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Effect of Artificial Sugar feeding in Honey bees

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INTRODUCTION

Honeybees are social insects that stay with colony mates for all their life period with overlapping generations. They have coevolved with angiosperms and therefore rely on nectar and pollen for their dietary requirement. According to the National Bee Board, under the Ministry of agriculture, India's honey production in 2017-18 was 1.05 lakh metric tons (MT) as compared to the 35,000 MT honey production in 2005-06. Currently, India has 35 lakh bee colonies as compared to 8 lakh bee colonies in 2005-06. The number of beekeeping companies and societies has also increased and as of January, 2019, there are 9091 registered bodies in apiary business.

Most importantly, pollination of many crops is done by honeybees. Currently, seven species of Apis have been described; India is an elite country which habitats four of these; two domesticated species, viz.Apis cerana indica Fab.and A.Mellifera L. and two wild species, viz. Apis dorsata and A. florea. Indian honeybee (Apis cerana indica Fab.) is the base of Indian beekeeping and is dispersed throughout India. It thrives up to 2500 m above mean sea level and has many valuable characteristics of biological and economic importance.

A. cerana naturally occurs on roughly 30 million km2 of Asian landscape in climatic regions ranging from tropical, moist rainforests to dry grasslands and taiga (Koetz, 2013; Radloffet al., 2010). Conversely, the drawbacks with this species are frequent swarming, absconding, the tendency to rob, production of laying workers, low honey yield and susceptibility to Thai sacbrood virus. Pollen grains are the male germs of flowers, rich in high quality protein, which serve as the building material for growth and tissue repair to honey bee colonies (Somerville, 2000; Alghamdi, 2002; Mishima et al., 2005). The foremost part of the diet of the colony is carbohydrates. This is required by both larvae and adults for normal growth and development. The major sources of carbohydrate are nectar and honey. Thus the carbohydrate supplement may help to sustain the brood rearing and colony development during contrary conditions. Pollen is essential particularly for brood rearing though nectar is used as a diet for brood and adults. They collect nectar from natural sources. At times, when bee foraging plants continue their vegetative phase without any flower. The bees suffer from dearth of nectar. Rainy season is also very uncongenial for the bees as during that period bees face acute food shortage leading to absconding.

Why Artificial feeding is given to Bees

Under such circumstances food supplement is inevitable for the bees. By foraging, honey bees collect pollen and nectar where pollen is a protein source and nectar is carbohydrate source which together meet their nutrient requirements (Seeley, 1985 and Winston, 1987). As the honeybees have division of labor, foraging will be only performed by the forager bees (VonFrisch, 1967; Suwannapong, 2000). Provision of sufficient food stores in terms of honey and pollen during the monsoon and winter seasons is essential. Woyke(1976)and Raj and Basavanna (1980) found that supplementary pollen feeding also reduced absconding in *Apis cerana indica* Fab.

In a supplementary feeding programme , sugar is most effective in bee feeding, because it stimulates bees for breeding,foraging for pollen and eventually honey production during honey flow season. Sugar feeding can boost bees into action. Supplemental feeding allows the colony to optimize its potential as a production unit and increase its ability to produce more honey and accomplish successful pollination. Feeding sugar syrup to colonies can cause them to rear more broods. This then affects the amount of pollen a colony collects. Feeding bees with pollen substitute and sugar syrup increases the number of bees and frames covered by bees, brood area and colony weight much higher than feeding only

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with sugar syrup or pollen (Sahinler et al., 2003).

How Artificial Bee feeding is carried out

Bee management requires three types of feeding, viz. dearth feeding (rainy season), supplementary feeding (summer season) and stimulant feeding (winter season). Out of this dearth feeding is must while supplementary and stimulant feeding is given on need basis by different beekeepers. Currently many beekeepers increased their honey production by feeding their bee colonies with sugar syrup before and during the flowering season; hence the sugar syrup was mixed with the nectar by bees. The extracted honey looks like natural honey but with deficiencies of nutritive and medicinal values (El-Banby et al., 1989). Hence, for fruitful honey production and for survival of A.ceranaindicaFab.in dearth period artificial supplement of food is necessary. Sugar syrup (1:1) is one of the most common nectar substitutes whereas soybean flour, mung bean flour, corn flour, mixed flour etc. are different pollen substitutes for honey bees during the dearth period. The efficiency of such nectar and pollen alternatives in the maintenance of honeybee colonies is necessary to evaluate. However, not much work has been conducted to ascertain the effect of regular feeding on growth and development as well as foraging activities of Apis cerana indica Fab. in India in general and Odisha in particular.

Artificial food to feed bees

The first choice of food for bees is usually honey. Honey with a strong flavor, unsuitable for marketing can be used for feeding. White table sugar is the most common feed for bees. Unrefined brown sugar in the form of a wet patty of cakes in the tropical areas, waste sugar from refining mills, glucose, fructose, disaccharides, tri-saccharides are fed to the bees in climates where bees can make frequent flights to void fecal matter, these types of feeds are satisfactory.

The traditional alternative sugar food for colonies is candy, which is soft, fudge-like sugar solid bee food, used at times when bees will not take sugar syrup for instance, when bees are confined in cages for transportation. In the past, candy was used during winter to feed colonies. At present, it is used by some supply rums to provide food for package bees in transit and a special mix called queen-cage.

Candy

Homemade candy can be prepared by boiling 3.2 kg sugar in one liter of water until it reaches a temperature of 117-220 C after which it is allowed to cool for a while and then beaten until it grows thick and white to prepare candies. Queen-cage candy can be made by mixing ground candy or icing sugar with honey until the required consistency is reached. The honey prevents the candy from becoming a bard.

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Sugar syrup

The standard feed for bees is sugar syrup. The ratio of 1:1 syrup is made by dissolving 1 kg of sugar in 1.25 liter of water which is called light syrup. A ratio of 2:2 syrup is made by dissolving 2 kg of sugar in 1.25 of water and is called heavy syrup. Warm water can be used for dissolving the sugar, but do not allow the syrup to get boiled. The heavy syrup is more useful. The colonies should be fed in such a way that syrup is consumed by the bees within 2 -3 days.

CONCLUSION

Artificial sugar feeding is necessary as the beekeepers have observed that if the bee colonies do not have 2 to 3 kg of honey in-store and the reserves fall below a certain minimum level, the bee colony begins to show the symptoms of starvation. The first sign of starvation in colonies is the removal of larvae, which may be seen discarded in front of the hive. Also before the winter or dearth period starts the high level of food reserve is necessary as a protection against starvation, as the bee-keeper will not be able to open up the hive to check stores as the cold or rainy season progresses.