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Major contributing factors in Determining the knowledge level of Beekeepers in Cuddalore District of Tamil Nadu (India)

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Abstract

Honey is a food rich in medicinal properties used by people all over the world. As its use is increasing in all countries of the world, the demand is also increasing. As naturally available honey is not enough to meet this demand, the technology of "beekeeping" which involves rearing bees and extracting honey from it for marketing is becoming a widespread industry all over the world. India, which is rich in plant resources, plays a major role in the production of such honey. Various practices have been devised to make this business profitable. The profile characteristics of the beekeepers play a vital role in determining their knowledge level on recommended beekeeping practices. The zero-order correlation co-efficient and linear multiple regression analysis were employed to study the relationship and contribution of characteristics with knowledge level in beekeeping practices. The study was taken up in the Cuddalore district of Tamil Nadu State (India) with a sample size of hundred and twenty beekeepers selected based on the random sampling method. The findings revealed that about half of the respondents (54.17 per cent) possessed medium level of knowledge about the recommended beekeeping practices followed by low level (25.83 per cent) and high level (20.00 per cent) of knowledge. And out of fifteen independent variables, eight variables such as educational status, annual income, extension agency contact, mass media exposure, economic motivation, market perception, decision making behaviour and training undergone were found to be positive and significant relationship with knowledge level of beekeeping practices in both correlation and regression analysis.

Key words : Beekeepers, knowledge level, profile characteristics.

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Beekeeping with Apis cerana indica is an indigenous industry that forms an integral part of the social and cultural heritage of rural communities in India[11]. Beekeeping has established itself as an economic activity and a commercial enterprise worldwide which not only promote agricultural and horticultural development but also has a great potential for upliftment of the rural economy of the country. It provides employment, new sources of income generation, food and nutritional security and improves rural economy. The increase in knowledge and adoption of scientific beekeeping practices offers a means to increase the honey production and generate income and employment for the rural youth.The distinctive feature of beekeeping is the small capital investment required as compared to other industries. Furthermore, beekeeping does not need raw material in usual sense as nature provides the same in the form of nectar and pollen[10]. During the last few years, adoption of beekeeping as an enterprise increased substantially due to increased awareness among the people about the benefits of beekeeping. Although, a large number of people are performing this activity as a main or allied occupation, but most of them have started without having enough knowledge through training programme. Due to lower or incomplete knowledge about beekeeping, they are unable to give their best in earning the maximum from this occupation. To start any activity, complete knowledge about its all aspects is utmost important. In this regard, training is major catalytic force for augmenting human productively in all spheres of development (Singh & Singh, 2019). Knowing the knowledge level of beekeepers on recommended practices and the factors influencing it may help the scientists and extension functionaries to train them on beekeeping. Keeping this in view, the present study has been made to know the relationship and contribution of characteristics of beekeepers with knowledge level in beekeeping practices.

Selection of the study area :

The study was conducted in Cuddalore district of Tamil Nadu. Out of fourteen blocks in Cuddalore district, six blocks namely Vridhachalam, Kammapuram, Kurinjipadi, Keerapalaiyam, Parangipettai and Kumaratchi were selected for the study on the major bee farming area.

Selection of respondents :

A sample size of 120 respondents was considered for study from the 17 selected villages. Six villages namely Sembalakkurichi, Kattuparur, Pudhukoorapettai, Manavalanallur, Edachithur and Chinnakandiyankuppam from Vridhachalam block, two villages namely Gopalapuram and C. Keeranur from Kammapuram block, three villages namely Vazhuthalampattu, Vanniyarpalayam and Anukampattu from Kurinjipadi block, two villages namely Ayeepettai and Veyyalur from Keerapalaiyam block, two villages namely Kovilampoondi and Thachakadu from Parangipettai block, two villages namely Varahoor and C. Arasur from Kumaratchi block were selected for the study. The number of respondents for each of the 17 villages was selected based on the proportionate random sampling technique.

Selection of variables :

Totally fifteen variables were selected

for this study. They were age, educational status, occupational status, family type, annual income, farm size, experience in beekeeping, social participation, extension agency contact, mass media exposure, economic motivation, marketing perception, decision making behaviour, innovativeness and training undergone.

Research design and data collection :

The present study is an ex-post-facto research design that was adopted as strategy of investigation to obtain answer to the research questions. The data collection was done with the use of a well-structured and pre-tested interview schedule. The data were collected by personally contacting all the respondents with the help of well structured and pre-tested interview schedule.

Statistical analysis :

The data collected from the respondents were coded, compiled and analysed using percentage analysis, simple correlation coefficient, multi linear regression analysis.

I. Knowledge level of beekeepers about recommended beekeeping practices :

Knowledge about an idea or technology helps farmers to participate in farm activities. Hence, the following parts to analyze the level of knowledge of beekeepers about recommended practices.

I.1 Over all knowledge level of beekeepers about recommended beekeeping practices:

The result on distribution of respondents according to their overall knowledge level of beekeepers about recommended beekeeping practices are presented in Table-1.

Table-1. Distribution of the respondents according to their overall knowledge level about recommended beekeeping practices

(n=120)

S.no.	Category	Number	Per cent
1.	Low	31	25.83
2.	Medium	65	54.17
3.	High	24	20.00
	Total	120	100.00

The results in Table-1 show that more than half of the respondents (54.17 per cent) had medium level of knowledge followed by low (25.83 per cent) and high (20.00 per cent) levels on recommended beekeeping technologies. As majority of the respondents had medium level of extension agency contact, mass media exposure and innovativeness and which would have resulted in medium level of knowledge on beekeeping. This finding is in line with the findings of Rajaguru[6].

I.2 Practice wise knowledge level of the respondents about recommended beekeeping practices :

In order to obtain detailed and in-depth idea and facts about knowledge level of the respondents, a practice wise knowledge level of the respondents was worked out. The percentage wise knowledge of respondents about beekeeping technologies are presented in Table-2.

Table-2. Practice wise knowledge level of the respondents about recommended beekeeping practices

(n=120)

S.No	Recommended practices	Number	Per cent
1.	Species of honey bee is preferred for bee keeping	95	79.16
2.	Criteria for selecting the site for bee keeping	85	70.83
3.	Different castes of bees	90	75.00
4.	Caste of bee that collects honey	94	78.33
5.	Caste of bee that lays eggs	97	80.83
6.	Identification of the queen bee	111	92.50
7.	Equipment used for protection against stings from honey bees	92	76.67
8.	Equipment used to drive away bees from the hive	85	70.83
9.	Equipment used to extract honey from comb	80	66.67
10.	Seasons of honey bee	90	75.00
11.	Management practices followed during honey flow period	77	64.17
12.	Management practices followed during dearth period	60	50.00
13.	Management practices followed during colony build up period	45	37.50
14.	Maintenance of bee colonies during summer season	115	95.83
15.	Maintenance of bee colonies during rainy season	110	91.67
16.	Major pests affecting honey bees	108	90.00
17.	Symptoms of wax moth infestation	65	54.17
18.	Management practice of wax moth infestation	48	40.00
19.	Symptoms of ant infestation.	62	51.67
20.	Management practices for ant infestation	42	35.00
21.	Symptoms of wasp infestation	75	62.50
22.	Management practice for wasp infestation	47	39.17
23.	Major diseases affecting the honey bees	98	81.67
24.	Management practice for European foul brood disease	60	50.00
25.	Management practice for American foul brood disease	54	45.00
26.	Crops or plants that have abundant nectar source	93	77.50
27.	Indication of harvest in the comb	99	82.50
28.	Specific gravity of pure honey	12	10.00
29.	Byproducts in beekeeping	81	67.50
30.	Method of obtaining bee wax	38	31.67
31.	Value-added products of honey	60	50.00

It is interesting to note from the Table 2 that above ninety per cent of the respondents had complete knowledge on few practices such as maintenance of bee colonies during summer season (95.83 per cent), identification of the queen bee (92.50 per cent), maintenance of bee colonies during rainy season (91.67 per cent) and major pests affecting honey bees (90.00 per cent).

More than three-fourth of the respondents had the knowledge about indication of harvest in the comb (82.50 per cent), major diseases affecting the honey bees (81.67 per cent), caste of bee that lays eggs (80.83 per cent), species of honey bee preferred for bee keeping (79.16 per cent), caste of bee that collects honey (78.33 per cent), crops or plants that have abundant nectar source (77.50 per cent), equipment used for protection against stings from honey bees (76.67 per cent), different castes of bees (75.00 per cent) and seasons of honey bee (75.00 per cent).

Further it could be observed half and above of the respondents had knowledge oncriteria for selecting the site for bee keeping (70.83 per cent), equipment used to drive away bees from the hive (70.83 per cent), by-products in beekeeping (67.50 per cent), equipment used to extract honey from comb (66.67 per cent), management practices followed during honey flow period (64.17 per cent), symptoms of wasp infestation (62.50 per cent), symptoms of wax moth infestation (54.17 per cent), symptoms of ant infestation (51.67 per cent), management practice for European foul brood disease (50.00 per cent), management practices followed during dearth period(50.00 per cent) and value-added products of honey (50.00 per cent).

The knowledge level for management practice for American foul brood disease (45.00 per cent), management practice of wax moth infestation (40.00 per cent), management practice for wasp infestation (39.17 per cent), management practices followed during colony build up period (37.50 per cent), management practices for ant infestation (35.00 per cent) and method of obtaining bee wax (31.67 per cent) were reported by the respondents.

Only 10.00 percent of the respondents had knowledge about specific gravity level of pure honey.

II. Relationship between the profile characteristics of the respondents with their knowledge level :

This section deals the relationship between the profile characteristics of the beekeepers with their knowledge level and training needs.

II.1. Association between the profile characteristics of the beekeepers and their knowledge level on recommended practices:

In order to assess the association between the profile characteristics of the respondents and their knowledge level, zero ordercorrelation co-efficient was worked out and the results are presented in Table-3.

The results in Table-3, Exhibited that out of fifteen independent variables considered for the study, eight variables viz., educational status (X_2), annual income (X_5), extension agency contact (X_9), mass media exposure (X_{10}), economic motivation (X_{11}), market perception (X_{12}) decision making behaviour

Table-3. Association between the profile characteristics of the beekeepers and their knowledge level on recommended practices

(n=120)

Variable No.	Independent Variables	Correlation–coefficient'r' value
X1	Age	0.155 NS
X2	Educational status	0.195*
X3	Occupational status	0.145 NS
X4	Family type	0.100 NS
X5	Annual income	0.271**
X6	Farm size	0.046 NS
X7	Experience in beekeeping	0.155 NS
X8	Social participation	0.159 NS
X9	Extension agency contact	0.219*
X10	Mass media exposure	0.195*
X11	Economic motivation	0.277**
X12	Marketing perception	0.267**
X13	Decision making behaviour	0.205*
X14	Innovativeness	0.136 NS
X15	Training undergone	0.398**

** - Significant at 1% level * - Significant at 5 % level NS -Non-significant

(X_{13}) and training undergone (X_{15}) were found to have positive and significant relationship with the knowledge level.

Among the significant variables the annual income (X_5), economic motivation (X_{11}) market perception (X_{12}) and training undergone (X_{15}) were found to be highly significant at one per cent level of probability. The rest of the four variables viz., educational status (X_2), extension agency contact (X_9), mass media exposure (X_{10}), and decision making behaviour (X_{13}) were found to be significant at five per cent level of probability.

The correlation values for rest of the seven variables showed non-significant association with the knowledge level of bee keepers.

Educational status had shown positive and significant relationship with their level of bee keeping at five per cent level of probability. This might be due to the fact that majority of the respondents having literate from primary school level to higher secondary school level. It may have helped the respondents to assess the different information related to beekeeping from various sources. This finding is in line with the findings of Saravanan[8].

Annual income showed a positive and

highly significant relationship with their knowledge level at one per cent level of probability. This may be due to the fact that almost seventy percent of the respondents in the study area fall under the middle and high income category due to their adequate knowledge level about beekeeping.The finding derives support from the findings of Pratheebkumar[5] and Prakash[4].

Extension agency contact had showed a positive and significant relationship with their knowledge level at five per cent level of probability. It is generally acceptable that this characteristic will help an individual to get additional information about the relevant information which required for acquisition of knowledge. Almost seventy percent of the respondents had medium and high level contact with extension agencies may be the reason for it. This finding is in line with the findings of Prakash[4].

Mass media exposure had showed a positive and significant relationship with the knowledge level of respondents at five per cent level of probability. Almost eighty five percent of the respondents in the study area had high and medium level mass media exposure. This may be due to the fact that respondents can easily acquire knowledge of new techniques when mass media exposure is high.The finding is in line with the findings of Arockiyamary[1].

Economic motivation showed a positive and significant relationship with their knowledge level of bee keeping at one per cent level. This may be due to the fact that people having the economic motivation naturally seeks knowledge about new techniques. Three-fifth of the respondents in the study area had medium and high level economic motivation. This finding is in line with the findings of Prakash[4].

Market perception showed a positive and highly significant relationship with the knowledge level of respondents at one per cent level. Such a state of mind would have prompted them to seek more knowledge from various marketing sources. This may be due to the fact that seventy five percent of the respondents were interested in marketing perception. This finding derives support from the findings of Sakthiganesh[7].

Decision making behaviour had exhibited a positive and significant relationship with the knowledge level at one per cent level of probability.This may be due to the fact that three-fourths of the respondents were empowered to make their own decisions. This finding derives support from the findings of Sathishwaran[9] and PonAlagammai[3].

Training undergone showed a positive and highly significant relationship with their knowledge level at one per cent level of probability.This could be attributed to the fact that almost three-quarters of the respondents had received adequate training.This finding derives support from the findings of Sakthiganesh[7].

II.2. Contribution of profile characteristics of the beekeepers with their knowledge on recommended practices :

In order to find out which of the independent variables explained the variation in the knowledge level and also to know the

Table-4. Contribution of profile characteristics of the beekeepers with their knowledge on recommended practices

(n=120)

Variable No.	Impendent Variables	Regression co-efficient	Standard error	't' value
X1	Age	0.863	0.802	1.076 NS
X2	Educational status	1.398	1.170	2.084*
X3	Occupational status	0.310	0.210	1.476 NS
X4	Family type	-0.399	0.268	-1.488 NS
X5	Annual income	1.414	0.510	2.772**
X6	Farm size	1.010	1.005	1.004 NS
X7	Experience in beekeeping	-0.504	0.345	-1.460 NS
X8	Social participation	0.466	0.302	1.543 NS
X9	Extension agency contact	0.860	0.520	1.653*
X10	Mass media exposure	0.870	0.420	2.071*
X11	Economic motivation	0.198	1.070	2.708**
X12	Marketing perception	1.158	1.100	2.689**
X13	Decision making behaviour	1.314	1.014	2.282*
X14	Innovativeness	0.107	0.954	1.160 NS
X15	Training undergone	0.121	0.275	2.715**

R^2 =0.561 F= 6.745 a =9.186

** - Significant at 1% level * - Significant at 5 % level NS -Non-significant

extent of contribution made by these variables multiple regression analysis was carried out and the results are presented in Table 4.

It could be observed from Table 4 that all fifteen variables together explained 56.10 per cent of the variation in the knowledge level. The 'F' value was found to be significant at 1.00 per cent level of probability hence, it could be concluded that a linear functional relationship between the independent and dependent variables could be established.

Out of fifteen variables, four variables had shown positive and significant relationship at one per cent level of probability. They were annual income (X_5), economic motivation (X_{11}), market perception (X_{12}) and training undergone (X_{15}). Another four variables viz., educational status (X_2), extension agency contact (X_9), mass media exposure (X_{10}) and decision-making behaviour (X_{13}) contributed significantly and positively at five per cent level of probability towards the knowledge level of beekeeping. All other variables were found to be non-significant.

The strength and contribution of eight

variables could be explained as one unit increase ceteris paribus in educational status, annual income, extension agency contact, mass media exposure, economic motivation, market perception, decisionmaking behaviour and training undergone would bring on increase of 2.084,2.772, 1.653, 2.071, 2.708, 2.689, 2.282 and 2.715 units in knowledge respectively.

Hence it could be inferred that the knowledge level of beekeepers would be significantly contributed by their educational status, annual income, extension agency contact, mass media exposure, economic motivation, market perception, decisionmaking behaviour and training undergone.

The prediction equation is as follows,

$Y = 9.186 + 0.863(X_1) + 1.398(X_2) + 0.310(X_3) - 0.399(X_4) + 1.414(X_5) + 1.010(X_6) - 0.504(X_7) + 0.466\ (X_8) + 0.860(X_9) + 0.870(X_{10}) + 0.198(X_{11}) + 1.158\ (X_{12}) + 1.314(X_{13}) + 1.107(X_{14}) + 0.121(X_{15})$.

The study concluded that about half of the respondents (54.17 per cent) possessed medium level of knowledge about the recommended beekeeping practices followed by low level (25.83 per cent). Around two-fifth (20.00 per cent) of the respondents had high level of knowledge. About ninety per cent of the respondents had complete knowledge on few practices such as maintenance of bee colonies during summer season (95.83 per cent), identification of the queen bee (92.50 per cent), maintenance of bee colonies during rainy season (91.67 per cent) and major pests affecting honey bees (90.00 per cent).

More than three-fourth of the respondents had the knowledge about indication of harvest in the comb (82.50 per cent), major diseases affecting the honey bees (81.67 per cent), caste of bee that lays eggs (80.83 per cent), species of honey bee preferred for bee keeping (79.16 per cent), caste of bee that collects honey (78.33 per cent), crops or plants that have abundant nectar source (77.50 per cent), equipment used for protection against stings from honey bees (76.67 per cent), different castes of bees (75.00 per cent) and seasons of honey bee (75.00 per cent).

Half and above of the respondents had knowledge on criteria for selecting the site for bee keeping (70.83 per cent), equipment used to drive away bees from the hive (70.83 per cent), by products in beekeeping (67.50 per cent), equipment used to extract honey from comb (66.67 per cent), management practices followed during honey flow period (64.17 per cent), symptoms of wasp infestation (62.50 per cent), symptoms of wax moth infestation (54.17 per cent), symptoms of ant infestation (51.67 per cent), management practice for European foul brood disease (50.00 per cent), management practices followed during dearth period (50.00 per cent) and value-added products of honey (50.00 per cent).

The knowledge level for management practice for American foul brood disease (45.00 per cent), management practice of wax moth infestation (40.00 per cent), management practice for wasp infestation (39.17 per cent), management practices followed during colony build up period (37.50 per cent), management practices for ant infestation (35.00 per cent) and method of obtaining bee wax (31.67 per cent) were reported by the respondents.

Only 10.00 per cent of the respondents had knowledge about specific gravity level of pure honey.

The knowledgeabout recommended beekeeping technologies may be imparted to the respondents by conducting regular training programmes, organizing awareness campaigns and also through media.

Regarding knowledge level, the results of correlation analysis indicated that the variables namely educational status, annual income, extension agency contact, mass media exposure, economic motivation, marketing perception, decision-making behaviour and training undergone were found to have positive and significant relationship with knowledge. In case of regression analysis, the variables viz. educational status, annual income, extension agency contact, mass media exposure, economic motivation, marketing perception, decision making behaviour and training undergone were found to have positive and significant contribution with knowledge. These crucial variables influenced the knowledge level of beekeepers. So, the extension personnel should consider such characteristics of beekeepers in designing their training programmes.

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