GAU Res. J. 1998, 24 (1) : 58-61

A Test to Measure the Knowledge Level of Mango Orchard Growers About Drip Irrigation System

C. P. Desai,* J. C. Trivedi, Arun A. Patel and Mahesh R. Patel

Directorate of Extension Education, Gujarat Agricultural University, Ahmedabad - 380 004

ABSTRACT

Adoption of drip irrigation system is the only alternate to use irrigation water in agriculture economically. However, knowledge about drip irrigation system plays a crucial role for better understanding and efficient utilization of the system. Hence, there is a great need to measure the knowledge level about drip irrigation system. But, the measurement of knowledge would be impossible without a standard test. Keeping this in view, an effort was made to develop the test. The test developed could be used to measure the knowledge level of mango orchard growers about drip irrigation system as well as at other places with partial modifications.

(Received on 29th Aug., 1997)

INTRODUCTION

It is neccessary to economize the use of water for agriculture to bring more area under irrigation. This could be achieved by introducing the advanced method of drip irrigation. The Saurashtra region is considered as a dry farming area, where the availability of water for irrigation in wells is extremely scarce and irregular. Therefore, the farmers of this region have been attracted towards the modern method of irrigation and they have introduced drip irrigation system in their mango orchards.

It is fact that the knowledge plays a vital role in understandaing and utilizing the technology more efficiently. Keeping this in view, a test to measure the knowledge level of mango orchard growers about drip irrigation system was constructed and standardized.

MATERIALS AND METHODS

(a) Item collection

The content of knowledge test composed questions called items. Items were collected by referring to the relevant literature by consulting the scientists working in agronomy, horticulture and farm engineering department of College of Agriculture, Irrigation Department of College of Agricultural Engineering and Technology, Water Management Project and from discussion with the extension experts. The 47 items covering all aspects of drip irrigation system were collected to form an initial test battery to carry out item analysis.

*Present address : Technical Officer, Directorate of Extension Education, GAU, Ahmedabad.

(b) Item analysis

The method of item analysis used by Jha and Singh (1970) was followed so as to yield three kinds of indices viz., index of item difficulty, index of item discrimination and index of item validity.

The items collected were numbered from 1 to 47 and administered to the 42 mango orchard growers selected randomy from the study area, resembling the sample farmers which were not included for the final study. Each respondent was given the score 1 or 0 for the dichotomised response of correct or incorrect and for yes or no answers, respectively. Thus, the total score obtained by an individual respondent on 47 items for correct or yes answers was the knowledge score. The scores obtained by 42 respondents were arranged separately from highest to lowest in magnitude.

These 42 respondents were divided into six equal groups, each of seven and were arranged in descending order of the total scores obtained by them. Each group was named as G1, G2, G3, G4, G5 and G6, respectively. The range of scores obtained by the respondents of six groups is as under :

Group	*Score out of 47*	*Respondents*
G1	42 to 35	7
G2	35 to 33	7
G3	33 to 31	7
G4	30 to 28	7
G5	27 to 26	7
G6	26 to 23	7

For the purpose of item analysis, the middle two groups (G3 and G4) were eliminated keeping four extreme groups with high and low scores. The data pertaining to the correct responses for all the items in respect of these four groups (G1, G2, G5 and G6) were tabulated for calculating the difficultly and discrimination indices. An example of the calculation of the difficulty and discrimination indices is presented below :

Difficulty (P) and discrimination (E 1/3) indices of the knowledge test items.

Item no. in the initial list	*Frequencies of correct answer*				*Total frequencies of correct answers* ($S_1+S_2+S_3+S_4+S_5+S_6$)	*Percentage of respondents giving correct answers (P)*	*E 1/3*
	S_1	S_2	S_5	S_6			
3	6	7	2	2	28	66.66	0.642
19	7	7	3	1	25	59.52	0.714
40	5	4	1	0	16	38.09	0.571

Where,

P = Item difficulty index

E 1/3 = Item discrimination index

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

Where,

S1, S2, S5 and S6 are the frequencies of correct answer in the group of G1, G2, G5 and G6, respectively.

N = total number of respondents in the item analysis sample = 42.

Substituting the values for item number 3 of the above table, value arrived at

$$E\ 1/3 \text{ for item No. } 3 = \frac{(6 + 7) - (2 + 2)}{42/3} = 0.642$$

Selection of items for the final format of the knowledge test based on the following criteria :

1. Item difficulty index

The index of difficulty was worked out as the percentage of the respondents answering an item correctly. The usual assumption in this item index of difficulty was that the difficulty was linearly related to the level of respondent's knowledge about DIS. The item with 'P' values ranging from 17 to 90 were considered for final selection of the knowledge test battery.

2. Discrimination index

The second criteria for item selection was the discrimination index indicated by E 1/3 values items. In the present study, the items with E 1/3 values ranging from 0.21 to 0.79 were considered for final selection.

3. Biserial correlation

It is used for the test of item validation when the criterion of validity is ranged as internal consistency, that is, the relationship of total score to a dichotomised response to any given item. Keeping this in view, the Biserial correlation for each of the items was calculated with the help of formula suggested by Guilford (1965). The significance of the Biserial correlation for each of the items was calculated and tested by using the formula given by Guilford (1965). The items having significant Biserial correlation at 0.05 level of probability were retained in the final format of the kwoledge test.

Representativeness of the test

Though the aforesaid criteria were the main considerations for the final selection of the knwoledge items, yet care was taken not to eliminate the important aspects if any.

Thus, in light of the four criteria described above, 18 items were finally selected, which formed the actual (final) format of the knowledge test and it has been appended in Appendix-I.

Appendix – I

Final format for measuring knowledge level of mango orchard growers about drip irrigation system :

1. Does the drip system keep soil moisture within the desired range for optimum plant growth ?
2. Which type of soil is more suitable for drip irrigation ?
3. Why above mentioned type of soil is more suitable ?
4. Is the drip system useful for more saline water ?
5. Can plant nutrients be supplied along with irrigation water in DIS ?
6. Does DIS offer considerable flexibility in fertigation ?
7. Is application of soluble fertilizers easy in drip system ?
8. Which device is useful in fertilizers application through DIS ?
9. Name the fertilizers which can be applied through DIS.
10. Does the fertilizers application through DIS seem beneficial over the traditional method ?
11. What could be the reason behind the failure of entire system ?
12. Is there any mechanical damage to drip system caused by rodents ?
13. Which care is required to prevent the damage caused by rodents to DIS ?
14. Is there any chemical treatment required for clogging of emitters ?
15. When DIS does not start, which steps do you follow ?
16. Do you know insecticides/pesticides/fungicides/nematicides and weedicides may also be applied through DIS ?
17. Do you know general repairing of the DIS ?
18. Name the chemicals commonly used for acid and chlorine treatment.

(c) Reliability and validity of the knowledge test :

To know the reliability of the knowledge test developed, the 'split-half method' was employed. In this method, the 18 items were divided into two equal halves, with 9 odd numbered statements in one half and 9 even numbered statements in the other. These were administered to 20 respondents separately who were neither previously interviewed nor had a chance to come in the final sample of the study. Thus, two sets of knowledge scores were obtained for each of the 20 respondents. The co-efficient of reliability between two sets of knowledge scores was calculated by the Rulon's formula (Guilford, 1954), which was found to be highly significant (r = 0.863). Therefore, the knowledge test under study has been found to be highly stable and dependable.

The Biserial correlation (r bis) was considered as a measure of test item validity. Highly significant Biserial correlation co-efficient (r_{bs}) proved the construct validity of the items included in the knowledge test battery.

RESULTS AND DISCUSSION

The test consisted of 18 items concerning drip irrigation system, the respondents would ask to answer in dichotomised categories, that is, correct or incorrect, yes or no or they would ask to answer some direct questions specifically. The correct answers would be tick-marked. The total number of tick-marked items would take as the knowledge score optained by an individual respondent. The knowledge score would be calculated as sum of the scores of correct responses.

REFERENCES

Guilford, J. P. (1954). 'Psychometric Methods', TMH Ed., Tata Megraw Hill Book Co. Ltd., New Delhi, P. 597.

Guilford, J. P. (1965). 'Fundamental Statistics in Psychology and Education', Mc-Graw Hill Book Co. Inc., New York, PP. 317-319.

Jha, P. N. and Singh., K. N. (1970). A test to measure farmers' knowledge about high yielding variety programme, *Intepdiscipline* 7 (1) : 65-78.