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Enhancing income of tribal farmers through popularization of scientific beekeeping in Meghalaya

Sandip Patra¹ • Rumki H. Ch. Sangma¹ • H. Rymbai¹ • J. Layek¹ • P. Baiswar¹ • B. Bhattacharjee¹ • H. Kalita² • S. Hazarika¹

¹ICAR Research Complex for NEH Region, Umiam, Meghalaya-793103, India.

²ICAR RC for NEH Region, Arunachal Pradesh Centre, Basar-791101, India

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ABSTRACT

An experiment was carried out to study the impact of popularization of scientific beekeeping for enhancing of farm income of tribal farmers and beekeepers in Meghalaya after distribution of modern bee boxes to the interested farmers and traditional beekeepers. Total sixty-four beekeepers were targeted for evaluation of impact of popularization of scientific beekeeping for enhancing of income from eleven villages of two districts of Meghalaya. Based on the number of beekeepers evaluated in different villages, the present study showed that modern bee boxes ranged from 0 to 25 boxes/beekeeper among the intervened farmers and beekeepers. The results revealed that adoption of scientific beekeeping with modern bee boxes ranged from 50.00 to 100% with an average adoption rate of 91.72% among the total beekeepers in different selected villages under this study. Average yield of honey/hive/year was recorded from 3.18 to 5.83 kg with an average yield of 4.48 kg of honey/hive/year from the different villages. Income generated from scientific beekeeping among the adopted beekeepers was ranged from Rs.1800 to 82500/-depending upon the number bee boxes belong to individual beekeeper. Out of the total beekeepers, all of them (100.0%) generated their income from selling of honey. Apart from that 1.56% beekeepers generated income through selling of wax and 3.13% from selling of wax and bee colonies. Price of honey varied from Rs. 500 to Rs. 800/kg of honey in different regions of Meghalaya.

1. Introduction

Beekeeping is the science and art of rearing bees for production of honey and other hive products. Beekeeping is one of the most important occupations in rural life throughout the world. It plays a vital role in integrated rural development programmes through income generation without much investment. This venture is an economically sustainable occupation, offering attractive avenues for self-employment with multiple benefits (Marnagar and Lyngdoh, 2014; Pande et al., 2020). Apiculture provides several products as a component of people's livelihood policies (Joshi et al., 2002 and Hilmi et al., 2011). Besides, beekeeping acts as primary agents for pollination of wide varieties of agricultural and horticultural crops. It is reported that the honey bees increased agricultural productivity to the tune of 30–80 per cent annually through cross-pollination (Singh, 2000; Monga and Manoch, 2011). It may be considered as a hobby or sideline activity (Ahmad et al., 2010; Krantz, 2001;

Masuku, 2013). Many farmers practice beekeeping with traditional hives since immemorial and facing many problems associated thereof such as poor yield, harvesting with destruction method, unhygienic extraction and poor self-life of the honey. Meghalaya has long history of traditional beekeeping. Therefore, introduction of scientific beekeeping is necessitated to overcome the many issues associated with traditional practices. Moreover, beekeeping does not require raw material in usual sense as nature provides the same in the form of nectar and pollen (Sharma and Dhaliwal, 2014). The scientific beekeeping started in India at the end of nineteenth century. Meghalaya State Government also initiated an Apiculture Mission under Integrated Basin Development and Livelihood Promotion (IBDLP) programme in 2014 for enhancing the productivity level of agricultural and horticultural crops and at the same time it is very much useful to conserve the bio-diversity beside honey production (Anonymous, 2015). There is a demand for honey in the state

*Corresponding author: sandipatra47@gmail.com

and hence there is a need to motivate traditional beekeepers to adopt modern and scientific beekeeping practices with native honey bee (*Apis cerana Himalaya*) in order to increase the productivity of honey (Marngar and Lyngdoh, 2014). The native honey bee of the state has a natural and well-organized strategy for the defense of colony against predatory wasp (Pande et al., 2019). Therefore, present study was undertaken to evaluate the impact of popularization of scientific beekeeping for enhancing the income among the traditional beekeepers and farmers in Meghalaya.

2. Materials and Methods

An experiment was carried out to study the impact of intervention of scientific beekeeping for enhancing of income of tribal farmers of Meghalaya under Tribal Sub-Plan (TSP) programme of ICAR Research Complex for NEH Region, Umam, Meghalaya. Total sixty-four beekeepers from eleven villages of two districts namely Ri-Bhoi and East Khasi Hills of Meghalaya (Table 1) were selected to evaluate the effect of intervention of scientific beekeeping for enhancing the income of tribal farmers. All the selected farmers were trained with hands on training and practical demonstrations at ICAR Research Complex for NEH Region, Meghalaya before distribution of scientific beekeeping inputs during 2017-2019. Each beekeeper received two modern bee boxes with beekeeping accessories (excluder sheet, bee veil, hand gloves, high polish knife, honey extractors etc.). All the beekeepers practiced scientific beekeeping with *Apis cerana Himalaya* in modern bee hives. Beekeeping activities were monitored by periodical inspection and conducting training cum awareness programme at village level. Data on adoption of scientific beekeeping, total number of functional bee box, time of harvesting, number of harvesting/year, yield of honey/hive/year and price of honey and other hive products were collected from beekeepers with periodical visits as well as through training programme.

3. Results and discussion

3.1. Adoption of scientific beekeeping

Adoption of scientific beekeeping by beekeepers in selected villages are illustrated in Table 1. The results revealed that adoption of scientific beekeeping with modern bee boxes ranged from 50.00 to 100% with an average adoption rate of 91.72% among the selected villages under this study. It was observed that out of 64 beekeepers evaluated, 59 (92.19%) beekeepers adopted the scientific beekeeping with modern bee boxes and 5 (7.81%) beekeepers failed to adopt the same. Out of adopted beekeepers, only 32 (50.0%) beekeeper increased the number of bee boxes ranged from 3 to 25 bee boxes/individual, 21 (32.81%) beekeeper maintained only two bee boxes which were received initially and 6 (9.38%) beekeeper maintained only one bee box (Table 1).

3.2 Number and time of harvesting of honey

Based on the feedback of beekeepers during periodical interaction, it was recorded that harvesting of honey from modern bee hives were twice a year in the intervened sites. Period of harvesting of honey slightly varied from region to region. The time of harvesting of honey reported from October to November (first harvesting) and March to April (second harvesting) was recorded in East Khasi Hills district whereas in December (first harvesting) and in May (second harvesting) were recorded as harvesting period in Ri-Bhoi district. However, many of the beekeepers also reported that harvesting time slightly varied depending upon the seasonality of particular year.

3.3 Production and yield of honey in the intervened villages in Meghalaya

Honey production and yield of scientific bee hive is presented in Figure 1. Production of honey from modern bee hives ranged from 15 kg (Khliehmawlong) to 254.5 kg (Liatiam) depending upon the number of modern bee hives maintained in the villages. Other potential villages were Umralleng (170kg), Nonthymmai (169kg), Shnongkawar (145kg) and Klew (135kg) for honey production from modern bee hives. Yield of honey was ranged from 3.18kg/hive/year (Liatiam village) to 5.38kg honey/hive/year (Shnongkawar village) with average yield of 4.48kg/hive/year of honey from different villages.

3.4 Income level of scientific beekeeping

Income generated from modern bee hives is depicted in Figure 2. It was recorded that majority of the beekeepers (68.75%) earned Rs. \leq 10000/- from scientific beekeeping, 15.63% beekeepers generated between Rs. 10001 to 20000/- and 6.25% beekeepers made between Rs. 20001 to 30000/- from this venture. Only 1.56 % beekeepers were categorized for each other income slab starting from Rs. 30001 to Rs 90000/-.

3.5 Sources of income from different hives products

Income earned from different hive products by the beekeepers from different villages is presented in Figure 3. Out of the total beekeepers, all of them (100%) earned major income only from selling of honey. Income generated from selling of honey+wax+bee colony was recorded for 3.13% beekeepers followed by selling of honey+wax for 1.56% beekeepers. No beekeepers were found to harvest royal jelly and pollen from their bee hives for generating of income.

3.6 Variation of price of honey in selected villages

Price of honey in different villages is depicted in Figure 4. It was observed that price of honey differed from one place to another place in Meghalaya. Even the price of honey also varied within the district. Price of honey was

ranged from Rs. 500/kg (Nonthymmai and Pynthor) in Ri-Bhoi district to Rs. 800/kg (Many villages) in East Khasi Hills district.

The adoption rate of scientific beekeeping in present experiment are in line with the finding of Singh and Singh (2019) who revealed that majority of the respondents (95.6%) showed interest in adopting beekeeping as an occupation. Marngar and Lyngdoh (2014) reported that the total annual income from apiculture per beekeeper was ranged from 10% to 78.12%. Results of present experiment may be the supplemented of earlier study. Present study showed that scientific beekeeping is potential sector for generating income for enhancing income of farming communities for livelihood improvement. The present finding may be supplemented with Singh and Singh (2019) who indicated that the beekeeping as a viable venture for generating huge amount of money with minimum capital investment. Beekeeping empowers the small-scale farmers with only modest capital investments (Famuyide et al., 2014).

4 Conclusion

From the present experiment it was observed that small scale adoption of scientific beekeeping by tribal farmers of Meghalaya was very much encouraging and enhancement of income from this venture was lucrative to the most of the beekeepers. Therefore, it may be concluded that exploration of scientific beekeeping among the interested beekeepers may play an important role to boost up the farm income for livelihood improvement in Meghalaya. However, comprehensive research is required to study the social impact of beekeeping with large-scale adoption for sustainable farming development.

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Table 1. Details of villages selected for evaluation of impact of scientific beekeeping with modern bee boxes

Name of District	Name of villages	Number of farmers intervened	Year of intervention	Number of bee box received	Present number of box	Number of beekeepers with more than two bee box after intervention	Number of beekeepers with two bee box after intervention	Number of beekeepers with one bee box after intervention	Number of farmers with no bee box after intervention	Adoption (%)
Ri-Bhoi	Klew	4	2017, 2018	8	27	1	1	0	2	50.00
	Pynthor	3	2018	6	6	1	1	0	1	66.67
	Nongthymmai	10	2018	20	36	5	4	1	0	100.00
	Umralleng	2	2018	4	42	2	0	0	0	100.00
East Khasi Hills	Sohbar	3	2017	6	11	2	1	0	0	100.00
	Nongnong	5	2017	10	21	3	2	0	0	100.00
	Mawsiangei	4	2017	8	11	2	2	0	0	100.00
	Khlichmawlong	2	2017	4	4	0	2	0	0	100.00
	Shnongkawar	2	2017	4	25	2	0	0	0	100.00
	Rumnong	3	2017	6	14	3	0	0	0	100.00
	Laitiam	26	2019	52	75	11	8	5	2	92.31
		64 (Total)	2017-2019 (Year)	128 (Total)	272 (Total)	32 (50.00%)	21 (32.81%)	6 (9.38%)	5 (7.81%)	91.72 % (Average)

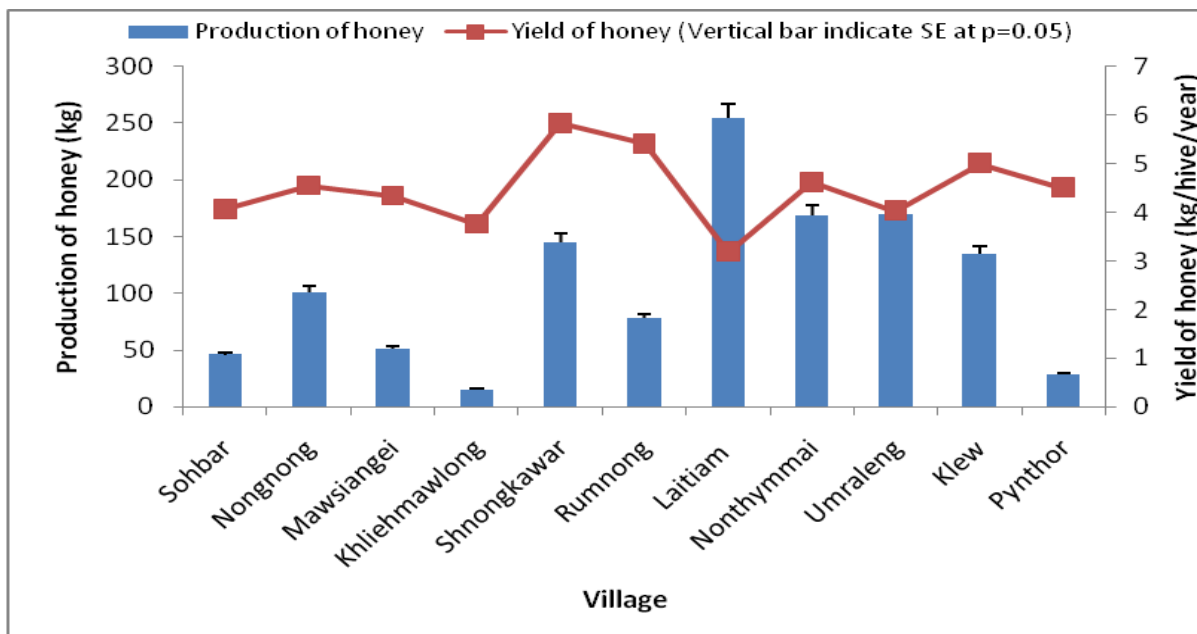


Figure 1. Honey production and yield of honey in selected villages of Meghalaya

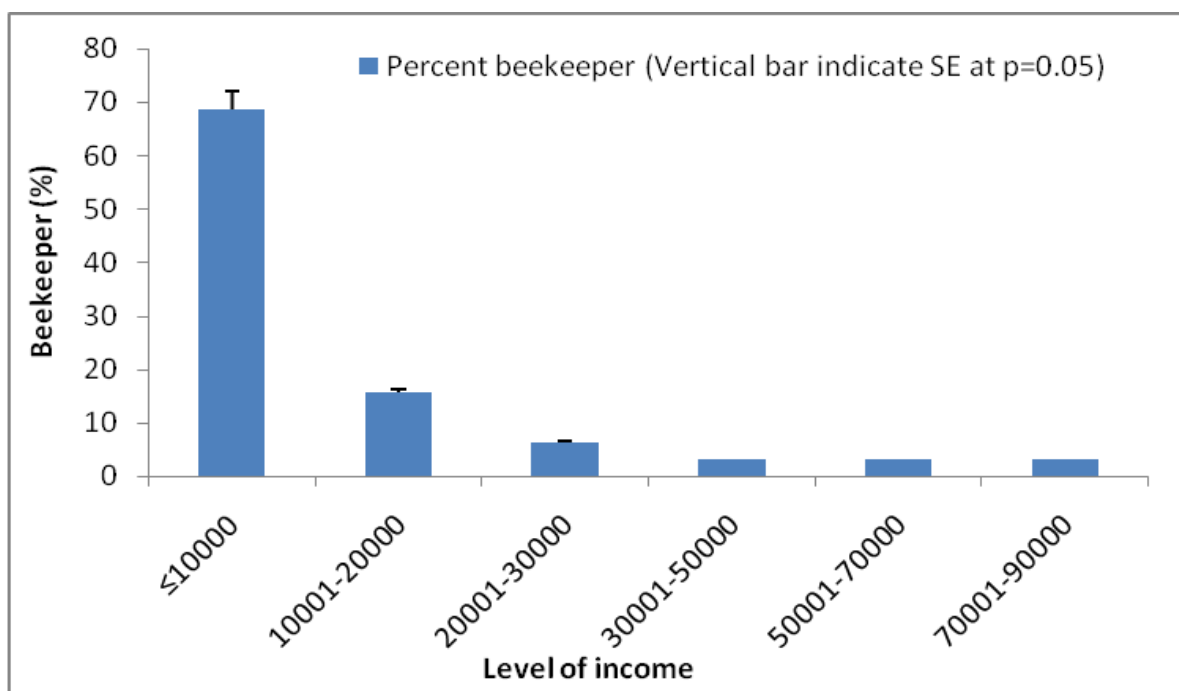


Figure 2. Income level of beekeepers from scientific beekeeping in selected villages of Meghalaya

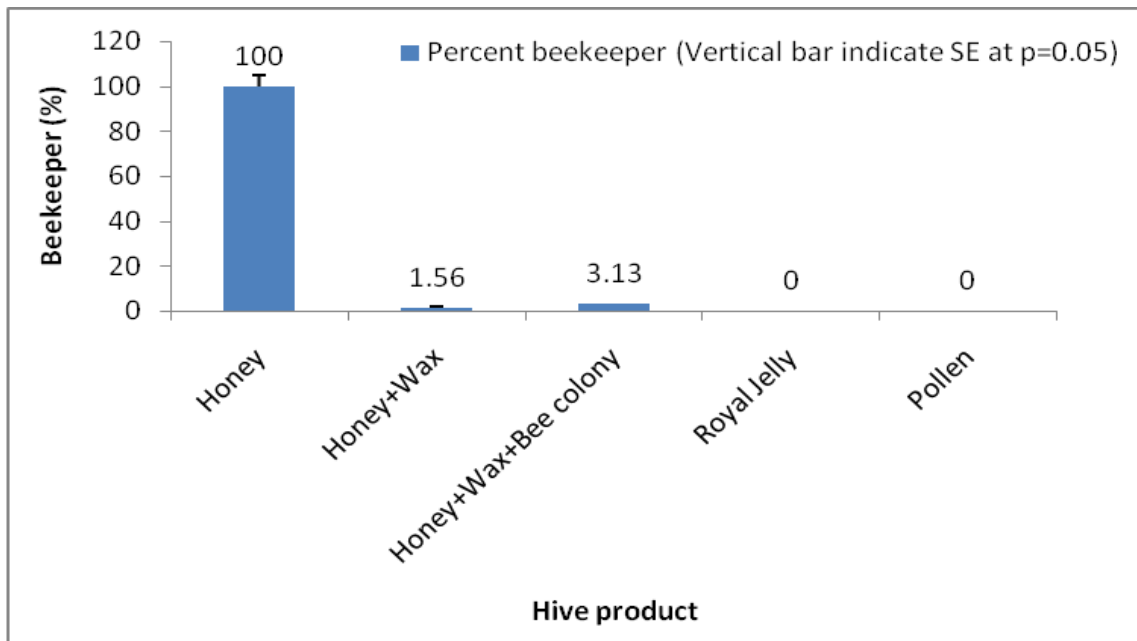


Figure 3. Status of source of income of beekeepers from different hive products

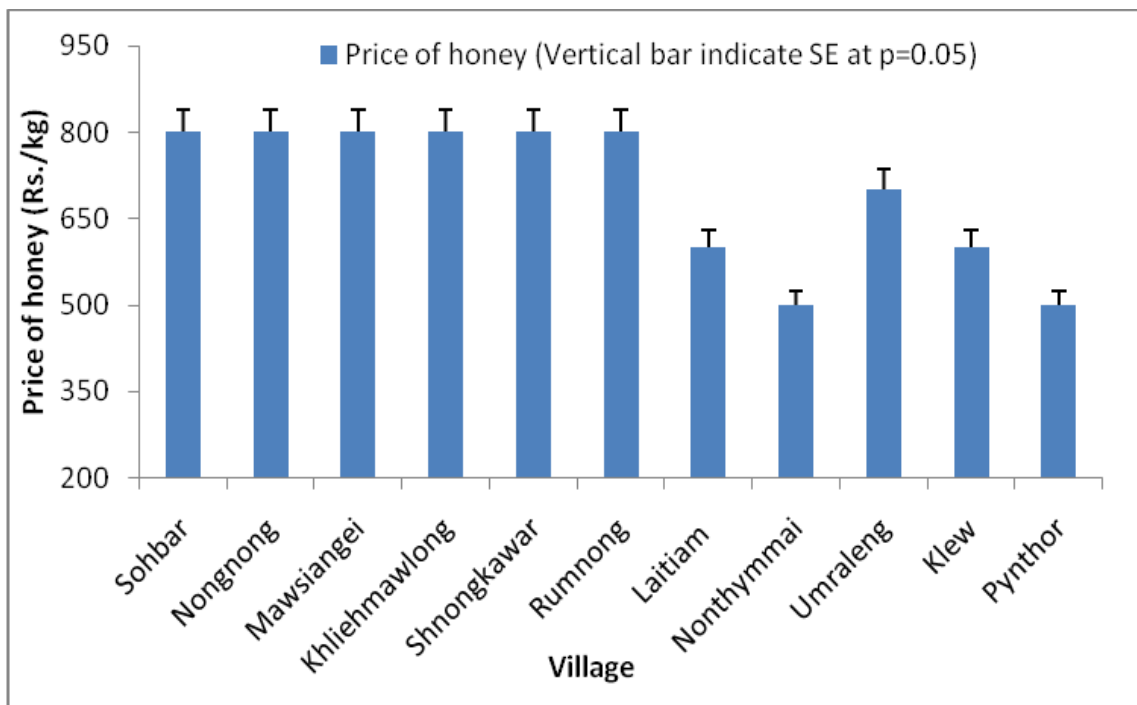


Figure 4. Price variation of honey in selected villages of Meghalaya