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### Construction of a scale to measure the attitude of vegetable growers towards hi-tech vegetable cultivation practices

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#### Abstract

Hi-tech vegetable farming is the practice of applying modern techniques to grow vegetable crops commercially. It includes techniques such as hydroponics, protected cultivation, precision farming etc., While efforts have been taken to popularize hi-tech practices among vegetable farmers, it is essential to understand the attitude of the farmers towards the practices which would influence adoption and continuance of the technology. Hence, in this paper, a scale is developed to measure the attitude of the vegetable farmers regarding Hi-tech practices. Likert's method of summated ratings is employed to develop the scale. A total of 28 items, retained after editing 71 statements as per the informal criteria, were administered for item analysis among 100 vegetable farmers. A total of 10 statements were selected based on the 't' value resulted from item analysis and included in the final scale. The reliability and validity of the final scale are established by appropriate methodology.

**Keywords:** Hi-tech vegetable cultivation, Attitude of vegetable growers, attitude towards Hi-tech farming, Likert scale, summate ratings

#### 1. Introduction

Like any other sectors, farming sector is also welcoming major changes in its approach. High tech vegetable farming is one such approach which is promoted to improve the production as well as quality of the produce. Popular Hi-tech vegetable farming practices include Hydroponics, protected cultivation, precision farming etc., Hi-tech practices exhibit major advantages like production of high value crops, off season cultivation, export potential, optimum use of inputs. It is a capital intensive agriculture since large capital outlay is required towards purchase of specialized equipment, maintenance of assets, training of labour, etc. While various efforts are taken by the Government to promote Hi-tech practices, it is imperative to understand the attitude of farmers towards hi-tech agriculture.

Attitude is the sum of personal tendencies and feelings, prejudice and bias, thought, belief, fear and anxiety on any subject (Thurstone, 1928) <sup>[8]</sup>, which is conceptualized as the degree of positive or negative affect associated with some psychological object (Edwards, 1957) <sup>[1]</sup>. It is widely accepted that attitude towards a technology is a significant

factor in determining whether people adopt and continue to use the technology. Hence, this study is undertaken to develop and standardize a scale to measure the attitude of vegetable growers towards hi-tech vegetable cultivation practices.

#### 2. Materials and Methods

The Method of Summated ratings proposed by Likert is employed to construct the attitude scale. In a Summated ratings scale the respondent is asked to respond to each of the statements in terms of several degrees, usually five degrees of agreement or disagreement. (Kothari, 2004) <sup>[4]</sup>.

##### 2.1 Collection of Items

As the first step, 71 statements pertaining to the attitude of farmers towards hi-tech practices were collected. The statements were collected by interacting with farmers, extensive review of various literatures such as research articles, newspaper articles, discussion with extension and horticultural scientists and extension officials. The statements were then edited in view of the Informal Criteria (Edwards, 1957) <sup>[1]</sup>.

## 2.2 Relevancy test

To ascertain that only the most relevant items are included in the scale, the items were subjected to relevancy test. The relevancy test was carried out by sending the compiled set of items to extension experts working under various capacities. The responses were obtained from 30 judges against 5 response categories namely Highly relevant, Relevant, Neutral, Irrelevant and Highly irrelevant carrying scores of 5, 4, 3, 2, and 1 respectively. The relevancy of the items were established by computing the Relevancy Weightage and Mean Relevancy Score (Jamal, 2018) [2].

$$\text{Relevancy weightage (RW)} = \frac{\text{HRR} + \text{RR} + \text{NR} + \text{IR} + \text{HIR}}{\text{MPS}}$$

$$\text{Mean Relevancy Score (MPS)} = \frac{\text{HRR} + \text{RR} + \text{NR} + \text{IR} + \text{HIR}}{N}$$

Based on these criteria, the items with relevancy weightage  $\geq 0.80$  and Mean Relevancy Score  $\geq 4.0$  were identified as relevant to be included in the scale. Thus, out of 71 items, 28 items, which satisfied the criteria, were retained.

## 2.2 Item analysis and Selection of Items

Item analysis is carried out to demarcate the items based on the extent to which they can differentiate a respondent with a favourable attitude towards the psychological object and the one with an unfavourable attitude. For item analysis, the scrutinized set of 28 statements were administered to the actual respondents i.e., the vegetable farmers. 100 vegetable farmers in the Oddanchathiram block of Dindugal district were selected as sample for the study. The respondents were asked to indicate their response in a 5 point scale (Kothari, 2004) [4]. The responses are scored in such a way that the one indicating the most favourable attitude gets a score of 5 and the one indicating most unfavourable attitude gets a score of 1. That is, for favourable statements, the response of 'Strongly Agree' is scored 5; 'Agree' gets 4; 'Undecided' gets 3; 'Disagree' gets 2 and 'Strongly Disagree' gets the least score of 1. On the other hand, for the unfavourable statements the scoring pattern is reversed such that the response of 'Strongly Disagree' is given the highest score of 5 and so on.

Thus, for each of the respondent, the maximum possible score for 28 statements was 140 and minimum possible score was 28. The respondents were arranged in the descending order of their scores. The respondents with the highest 25 percent and the lowest 25 percent of the total scores were considered as high group and low group respectively for carrying out item analysis.

Item analysis is carried out by computing the 't' value. 't' value is the measure of the extent to which the given statement differentiates between the high and low groups. The formula for calculating 't' is

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

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

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

$\bar{X}_H$  = the mean score on a given statement for the high group  
 $\bar{X}_L$  = the mean score on the same statement for the low group

$\sum X_H$  = The sum of scores of all subjects on a given statement for the high group

$\sum X_L$  = The sum of scores of all subjects on a given statement for the low group

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

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

## 2.3 Selection of Statements for final Attitude scale

After 't' values for all the items are calculated, the statements with highest 't' values are selected for inclusion into the final attitude scale. The thumb rule for omitting the items is when the 't' value is less than 1.75. The norms for considering the statements for the final scale are

- 't' value of more than 1.75.
- The statement should be expressing a new idea which does not overlap with the idea expressed by the other statement. The statement should be simple worded and brief. (Jamal, 2018) [2].

After obtaining the *t* value for all the items, 10 items with higher *t* value were finalized to constitute the final scale. The items included in the scale and their respective *t* values are furnished in the table 1.

## 2.4 Reliability and Validity of the Attitude scale

The scale is standardized by establishing its reliability and validity. "Reliability is the accuracy or precision of measuring instrument" (Kerlinger, 1973) [3]. Split- Half method is employed to find the reliability of the scale. Validity refers to "the degree to which a test measures, what it claims to measure" (Ray, 2011) [5]. Content validity is employed to establish the validity of the scale.

### 2.4.1 Split-half method

The Split-half method is regarded as the best method among the methods for measuring reliability. The Final scale with 10 statements was split into two halves based on odd and even number of statements and it was administered with 25 respondents. The responses were obtained on 5 point continuum such as Strongly Agree, Agree, Undecided, Disagree and Strongly Disagree. The two sets of responses were subjected to product moment correlation using SPSS. The reliability coefficient of the half-test ( $r_{tt}$ ) is 0.653 and the reliability coefficient of the whole test is 0.79. According to Singh (1986) [6], the scale is reliable when  $r_{tt}$  is greater than 0.6.

**Table 1:** Item analysis of statements

Statement number	Attitude statement	't' value
1	Hi-tech practices should become the prominent way of vegetable farming in the future.	4.731**
2*	Hi-tech Practices are not affordable to all farmers.	2.753**
3	Farming should be modernized as of other professions.	0.231
4*	Hi-tech practices are suitable only for the educated farmers.	5.563**
5	Hi-tech practices yields produce preferable in the market.	2.639**
6*	Hi-tech practices requires skills beyond my capacity.	1.203
7	If a farmer expects more profit, he must adopt advanced technologies.	6.076**
8	Hi-tech Practices are the only ways to get more profit in vegetable cultivation.	3.036**
9	Farmers can adopt Hi-tech practices if they are offered at subsidized price.	0.372
10*	The maintenance of hi-tech structures and equipments is tedious.	3.642**
11	Hi-tech practices eases the work of the farmer.	0.841
12	Hi-tech practices conserve resources.	0.481
13	Hi-tech practices can be adopted for facilitating optimum usage of chemicals.	0.408
14	Farmers would prefer Hi-tech practices for their efficient utilization of water.	4.358**
15*	Adoption of Hi-tech practices limits a farmers choice of crops.	4.330**
16	Hi-tech practices reduce the expenses for weed management.	0.325
17	Adoption of Hi-tech practices would increase a farmer's respect among peers.	4.210**
18*	Maintenance of the Hi-tech structures itself need special skills.	1.197
19	Hi-tech practices impart only minimum effect on soil health.	2.091**
20	Hi-tech practices are a revolution in vegetable farming.	0.612
21*	Hi-tech practices are difficult to be taught to labourers.	1.877**
22*	Hi-tech practices are essential to attract Youth into farming.	3.161**
23	Quality produce can be achieved through Hi-tech practices.	1.006
24	Hi-tech practices are useful in protecting crops from climate abnormalities.	2.51**
25	The Hi-tech practices are developed for increasing profitability of vegetable cultivation.	1.521
26*	The market has no scope for produce from Hi-tech practices.	2.906**
27	Hi-tech practices are profitable only in Export oriented productions..	1.155
28*	Hi-tech practices cannot guarantee consistent yield year after year.	2.969**

\* Negative statements

\*\* Statements with significant t values

#### 2.4.2 Content validity

The scale is constructed in concordance with the steps articulated in the summated rating scale. A fair degree of content validity is ensured by taking due care while selecting the statements. The collected statements were put forth to experts and modified suitably ensuring the validity. The calculated “t” value being significant for all the final statements of the scale indicated that the attitude statements have discriminating ability. Hence the scale can be reasonably accepted as a valid measure of the attitude of growers towards hi-tech vegetable cultivation practices.

### 3. Results and Discussion

The range of the calculated 't' values is found to between 0.231 and 6.076. A total of 16 statements were found to have 't' values above 1.75. To eliminate the acquiescence bias, it was considered to include approximately equal number of positively and negatively worded items (Spector, 1992) [7]. Thus 5 positive and 5 negative statements having the highest t values, omitting the ones with contrasting ideas included for establishing reliability, were selected from the 16 statements.

**Table 2:** Statements to be constituting the final attitude scale

S. No.	Question number	Attitude statements
1	1	Hi-tech practices should become the prominent way of vegetable farming in the future.
2	4*	Hi-tech practices are suitable only for the educated farmers.
3	7	If a farmer expects more profit, he must adopt advanced technologies.
4	10*	The maintenance of hi-tech structures and equipments is tedious.
5	14	Farmers would prefer Hi-tech practices for their efficient utilization of water.
6	15*	Adoption of Hi-tech practices limits a farmers choice of crops.
7	17	Adoption of Hi-tech practices would increase a farmer's respect among peers.
8	22	Hi-tech practices are essential to attract Youth into farming.
9	26*	The market has no scope for produce from Hi-tech practices.
10	28*	Hi-tech practices cannot guarantee consistent yield year after year.

### 4. Conclusion

Hi-tech farming practices can be beneficially adopted by farmers for improving the quality and quantity of the produce. In the era where impetus is being given to climate smart agriculture, Hi-tech farming practices can facilitate vegetable farmers to becoming actual climate-smart. Thus

by understanding their attitude as well as the underlying factors influencing their attitude and with necessary intervention, farmers can be sensitized with the importance and potential of Hi-tech farming practices. Thus, the scale developed will be useful for the researchers to understand the attitude of farmers regarding Hi-tech vegetable farming

practices.

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