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# SCALE FOR MEASURING ATTITUDE OF FARMERS TOWARDS IMPROVED LARGE CARDAMOM CULTIVATION

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## Abstract

Attitude is considered a psychological construct. It is a mental and emotional entity that would characterize an individual. The success or failure of any agricultural activity depends on the attitude of farmers towards it to a great extent. A scale was developed to measure the attitude of the farmers towards improved large cardamom practices based on Likert's summative rating technique of scale construction. The final scale consisted of 17 statements including 10 positive and 7 negative statements, which were selected based on the 't' values. Split half technique was used to test the reliability of scale. Reliability co-efficient of the scale was found to be 0.83. Validity of scale was tested using content validity. The reliability and validity of the scale indicates the consistency and precision of the results using the developed scale. The scale was pre-tested before data collection from the large cardamom farmers.

***Key words:*** Summated rating scale, attitude, large cardamom, validity, reliability.

## Introduction

Large cardamom (*Amomum subulatum* Roxburgh), which belongs to the family Zingiberaceae, is one of the oldest and popular spices used by mankind. It is highly valued for its pleasant aroma due to which it is extensively used as a spice in a wide variety of indigenous and exotic culinary recipes. It is also known to have many medicinal properties. It has distinguished itself as a popular cash crop due to its wide range of medicinal and physiological properties. Large cardamom can be integrated into secondary forest formations without any ecological damage. In India, the major large cardamom growing areas are in Sikkim and Darjeeling districts of West Bengal. However in the recent past, its cultivation has spread to the North Eastern states like Mizoram, Nagaland, Meghalaya, Arunachal Pradesh and Manipur and to the central Indian state of Uttarakhand (Srinivasa, 2006). Nagaland known as one of the culturally vibrant State of North East India, is an agrarian state employing about nine-tenths of its population. Spices play a very important role in improving the agricultural practices and social status of Naga farmers who have now moved on from subsistence farming to profitable crop enterprises. Large cardamom is one of the important spice crops grown in all the districts of Nagaland, except Dimapur district. During 2014-2015, the total area and production of large cardamom in the state accounted for 3314 ha and 1476 MT respectively. Sensing the economic potential of this crop, farmers have started taking interest in large cardamom cultivation and area under its cultivation has increased over in the last few years.

Attitude measurement is a very important factor to be considered especially in research that concerns farmers' socio-economic aspects. It is a fair assumption to say that when farmers are asked to provide information with respect to expenditures on the farm, they tend to exaggerate the costs and expenses. However, when asked about their income, capital and net profits, they become reluctant to deliver actual information. It is therefore immensely important that we apply attitudinal approach in order to avoid such problems of asymmetric information. Understanding of farmer's behaviour with respect to following recommended package of practice is important to enhance the environmental sustainability and productivity to its maximum in addition to the keep in concern the necessity of healthy food, healthy people and healthy environment. In this regard, attitude plays a pivotal role in influencing one's overt or covert behaviour at three levels *i.e.* cognitive (favourable or unfavourable,

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desirable or undesirable, good or bad etc.), feelings (likes or dislikes, pleasing or displeasing etc.) and action tendency (behavioural readiness).

Due to these reasons, it is very important for a researcher to study the attitude of farmers towards improved large cardamom cultivation, as attitude forms one of the most important factors for implementation and success of any innovative agricultural practice. There are however instances where the researcher is unable to get a completely adequate scale to measure a certain concept. Under such circumstances, it becomes necessary to develop a new and suitable scale which could serve the purpose. Its quantification will be helpful in chalking out efficient extension strategies/training programmes for popularization of recommended large cardamom cultivation practices among farming communities.

Rarely any scale is available to measure the attitude of farmers towards improved large cardamom cultivation in Nagaland. Therefore a research study was undertaken with an objective to develop an attitude scale to measure the attitude of farmers towards improved cultivation practices of large cardamom, as attitude of farmers determine their adoption behaviour in terms of following the improved practices. Kumar and Sharma, (2018) found in their study that variables like age, education level, size of land holding and extension participation were found to be positively and significantly associated with the attitude of farmers towards recommended soybean cultivation practices. Singh *et al.,* (2019) showed that education, caste, size of land holding, social participation, socio-economic status, annual family income were positively and significantly correlated with the attitude of farmers towards improved rapeseed-mustard production technology.

## Materials and Methods

Likert scale is applied as one of the most fundamental and frequently used as psychometric tools in educational and social sciences research (Joshi, 2015). By implication, Likert scaling is convenient to work with, for constructing attitude scale, as it makes the response process cumulative. The scores can be summed, yielding a summary score. A Likert scale is never an individual item, rather it is a set of several items and the responses to these items are averaged to produce an overall score or measurement (Krabbe, 2017). Likert scale has been accepted widely by many researchers. It is used not only in psychology, marketing and social sciences but also in areas *viz*. education (Albanese *et al.,* 1997), medicine (Grant *et al.,* 1999), nutrition (Lindhorst *et al.,* 2007), nursing (Seal, 2007) and also other areas like finance, engineering and human study (Pimentel, 2010). The method of summated rating suggested by Likert, (1932) was used for construction of the present attitude scale for measuring the attitude of farmers towards improved cultivation practices of large cardamom, as it offers opportunities to select statements based on their discriminating power as well as being appropriate. The procedures followed for scale construction are as follows:

### Item collection

A group of items which make up an attitude scale is known as a 'Statement'. A statement is anything which is said about a psychological object or stimulus. The initial step in the construction of attitude scale was to collect statements about improved cultivation practices of large cardamom. The statements, consisting of both favourable and unfavourable methods of cultivation reflecting various dimensions of attitudes have been collected from research papers, newsletters, journals, bulletins, magazines, books and by discussions with Professors, subject matter specialists, extension officers and research scientists, who were directly or indirectly exposed to such a system of knowledge. A preliminary list of 80 statements, consisting of 46 positive and 34 negative statements, capable of differentiating the opinion of farmers towards the improved cultivation practices of large cardamom were collected based on the applicability of statements to the selected area.

### Editing and selection of items

The statements collected were carefully edited by following the criteria suggested by Edwards, (1957). After rigorous discussions with experts, a total of 58 statements were retained out of 80 statements. Each statement comprised of minimum possible words and these were checked for their easy comprehension. Care was taken to include both positive and negative statements.

### Item analysis

Analysis of an item is an important step in the construction of a valid and reliable scale. The main objective of an item analysis is to identify those items that constitute an internally consistent scale and to remove those items that do not (Spector, 1992). The item analysis would give detailed information on how well a particular item relates to the other in the given analysis. For this purpose 58 statements selected after editing the original statements were subjected to item analysis to delineate the items that discriminate between persons having favourable and unfavourable attitudes.

The response of respondents for each statements were obtained on a 5 point continuum *viz*., 'strongly

agree', 'agree', 'undecided', 'disagree' and 'strongly disagree' with the score of 5, 4, 3, 2 and 1 respectively for positive statements whereas for the negative statements, the scores were reversed as 1, 2, 3, 4 and 5. Then, the scores of all the items of the individual were summed up and the total score was computed.

**Computation of 't' value**

For computation of 't' value, 58 items were administered to a random sample of 20 farmers from non-sampled area. The statements were arranged in descending order based on total score for individual statements. The top 27 percent of the respondents with high score (high group) and bottom 27 percent of the respondents with lowest score (low group) were used as criterion group to evaluate the discriminating ability of each scale item. The critical ratio ('t'-value) for the items was calculated using the formula given by Edwards (1957).

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

Where,

$$\sum \left(X_H - \bar{X}_H\right)^2 = \sum (X_H)^2 - \frac{(\Sigma X_H)^2}{n}$$

$$\sum \left(X_L - \bar{X}_L\right)^2 = \sum (X_L)^2 - \frac{(\Sigma X_L)^2}{n}$$

$\bar{X}_H$ = Mean score of given statement of high group

$\bar{X}_L$ = Mean score of given statement in low group

$\sum (X_H)^2$ = Sum of squares of individual score on a given statement for high group.

$\sum (X_L)^2$ = Sum of squares of individual score on a given statement for low group.

$\sum X_H$ = Summation of scores on given statement for high group.

$\sum X_L$ = Summation of scores on given statement for low group.

n = Number of respondents in each group.

## Results and Discussion

**Analysis of attitude statements**

Mean score and Critical ratio ('t' value) were calculated for all 58 items as follows:

Critical ratio ('t' value) for all the scale statements (Table 1) was used for final selection of statements. Items or statements were selected on the basis, 't' value equal to or, greater than 1.75 as this 't' value significantly differentiates between high and low groups of items (Edwards, 1957). Statements were arranged in descending order based on their 't' values. Therefore, for inclusion of statements in final format of the attitude scale by this procedure, 17 statements (10 positive and 7 negative) were selected as shown in table 2.

**Table 1:** Mean score and 't' values of the scale items.

| Sl. No | Statements | Mean Score | 't' value |
|---|---|---|---|
| 1. | Large cardamom farming is a profitable venture. (+) | 4.25 | -1.00 |
| 2. | I believe that improved cultivation practice of large cardamom is worth to adopt though it is laborious and complicated. (+) | 4.25 | 4.00 |
| 3. | Improved practice of large cardamom cultivation is difficult to adopt because its operations are tedious. (-) | 3.50 | 0.84 |
| 4. | I like to adopt large cardamom cultivation because it helps in generating high agricultural return. (+) | 4.25 | 0.64 |
| 5. | I believe that improved cultivation practices of large cardamom help to produce quality production. (+) | 3.85 | 2.13 |
| 6. | I prefer local variety to the improved variety of large cardamom. (+) | 2.50 | 1.31 |
| 7. | Improved cultivation practices of large cardamom are only for the educated and rich farmers. (+) | 1.35 | -2.12 |
| 8. | I think that improved cultivation practice of large cardamom is possible to adopt by all farmers. (+) | 3.95 | 2.55 |
| 9. | Large cardamom growers can get good price by adopting post-harvest management practices. (+) | 4.45 | 1.63 |
| 10. | The most successful large cardamom grower is one who gets maxi. return with mini. investment. (+) | 4.15 | 1.46 |
| 11. | In my view, adoption of large cardamom cultivation means inviting risk. (-) | 3.50 | -2.12 |
| 12. | Large cardamom cultivation can improve the living standards of growers. (+) | 3.85 | 1.63 |
| 13. | It is worth to adopt improved cultivation practices of large cardamom even by burrowing money. (+) | 3.15 | 0.34 |
| 14. | It is better to give more importance to other occupation than following improved cultivation practices of large cardamom. (-) | 3.05 | 0.94 |

*Table 1 Continue ...*

*Continue Table 1 ...*

| | | | |
|---|---|---|---|
| 15. | Recommended large cardamom production technology cannot bring significant change in cultivation practices of farmers. (-) | 3.85 | 4.00 |
| 16. | Demonstration is helpful for generating confidence in large cardamom growers. (+) | 4.70 | 1.68 |
| 17. | The improved cultivation practices of large cardamom can improve the social status of the farmers. (+) | 4.05 | 2.88 |
| 18. | I would like to give my ideas and take the other ideas for the benefit of my enterprise. (+) | 4.60 | 1.26 |
| 19. | I want to become a role model for other farmers by succeeding in improved large cardamom production. (+) | 4.05 | 1.00 |
| 20. | A farmer should select a proper marketing channel to increase the income of large cardamom farming. (+) | 4.25 | 1.04 |
| 21. | Short duration training organized by Govt/NGO/private is not sufficient to perform agricultural operation successfully in large cardamom cultivation. (-) | 2.75 | -5.30 |
| 22. | Improved large cardamom production technology does not require regular contact with extension workers. (-) | 3.75 | 0 |
| 23. | The risk of cultivation of large cardamom is minimized with the adoption of improved production technology. (+) | 3.35 | 4.00 |
| 24. | Seed and soil treatment are not beneficial to large cardamom farmers. (-) | 4.10 | 1.62 |
| 25. | There is little advantage in large cardamom crop as compared to other spice crops grown in the same season. (-) | 3.80 | 1.50 |
| 26. | Good large cardamom cultivators should motivate the fellow farmers to adopt its cultivation. (+) | 4.35 | 0.84 |
| 27. | Large cardamom cultivation is not being properly promoted by the Government. (-) | 2.95 | 2.13 |
| 28. | Farmers are not cultivating large cardamom due to other beneficial crops. (-) | 3.60 | 1.41 |
| 29. | It is difficult to continue cultivating large cardamom due to unstable price in the market. (-) | 2.10 | 1.73 |
| 30. | Large cardamom cultivation is also possible by untrained farmers. (+) | 3.10 | 2.44 |
| 31. | Improved large cardamom cultivation is difficult to do for inexperienced farmers. (-) | 3.20 | 2.23 |
| 32. | I would like to advise my children to continue improved large cardamom cultivation. (+) | 3.75 | 0.63 |
| 33. | Adoption of improved large cardamom cultivation opens the door of progressive aspiration. (+) | 4.30 | 6.00 |
| 34. | Good large cardamom cultivation demands personal experience and better knowledge regarding improved technologies. (+) | 4.30 | 1.26 |
| 35. | Higher use of chemical fertilizers is the only way to produce high large cardamom yields. (-) | 3.90 | -2.52 |
| 36. | Adoption of improved large cardamom cultivation practices will arrest the migration of farmers to the urban areas. (+) | 3.05 | 0 |
| 37. | There is no surety of getting the highest price from large cardamom even if a farmer adopts improved production technology. (-) | 3.00 | 2.13 |
| 38. | Adoption of recommended plant protection methods requires more knowledge. (+) | 4.05 | 1.00 |
| 39. | Though it takes lot of time for a farmer to learn improved production technologies of large cardamom, it is worth the efforts. (+) | 4.30 | 4.00 |
| 40. | I believe that large quantity of inputs should be used in large cardamom cultivation as long as it is profitable. (+) | 3.45 | 1.26 |
| 41. | Recommended plant protection measures do not help in minimizing insect pest incidence. (-) | 4.05 | 0 |
| 42. | I do not prefer recommended dose of manures and fertilizers. (-) | 3.80 | -1.26 |
| 43. | Land preparation, planting time and spacing as per recommendation have no effect on large cardamom production. (-) | 3.85 | 2.44 |
| 44. | It is not necessary to use compost or green manure as fertilizers are more effective to replenish the soil. (-) | 4.00 | -0.40 |
| 45. | For successful farming one should adopt crop rotations and diversifications. (+) | 3.35 | -0.92 |
| 46. | Processing and marketing of large cardamom can be best done at local and regional level. (+) | 2.75 | 4.42 |
| 47. | Most farmers should specialize to practice large cardamom farming in harmony with nature. (+) | 4.35 | 0.63 |
| 48. | Application of biofertilizers should not be encouraged in large cardamom cultivation. (-) | 3.80 | 0.63 |
| 49. | The optimum temperature for successful cultivation of large cardamom is not important. (-) | 4.05 | 1.41 |
| 50. | I prefer soil and seed treatment as it reduces insects and disease infestation. (+) | 4.00 | 0 |
| 51. | I prefer chemical weed control as it is easy to control weeds by using herbicides in large cardamom cultivation. (-) | 3.75 | -2.06 |
| 52. | Mulching has been found not beneficial to conserve soil moisture and check weed growth. (-) | 3.95 | 1.00 |
| 53. | It is recommended to remove the entire plant of large cardamom when virus diseases are noticed. (+) | 4.65 | 4.00 |
| 54. | Gap filling should be done by removing the affected plants and replacing it by healthy ones. (+) | 4.05 | 1.00 |
| 55. | The planting material of LC can be procured from any local farmer. (-) | 3.80 | 1.69 |
| 56. | Maintaining soil moisture and optimum temperature is not required for planting large cardamom. (-) | 4.00 | 2.52 |
| 57. | One should use natural fertilizers, compost, practices intercropping and use biological pest control methods. (+) | 4.55 | 0 |
| 58. | For preservation of planting materials, diseased and unhealthy plants of large cardamom can also be stored. (-) | 4.50 | 6.00 |

**Table 2:** Standardized scale to measure the attitude of farmers towards improved large cardamom cultivation practices.

| S. No. | Statements | 't' values |
|---|---|---|
| 1. | Adoption of improved large cardamom cultivation opens the door of progressive aspiration. (+) | 6.00 |
| 2. | For preservation of planting material of large cardamom, diseased and unhealthy plants can also be stored. (-) | 6.00 |
| 3. | Processing and marketing of large cardamom can be best done at local and regional level. (+) | 4.42 |
| 4. | I believe that improved cultivation practice of large cardamom is worth to adopt though it is laborious and complicated. (+) | 4.00 |
| 5. | Improved large cardamom production technology can't bring significant change in cultivation practices of farmers. (-) | 4.00 |
| 6. | The risk of cultivation of large cardamom is minimized with the adoption of improved production technology. (+) | 4.00 |
| 7. | Though it takes lot of time for a farmer to learn improved production technologies of large cardamom, it is worth the efforts. (+) | 4.00 |
| 8. | It is recommended to remove the entire plant of large cardamom when virus diseases are noticed. (+) | 4.00 |
| 9. | The improved cultivation practices of large cardamom can improve the social status of the farmers. (+) | 2.88 |
| 10. | I think that improved cultivation practice of large cardamom is possible to adopt by all farmers. (+) | 2.55 |
| 11. | Maintaining soil moisture and optimum temperature is not required for planting large cardamom. (-) | 2.52 |
| 12. | Large cardamom cultivation is also possible by untrained farmers. (+) | 2.44 |
| 13. | Land preparation, planting time and spacing as per recommendation have no effect on large cardamom production. (-) | 2.44 |
| 14. | Improved large cardamom cultivation is difficult to do for inexperienced farmers. (-) | 2.23 |
| 15. | I believe that improved cultivation practice of large cardamom help to produce quality production. (+) | 2.13 |
| 16. | Large cardamom cultivation is not being properly promoted by the Government. (-) | 2.13 |
| 17. | There is no surety of getting the highest price from large cardamom even if a farmer adopts improved production technology. (-) | 2.13 |

**Reliability of the scale**

The reliability of a testing instrument is measured by its ability to give an accurate, stable and consistent measurement score repeatedly with same instrument. It helps to assess the homogeneity of items in scale (Singh, 2018). Furthermore, Saunders *et al.,* (2009) defined reliability as "the extent to which your data collection techniques or analysis procedures will yield consistent findings". Split-half method was used to determine the reliability of the scale. Odd-even method was then used to divide the 17 selected attitude items into two halves (Singh, 2008). The two halves were then administered randomly to 20 large cardamom farmers in a non-sampled area. The Pearson product moment correlation between scores of odd and even groups was found to be 0.72. This coefficient indicates split half reliability of the scale. To calculate the reliability coefficient (R) of the whole scale, Spearman- Brown, (1910) prophecy formula was used as follows:

$$R = \frac{2r}{1+r} = \frac{2 \times 0.72}{(1+0.72)} = 0.83$$

Where,

R= Reliability coefficient of the whole scale.

r = Estimated correlation between two halves (Pearson r).

The test reliability was 0.83 and significant at 1% level of probability.

Spilt half method is considered a convenient method for assessing the reliability of a test due to its advantage of single administration of the test and use of a single sample. The main limitation of Split half method has been that it does not provide the same information as the correlation between two forms given at different times (Cronbach, 1946). This issue can however be resolved by using Cronbach's alpha which according to most researchers is the average of all possible split-half correlations (Cortina, 1993).Hence, the standardised version of Cronbach's alpha can be used to get more stability and accuracy with the following formula:

$$\alpha\ standardized = \frac{Kr}{[1+(K-1)r]} = \frac{17 \times 0.72}{1+(17-1)0.72} = 0.97$$

Where,

K = Number of items in scale

r = mean of the K (K-1)/2 non-redundant correlation coefficients

The value of Cronbach's alpha was calculated and found to be 0.97, showing that the scale had excellent consistency measurement and thus, the scale was reliable.

**Validity of the scale**

It refers to the efficiency with which it measured what it intended to measure. The developed scale was tested for its content validity. The content validity of scale is sampling adequacy or the representative of the

substance, the topics, the matter and the content of a measuring instrument (Kerlinger, 1987). According to Chovatia *et al.,* (2017), the validity of the scale was examined for its content validity by determining how well the content of the scale represented the domain subject matter under study. The statements of the attitude scale were derived from books, journals, newsletters, bulletins and consultations with concerned experts in the field. The 't' values were significant for all the 17 statements which reflect high discriminating values. It indicated that the scores obtained by utilising the present scale would measure the intended item under the present study. Thus the scale is considered as valid based on the content validity criterion.

**Administration of the scale**

The final scale to measure the attitude of farmers towards improved large cardamom cultivation practices consisted of 17 statements. The scale can be administered on a five point continuums *viz.,* strongly agree (SA), agree (A), undecided (UD), disagree (DA) and strongly disagree (SDA) with a score of 5, 4, 3, 2 and 1, respectively for positive statements and reverse scoring for negative statements. Therefore, maximum obtainable score as per present attitude scale is 85, whereas minimum obtainable score is 17. The high or low score of scale connotes the state of attitude of farmers.

## Conclusion

Attitude plays a vital role in influencing behavioural component. The success and failure of any agricultural development program or activity depends largely on the favourable attitude of the farmers towards it. By measuring the attitude of the farmers, it will help to provide inputs to the policy makers for desirable changes in the existing system. The reliability and validity of the scale indicated the precision and consistency of the results. Further, the scale can also be used to identify and measure the attitude of farmers in similar situations outside the research area with necessary modifications.

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