

BEEKEEPING: ADDITIONAL SOURCE OF INCOME FOR FARMERS OF UTTAR PRADESH

Article Id: AL202177

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Beekeeping is one of the excellent business opportunities for small and marginal farmers where they can invest in and bring the green business revolution, which is mainly driven by the demand of consumers who are interested in purchasing goods that incorporate eco-friendly manufacturing processes and saving natural resources. It involves the rearing of honeybees for the benefit of human being and also has the capabilities of building up any nation (Ononye and Akunne, 2015). Apart from honey and other byproducts, bees contributed to sustaining as well as enhancing crop production through their pollination services. In our country, about sixteen lakh people are involved in beekeeping and allied activities directly or indirectly. In India, honey and beekeeping have a long history, and also honey was the first sweet food tasted by our forefathers inhabiting rock shelters and forests (Khanra and Mukherjee, 2018). They hunted bee hives for this gift of God. Now honey and bee products find use in several industries such as pharmaceuticals, bees wax industries, bee venom, royal jelly, bee nurseries, bee equipment, and hives etc. Bee-keeping is quite profitable in areas with good floral pasturage. According to recent statistics, about 50 million hectares of land is under the cultivation of oilseeds, pulses, orchards, and other crops which is useful to bees and benefitted by bee pollination. In addition, there is about 60 million hectares of forest area with beekeeping potential. This vast area of agriculture

Beekeeping in India

India has the potential to keep about 120 million bee colonies that can provide self-employment to over 6 million rural and tribal families (Abrol and Shankar, 2015). In terms of production, these bee colonies can produce over 1.2 million tons of honey and about 15,000 tons of beeswax. Organized collection of forest honey and beeswax using improved methods can result in additional production of at least 120,000 tons of honey and 10,000 tons of

beeswax. The major honey producing states include Punjab, Haryana, Uttar Pradesh, Bihar, and West Bengal. Govt. of India has approved a new Central Sector Scheme entitled “National Beekeeping & Honey Mission (NBHM)” for two years for overall promotion and development of scientific beekeeping in mission mode to achieve the goal of “Sweet Revolution” in the country by giving thrust on capacity building & training, specific focus on women, input support for promotion & production, setting up of Integrated Beekeeping Development Centres (IBDCs), other infrastructures, digitization /online registration, processing, value addition, market support, etc. In Uttar Pradesh, the beekeeping program is being operated in various 15 districts of the state by the Department of Horticulture and food processing, with the motive to promote beekeeping for the business purpose among the farmers of the state. For training, the centers are Allahabad, Saharanpur, Basti, and Moradabad, while Sub-centers are Lucknow, Gorakhpur, Agra, Bareilly, Varanasi, Sultanpur, Ghazipur, Jaunpur, Faizabad, Kanpur Nagar, and Azamgarh.

Requirements and Market Potential for Beekeeping

The raw materials for the beekeeping industry are mainly pollen and nectar that come from flowering plants. Both the natural and cultivated vegetation in India constitute an immense potential for the development of beekeeping. About 500 flowering plant species, both wild and cultivated, are useful as major or minor sources of nectar and pollen. A rich diversity of bee flora and fauna is available in Uttar Pradesh that can be utilized for the development of the honey industry in the country. Beehives neither demand additional land space nor do they compete with agriculture or animal husbandry for any input (Agrawal, 2014). The beekeeper needs only to spare a few hours in a week to look after his bee colonies. Beekeeping is therefore ideally suited to him as a part-time occupation.

In the domestic market, very little amount of honey is used for personal consumption, while the pharmaceutical and confectionary industry utilizes the majority. With changing lifestyles and increasing health consciousness, the consumption of honey is increasing as health food. This is likely to drive domestic demand in the future. As per the information available from the Agricultural & Processed Food Products Export Development Authority, India has exported 51547.31 MT of Natural Honey to the world for the worth of Rs. 653.58 crore/ 101.32 USD million during the year of 2017-18, and the Major Export Destinations (2017-18) are USA, Saudi Arab, UAE, Canada, and Qatar.

Low budget Investment: Bee Farming is not a manufacturing activity, as such costly machines and tools are not required. There is nothing like production capacity as well. Only small wooden frames with boxes are needed. Their sizes are also standardized. To begin with, around 15 such sets/boxes can be purchased or assembled at a rate of Rs.1500.00 per box that would cost Rs.22 500/- for 15 Boxes. Honey extractors would cost to the tune of Rs.5 000/- each with filtration facilities. For other miscellaneous expenditures, including training and consultancy services, a sum of Rs.5000.00 can be earmarked. That means a total of Rs.32 000.00 would be required to start Bee Farming with 15 Boxes which is equivalent to or less than the cost of cultivation of one acre of paddy field.

Better Returns: As per the established norms, each box comprises 7-8 hives which is able to harvest around 30-35 kg of honey in a year. The annual harvest of honey starting with 15 bee boxes could be 450-525 kg, depending on the flowering season. Even after considering a very conservative selling price of Rs. 150/- per kg, the annual realization would be to the tune of Rs. 67,500/- to Rs.78,750/-. Therefore, Bee Farming can be considered as an excellent, profitable agro-based green enterprise for landless farmers and entrepreneurs (Singh and Mehla, 2019).

Value addition in Byproducts of Beekeeping

By and large, at present, beekeeping in our country is practiced mainly for honey production. To make this trade more fascinating and higher income generation, more focus should be given to diversify beekeeping to get other valuable bee products- bee wax, bee venom, royal jelly, propolis, and pollen, and using beekeeping for commercial pollination services.

Honey- Honey is a best health food, which is considered a wonderful creation. It is very useful in weight management, throat and cough irritation, allergies etc. When we compare to sugar, it contains vitamins, minerals, antioxidants, and lesser calories.

The following seasonal chart of various types of honey can provide the exploration of different flora for honey and a source of a good income during the different months:

September	Khair honey, arhar honey, til honey, jowar honey
October	Rape honey, eucalyptus honey Mustard honey/pollen, eucalyptus honey
November	Mustard honey/pollen, eucalyptus honey
December	
January	Mustard honey/pollen
February	Mustard honey/pollen, eucalyptus honey, coriander honey, saunf honey, coconut honey, rubber honey
March	Mustard honey/pollen, eucalyptus honey, multi flower honey, litchi honey, plum honey, saunf honey, sehjan honey
April	Shisham honey, eucalyptus honey, multi flower honey, litchi honey, plum honey, coriander honey, saunf honey
May	Sunflower honey, berseem honey, neem honey

Mead or honey wine- It is the first alcoholic drink brewed by men, earlier than wine or beer. Today mead has evolved and expanded its flavors to include fruits such as blueberry and cherry, malt as well as various herbs and spices, which may increase the value of honey as well as the income of beekeepers.

Beeswax- Around 30-40 percent of the world's trade in beeswax is used for the pharmaceutical and cosmetics industry. The world price is usually around US\$ 4-10 per kilogram. Around 20 percent of the beeswax trade is used for candle making. Around 20 percent is used for models and casting in industry and art. Wax is also used to make figures, decorations or sculptures and jewelry before they are placed in a mold for casting in silver, gold or bronze. In India, beeswax is available in the market at the cost of Rs.250-1500 per kg.

Pollen - Bee Pollen is known as the most natural & complete food. Bee Pollen has been found to contain a wide spectrum of trace nutrients and includes - Complex Vitamins, & Vitamins B, C, D, E, K, & Beta Carotene (Vitamin A), Vitamin B6 (Methionine) plus numerous minerals, enzymes & coenzymes, plant source fatty acids, carbohydrates, proteins,

& amino acids. In India, Bee Pollen Caps @ 500 mg (250 Capsules) are available at the cost of Rs. 2,100.00/-(approx.)

Propolis - Propolis or bee glue is a mixture of beeswax and resins collected from leaves and twigs. Propolis contains easily volatile etheric oils possessing clearly marked antimicrobial effects. It is very much beneficial for all kinds of dental & oral problems, inflammation, and any kind of tumor and a very good antioxidant. In India, India Mart is selling propolis (Forever Bee Propolis) at the cost of Rs 1,800/bottle containing 60 tablets.

Royal jelly - It is perhaps the most important bee product which stimulates regular growth and development of an organism, adds the needed strength, activates metabolic processes in an organism, and maintains a regular functioning of the endocrinal system.

Bee Venom - Venom may have benefits to humans in curing arthritis and rheumatism. Bee venom prices are also vary, from \$30.00 US (sometimes even much low) up to \$300.00 US per grams.

Bee pollination- By adding bee colonies to increase pollination, farmers and beekeepers can gain much more than just the yield of honey. Pollination is, as far as earnings are concerned, the most important product of beekeeping. Bees in general and social bees in particular are the most important pollinators of cultivated plants; they depend almost entirely on the pollen and nectar of flowers. Honeybees, and in particular *Apis mellifera* L., are the most economically valuable pollinators of crop monocultures worldwide; they are available throughout the growing season, they pollinate a wide variety of crops, and they can be concentrated in large numbers whenever and wherever needed (Rai, *et al* 2020). Thus, among all pollinators, bees are recognized as the most efficient pollinators.

Conclusion

Beekeeping provides an excellent source of employment for the rural unemployed, enhances the income of farmers and the landless beekeepers. It enhances the productivity levels of agricultural, horticultural, and fodder crops through pollination services. A number of small scale industries depend upon bees and bee products. It provides them valuable nutrition in the form of honey, qprotein-rich pollen and brood. Production of honey has been the major aim of the industry. Modern beekeeping also includes the production of beeswax, bee collected pollen, bee venom, royal jelly, and propolis. It is vital to make the beekeeping

industry more vibrant, to contribute to the national goal for reducing poverty, improving community livelihoods, and maintaining sustainable natural resources under the Green Business Revolution.

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