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Construction of Knowledge Test on Large Cardamom Cultivation Practices in Arunachal Pradesh

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Authors' contributions

This work was carried out in collaboration among all authors. Author BK and RJS designed the study, wrote the protocol, performed the statistical analysis, managed the analyses of the study and wrote the first draft of the manuscript. Authors LD, RS and LH supervised the work, managed the literature searches and edited the manuscript. All authors read and approved the final manuscript.

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ABSTRACT

The knowledge test was developed to measure the knowledge of large cardamom growers. All 32 items were primarily fabricated on the basis of indorsing rational rather than root memorization and discriminate the sound knowledgeable large cardamom growers from the ailing knowledgeable ones.The scores from selected respondents were subjected to item analysis, consisting of item difficulty index and item discrimination index.In the final selection, the scale consisted of 17 items with ranging from 30-80 and discrimination index ranging from 0.30 to 0.55. The reliability of knowledge test being developed was tested by using Split-Half method and it was found to be 0.704.

Keywords: Knowledge test; large cardamom growers; difficulty index; discrimination index; reliability.

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1. INTRODUCTION

Large cardamom is an imperative spice and a potent flavouring agent with a characteristic murky tang. It is largely cultivated in the Sub-Himalayan area of the north-eastern Indian states, Bhutan and Nepal [1]. As reported by [2] cultivation of large cardamom has also spread to northern part of Uttar Pradesh. This spice crop is grown in nearly every district of Arunachal Pradesh. Major producing districts are Anjaw, Changlang, Lower Subansiri, East Siang and West Siang. The cultivars cultivated in the state are Golsey (low to mid elevation area), Ramla and Ramsey (higher altitude areas), Bharlangey (mid to high altitude) and Sawney (highly adaptable, can be grown from low to high altitude areas). Other cultivars found in the state *viz.,*Bebo, Boklok, Jaker and Belak. The total area and production under large cardamom cultivation during the year 2015-16 was reported to be 8300.26 Ha and 1757.43 MT respectively [3]. It contains 2-3 percent essential oil and holds medicinal properties. The main markets in India are Delhi, Kolkata Amritsar, Kanpur and Guwahati. It is also cultivated in chunks of Uttaranchal and in certain additional North-eastern states. However, the farmers have been facing an income crash due to deteriorating output and it entails to ensure improved quality planting material, post-harvest management, technical knowledge, improved scientific techniques, disease and pest management, passable supply of nutrient, apt shade management to fetch improved productivity as well as income to cultivators [4]. Production of large cardamom has waned in recent years as reported by Sharma et al. [5] and one of the key reasons for this is viral diseases like foorkey and chirkey as indicated by Stoep [6]. The Indian Cardamom Research Institute, in cooperation with the Indian Council of Agricultural Innovation Project on Improvement of Large Cardamom, comprising com-mercialisation of improved bhatti in Sikkim [7]. In Arunachal Pradesh, improved bhattis are used by a few farmers. They were also introduced in the state of Sikkim by the Spices Board of India, but farmers are unenthusiastic to embrace them [8]. In spite of these improvement policies, farmers continue to face hitches in all facets of improvement of the crop. In this context, the knowledge of farmers is of paramount importance.

Knowledge is usually tacit as an intimate consociate of an individual with actualities. Knowledge is being defined as a body of understood information possessed by an individual or by a culture [9]. Knowledge is an important tool, which facilitates farmers in decision making to adopt the recommended practices to make large cardamom farming more profitable and sustainable. The knowledge test of large cardamom may also create the awareness about importance of adopting scientific cultivation practices by the growers as well as help to bridge the knowledge gap between the farmer and researcher and yield gap between farmer's field and research station. Thus, it may also facilitate the growers to realize profit and have better livelihood security, ability to educate their children, assured source of income and reduced vulnerability. On this backdrop, an attempt was made to develop knowledge test about large cardamom cultivation practices for its application to the farmers in Arunachal Pradesh.

2. MATERIALS AND METHODS

Item assortment: The content of knowledge test was composed of questions called items. Items for the test were compiled from different sources, such as literature, field extension personnel, subject matter specialists in horticulture and the researcher's own experiences. The questions were designed to test the knowledge level of large cardamom growers about package of practices of large cardamom.

Preliminary selection of items: The assortment of items was done on the basis of the following standards:

(i) It should indorse rational rather than rote-memorization, and

(ii) It should distinguish the well-informed large cardamom growers from the ill-informed ones and have a convinced difficulty value. Based on these two gauges 32 items were primarily collected for construction of the knowledge test which were in objectives form and were in dichotomous or multiple choice format. A schedule was prepared with these 32 items for administering it to the large cardamom growers for item analysis and screen out further items.

3. RESULTS AND DISCUSSION

3.1 Preliminary Administration of Test

Items were pretested and modified by administering to 30 randomly selected large cardamom growers. Score was given as '1' for

right and 0 for wrong answer for each of the 32 items. The total correct response was the knowledge score obtained by an individual farmer. The farmers were then distributed into 6 groups (G1 to G6) each having 5 farmers. The farmers in each group were arranged in plunging order according to the scores obtained by them. Only four extreme groups with high and low scores were ruminated for calculation of item difficulty and item discrimination indices.

3.2 Item Analysis

The item analysis of a test yields two kinds of information: Item difficulty and item discrimination as reported by Guilford [10]. The index of item difficulty exposed how difficult an item was whereas the index of discrimination specified the magnitude to which an item discriminates to well notify individuals from the ill-informed ones.

3.3 Item Difficulty Index (Pi)

The difficulty index of an item was defined as the proportions of large cardamom growers giving precise responses to that particular item. This was calculated by the formula:

$$P_i = n_i/N_i \times 100$$

Where,

P_i = Difficulty index in percentage of the i^{th} item.
n_i = Number of large cardamom growers giving correct response to i^{th} item.
N_i = Total number of large cardamom growers to whom i^{th} item was administered

3.4 Item Discrimination Index

The discrimination index was calculated by employing the method given by [11]. Item discrimination index was calculated by the formula given below:

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

Where,

S1, S2, S5 and S6 were the respective frequencies of correct answers in G1, G2, G5 and G6 groups respectively, and N = Total number of large cardamom growers in the sample of item analysis.

3.5 Selection of Items for test

Two criteria *i.e.* item difficulty index and item discrimination index were measured for assortment of items in the final format of the knowledge test. In the current study, items with difficulty index vacillating from 30 to 80 and discrimination index vacillating from 0.30 to 0.55 were incorporated in the final format of the knowledge test. Item difficulty index and item discrimination index of all the 32 items were calculated and 17 items which contented both the standards were selected for the final format of knowledge test as shown in Table-1.

Table 1. Difficulty index (DI) and discrimination index (Disc. Index) for knowledge test Items

Sl. no.	Items	DI	Disc. index	S = Selected item and R = Rejected item
1.	Which of the following variety of large cardamom is/are recommended for your area? Kindly suggest any other variety if you know.	66.67	0.2	R
2.	Do you know the most suitable time/month for plantation of large cardamom and its follow-up?	60	0.1	R
3.	Do you know the optimum temperature during the growing season for large cardamom cultivation?	53.33	0.3	S
4.	Which of the following is/are the soil recommended for improve large cardamom cultivation?	46.67	0.5	S
5.	What is the quantity of farm yard manure to be incorporated during planting? (per plant)	30	0.3	S
6.	Which of the following is/are the recommended pit size for large cardamom seedling transplantation?	60	0.5	S
7.	What is the recommended spacing for large cardamom cultivation?	50	0.3	S
8.	What is the average depth of soil for large cardamom cultivation?	50	0.3	S

Sl. no.	Items	DI	Disc. index	S = Selected item and R = Rejected item
9.	Do you know seed treatment of large cardamom for improved cultivation? If Yes, kindly share your knowledge/skill.	80	0.1	R
10	Which of the following is/are the number of large cardamom suckers that you can grow in 1ha of land?	40	0.2	R
11.	What is the total recommended fertilizer dozes for improved large cardamom cultivation?	76.67	0.2	R
12.	Which of the following are the crops grown for providing shades to large cardamom saplings?	70	0.1	R
13	Which of the following is/are the recommended time period for irrigation of large cardamom?	63.33	0.7	S
14.	Which of the following irrigation system is/are the recommended for large commercial plantation of large cardamom?	63.33	0.2	R
15.	Do you know about weeding schedule in large cardamom? If yes, how do you follow the recommended schedule of weeding to control the weed?	73.33	0.1	R
16.	Do you know what kind of material is used for mulching large cardamom?	83.33	0.1	R
17.	What do you understand by the term Hybrid? If yes, mention hybrid varieties of large cardamom.	66.67	0.6	S
18.	Are you aware about the important pests of large cardamom?	66.67	0.6	S
19.	Are you aware about the important diseases of large cardamom?	40	0.4	S
20.	Do you know IPM on improved large cardamom cultivation? Please share important IPM techniques on improved large cardamom cultivation.	66.67	0.1	R
21.	What do you mean by the term trashing of large cardamom?	46.67	0.5	S
22.	Which method of propagation of large cardamom yields early maturing of capsules?	40	0.3	S
23.	In which of the following month/s harvesting of large cardamom is done at low altitude?	33.33	0.2	R
24.	In which of the following month/s harvesting of large cardamom is done at high altitude?	26.67	0.2	R
25.	Which of the following is/are the indication for harvesting of large cardamom?	70	0.4	S
26.	Which of the following year/s is/are the indication for harvesting of first crop of large cardamom?	56.67	0.5	S
27.	Which of the following is/are years is the indication for stabilized yield of large cardamom?	70	0.2	R
28.	Which of the following is/are the optimum temperature during curing process of large cardamom?	23.33	0.5	R
29.	Which of the following is/are the optimum moisture content of cured large cardamom capsules?	30	0.5	S
30.	Do you know about scientific curing (improved bhatti) method and follow the same?	60	0.1	R
31.	Which of the following is/are the materials used for packing large cardamom capsules?	70	0.2	R
32.	Do you know and visit nearby market where large cardamom auction is held to market the produce?	80	0.2	R

3.6 Reliability

The reliability of knowledge test being developed was tested by using Split-Half method: The coefficient of correlation between two sets of scores was calculated and found to be 0.704 was significant at 1% level thus indicating that the internal consistency of the knowledge test developed for the study was relatively high. The findings of the study were in line with the study conducted by Subba and Ghosh [12]. Knowledge test on vegetable farming (cauliflower and carrot) included 11 items as reported by Barua [13]. Out of total 55 items, 20 items were finally selected where 12 items on adaptation practices of climate change and 8 items represented knowledge on mitigation practices [14]. Knowledge test on natural resource management practices included 30 items as reported by Archana et al. [15]. 28 items were selected from 46 items on knowledge test developed for IPM, INM and IWM Practices as indicated by [16].

3.7 Content Validity of Knowledge Test

In the final selection of items, caution was taken to contain items covering the whole universe of pertinent behavioral facets of the respondents with respect to knowledge about large cardamom growing practices. Items were collected through various sources including whizzes and henceforward it was presumed that the scores obtained by administrating this test has measured the knowledge of the respondents as envisioned.

4. CONCLUSION

Scientific knowledge of growing large cardamom is very much essential for entrepreneurship development. It is also decisive for valuation and devising of need based planning for the socio economic development of large cardamom growers. But there is no such standard process for testing the knowledge level of large cardamom growers. With this circumstantial a knowledge test scale was developed to weigh the knowledge level of the large cardamom growers. It was found that knowledge test constructed was exceedingly stable and reliable for measurement of the knowledge level of the large cardamom growers. So, out of the total 32 item statements only 17 item statements were included in the final knowledge test.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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