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## A scale to analyse the perception of farmer-bee keepers towards bee keeping

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### Abstract

An attempt is made in the present study to develop and standardize scale to analyze the perception of farmer-bee keepers towards bee keeping. The developed perception scale was found to be highly reliable (0.901) and valid (0.953). The perception scale consists of 21 statements classified as ecological and economic benefits/importance of rearing honey bees. The developed perception scale was administered to 32 farmers in Tumkuru district of Karnataka state during 2021-22. The results revealed that a vast majority of the farmer-bee keepers (75.00%) had good to better perception towards bee keeping, while one-fourth of the farmer-bee keepers had poor perception towards bee keeping.

**Keywords:** bee keeping, farmer-beekeepers, perception, reliability, validity

### Introduction

Beekeeping offers an immense potential for providing employment to rural folk in India where many evergreen and moist deciduous forests, orchards etc. constitute good beekeeping areas. The unique feature of beekeeping is that the capital investment required is small and unlike many other industries, it does not need raw material in usual sense as nature offers the same in the form of nectar and pollen. Beekeeping is a very fascinating occupation. It can be practiced equally by men, women, grown up children and even by physically handicapped and old persons. The investment required is low, and the economic returns are comparatively very high. Beekeeping improves the economic condition of the farmers; restrict the migration of rural youth to urban areas and helps in holistic development of rural society. It is a subsidiary, complementary, supplementary and a family business enterprise which is pollution free.

Honey harvesting by smoking away the honeybees and squeezing out their combs for honey has been traditional in India for the last several thousand years. Honey has been traditionally used in various diet preparations, medicines, cosmetics, ointments and house-hold items. Honey bee apiaries, thus, prove of great value in terms of food and medicinal security. More, than 2.50 lakh farmers in India are involved in beekeeping. The average quantity of honey produced per beehive per year in our country was 8.5 kg in 2014, as compared to 1.50 kg during 1953 -54. During 2017-18, the global market for apicultural products was estimated at USD 8,819 million. In India, currently the total number of bee hives is estimated at 12 lakhs. The country's apiculture market size was worth INR 16,818 million in 2018, it is further projected to reach INR 33,128 million by 2024, with 12 per cent average growth rate per year during 2019 - 20.

There is no scale to analyze the perception of farmers towards bee keeping, hence the present research study was carried out to develop and standardize a scale to analyze the perception of farmer-beekeepers towards bee keeping, and to analyze the perception of farmer-beekeepers towards bee keeping

### Methodology

The present study was carried out during 2020-21 for developing and standardizing a scale to analyse the perception of farmer-beekeepers towards bee keeping. The developed scale was used to analyze the perception of farmer-beekeepers towards bee keeping in Tumkuru district of Karnataka state. Thirty-two farmer-beekeepers were interviewed for the purpose. Based on the cumulated score, the respondents were categorized as poor, good and better levels of perception considering mean (71.22) and half standard deviation (10.38) as a measure of check.

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## Results and Discussion

### A.) Development of scale to analyse the perception of farmer-beekeepers towards bee keeping

Perception of farmer-beekeepers towards bee keeping is operationally defined in the present study 'as the extent of mental awareness of farmer bee keepers about the ecological and economic benefits/ importance of beekeeping'. The method of summated rating scale suggested by Likert (1932)<sup>[2]</sup> and Edwards (1969)<sup>[1]</sup> were followed in the development of the perception scale following six stages viz., (1) identification of components, (2) collection and editing of perception statements, (3) relevancy test, (4) item analysis, (5) reliability and (6) validity. (Naveen *et al.*, 2018)<sup>[3]</sup>

**1. Identification of components:** Two components related to perception of farmer-beekeepers towards bee keeping were identified based on review of literature and discussion with apiculturists and entomologists. The identified two components are:

- Ecological benefits/importance of rearing honey bee, and
- Economic benefits/importance of rearing honey bees

**2. Collection and editing of perception statements:** The first step in the construction of perception scale was to collect statements pertaining to the perception of farmer-beekeepers towards bee keeping. A tentative list of 50 statements pertaining to the perception of farmer-beekeepers towards bee keeping were collected through extensive review of literature and by consulting apiculturists and entomologists. These 50 statements were edited as per the 14 criteria enunciated by Edwards (1969)<sup>[1]</sup> and Thurstone and Chave (1929)<sup>[4]</sup>. As a consequence, 18 statements were eliminated. The remaining 32 perception statements were included for the study.

**3. Relevancy test:** Thirty-two statements were sent to 80 experts/judges in the field of biological and social sciences working in State Agricultural Universities, Indian Council of Agricultural Research Institutes and Development Departments, to critically evaluate the relevancy of each statement viz., Most Relevant (MR), Relevant (R), Somewhat Relevant (SWR), Less Relevant (LR) and Not Relevant (NR) with the score of 5,4,3,2 and 1, respectively. The experts/judges were also requested to make necessary modifications and additions or deletion of perception statements, if they desired to. A total of 60 judges/experts returned the questionnaires duly completed and the perception statements were considered for further processing. From the data gathered, 'relevancy percentage (RP)' and 'mean relevancy score (MRS)' were worked out for all the 32 statements. Using these criteria, individual perception statements were screened for relevancies using the following formulae.

**i) Relevancy Percentage (RP):** It was obtained by using the following formula

$$R.P. = \frac{MR \times 5 + R \times 4 + SWR \times 3 + LR \times 2 + NR \times 1}{\text{Maximum possible score}} \times 100$$

**ii) Mean Relevancy Score (MRS):** It was worked out using the following formula

$$M.R.S. = \frac{MR \times 5 + R \times 4 + SWR \times 3 + LR \times 2 + NR \times 1}{\text{Number of judges/experts responded}}$$

Accordingly, statements having 'relevancy percentage' of 75 per cent and above and mean relevancy score of 3.75 and above were considered for final selection. Accordingly, 26 perception statements were retained after relevancy test and these statements were suitably modified and written as per the comments of the judges wherever applicable.

**4. Item analysis:** Twenty six perception statements were subjected to item analysis to delineate the items based on the extent to which they can differentiate the respondent having better perception from the respondent with poor perception regarding bee keeping. A sample of 32 farmer-beekeepers in Tumkuru district of Karnataka state were selected for the study. The respondents were asked to indicate their degree of agreement or disagreement with each of the 26 perception statements on a five-point continuum ranging from 'strongly agree' to 'strongly disagree'. Based upon the total scores, the respondents were arranged in descending order. The top 25 per cent of the respondents with their total scores were considered as the high group and the bottom 25 per cent as the low group. These two groups provided criterion groups in terms of evaluating the individual statements. Thus, out of 32 farmer-beekeepers to whom the perception statements were administered for item analysis, eight farmer-beekeepers with highest and eight farmer-beekeepers with lowest perception scores were used as criterion groups to evaluate individual items. The critical ratio, that is, the 't' value which analyses the extent to which a given statement differentiates between the better and poor groups of respondents for each statement, was calculated by using the following formula:

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

Where,

$\bar{X}_H$  = The mean score on given statement of the high group

$\bar{X}_L$  = The mean score on given statement of 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

n = Number of respondents in each group

$\sum$  = Summation

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

After computing the 't' value for all the 26 items, twenty-one perception statements with 't' value equal to or greater than 1.67 were finally selected and included in the final perception scale.

**5. Reliability:** Reliability refers to precision of the scale constructed for any purpose. A reliability test will be reliable when it gives the same repeated result under the same conditions. In any social science research, a newly constructed scale has to be tested for its reliability before it is used. The split-half method was employed to test the reliability of the perception scale. The value of correlation coefficient was 0.834 and this was further

corrected by using Spearman Brown formula to obtain the reliability coefficient of the whole set. The 'r' value of the scale was 0.901, which was significant at one per cent level indicating the high reliability of the scale. It was concluded that the perception scale constructed was reliable.

**a) Half test reliability formula**

$$R_{1/2} = \frac{N(\sum XY) - (\sum X)(\sum Y)}{\sqrt{(N\sum X^2 - (\sum X)^2)(N\sum Y^2 - (\sum Y)^2)}}$$

Where,

- $\sum X$  = Sum of the scores of the odd number items
- $\sum Y$  = Sum of the scores of the even number items
- $\sum X^2$  = Sum of the squares of the odd number items
- $\sum Y^2$  = Sum of the squares of the even number items

**b) Whole test reliability formula**

$$r_{1/1} = \frac{2r_{1/2}}{1 + r_{1/2}}$$

Where,

$r_{1/2}$  = Half test reliability

**6. Validity:** It refers to how well a scale analyses what it is

purported to measure. The data was subjected to statistical validity, which was found to be 0.953 for scale which is greater than the standard requirement of 0.700. Hence, the validity coefficient was also found to be appropriate and suitable for the tool developed. Thus, the developed scale to analyze the perception of farmer-beekeepers towards bee keeping was feasible and appropriate.

**Administration of perception scale and method of scoring:**

The final scale consists of 21 statements (Table 1) for determining the perception of farmer-beekeepers towards bee keeping. The response could be collected on a five-point continuum, namely, strongly agree, agree, undecided, disagree and strongly disagree with assigned score of 5,4,3,2 and 1, respectively. The perception score of a respondent could be calculated by adding up the scores obtained by him/her on all the 21 statements. The perception score of this scale ranges from a minimum of 21 score to a maximum of 110 score. Based on the mean and half standard deviation the respondents could be categorized into three perception categories, viz., poor, good and better. Higher score on this scale indicates that the respondent has better perception towards bee keeping and the lower perception score indicates that the respondent has poor perception towards bee keeping.

**Table 1:** Scale to analyse the perception of farmer-bee keepers towards bee keeping

Sl. No	Perception statements	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<b>A.</b>	<b>Ecological importance/ benefits of rearing honey bee</b>					
1	Bees play a key role in pollination of agri-horticultural and other crops					
2	Bees are responsible for the production of many seeds, nuts, berries, and fruit, which serve as a vital food source for wild animals and man					
3	Bees are the vital part of food chain and they act as a food source for predators					
4	Bees contribute to complex, interconnected ecosystems that allow a diverse number of different species to co-exist					
5	Beekeeping is an environmentally friendly subsidiary income generating activity					
6	Closer the relationship between life forms and apiculture is realized, the much higher will be the consciousness of conservation of forest and crop species					
7	Bee keeping requires least land area and even, backyard is sufficient, hence it releases people from land demanding activities and reduces pressure on land					
8	Bee keeping has been a skillful low impact technologies to deliver great benefits to people and biodiversity					
9	The honey bee is a unique pollinator as it provides multiple by-products in addition to pollination services					
10	Bee hive fences are used as multi-dimensional conflict mitigation tool in protecting crops against elephants raids - a livestock wild interface					
<b>B.</b>	<b>Economic importance/ benefits of rearing honey bees</b>					
1	Apiculture is a non-farm income generating activity, to increase income of the rural and urban households					
2	Apiculture can be integrated into already existing agriculture enterprises such as piggery, dairy, horticulture and field crops					
3	Bee keepers can be better organized by enrolling themselves in Beekeeping Associations, adopt improved techniques, increase production and strengthen their position on the market					
4	Bee keeping is not labour intensive activity					
5	Bee keeping is easy to manage even by women and children					
6	Bee keeping is a cash crop					
7	Selling a secondary product such as bee wax, royal jelly, bee venom etc., brings a far better return for the producer than selling the raw commodity					
8	By practicing beekeeping the farmer family becomes less vulnerable to economic pressure strengthening their ability to look into the future					
9	Apiculture uses inexpensive, locally available resources, with quick returns					
10	Bee keeping requires relatively lower levels of investment and is a non-physically demanding work					
11	The growing market potential for honey and its products has resulted in bee keeping emerging as a viable enterprise					

**B.) Perception of farmer-beekeepers towards bee keeping**

The perception scale developed was administered to 32 farmer-beekeepers in Tumkuru district of Karnataka state during 2021-22. The results (Table 2) revealed that a larger

proportion of the farmer-bee keepers had better perception towards bee keeping (46.87%), whereas 28.13 per cent of the farmer-bee keepers had good perception towards bee keeping and the remaining one-fourth (25.00%) of the farmer-bee keepers had poor perception towards bee keeping, it could be

inferred that a vast majority of the farmer-bee keepers (75.00%) had good to better perception towards bee keeping. Bee keeping is an environmentally friendly subsidiary income generating activity, not a labour intensive activity, could be

easily managed even by women and children, and uses inexpensive, locally available resources with quick returns, hence a vast majority of the farmer-bee keepers had good to better perception towards bee keeping.

**Table 2:** Perception of farmer-bee keepers towards bee keeping (n=32)

Sl. No.	Perception categories	Farmer-beekeepers		Mean	Standard deviation
		Number	Per cent		
1.	Poor (< 66.03 score)	8	25.00	71.22	10.38
2.	Good (66.03 to 76.41 score)	9	28.13		
3.	Better (>76.41 score )	15	46.87		
Total		32	100.00		

### Conclusion

The perception scale developed is found to be reliable and valid, hence it can be used to analyze the perception of farmer-bee keepers towards bee keeping. The perception scale when administered to the farmer-bee keepers revealed that three-fourth of the farmer-bee keepers (75.00%) had good to better perception towards bee keeping.

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