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A SCALE TO MEASURE FARMERS' PERCEPTION TOWARDS CLIMATE CHANGE

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ABSTRACT

Climate change is a major challenge for agricultural sustainability and farmers' livelihoods. Understanding how farmers perceive climate change is important for creating effective adaptation and mitigation strategies. This study set out to develop and standardize a reliable and valid scale to measure farmers' perceptions of climate change in selected agro-climatic zones of Rajasthan. The Likert summated rating scale method was used to build the scale. At first, 120 statements were created based on a literature review and expert input. These were narrowed down to 60 statements using Edwards' criteria. A panel of 40 experts then tested the relevancy of these statements, and 43 statements that met the required thresholds for relevancy percentage, weightage, and mean score were kept. Next, item analysis was done using the t-test method to see how well each statement could distinguish between different responses. Statements with t-values of 1.75 or higher were kept, resulting in 32 statements for the final scale. The scale covers four areas: perception of weather parameters, causes of climate change, climate risk perception, and overall perception of climate change. The split-half method showed the scale is reliable, with a coefficient of 0.865, which means it is highly consistent. Content validity checks confirmed the scale is suitable and appropriate. The developed scale provides a standardised and scientific tool to measure farmers' perception towards climate change and can be effectively used for research, policy formulation, and extension interventions.

Keywords: climate change, perception, scale development, likert scale, reliability; validity

INTRODUCTION

Changes in the global climate have attracted widespread attention from experts across disciplines due to their potential to cause far-reaching consequences for human civilization (Singh, 2020). Although Earth's climate has always been subject to gradual shifts, the pace of change has accelerated significantly over the past century. Human activities, particularly the release of greenhouse gases (GHGs), have driven a rise in average global temperatures of about 0.9 °C since the 19th century. Projections suggest that this warming could reach 1.5°C by 2050, or even higher, due to deforestation, increasing emissions, and widespread pollution of air, water, and soil, which lead to climate change (Choudhary K. R. et al. 2026). Climate change refers to long-term alterations in climatic conditions caused either directly or indirectly by human activities that modify the composition of the global atmosphere over a considerable period of time (UNFCCC, 2011). In broader terms, climate change includes persistent changes in major climatic components such as temperature, rainfall, evaporation, and humidity, along with variations in the intensity and frequency of extreme weather events such as droughts, floods, heat waves, and cyclones. Agriculture, which forms the backbone of the Indian economy, is highly sensitive to weather and climatic conditions, with nearly 80 percent of variations in agricultural output attributed to fluctuations in local weather and climate (Nageswara Rao et al., 2018). Rajasthan, one of the largest states in India, exhibits diverse agro-climatic conditions ranging from arid western plains to sub-humid southeastern regions based on variations in climatic conditions and agricultural practices, Rajasthan has been classified into ten distinct agro-climatic zones ranging from the arid western region to the flood-prone eastern region. Rajasthan is the largest state in India, covering about 10.4 per cent of the country's total geographical area. Nearly 76 per cent of the state's population resides in rural areas and largely depends on agriculture and allied activities for their livelihood. The state contributes approximately 5.49 per cent to the total food grain production and 21.31 per cent to the total oilseed production of the country (Khanday, Q. A., 2022).These agro-climatic zones differ significantly in terms of rainfall patterns, temperature regimes, soil characteristics, and cropping systems, thereby influencing farmers' experiences and responses to climate variability

(ICAR, 2015; Rathore, 2005; Saikanth, D.R.K., 2023). From an agricultural perspective, they are required to ensure food and nutritional security while simultaneously protecting environmental quality and promoting sustainable farming practices (Asrat & Simane, 2017; Vinaya et al., 2025). In that respect, farmers' perceptions are changing over time due to changing climatic conditions. As temperatures increase and rainfall patterns shift, heavy climatic disaster is occurring. Farmers are increasingly concerned about the unpredictable and extreme weather as the greatest risk from climate change on their farms (42.3%) (Hyland et al. 2016; Vinaya & Gadde, 2025). Perception refers to the process through which individuals acquire and interpret information from their surrounding environment (Maddox, 1995). Climate change perception is a multidimensional concept that includes individuals' knowledge, beliefs, attitudes, awareness, and concerns regarding the occurrence and impacts of climate change (Whitmarsh and Capstick, 2018). The perception of climate change is influenced by several factors such as personal characteristics, previous experiences, access to information, and the cultural and geographical context in which individuals live (Van der Linden, 2015; Whitmarsh and Capstick, 2018). However, even when people correctly perceive the phenomenon of climate change, they may not always respond or adapt effectively due to various constraints such as lack of capacity, inadequate resources, and insufficient information. (Tripathi, A., & Mishra, A. K. (2020).

Hence, this study provides a standardized and scientifically validated scale to measure farmers' perception towards climate change, addressing a critical gap in agriculture extension research. The tool enables accurate assessment of farmers' understanding, which is essential for designing effective climate adaptation and mitigation strategies. It also supports policymakers and extension agencies in developing need-based intervention for climate resilient agriculture. Additionally, the scale can be adapted for use in other regions, enhancing its wider applicability.

OBJECTIVE

To develop and standardize a scale to measure the Perception of farmers towards Climate Change**.**

METHODOLOGY

Climate change perception assessment refers to the systematic evaluation of how farmers recognize, understand, and interpret changing climatic conditions and their associated impacts. It is therefore important to examine farmers' awareness and understanding of climate variability, along with their perception regarding its causes, consequences, and overall implications. The present study was conducted using an Ex-post facto research design. In this study, the Likert Summated Rating Scale technique developed by Rensis Likert (1932) was employed for the development of the perception scale. A summated rating scale consists of a series of statements that are considered to have approximately equal importance. For developing a reliable and valid scale, a systematic procedure was followed by adopting methodologies and approaches used in earlier studies conducted by Shrivastava (2022), Pathak et al. (2026), Pandey et al. (2025), Vaishnavi et al. (2023), Gudadur and Dolli (2022); Bhabhor et al. (2024) and Biradar et al. (2021). The details of the steps followed in developing the scale to measure the perception of farmers toward climate change are discussed below:

(1) Identification of dimension

The possible indicators of farmers' perception towards climate change were identified through an extensive review of related literature. After detailed examination and careful understanding of the concept, these indicators were further discussed and validated in consultation with subject matter experts. Based on their suggestions and recommendations, four major indicators were finally selected for the construction and standardization of the scale. The selected indicators included perception towards weather parameters, perception regarding causes of climate change, climate risk perception, and overall perception of farmers towards climate change.

(2). Identification of Items/statements

2.1 Collection of Items /statement

In the initial phase of the study, an extensive review of literature related to climate change was carried out using various sources of information. Based on the insights obtained from the review, a total of 120 statements reflecting farmers' perception towards climate change were initially developed. These statements were carefully edited and refined according to the fourteen criteria suggested by Edwards (1959) for constructing attitude statements. After thorough scrutiny, 60 statements were retained as they were found to be clear, non-factual, and free from ambiguity. The method followed as suggested by Vinaya et al. (2016).

(3). Relevancy Weightage (RW)

As a part of the scale development process, the suitability of the drafted statements was examined through expert judgement. Sixty statements pertaining to farmers' perception towards climate change were forwarded to 115

experts drawn from relevant disciplines for their review and comments. Each expert was requested to express the degree of relevance of every statement using three response categories, namely Most Relevant, Relevant, and Least Relevant. Scores of 3, 2, and 1 were assigned to these categories for positively worded statements, while the scoring sequence was reversed for negatively framed statements. Within three months, evaluations were received from 40 experts. The responses provided by the experts were compiled and converted into numerical scores. Thereafter, the cumulative relevance score for each statement was derived by aggregating the ratings awarded by all the respondents. These scores were subsequently used for further statistical examination using the prescribed relevancy measures.

$$\text{Mean Relevancy Percentage (RP)} = \frac{MR*3+R*2+LR*1}{Number\ of\ Respondents} \times 100$$

$$\text{Mean Relevancy Weightage (RW)} = \frac{MR*3+R*2+LR*1}{Maximum\ possible\ score\ (40*3=120)}$$

$$\text{Mean Relevancy Score (MRS)} = \frac{MR*3+R*2+LR*1}{Number\ of\ judges}$$

Statements with a relevancy percentage above 75.00 per cent, relevancy weightage greater than 0.75, and mean relevancy score exceeding 2.00 were retained for further consideration. Applying these criteria, 43 statements fulfilled all the required conditions and were selected during the first stage of screening. These statements were further refined and modified in accordance with the suggestions and comments provided by the experts. Thus, a final set of 43 statements (Table 1) was retained after conducting the relevancy test.

Table 1: Scale on measure perception of farmers towards climate change relevancy Weightage, relevancy percentage, mean relevancy score

Sr. No	Statements	Relevancy rating			Selected/Rejected
		RP	RW	MRS	
A.) Perception towards weather parameters					
1	There is no major difference in weather patterns compared to 10 years ago	69.16	0.69	2.075	Rejected
2	There is an increase in environmental temperature	91.66	0.91	2.75	Selected
3	I have experienced more frequent scorching sunshine in recent years.	85	0.85	2.55	Selected
4	I have observed that the number of rainy days (with >2.5mm rainfall) has decreased.	68.33	0.68	2.05	Rejected
5	I have observed that the sudden heavy rainfall events have increased.	85	0.85	2.55	Selected
6	There is uneven distribution of rainfall during the cropping season.	90	0.9	2.7	Selected
7	There is a late onset of monsoon in my region.	75	0.75	2.25	Selected
8	Long dry spell during the cropping season have become more frequent.	79.16	0.79	2.375	Selected
9	In my experience, the monsoon still arrives on time most years.	73.33	0.73	2.2	Rejected
10	The occurrence of droughts has increased over the years.	75	0.75	2.25	Selected
11	There is an increasing incidence of strong winds affecting crops.	76.66	0.76	2.3	Selected
12	Hailstorms during the Rabi season have become more common.	76.66	0.76	2.3	Selected
13	Seasons like monsoon and winter are still the same as before	74.16	0.74	2.225	Rejected
14	Winters are warmer and shorter compared to earlier years.	77.5	0.77	2.325	Selected
15	The summer season has become longer and more intense	85	0.85	2.55	Selected
16	The Rabi season has shortened compared to earlier years.	74.16	0.74	2.225	Rejected
17	Traditional water sources (e.g., ponds, wells) are drying up earlier in the season.	82.5	0.825	2.475	Selected
18	My livestock experience more heat stress during summer than earlier.	80.83	0.80	2.425	Selected
19	Prolonged dry spells have reduced the availability of clean drinking water for my animals	72.5	0.72	2.175	Rejected
B.) Perception towards the causes of climate change					
20	Deforestation is a major cause of climate change.	93.33	0.93	2.8	Selected

Sr. No	Statements	Relevancy rating			Selected/Rejected
		RP	RW	MRS	
21	Continuous cropping contributes to changes in climate patterns.	76.66	0.76	2.3	Selected
22	Farming practices have no impact on climate change	74.16	0.74	2.225	Rejected
23	Overgrazing is a reason for climate change.	75	0.75	2.25	Selected
24	Livestock rearing contributes to climate change	56.66	0.56	1.7	Rejected
25	Overuse of fertilizers and chemicals	85	0.85	2.55	Selected
26	Burning of crop residues contributes to air pollution and climate change.	91.66	0.91	2.75	Selected
27	Urbanization contributes to climate change.	74.16	0.74	2.225	Rejected
28	Climate change is a natural phenomenon.	74.16	0.74	2.225	Rejected
29	Human activities do not contribute to climate vulnerability.	75.83	0.75	2.275	Selected
C.) Climate risk perception					
30	Extreme weather events will occur more frequently in the future.	85.83	0.85	2.575	Selected
31	Weather changes have not disrupted my farming in any way.	72.5	0.725	2.175	Rejected
32	New insect pests may emerge due to climate change	84.16	0.84	2.525	Selected
33	I believe that traditional knowledge alone is not sufficient to handle new climate-related risks.	85	0.85	2.55	Selected
34	Climate change does not affect pests, weeds, or diseases on my farm	74.16	0.74	2.225	Rejected
35	There is no need to change farming practices because of climate change	73.33	0.73	2.2	Rejected
36	New weed species may appear in farms due to climate change	80.83	0.80	2.425	Selected
37	New plant diseases may arise in farms due to climate change	88.33	0.88	2.65	Selected
38	New livestock diseases may emerge due to climate change	85	0.85	2.55	Selected
39	Implementing adaptation strategies increases my cost of cultivation	77.5	0.77	2.325	Selected
40	Uncertainty in rainfall pattern major factor affecting crop yields.	87.5	0.87	2.625	Selected
41	Climate change may have significant impacts on agriculture.	93.33	0.93	2.8	Selected
42	Climate change may have significant impacts on human health and livelihood	90.83	0.90	2.725	Selected
43	Climate change may reduce the availability of groundwater for irrigation	85	0.85	2.55	Selected
44	Livestock suffer from more frequent heat stress during summer than in the past	73.33	0.73	2.2	Rejected
45	Rising temperatures are affecting animal fertility and reproductive health	86.66	0.86	2.6	Selected
D.) Overall perception of the farmers towards climate change					
46	My farming methods don't need any change due to climate conditions.	76.66	0.76	2.3	Selected
47	The effects of climate change are extreme and noticeable.	80.83	0.80	2.425	Selected
48	Climate change has no serious impact on farming	68.33	0.68	2.05	Rejected
49	There is a noticeable variation in summer temperatures	72.5	0.72	2.175	Rejected
50	There is a noticeable variation in winter temperatures	74.16	0.74	2.225	Rejected
51	Rainfall distribution during crop growth periods is erratic	85	0.85	2.55	Selected
52	Cropping seasons are changing in my village due to climate vulnerability.	88.33	0.88	2.65	Selected
53	Land degradation and reduced suitability for cultivation are increasing.	82.5	0.825	2.475	Selected
54	Climate vulnerability is affecting farming practices.	89.16	0.89	2.675	Selected

Sr. No	Statements	Relevancy rating			Selected/Rejected
		RP	RW	MRS	
55	Climate change increases food insecurity.	85.83	0.85	2.575	Selected
56	Climate change has negatively impacted livestock productivity and animal health in my village	85.83	0.85	2.575	Selected
57	Critical crop growth stages are highly vulnerable to weather variability.	91.66	0.91	2.75	Selected
58	Climate vulnerability is forcing villagers to migrate to urban areas.	75	0.75	2.25	Selected
59	Climate change has increased uncertainty in farming decisions.	83.33	0.83	2.5	Selected
60	My standard of living will improve if climate vulnerability is reduced.	76.66	0.76	2.3	Selected

Note: Relevancy percentage (RP), Relevancy Weightage (RW), Mean relevancy score (MRS)

4. Item analysis

The discriminating ability of the shortlisted statements was examined through item analysis, which is a crucial procedure in Likert scale construction. This step ensures that only those statements capable of distinguishing between respondents with varying levels of perception are retained in the final scale. For this purpose, the 43 statements selected after the relevancy screening were subjected to empirical testing. A questionnaire containing these statements was administered to 32 farmers drawn from an area outside the study sample. Responses were obtained on a five-point rating scale ranging from Strongly Agree to Strongly Disagree. Scores of 5, 4, 3, 2, and 1 were assigned to positive statements, whereas the scoring sequence was reversed for negative statements. An overall perception score for each respondent was obtained by summing the individual item scores. Subsequently, respondents were arranged according to their total scores and divided into groups representing contrasting levels of perception. Following the procedure recommended by Edwards and Kilpatrick (1957), the highest scoring 25 per cent and the lowest scoring 25 per cent of respondents were selected as criterion groups. Accordingly, 8 respondents from each extreme group were retained for further analysis. The effectiveness of each statement was then evaluated by comparing the responses of these two groups. The degree to which a statement differentiated between respondents with high and low perception levels was determined through the computation of a t-statistic. Statements with larger t-values exhibited greater discriminatory capacity and were therefore considered more suitable for inclusion in the scale. The t-values for all statements were calculated using the procedure proposed by Edwards.

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

Where,

t= the extent to which a given statement differentiates between high and low groups.

X_H= the mean score on a given statement for the high group

X_L= the mean score on a given statement for the low group

$\sum(X_H + \bar{X}_H)$= the variance of the distribution of respondents for the high group to the statements

$\sum((X_H - \bar{X}_H))$= the variance of the distribution of respondents for the low group to the statements and

n= number of subjects in low or high group

Thereafter, the statements were arranged in descending order based on their t-values, and those statements having t-values greater than 1.75, irrespective of whether they were positive or negative in nature, were retained in the final scale due to their superior discriminating capacity.

Selection of statements for final scale

After calculating the 't' values for all the statements, 32 items having the highest discriminating values with a 't' value equal to or greater than 1.75 were retained for inclusion in the final scale. Statements with 't' values below 1.75 were rejected in accordance with the guidelines suggested by Edwards (1957). While selecting the final items for the scale, emphasis was given not only to the discriminating ability and authenticity of the statements, but also to their uniqueness and clarity.

Accordingly, the following criteria were considered for selecting statements for the final scale:

(1) 1. The statement should have a 't' value equal to or greater than 1.75.

(2) 2. The statement should convey a distinct and non-overlapping idea.

(3) 3. The statement should be simple, clear, and concise in wording.

Note: Statement having equal to or greater than 1.75 ‘t’ value were selected for the final scale

5. Reliability and validity of perception scale

The validity and reliability of the scale were established to ensure its standardization. Validity was assessed through content validity and criterion validity.

Split-Half methodology

The consistency of the developed perception scale was examined through the split-half reliability technique. For this purpose, the 32 finalized statements were divided into two equivalent sets following the odd-even procedure. The scale was then administered to 46 farmers from an area that was not included in the main sample. Scores obtained from the two sets of statements were correlated using Karl Pearson’s Product Moment Correlation Coefficient. The correlation value obtained for the half-test was 0.76 and was significant at the one per cent level of probability. This result indicated a strong degree of internal consistency among the items and confirmed that the scale was sufficiently reliable for measuring farmers’ perception towards climate change.

$$r = \frac{n\sum xy - \sum x \sum y}{\sqrt{\left(n\sum x^2 - (\sum x)^2\right)\left(n\sum y^2 - (\sum y)^2\right)}}$$

∑X = Sum of the scores of the odd number items

∑Y = Sum of the scores of the even numbers’ items

∑X2 = Sum of the squares of the odd number items

∑Y2 = Sum of the squares of the even number items

n = Number of respondents

Further, the reliability coefficient of the complete scale was estimated by applying the Spearman–Brown Prophecy Formula using Microsoft Excel (2021 version). The obtained reliability coefficient value was 0.865, which was highly significant at the one per cent level of probability, indicating a high degree of reliability and consistency of the developed scale.

(6) Content validity of the perception scale

The validity of the scale was assessed through content validity, which refers to the extent to which the instrument adequately represents the subject matter under study. The developed scale fulfilled this criterion as the statements related to pesticide use behaviour were carefully formulated based on standard literature and expert consultation. Adequate care was taken to ensure proper representation and relevance of the statements. Further, the calculated “t” values for all the finalized statements were found to be significant, indicating good discriminating power of the items included in the scale. Therefore, the scale may be considered a valid instrument for measuring farmers’ perception.

RESULTS AND DISCUSSION

Administration and scoring of scale

The standardized scale comprised 32 statements developed to assess farmers’ perception towards climate change. Each statement was presented to the respondents on a five-point rating continuum ranging from Strongly Agree to Strongly Disagree. For positively framed statements, scores of 5, 4, 3, 2, and 1 were assigned respectively, whereas the scoring sequence was reversed for negatively framed statements. The score obtained by an individual respondent was calculated by summing the ratings assigned to all the statements included in the scale. Consequently, the possible score ranged from 32 to 160, with higher scores indicating a greater level of perception towards climate change. The obtained scores were used to quantify the perception level of farmers and served as the basis for subsequent statistical analysis and interpretation.

Table 2: Items generated with t values based on item analysis

Sr.No.	Statements	‘t’ Value
A)	**Perception towards weather parameters**	
1	There is an increase in environmental temperature	7.02
2	I have experienced more frequent scorching sunshine in recent years.	8.08
3	There is uneven distribution of rainfall during the cropping season.	6.36
4	There is a late onset of monsoon in my region.	2.54
5	Long dry spells during the cropping season have become more frequent.	3.20
6	The occurrence of droughts has increased over the years.	2.37
7	There is an increasing incidence of strong winds affecting crops.	6.36
8	Winters have become shorter and warmer.	2.21

Sr.No.	Statements	't' Value
9	My livestock experience more heat stress during summer than earlier.	3.82
B)	**Perception towards the causes of climate change**	
10	Deforestation is a major cause of climate change.	5.88
11	Continuous cropping contributes to changes in climate patterns.	2.30
12	Overgrazing is a reason for climate change.	2.76
13	Overuse of fertilizers and chemicals contributes to climate change.	2.91
14	Human activities are largely responsible for increasing climate risk.	2.21
C)	**Climate risk perception**	
15	New insect pests may emerge due to climate change.	2.39
16	I believe that traditional knowledge alone is not sufficient to handle new climate-related risks.	1.78
17	New weed species may appear in farms due to climate change.	6.42
18	New livestock diseases may emerge due to climate change.	2.33
19	Implementing adaptation strategies increases my cost of cultivation	2.41
20	Uncertainty in rainfall patterns is a major factor affecting crop yields.	3.20
21	Climate change may have significant impacts on agriculture.	2.43
22	Climate change may reduce the availability of groundwater for irrigation.	1.94
23	Rising temperatures are affecting animal fertility and reproductive health.	3.23
D)	**Overall perception of the farmers towards climate change**	
24	The effects of climate change are extreme and noticeable.	3.79
25	Cropping seasons are changing in my village due to climate vulnerability.	3.82
26	Land degradation and reduced suitability for cultivation are increasing.	2.60
27	Climate vulnerability is affecting farming practices.	2.91
28	Climate change increases food insecurity.	2.55
29	Climate change has negatively impacted livestock productivity and animal health in my village	3.13
30	Critical crop growth stages are highly vulnerable to weather variability.	2.37
31	Climate change has increased uncertainty in farming decisions.	1.76
32	My standard of living will improve if climate vulnerability is reduced.	2.71

Table 3: Final statements of perception of farmers toward climate change

Sr. No	Statements	SA (5)	A (4)	UD (3)	DA (2)	SDA (1)
(A)	**Perception towards weather parameters**					
1	There is an increase in environmental temperature					
2	I have experienced more frequent scorching sunshine in recent years.					
3	There is uneven distribution of rainfall during the cropping season.					
4	There is a late onset of monsoon in my region.					
5	Long dry spells during the cropping season have become more frequent.					
6	The occurrence of droughts has increased over the years.					
7	There is an increasing incidence of strong winds affecting crops.					
8	Winters have become shorter and warmer.					
9	My livestock experience more heat stress during summer than earlier.					
(B)	**Perception towards the causes of climate change**					
10	Deforestation is a major cause of climate change.					
11	Continuous cropping contributes to changes in climate patterns.					
12	Overgrazing is a reason for climate change.					
13	Overuse of fertilizers and chemicals contributes to climate change.					
14	Human activities are largely responsible for increasing climate risk.					

Sr. No	Statements	SA (5)	A (4)	UD (3)	DA (2)	SDA (1)
(C)	**Climate risk perception**					
15	New insect pests may emerge due to climate change.					
16	I believe that traditional knowledge alone is not sufficient to handle new climate-related risks.					
17	New weed species may appear in farms due to climate change.					
18	New livestock diseases may emerge due to climate change.					
19	Implementing adaptation strategies increases my cost of cultivation					
20	Uncertainty in rainfall patterns is a major factor affecting crop yields.					
21	Climate change may have significant impacts on agriculture.					
22	Climate change may reduce the availability of groundwater for irrigation.					
23	Rising temperatures are affecting animal fertility and reproductive health.					
(D)	**Overall perception of the farmers towards climate change**					
24	The effects of climate change are extreme and noticeable.					
25	Cropping seasons are changing in my village due to climate vulnerability.					
26	Land degradation and reduced suitability for cultivation are increasing.					
27	Climate vulnerability is affecting farming practices.					
28	Climate change increases food insecurity.					
29	Climate change has negatively impacted livestock productivity and animal health in my village					
30	Critical crop growth stages are highly vulnerable to weather variability.					
31	Climate change has increased uncertainty in farming decisions.					
32	My standard of living will improve if climate vulnerability is reduced.					

Note: Strongly Agree (SA), Agree (A), Undecided (UD), Disagree (DA), Strongly Disagree (SD)

The present study successfully developed and standardized a scale to measure farmers' perception towards climate change (Table-3) by employing the Likert summated rating technique. The statements included in the final scale possessed satisfactory discriminating ability as the selected items effectively differentiated respondents with high and low perception levels. The reliability and validity of the developed instrument further indicated its suitability for measuring farmers' perception towards climate change. Similar methodological procedures and findings regarding item selection, reliability and validity of perception scales were also reported by Shrivastava (2022) in the development of climate vulnerability perception scale and by Biradar et al. (2021) while developing a scale to measure farmers' perception about climate change. Comparable findings regarding reliability and standardization of perception scales were also observed by Gudadur and Dolli (2022) in their study on pesticide use behaviour. Hence, the developed scale may be considered as a scientifically standardized and dependable instrument for future research and extension studies related to climate change perception among farmers.

CONCLUSION

Effective adaptation towards climate vulnerability mainly depends upon when farmers were able to understand climate change and vulnerability which in turn is reflected by their perception of it. Hence, the present study successfully developed and standardized a scale to measure farmers' perception towards climate change. The scale consisted of carefully selected statements covering different dimensions of climate change perception and was tested for validity and reliability using appropriate statistical procedures. The obtained results indicated that the developed scale possessed satisfactory reliability, consistency, and discriminating ability. Hence, the scale may serve as an effective tool for understanding farmers' perception towards climate change under different agro-climatic conditions.

POLICY IMPLICATIONS

Farmers' perception towards climate change plays a vital role in influencing their understanding, preparedness, and adoption of suitable adaptation strategies. Hence, it is recommended that government departments, extension agencies, and policy makers utilize the developed scale to assess the perception level of farmers regarding climate

change. The findings may help in designing location-specific awareness programmes, training, and extension activities aimed at improving farmers' understanding of climate change and promoting appropriate climate-resilient agricultural practices.

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CONFLICT OF INTERESTS

The authors declare that they have no conflict of interest.

REFERENCES

Asrat, P., & Simane, B. (2017). Characterizing vulnerability of crop-based rural systems to climate change and variability: agro-ecology specific empirical evidence from the Dabus watershed, north-West Ethiopia. *American Journal of Climate Change*, 6(4), 643.

Bhabhor, G. K., Shaikh, A. A. and Machhar, R. G. (2024) Awareness about climate change among the farmer friends. Gujarat Journal of Extension Education, 37(1):34-38. https://doi.org/10.56572/gjoee.2024.37.1.0005.

Biradar, N., Chand, K., Tirlapur, L., Kerur, A., & Raghuprasad, K. P. (2021). Development of a scale to measure perception of farmers about climate change. *Indian Journal of Extension Education*, *57*(2), 43-48.

Choudhary, K. R., Yogi, V., Singh, R. P., Dadhich, S., & Kumar, A. (2026). Spatial and Temporal Trends of Mean Rainfall and Temperature of Rajasthan, India. *Archives of Current Research International*, *26*(1), 334-342.

Edwards, A. L., & Kilpatrick, F. P. A. (1948). A technique for the construction of attitude scales. *Journal of Applied Psychology*, 32(4), 374–384.

Hyland, J. J., Jones, D. L., Parkhill, K. A., Barnes, A. P., & Williams, A. P. (2016). Farmers' perceptions of climate change: identifying types. Agriculture and Human Values, 33(2), 323-339.

Khanday, Q. A., Kumari, R., & Sharma, P. (2022). A Study of Climate Change in Rajasthan and Its Impact on Flora and Fauna. *International Journal of All Research Education and Scientific Methods,* 10(5), 289-92.

Likert, R. (1932). A technique for the measurement of attitudes. Archives of Psychology, 22 :140- 55

Maddox, G. L. (1995). The Encyclopaedia of Aginy. (2nd Edition). New York: Springer Publishing Company.

Nageswara Rao, M. M., Dhekale, B. S., & Mohanty, U. C. (2018). Impact of climate variability on various Rabi crops over Northwest India. Theoretical and Applied Climatology, 131(1),503-521.

Pandey, M. K., & Singh, D. (2025). A Scale to measure the entrepreneurial behaviour of tomato growers. *Gujarat Journal of Extension Education39(1),* 131-138.

Pathak, D. K., Gupta, B. K., Mishra, G., Suryavanshi, A., Mishra, B. P., & Singh, L. (2026). Development and Standardization of a Scale to Measure Farmers' Risk Perception towards Climate Change. *Indian Journal of Extension Education*, 62(2),149-155.

Saikanth, D. R. K., Kumar, S., Rani, M., Sharma, A., Srivastava, S., Vyas, D., & Kumar, S. (2023). A comprehensive review on climate change adaptation strategies and challenges in agriculture. *International Journal of Environment and Climate Change*, *13*(11), 10-19.

Shrivastava, V. (2022). A Scale to Measure Farmers' Perception towards Climate Vulnerability. *Int. J. Environ. Clim. Chang*, *12*, 1318-1324.

Singh, S. (2020). Farmers' perception of climate change and adaptation decisions: Micro-level evidence from Bundelkhand Region, India. Ecological Indicators, 116, 106475.

Tripathi, A., & Mishra, A. K. (2020). Knowledge and passive adaptation to climate change: An example from Indian farmers. Climate Risk Management, 27, 100197.

UNFCCC (United Nations Framework Convention on Climate Change) (2011), "Reducing vulnerability to climate change, climate variability and extremes, land degradation and loss of biodiversity: environmental and developmental challenges and opportunities", available at: http://unfccc.int/ resource/docs/ publications/ldc_reducingvulnerability.pdf.

Vaishnavi, P., Nithya Shree, D. A., & Sunil, V. H. (2023). A Scale to measure the perception of staff towards Student READY Programme. *Gujarat Journal of Extension Education 36*(1), 12-17.

Van der Linden, S. (2015). The social-psychological determinants of climate change risk perceptions: towards a comprehensive model. *Journal of Environmental Psychology*. 41: 112-124.

Vinaya Kumar, H. M. and Gadde, S. (2025). A tool to measure livelihood vulnerability of climate-sensitive farming communities. Indian *Journal of Extension Education,* 61(4), 160–164. https://doi.org/10.48165/IJEE.2025.614RT01

Vinaya Kumar, H. M., Gadde, S., & Cariappa, A. G. A. (2025). Understanding farmers' trust in stakeholders of carbon credit projects: A perception-based analysis. *Current Research in Environmental Sustainability,* 10, 100317. https://doi.org/10.1016/j.crsust.2025.100317

Vinaya Kumar, H. M., Shivamurthy, M., & Biradar, G. S. (2016). A scale to measure climate-induced crisis management of farmers in Coastal Karnataka (India). *Advances in Life Sciences,* 5(16), 6206–6212.

Whitmarsh, L. and Capstick, S. (2018). Perceptions of climate change in psychology and climate change in human perceptions, impacts and responses. Pp. 13-33.

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