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Standardization of a Scale to Assess the Impact of Wildlife-Induced Crop Damage among Tribal Farmers

Reshma Vattekkad[1], Sowmya Sahadevan[2]* and Manikandan Krishnan[3]

[1]Research Scholar, [3]Professor, Department of Economics, The Gandhigram Rural Institute- DTBU, Gandhigram, Dindigul, Tamil Nadu, India
[2]Assistant Professor, Department of Economics, Sree Narayana college Alathur Palakkad, Kerala, India
*Corresponding author email id: sowmya.babu7@gmail.com

HIGHLIGHTS

- Developed and standardised a 17-item scale for assessing the impact of wildlife- induced crop damage among tribal farmers.
- The scale demonstrated high reliability (0.914) with strong internal consistency.
- Four dimensions, namely, economic, nutritional, psychological and institutional impacts, were identified from exploratory factor analysis.

ARTICLE INFO

Keywords: Human–wildlife conflict, Tribal farmers, Extension interventions, Crop damage, Scale standardization, Psychometric validation.

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Reviewed by: Dr. Rahul Singh (rahuliari@gmail.com); Sonam Prabhakar (sonamprabhakar1@gmail.com)

ABSTRACT

The increasing incidence of animal attacks on crops has emerged as a major challenge for tribal farmers, necessitating a systematic evaluation of perceptions regarding their impact. The study, conducted in 2025, developed and validated a standardised Likert-type scale to measure the impact of wildlife crop damage among the tribal farmers. An initial set of 44 items was considered on the basis of literature review and expert consultation. Fourteen judges evaluated the statements' relevancy, and based on predefined criteria (MRS ≥ 4.00, RP ≥80 per cent, RW ≥0.80), 28 statements were retained. These statements were administered to 150 tribal farmers chosen from Attappady. Item analyses were undertaken using the critical ratio (t-test), and reliability analyses resulted in the elimination of 11 items, yielding a final scale comprising 17 statements. The scale confirmed a high internal consistency with a Cronbach's alpha value of 0.914. Exploratory factor analysis confirmed the adequacy of the data (KMO + 0.795) and identified four components – nutritional, economic, psychological and institutional impacts – which explained 78.95 percent of total variance. The developed scale was found to be a reliable and valid instrument for examining the multidimensional impact of wildlife-induced crop damage among the tribal farmers.

INTRODUCTION

Human-wildlife conflict has emerged as an important barrier in the agrarian context, especially among the tribal farmers who are living in the forest-adjacent region. In recent years, this issue has been increasing in various parts of India, mainly due to land-use changes, habitat destruction and declining availability of natural forage (Madhusudan, 2003; Rao et al., 2002). The crop loss resulting from attacks by wild animals such as elephants, monkeys and pigs adversely affects agricultural productivity and creates multidimensional challenges, including economic vulnerability, food insecurity and psychological stress among the tribal farming households (Rathi et al., 2021).

Existing literature states that wildlife-induced damage to crops reduces the farm income and threatens the long-term sustainability of smallholder agriculture. In many tribal regions, losses caused by wildlife often surpass those resulting from climate variability and pest infection (Meena et al., 2022). These difficulties were further complicated due to inadequate institutional support, delay in the

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compensation, and lack of effective preventive measures, including fencing. Although previous studies have documented the economic loss or socio-psychological consequences of wildlife-induced crop damage, most have analysed these dimensions independently, without integrating them into a comprehensive analytical framework. Given the nature of the problem is inherently multidimensional, a systematic approach is required to measure its varied impact. Tribal farmers who depend on agriculture for both income and household consumption face compound risk, with the loss in the crop directly affecting food availability and livelihood continuity. Despite its relevance, there is a lack of standardised and validated measurement tools to assess the overall impact on crop cultivation due to animal attacks from the perspectives of tribal farmers.

Against this background, the present study explores, how can the multifaceted effects of wildlife-induced crop damage among the tribal farmers be effectively conceptualised and assessed by employing a valid and reliable scale? Accordingly, the study conceptualises the effect of wildlife-induced crop damage among tribal farmers as a latent multidimensional construct indicating the perceived adverse consequences experienced by tribal farming households because of the recurrent wildlife incursions into their farming area. Unlike direct measures of crop loss that quantify the economic loss, the construct captures farmers' perceptions of how repeated wildlife-induced crop damage impacts their livelihoods, household well-being, and interactions with institutional support systems. The construct is theoretically bounded to the perceived consequences of wildlife-induced crop damage on farming households and excludes ecological aspects of wildlife conservation, animal behaviour, or attitudes towards wildlife protection. Further, the study intends to develop the scale items that are culturally appropriate and validate their content through expert assessment and pilot testing. Even though the suggested instrument does not directly serve the needs as an evaluation tool, it is intended to facilitate future assessments by producing systematic and comparable evidence (DeVellis, 2012). Since these impacts are likely to be interrelated rather than directly observable, the construct is treated as multidimensional, and its underlying dimensions are identified through Exploratory Factor Analysis (EFA) during the scale-development process.

METHODOLOGY

The research was undertaken to develop and standardise a scale for measuring the perceived impact of wildlife-induced crop loss among the tribal farmers. An exploratory research design was adopted, and the Likert summated rating method (Likert, 1932) was employed for constructing the scale, as it is widely employed for measuring the individual difference in perceptions and attitudes. The procedures suggested by Reddy et al. (2023) and Shukla et al. (2026) were adopted for scale development.

Initially, 44 statements were identified representing various dimensions of animal attacks on crop based on the literature review (Gatew & Azadge, 2025; Rathi et al., 2021; Thakur et al., 2022; Galley & Anthony, 2024) and consultation with experts in agriculture. These statements were subjected to content validation by a panel of 14 judges who assessed the relevance and clarity. Microsoft Excel was used for analysing each statement.

Following established procedures in agricultural extension scale development studies (Shanila & Helan, 2025; Shukla et al., 2026; Pathak et al., 2026), statements with MRS $\geq$4.00, RP $\geq$80%, and RW $\geq$0.80 were retained for further examination. An MRS of 4.00 indicates that, on average, the expert panel rated the statement as 'Relevant' or 'Most Relevant', thereby suggesting adequate content validity. Similarly, an RP of at least 80% and an RW of 0.80 or above indicate a high degree of agreement among experts with regard to the relevance and appropriateness of the statements for measuring the construct.

The validated statements were administered to a total of 150 tribal farmers from the Attappady block of Kerala. The Attappady block of Palakkad district was purposively chosen, as it is one of the largest tribal settlements in Kerala and experiences frequent incidents of wildlife-induced crop damage due to its proximity to forest areas. The block comprises three panchayats, namely Agali, Sholayur, and Pudur, and all were included, as they represent the major tribal farming regions within the block. From each panchayat, 50 tribal farmers were selected using simple random sampling from the list of eligible farming households, resulting in a total sample of 150 respondents. The respondents included in the present study were required to satisfy the following criteria: (i) belong to a recognised tribal community, (ii) be actively engaged in crop cultivation, and (iii) have experienced wildlife-induced crop damage during recent cropping seasons.

The sample size exceeded the recommended minimum of five respondents per item for exploratory factor analysis; hence, it is considered to be adequate in general. The responses obtained from them were scored, ranging from 5 to 1, respectively. On the basis of procedures put forward by Edwards (1957), the item analysis was carried out. The respondents were organised in descending order on the basis of total scores, and the upper 25 per cent and lower 25 per cent were identified as high and low groups, respectively. The significant variations between the mean scores of these two groups for each statement were tested by applying an independent samples t-test. Further, Cronbach's alpha coefficient was employed to analyse the internal consistency of the scale. Sample adequacy was examined through Kaiser-Meyer-Olkin (KMO) and Bartlett's Test of Sphericity. Thus, the validity and reliability of the scale were confirmed through content validation, item analysis, internal consistency assessment and exploratory factor analysis. Principal component analysis with varimax rotation was applied to identify the underlying domains of the scale. Microsoft Excel 2019 for relevancy score estimation and for other statistical analyses were conducted using IBM SPSS Statistics, version 23.

Prior administrative permission for conducting the study was obtained from the Nodal Officer (Sub-Collector, Ottappalam), followed by approval from the Integrated Tribal Development Project (ITDP), Agali, to undertake the research among the tribal communities of Attappady. Prior informed consent was obtained from all respondents before the interviews, and participation in the study was entirely voluntary. The respondents were informed about the objectives of the study and assured that the information collected would be used solely for academic purposes.

RESULTS

The scale development process followed four main stages: relevancy testing, item analysis, reliability assessment and exploratory factor analysis. The results obtained in each stage are presented in the following section.

Relevancy test

Based on the 44 statements representing different dimensions of impact on crops due to animal attacks, they were subjected to the relevancy testing. These statements were examined by a panel of 14 experts from various fields such as economics, agricultural extension, and tribal economics. The judges were required to rate each of the statements on a five-point continuum ranging from Most Relevant to Not Relevant. The responses were then quantified, and the relevancy of each statement was computed by applying the following indices.

Relevancy weightage (RW)

$$RW = \frac{\{(MR*5) + (R*4) + (UR*3\ ) + (LR*2) + (NR*1)\}}{\text{Maximum possible score}} \quad ...(1)$$

$$RP = \frac{\{(MR*5) + (R*4) + (UR*3) + (LR*2) + (NR*1)\}}{\text{Maximum possible score} * 100} \quad ...(2)$$

$$MRS = \frac{[(MR*5) + (R*4) + (UR*3) + (LR*2) + (NR*1)]}{\text{Number of Judges}} \quad ...(3)$$

Where, MR = Most Relevant; R = Relevant; UR = Undecided; LR = Less Relevant; NR = Not Relevant.

The maximum possible score was calculated as,

Maximum possible score = Number of judges x Maximum score = 14 x 5 = 70

The results are given in Table 1. Based on the predetermined criteria, 28 items were retained for subsequent item analysis. The MRS values of the retained statements range from 4.21 to 4.93, while the RP and RW values fall between 84.29 and 98.57 per cent and 0.84 and 0.99, respectively. The high MRS, RPM and RW values obtained for these statements indicate a strong level of agreement among the experts with respect to the relevance and appropriateness of the statements for measuring the perception of tribal farmers.

Item analysis

For evaluating the discriminating ability of the statements, item analysis was performed by employing the critical ratio method. On the basis of standardised procedures put forward by Edwards (1957), the respondents were divided into high and low groups, and the significance of the difference between these groups was tested by conducting an independent sample t-test.

Following the criterion proposed by Bird (1940), statements with t-values less than 1.75 (irrespective of negative signs) were taken into consideration to have a poor discriminating power and were excluded from the scale. Only those statements having a value more than 1.75 were included, as they effectively differentiated among the sample tribal farmers with high and low levels of perceived impact. Accordingly, four statements (statement numbers 11, 12, 23, and 27) were eliminated due to inadequate discrimination, while the remaining 24 statements scoring a t-value above 1.75 were retained for further refinement. Table 1 displays the 28 statements with MRS, RP and RW and their t-value.

Reliability analysis

The reliability of the scale was examined employing the Cronbach's alpha coefficient to determine the internal consistency of the items. Initially, the reliability was tested for the 24 statements which were retained after item analysis. Seven statements were

Table 1. Relevancy and item analysis of selected statements measuring the impact of animal attacks on crops among tribal farmers

Item No.	Statement	MRS	RP (%)	RW	t-value
1	The compensation provided for crop losses due to animal attacks is inadequate.	4.93	98.57	0.99	14.877
2	My income from farming has reduced significantly due to animal damage	4.86	97.14	0.97	26.717
3	Animal menace has discouraged investment in improved seeds or fertilizers.	4.86	97.14	0.97	4.442
4	I have abandoned or reduced cultivation in high-risk areas due to repeated attacks	4.71	94.29	0.94	6.384
5	Government agencies do not provide sufficient support to prevent crop damage caused by wild animals.	4.64	92.86	0.93	8.319
6	Have reduced the quantity of food available to my family	4.64	92.86	0.93	19.461
7	Repeated animal attacks have reduced my investment in farming.	4.57	91.43	0.91	9.679
8	Recurrent damage reduces the diversity of crops I can grow	4.50	90.00	0.90	13.908
9	Men and elderly members face added workload due to guarding or replanting damaged crops	4.43	88.57	0.89	13.011
10	Crop loss affects my household's nutritional intake and food variety	4.43	88.57	0.89	18.340
11	Repeated crop losses cause frustration and mental stress	4.36	87.14	0.87	13.231
12	I often feel anxious about possible animal attacks during the cropping season	4.36	87.14	0.87	10.310
13	Staying awake at night to guard fields causes fear and exhaustion	4.29	85.71	0.86	5.373
14	Crop destruction by animals forces my household to depend more on purchased food	4.21	84.29	0.84	6.148
15	Frequent animal attacks on crops lead my household to adopt less preferred or lower-quality foods.	4.93	98.57	0.99	10.689
16	Crop loss from animal attacks reduces the household's ability to store sufficient food for future consumption.	4.86	97.14	0.97	28.824
17	The community lacks a common platform to discuss and report wildlife damage	4.43	88.57	0.89	7.803

Note: MRS = Mean Relevancy Score; RP = Relevancy Percentage; RW = Relevancy Weightage.

identified as inconsistent on the basis of corrected item-total correlation and the Cronbach's alpha if item-deleted values, and these statements were subsequently eliminated from the scale. The reliability analysis was then repeated with the remaining 17 statements to ensure the consistency of the refined scale. The Cronbach's alpha value obtained for the final set of statements was 0.914, suggesting a high level of internal consistency across the statements (Nunnally, 1978). This suggests that the scale is reliable and appropriate for examining the effect of animal attacks on crops among the tribal farmers.

Scoring of the standardised scale

The final scale consists of 17 items, each item measured on a five-point continuum, having a total score ranging from 17 to 85, with a higher score indicating a greater perceived impact of wildlife-induced crop damage. The respondents were classified into low, medium, and high impact categories using the mean ± standard deviation method. Based on the observed mean score (70.50) and standard deviation (7.95), respondents scoring 62 or below were classified as having low perceived impact, those scoring 63–78 as having medium perceived impact, and those scoring 79 or above as having high perceived impact (Table 2). It was reported that 69.3 per cent of the respondents perceived a moderate impact, followed by 20.0 per cent and 10.7 per cent reporting low and high perceived impacts, respectively, indicating that wildlife-induced crop damage affected most tribal farmers to a moderate extent.

Table 2. Scoring Guidelines and Distribution of Respondents Based on the Standardized Scale

Impact Category	Total Score	Frequency	Percentage (%)
Low	≤ 62	30	20.0
Medium	63–78	104	69.3
High	≥ 79	16	10.7
Total	-	150	100.0

Source: Primary data, 2025

Exploratory factor analysis

Exploratory Factor Analysis (EFA) was undertaken on the final set of 17 statements for identifying the major dimensions of the construct. The Kaiser-Meyer-Olkin (KMO) test and Bartlett's test of sphericity were applied to confirm whether the data are suitable for factor analysis. Table 3 shows the results of the KMO and BTS results. The value of KMO was 0.795, confirming sample adequacy for factor analysis, while BTS was significant (χ^2 = 2655.905, $p < 0.001$), stating the existence of intercorrelations among the statements, and the correlation matrix was appropriate for the factor extraction.

Table 3. KMO and Bartlett's Result

KMO Measure of Sampling Adequacy.		.795
Bartlett's Test of Sphericity	Approx. Chi-Square	2655.905
	df	136
	Sig.	0.000

Principal Component Analysis (PCA) with Varimax rotation was employed for factor extraction. Based on the Kaiser criterion (eigenvalue > 1), four factors were extracted. These four factors together explained 78.95 per cent of the total variance, which exceeds the recommended threshold level of 60 per cent (Hair et al., 2010). The findings of total variance explained using PCA are given in Table 4.

Further, the scree plot (Figure 1) also supported the retention of four factors, as there was a clear point of inflection soon after the fourth component, indicating that additional factors contributed negligibly to the explained variance. The rotated component matrix revealed that all the included 17 statements had a factor loading greater than 0.50 on their respective components, indicating a well-defined factor structure. On the basis of the rotated component matrix, the 17 statements were grouped under four factors (Nutritional Impact, Economic Impact, Psychological Impact and Institutional Impact) according to their highest factor loading.

Table 4. Total variance explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.189	48.170	48.170	8.189	48.170	48.170	3.927	23.097	23.097
2	2.318	13.637	61.807	2.318	13.637	61.807	3.497	20.573	43.670
3	1.547	9.099	70.906	1.547	9.099	70.906	3.105	18.265	61.935
4	1.367	8.042	78.948	1.367	8.042	78.948	2.892	17.013	78.948
5	.798	4.693	83.641						
6	.693	4.078	87.719						
7	.432	2.543	90.262						
8	.353	2.077	92.339						
9	.305	1.795	94.134						
10	.283	1.666	95.800						
11	.209	1.229	97.030						
12	.150	.881	97.911						
13	.105	.619	98.530						
14	.095	.556	99.086						
15	.085	.500	99.587						
16	.049	.289	99.876						
17	.021	.124	100.000						

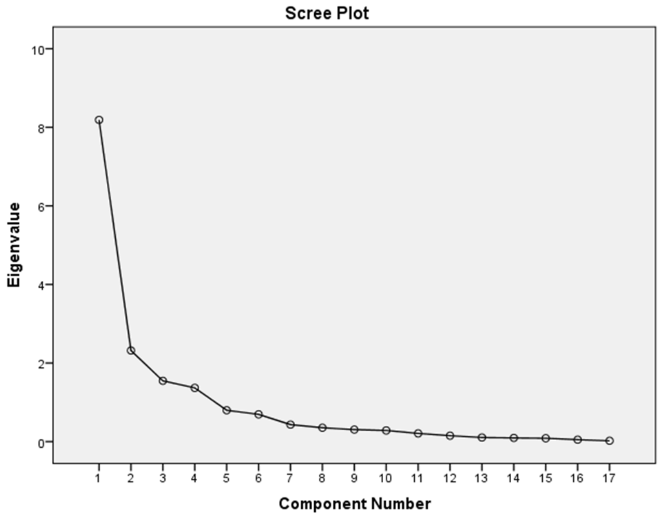

Figure 1. Scree plot

DISCUSSION

Initially, 44 statements were subject to expert judgement to refine the statements and enhance the content validity. Based on the thresholds for MRS, RP and RW, only 28 statements were included. The item analysis further refined the scale by excluding four statements that exhibited weak discriminating power and are excluded. The retained items demonstrate the ability to distinguish between farmers experiencing various degrees of impact, leading to the strengthening of the scale's construct validity. This finding aligns with the existing studies stating the importance of critical ratio analysis enhancing the precision of attitudinal measurement (Bird, 1940; Edwards, 1957).

The reliability analysis further confirmed the internal consistency of the scale, resulting in a final set of 17 items. The elimination of certain statements during the reliability testing suggests the scale purification increases the coherence without compromising content coverage. The high Cronbach's alpha value (0.914) indicates strong internal consistency among the retained statements. Such a high value is in accordance with the standards value suggested by Nunnally (1978) and DeVellis (2012), confirming that the scale is dependable for empirical application. The classification of respondents into low, medium, and high impact categories revealed that most tribal farmers perceived a moderate level of wildlife-induced crop damage, highlighting the widespread yet varying severity of its effects. This categorisation enhances the applicability of the scale for identifying vulnerable households and guiding targeted policy and extension interventions.

Exploratory factor analysis results reported four factor components, with 78.95 per cent of total variance explained. The sample adequacy and inter-item correlation were confirmed by the KMO and Bartlett's tests, supporting the appropriateness for undertaking the factor analysis (Kaiser, 1974; Bartlett, 1954). The extracted factors indicate the multidimensional nature of the impact of animal attacks, encompassing economic, nutritional, psychological and institutional dimensions. This was in line with the existing studies on human-wildlife conflicts, which observed that damage caused by animal attacks extended beyond the visible and immediate yield loss to affect the livelihoods, food security, and mental well-being (Barua et al., 2013).

The first factor identified is nutritional impact, indicating that crop damage directly has an impact on household food security, dietary diversity and food availability. This finding is particularly important among tribal households that rely on farm production for self-consumption. This aligns with the findings reported by Galley and Anthony (2024), who emphasised the close relationship between agricultural production and nutritional security in subsistence farming communities. Similar observations have been reported in rural communities of eastern Africa, where repeated wildlife incursions reduced food availability and increased household food insecurity among smallholder farmers (Hill, 2004).

The second major factor is that economic impact comprises reduced income, increased cultivation costs and changes in cropping patterns. Similar results were reported in the study by Thakur et al. (2022), who observed that wildlife-induced crop loss significantly impacts the rural household economies and livelihood sustainability.

Third, the psychological dimension reflects that the repeated exposure to animal attacks leads to stress, fear, anxiety and emotional distress among the farmers. This was substantiated by Barua et al. (2013), who highlighted the often-overlooked psychological burden associated with human–wildlife conflict. Comparable findings have also been reported in studies conducted in Africa, where persistent wildlife encounters generated fear, anxiety, and emotional distress among farming households living adjacent to such forest areas (Nyhus, 2016). The findings suggest that the effects of wildlife-induced crop damage are not limited to economic losses but also influence the mental well-being of affected households. Finally, the fourth-dimension deals with the institutional impact. This dimension reflects inadequate compensation mechanisms, limited preventive support measures and a common community platform pointing towards the gaps in addressing the wildlife-related issues. Similar findings were identified in the studies in Ethiopia and other developing countries, where inadequate compensation mechanisms, delayed institutional responses, and limited community participation reduced farmers' willingnes in wildlife management programmes (Gatew & Azadge, 2025; Nyhus, 2016).

CONCLUSION

The study establishes a reliable and valid scale to assess the impact of animal-induced effects on crops among the tribal farmers. The systematic refinement of statements through relevancy testing, item analysis, and reliability assessment ensures that the final 17-item scale precisely reflects the multidimensional nature of the problem. The identification of four underlying dimensions – nutritional impact, economic impact, psychological impact, and institutional impact – demonstrates that consequences of wildlife-induced damage extend beyond direct production losses. However, the findings are based on tribal farmers from the Attappady block of Kerala, and the factor structure was established using exploratory factor analysis only. Future studies may validate the scale across diverse geographical settings using Confirmatory Factor Analysis (CFA) to further establish its generalisability and robustness.

DECLARATIONS

Ethics approval and informed consent: Informed consent from the specialist possessing specialized knowledge were sought to obtain validation. From their feedback, a pilot study was carried out with randomly respondents.

Conflict of interest: The authors declare that this research was carried out without any financial contribution that could be considered as potential conflicts of interest. The authors further affirm that they independently reviewed, revised, and edited the manuscript throughout its preparation and accept the final content of this publication.

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REFERENCES

Bartlett, M. S. (1954). A note on the multiplying factors for various ÷2 approximations. *Journal of the Royal Statistical Society Series B: Statistical Methodology*, *16*(2), 296-298. https://doi.org/10.1111/j.2517-6161.1954.tb00174.x

Barua, M., Bhagwat, S. A., & Jadhav, S. (2013). The hidden dimensions of human–wildlife conflict: Health impacts, opportunity and transaction costs. *Biological Conservation*, *157*, 309-316. https://doi.org/10.1016/j.biocon.2012.07.014

DeVellis, R. F. (2012). *Scale development: Theory and applications*. SAGE Publications.

Edwards, A. L. (1957). *Techniques of attitudes scale construction*. New York: Appleton-Century-Crofts.

Galley, W., & Anthony, B. P. (2024). Beyond crop-raiding: Unravelling the broader impacts of human-wildlife conflict on rural communities. *Environmental Management*, *74*(3), 590-608.

Gatew, S., & Azadge, W. (2025). Human-wildlife conflict and its socio-economic impacts in north west Ethiopia. *Discover Life*, *55*(1). https://doi.org/10.1007/s11084-025-09685-6

Hair, J.F., Black, W.C., Babin, B.J. and Anderson, R.E. (2010) Multivariate Data Analysis. *7th Edition, Pearson, New York*.

Hill, C. M. (2004). Farmers' perspectives of conflict at the wildlife–agriculture boundary: Some lessons learned from African subsistence farmers. *Human Dimensions of Wildlife*, *9*(4), 279-286. https://doi.org/10.1080/10871200490505710

Kaiser, H. F. (1974). An index of factorial simplicity. *Psychometrika*, *39*(1), 31-36. https://doi.org/10.1007/bf02291575

Madhusudan, M. D. (2003). Living amidst large wildlife: Livestock and crop depredation by large mammals in the interior villages of Bhadra tiger reserve, South India. *Environmental Management*, *31*(4), 466-475. https://doi.org/10.1007/s00267-002-2790-8

Meena, D. C., Meena, B., Garai, S., Meena, H., Sankhala, G., & Chadda, A. (2022). Crop and livestock depredation by wild animals: The case of Ranthambore tiger reserve, India. *Indian Journal of Extension Education*, 38-41. https://doi.org/10.48165/ijee.2022.58408

Nunnally, J. C. (1978). *Psychometric theory*. McGraw-Hill Companies.

Nyhus, P. J. (2016). Human–Wildlife Conflict and Coexistence. *Annual Review Environment and Resources, 41*, 143-171. https://doi.org/10.1146/annurev-environ-110615-085634

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. https://doi.org/10.48165/ijee.2026.622rt03

Rao, K., Maikhuri, R., Nautiyal, S., & Saxena, K. (2002). Crop damage and livestock depredation by wildlife: A case study from Nanda Devi biosphere reserve, India. *Journal of Environmental Management*, *66*(3), 317-327. https://doi.org/10.1006/jema.2002.0587

Rathi, R., Kukreti, M., & Bhatt, D. (2021). Estimation of losses to agricultural crops by the wild animals in Najibabad forest division. *The Indian Journal of Animal Sciences*, *90*(8), 1201-1203. https://doi.org/10.56093/ijans.v90i8.109318

Reddy, D. A., Garai, S., Maiti, S., Manjunath, K. V., Panja, A., & Sahani, S. (2023). Construction of scale to measure women farmers' attitude towards climate resilient dairy farming practices. *Indian Journal of Extension Education*, *59*(3), 141-144. https://doi.org/10.48165/ijee.2023.59327

Shanila, S., & Helen, S. (2025). Development of a scale to assess Kerala farmers' attitude towards digital technologies in agriculture. *Indian Journal of Extension Education*, *61*(4), 165-169. https://doi.org/10.48165/ijee.2025.614rt02

Shukla, G., Ghadei, K., Roy, S., Chennamadhava, M., & Singh, P. (2026). A scale for measuring entrepreneurial orientation of farmers' producer companies towards secondary agriculture. *Indian Journal of Extension Education*, *62*(1), 142-147. https://doi.org/10.48165/ijee.2026.621rt01

Thakur, R. K., Mehta K., Kumar, V., & Lala, H. (2022). Increasing interference of stray and wild animals in farming: Reflections from western Himalayan foothills. *Indian Journal of Ecology*, *49*(1), 57-63. https://doi.org/10.55362/ije/2022/3477