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**Migratory beekeeping: a boon to both farmer and beekeeper***Swapna Rani K<sup>1</sup>, Samrat Saha<sup>2\*</sup> and Jawahar Reddy A<sup>3</sup>*<sup>1</sup>Department of Entomology, Sri Krishnadevaraya College of Agricultural Sciences, Anantapur-515001, Andhra Pradesh, India<sup>2</sup>Department of Agricultural Entomology, Uttar Banga Krishi Viswavidyalaya, Pundibari- 736165, Cooch Behar, West Bengal, India<sup>3</sup>Department of Entomology, Sri Krishnadevaraya College of Horticultural Sciences, Anantapur-515001, Andhra Pradesh, India*\*Corresponding author: isamratsahamtb43@gmail.com***Abstract**

Migratory beekeeping is a modern concept of commercial beekeeping that improves the yield of honey by many times. In this type of beekeeping, honey bee boxes are transported from one nectar-exhausted area to another nectar-rich area. It is not only beneficial for the beekeeper but also increases the crop yield through pollination and thus provides an additional income to the farmer. There are many plants that depend on honey bees for pollination for which migratory beekeeping is a blessing in disguise. In many developed countries migratory beekeeping has already been considered as a remunerative venture and has a significant contribution to the economy of that country.

**Keywords:** Migratory beekeeping, honey bees, pollination, Global scenario, Indian scenario

**Introduction**

People often mistakenly believe that the production of honey and other associated products like wax, propolis, royal jelly and bee venom is the only role of honey bees. But is it true? Answer is a big no, because honey bees play a pivotal role in pollination of several agricultural and horticultural crops. In fact, the pollination service provided by bees is ten times more valuable than the honey. Entomophily is the second important source of pollination after anemophily and among all insects, bees are the most dominant pollinating

agents. Migratory beekeeping is one such practice that deploys bee pollinators in action when the plants are in need i.e., during the blooming period. The concept of migratory beekeeping is gaining popularity day by day and is now recommended by researchers due to its economic importance in all developed agricultural systems.

**Bees in pollination**

It is needless to state that pollination is the primary objective of migratory beekeeping whereas continuous and increased honey

production is the secondary objective. Also, to cater the needs of increasing population, deployment of managed bee pollinators is essential for achieving higher food production. All over the world insect pollination has an annual valuation of more than 153 billion Euro for agricultural production (Gallai *et al.*, 2009). Among several pollinating insects, bees (Hymenoptera: Apiformes) are the most important one and responsible for pollinating about 80% (Michener, 2007) of all flowering plants of which majority are agricultural crops.

From an experimental study it has been estimated that nearly 17% increase in seed yield was observed in onion and 35% fruit yield increase in pomegranate by deployment of managed bee pollinators. Different plants having different level of dependency on pollinators viz., in the plants like cocoa, pumpkin, squash, vanilla and watermelon artificial bee pollination is essential whereas others like cardamom, cashew, coriander, cucumber, and cross pollinated varieties of strawberry regarded as highly dependent on bee pollination (BEEINFORMed, 2018). Hence, there is huge scope for mobile beekeeping in tropical regions where these plant species grow abundantly.

### **Migratory beekeeping in ancient Egypt**

Migratory beekeeping is actually an age old practice mentioned in the history, where ancient Egyptians moved their cylindrical clay hives in floating rafts along the river Nile to catch bloom and nectar flow

season by moving north towards Cairo during summers and similarly towards southern direction in winters. This practice exposes bees to longer blooming seasons thus more conversion of nectar into honey which is more profitable to the beekeeper (Abou-Shaara, 2009).

### **Migratory beekeeping: The global scenario**

Though earlier several attempts have been made to bring migratory beekeeping to commercial level, they were proved to be non-practical until the 19<sup>th</sup> century. In the 1920's roadways started improving in developed countries led to use of trucks for mobile beekeeping. By the end of World War I, beekeepers had started providing commercial pollination service to the growers of the United States (USA) (Cheung, 1973).

The concept of mobile beekeeping is very much popular in developed countries like USA and Germany, where a huge eighteen-wheeler truck carrying many bee colonies is sent on a rental basis for pollination of fruit trees which blooms only once in a year such as almond plantations, kiwi, cherry and apple orchards. As most of these tree species are self-incompatible, bee pollination is essential not only for achieving good yield but also for better quality of produce.

The California almond is the most notable example of the role of bee pollination service. In the USA, every year approximately 1.5 million commercially managed beehives

migrate to the Central Valley of California for pollination of the almond crops. This value accounts for over 60% of total commercially managed beehives in the USA (Glenny *et al.*, 2017). It is not an exaggeration that each almond they eat is produced by the pollination service provided by honeybees. The net value of the almond crop is 2.2 billion USD and it adds an estimated amount of 21.5 billion USD

to the economy of California and also generates employment for 104,000 people in different sectors from production to marketing (Sumner *et al.*, 2016). In the USA, the managed honey bee pollination service generates an annual estimated revenue of approximately 17 billion USD (Calderone, 2012).



**Fig. 1:** A mobile bee keeping truck containing stacked honeybee colonies (Source: Complete Beehives, 2022).

In Southern Europe, rape seed starts blooming during the early spring for which bee colonies are migrated following the bloom (EIP-AGRI, 2019). In the European Union (EU), the estimated insect pollination service revenue accounted for 14.6 [ $\pm 3.3$ ] billion Euro annually, that equivalent to 12 ( $\pm 0.8$ ) per cent of the total annual crop production value (Leonhardt *et al.*, 2013).

### **A mutualistic relation between beekeeper and farmer**

Migratory beekeeping creates a mutualistic environment between beekeeper and farmer where both the participants get benefitted. The pollination service provided by the bees allow the land owner to earn additional income due to the higher yield obtained, whereas the surplus nectar collected from the crops has been converted by the bees into honey that generate good income for the beekeeper. Moreover, beekeepers can earn

additional income by renting out their hives to farmers at the rate two per acre to install in their farms for a three to four weeks period of blooming to fetch additional income besides the income from honey. Even sometimes the beekeepers pay the farmer for allowing bees to feed on their land.

### **Transportation of bee hives**

After exhaustion of floral nectar in one area the beekeeper usually packs their hives during night times stacked onto pallets and placed inside the truck. The whole process of packing and shifting into the trucks need to be done during nights only because moving the hives in daytime when bees engaged in forging activity will lead to loss of their home. The beekeepers select new locations where plants containing ample amounts of nectar present in their sweet scented blooms as the next destination and the entire travelling carried out in the night time only. Upon reaching the destination, the beekeepers carefully open the hive and stack additional supers by wearing hand gloves and face veils on the top. This practice encourages bees to yield maximum honey and it can be gathered after three weeks.

### **Old bus to mobile beehive centre:**

The large and lavish trucks are not always necessary for mobile beekeeping. For example, recently in 2020, an innovative beekeeper named Karlen Tchagharyan of Armenia, USSR showed his immense love to his honey bees and successfully converted

three old Soviet era tourist buses into mobile bee center and each bus containing 40 bee boxes, set up with luxurious rooms splendid for bees (Katy, 2020).

### **Migratory beekeeping in Indian context:**

Now the question is, how can migratory beekeeping influence the Indian beekeeping industry? In India, mobile beekeeping by using *Apis mellifera* colonies allows the beekeeper to go for 4–5 harvests every year that provide an average annual honey yield of approximately 50–60 kg/hive generating a significant income (Sharma *et al.*, 2013, Kishan Tej *et al.*, 2017). In addition, the strength of the colonies also improved due to migration (Brar *et al.*, 2018). In small scale intra-state migration and in large scale inter-state migration is practiced. In North India, transhumance is carried out between plain lands and hilly areas, thus exploiting the flowering crops like lychee orchards and mustard, rapeseed or sunflower fields. In South India, the rubber and tamarind blooms are exploited for honey production (Kishan Tej *et al.*, 2017)

Recently in India, mobile honey processing vans have been launched by Khadi and Village Industries Commission (KVIC) which can process nearly 37 kg of honey per hour. These mobile processing vans move to different apiaries to process honey which has proven to be beneficial for small beekeepers that save their expenses on transportation of honey to processing units (GOI, 2022). But

still the improper condition of migratory routes, lack of awareness regarding the role of bees in pollination, small land holdings of farmers making the migratory beekeeping challenging for the beekeepers of our country.

### **Migratory beekeeping always lucrative?**

Just like every coin, migratory beekeeping also has two sides. Though people always focus on the positive side without giving much attention to the negative side. Studies revealed that migratory beekeeping has an influence on the lifespan of honey bees. The travelling bees generally spend a shorter life than the stationary bees. Those travelling bees face a greater level of oxidative stress that results in quick aging of travelling bees and may also reduce their ability to escape disease and parasites (Simone-Finstrom *et al.*, 2016). But there are many complications on how migratory beekeeping impacts health and aging of honeybees, whereas new environmental conditions may show more influence on their health (EIP-AGRI, 2019).

Even during transportation in trucks the hives are kept side by side very closely which can cause easy spreading of mites and diseases. Migratory beekeeping also requires good road conditions, otherwise bees will face shaking and uncomfortable situations during transportation.

### **Conclusion**

Though migratory beekeeping has some constraints, if they are managed

properly, it will be a blessing for both the beekeeper and farmer. Particularly, in countries like India where tropical and subtropical climatic conditions exist without severe cold weather during winters and blooming occurs throughout the year, there is more scope for migratory beekeeping which can be more profitable compared to temperate countries. Although precautions need to be taken when warm and dry weather persists and by taking proper care and maintaining hygiene of bee colonies, one can derive good profits by venturing into mobile beekeeping.

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