

**RESEARCH ARTICLE**

## **A Scale to Measure the Attitude of Farmers towards Organic Farming in Ladakh**

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**ABSTRACT**

*Attitude is one of the constructs which is very difficult to measure directly. Several psychometric methods of measurement of attitudes have been developed over a period with various advantages and limitations. In the quest to make Ladakh, an organic Union Territory, several efforts are already in progress. Since the region has a unique socio-cultural and economic conditions along with challenges put forth by the cold-arid high-altitude environment, any development intervention in a desired direction would be accomplished only if it is compatible with the prevailing attitude of the farmers of Ladakh for whom the interventions are designed. The current study features the use of Thurstone's Equal Appearing Interval method to construct a scale to measure the attitude of the farmers towards Organic farming in Ladakh. The initial set of 62 statements were collected and sorted according to the 14-point criteria given by Edwards. Later, 30 judges judged each item on a 9-point continuum. Cronbach alpha coefficient and intraclass correlation coefficient were used to check the consistency in the judgment and ten judges with inconsistent responses with others, were eliminated. The statements for the final scale were selected by calculating the scale value (median) and inter-quartile range and 16 items were included in the final scale. The reliability was measured with the Cronbach alpha and inter-rater method (0.936). The scale was also found to be high in its content and construct validity (0.967). The scale will help the scholars, researchers, and policymakers to understand the attitude of the farmers towards Organic farming in trans-Himalayan high altitude Ladakh region of India and further design strategies to change that attitude in the desirable direction.*

**Key words:** Attitude scale; Attitude; Organic farming, Thurstone's scale; Equal appearing interval.

**T**he Union Territory (UT) Ladakh lies in the trans Himalayan region of India, where the region is characterised by a rugged topography at an average altitude of over 3000 m. The region also faces extreme temperature variations, low precipitation mostly in the form of snow, high wind velocity, sparse plant density, thin atmosphere with high UV-radiation and fragile ecosystem. The temperature drops down to -30 °C in winter (Stobdan et. al, 2017). Long harsh winters reduce the cropping season to just four to five months in a year. Single-cropping is dominant, as double-cropping is possible only in a limited area falling below an altitude of approximately 3000 m. The combination of an effective social organization

with technical expertise suited to the local environment has enabled the farmers of Ladakh to convert a few patches of their semi-desert to a very intensive and highly productive agriculture (Osmaston, 1985). This adaptation by the Ladakhi farmers to a high altitude semi-arid-desert is the foundation of human settlement in Ladakh. As the growing season is only a few months long every year, over the centuries, the people of Ladakh have developed a farming system uniquely adapted to this unique environment. Farming is small scale; traditionally, each family owns a few acres of land, and their whitewashed mud houses are grouped together in villages whose size varies according to the availability of water (Angchok et. al, 2009).

Considering the thin native population and the available resources in the region, farming was basically subsistence, totally dependent on irrigation, based with barley and wheat as the major cereal staple food crops. Limited types of vegetable crops mostly root crops like radish, turnip and carrots were grown. Situation changed in later periods after the 1970s, when the region was opened for general tourists along with mass deployment of defence forces to guard the region from neighbouring countries. Due to this change in contextual factors, need for fresh food production to meet the food requirement of the incoming floating population was felt, and accordingly interventions related to agro-animal research was initiated, initially by DRDO followed by other agencies like ICAR and NGOs. Presently, diversity of vegetables is being grown by the local farmers catering to the need of local population, incoming tourist, and the defence forces. For instance, 50 percent of the fresh food requirement of Army deployed here is met by the local farmers.

Similar to the green revolution movement in India, though the production was increased (by development and adoption modern technologies and package of practices) and many new vegetables were introduced in Ladakh, but, on the other hand the ill-effects of adoption of synthetic chemical input responsive crops and practices also started to surface. During the early 2000s, need for revival of agriculture system in Ladakh started to find place in public forums. Later on, after the increasing awareness about global warming, melting glaciers and utility of practicing traditional farming practices, the policy decision makers also showed their inclination towards this upcoming change.

This felt need to change took its momentum after the bifurcation of then J&K state and making Ladakh as a separate 'Union Territory' in 2019 by the Government of India. And, consequently in 2020, the Ladakh UT administration launched Mission Organic Development Initiative (MODI) of Ladakh, which aims at making Ladakh as the first organic UT of India by 2025. The mission has a vision to transform agriculture in Ladakh into a sustainable, remunerative, respectable occupation and to enable the farmers to reap the benefits of dynamic market opportunities.

In line with the upcoming change in agriculture system in Ladakh and on-going MODI programme, it becomes imperative to study the attitude of the local farmers towards organic farming. The study of attitude of the farmers would help in preparing the diffusion

and adoption strategies for promoting organic farming in the Ladakh region. Since the region has a unique socio-cultural and economic conditions along with challenges put forth by the cold-arid high altitude environment, any development intervention in a desired direction would be accomplished only if it is compatible with the prevailing attitude of the clients (in this case local farmers of Ladakh) for whom the interventions are designed.

Therefore, a need was felt to develop a scale to study the attitude of the farmers towards organic farming in Ladakh, which would be of immense utility for use by any intervening agency like state department of agriculture, agriculture research institutes and NGOs working in the domain area.

## **METHODOLOGY**

The scale to measure the attitude of the farmers towards Organic farming was developed using Thurston's Equal Appearing Interval method (*Edwards, 1957*). For the construction of the scale, following method was followed:

*Defining the construct:* Attitude of the farmers is defined as the degree of favourable or unfavourable disposition of farmers towards Organic farming in Ladakh.

*Initial selection of statements:* The first step is obtaining items/statements which represent the universe. The items covering the universe of content were prepared and collected from relevant literature, discussion with experts and resource personnel working in Ladakh. A total of 62 statements on attitude towards organic farming were initially selected considering the different dimensions related to socio-economic aspects, complexities involved, personal choices, environmental prospects, knowledge about organic farming, social implications and technological aspects etc. The statements were thus carefully revised and restructured based on the fourteen informal criteria and guidelines suggested by *Edwards (1957)*. Out of these, 45 generalized attitude statements which were found to be non-factual, non-ambiguous, written in the simple, straight language and giving a clear idea were selected. The statements were then given to the group of experts of subject matter to eliminate the unsatisfactory statements. This was done with relevancy test with 6 experts into dichotomous scale i.e. relevant/ irrelevant. Thus, 45 out of 62 statements were finalized for further analysis.

*Finalizing the statements:* The statements were then given to the number of experts of the subject to judge the degree of favourableness and unfavourableness feeling expressed by each statement about the construct. The schedule containing 45 statements was administered by 30 judges to judge the statements in 9-point continuum from extremely unfavourable through neutral to extremely favourable. Where 1 depicted extremely unfavourable, 5 neutral and 9 depicted extremely favourable feeling expressed by the statement towards organic farming. A set of instructions was also attached to the form to make the process of judgment clearer. The finalization of the statements was achieved by conducting a brainstorming session organized at DIHAR, Leh in which experts, scientists, research fellows from Agriculture department, DIHAR-DRDO, SKUAST and ICAR-CAZRI working in Ladakh region participated. The judges were given ample time to consider and rate the statements as directed. Further, suggestions were also taken from the judges for improvement in the statements.

*Verification of judgment:* As per the criterion used by *Thurstone and Chave (1928)*, to eliminate the subject who may misunderstood the direction or given their agreement/disagreement to the statement and can distort scale values of the statements.

The assumption was verified from the consistency of the judgment by using the method of inter-rater agreement which was described by *Bandalos (2018)* and used by *Joshi et al. (2021)*. It shows the consistency between judgments of the judges. For this, Cronbach Alpha and intra-class correlation coefficient was calculated for each of the judges and the reliability in terms of consistency of the judgment was determined. As consistency measures are appropriate to use when individual scores are to be compared whereas absolute agreement between the judges is used to find the raters' agreement in numerical ratings. Thus, for the present study, intra-class correlation with two-way mixed model for absolute agreement was used. Since intra-class correlation gives result for single measures and the average measures, the measure with average values is of more interest for the study as it explains the scale value as the average or median value of all retained judges.

The Table 1 shows the correlation between the judges. The judges with the coefficient value less than 0.5 were removed from the judgment for the scale values. Hence, 11 judges (J1, J7, J8, J10, J12, J13, J18,

**Table 1. Individual to total statistics of judges using Cronbach Alpha coefficient**

Judge	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
J1	0.070	0.909
J2	0.501	0.903
J3	0.613	0.902
J4	0.642	0.900
J5	0.501	0.903
J6	0.856	0.897
J7	0.471	0.904
J8	0.064	0.909
J9	0.727	0.899
J10	-0.031	0.916
J11	0.678	0.900
J12	0.014	0.910
J13	0.267	0.906
J14	0.532	0.903
J15	0.679	0.899
J16	0.688	0.899
J17	0.674	0.899
J18	0.308	0.906
J19	0.309	0.906
J20	0.636	0.900
J21	0.570	0.902
J22	0.566	0.902
J23	0.669	0.899
J24	0.127	0.908
J25	0.694	0.899
J26	0.547	0.902
J27	0.472	0.903
J28	0.631	0.903
J29	0.506	0.903
J30	0.629	0.902

J19, J24 and J27 with the Cronbach alpha values 0.07, 0.471, 0.064, -0.031, 0.014, 0.267, 0.308, 0.309, 0.127 and 0.472 respectively were eliminated to reach to the consistent judgments for each statement.

The values of Cronbach's alpha coefficient and intra-class correlation before and after eliminating the judges are presented in the Table 2. Both the coefficients revealed high correlation between the judges after eliminating the inconsistent judgments.

**Table 2. Test coefficient values for judges before and after verification**

Number of judges	Value of Cronbach Alpha	Intraclass correlation	
		Single measure	Average measure
30 (Before)	0.906	0.224	0.896
20 (After)	0.927	0.364	0.920

**Table 3. Final statements with their scale value and Q-value**

Item No.	Statements	Scale Value	Q-value	Accepted
11	Organic farming provides healthy food to the family	9	0	Yes
23	Organic farming is necessary to make Ladakh a “Carbon Neutral Region”	9	0	No
31	Organic farms and products in Ladakh can also be a source of attraction for tourists	9	0	Yes
27	Organic farming can restore the threatened traditional farming culture in Ladakh	9	0.75	No
29	Organic produce fetches more price in the market as compared to non-organic produce	9	0.75	Yes
1	Organic farming is an effective way of conserving natural resources	9	1	Yes
9	Organic farming is the need of the hour	9	1	No
13	Farmers should prefer organic farming over chemical farming	9	1	Yes
21	If I do organic farming then my family members will have better health condition	9	1	No
25	Organic farming has the potential to revive the shrinking biodiversity in Ladakh	9	1	No
33	Organic products from Ladakh have the potential to fetch premium prices across the globe	9	1	No
34	Organic farming can restore and maintain the balance in soil health	9	1	Yes
17	Organic farming strengthens the use of indigenous knowledge	9	2	No
5	I would like to recommend every farmer to be an organic farmer	9	3	No
30	Getting organic certification is a very complex process	8	1	Yes
43	The results of organic measures of pest control are not convincing	8	1	Yes
3	Organic farming will fetch profit over a long time	8	1.75	No
7	Organic farming can prove to be helpful in improving the livelihood of the farmers	8	2	No
36	Organic farming has less risk of environmental pollution	8	2	No
41	Organic Farming can only be successful if all the farmers of a village or proximal cluster adopts it	8	2	No
15	Organic farming is economical than chemical farming	8	3.5	No
19	Organic manures applied in farm does not affect consumers’ health	8	3.75	No
42	Ladakh has the potential to become the brand ambassador of Indian Organic Produce	8	3.75	No
40	The profits earned from Organic farming can prevent unnecessary rural urban migration	8	4	No
37	There is lack of knowledge about organic measures of nutrient and pest management among farmers	7	2	No
44	Research organizations should develop and propagate organic package and practices appropriate for Ladakh	7	2	Yes
39	It is difficult to persuade every farmer in a village to adopt Organic Farming	7	2.75	No
22	I will have the problem in sourcing and purchasing of organic inputs	7	3.5	Yes
14	Organic farming does not insure good income	7	6	No
24	Chemical herbicides are more suitable to control weeds than organic methods of weed control	6	3	Yes
26	Scientists have insufficient knowledge and training of organic farming practices	6	3	No
10	Sole dependence on Organic farming will create shortage of food	6	3.75	No
32	Organic fertilizers are costlier than chemical fertilizers	6	4.5	No
38	Organic farming can make Ladakh self-reliant in terms of food sufficiency	6	4.5	Yes
45	There is a lack of marketing channels for organic produce in Ladakh	6	5.5	No
4	Adoption of organic farming is a gamble	5	3.75	Yes
6	It will be better for farmers to focus on judicious use of agrochemicals rather than organic farming	5	3.75	Yes
28	Supervision of organic farming activities will be very difficult	5	3.75	No
20	Adoption of organic farming is not possible due to labour shortage in Ladakh	5	3.75	No
2	A farmer can never obtain higher yields without using agrochemicals	5	4	No
16	Adoption of organic farming at small scale is worthless	5	5.5	No
8	Organic farming is not practically possible for farmers	5	6	No
18	Organic farming is beneficial for only large farmers	3	3	Yes
12	Produce from chemical farming is as good as organic produce	2	2.75	Yes
35	Organic farming is not beneficial for farmers	2	5	No

**Table 4. The statements included in the scale**

Item No.	Statements
11	Organic farming provides healthy food to the family
31	Organic farms and products in Ladakh can also be a source of attraction for tourists
29	Organic produce fetches more price in the market as compared to non-organic produce
1	Organic farming is an effective way of conserving natural resources
13	Farmers should prefer organic farming over chemical farming
34	Organic farming can restore and maintain the balance in soil health
30	Getting organic certification is a very complex process
43	The results of organic measures of pest control are not convincing
44	Research organizations should develop and propagate organic package and practices appropriate for Ladakh
22	I will have the problem in sourcing and purchasing of organic inputs
24	Chemical herbicides are more suitable to control weeds than organic methods of weed control
38	Organic farming can make Ladakh self-reliant in terms of food sufficiency
4	Adoption of organic farming is a gamble
6	It will be better for farmers to focus on judicious use of agrochemicals rather than organic farming
18	Organic farming is beneficial for only large farmers
12	Produce from chemical farming is as good as organic produce

**Table 5. Coefficient of reliability and validity of attitude scale**

Coefficient of reliability	Intrinsic validity
Attitude of farmers towards Organic farming in Ladakh 0.936	0.967

*Determination of scale values and interquartile range:*

The next step is to calculate median and inter-quartile range for each of the 45 statements. Scale values (median) and Q-values ( $Q_3-Q_1$ ) of the statements by taking 20 judges. The items with high scale value (median) and low ambiguity (low IQR value) were selected because of favorableness in the judgments. A total of 14 statements were selected for the finalization of the statements with scale value ranging from 2 to 9 and Q-value less than or equal to 2 (Table 3). Statements from each stratum (scale value) were selected with the

help of subjective judgment of the experts.

Thus, the final 16 statements selected for scale to measure the attitude of farmers towards Organic farming in Ladakh are given in Table 4:

*Reliability of the scale:* A scale is said to be reliable when it consistently produces the same result when applied to the same sample. In the present study, Cronbach's alpha and inter-rater method of testing reliability was used using SPSS 16 software. The coefficient of reliability came out to be 0.936 which is very high (Table 5).

Statements	Scale value	Agree/ Disagree
Organic farming provides healthy food to the family	9	
Organic farms and products in Ladakh can also be a source of attraction for tourists	9	
Organic produce fetches more price in the market as compared to non-organic produce	9	
Organic farming is an effective way of conserving natural resources	9	
Farmers should prefer organic farming over chemical farming	9	
Organic farming can restore and maintain the balance in soil health	9	
Getting organic certification is a very complex process	8	
The results of organic measures of pest control are not convincing	8	
Research organizations should develop and propagate organic package and practices appropriate for Ladakh	7	
I will have the problem in sourcing and purchasing of organic inputs	7	
Chemical herbicides are more suitable to control weeds than organic methods of weed control	6	
Organic farming can make Ladakh self-reliant in terms of food sufficiency	6	
Adoption of organic farming is a gamble	5	
It will be better for farmers to focus on judicious use of agrochemicals rather than organic farming	5	
Organic farming is beneficial for only large farmers	3	
Produce from chemical farming is as good as organic produce	2	

*Validity of the scale:* Validity refers to the representativeness or sampling adequacy of the content of a measuring instrument (Kerlinger, 1973). Content and construct validity were determined with the help of experts of state departments, scientists, experts from different agricultural research organizations working in Ladakh region. Thus, the present scale satisfied the content validity.

*Calculation of attitude score:* The finalized statements are arranged randomly and are presented to the farmers with instructions to indicate their agreement/disagreement with the statements. Attitude score is obtained for each of the respondent by taking the median of the scale values of the statements with which the respondent agrees.

*Guide to use the scale:*

*Step 1:* Present the scale in the following form (without the scale value – meant only for the evaluator) to the farmer respondents. Instruct the farmers to mention their responses according to their agreement or disagreement towards each statement.

*Step 2:* For calculating the attitude score for each farmer, check the statements to which the respondent has agreed. Calculate the median of the scale values of the statements to which the farmer has registered his agreement. The median score will be the attitude score for respective respondent.

*Step 3:* Record the attitude score of each respondent. Note down the minimum and maximum observed values of attitude scores among all the respondents. Make three (Favourable, Neutral, Unfavourable) or five (Highly Favourable, Favourable, Neutral, Unfavourable, Highly Unfavourable) categories of attitude based on these values, as desired. Categorize the respondents based on frequency and carry out other statistical measures as needed.

## CONCLUSION

The present study was conducted to construct a scale in order to measure the attitude

of farmers towards Organic farming in Ladakh using Thurstone's Equal Appearing Interval Method. As a result, a total of 16 statements were finally selected for the scale. The reliability and validity of the scale came out to be 0.936 and 0.967 respectively, which is quite high. It is ready to be utilized by the researchers and policy makers to study the attitude of farmers in high altitude areas of Ladakh and other areas where similar environment prevails.

## CONFLICTS OF INTEREST

The authors have no conflict of interest.

## REFERENCES

- Angchok, D., Dwivedi, S.K., & Ahmed, Z. (2009). Traditional foods and beverages of Ladakh. *Indian Journal of Traditional Knowledge*, **8** (4): 551-558.
- Bandalos, D.L. (1918). Measurement theory and application for social sciences. The Guilford Press, New York, 2018.
- Edwards, A.L. Techniques of attitude scale construction. Appleton-century crofts, Inc. New York, USA, 1957.
- Joshi, D., Dhaliwal, R. K., & Singh, D. (2021). A measurement tool to assess attitude of rural youth towards agriculture as an occupation. *Indian Research Journal of Extension Education*. **21**(2&3):1-4.
- Kerlinger, F.N. (1987). *Foundations of behavioural research. (Third Edition)*. Holt, Rinehart and Winston, New York, 1987.
- Osmaston, H.A. (1985). The productivity of the agricultural and pastoral system in Zangskar, second Ladakh Colloquium, University of Pau. *Acta Biologica Montana*. **5**, 75pp.
- Stobdan, T.; Dolkar, P.; Chaurasia, O.P. & Kumar, B. (2017). Seabuckthorn (*Hippophaerhamnoides* L.) in trans Himalayan Ladakh, India. *Defence Life Science Journal*, **2**: 46-53. doi: 10.14429/dlsj.2.11074
- Thurstone, L.L. (1946). Theories of intelligence. *The Scientific Monthly*, **62**:101-112.
- Thurstone and Chave. *The Measurement of Attitudes*. Chicago University Press, Chicago, 1928.

