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Research Article

Construction of Knowledge Test to Measure the Gain in Knowledge of Farmers on Rice Production Technology

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ABSTRACT

In India, two third of the population depending on agriculture directly or indirectly and it contributes around 17.4 per cent of gross domestic product (GDP) of the country. It is extremely difficult to imagine that the national and economic development without the input of external information (Schramm, 1964). Such effective communication is not possible when bulk population lives less accessible and isolated areas of plains and hills. In such situations mass media plays a vital role in involving people for social development. Mass media create empathetic spirit, widens people's horizon and conducive climate for change and it should be put under service of national development (Bellurkar, 2000). Among the different mass media, television is considered as most powerful media, as an institutionalized source of information for creating awareness about the latest agricultural technology. But, it is very upsetting to note the insufficient coverage of agriculture information in media including print and electronic, which is even less than two percent. This is probably because of the non-lucrative nature of farm information to the media organizers. Hence a detailed study on effect of farm broadcast programmes in terms of gain in knowledge need to be studied. Due to non availability of proper test to measure the knowledge of farmers on rice production technology, it was thought necessary to construct a test for the purpose. Keeping this in view, an attempt has been made to develop a test for measuring the knowledge of farmers towards rice production technology. Relevant items were collected covering all aspects of rice production technology. After getting jury opinion, the difficulty index and discrimination index, reliability and validity for all the items 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. Forty three items were finally selected out of 94 initial items.

Keywords: *Rice production technology, Knowledge test, Gain in knowledge, Farm broadcast, Farm telecast, Television.*

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INTRODUCTION

Rice is the staple food crop of Andhra Pradesh with an area of 21.16 lakh ha in both kharif and rabi seasons. The productivity of rice crop is 5702 kg ha^{-1} and it was considered to be very low (Agricultural Statistics at a glance – Andhra Pradesh: 2016 – 17). This might be due to low level of knowledge of farmers on recommended technologies on rice cultivation. Television is one of the most powerful education tools to improve the knowledge levels of farmers. It is one of the most versatile audio – visual aid ever developed. Its ability to convey life and events in action has profound influence upon masses. The eye and ear mindedness of rural people make television as one of the most promising media of the present day educational source. Need based telecast of farm broadcasts might help in improving the knowledge levels of farmers. As a part of Ph. D work (2014 to 2019) the researcher wants to test the effect of farm broadcast programme on gain in knowledge of the farmers on rice production technology. Due to non availability of proper knowledge test on rice cultivation, it was thought necessary to construct a test for the purpose. Keeping this in view, an attempt has been made to develop a test for measuring the knowledge of farmers towards rice production technology.

MATERIALS AND METHODS

Knowledge can be defined as those "behaviors and test situations which emphasizes the remembering either by recognition or by recall of ideas and material on some phenomenon". (Bloom et al., 1956).

Collection of items

Programmes broadcasted related to rice production technology in ETV – Annadata were recorded and converted in the form of DVD. From the contents of DVD, an item pool of knowledge questions was prepared covering the whole universe of rice production technology. After thorough screening, an item pool of 94 items which covered all aspects of rice cultivation were selected to form the initial test battery to carry out item analysis.

Judges Rating

To find out relevancy of each item, the selected 94 items were send to 20 specialists in rice crop, from regional agricultural research station, Maruteru, krishi vigyan kendras and district agricultural advisory and transfer of technology centres of the study area. Ask them to put their judgment on three point continuum viz., most relevant, relevant and irrelevant. A respective weightage of 3, 2 and 1 scores was given to these categories. The mean score of each item was calculated by using the following formula.

$$\text{Mean Score} = \frac{\text{Total score of each statement}}{\text{Total number of judges}}$$

After calculating the mean score for all the items, overall mean score was calculated by using the following formula.

$$\text{Overall mean Score} = \frac{\text{Total score of all the statement for all the judges}}{\text{Total number of statements} \times \text{Total number of judges}}$$

The overall mean score was found to be 2.105. The items having mean score value more than or equal to 2.105 were selected for the construction of knowledge test.

Framing of test items

After judges opinion a total number of 55 items with mean score value more than or equal to 2.105 were selected for constructing knowledge test. These items were framed in the form of all types of objective form of questions namely multiple choice, fill in the blank, true or false and yes or no.

Pre-testing

The selected 55 items on rice production technology were administered separately to 30 televiewing farmers. The care was taken that

the selected 30 televiewing farmers were outside the sample area of this study.

Item analysis

The pre tested items were administered to 30 televiewing farmers selected from outside the sample area of this study.

To carry out item analysis, a score of '1' was given to each correct answer and '0' was given to each wrong answer. After getting the responses, the responses of each televiewing farmers were summed up to get individual scores. After computing individual scores the televiewing farmers were arranged in descending order of magnitude from highest to lowest based on their individual total scores. After arrangement, the 30 respondents were grouped into six 6 equal groups viz., G1, G2, G3, G4, G5, and G6, with 5 respondents in each group. For carrying out item analysis, the middle two groups G3 and G4 were eliminated. Finally 4 extreme groups were left, namely G1 and G2 (High group) G5 and G6 (low group). These two groups are considered as criterion groups for computation of item difficulty index, discrimination index and point biserial correlation.

Items difficulty index (P)

Item difficulty index is a measure of the degree of difficulty in answering a particular question. Item difficulty index of each of the items, i.e., the percentage of televiewing farmers answering an item correctly was computed by using the following formula.

$$\text{Difficultuy Index} = \frac{\text{No. of correct answers for ith item}}{\text{Total no. of televiewing farmers}} \times 100$$

The items having difficult index ranging from 20 to 80 were selected for inclusion in final knowledge test to avoid the extremely simple and difficult items.

Discrimination index ($E^{1/3}$)

Discrimination index is a measure of an item's ability to discriminate between high and low groups. Discrimination index of each of the items were computed by using the following formula.

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

Where S1, S2, S5 and S6 are the frequencies of correct answers in groups G1, G2,
G5 and G6 respectively and
N = Total number of televiewing farmers in the sample selected for item analysis (30).

The items with discrimination index ranging from 0.2 to 0.8 were selected for inclusion in final knowledge test.

Point biserial correlation

Point biserial correlation (*rpbis*) is used to measure the degree of association between total scores with dichotomized response to any given item. By this test the criterion of validity of test is considered to be internally consistent. Point biserial correlation was calculated by using the following formula (Garret, 1967).

$$rpbis = \frac{Mp - Mq}{S.D} \times \sqrt{pq}$$

Where,

rpbis = Point biserial correlation coefficient

Mp = Mean of the total scores of the televiewing farmers who answered the item correctly

or

$$Mp = \frac{\text{Sum total of XY}}{\text{Total no. of correct answers}}$$

Mq = Mean of the total scores of the televiewing farmers who answered the item incorrectly

or

$$Mq = \frac{\text{Sum total of X} - \text{Sum total of XY}}{\text{Total no. of wrong answers}}$$

S.D = Standard deviation of entire sample

P = Proportion of televiewing farmers giving correct answer to the Item

$$P = \frac{\text{Total no. of correct answers}}{\text{Total number of televiewing farmers}}$$

q = Proportion of televiewing farmers giving incorrect answer to the item

q = 1 – P

X = Total score of the televiewing farmers for all items

Y = Response of the individual televiewing farmers for the items

XY = Total score of the televiewing farmers multiplied by the response of the individual to the item

Items with significant point biserial correlation coefficient at 0.01 % and 0.05 % of probability level were selected for inclusion in final knowledge test (Table 1).

Reliability of the test

Test – retest method was used to find out the reliability. In this method, the knowledge test was administered to 30 televiewing farmers with 15 days interval to same group of televiewing farmers in non sample study. The scores obtained two times were correlated and the coefficient was found to be significant (r= 0.841) indicating the reliability of the test to measure the knowledge of the televiewers on rice production technology

Validity of the test

The items with highly significant point biserial correlation (rpbis) at 0.01 level of probability indicated the validity of the items in relation to the knowledge test designed to measure the knowledge about the rice production technology. However, content validity was tested through jury opinion. As the test included all the contents as indicated by experts and extension personnel in the field of rice production technology, it could be said as being content validity.

Selection of the items

A total number of 43 items on rice production technology with difficulty index ranging from 20 to 80 and discrimination index ranging from 0.2 to 0.8 and significant point biserial correlation coefficient were selected for inclusion in final knowledge test (Table 2). Dey & Sarkar (2011), Raju (2002), Eswarappa (1991) & Jaiswal, Purnadare & Yadappanwar (1982).

Representativeness of the test

Care was taken to see that the test items selected finally covered the entire universe of the relevant behavioural aspects of televiewing farmers and knowledge about rice production technology.

Administration of the test

Before administering the final knowledge test, the television programme on rice cultivation was provided. Earlier to interview, selected respondents in sample villages were contacted and explained about the collection of data on knowledge items in respect of television programme i.e., before and after exposure to selected televiewing farmers of rice production technology. Before presentation of telecast, the data on knowledge items were collected by

personal interview in experimental group with the help of structured schedule developed for the study in the selected villages.

Knowledge test after viewing farm broadcast programme

Data on knowledge items were collected from 240 (Experimental group) and 60 (Control group) televiewing farmers before and after viewing the farm broadcast programme separately. Knowledge scores of televiewing farmers were calculated for rice production technology and the difference of scores were also worked out, the possible range of gain in knowledge was between 0 and 43.

Knowledge gap among the televiewing farmers on rice production technology was tested for its significance with the help of paired 't' test and values were computed with table values at 0.01 and 0.05 level of probability.

To test the significance of difference of mean values of scores obtained at before exposure stage and immediately after exposure stage in each of the farm broadcast programme, paired t- test was employed. The following formula was used for calculating the value of 't'.

$$t = \frac{\bar{d}}{SE_{(\bar{d})}} = \frac{(\bar{X} - \bar{Y})}{SE_{\bar{d}}}$$

Where

$\bar{d}$ = $\bar{X}$ - $\bar{Y}$

X = mean of pre-exposure scores

Y = mean of post exposure scores

$\bar{d}$ = $\frac{(di - \bar{d})^2}{n(n-1)}$

di = difference of core for ith individual

n = sample size

The significance of calculated 't' value was tested by referring to the fisher and Yates.

Depending on the total knowledge scores of individual televiewing farmers, the level of knowledge on rice production technology were tabulated using mean and standard deviation.

S. No.	Category	Range
1.	Low Level of Knowledge	< Mean – SD
2.	Medium Level of Knowledge	Mean ± SD
3.	High Level of Knowledge	> Mean + SD

Table 1: Respondents in four extreme groups

S. No.	Frequencies of correct answer of respondents in four extreme groups				Frequency of correct answers	Difficulty Index (%)	Discrimination Index	*rpbis*
	S1	S2	S3	S4				
1	9	5	1	0	21	35.00	0.65	0.619**
2	9	5	0	0	28	46.67	0.7	0.629**
3	9	7	1	0	31	51.67	0.75	0.648**
4	9	6	2	0	24	40.00	0.65	0.601**
5	10	8	5	2	41	68.33	0.55	0.557**
6	8	6	6	2	36	60.00	0.3	0.349**
7	8	5	0	0	18	30.00	0.65	0.613**
8	10	8	6	4	44	73.33	0.4	0.456**
9	8	6	6	2	36	60.00	0.3	0.352**
10	8	5	2	0	21	35.00	0.55	0.568**
11	8	6	3	0	24	40.00	0.55	0.465**
12	9	6	3	0	32	53.33	0.6	0.576**
13	9	5	0	0	16	26.67	0.7	0.665**
14	9	3	0	0	14	23.33	0.6	0.649**
15	8	6	2	0	21	35.00	0.6	0.565**
16	9	6	1	0	19	31.67	0.7	0.623**
17	9	5	1	0	18	30.00	0.65	0.616**
18	8	4	2	0	17	28.33	0.5	0.548**
19	9	6	3	1	34	56.67	0.55	0.538**
20	10	6	5	1	36	60.00	0.5	0.532**
21	9	7	1	0	31	51.67	0.75	0.648**
22	10	5	5	1	35	58.33	0.45	0.513**
23	8	6	1	0	29	48.33	0.65	0.600**
24	6	8	10	10	54	90.00	-0.3	-0.438 NS
25	10	10	10	10	56	93.33	0	-0.02 NS
26	8	7	9	10	52	86.67	-0.2	-0.229 NS
27	8	5	0	0	26	43.33	0.65	0.579**
28	10	6	5	1	36	60.00	0.5	0.538**
29		6	4	1	34	56.67	0.05	0.489**
30	8	6	0	0	16	26.67	0.7	0.636**
31	6	9	10	10	55	91.67	-0.25	-0.437 NS
32	9	9	9	7	52	86.67	0.1	0.118 NS
33	10	6	7	9	51	85.00	0	0.022 NS
34	8	8	9	10	53	88.33	-0.15	-0.088 NS
35	8	6	1	0	21	35.00	0.65	0.598**
36	8	6	0	0	16	26.67	0.7	0.652**
37	7	4	0	0	24	40.00	0.55	0.492**
38	9	6	1	0	22	36.67	0.7	0.635**
39	9	5	1	0	21	35.00	0.65	0.619**
40	9	5	1	0	18	30.00	0.65	0.616**
41	8	4	5	1	32	53.33	0.3	0.416**
42	7	9	10	10	56	93.33	-0.2	-0.386 NS
43	2	2	1	0	6	10.00	0.15	0.265**
44	10	8	6	4	47	78.33	0.4	0.439**
45	10	9	8	9	56	93.33	0.1	0.153**
46	9	7	1	0	31	51.67	0.75	0.644**
47	8	7	1	0	22	36.67	0.7	0.610**
48	10	8	5	1	41	68.33	0.6	0.579**
49	10	7	6	3	43	71.67	0.4	0.441**
50	9	6	2	0	24	40.00	0.65	0.601**
51	8	7	1	0	22	36.67	0.7	0.608**
52	9	5	1	0	21	35.00	0.65	0.619**
53	8	4	2	0	17	28.33	0.5	0.548**
54	8	3	1	0	16	26.67	0.5	0.565**
55	3	3	2	0	9	15.00	0.2	0.227NS

Table 2: Items selected for inclusion in final knowledge test

S. No.	Items Selected	Correct Answers
1.	The minimum germination percentage required for good quality seed in rice crop is	80%
2.	The rice variety resistant to Brown Plant Hopper is	Vijetha
3.	The rice variety resistant to Blast disease is	Nellore Mahoori
4.	The dose of concentrated Nitric Acid for breaking seed dormancy in rice is	6.3 ml/l/Kg
5.	The optimum seed rate required for direct sowing in rice crop is	10 – 12 Kg
6.	The recommended dose of Carbendazim for dry seed treatment in rice is	3g/Kg
7.	The optimum plant population per square meter in rice is	33/sq.mt
8.	The recommended dose of zinc sulphate for basal application in rice crop is	20 Kg/ac
9.	The rusty spots appearing on older leaves is the deficiency symptom of	Zinc
10.	Premature yellowing of younger leaves is the deficiency symptom of	Iron
11.	The dose of ferrous sulphate for foliar application in rice crop is	5 g/l
12.	The quantity of neem cake required for preparation of 50 Kg of neem coated urea is	10 Kg
13.	The recommended nitrogenous bio – fertilizer in rice crop is	Azospirillum
14.	The quantity of Azospirillum required for rice crop is	2 Kg
15.	Leaves drying from margins is symptom of nutritional deficiency of	Potassium
16.	The recommended Phosphatic bacteria in rice crop is	Phosphorus solubilising bacteria
17.	The quantity of Phosphorus solubulising Bacteria required for rice crop is	2 Kg
18.	The pre– emergence herbicide recommended for grassy weeds in rice crop is	Pretilachlor
19.	The pre – emergence herbicide recommended for both grassy and broad leaved weeds in rice crop is	Oxadiargyl
20.	The post – emergence herbicide recommended for grassy weeds in rice crop is	Cyhalofop butyl
21.	The post – emergence herbicide recommended for both grassy and broad leaved weeds in rice crop is	Bispyribac sodium
22.	The post – emergence herbicide recommended exclusively for broad leaved weeds in rice crop is	2,4 D sodium salt
23.	The recommended dose 2,4 – D Sodium salt herbicide in rice crop is	400 g/ac
24.	Zinc sulphate applied along with Phosphatic fertilizers	False
25.	Alley ways are formed to control Brown Plant hopper in Rice	True
26.	The economic threshold level for BPH in rice is more than 20 to 25 hoppers per hill at panicle initiation stage	True
27.	The economic threshold level for Gall midge in rice is more than 5 % silver shoots per square meter	True
28.	Panicle mite in rice will be controlled by release of *Trichogramma chilonis* parasitoid	False
29.	Four Pheromone traps are required for monitoring of yellow stem borer in rice	True
30.	Leaf mite in rice will be controlled by application of Nuclear Polyhedrosis virus	False
31.	Leaf folder in rice will be controlled by application of *Bacillus thuringiensis*	True
32.	Brown plant hopper in rice will be controlled by clipping of leaf tips	False
33.	Low night temperatures are congenial for Blast disease in rice	True
34.	The recommended dose of *Bacillus thuringiensis* for control of lepidopteron pests in rice is 400 g/ac	Yes
35.	Coincidence of flowering stage with heavy rains in rice is congenial atmosphere for False smut disease in rice.	Yes
36.	Sudden wilting and appearance of black spots at the stem region is the symptom of Stem rot disease in rice	Yes
37.	Rat infestation in rice will not be minimized by reducing the number and size of the bunds	No
38.	The recommended proportion for rodent bait in rice is 90 % broken rice + 5 % vegetable oil + 5 % Bromodialone	No
39.	Acute rat poison bait Zinc Phosphide shall be used only once in the rice growing period.	Yes
40.	Aluminum Phosphide is used for fumigation of rat burrows	Yes
41.	One permanent bait station is sufficient for one acre of rice field	Yes
42.	Common salt is used to prevent germination of rice gains during heavy rain situation	Yes
43.	14 % is the optimum moisture percentage for safe storage of paddy grains for longer time	Yes

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