



Diagnosis and Remedial Measures of Common Technological Problems in Bee Keeping

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ABSTRACT

The main objective of Krishi Vigyan Kendra (KVK) is to help the farmers in the command area in the field of agriculture and allied sectors. During the last 3 years i.e. from 2013 to 2015, a record of all the visiting farmers was maintained in the plant health diagnostic laboratory at the KVK, in which complete details of the farmer with address and contact number was maintained. Similarly, the purpose of visiting KVK was recorded date wise by the KVK scientist and at the end of each month, a summary was prepared and analysed. It was inferred that majority of the farmers enquired about management of wax moth and varroa mite which reveals that these are the most important pests of honey bees and their products and cause serious losses in commercial beekeeping. Out of total 71 farmers who visited the KVK with queries pertaining to the honey bees from January to December months, 43.7 per cent farmers (31 farmers) enquired about management of wax moth and 40.8 per cent farmers (29 farmers) enquired about management of varroa mite which confirms that these were the two most devastating pests of honey bees. The other problems faced by the farmers were colony collapse due to severe cold (4.2% farmers), management of honey bees during different seasons (4.2 per cent farmers) and problem of robbing (2.8% farmers).

Key Words: Diagnosis, Technological problems, Insect Pest, Diseases, Honey Bees.

INTRODUCTION

Bee keeping is a profitable enterprise that requires little investment. Punjab farmers have taken up bee keeping on a large scale. Punjab has the largest number of 3,00,000 colonies, followed by Haryana (10,500 colonies), Himachal Pradesh (50,000 colonies) and J& K (15,000 colonies). There are 30,000 bee keepers in Punjab and honey production in 14,000mt. A large number of factors affect honey bee and hence the production of honey like honey bee do not do well in coniferous forests, in deserts where there are long stretches of sand dunes, in heavy monsoon areas and in cropped areas where insecticides are applied extensively by ground or aerial spraying. Similarly, a large number of insects act as enemies of the honey bee, but their attack is not serious in all cases. Some, like the wax moths and varroa mite, are extremely damaging and can cause absconding and death of a colony. Wasps an hornet, near relatives of the honey bees,

actively prey upon them and also rob them of their brood, depleting colony strength to such an extent that bee keeping cannot be practiced in the area of their abundance.

As far as diseases are concerned, there are a number of serious diseases of immature stages and of adult honeybees. Some are contagious caused by pathogens, others are non-contagious caused by physiological disorders or by poisons in the environment. The pathogens include viruses, bacteria, fungi, protozoa, mites etc. For the last so many years, every year, a large number of farmers visited KVK, Kapurthala to have guidance from the scientists posted at the Kendra. It has been reported earlier that during different seasons in a year, number of farmers seeking technical guidance regarding agriculture and allied fields varied to a large extent (Kaur, 2016). Therefore, it was planned to ascertain the areas in which farmers made most of the queries so that the Kendra can make changes

in the action plan so that maximum farmers can be benefitted. Keeping in view the above facts, it was planned to classify the data pertaining to number of farmers who visited KVK campus in the plant disease diagnostic laboratory pertaining to honey bee keeping to get the problem solved with the advice of scientist posted at the Kendra.

MATERIALS AND METHODS

During the last 3 years i.e. from 2013 to 2015, record of all the visiting farmers was maintained in the plant health diagnostic laboratory at the KVK, in which complete details of the farmer with address and contact number was maintained. Similarly, the purpose of visiting KVK was recorded date wise by the KVK scientist and at the end of each month, a summary was prepared and analysed for severity of the attack of insect pest and diseases. The data were classified month wise and problem wise to note down the extent of damage caused by the insect pests, diseases or other agencies on honey bees. The samples were diagnosed using simple microscope, compound microscope and preparing slides of the diseased specimen to know the pathogen involved for diagnosis. Based on the results of the diagnosed specimen, the bee keepers were advised to follow the recommendations accordingly.

RESULTS AND DISCUSSION

Insect pests of honey bees

Data (Table 1) showed that out of 71 farmers who visited the KVK campus with queries pertaining to honey bees, per cent values for the month of January, February, March, April, May, June, July, August, September, October, November and December were 2.9, 1.7, 15.4, 0.8, 1.2, 26.2, 6.7, 7.1, 2.5, 1.2, 5.9 and 28.4 per cent, respectively. It was inferred that majority of the farmers enquired about management of wax moth and varroa mite which reveals that these are the most important pest of honey bees and their products and cause serious losses in commercial beekeeping.

Attack of wax moth

Out of 71 farmers who visited the KVK with queries pertaining to the honey bees from January to December months, 43.7 per cent farmers (31 farmers) enquired about management of wax moth which confirms that it is the most devastating pest of honey bees. Secondly, a constant number of farmers visited the KVK with queries pertaining to its management in every month of the year which again confirms its devastating nature and its activeness throughout the year. Maximum number of farmers (12.9%) enquired about its management in the month of September because of the two reasons. Firstly, in this month, the colony was unable to defend itself due to its low strength which was due to shortage of bee flora. Secondly, the left over raised combs in the hive (due to weak strength of the colony) have to be removed and kept in storage for further use in the coming peak season when bee flora is maximum. The larvae of the wax moth destroy raised combs in storage also by tunneling through near the midrib of a comb in search of pollen, wax and protein of the pupal skins and the farmers do not know the right procedure of storage of these raised combs.

The farmers were advised to follow the prophylactic measures which are more effective in keeping an apiary free from this pestilence as controlling this pest inside a hive in active season is not so easy. The farmers were advised to keep the bee colony stronger as a stronger bee colony itself is able to manage this pest. The farmers were also advised to keep the bottom board clean and burn the collected debris from the bottom board as a large number of eggs are laid by the moth on bee wax or in debris on the bottom board, to keep cracks and crevices in the hive plugged and to remove extra empty combs from the colony and store them properly with fumigation as fumigation with a poisonous gas kills all stages of the wax moth.

Periodic fumigation was advised keeping in view its activeness throughout the year. In the

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hibernating season, the farmers were advised to pick the cocoons from inside the hives and destroy. Similarly, the farmers were advised to kill the sluggish moths by swatting. Once the colony have been taken over by the wax moths, the farmers were advised to shift the bee to new combs and uninfested frames.

Attack of varroa mite

During January to December months, 40.8 per cent farmers (29 farmers) enquired about management of varroa mite which confirmed that it is the second most devastating pest of honey bees after wax moth. A constant number of farmers visited the KVK with queries pertaining to its management almost every month of the year which showed that it is active throughout the year. Maximum queries regarding its management were obtained in the month of November (27.6%), December (20.7%) and January (13.8%). This may be because of the reason that during this time brood rearing on large scale has just been initiated by the hive due to abundance of bee flora because the life cycle is started by a fertilized female living on adult bee and entering an uncapped cell containing 5d old worker or drone larva where the mite first feed on the left over royal jelly remaining in the cells. She lays her first eggs 60 hr after the cell is capped and more eggs at various intervals of one day or so. Depending upon the amount of damage caused, the honey bee adults emerge with various degrees of body deformities.

Regarding its management, the farmers were advised to trap varroa on drone brood as it is more attracted to drone brood and to cut and destroy the infested drone brood comb part. Secondly, the placement of a sticky paper covered with 8 mesh screen on the bottom board make the fallen mite stuck to it and prevents their return to the brood combs. Thirdly, dusting finely ground sugar @ 20g/10 bee frame strength colony, uniformly between the inter-comb spaces in the late evening time reduces infestation of the mite. In the chemical methods, the farmers were advised to treat colonies

with formic acid (85%) @ 5 ml/d continuously for two weeks.

Colony collapse due to severe cold

Out of total farmers, 4.2 per cent farmers (3 farmers) enquired about management of honey bees in the winter season because their honey bee colonies get collapsed due to severe cold which prevails in the district usually during the month of December. From the discussion with the bee keepers, the reason for this was found to be same for all the bee keepers. The honey bee colonies of these bee keepers were very weak at the onset of winter. Weaker honey bee colonies are usually found because before the winter season i.e. in the autumn season scarcity of bee flora occurs which leads to their weaker strength and weak colonies are unable to pass the winter season as *Apis mellifera* are sensitive to cold and stop their field activity at 7°C.

To overcome this menace, the bee keepers were advised to unite the weak colonies with stronger ones, using newspaper method and very weak colonies can be united into single chamber using vertical queen excluder and thirdly the bee keepers were advised to shift colonies to Raya growing areas of Punjab, Haryana and Rajasthan to sustain bee activities and brood rearing.

Management of honey during different seasons

The next very problem, about which the bee keepers enquired the most, was the management of honey bees in different seasons. There are five different seasons in Punjab and management practices are usually different, except some, during different seasons. 2.8 per cent farmers enquired about the management of honey bees in the winter and spring seasons each whereas 1.4 per cent farmers asked about management of honey bees in the summer season. The beekeepers asked about the general management practices during the different seasons and no critical problem had been faced by the beekeepers during the respective season.

30 **Table 1. Monthwise – per cent farmers visited KVK regarding problems in honey bee keeping. (average of 3 years)**

Sr. No.	Problem	Total farmers	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Per cent farmers
1	Attack of wax moth	31	9.7	6.5	9.7	3.2	6.5	9.7	3.2	3.2	12.9	9.7	19.4	6.5	43.7
2	Attack of varroa mite	29	13.8	6.9	13.8	3.4	3.4	0.0	0.0	3.4	6.9	0.0	27.6	20.7	40.8
3	Management of honey bees in spring season	2	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8
4	Problem of robbing	2	0.0	0.0	0.0	0.0	0.0	0.0	50.0	50.0	0.0	0.0	0.0	0.0	2.8
5	Problem of laying workers	1	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4
6	Management in summer	1	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4
7	Management in winter	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	2.8
8	Colony collapse due to severe cold	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	4.2
	Total	71	2.9	1.7	15.4	0.8	1.2	26.2	6.7	7.1	2.5	1.2	5.9	28.4	100.0

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As most of the bee keepers were trained one and know about the general management practices which one has to follow during the respective season, this may be the reason that very less number of bee keepers enquired about the management practices in the different seasons. The only bee keepers who enquired about the management of bees in the different seasons were the beginners. Hence, for management during the winter season, the beginners were advised to move the colonies to sunny places and to provide inner packing to weak colonies with dry paddy straw (prali) wrapped in newspaper or polythene sheets and outer packing with polythene sheet.

The beginners were further advised to examine colonies only on some calm and sunny days during noon time, grow wind breaks, plug cracks and crevices, narrow down the hive entrance and to place the colonies with entrance facing south-east to protect bees from chilly winds because these are the management practices which help the bees to maintain their inside temperature in the hive during the winter season. As far as the management during the summer season is concerned, the beginners were advised to keep the colonies at raised place and clear the vegetation growing around the colonies because these practices help to improve ventilation in colonies and keep the hive cool.

Problem of robbing

The problem of robbing was observed in honey bee colonies which were weak ones. Out of total farmers, 2.8 per cent farmers (2 farmers) enquired about its management in the month of July and August. Very less number of farmers enquired about its management. Actually it is a problem related to the scarcity of bee flora and hence can be easily cured either by shifting the colonies to the places where the bee flora is abundant or by providing

supplementary sugar: water feeding to the honey bee colonies.

As most of the bee keepers were well aware of the type of bee behavior which the bees generally show when robbing takes place and they have also included providing the supplementary sugar: water feeding during the lean period in their management practice, hence it may be the reason that very less number of bee keepers asked about the management of this problem. One thing to note that the bee keepers who enquired about this problem were the beginners and small bee keepers who were unable to shift the colonies to places of abundant bee flora or were unaware to provide the supplementary sugar solution during the lean period. To get rid of this problem, the beginners were advised to provide sugar feeding in the evening, to make colonies bee proof, by plugging cracks and crevices and reducing the entrance to one-bee feeding and prevent spillage of feed in the apiary or outside the colonies.

CONCLUSION

Plant health clinic established at KVK, Kapurthala is a unique initiative tried by the Krishi Vigyan Kendra to link the farmers with the scientific knowledge. There is need for adopting innovative strategies and more importantly adopting multipronged initiative and timely diagnostic and management strategies from plant health clinic to combat attack from pests and environmental stress, manage plant health mitigate losses.

REFERENCES

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