4983
27*.	5	4	5	3	80	0.2	0.3672
28.	1	2	1	1	16	0.1	NC
29.	5	4	3	3	80	0.2	0.1869NS
30*.	5	2	3	3	80	0.3	0.3645
31.	5	3	4	3	73	0.1	NC
32.	5	4	4	3	80	0.2	0.2693NS
33.	4	5	5	5	96	0.1	NC
34.	5	5	5	5	93	0.0	NC
35*.	5	5	2	2	80	0.6	0.5573
36*.	5	5	3	3	76	0.4	0.4196
37*.	5	4	4	1	80	0.4	0.5166

S. No.	Frequencies of correct answer of respondents in four extreme groups				Difficulty index	Discrimination index	Rpbis
	G-1	G-2	G-5	G-6			
38*.	5	5	3	1	80	0.4	0.5807
39*.	5	5	3	2	80	0.6	0.4483
40.	2	1	1	1	16	0.1	NC
41*.	5	4	4	3	80	0.2	0.3642
42*.	5	4	4	2	76	0.3	0.3884
43.	2	1	1	1	16	0.1	NC
44*.	5	5	4	0	80	0.6	0.6631
45*.	5	5	4	1	80	0.5	0.5349
46*.	5	5	4	1	80	0.5	0.5074

*** Selected items**
NS :Non Significant

NC- Rpbis is not calculated for items difficulty index more than 80 and less than 20 and items Discrimination index more than 0.8 and less than 0.2

Results and Discussion

Out of 46 items 28 items were selected to measure the knowledge of Agricultural officers on IPM, INM, and IWM.

Knowledge test for Agricultural officers on IPM, INM and IWM.

Integrated pest management

- Thuricides generally used against the moth pests
  True/ False
- Mode of action of thuricides is paralyzing the gut and mouth parts of insects
  True/ False
- The load of pest population at which pesticide spraying is recommended _____
- Crops like _____ recommended growing with cotton to act as trap crop of *Helicoperva sp.*
- The most popular bactericide is _____
- Please name one egg parasite_____
- Please mention two places in A.P from which parasites used for pest control could be obtained
  1._____ 2._____
- Please write the composition of bait (100gms) for controlling rats _____ (zinc Phasphite bait)
- Pesticide include
  a) Insecticide b) Fungicide
  c) Acaricide d) All
- IPM means ( )
  - Completely eradicate on the pests
  - Keeping the pest population below ETL level
  - Leaving the pest without taking any measures to control
  - All the above
- The following practice is useful to break multiplication ( )
  a) Crop rotation b) multiple cropping
  c) A & B d) None
- IPM includes ( )
  a) Chemical control b) cultural control
  c) Biological control d) All the above
- Azardirachitin act as ( )
  a) Repellent b) Attractant
  c) Poison d) All
- Pheromone is a ( )
  a) Harmone b) Chemical
  c) Both d) none
- Pheromones mode of action is ( )
  a) Killing the best b) Disrupting the mating
  c) A & B d) None
- Usually the following numbers of pheromone traps are required per one hectare to control insect population ( )
  a) 5-10 b) 25-50
  c) 50-100 d) None of the above
- IPM needs ( )
  a) Community cooperation b) Individual farmers interest
  c) A & B d) None of the above
- The chemical used to control rats ( )
  a)Zinc Phosphide b) Bromodiolone
  c) Celephos tables d) All the above
- Integrated Nutrient Management
- Legumes are well suited to green manuring because of their low Carbon to Nitrogen ratio
  True/ False
- Usually, the content of ca and P are higher in vermicompost han in farm yard manure
  True/ False
- In general, the ratio of N: P: k recommended is _____
- The biofertilizer that is recommended for pulse crop is _____
- In general, the quantity of biofertilizer (*Rhizobium* culture) recommended for one hectare of pulses is _____
- Please mention the way in which inoculation of pulse seed is done with biofertilizers _____
- Can you name two places from where we can get rhizobial strains _____
- Can you name two crops where *Azatobacter* is used _____
- Mention the method of inoculation of *Azatobacter*----------
- Please give the usual dose of BGA application in rice----------
- Please mention the time of application of BGA----------
- Mention the usual rate of application of *Azolla* ----------
- Please name few N-fixing green manure crops ----------
- Name a few plants/ trees used for green leaf manuring ----------
- The best stage of incorporation for green manure crop is ----------
- Name the material that are aften used for coating urea to increase it's efficiency----------
- In general efficient method of fertilizer application is ( )
  a) Foliar spray b) Basal application
  c) Top dressing d) None
- in te following BGA ( )
  Anabaena b) Nostoc
  c) A&B d) None
- Desrable cost benefit ratio of any cropping system is ( )
  a) <1.0 b) 1.0
  c) >1.0 d) None
- Main objective of mixed farming is ( )
  a) Subsistence b) Profitability
  c) A&B d) None of the above
- Integrated weed management
- Smothening crops such as cowpea and pillipesara can be used as inter crops to check weed growth in wide spaced crops
  (True /False).
- Prickly pear was successfully controlled by scale (True /False).
- IWM, the following following practice of weed control will be given greater importance ( )
  a) Biological b) Cultural
  c) Physical d) Chemical
- Strigar is associated with ( )
  a) Sorghum b) Ground nut
  c) Rice d) Cotton
- Sorghum helepense(Johnson grass) can be controlled by using the following Mycoherbicide ( )
- a) De-vine b) Collego
- c) Bipolaris d) Biolophos
- Pre-emergence application of herbicide means ( )
  a) Pre emergence to weed b) Pre emergence to crop
  c) Pre emergence to weed & crop d) None of the Above
- The best indicator weed for soil salinity ( )
- *a) Sida acuta* b) *Polygonum spp*
- c) *Crissa critica* d) All the above
- Mention one translocated herbicide ( )
  a) Paraquant b) Glyphosate
  c) 2, 4-D d) All the above

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