Construction of Knowledge Test to Measure the Knowledge of KVK beneficiary farmers on farming practices

ABSTRACT:

Due to the limited research on measurementof knowledge of KVK beneficiary farmers on farming practices, an attempt had been made to develop a test for measuring knowledge of KVK beneficiary farmers on farming practices. For this purpose, pertinent items were collected covering all aspects of farming practices. After getting jury opinion on the items of test, the item difficulty index, item discrimination index and point bi-serial correlation were worked out. Thirty eight statements were finally selected from 60 statements. To administer the knowledge test, a score of one was given for each correct answer and zero was given for a wrong answer.

Introduction:

Krishi Vigyan Kendras (KVK) or ~~F~~farm ~~S~~science ~~C~~centres are the knowledge network centres, established by the Indian Council for Agricultural Research (ICAR) and its affiliated institutions with the "*District*" as the jurisdiction, serving as the ultimate link between Indian Council of Agriculture and farmers to apply agricultural research in practical and~~,~~ localized settings.There are 13 KVKs in Andhra Pradesh under the control of Acharya N.G.Ranga Agricultural University serving as the down to earth institutions enormously working for the benefit of farmers and rural agriculture through vocational trainings, on farm trials, Front Line Demonstrations, transfer of technology and various schemes.KVKs are creating awareness about improved agricultural technologies through large number of extension programmes. All agricultural stakeholders have witnessed the growth of the KVK network, but not much attention has been given to empirical evidence for this.

As part of this,an attempt had been made to develop a test for measuring knowledge of KVK beneficiary farmers on farming practices. Knowledge in this study was operationalized as the "quantum of technical information possessed by the KVK beneficiary farmers on farming practices". A knowledge test was developed with 38 items to measure the Knowledge of KVK beneficiary farmers on farming practices. Each item was measured on two point continuum. i.e. Correct and incorrect with '1' and '0' respectively. The maximum and minimum scores to be obtained by the individual respondent were 38 and 0 respectively. The details of the construction and standardization of this knowledge test was given below.

Comment [K1]: Abstract:
-It is unclear what the main findings are in the abstract. Authors could make the main findings clear in 2-3 sentences as the abstract is a summary of the whole work which must coax readers.
-Again, authors are advised to add the significance or theoretical/application value of findings to the abstract, particularly, as a concluding sentence (s).

Comment [K2]: Line 5: Kindly state the full meaning of KVK, before using the abbreviated format in the abstract.

Comment [K3]: Introduction:
-Authors are advised to briefly integrate, add or give a background to the key concept and theories anchoring the current study.
-Authors must integrate the research progress; thus, what's known about the topic from a global perspective and what's unknown but important to be studied that is currently driving the study objectives.
-The last paragraph must highlight the main objective (s) clearly, contribution of the study to theory/application, policy-makers, research community, industrial players, farmers and so on clearly.

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Methodology:

The knowledge test to measure the knowledge of KVK beneficiary farmerswas constructed duly following the steps involved in knowledge test construction *viz.*, collection and framing of knowledge items,selection of items for item analysis, item analysis,reliability of the test and validity of the test

Collection and framing of knowledge items

A comprehensive list of knowledge questions on farming practiceswere prepared by consulting the scientists of KVK, DAATTC and ARS, Utukur of Acharya N.G. Ranga Agricultural University, Lam, Guntur, Andhra Pradesh. In addition to this, books, magazines and journals were also referred for collection and framing of knowledge items.

Selection of items for item analysis

The selection of items was done on the basis of following criteria.

1. Response to items should promote thinking rather than routine memorization
2. Theyshould differentiate the well-informed respondent from less informed andshould have certain difficulty value.
3. The items included should cover all areas of knowledge aboutgeneral agriculture/farming practices

By using the criteria above ~~criteria~~, 60 items were selected for developing knowledge test, after editing carefully and by subjecting them to expert's endorsement.The items were then framed into objective form questions and in this form, the answers were completely controlled by having true/ false, yes/ no, multiple choice and fill in the blanks and therefore the assessment was objective and impersonal

Comment [K4]: Methodology:
-What expression or theorywas used at arriving or can be used to substantiate this sample size?
-How justifiable is the said number in drawing logical or general conclusions for this study?
-how did authors deal with bias or partial judgements from the experts or respondents?
-Did authors consider gender bias?
-Kindly number all the equations given in the study

Pre-testing

Pre-testing of the items was done as suggested by Gonard (1948) by administering all the 60 questions to 30 KVK beneficiary farmers in non- sample area. The scores allotted were '1' for correct response and '0' for incorrect response. After computing total scores obtained by each of the 30 respondents on 60 items, they were arranged in the descending order. Then the respondents were divided into six equal groups of five members each and were labelled as

G1, G2, G3, G4, G5 and G6. 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.

Item analysis

The item analysis was carried out as per the standard procedure, so as to yield three kinds of information *viz.*, "index of item difficulty", "item discrimination index" and "point biserial correlation". The index of the item difficulty reveals how difficult an item is,whereas discrimination index indicates the extent to which an item discriminates the well-informed farmerfrom the poorly informed farmer. The point biserial correlation provides information on how well an item measures or discriminates with the rest of the test items.

i. Item difficulty index (P)

The item difficulty index for each of 60 items was calculated as the percentage of the farmers answering an item correctly. Difficulty index was computed by using the following formula

$$\text{Difficulty index} = \frac{\text{Number of KVK beneficiary farmers answered correctly}}{\text{Total number of KVK beneficiary farmers}} \quad \ldots (1)$$

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

Discrimination index of each of the 60 items were indicated by '$E^{1/3}$' and calculated by the following formula.

$$E^{1/3} = \frac{(S1+S2)-(S5+S6)}{N/3} \quad \ldots (2)$$

Where S1, S2, S5 and S6 are the frequencies of correct answers in groups G1, G2,G5 and G6 respectively. N is the total number of farmers of the sample selected for items analysis *i.e.*,30.

iii. Point biserial correlation (rpbis)

The main aim of calculating point biserial correlation (rpbis) was to work out 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 individual item of preliminary knowledge test calculated by using following formula.

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$$\textbf{rpbis} = \frac{M_P - M_Q}{SD}\sqrt{PQ} \quad \ldots (3)$$

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Where,

r pbis = point biserial correlation coefficient

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

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

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

$$MQ = \frac{\text{Sum of the total of XY}}{\text{Total no. of wrong answers}}$$

SD = Standard deviation of entire sample

p = Proportion of respondents giving correct answer to the item

$$p = \frac{\text{Total no. of correct answers}}{\text{Total no. of farmers}}$$

q = Proportion of respondents giving incorrect answer to the item

q = 1 – p

X = Total score of the respondents for all items

Y = Response of the individual for the items

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

Selection of the items

Out of 60 items, 38 items were finally selected based on

1. Items with difficulty indices ranging from 20 to 80.
2. Items with discrimination indices ranging from 0.20 to 0.80.
3. Items having significant point biserial correlation either at 1 percent or 5 percent level.

Validity of the test: The validity of the knowledge test of KVK beneficiary farmers for farming practices was obtained through content validity by consulting the scientists. The items selected for the knowledge test were evaluated individually and as a whole by the scientists. These were again checked by experts in Acharya N.G. Ranga Agricultural University for their coverage. . 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 KVK beneficiary farmers about farming practices as it showed a greater degree of reliability and validity.

Administration of the test : All the 38 items in the knowledge test read out to the respondents in translated version (Telugu) by the investigator and the respondents were asked to answer the items by themselves. The responses in the form of correct or incorrect answers were recorded there after.

Scoring procedure : A score of '1' and '0' was assigned for correct and wrong answer for each item respectively and the total number of correct responses given by the KVK beneficiary farmers out of the 38 items was the knowledge score obtained by him/her. Thus, the maximum and minimum possible score for a KVK beneficiary farmer was 38 and 0 respectively. The KVK beneficiary farmers were grouped into three categories based on mean and standard deviation as follows

Results And Discussion

Out of 60 items 38 items were selected to measure the knowledge of KVK beneficiary farmers on farming practices.

Table 1. Selection of items for final knowledge test based on Item difficulty index, Item discrimination index and Point biserial correlation values.

Item No	Frequency of correct answers in the groups G1, G2, G5 and G6				S1+ S2	S5 +S6	Total frequencies of Correct answers by all Six groups	Difficulty Index	Discrimination Index ($E^{1/3}$)	Point Biserial Correlation (r pbis)	Item selected for the study
	S1	S2	S5	S6							
1.	4	5	4	4	9	8	17	0.85	0.10	0.678	No
2.	5	5	4	3	10	7	17	0.85	0.30	0.283	No
3.	5	2	3	1	7	4	11	0.55	0.30	0.336	Yes
4.	5	4	4	3	9	7	16	0.80	0.20	0.387	Yes
5.	5	5	5	3	10	8	18	0.90	0.20	0.101	No
6.	4	4	1	1	8	2	10	0.50	0.60	0.562	Yes
7.	5	5	5	4	10	9	19	0.95	0.10	0.011	No
8.	5	2	3	1	7	4	11	0.55	0.30	0.315	Yes
9.	5	4	2	3	9	5	14	0.70	0.40	0.591	Yes
10.	5	4	4	1	9	5	14	0.70	0.40	0.327	Yes
11.	3	3	3	0	6	3	9	0.45	0.30	0.331	Yes
12.	5	5	5	3	10	8	18	0.93	0.20	0.281	No
13.	2	1	1	1	3	2	5	0.25	0.10	0.107	No
14.	2	2	1	1	4	2	6	0.30	0.20	0.255	No

Comment [K5]: Results and Discussion:
-Authors failed to thoroughly explain results generated. Again, correlation and other analysis conducted were not explained. The current presentation or status for this section is unacceptable and inappropriate.
-Authors need to compare the study findings to other studies with similar scope or existing literature in order for readers to appreciate and understand findings.
-The discussion section could be separated from the results section.

Item No	Frequency of correct answers in the groups G1, G2, G5 and G6				S1+ S2	S5 +S6	Total frequencies of Correct answers by all Six groups	Difficulty Index	Discrimination Index ($E^{1/3}$)	Point Biserial Correlation (r pbis)	Item selected for the study
	S1	S2	S5	S6							
15.	5	5	3	3	10	6	16	0.80	0.40	0.516	Yes
16.	5	5	5	3	10	8	18	0.90	0.20	0.255	No
17.	5	4	3	2	9	5	14	0.70	0.40	0.412	Yes
18.	5	5	1	3	10	4	13	0.65	0.60	0.621	Yes
19.	4	5	2	2	9	4	13	0.65	0.50	0.676	Yes
20.	5	5	1	3	10	4	13	0.65	0.60	0.580	Yes
21.	5	3	0	3	8	3	11	0.55	0.50	0.704	Yes
22.	4	3	2	1	7	3	10	0.50	0.40	0.727	Yes
23.	5	5	1	3	10	4	14	0.70	0.60	0.623	Yes
24.	4	3	1	1	7	2	9	0.45	0.50	0.566	Yes
25.	5	4	4	1	9	5	14	0.70	0.40	0.491	Yes
26.	3	4	2	1	7	3	10	0.50	0.40	0.674	Yes
27.	4	5	3	2	9	5	14	0.70	0.40	0.373	Yes
28.	4	2	2	1	6	3	9	0.45	0.30	0.309	Yes
29.	5	5	1	2	10	3	13	0.65	0.70	0.335	Yes
30.	4	4	3	2	8	5	13	0.65	0.30	0.591	Yes
31.	5	4	4	3	9	7	16	0.80	0.20	0.173	No
32.	2	2	0	1	4	1	5	0.25	0.30	0.011	No
33.	3	4	2	2	7	4	11	0.55	0.30	0.369	Yes
34.	5	4	4	3	9	7	16	0.80	0.20	-0.678	No
35.	5	4	4	3	9	7	16	0.80	0.20	-0.076	No
36.	5	4	4	1	9	5	14	0.70	0.40	0.387	Yes
37.	5	2	3	1	7	4	11	0.55	0.30	0.422	Yes
38.	3	4	2	1	7	3	10	0.50	0.40	0.720	Yes
39.	4	2	2	1	6	3	9	0.45	0.30	0.372	Yes
40.	4	5	3	4	9	7	16	0.80	0.20	0.176	No
41.	4	5	3	4	9	7	16	0.80	0.20	0.281	No
42.	2	2	1	1	4	2	6	0.30	0.20	0.107	No
43.	4	5	3	4	9	7	16	0.80	0.20	0.164	No
44.	2	2	1	1	4	2	6	0.30	0.20	-0.048	No
45.	4	5	3	4	9	7	16	0.80	0.20	0.107	No
46.	4	5	3	4	9	7	16	0.80	0.20	0.255	No
47.	3	2	1	1	5	2	7	0.35	0.30	0.387	Yes
48.	2	3	1	2	5	3	8	0.40	0.20	0.422	Yes
49.	2	2	1	1	4	2	6	0.30	0.20	0.154	No
50.	2	2	1	1	4	2	6	0.30	0.20	0.252	No
51.	5	4	3	3	9	6	15	0.75	0.30	0.372	Yes
52.	5	4	2	2	9	4	13	0.65	0.50	0.375	Yes
53.	5	4	2	1	9	3	12	0.60	0.60	0.590	Yes
54.	4	3	2	1	7	3	10	0.50	0.40	0.562	Yes
55.	4	3	1	1	7	2	9	0.45	0.50	0.674	Yes
56.	4	5	2	3	9	5	14	0.70	0.40	0.491	Yes
57.	4	5	2	2	9	4	13	0.65	0.50	0.580	Yes

Item No	Frequency of correct answers in the groups G1, G2, G5 and G6				S1+ S2	S5 +S6	Total frequencies of Correct answers by all Six groups	Difficulty Index	Discrimination Index ($E^{1/3}$)	Point Biserial Correlation (r pbis)	Item selected for the study
	S1	S2	S5	S6							
58.	4	2	3	1	6	4	10	0.50	0.20	0.615	Yes
59.	4	5	3	4	9	7	16	0.80	0.20	0.418	Yes
60.	5	5	3	3	10	6	16	0.80	0.40	0.469	Yes

Conclusion

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COMPETING INTERESTS DISCLAIMER:

Authors have declared that they have no known competing financial interests OR non-financial interests OR personal relationships that could have appeared to influence the work reported in this paper.

Comment [K6]: Conclusion:
-Authors need to include a concluding section.
-Must summarize the main aim, key findings, study limitations, gaps and opportunities that could drive future studies and finally, highlight briefly the importance or contribution of study findings to key players.

Other comments:
-Some minor to moderate grammatical defects and syntax errors were identified throughout the manuscript; few were revised or corrected. Though the paper is generally well-written, the authors need to revised or correct this minor to moderate defects to enhance the overall proficiency level of the paper.

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Standardized knowledge test for measuring knowledge of KVK beneficiary farmers on farming practices

1. Red soils are rich in ----------than in black soils

2. A high content of organic matter in soil drastically reduces its water holding capacity
True/ False

3. Seed quality is high in ( )

a. Nucleus Seed b. Breeder Seed

c. Foundation Seed d. Certified Seed

4. Seed that is changed every year is known as ----------

5. Seed treatment generally protect the crop for ( )

a. 10 days b. 30 days c. 60 days d.90 days

6. Important chemical used for seed treatment is----------

7. Roughing has to be done at ( )

a. Vegetative stage b. Flowering stage

c. Maturity stage d. All the stages of crop growth

8. One should apply fertilisers as per Soil Health Card reports Yes/No

9. Over dose of 'N' fertilizers leads to ( )

a. High vegetative growth b. Increased pest and diseases

c. Decreased pest & diseases d. Quality in yield

10. Split dose of 'N' is recommended for ( )

a. Reducing leaching losses b. Reducing evaporation losses

c. a & b d. None of these

11. The urea coated with ----------increases its efficiency.

12. Role of phosphoric fertilizers in crop growth is ( )

(1) Increase plant size (2) Helps in leaf and fruit production

(3) Prevents soil acidity (4) Increase plant resistance against diseases and insects

a. 1 & 2 b. 3& 4 c. 1, 2, 3 d. 1, 2, 3 & 4

13. High doses of 'P' fertilizers leads to ----------

14. Potassic fertilizers helps in ( )

1. Root growth 2. Resistance 3.Quality in yield 4. Vegetative growth

a. 1 &2 b. 2 & 3 c. 3 & 4 d. Only 2

15. Pre mature fruit drop and cracks in fruits is the deficiency symptom of ----------Nutrient.

16. In general efficient method of fertilizer application is ( )

a. Foliar spray b. Basal application

c. Top dressing d. None

17. 1 kg of Azolla application can reduce usage of ----------kg of Urea

18. Time of incorporation of green manure crop is----------

19. Vermicompost is rich in----------

20. An example for Nitrogen supplying bio fertilizers ----------

21. An example for 'P' supplying bio fertilizers ----------

22. The most popular fertilizer for foliar application is ( )

a. Potassium b. Phosphate c. Urea d. Ammonium

23. The herbicide which is used to control broad leaved weeds is ----------

24. Non selective weedicide which is popularly used is ----------

25. The weed that causes respiratory problems reproduce vigorously and causes skin allergy is ----------

26. Irrigation over a period of time can contribute to the salinization of some agricultural lands True/False

27. There is no direct chemical to control viral diseases Yes/No

28. Soil borne disease can be controlled by ( )

a. Application of Trichoderma Viridae b. Deep ploughing

c. a & b d. a, b & Soil drenching with suitable chemical

29. An example for granular insecticide is ----------

30.An example for systemic insecticide is ----------

31. The insecticide with systematic and fumigant action is ----------

32. An example for contact insecticide is ----------

33. Excessive use of pyrethroids leads in resurgence Yes/No

34. Higher the droplet size , more will be the spraying efficiency True/ False

35. The pest that acts as carrier for viral diseases in plants----------

36. Root nodules are symptom of damage caused by ( )

a. Nematodes b. Fungi c. Bacteria d. Virus

37. The Red label on the insecticides bottle indicates extremely toxic level of toxicity True/ False

38. The Green label on the insecticides bottle indicates slightly toxic level of toxicity True/False