Research Article

DEVELOPMENT OF THE TEST TO MEASURE THE LEVEL OF KNOWLEDGE OF BANANA GROWERS ABOUT IPM

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Abstract: Integrated pest management (IPM), also known as Integrated Pest Control is a broad-based approach that integrates practices for economic control of pests. It is necessary to know the fact that up to what extent farmer's had the knowledge about various aspects of integrated pest management practices in banana crop. For knowing the level of knowledge of banana growers about IPM, this knowledge test was developed. For the preparation of the knowledge test,33items (questions) were initially selected from different sources such as literature, field extension personnel, relevant specialists and the researcher's own experience. There were total 18 items in final knowledge test to measure the level of knowledge of banana growers about IPM after working out 'Index of item difficulty', 'Index of item discrimination' and 'Index of item validity. The test was found to be reliable (0.88) and valid.

Keywords: Integrated pest management, Banana growers

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Introduction

Banana becomes one among the most popular fruits due to its low price and high nutritive value. There are several Insect pests of banana which can cause significant damage to fruits. Integrated pest management is a system approach to pest control which combines biological, cultural and other novel approaches with the judicious use of pesticides. Main aim of IPM is to maintain pest levels below economically damaging levels while minimizing detrimental effects of pest control on human health and environmental resources. Knowledge is one of the key components of behaviour and as such holds an important role in the covert and overt behaviour of an individual. It is necessary to know the fact that up to what extent farmer's had the knowledge about various aspects of integrated pest management practices in banana crop. Keeping in view of the above definition, a standardized knowledge test was developed with the help of following technique. This developed test can significantly measure the level of knowledge of banana growers about IPM [1-8].

Objective of study

To develop the test to measure the level of knowledge of banana growers about IPM

Material and Methods
Item Collection

The content of a knowledge test is composed of questions called items. Items for the test were compiled from different sources such as literature, field extension personnel, relevant specialists (Horticulturists, Entomologists, Pathologists and Extension educationists) and the researcher's own experience. The items were collected in relation to major fields. Care was taken to make sure that no crucial practice should be left out. The collected items were negotiated with research scientists of the concerned fields (Horticulture, Entomology, Pathology and Extension education) for relevance of the statements and for addition and alteration of the items. Keeping the following three criteria in view, the items were initially selected for developing knowledge test:

1. The item should provide thinking rather than simply rote memorization.
2. The item should differentiate the well-informed farmers from the poorly informed farmers and should have certain difficulty value.
3. The items included should cover all the areas of knowledge about concerned field.

Item Analysis

The item analysis used by Jha and Singh (1970) was carried out so as to yield three kinds of information, *viz.*, "Index of item difficulty", "Index of item discrimination" and "Index of item validity". Index of item difficulty refers to the extent to which an item was difficult, while the index of item discrimination was computed to find out whether an item really discriminates a well-informed person from a poorly informed one. The index of item validity indicates how well an item measures or discriminates in agreement with the rest of the test. The items were checked and modified on the basis of pretesting and administered to 42 respondents for item analysis. The respondents for administering the items were randomly selected and were not included in the sample for final study. This was mainly done to avoid testing effect. Each one of the 42 respondents, to whom the test was administered, was given a score 1 or 0 for each item, according to whether the answer was right or wrong and responses were also collected under multiple choice question system in which those respondents who gave correct answer was given score 1 and 0 for those who gave wrong answer. The total number of correct answers given by the respondent out of collected items was the knowledge score of the individual. After calculating the score obtained by 42 respondents, the scores were arranged from highest to lowest in order of magnitude.

Table-1 *Final Knowledge test to measure the level of knowledge of banana growers about IPM*

1	Which of the following is the main pest of banana?	
	a. Rhizome weevil.	b. *Helicoverpa* sp
	c. Mealy bug	d. *Spodoptera* sp
2	Which of the following steps are adopted for controlling banana rhizome weevil?	
	a. Don't use infested rhizomes	b. Field sanitation
	c. Rhizome or sucker treatment with chlorpyriphos 20-30ml for 5-10ml	d. All the above
3	Which of the following disease is spread through vector aphid?	
	a. Bunchy top	b. Leaf curling
	c. Yellow vein mosaic	d. None of the above
4	Which of the following insecticide is used for the control of banana aphid?	
	a. Rogor	b. Ekalux
	c. Dursban	d. None of the above
5	Which of the following insecticide should be used for controlling banana thrips?	
	a. Regent	b. Tracer
	c. Prudent	d. both a and b
6	Which of the following insecticide is used for the control of mite infestation in banana?	
	a. Prudent	b. Magister
	c. Omite	d. Both a and b
7	Which among the following is the sporadic pest of banana?	
	a. Fruit fly	b. Mealy bug
	c. Semilooper	d. All of the above
8	Which of the following steps do you adopt to prevent disease infection in banana?	
	a. Summer deep ploughing	b.Use of resistant variety
	c. Use healthy suckers and tissue culture seedlings	d.All of the above
9	Which of the following steps should be adopted to prevent leaf spots in banana?	
	a. Collection and destruction of diseased leaves	b. Use of fungicides.
	c. Both a and b	d. None of the above
10	Which of the following fungicides is used to prevent leaf spot?	
	a. Contaf	b. Tilt
	c.Both a and b	d. None of the above
11	Which of the following steps do you adopt to prevent pseudostem wilt in banana?	
	a. Rhizome treatment with aureofungin (90 mins) + dipping in streptocyclin solution before sowing	b.Application of carbofuran 3G @ 5-10g.
	c. Application of *Trichoderma* (as fungicide) 50g/dibble	d.All of the above
12	Which of the viral disease is seen in banana?	
	a. Bunchy top	b. Mosaic
	c. Both a and b	d. None of the above
13	Which of the following steps are adopted to prevent the infection of viral diseases?	
	a. Use of disease free area or plant material	b.Use of tissue culture banana seedlings
	c. Use of systemic insecticide to prevent the sucking pests	d. All of the above
14	Which of the following fungicide is used for panama disease in banana?	
	a. Blue copper	b. Tilt
	c. Bavistin	c. All of the above
15	Which is the vector of bunchy top disease?	
	a. Nematode	b. Aphids
	c. Mealy bugs	d. White flies
16	Which of the following steps is used to prevent bunchy top disease?	
	a. Roughing out infected plants	b. Carbofuran granules
	c. Both a and b	d. None of the above
17	Which is the biocontrol agent used in banana?	
	a. Chrysoperla	b. Ant
	b. Wasp	d. None of the above
18	What do you use for controlling nematode disease?	
	a. Carbofuran	b. Prudent
	c. Regent	d. None of the above

These 42 respondents were divided into six equal groups, each group having "7" respondents and were arranged in descending order of total scores secured by them. These groups were given names as G_1, G_2, G_3, G_4, G_5 and G_6, respectively. For item analysis, the middle two groups, *i.e.* G_3 and G_4 were removed. Only following four extreme groups with high and low scores were taken into account for the calculation of item difficulty and item discrimination indices:

Calculation of Difficulty Index (Pi)
The difficulty index of an item is defined as the proportion of respondents giving correct answer to that particular item. This was calculated by the following formula:

$$P_i = \frac{n_i}{N_i} \times 100$$

Where,
P_i = Difficulty index in percentage of the ith item
n_i= Number of respondents giving correct answer to i^{th} item
N_i = Total number of respondents

Calculation of Discrimination Index ($E^{1/3}$)
The discrimination index can be obtained by computing the phi-coefficient as formulated by Perry and Michael (1951). Although, Mehta (1958) in using $E^{1/3}$ method to find out item discrimination emphasized that this method was analogous to, and hence, a convenient substitute for the phi-coefficient. The ($E^{1/3}$) was used in the research study.

$$E^{1/3} = \frac{(S_1 + S_2) - (S_5 + S_6)}{N/3}$$

Where, S_1, S_2, S_5, and S_6 = the frequencies of correct answers in groups G_1, G_2, G_5 and G_6, respectively
N = total number of respondents in the sample of item analysis

Calculation of Biserial Correlation
It was used for the test item validation, when the criteria of validity are regarded as internal consistency that is, the relationship of total score to a dichotomized response to any given item.

Keeping this in view, with the help of following formula proposed by Guilford (1965), the Biserial correlation for each of the item was computed. The significance of the Biserial correlation coefficient was tested by using the formula given by Guilford (1965). The items which are found to be significant at 0.5 percent level of significance was included in the final format of the knowledge test battery.

$$rbis = \frac{M_p - M_q}{6_t} \times \frac{pq}{y}$$

Where,

M_p = Mean of X values for higher group (Giving correct answer of particular item) in dichotomized variable

M_q = Mean of X values for lower group (Giving wrong answer of particular item) in dichotomized variable

p = Proportion of cases in higher group (Giving correct answer of particular item)

q = Proportion of cases in lower group (Giving wrong answer of particular item)

y = Ordinance of the unit normal distribution curve with surface equal to 1.0 at the point of division between segments containing p and q proportion of the cases.

6t = Standard deviation

Representative of the test
Though the aforesaid criteria were the focal consideration for the final selection of the knowledge items, the care was taken not to avoid the important aspects if any. In this way, one item was included in the final format of the knowledge test. Finally, there were total 18 items in final knowledge test to measure the level of knowledge of banana growers about IPM.

Reliability of the test
A test is reliable when it consistently produces the same results when it applied to the same sample. In the present study to test the reliability of the test, the split half method was used. The 18 statements were divided into two halves with 9 odd numbered in one half and 9 even-numbered statements in the other. These were administered to 30 respondents. Each of the two sets of statements was treated as a separate test and then co-efficient of reliability was calculated by the Rulon's formula, which came to 0.79. However, reliability is directly related to the length of the test when we split to odd and even number items. The reliability coefficient which has been calculated is the value of half size of the original test. Thus, correction factor is calculated by using Spearman Brown formula which came to 0.88. Thus, the test developed was found highly reliable.

Application of research: Study of banana growers about integrated pest management

Research Category: Agricultural Extension

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Study area / Sample Collection: Anand district of Gujarat state

Cultivar / Variety / Breed name: Banana

Conflict of Interest: None declared

Ethical approval: This article does not contain any studies with human participants or animals performed by any of the authors.
Ethical Committee Approval Number: Nil

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