Bulletin of Environment, Pharmacology and Life Sciences
Bull. Env. Pharmacol. Life Sci., Vol 8 [2] January 2019 : 46-49

Online ISSN 2277-1808
Journal's URL:http://www.bepls.com
CODEN: BEPLAD
Global Impact Factor 0.876
Universal Impact Factor 0.9804
NAAS Rating 4.95

ORIGINAL ARTICLE **OPEN ACCESS**

Improving traditional apiculture practices to double farmer's income

[1]Khyati Singh*, [2]Mukesh Kumar Mehla
[1]Department of Vegetable Science, MaharanaPratap Horticultural University, Karnal- 132001
[2]Department of Soil and Water Engineering, CCS Haryana Agricultural University, Hisar- 125001
*Corresponding author: Khyati Singh
Email id: chaudhrykhyati@gmail.com

ABSTRACT
In India, farmers having marginal landholding can be benefited by secondary activity like beekeeping. Presently, it is estimated that India has about ten lakhs indigenous bee colonies and two lakhs imported European bee colonies. The paper enlists different strategies to increase honey production, quality and to increase adoption of apiculture by farmers for commercializing beekeeping by improving current beehive structures, proper bee hive management, insitu-honey extraction system. Different entrances like flap entrance, rotating door entrance, manually controlled entrances and electronic adjustable hive entrances (butterfly entrance design) can be used to optimize hive entrance and provide scope for promoting better traffic flow, assist in proper ventilation of hives and exclude pests. The roof design is also taken care off. Non-white colors absorb more hot sunlight, increasing difficulty for bees to keep the hive cool. So, roofs are made from galvanized iron that absorb up to about 90% and white paint only absorbs about 30% of sunlight. Elevating the rooftops of hives, switching to other materials for construction of roofs and painting hive box with lighter colors can help in keeping hives cool thus reduces the drudgery of bees to maintain hive temperature and also improve production. The insitu-honey extraction type hive boxes with honey extraction and filtration unit proved efficient for easy honey extraction. Vents are made to keep hive cooler. Aluminum or insulating thermoplastic is used inside the hive box. The handle is rotated to extract honey which after passing through a screen and filters can be collected through an outlet. Following the given strategies and further research in this area can help in increasing honey production and quality, and thus play important role in increasing farmers income through adoption of modern apiculture.
Keyword: *Apiculture, Beehives, Hive box, Hive gate, Beebox*

Received 21.09.2018 Revised 29.11.2018 Accepted 31.12.2018

INTRODUCTION

Honey bees are highly social organisms belongs to order Insecta. The inter-relationship of bees and plants is an excellent example of symbiosis. The bees obtain food from flowers and help one plant to cross with other plants. Honeybees are extremely important creatures to humans because of their ability to pollinate flowers [4]. About one third of all plants or plant products eaten by humans depend directly or indirectly on bees for their pollination [3]. Bees are very efficient in producing honey from flower nectar. This gives the opportunity to humans to exploit the ability of bees and to rear them under favorable conditions for its use. Beekeeping, also known as Apiculture, is the act of rearing, breeding and managing honey bee colonies in artificial hives such as traditional and modern beehives for optimum productivity of honey and its byproducts [2]. It involves the culturing or manipulation of honeybees for the benefit of man and also has the capabilities of building up any nation [7]. The good management of apiary is a must for higher honey production. The apiary should be set up near the source of food and nectar and under shade conditions to protect from high intensity of sunlight and extreme weather conditions. Honey is a traditional medicine or food in nearly all societies and whether sold in a simple way at village level or packaged more sophisticatedly, honey generates income and can create livelihoods for several sectors within a society [5]. In India, farmers having marginal landholding can be benefited by secondary activity like beekeeping. Maintaining honeybees in a suitable beehive is a promising method for trapping them

and enhancing their performance. But till now, farmers find it difficult to select and construct suitable hives for their beekeeping activities [6]. Presently, it is estimated that India has about ten lakhs indigenous bee colonies and two lakhs imported European bee colonies.

There are different types of beehives available for bee farming. The langstroth hive has removable frames for easy inspection. The entrances of hive box can play important role to optimize hive entrance and provide scope for promoting better traffic flow, assist in proper ventilation of hives and exclude pests. The different types of adjustable hive entrances mentioned are flap entrance, rotating door entrance, manually controlled entrances and electronic adjustable hive entrances (butterfly entrance design). Due to high sunlight, bees have to work harder to maintain the hive temperature. The insulation of hive was maintained by maintaining slight air gap between the metal and the wood. The roof color of hive makes a great difference in the hive temperature. The Indian beehives are made up of galvanized iron but painting the tops white leads to more reflection of sunlight. The *in situ*-honey extraction type hive boxes with honey extraction and filtration unit has proved efficient for easy honey extraction. Following the given strategies and further research in this area can help in increasing honey production and quality, and adoption of modern apiculture as allied agricultural practice especially by the small and marginal farmers can play important role in increasing their income.

MATERIAL AND METHODS

Adjustable hive entrance

Adjustable hive entrance played significant role to protect bees from pest, to optimize ventilation and to maintain traffic flow. The difference in types of entrance has resulted in varying effect in apiary management and honey production. The hive entrances can be divided into three types: Bee Controlled Entrances, Electronic Adjustable Hive Entrances and Manually Controlled Entrances.

Bee Controlled Entrances

1. Flap Entrance

This type of hive entrance (Fig.1.) is made with clear flap doors which are to be pushed open by the bees and restricting the entry of pests who will not be able to push open the flaps. This would have proved to be effective in restricting the traffic flow. It is found that if the flap doors are made slightly more horizontal than vertical so that the bees can easily enter the hive.

2. Rotating Door Entrance

It was set up to know if bees could learn to open the entrance. The design (Fig.2.) used had two doors clear and one black colored. The doors could be pushed open but could not lock to the outside. It was observed that bees could open both the door and accidently closed them and not on purpose.

Electronic Adjustable Hive Entrances

The design is named as Butterfly Entrance Design (Fig.3.) as it looked like butterfly valve. The construction is such that an Arduino was connected to a servo laid in a 3d printed case. A shaft connected to 3d printed gates was secured to the servo. The slight gap to the right remains open to prevent fully trapping bees outside of the hive [1]. The entrance rotating at an angle of 20 and 10 degrees per second showed that the slight rotation prevented the bees from getting squished. Also, the provision is made if any bee gets trapped under the entrance, the entrance trap can move vertically and set the bee free.

Manually Controlled Entrances

The traditional block entrance reducers are difficult to adjust as it requires support to remove and adjust the entrance gap. The manually controlled entrance (Fig.4.) is easy to adjust. The main component of the design is the wedge block which slides horizontally in the entrance reducer. The sliding block has a handle attached to it so that it can be easily removed and placed at a desired location.

Fig.1. Flap Door Entrance

Fig 2 Rotating Door Entrance

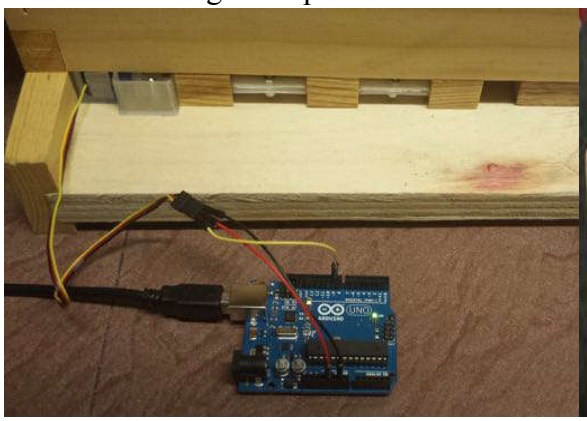

Fig.3. Butterfly value entrance

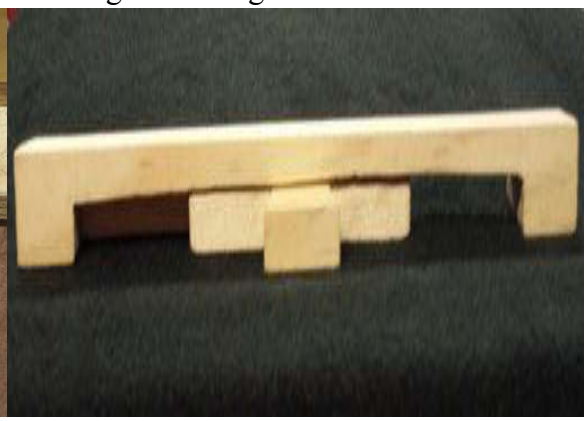

Fig.4. Manual wedged slidable entrance

Effect of Hive Roof Color

Fig.5. Hive roof painted with white and blue color

The color of hive box has great effect on the honey production. The tops if painted white and blue, and some of the tops were kept plain (no color) as shown in the Fig.5. It is resulted that the average temperature maintained in the hive painted white was 50.2°C, the blue 55.8°C, and the plain 56.8°C [1]. The white roof showed more significant difference than blue and plain roofs. It was evaluated that the white colored tops reflected most of the sun rays and proved best for the regulation of hive temperature. Non-white colors absorb more hot sunlight, increasing difficulty for bees to keep the hive cool. So, roofs are made from galvanized iron that absorb up to about 90% of sunlight and white paint only absorbs

about 30% of sunlight. Elevating the rooftops of hives, switching to other materials for construction of roofs and painting hive box with lighter colors can help in keeping hives cool thus reduces the drudgery of bees to maintain hive temperature and also improve production.

In-Situ Honey Extraction Method

The *insitu*-honey extraction type hive boxes, as shown in Fig.6,with honey extraction and filtration unit with main working parts as hive box, lobed shaft, tap, screen and filters have proved to be effective for easy and quick honey extraction method. Aluminum or insulating thermoplastic is used inside the hive box and vents are made to keep hive cooler. The handle is rotated to extract honey which after passing through a screen and filters can be collected through an outlet.

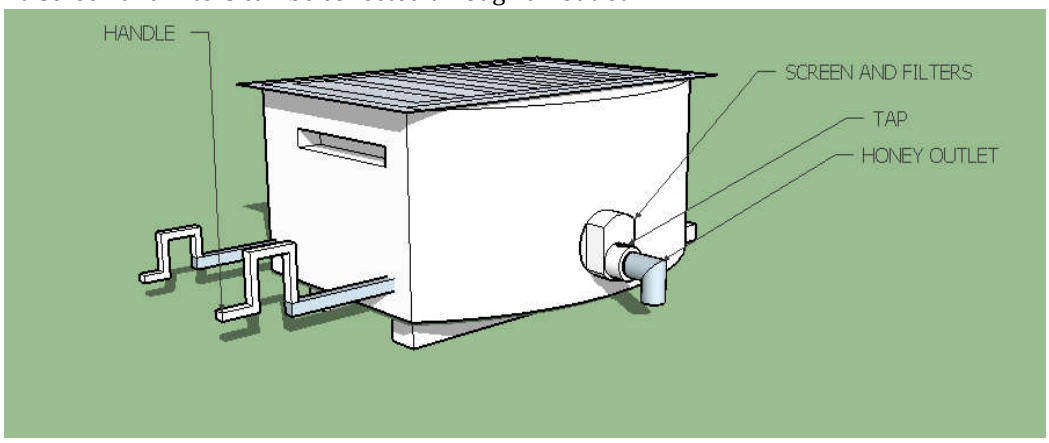

Fig.6. Model of an in-situ honey extraction system in beehive

DISCUSSION AND CONCLUSION

It can be concluded that as the honey bees plays important role in the lives of humans that about one third of all plants or plant products eaten by humans depend directly or indirectly on bees for their pollination [3]. Also, bee farming has also proved to be effective in increasing the income and generating additional income to the small and marginal farmers. It has proved beneficial to adopt the modern hive boxes with adjustable hive entrances like flap door entrance, rotating door entrance, manually controlled entrances and electronic adjustable hive entrances (butterfly entrance design) that are able to assist in better traffic flow, proper ventilation of hives and exclude pests. The color of hive box has great effect on the honey production by maintaining the temperature inside the hive. The roof tops should be made up of galvanized iron sheet and painted white as they reflect at least 30% of sunlight due to white color and 90% due to material they are made up off. The *in-situ* honey extraction system is very effective in collecting honey directly from the hives without putting much effort and at low cost. Following the given strategies and further research in this area can help in increasing honey production and quality, and thus play important role in increasing farmers income through adoption of modern apiculture.

REFERENCES

1. Abbott, J.E.(2016). Improving indian beehives and beekeeping, M.Sc. Thesis, Department of Mechanical Engineering, Massachusetts Institute of Technology.
2. Aduke, F. (2012). University education and poverty alleviation as mechanisms for enhancing youth development in Nigeria. *International Journal of Psychology and Counseling*, 4(1): **1-5**.
3. Bradbear, N. (2009).Bees and their role in forest livelihoods: A guide to the services provided by bees and the sustainable harvesting, processing and marketing of their products. *FAO Pub*.
4. Bayir, R., and Albayrak, A. (2016). The monitoring of nectar flow period of honey bees using wireless sensor networks. *International Journal of Distributed Sensor Networks,* 12(11), **1-8**.
5. Gotte, L.B. (1998). Honey as a dressing for wounds, burns, and ulcers: A brief review of clinical reports and experimental studies. Honey Research Unit, Department of Biological Sciences, University of Waikato, Hamilton, New Zealand.
6. Magnum, W. (2001). Top-bar hives in the USA. *Bees for Development Journal*, 58: **3-5**.
7. Ononye, B.U., and Akunne, C.E. (2015a). Apiculture: A tool for nation building. A Paper presented during the 2nd Biennial Nigeria Beekeeping Conference held on November 9-12, 2015 at Oshogbo, Osun State Nigeria, **16.**

CITATION OF THIS ARTICLE

Khyati Singh, Mukesh Kumar Mehla. Improving traditional apiculture practices to double farmer's income. Bull. Env. Pharmacol. Life Sci., Vol 8 [2] January 2019: 46-49