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BEEKEEPING: A PROMINENT ENTERPRISE TO ENHANCE FARMERS' INCOME

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Introduction:

Beekeeping, more technically termed as Apiculture, is an agro-based activity that is well suited under varied agro-ecosystems and involves maintenance of bee colonies, commonly in man-made hives, by humans. Diversified agro climatic conditions of India provide great potential and opportunities for beekeeping/ honey production and export of honey. Beekeeping supplements income & employment generation and nutritional intake of rural population. Beekeeping/honeybees have proved to be the 5th input for agriculture in addition to first four inputs: land, labour, capital & management. Beekeeping is also one of the thrust areas and flagship programmes of Ministry of Agriculture & Farmers Welfare.

Importance of honeybees:

Honeybees provide a wide range of benefits to human from honey, other bee products, pollination of food crops and ecological services. The best known primary products of beekeeping are honey and wax, but pollen, propolis, royal jelly, venom, queens, bees and their larvae are also marketable bee products.

Though the honeybees are best known for the honey they produce, their economic role in nature is to pollinate hundreds and thousands of flowering plants and assure setting of seeds or fruits. The value of additional yield from pollination services by honeybees alone is about 15-20 times more than the value of all hive products put together. Honeybee pollination also improves the quality of produce. The potential benefits due to bee pollination in the form of increased yields of various crops vary from 5 to even up to 33150 per cent (Saraswat, 2017).

Beekeeping in India:

Owing to the differential climatic conditions, ranging from tropical to temperate, there is great diversity of bee pasture in the country; hence, there exists a great scope for development of beekeeping in India. For Indian conditions, especially in rural tropics, apiculture will have to be labour intensive and part of Agriculture. A beekeeper or bee farmer in rural areas will initially depend on government or government aided agencies for supply of material input and technical know-how.

Presently 10,000 beekeepers/beekeeping & honey societies/firms/companies with 16.00 lakhs honeybee colonies have been registered with National Bee Board (NBB) producing 1,20,000 Metric Tons of honey (2019-20). India is one of the leading honey exporting countries. Export of honey has increased from 28,378.42 MTs (2013-14) to 59,536.74 MTs (2019-20) which is 109.80 % increase (Press Information Bureau Report, 2021).

How to start beekeeping?

a) Training and financial assistance:

Before starting beekeeping it is necessary for beekeepers to participate in the trainings or other capacity building programmes to gain scientific knowledge on the subject. There are several agencies in India which are promoting bee keeping by financing the farmers through various schemes. Various agencies like Khadi and Village Industry, National Bee Board, Central Bee Research Training Institute, NABARD and various other agencies of State Governments are promoting farmers and youth to adopt bee keeping as an enterprise. NBB provides training to the aspiring farmers who are interested to start bee keeping on commercial scale. Moreover various Krishi Vigyan Kendras are imparting vocational trainings on beekeeping which can be of great help for beginners who are planning to start this venture (Joshi *et al.*, 2018).

The Government is also providing 35% Subsidy to the Apiculture Business in India. The reserved category candidates will have to invest 5% from their own pockets. The government may offer Rs 10 lakh under the Prime Minister Employment Scheme, to start beekeeping as a full-time business. In order to provide social security to beekeepers, the General Committee of the NBB also provides the group insurance policy for all beekeepers registered with them.

b) Selection of good apiary site:

- Apiary ground should be clean & free from dry leaves etc. to avoid fire during summer and there should not be any source of stagnant / dirty water, chemical industry/ sugar mill, etc., nearby the apiary.
- Apiary site should be away from power station, brick kilns, highway and train tracks and there should not be other commercial apiary within 2-3 kilometers of the apiary
- Fresh running water should be easily available near the apiary
- Site should receive early morning and afternoon sunshine
- Site should be open & at dry place having shade
- It should have natural / artificial wind breaks
- Site should be easily accessible by road
- Area should be rich in bee flora

c) Selection of good quality bees:

- Beekeeping can be done by domesticating two species of honey bees viz; *Apis cerena* and *Apis mellifera* depending upon floral conditions and capability of investments
- Either buy disease free bee colonies from existing beekeepers or capture few bee colonies from their natural abodes in forests which may be used for further breeding/ multiplication to prevent inbreeding after getting training on the subject

- Select and multiply honey bee colonies only from disease resistant, high honey yielding, young, healthy and high egg laying capacity queen, etc.
- Keep colonies with good prolific queens

d) Equipments required

Bee hive (Hive stand, Bottom board, Brood chamber, Queen excluder, Super, Top cover), Hive tool, Gloves, Bee brush, Veil, Feeders, Smokers, Uncapping knife, Honey extractor, etc.

Management of Apiary

a) Placement of colonies in apiary

Hives should be as per specification of BIS/ISI and should be of locally available seasoned light weight wood. Unseasoned and heavy wood should be avoided. Restrict number of bee colonies in an apiary from 50-100. Keep row to row and box to box distance as 10 and 3 feet, respectively. Avoid over- stocking of colonies in the apiary.

b) Inspection of colonies

Adopt general colony and personal hygiene in the apiary like cleanliness in the beehives including cleaning the bottom board, top cover, etc. frequently. Check the colonies periodically for any abnormalities or changes in behaviour of bees. Inspect colonies on clear sunny days preferably at temperatures between 20 and 30°C. Do not inspect colonies in cold, windy and cloudy days. Use smoker when needed to subdue the bees. Use protective dress and veil while inspecting colonies. Handle colonies gently, avoid jerks. Avoid crushing bees as it could lead to stinging. Handle diseased and healthy colonies separately. Isolate the diseased colonies from healthy ones.

c) Provision of fresh water in the apiary

Ensure availability of fresh water preferably in shallow containers near the apiary to maintain a healthy apiary. Water is needed for maintenance of adequate humidity in a colony to ensure proper incubation of eggs and by nurse bees for feeding bee bread. When temperature in the apiary increases beyond 37°C, water is used by bees to cool the colony.

d) Care during honey extraction

Use honey extractor, containers and other bee hive tools /equipments made of stainless steel / food grade plastic. Don't use tins & containers made of other degraded material. Wash all the equipments / containers etc. thoroughly with warm water before honey extraction. Extract honey only from super chambers. Select frames only with 75% sealed cells with ripened honey for extraction. To avoid robbing, cover the entrance gate of the colony with small branches or twigs and extract honey in a closed room. Do not leave super and brood frames, after extraction of honey open in the apiary. Avoid spilling honey in the apiary.

e) Seasonal management of apiary

Summer Management: Keep the colonies in thick shade. Regulate the microclimate of the apiary by using wet gunny bags over top cover and sprinkling water around the colonies in

the apiary during noon hours. Provide proper ventilation in the colony by widening the entrance gate of the colony, providing additional gates to multi chambered colonies, placing thin small stick pieces between two adjacent chambers for the passage of fresh air, reducing the number of frames by 1 and allow 9 in the chamber.

Monsoon management: Clean the bottom board frequently. Keep the surroundings of the colony clean by cutting the unwanted vegetation which may hamper free circulation of the air. Provide artificial feeding (sugar syrup and/or pollen substitute) as per requirement of the colony. Check the robbing within the apiary. Unite weak worker colonies. Control predatory wasps, ants, frogs, lizards etc. in the apiary.

Post monsoon season management: Provide sufficient space in the colony. Strengthen the colonies to stimulate drone brood rearing. Control ectoparasitic mites, wax moth and predatory wasps. Extract autumn honey before the winter sets in.

Winter management: Examine the colonies and provide winter packings in weak colonies especially in hilly areas. Feed sugar/pollen substitute to weak colonies as stimulative feeding to provide energy and initiate brood rearing. Shift the colonies to sunny places. Protect the colonies from chilly winds by using wind breaks. Unite the weak colonies with stronger ones.

Spring management: Unpack the colonies, clean the bottom board, replace the worn out hive parts and provide sufficient space. Provide stimulative sugar/pollen substitute to increase brood rearing. Extra frames should be raised by providing comb foundation sheets. Replace the old queens with new ones through mass queen rearing or divide the colonies. Manage the colonies in such a way to prevent swarming. Monitor regularly for ectoparasitic mites and adopt control measures. Extract honey frequently during this season.

f) Protecting colonies from pesticides

Persuade the farmers not to use pesticides or use selective pesticides that are less harmful to bees at recommended concentrations. Avoid the use of dust formulations as they are more harmful to bees than spray formulations. Prior information about spraying would help in reducing poisoning of bees. Avoiding spraying of pesticides during flowering of the crop and peak foraging time of the bees would help in reduction in the mortality of foraging bees. Spraying may be done in the evening after sun set when bees do not forage. Colonies may be temporarily shifted if heavy spraying schedule is fixed. If shifting of the colonies is not possible, feed with 200 ml sugar syrup and close the gate by using wire screen for the day of spraying

g) Management of Honey Bee Diseases

Honey bees could be affected by diseases and the real cause of abnormality or any disease present in the honey bee broods need to be ascertained before taking up any control measures. It is best to contact the researchers/scientists/beekeeping experts at the nearest centre or university or Government department working on honey bees. After the exact diagnosis of the causal agent of the particular disease, the guidelines/ recommendations given by the expert should be followed in true letter and spirit.

Economics

If an apiary is properly maintained following all the scientific advices and management practices at proper time and in right way, an entrepreneur can harvest good returns. Though a beginner can start his apiary with 2 to 5 hives, but it is economical only with a unit with 50 hives. An economics estimate for a unit of 50 hives is as such: Fixed Cost of Rs. 2.10 Lakhs, Recurring Cost of Rs. 1.86 Lakhs, Total income of 4.60 Lakhs and Net Income per year of 2.74 lakhs. Though this estimate of returns is given by NBB but the actual returns would depend upon the rates of honey and other by-products in the market and the cost benefit ration may alter accordingly.

Benefits of Beekeeping

- Beekeeping industry is a source of livelihood for rural/tribal/forest based population.
- Unemployed youth can start this business with minimal funds (Rs. 1.00 to 2.00 lakhs)
- May help in doubling farmers income by supplementing/complimenting agriculture/ horticulture
- Honeybee pollinated crops are more productive and of better quality. Beekeepers are therefore hired and paid to place their hives in field to provide pollination service to the crop.
- Generates 3.75 lakhs man days to maintain 10,000 Bee colonies in Bee hives
- Different sectors and trades benefit from a strong beekeeping industry
- Beekeeping helps in increasing national income
- Income from 100 bee colonies is around Rs. 2.50-3.00 lakhs per annum
- Export of honey/bee hive products attracts foreign exchange
- It helps in rural development and promotes small village industry
- Beekeeping is benign: generates income without destroying habitat and promotes sustainable agriculture and encourages ecological awareness
- Encouraging beekeeping encourages biodiversity. Hence, beekeeping may be adopted as an enterprise by anyone after getting training on the subject.

Conclusion

There is vast potential for beekeeping in India where it can prove to be an important agri-business that not only promises good returns to the farmers but also helps increase agricultural productivity. However, due to lack of knowledge and skills beekeeping is not being practiced by many. It is necessary to create awareness among farmers about the role of honeybees/beekeeping in pollination and its economic advantages so that they can go for adoption of beekeeping. For this, farmers have to be trained in scientific beekeeping including production of high value beehive products.

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