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Apiculture for Sustainable Agriculture

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Abstract

Because of its abundant floral variety and abundance of honeybee species, India offers great potential for apiculture (beekeeping). One species of honeybee, *Apis mellifera* L., is native to Europe and Africa; three kinds of native honeybees include *Apis florea*, rock bees, and *Apis cerana indica*, the Indian hive bees. Over the last decade, both honey production and beekeeping have flourished in India, propelling the country to second place globally, behind only China. This is in addition to the fact that exports of natural honey have been on the rise in recent years. Rural and marginalised landless farmers in India benefit economically from beekeeping. Beekeeping has many benefits, including increased agricultural yields thanks to improved pollination services and the preservation of natural biodiversity from the southern coast to the high Himalayas. Bee products are also economically significant. Profits from bee products and beehives are shared by beekeepers and crop growers alike, and beekeeping also boosts crop yields for crops that rely on pollination by guaranteeing effective pollination services. The sustainable methods of beekeeping improve farmers' lives, according to these beekeeping viewpoints. In regions where beekeeping is common, agricultural yields tend to rise by about 20-30%. In light of this production, beekeeping should be a priority for both the public and commercial sectors in order to improve farmers' financial situations and promote sustainable agriculture.

Keywords: Apiculture, Agriculture, Biodiversity, livelihood, Farmers.

Introduction

Apiculture, also known as beekeeping, is the practice of raising beehives on a human scale. While the majority of these bees are *Apis* honey bees, several species

like *Melipona* stingless bees are also raised for their honey. Apiarists maintain beehives for a variety of reasons, including pollinating crops, collecting honey and other byproducts (such as propolis, flower pollen, bee pollen, and royal jelly), and even to sell to other beekeepers. "Bee yard" or "apiary" refers to a place where beehives are housed. Beekeeping is largely done in India as a full-time job and a fascinating pastime, with the goal of producing honey for consumption and a tidy profit¹. The pollination services and valuable products produced by honeybees (including beeswax, propolis, bee venom, and honey) make honeybees a unique gift to humans. Various local and large-scale enterprises in India make extensive use of these items. Bee stings are the one unpleasant aspect of beekeeping. As an integrated agricultural practice, beekeeping is an agro-based activity that farmers and landless labourers in rural areas engage in. Beekeeping is a great way for those living in rural areas to earn extra money, find work, and improve their diet. Honeybees may be most recognised for their sweet nectar, but they really play an important ecological function by pollinating many blooming plants and ensuring the successful set of seeds or fruit. Assuring pollination of cross-pollinated crops, producing honey, and a host of other beehive products are just a few ways honeybees have been helping humanity for a long time. Maintaining plant bio-diversity and, by extension, environmental stability, is an important function that honey bees play. The Ministry of Agriculture and Farmers' Welfare has made beekeeping a priority and a highlight of its activities. The purpose of this research is to examine apiculture and how it contributes to sustainable agriculture in India.

The History of Honey Bee Culture-

Traditional beekeeping began some 6,000 years ago, with the primary goal of harvesting honey. Its current applications include agricultural pollination and the production of wax and propolis, among others. Although most beekeepers are not involved in the industry for profit and maintain less than 25 hives, the biggest beekeeping enterprises are agricultural companies run for profit. Running a little beehive is a pastime for many individuals. Beekeeping has grown in popularity in recent years due to improvements in beekeeping equipment, increased accessibility, and the proliferation of urban beehives. Because of the increased variety and less use of pesticides, some researchers have concluded that "city bees" are better for bee health than "rural bees."³ For hundreds of years, bees and beekeeping have played an important role in agricultural literature across the globe. Thomas Hill's *A delightful instruction of the parfit ordering of Bees*⁷, first published in 1572, is one of numerous early published works on honeybee husbandry that are housed in Special Collections. These materials help to trace the history of beekeeping. Scientific understanding of bees has progressed thanks to other publications. This is shown, for instance, in the 1609 edition of Charles Butler's *The Feminine Monarchie: or The Historie of Bees*.⁴ Despite widespread belief to the contrary in his 1609 book (the 1623 and 1634 versions are in Special Collections), Butler was one of the first observers to notice that worker bees were female.³ The Special Collections has a number of illustrated publications that provide historical context on bee culture by chronicling the wide variety of hives and equipment used in India and other countries. A look into the art and skill of beekeeping may be found in ads for beekeeping gear, rare books, and seed and nursery trade catalogues.

Importance of Apiculture in Agriculture and Rural Development

In comparison to the whole value of hive products, the value of honeybee pollination services alone is around fifteen to twenty times higher. Additionally, crops benefited from pollination by honey bees. Bee pollination has the ability to enhance agricultural yields by anywhere from 5% to 3,315,000%.³ See Table-1 for a breakdown of the crops whose yields were enhanced by bee pollination.

Table 1

Showing crops-wise details of increase in yield due to bee pollination

Oilseeds	% increase in yields	Legume/ pulses	% increase in yields
Mustard	128.1 to 159.8	Alfalfa	23.4 to 19,733.3
Rai	18.4	Berseem and other Clovers	23.4 to 33,150
Rapeseed	12.8 to 139.3	Vetches	39 to 20,000
Toria	66 to 220	Broad Beans	6.8 to 90.1
Sarson	222	Dwarf beans	2.8 to 20.7
Safflower	4.2 to 114.3	Kidney beans	500 to 600
Linseed	1.7 to 40	Runner beans	20.6 to 1,100
Niger	260.7	Arahar	21 to 30
Sunflower	20 to 3,400	Other pulses (Arahar, etc.)	27-30 (RAU)
Orchard crops	% increase in yields	Vegetables for seed/ fruits	% increase in yields
Apple varieties	180 to 6,950	Radish	22 to 100
Pears	240 to 6,014	Cabbage	100 to 300
Plums	6.7 to 2,739	Turnip	100 to 125
Cherry	56.1 to 1,000	Carrot	9.1 to 135.4
Straw-berry	17.4 to 91.9	Onion	353.5 to 9,878
Raspberry	291.3 to 462.5	Brinjal	35-67
Persimmon	20.8	Cucumbers	21.1 to 411
Litchi	4,538 to 10,246	Miscellaneous crops	
Citrus varieties	7 to 233.3	American cotton	5 to 20
Grapes	756.4 to 6,700	Egyptian cotton	16 to 24
Squashes	771.4 to 800	Buckwheat	62.5
Guava	70-140	Coffee	16.7 to 39. 8
Papaya	22.4-88.9		
Mosambi	36-750		
Orange	471-900		

Given the aforementioned, honey bees/beekeeping have emerged as a fifth input for agriculture, regulating the effectiveness of the first four: land, labour, capital, and management (including seed, fertiliser, pesticides, water, equipment, etc.).

Initiatives of Ministry of Agriculture & Farmers Welfare & others-

Since May 2005, when the National Horticulture Mission was consolidated into the Mission for Integrated Development of Horticulture (MIDH), beekeeping has been included as an activity to promote cross-pollination of horticultural crops. All regions of the nation have begun implementing MIDH. The State Departments of Horticulture/Agriculture are actively implementing the available support to promote Scientific Beekeeping under the MIDH's 'Pollination Support via Beekeeping' component. Beekeeping programmes are also being run by several government agencies, such as the Khadi and Village Industries Commission, the State Khadi Board, the Ministry of Micro, Small, and Medium Enterprises, and others.

Role of National Bee Board in Apiculture Industry (NBB)-

Our primary goal at NBB is to advance beekeeping as a whole by spreading the word about scientific beekeeping in our nation. This will help farmers and beekeepers earn more money by pollinating more crops and by producing more honey and other beehive products. MIDH includes NBB as one of its National Level Agencies (NLAs). One of the current goals of the National Beekeeping Board (NBB) is to establish a beekeeping-focused Centre of Excellence (CoE) or Integrated Beekeeping Development Centre (IBDC) in every state. These centres, known as IBDCs, may house all the necessary infrastructure for a nation to grow its scientific beekeeping in a unified fashion. Centres will integrate scientific beekeeping across the country and assist local beekeepers and farmers in adopting the practice. There were three IBDCs that were authorised or commissioned in 2015–2016, and another seven that are currently under consideration.

Apiculture Industry in India-

Including honey produced by wild honey bees, over 30 lakhs of bee colonies in India are now generating 94,500 metric tonnes of honey (2016-17 projected), and they are employing around 3,00,000 people⁵. India is among the nations that export honey. German, American, British, Japanese, French, Italian, Spanish, and other European countries are the main buyers of Indian honey.

International scenario of Apiculture (beekeeping)

All throughout the globe, bees are busy producing honey, a priceless natural health product. The overall amount generated globally ranges from fourteen to fifteen lakh metric tonnes. Ninety percent of the world's manufacturing comes from only fifteen nations. China, India, Russia, Turkey, Mexico, Argentina, Ukraine, and the United States are among the world's most important honey producers.

Apiculture as an Enterprise, source of Livelihood and benefits

1. Proper utilisation of natural resources– nector
2. Generates 3.75 lakhs mandays to maintain 10,000 Bee colonies in Bee hives;
3. Unemployed youth can start this business with minimal funds (Rs. 1.00 to 2.00 lakhs);
4. Rural poor, tribal, and forest-dwelling populations rely on the apiculture sector

for subsistence.

5. Beekeeping is benign: Beekeeping generates income without destroying habitat;
6. It helps in rural development and promotes small village industry;
7. Export of honey/beehive products attracts foreign exchange;
8. May help in doubling farmers income by supplementing/complimenting agriculture/ horticulture;
9. Income from 100 Bee colonies is around Rs. 2.50-3.00 lakhs per annum;
10. Beekeeping helps in increasing National income;
11. Beekeeping encourages ecological awareness;
12. Different sectors and trades benefit from a strong beekeeping industry;
13. Pollen otherwise go waste; So, after receiving the necessary skills, anybody may start beekeeping as a business.

Potential and Opportunities-

Beekeeping in India has a lot of promise. More chances for the growth of the beekeeping industry¹⁰ are presented by the variety of plants and animals. In order to pollinate twelve of the country's most important crops, the National Commission on Agriculture had anticipated the need to deploy around 150 million bee colonies. There is a current need for 200 million beehives in order to improve their productivity, which would raise food production⁶, provide jobs for 215 lakh people, and generate 10 million metric tonnes of honey.

Conclusion-

The sale of bee products and the benefit gained from pollinating farmers' crops have long made apiculture a lucrative industry.^{5, 6} The main points that need to be communicated include the following: the establishment of state bee boards, missions, and IBDCs; the production of high-quality honey bee germplasm and nucleus stock; the careless use of pesticides in crops; the establishment of quality standards for honey and other beehive products by organisations like BIS and FSSAI; the establishment of disease diagnostic labs and bee product quality analysis labs; the exemption of certain taxes for beekeeping and beekeepers; the treatment of beekeepers as farmers in all regards, including compensation for damage to bee colonies; and the provision of subsidised insurance for bee colonies. With all these factors in play, apiculture might become a viable option for environmentally conscious Farmers.

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