Construction of Knowledge Test to Measure the Knowledge of farmers about Banana production technology

Abstract

Due to the non-availability of a standardized scale to measure farmers' knowledge about banana production technology, it was thought necessary to construct a test for the purpose and an attempt has been made to develop a test for measuring knowledge about banana production technology. Pertinent items were collected covering all aspects of banana production technology. After getting the jury's 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 marks for each wrong answer. Twenty-five statements were finally selected from 32 statements

.**Key Words**-Knowledge test, Package of practice, post-harvesting practices, value addition

1.Introduction

Banana farming is regarded as a major boon to local communities, and farmers that focus on banana farming would be able to increase their productivity and boost their livelihoods over time. Among many farmers, however, the banana is considered a subsistence cash crop. Traditional farming practices prevail, hence, productivity, and production levels remain low. Government strategies are now enhancing the productivity profitability and competitiveness of small banana farming. Effective adoption can be attained if farmers possess sufficient knowledge of banana production technology. With this background, the present paper is aimed to develop a knowledge test to measure the knowledge level of farmers about banana production technology. For the present study, knowledge is operationalized as the quantum of information known to the farmers on recommended banana production technology, including a package of practice, post-harvesting practiced value addition, etc.

A knowledge test was developed with 25 items to measure the knowledge of banana production technology. Each item is measured on a two-point continuum.I.e. correct and incorrect with scores of "1" and "0" respectively. The maximum and minimum scores to be obtained are 25 and 0 respectively.

The detailed procedure for the construction and standardization of the knowledge test is given below.

2. Methodology

The whole paper is presented in two parts, the first part deals with knowledge test development, and the second part deals with the measurement of the knowledge level of farmers

2.1. Knowledge test development

2.1.1. Collection of items

The items of the test were collected through the relevant literature and discussion with the experts in the field of Horticulture, Agronomy, and Entomology, thus a total of 71 items were collected focusing on various aspects of banana production technology. After making improvements and editing based on the opinion of the concerned scientist 48 items were retained. They retained 48 items and were then pacified to item analysis to have suitable items to beincluded inthefinal schedule based on the opinion of the respondents from the non-sample area.

2.1.2. Item analysis

Item analysis has been done based on the three indices i.e. item difficulty index, item discrimination index, and point biserial correlation The index of item discrimination provides information on how well an item discriminates in agreement that whether thereis an item really discriminates well-informedrespondents from a poorly informed respondent. Whereas the item difficulty index indicates the extent to which an item was difficult. The point biserial correlation provided information on how well the 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 48 respondents selected for the purpose of pretesting in a controlled situation.

2.1.3. Item Difficulty Index (P)

The 48 items were selected from 48 non-sample respondents with a 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 48 respondents on 48 items, they were arranged in order from highest to lowest. Based on this the 48 respondents were then divided into six equal groups. These groups were labeled as G1, G2, G3, G4, G5, and G6 with 8 respondents in each group. For the purpose of item analysis, the middle two groups G3 and G4 were eliminated keeping only four extreme groups with high and low scores.

The index of item difficulty was worked out as the percentage of the respondents answering an item correctly. The items with 'p' values ranging from 50 to 95 were considered for the final selection of the knowledge test.

The difficulty level was calculated using the following formula.

Pi=ni /N; Where, Pi=Difficulty index for the ith item, ni =Number of respondents correctly answered the ith item, N=Total number of respondents to which ith item was administered.

2.1.4. Item Discrimination Index (E 1/3)

The item discrimination index is specified by "E 1/3".for getting the E1/3 value of items following formula has been used for calculation-

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

In the groups G1, G2, G5, and G6, S1, S2, S5, and S6 are the frequencies of correct answers. 'The total number of respondents of the sample selected for the item analysis N= 48. The discrimination index varies from 0 to 1. The items with a discrimination index ranging from 0.5- to 1.00.Wereselected for the final test.

2.1.5. Point Biserial Correlation (r_{pbis})

The point biserial correlation was used to know the internal consistency of the items i.e. the relationship of the total score to a dichotomized 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 the test is calculated by using the formula suggested by Garret (1966).

$$rpbis = \frac{MP - MQ}{SD} \times \sqrt{Pq}$$

rpbis = Point biserial correlation.

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

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

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

$$MQ = \frac{\text{Sum total of X - Sum total of XY}}{\text{Total number of Wrong answers}}$$

SD = Standard deviation of the entire sample.

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

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

Q= Proportion of the respondents giving an 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 percent (or) 5 percent level was selected for the final test of the knowledge.

2.1.6. Representativeness of the Test

It is attended that the test items selected finally covered the knowledge about the banana production technology

2.1.7. Total elected items

Out of 32 items, 25 items were finally selected based on

- Items with difficulty level indices ranging from 0.50-0.95.
- Items with discrimination indices ranging from 0.5-to 1.00.
- Items having significant point biserial

Thus, the finally selected knowledge test items comprised of 3 types of questions viz true/false, multiple-choice direct questions totaling 25 items to measure the knowledge on banana production technology.

The selected items with P, E1/3, and Rpbis values are appended (table 1).

2.1.8. Test-Retest Reliability

The test was administered to 48 respondents separately with an interval of 15 days. The two sets of knowledge scores obtained by the farmers were correlated. The correlation coefficient (r=0.72) was highly significant indicating a high degree of dependability of the instrument for measuring the knowledge of banana growers.

2.1.9. Validity

Point biserial correlation was used to test the validity of the test items (rpbis). The items that have highly significant correlation coefficients either at 1 percent or at 5 percent level indicated the validity of the items of the knowledge test designed to measure the knowledge about banana production technology of banana growers.

2.1.10. Content Validity

The content validity of the knowledge test was obtained from a long list of test items representing the whole universe of banana production technology collected from various sources. 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 farmers about banana production technology it showed a greater degree of reliability and validity.

2.1.11. Scoring Pattern

The selected knowledge test items were arranged under different types as Correct/incorrect, multiple-choice, and fill-up the blanks. The correct response to each test item was given a score of 'one' and the incorrect response a score of 'zero'. 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 48.

2.2. Results and Discussion Administration of the test

The final knowledge test comprising 25 items was administered. The responses in the form of correct or incorrect answers were listed. The correct answer was assigned 'one' and the incorrect with 'zero'.

2.2.1. Categorization

The obtainedknowledge score of respondents were grouped into 3 categories by using the class interval technique. The class intervals were calculated based on the maximum and minimum obtained score

Table 1: Respondents in four extreme group

S.NO.	Frequencies of correct answer of respondents in four extreme groups				Difficulty index	Discrimination index	Rpbis
	G1	G2	G5	G6			
1*	8	8	7	8	97	1.00	0.78
2*	8	7	7	8	95	1.00	0.21
3*	7	7	8	8	95	0.87	0.21
4*	7	6	8	8	93	0.81	0.35
5*	6	8	5	8	89	1.00	0.73
6*	7	8	5	6	87	1.00	0.89
7*	8	8	6	4	87	0.87	0.89
8*	8	7	6	5	87	0.87	0.89
9*	7	7	6	6	87	0.87	0.89
10*	5	7	8	6	87	0.87	0.89
11*	7	5	6	7	85	0.81	0.40
12*	8	6	7	4	85	0.68	0.14
13*	7	5	7	6	85	0.68	0.14
14*	8	6	4	7	85	0.68	0.40
15*	8	6	4	6	83	1.00	0.16
16*	7	6	5	4	79	0.75	0.14

17*	5	4	4	3	66	0.50	0.13
18*	4	4	5	3	66	0.50	0.13
19*	7	2	3	4	66	0.50	0.13
20*	4	4	5	3	66	0.50	0.13
21*	5	4	4	3	66	0.50	0.13
22*	5	4	2	3	62	0.62	0.24
23*	5	5	2	2	62	0.62	0.24
24*	4	5	4	1	62	0.62	0.24
25*	5	6	2	1	62	0.62	0.24
26	5	4	3	1	60	0.43	NS
27	4	3	3	2	58	0.37	NS
28	3	2	3	4	58	0.37	NS
29	5	3	1	1	54	0.50	NS
30	3	2	3	1	52	0.18	NS
31	2	3	2	1	50	0.25	NS
32	2	1	1	1	43	0.18	NS

*** Selected items**

NS: Non-Significant

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

Table 2 represents the final knowledge items selected for assessing the knowledge level of farmers on banana production technology. The items were selected finally using standard procedures. Out of 32 items 25 items were selected to measure the knowledge of farmers about banana production technology.

Table 2: Knowledge Items Identified for banana production technology with knowledge score of respondents

S.N.	Statements	%	Mean score
1	Which soil is most preferred for banana cultivation with a pH between 6-7.5 (A).Deep (B.) rich loamy Salty(C). Clay loam soil (D)Red soil	58	0.58
2	You have knowledge about the recommended irrigation method and which method do you follow A-Drip irrigation B- Check basin C. Furrow irrigation	85	0.85
3	Normally a pit size should be 1.6m×1.6m is required	78	0.78
4	In the pit method of planting the size of pit should be 60×60×60cm	62	0.62
5	1.8×1.8 m spacing is mostly adopted in the square system of planting	49	0.49
6	Distance between the two lines should be 0.90 to 1.20m and plant to plant distance is 1.2 to 1.2m	53	0.53
7	In banana, cropping can be done with a suitable material like bamboo or wooden poles	73	0.73
8	The pits are to be refilled with topsoil mixed with 10kg of FYM (well decomposed) 250 gm. of neem cake and 20 gm. of carbofuran	67	0.67
9	Do you know the recommended banana commercial verities for your area and have you adopted them	89	0.89

	Robusta, Grand Naine(G9), Dwarf Cavendish, Poovan Nendran		
10	Tissue cultural plants are healthy, pest and disease-free uniform, and shorter harvesting period	76	0.76
11	fertilizer management is necessary for banana production and do you have knowledge about it N-200 gram/plant P-100 gram/plant K-300 gram/plant	57	0.57
12	Do you know about the major pests/ insect of banana crop and their control measure? A) Pseudo stem weevils - Furadon/Thimet/1Kg neem cake/celphos tablets (3/plant) B) Aphids – Nuvacron/metasistox/Demacron/ Malation (0.05%) C) Nematode- Furadon / Thimate/ 1 kg neem cake	68	0.68
13	Do you know the banana bunchy top virus is transmitted through Aphids	72	0.72
14	Do you know about having the major diseases of bananas and their control measures A)-Bunchy top-Metasistox/nuvacron/democron in1 lit of water monocrotophos (0.1%) B)-Panama wilt-Application of quick lime to base of the plant, dipping suckers with bavistin (0.2%) for 30 min. C)-Virus streak disease-Inter cropping with cucumber plants irradiation of infected plants	65	0.65
15	Banana intercropping can be profitable	82	0.82
16	Mulching is desirable after planting	56	0.56
17	Seedlessness of banana is due to vegetative parthenocarpy	86	0.86
18	Earthling up of the soil is required to be carried out two times annually	46	0.46
19	In banana crop, drip irrigation improves water efficiency by saving 56% of water	76	0.76
20	Do you know about the ideal temperature range for the banana crop is around 26-30C^0	90	0.90
21	Banana crop ready for harvesting after 11-12 months	92	0.92
22	Threshing is done by removing dried leaves	78	0.78
23	Do you know about the post-harvesting practices of the banana crop A) Precooling after harvest B) Cleaning or Disinfecting C) Sorting and grading D) Packaging (E) Storage	65	level

It is found intable 2,that 32 percent of respondentshad low-level knowledge and 4.72 percent had medium-level knowledge whereas 1.68 percent of the respondent had high-level knowledge .it is

observed that there is need for improving banana growers' knowledge of banana production technology.

Conclusion:

A medium level of the knowledge base has been realized however farmers have more experience in banana cultivation technology so if we can supplement experience knowledge with scientific evidence, the knowledge level is more in operationalized area of study.

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