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M Uday Bhaskar
Ph.D. Scholar, Department of Agricultural Extension Education, S.V Agricultural College, Tirupati, Acharya N G Ranga Agricultural University, Andhra Pradesh, India

PV Sathya Gopal
Professor and Head, Institute of Agribusiness Management, S.V Agricultural College, Tirupati, Acharya N G Ranga Agricultural University, Andhra Pradesh, India

V Sailaja
Professor, Department of Agricultural Extension Education, S.V Agricultural College, Tirupati, Acharya N G Ranga Agricultural University, Andhra Pradesh, India

Y Reddi Ramu
Principal Scientist, Department of Crop Production, DAATTC, Chittoor, Acharya N G Ranga Agricultural University, Andhra Pradesh, India

P Lavanya Kumari
Assistant Professor & Head, Department of Statistics and Computer Applications, S.V Agricultural College, Tirupati, Acharya N G Ranga Agricultural University, Andhra Pradesh, India

Corresponding Author:
M Uday Bhaskar
Ph.D Scholar, Department of Agricultural Extension Education, S.V Agricultural College, Tirupati, Acharya N G Ranga Agricultural University, Andhra Pradesh, India

Construction of a scale to measure the attitude of farmers towards Blackgram cultivation

M Uday Bhaskar, PV Sathya Gopal, V Sailaja, Y Reddi Ramu and P Lavanya Kumari

Abstract
Attitude refers as the degree of positive or negative effect associated with some psychological object (Thurstone, 1946). Attitude exhibits a pivotal role in influencing one's behaviour towards any psychological object. In the present study, attitude of the farmers towards blackgram cultivation was operationalised as the psychological disposition of the farmers about blackgram cultivation in varying degrees of favourableness or unfavourableness. For this a tentative list of 60 statements were collected from different sources of information. After editing of these 60 statements by using various informal criteria 40 statements were retained. 32 statements out of 46 were selected through relevancy testing. Out of 32 statements, 18 statements (9 positive and 9 negative) with t value more than 1.75 were selected for final attitude scale. It is tacit that this scale with suitable modifications could be used in further studies for determining the attitude of farmers towards blackgram cultivation.

Keywords: Psychological object, relevancy testing, behaviour towards

Introduction
Blackgram (*Vigna mungo* L.) cultivation is an important agricultural practice with immense potential for enhancing farmers' income and contributing to sustainable agriculture. However, the success of blackgram cultivation relies not only on technical aspects but also on farmers' attitudes and perceptions towards the crop. Understanding farmers' attitudes is crucial for the development of effective extension programs, policy formulation, and targeted interventions to promote blackgram cultivation. To gain insights into farmers' attitudes towards blackgram cultivation, researchers and agricultural practitioners have recognized the need for a reliable and valid measurement tool. This article presents the construction of a scale specifically designed to assess farmers' attitudes towards blackgram cultivation. This scale aims to provide a standardized and quantitative approach to capturing farmers' beliefs, perceptions, preferences, and behavioral intentions related to blackgram cultivation. The construction of the scale involves a systematic process that includes item generation, expert validation, and pilot testing. Initially, a comprehensive review of existing literature, field observations, and expert consultations is conducted to identify key dimensions and constructs relevant to farmers' attitudes towards blackgram cultivation. Based on this knowledge, a pool of items is generated, reflecting various aspects such as economic viability, environmental sustainability, market factors, perceived risks, and social influences. The generated items are then subjected to rigorous expert validation, ensuring their content relevance, clarity, and appropriateness for capturing farmers' attitudes. Expert feedback and consensus are sought to refine and finalize the scale items. Subsequently, the scale is pilot-tested with a sample of farmers to evaluate its psychometric properties, including reliability and construct validity. Statistical analyses are performed to identify and retain the most reliable and discriminant items that effectively measure the targeted attitudes.

By employing this measurement tool, they can gain a deeper understanding of farmers' attitudes, identify key factors influencing their decision-making processes, and design targeted interventions to address specific challenges or barriers. Moreover, the scale can serve as a benchmark for future research, allowing for comparative studies across regions and timeframes. Ultimately, the findings derived from this scale can contribute to the development of evidence-based strategies to support and enhance blackgram cultivation, fostering agricultural productivity and rural development.

Messsthodology

Thurstone (1946) [8] defined attitude as "the degree of positive or negative affect associated with some psychological object." In the present study, attitude of the farmers towards blackgram cultivation was operationalised as the psychological disposition of the farmers about blackgram cultivation in varying degrees of favorableness or unfavourableness. The scale was developed using summated ratings method (Likert, 1932) [7].

Procedure followed for the construction of attitude scale to measure the "Attitude of farmers towards blackgram cultivation".

The following steps were carried out to construct the scale to measure the attitude of farmers towards blackgram cultivation (Edwards, 1969) [4].

Definition of universe: The first step in the scale construction is to define the general area of universe of content. The class of all possible statements that could be made about a given psychological object is often called a universe. In the present study all the possible statements about "Attitude of farmers towards blackgram cultivation" represent the universe.

Collection of statements: A number of statements about "Attitude of farmers towards blackgram cultivation" were gathered from books, magazines, newspapers, research articles, journals, academic attainments, expertise of intellectuals in extension, research, teaching, farmers, self-intuitions and own experiences. From all these sources a tentative list of 60 statements belonging to attitude of farmers towards blackgram cultivation were prepared keeping in view of the applicability of statements suited to the area of study.

Editing of statements: The 60 statements collected were carefully edited by using various informal criteria suggested by Chave (1929) [2], Likert (1932) [7], Wang (1932) [9], Bird (1940) [1], Edwards (1941) [3], Thurstone (1946) [8] and Kilpatrick (1948) [6]. After editing the 60 statements, 20 statements were deleted, and 40 statements were retained.

Testing the statements for relevancy: All the statements collected may not be relevant equally in measuring the attitude of farmers towards blackgram cultivation. Hence, the statements were subjected to scrutiny by judges to determine the relevancy and screening for inclusion in the final scale. For this purpose, the list of all the 40 statements was prepared in the form of questionnaire and was sent to 100 judges. The judges were requested to critically evaluate each statement for its relevancy to measure attitude of farmers towards blackgram cultivation. They were requested to give their responses on a four-point continuum viz., highly relevant, moderately relevant, slightly relevant and less relevant with scores 4, 3, 2 and 1 respectively. They were also requested to feel free to add some more statements, if they feel important and also delete unrelated statements. The judges included the faculty and scientists working in Acharya N. G. Ranga Agricultural University and extension personnel, scientists and researchers across the country. The questionnaire was prepared in Google forms and sent to judges by their e- mails. The responses obtained from judges were subjected to Standard Normal Deviate test (z test). After giving the scores to the statements, 'z' values were calculated for each statement. The responses obtained from judges were subjected to Standard Normal Deviate test (z test). After giving the scores to the statements, 'z' values were calculated for each statement. Finally, the grand 'z' of all the 40 statements was obtained and 'z' was calculated. All the statements with 'z' values above '$\bar{z}$' (0.039) were selected as the scalable statements of attitude of farmers towards blackgram cultivation and are presented in the table 1. The statements with 'z' values below '$\bar{z}$' were eliminated. Thus, 32 statements out of 40 were selected through relevancy testing.

Table 1: Selected attitude statements based on relevancy test

S. No:	Statements	'z' value	Selected/Not selected
1	Blackgram is an traditional and orthodox crop (-)	1.38	Selected
2	Blackgram cultivation requires more labour when compared to other crops	1.56	Selected
3	Blackgram can be grown in fallow land for getting additional income	-0.258	Not Selected
4	I prefer to cultivate blackgram as it improves the soil fertility	0.99	Selected
5	Cost of cultivation is increasing day by day for blackgram (-)	1.23	Selected
6	Blackgram crop is suitable for all sizes of landholders	1.35	Selected
7	Blackgram crop can only be cultivated by trained or educated farmers (-)	0.04	Selected
8	Adoption of improved black gram practices is a complicated process (-)	0.78	Selected
9	Blackgram ensures assured income for farmers	1.72	Selected
10	Blackgram crop is highly susceptible to pests and diseases (-)	1.48	Selected
11	Black gram can be grown with limited inputs	1.54	Selected
12	There is no proper marketing facility for blackgram (-)	0.44	Selected
13	Price realization for blackgram is relatively less (-)	0.85	Selected
14	Good Agricultural practices helps in improving the export quality of blackgram produce	0.033	Not Selected
15	Blackgram crop lacks assured procurement (-)	1.19	Selected
16	There is enough support from the government for blackgram farmers	1.42	Selected
17	I would like to advise others for blackgram cultivation because of its increased yields	0.019	Not Selected
18	Traders are exploiting the blackgram farmers (-)	1.98	Selected
19	Scope in blackgram cultivation is very limited (-)	1.28	Selected
20	One can get maximum return from a minimum cost through blackgram cultivation	0.89	Selected
22	Blackgram is an unprofitable crop (-)	1.64	Selected
23	It is better to grow other pulses than blackgram crop (-)	1.32	Selected
24	Consumption value is increasing day by day for blackgram	1.35	Selected
25	A blackgram farmer should always think about returns rather than production practices (-)	1.71	Selected
26	Blackgram cultivation can be profitable even for those with poor resources.	1.64	Selected

27	Blackgram cultivation is more suitable for those who have their own storage and processing facilities	1.22	Selected
28	Market price of blackgram produce is usually less when compared to MSP (-)	-0.012	Not Selected
29	Blackgram is a mini fertilizer factory crop/less fertilizer intensive crop	0.022	Not Selected
30	High minimum support price motivates me to grow blackgram	1.72	Selected
31	Cultivation of blackgram crop is relatively easy	1.56	Selected
32	I am willing to grow blackgram only if proper marketing and price support are insured (-)	-0.456	Not Selected
33	Production or marketing risk is more in blackgram cultivation (-)	1.56	Selected
34	Labour cost is more than other input costs in blackgram cultivation. (-)	0.03	Selected
35	Post-harvest management methods can help blackgram farmers get a good value for their produce	0.98	Selected
36	Blackgram cultivation involves more risk (-)	1.88	Selected
37	Scope for entrepreneurial activity is usually high in blackgram	0.65	Selected
38	Blackgram can be cultivated with minimal natural resources	1.78	Selected
39	Blackgram cultivation acts as an essential component of crop rotation and diversification (-)	0.028	Not Selected
40	Blackgram cultivation is environmentally friendly and promotes sustainable farming practices	0.025	Not Selected

Note: (-) Negative Statements #The statement with z value more than z value (0.039)

Treating the statements with Likert's Summated Rating Technique of scale construction: In this step, the 32 statements selected through relevancy test were given to blackgram farmers from a non-sample area and were asked to indicate their responses on a five-point continuum viz., strongly agree (SA), agree (A), undecided (UD), disagree (DA) and strongly disagree (SDA) with 5, 4, 3, 2 and 1 for positive statements and vice-versa for negative statements respectively. After receiving the responses from the respondents, the sum of the scores of all statements given by each respondent was calculated and the respondents were arranged in descending order based on the sum of the scores obtained for all the statements. Then the top 25 per cent of the respondents with the highest scores and the bottom 25 per cent of the respondents with the lowest scores were considered as criterion groups to evaluate individual statements. The middle 50 per cent of the respondents were deleted for further analysis. The top 25 percent was considered as high group and bottom 25 per cent was considered as low group to calculate the critical ratio i.e., 't' value for each statement. The calculated 't' value for each statement will measure the extent to which the statement differentiates between the respondents of high group and low group. The 't' values were calculated by using the formula suggested by Edwards (1969) [4]. The 't' value for each statement was calculated by using the formula.

$$t = \frac{\left(\overline{X}_H - \overline{X}_L\right)}{\sqrt{\sum\left(X_H - \overline{X}_H\right)^2 + \sum\left(X_L - \overline{X}_L\right)^2 / n(n-1)}}$$

where,

$\overline{X}_H$ =Mean score on a given statement for the high group

$\overline{X}_L$ = Mean score on a given statement for the low group

$$\Sigma\left(X_H - \overline{X}_H\right)^2 = \Sigma X_H^2 - \frac{\Sigma\left(X_H\right)^2}{n_H}$$

$$\Sigma\left(X_L - \overline{X}_L\right)^2 = \Sigma X_L^2 - \frac{\Sigma\left(X_L\right)^2}{n_L}$$

$$\overline{X}_H = \frac{\Sigma X_H}{n_H}$$

$$\overline{X}_L = \frac{\Sigma X_L}{n_L}$$

$$n = n_L = n_H$$

After computing 't' values for all the 32 statements, the statements with 't' values more than 1.75 were selected for the final attitude scale. Thus, out of 32 statements, 18 statements with 't' value more than 1.75 were selected in the attitude scale and are presented in the table 2. Thus, the final attitude scale to measure the attitude of farmers towards blackgram cultivation comprises of 18 statements, out of which nine were positive statements and nine were negative statements measured on a five-point continuum viz., strongly agree (SA), agree (A), undecided (UD), disagree (DA) and strongly disagree (SDA) with 5,4,3,2 and 1 for positive statements and vice-versa for negative statements respectively.

Testing the reliability of the scale: A scale is reliable when it will consistently produce the same results when applied on the same sample (Goode and Hatt, 1952) [5]. For testing the reliability, split half method was employed. The attitude scale of 18 statements was distributed to thirty blackgram farmers of non-sample area for their responses. After getting back the responses, the scale was divided into two halves, all odd statements into one half and all even statements into another. Then the co-efficient of reliability was calculated between the two halves. The correlation coefficient for both the sets was worked out. The correlation coefficient (r=0.78) was significant at 0.01 level indicating the attitude scale was highly suitable for administration to the blackgram farmers.

Testing the validity of the scale: The validity of the scale on attitude of farmers towards blackgram cultivation was obtained through content validity by taking the judge's opinion. The statements selected for the scale were evaluated individually and as a whole by the judges. These were again checked by experts in Acharya N.G. Ranga Agricultural University for their relevance and coverage. As the content of the attitude scale was borne out by the method of collecting statements within the universe of attitude of farmers towards blackgram cultivation, it may reasonably be assumed that the attitude of farmers towards blackgram cultivation scale has content validity.

Table 2: Attitude scale statements with 't' values

S. No.	Statements	't' value	Selected/ Not selected
1	Blackgram is an traditional and orthodox crop (-)	1.86#	Selected
2	Blackgram cultivation requires more labour when compared to other crops	2.56#	Selected
3	I prefer to cultivate blackgram as it improves the soil fertility	3.42#	Selected
4	Cost of cultivation is increasing day by day for blackgram (-)	2.28#	Selected
5	Blackgram crop is suitable for all sizes of landholders	1.92#	Selected
6	Blackgram crop can only be cultivated by trained or educated farmers (-)	3.21#	Selected
7	Adoption of improved black gram practices is a complicated process (-)	1.21	Not Selected
8	Blackgram ensures assured income for farmers	2.29#	Selected
9	Blackgram crop is highly susceptible to pests and diseases (-)	4.43#	Selected
10	Black gram can be grown with limited inputs	2.95#	Selected
11	There is no proper marketing facility for blackgram (-)	3.75#	Not Selected
12	Price realization for blackgram is relatively less (-)	2.55#	Selected
13	Blackgram crop lacks assured procurement (-)	1.98#	Selected
14	There is enough support from the government for blackgram farmers	4.25#	Selected
15	High minimum support price motivates me to grow blackgram	1.01	Not Selected
16	Scope in blackgram cultivation is very limited (-)	1.45	Not Selected
17	One can get maximum return from a minimum cost through blackgram cultivation	1.56	Not Selected
18	Blackgram is an unprofitable crop (-)	1.73	Not Selected
19	It is better to grow other pulses than blackgram crop (-)	0.44	Not Selected
20	Consumption value is increasing day by day for blackgram	3.36#	Selected
22	A blackgram farmer should always think about returns rather than production practices (-)	1.23	Not Selected
23	Blackgram cultivation can be profitable even for those with poor resources.	0.98	Not Selected
24	Blackgram cultivation is more suitable for those who have their own storage and processing facilities	3.45#	Selected
25	Traders are exploiting the blackgram farmers (-)	1.85#	Selected
26	Cultivation of blackgram crop is relatively easy	2.92#	Selected
27	Production or marketing risk is more in blackgram cultivation (-)	1.35	Not Selected
28	Labour cost is more than other input costs in blackgram cultivation. (-)	0.89	Not Selected
29	Post-harvest management methods can help blackgram farmers get a good value for their produce	1.73	Not Selected
30	Blackgram cultivation involves more risk (-)	3.62#	Selected
31	Scope for entrepreneurial activity is usually high in blackgram	1.50	Not Selected
32	Blackgram can be cultivated with minimal natural resources	3.78#	Selected

Note: (-) Negative Statements, #The statement with 't' values more than 1.75

Results and Discussion

The final scale had 18 statements depicted in table 3. Each statement of scale was provided with five-point continuum of strongly agree, agree, undecided, disagree, strongly disagree with scores of 5, 4, 3, 2 and 1 respectively for positive statements and 1, 2, 3, 4 and 5 for negative statements. The attitude score of the respondent on the scale can be obtained by aid of summing up the scores of all the statements in the scale. The possible minimum and maximum score lies in the range of 18 and 90. The high score of scale will represent the favourable attitude farmers towards blackgram cultivation.

Table 3: Attitude scale to measure attitude of farmers towards blackgram cultivation

S. No	Statements	SA (5)	A (4)	UD(3)	D (2)	SD(1)
1.	Blackgram is an traditional and orthodox crop (-)					
2.	Cultivation of blackgram crop is relatively easy					
3.	Blackgram ensures assured income for farmers					
4.	Blackgram cultivation requires more labour when compared to other crops (-)					
5.	I prefer to cultivate blackgram as it improves the soil fertility					
6.	Blackgram crop is suitable for all sizes of landholders					
7.	Cost of cultivation is increasing day by day for blackgram crop (-)					
8.	Blackgram crop is highly susceptible to pests and diseases (-)					
9.	Blackgram can be grown with limited inputs					
10.	Blackgram can be cultivated with minimal natural resources					
11.	Blackgram crop lacks assured procurement (-)					
12.	Price realization for blackgram is relatively less (-)					
13.	Blackgram cultivation is more suitable for those who have their own storage and processing facilities					
14.	Traders are exploiting the blackgram farmers (-)					
15.	There is no proper marketing facility for blackgram (-)					
16.	Blackgram cultivation involves more risk (-)					
17.	There is enough support from the government for blackgram farmers					
18.	Consumption value is increasing day by day for blackgram					

Conclusion

The attitude scale developed in this study aids in measurement of attitude of farmers towards blackgram cultivation and was developed considering the study area, Andhra Pradesh. A positive and favorable attitude among farmers towards blackgram cultivation can greatly facilitate the adoption of improved practices, increased productivity, and ultimately, higher profitability. On the other hand, a negative attitude towards blackgram cultivation can act as a barrier to progress and development. The attitude scale developed in this study can serve as a valuable tool for future research and studies examining the attitude of farmers towards Blackgram cultivation. With suitable modifications and adaptations, it can be administered to farmers in different regions to gain insights into their perspectives, challenges, and opportunities related to blackgram cultivation.

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