Research Tool

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# Scale to Measure the Attitude of Farmers towards the Maize and Wheat Crops

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## HIGHLIGHTS

- Reliability of the Maize crop's scale was higher (0.80) than the wheat crop's scale (0.71).
- For the Maize crop, 13 items were finally retained out of 26 items, whereas 11 items were retained from 27 items, in terms of the Wheat crop.
- The development of this scale provides valuable insights into the decision-making processes of farmers.

ARTICLE INFO

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## ABSTRACT

Attitude plays a critical role in shaping one's behavior towards any psychological object. Scales were created to examine farmers' attitudes on maize and wheat crops. A list of 26 attitude statements for maize crop and 27 attitude statements for wheat crop was compiled and improved using Edward's 14 principles, and included both positive and negative remarks. The study was conducted in 2024 with a total of 56 farmers in the sub-tropical zone, which included districts such as Akhnoor, Samba, and Kathua, and 56 farmers in the mid-hill zone, which included districts such as Rajouri, Kishtwar, Ramban, and Doda. Ultimately, each statement's "t" value was calculated, and found that 13 statements for the maize crop and 11 statements for the wheat crop had a "t" value higher than 1.75, which were retained in order to assess the final scale's validity and reliability. Cronbach's alpha was proposed for assessing the reliability of attitude scales. In the case of scale for maize crop, the Cronbach's alpha coefficient was 0.81, and 0.71 in the case of the wheat crop, validating the constructed scale's internal consistency. The experts' opinions were used to determine the scale's content validity. With some changes, the ultimate scale will be used to gauge the attitude of farmers toward the maize and wheat crops.

## INTRODUCTION

As the main source of income for the vast most of the world's impoverished, agriculture plays a crucial role in the 2030 Agenda and is a key means of accomplishing many of the Sustainable Development Goals (SDGs) (Erenstein et al., 2021). As a result, agri-food systems are essential in fulfilling the 2030 Agenda for Sustainable Development's 17 Sustainable Development Goals. Eight nations–the United States, China, Brazil, Argentina, Ukraine, Indonesia, India, and Mexico–produce more than 25 million tons of maize every year, which combined make up 881 million tons, or three-quarters of the world's total production (Fanzo et al., 2021). Maize is a crop that can be used for many purposes. The main applications of maize (dry grain) worldwide are as feed (56% of production), non-food purposes (5%), and food (13%). It is predicted that 35 per cent of farms worldwide will grow maize by 2030, up from 33 per cent in 2020. Particularly dynamic is China, whose contribution to the anticipated worldwide fall in farm numbers is probably being driven by its fast economic change, urbanization, and farm consolidation (Erenstein et al., 2021). India's economy is undergoing change as well; rising demand for poultry is driving up maize output (Hellin et al., 2015). One of the most

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significant staple crops that significantly contributes to global food security is wheat (*Triticum aestivum*). It supplies 20 per cent of global human caloric intake. Bread, cereal, rusks, biscuits, pasta, cookies, noodles, and other wheat-based foods frequently include these calories. The area cultivated with cereals in the world is 840 million hectares, of which 227 million hectares is under wheat. Wheat is grown as a staple crop in more than 180 countries around the world. However, the yield is much lower than the allowable level of 2.71 t/ha. This meets 60 per cent of the population's grain needs (Dilmurodovich et al., 2021). Since almost 65 per cent of J&K's population makes their living either directly or indirectly from agriculture, it is a significant part of the state economy. Concerns about decreasing productivity, environmental degradation, and ecological unsustainability should be prioritized for the long-term expansion of agriculture in Jammu and Kashmir, in addition to achieving food and nutritional security. Low crop yield, which is reflected in the small average size of holdings, is the state of J&K's economic worry, highlighting the need for sustainable agriculture (Khan et al., 2018). To sum up, small farm management can significantly contribute to overall sustainability by increasing the farming system's production, profitability, and sustainability (Narayan, 2012).

## METHODOLOGY

Likert's Summated Rating attitude scale construction technique was employed to construct a scale for the objective. Subject-centered discrepancies among responders regarding their possession or status of a certain attribute or feature are measured using the Likert scale. (Ramya et al., 2019). To examine the correlations between items and scales, Likert scale with a continuum of five or seven points can produce sufficient variation and internal consistency (Lissitz, 1975). We chose to use the five-point continuum scale. A total of 35 pertinent attitudinal items spanning various facets of growing maize and wheat crops were gathered following a thorough assessment of pertinent literature, discussions with farmers, and the experience of the investigator. Out of 35 items, 26 for maize crop and 27 statements for the wheat crop were kept for additional examination if they met Edwards' (1969) requirements for building an attitude scale. These 26 statements for maize crop and 27 statements for wheat crop were administered to 56 farmers in the sub-tropical zone, which included districts namely Akhnoor, Samba, and Kathua and 56 farmers in the mid-hill zone, which included districts namely Rajouri, Kishtwar, Ramban, and Doda. To measure farmers' degrees of agreement, a five-point continuum scale was created, where 5 denoted highly agree and 1 denoted strongly disagree. The t value for each question was then calculated using the scores of the selected respondents. The results of the item analysis displayed the t-value for each item.

$$t=\frac{\bar{X}H-\bar{X}L}{\sqrt{\frac{\sum(X_H-\bar{X}_H)^2+\sum(X_L-\bar{X}_L)^2}{n(n-1)}}}$$

Whereas,

$$\sum(X_H-\bar{X}_H)^2=\sum(X_H)^2-\frac{(\sum X_H)^2}{n} \text{ and } \sum(X_L-\bar{X}_L)^2=\sum(X_L)^2-\frac{(\sum X_L)^2}{n}$$

Items that had a t-value greater than 1.75 were retained. In this way, 13 statements for maize crop and 11 statements for wheat crop were retained that will be further administered to 288 non-sampled respondents for the study. The reliability of 26 statements for the maize crop came out to be 0.81, and for 27 statements for the wheat crop came out to be 0.71.

## RESULTS

The uniformity of several measurements of a variable is referred to as reliability. The reliability of the measurement device was evaluated using the Cronbach alpha coefficient (internal consistency). In research, a Cronbach alpha value of 0.7 or higher is ideal, although in certain cases, a Cronbach coefficient of 0.6 or higher is also considered sufficient to confirm the accuracy of the measurement apparatus (Nunnally & Bernstein, 1994).

### Maize crop

The chosen attitude scale items that passed the item analysis (t-value of 1.75 or higher, computed), as shown in Table 1, are displayed. Thirteen statements were ultimately kept in the developed tool out of the 26 statements for the total pooled items for the maize crop. Any attitudinal item with a t value more than 1.75 has higher discrimination power and was retained in the final scale, following Edwards (1969). The scale has a good degree of

**Table 1.** A scale with corresponding t-values to gauge farmers' attitudes toward the maize crop

| Statements | t-value |
|---|---|
| Maize is cultivated less than any other crop in that season. | 6.99 |
| Maize is used in industries for the production of bio-ethanol. | 6.18 |
| Hybrid maize is preferred more as it reduces the crop loss due to crop pests. | 1.86 |
| Lack of drainage practice at the time of sowing destroys the crop. | 7.64 |
| Maize is the most suited cereal crop for poultry feeding. | 3.58 |
| Monkey menace is the major problem restricting farmers from undertaking maize cultivation. | 5.86 |
| The selling of green cobs fetches more money to the farmers. | 2.88 |
| The maize crop is more prone to human and bird pilferage. | 3.21 |
| Intercultural operations in the maize crop are more time-consuming. | 4.60 |
| Progressive maize cultivators can motivate fellow farmers to adopt their cultivation. | 6.08 |
| Maize fodder is the most promising material for silage/forage making. | 2.90 |
| The maize crop is more labour-intensive as compared to the other crops grown in the same season. | 5.87 |
| The maize crop can withstand moisture stress conditions. | 11.36 |

**Table 2.** Scale to measure the attitude of farmers towards the wheat crop with their respective t-value

| Statement | t-value |
|---|---|
| Wheat cultivation is more economical as compared to other crops grown in that season. | 2.53 |
| Inputs required for wheat cultivation is not easily available. | 3.35 |
| Wheat cultivation is the most suited option in Rainfed/Kandi/Mid-hill areas. | 1.79 |
| The government has initiated various programmes for wheat promotion in the country. | 5.61 |
| Wheat is an important crop in the NFSM mission. | 7.14 |
| Farmers are less inclined towards processed products of wheat. | 2.12 |
| Wheat cultivation is not successful in less fertile soil. | 2.02 |
| Farm mechanization is not satisfactory in wheat cultivation. | 3.76 |
| Varietal diversification is satisfactory in the wheat crop. | 3.51 |
| Wheat is an important crop in the crop rotation cycle. | 3.00 |
| Preparation of traditional value-added products of wheat is a very common practice in kandi/mid-hill areas. | 3.39 |

consistency in its measurement, as seen by the calculated Cronbach alpha coefficient of 0.80 for the maize crop (Table 1).

**Wheat crop**

The attitude scale items that were chosen and passed item analysis (calculated t value of 1.75 or above) are shown in Table 2. Eleven elements were ultimately chosen from the 27 assertions for the total pooled items of the wheat crop in the instrument that was built. Edward (1969) asserts that any attitudinal component with a t value above 1.75 has a larger capacity for discriminating and may be included in the final scale. The created scale's calculated Cronbach alpha coefficient for the wheat crop was 0.71 (Table2), which was deemed credible.

## DISCUSSION

If a scale measures what it is intended to measure, it is considered legitimate. It is the degree to which a scale accurately depicts the concept or idea of interest. The sample size or representativeness of the content about the universe's content is known as content validity. To confirm the present scale's content validity, experts were engaged and comments were collected from relevant literature. Researchers (Gupta et al., 2022; Bardhan et al., 2023; Reddy et al., 2023., Velamuri et al., 2024; Boora et al., 2022; Vavilava et al., 2024; Saikia et al., 2024; Chandra et al., 2024) employed a variety of techniques to estimate validity and dependability.

## CONCLUSION

Development of a standardized scale to measure the attitude of farmers towards maize and wheat crops represents a significant step forward in agricultural research and practice. The scale's robustness in capturing various dimensions of farmer attitude ensures its utility in tailoring more effective interventions and support systems for farmers. Future studies could build upon this work by further refining the scale, exploring regional variations, and investigating how attitude correlates with socioeconomic factors, technology adoption, and sustainability practices. Ultimately, a well-informed approach to understanding farmers' attitudes can lead to improved crop management strategies, higher productivity, and better-informed agricultural policies. This research emphasizes the importance of considering the farmers' perspectives in agricultural development and underscores the need for tools that can capture their complex and diverse attitudes toward crop cultivation.

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