The Pharma Innovation Journal 2023; SP-12(12): 553-556

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; SP-12(12): 553-556

www.thepharmajournal.com
Received: 17-10-2023
Accepted: 21-11-2023

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Understanding and exploration of adoption behaviour of bee-keeping practices

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Abstract
Bee–keeping practices play a vital role and adoption of beekeeping as a business has increased significantly in recent years, owing to greater people awareness of the benefits of beekeeping. Although a vast number of people pursue the occupation as a primary or secondary career, the majority of them started without a formal education. They are unable to maximise their earnings from this occupation due to a lack of or insufficient knowledge about beekeeping. To begin any endeavour, it is critical to have a thorough understanding of all aspects. In this way, training is a major catalytic force for increasing human productivity in all areas of growth. Bihar is India's fourth-largest honey-producing state, accounting for roughly 9% of total honey production. The state has a favourable temperature for beekeeping, as well as a great quantity of flowering plants and trees. Bihar's largest honey-producing districts are Vaishali, Muzaffarpur, and Samastipur. The district of Samastipur was selected on purpose. The district was selected on purpose because it is close to the Apicultural Research and Training Centre (ARTC), RPCAU, Pusa, the study was conducted in Pusa, Kalyanpur and Waarisnagar Block selected purposively. The 60 experimental group and 50 control group beekeepers were selected randomly. Thus, a total 120 respondents were interviewed for this study. The experimental group beekeepers had a mean score of 37.38, while the control group beekeepers had a score of 14.60. The t-value of 16.519 is highly significant. This table clearly shows that experimental group beekeepers had much higher levels of adoption than Control group beekeepers.

Keywords: Adoption, beekeeping, experimental group, control group

Introduction
Bihar is India's fourth-largest honey-producing state, accounting for roughly 9% of total honey production. The state has a favourable temperature for beekeeping, as well as a great quantity of flowering plants and trees. Bihar's largest honey-producing districts are Vaishali, Muzaffarpur, and Samastipur.

Based on reports, honey bees improved agricultural yield by 30 to 80 percent per year through cross pollination. The little investment in capital required for beekeeping distinguishes it from other sectors. Furthermore, beekeeping does not require raw materials in the traditional sense because nature gives them in the form of nectar and pollen. (Sharma and Dhaliwal,2014). In the present day, beekeeping training is regarded as one of the most important non-monetary components in all aspects of development programmes. This is also true in the agricultural sector. The significance of beekeeping practise training as an indispensable tool for the rapid transfer of scientific beekeeping technology and a means to modernise traditional beekeeping and beekeepers' financial situations.

Research Methodology
The present study was conducted in Pusa, Kalyanpur and Waarisnagar Block selected purposively. The 60 experimental group and 60 control group beekeepers were selected randomly. Thus, in turn, one hundred twenty respondents constituted the sample for the study. The data were collected with the personal interview technique. Mean score was used to rate specific areas and suitable statistical techniques were used for analysis of collected data. The responses that were obtained on the adoption of suggested beekeeping technologies in terms of adoption and non-adoption have been evaluated by assigning each practise a score of 1. As a result, the greatest adoption score that a respondent could get was the sum of the highest scores for all technologies that which came to 40. Similarly, the respondent's lowest adoption score was 0. As a result, the respondent's adoption ratings ranged from 0 to 40. The responders were classified based on their scores.

Table 1: Adoption ratings ranged from 0 to 40

Adoption category	Score range
Low	<Mean-SD
Medium	Mean-SD to Mean-SD
High	>Mean+SD

Results and Discussion

The findings of the present study as well as related discussion have been presented under following heads.

Table 2: Distribution of Adoption percentage of bee-keeping practices

Characteristics	Mean Adoption score of respondents		t-value
	Experimental (n=60)	Control (n=60)	
Adoption of Bee-keeping practices	37.38	22.62	16.519**

The above table revealed that the experimental and control groups of beekeepers differed significantly in terms of the adoption of bee-keeping practises. The experimental group beekeepers had a mean score of 37.38, while the control group beekeepers had a score of 14.60. The t-value of 16.519 is highly significant. This table clearly shows that experimental group beekeepers had much higher levels of adoption than Control group beekeepers. From the above discussion, it is possible to infer that beekeeping training programmes were beneficial and aided beekeepers in adopting approved beekeeping technologies. The experimental group's professional skill had increased, and they were more knowledgeable about the latest technical know-how of honey production; they may have adopted more recommended technology in their apiary, as a result that their honey bee colony production was significantly higher than that of the Control group beekeepers.

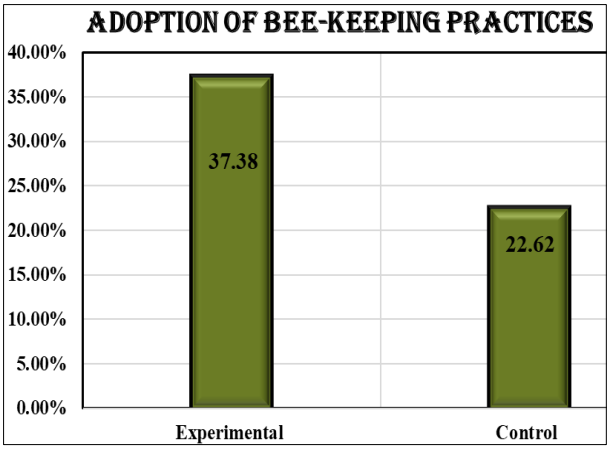

Fig 1: Distribution of respondents

Table 3: Distribution of Adoption percentage of Bee-keeping practices

Sl. No.	Adoption of Bee-keeping practices	Experimental (n=60)		Control (n=60)	
		f	*%*	*f*	*%*
1.	Lower< ($\bar{x}$ -S. D)	6	10	9	15
2.	Medium ($\bar{x}$ -S.D) to < ($\bar{x}$ +S.D)	53	88	43	72
3.	Higher > ($\bar{x}$ +S. D)	1	2	8	13
Mean		37.38		22.62	
S. D		3.43		4.99	

The above table Revealed that adoption of beekeeping practices in experimental (n=60) and control (n=60) groups differences shows higher proportions in medium practice adoption (88%) compared to control (72%). The experimental group's mean adoption was 37.38, while controls was 22.6

Relative contribution of variables towards Adoption of Bee-keeping practices of experimental group

Multiple regression analysis was used to determine the predictive values of the independent variables in contributing to the variation in the adoption of Bee-keeping practises (effect of training) between the experimental group (trained) and the control group (untrained) beekeepers. Because set standard regression coefficients are unit free, they can be compared to each other in terms of their contribution to variability in beekeeping practise adoption using these values. Adoption of beekeeping practises is influenced not only by one independent variable, but by all of them as a system. The regression models were fitted with the ten variables investigated. Above table showed that three of the 10 independent variables fit in multiple regression analysis contributed considerably. The remaining eight variables, including age, caste, education, occupation, family size, land holding size, annual income, social participation, and beekeeping training programme, had no significant impact. Gender contributed negatively strongly associated with bee-keeping practise adoption.

Table 4: The relative contribution of independent variables to experimental group adoption of Bee-keeping practices

Sl. No.	Independent variables	Regression coefficient	Standard Error (SE)	Standard regression coefficient (SRC)	T-value	Sig.
1.	Age	-.015	.039	-.046	-0.396 NS	.694
2.	Gender	-2.109	1.111	-.248	-1.899	.064
3.	Caste	.051	.812	.008	0.063 NS	.950
4.	Education	.802	.480	.266	1.671 NS	.101
5.	Occupation	.055	1.192	.013	0.046 NS	.963
6.	Family size	1.165	.871	.212	1.337 NS	.187
7.	Size of Land Holding	.132	.801	.025	0.165 NS	.870
8.	Annual Income	.389	1.173	.090	0.332 NS	.741
9.	Social Participation	-.384	.730	-.076	-0.526 NS	.601
10.	Beekeeping Training Programme	.492	.262	.239	1.879 NS	.066

**. Correlation is significant at the 0.01 level (2-tailed). NS-Nonsignificant

*. Correlation is significant R= .606 R^2 =0.367 Adjusted R^2 =.238 Std. Error of the estimate=2.994

The above table show that the development of scientific beekeeping technologies, beekeepers' use of beekeeping practises has increased. The reason for this negative significant impact could be that educated rural young people are idle, frustrated, and looking for white-collar work. They regard working on the farm as a source of position, and they place a secondary value on beekeeping. Thus, a review of the standardised regression coefficients reported in above table. revealed that, the impact of random variables was insignificant. The overall value of the dependent variable (adoption of Bee-keeping practises) partial regression coefficient bi (i = 1, 2, 3, 4. 10) were calculated. The coefficient of determination R^2 -.367 suggested that all 10 variables explained up to.36.7percent difference in bee-keeping practise adoption. Taking the standardised regression coefficient into account, the significant characteristics responsible for improving the adoption of Bee-keeping practises of experimental group (trained) beekeepers about honey production technology. However, the impact of other random variables was insignificant.

Table 5: The relative contribution of independent variables to control group of adoption Bee-keeping practices

Sl. No.	Independent variables	Regression coefficient	Standard Error (SE)	Standard regression coefficient (SRC)	T-value	Sig.
1.	Age	-.067	.084	-103	-0.791 NS	.432
2.	Gender	4.753	1.433	.425	3.317**	.002
3.	Caste	-1.393	1.013	-.158	-1.375 NS	.175
4.	Education	.244	.500	.059	0.448 NS	.628
5.	Occupation	.609	.938	.103	0.650 NS	.519
6.	Family size	2.686	1.220	.288	2.203*	.032
7.	Size of Land Holding	-.107	1.237	-011	-0.86 NS	.932
8.	Annual Income	.781	1.047	.028	0.173 NS	.863
9.	Social Participation	.969	1.019	.114	0.951 NS	.346
10.	Beekeeping Training Programme	-2.078	.917	-.282	-2.266*	.028

R= .629 R^2 =.395 Adjusted R^2=.272 Std. Error of the estimate= 4.260

The above table show that Correlation coefficient of independent variables with impact of training (adoption of Bee-keeping practices) of untrained beekeepers in the control group. Two Gender and Family size of the ten independent variables fit in multiple regression analysis contributed positively and significantly to the prediction of the adoption of suggested beekeeping practises. The association study of independent factors such as age, caste, education, occupation, size of land holding, annual income, social participation, and untrained beekeepers' beekeeping training programme with the adoption of bee-keeping practises was also carried out. Table shows the correlation analysis of the ten independent variables that were selected.

Summary and Conclusion

Experimental group beekeepers possess higher level of adoption in comparison to control group beekeepers. There was a significant difference in the mean level of adoption of Experimental and control group beekeepers in various components of bee management technology. The Independent variables occupation, family size, annual income, social participation, and beekeeping training programmes were found to be positively and significantly related to the respondents' Adoption of Bee-keeping practices at a one percent level of significance of Experimental group beekeepers.

- The experimental group beekeepers had a mean score of 37.38, while the control group beekeepers had a score of 14.60. The t-value of 16.519 is highly significant.
- Beekeeping training programmes were beneficial and aided beekeepers in adopting approved beekeeping technologies. The experimental group's professional skill had increased, and they were more knowledgeable about the latest technical know-how of honey production; they may have adopted more recommended technology in their apiary, as a result that their honey bee colony production was significantly higher than that of the Control group beekeepers.

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