

EFFECTIVITY OF ANTIMITES AGAINST VARROA JACOBSONI INFESTATION IN HONEY BEES

A. Nasim and T. Mahmood*

Department of Chemistry, Government College of Science, Lahore, Pakistan

*352-E, Punjab Housing Society, Defense Road, Lahore Cantt, Pakistan

ABSTRACT: The *Varroa jacobsoni* got introduced from Jammu in 1989. It caused huge destruction of honeybee in the hilly areas of Pakistan. The incidence of mite *Acarapis woodi* was comparatively high in colonies maintained in the Hivel. The incidence of Acarine mite was very low on the *Apis malfera*. The honey bees seem to be somewhat resistant to this mite. However, three different chemicals such as Bromopropylate, formic acid and lactic acid were compared to assess their efficacy against mites that revealed a significant difference ($p < 0.05$) against the mites. Compared to others, Bromopropylate was found to be more suitable followed by formic acid and lactic acid. Bromopropylate, though, is cost effective but it needs repeated treatment to control mites.

Keywords: Acarine mite, Lactic Acid, Formic Acid, Bromopropylate, *Varroa jacobsoni*, Folbex VA

INTRODUCTION

Honey, produced by the insect species of the genus *Apis* (commonly known as Honeybees), is a sweet and tasty nutritious product, and the raw material for honey is nectar produced in the nectaries in the flowers.

Bee Keeping Industry, like other agriculture crop/industry also has some natural enemies which attack the honey bee and affect the production of honey to large extent. Among these are the two wax moths *Achroia grisella* F. and *Galleria mellonella* L., five species of hornets *Wasps orientalis* L., *Vespula auraria* Sm., *V. velutina* Sm. and *V. germanica* F., two species of black ants *Monomorium salomonis* L., and *M. indicum* Morell and three species of mite *Acarapis woodi* (Rennie), *Tropilaelaps clareae* (Delfinado) and *Varroa jacobsoni* (Oudemans). These wax moths, hornets and mites are important enemies because these toll heavy losses to the bee colonies in Pakistan.

Honey bees (*Apis mellifera*) are attacked by the mite *Varroa jacobsoni* (Jong, 1988). This mite has spread to honey bees in many parts of the world, including Pakistan. In Pakistan, as in other places, experience has shown that bee colonies die after a few years unless treated.

At present, treatment is being carried out by means of a number of chemical substances, such as Folbex VA (Ciba-Geigy, 1985), formic acid and lactic acid. Many of the substances have to be used in the autumn, when there was no brood in the bee colonies. Folbex VA is one of the substances that are effective in treating for varroa.

MATERIALS AND METHODS

Treatment using three chemotherapeutic agents: Twelve diseased colonies comprising of seven bees frame per colony were isolated from apiaries and placed at National Agriculture Research Center, Islamabad in July 1990. The bee colonies were divided into four groups containing three colonies per group.

First group was treated with 98% formic acid. The formic acid was put into flasks. The flasks were then placed in the bee hives above the bees. When the formic acid evaporates, the bees distribute the fumes by ventilating with their wings. Second group was treated with 15% lactic acid. The third group was treated with Folbex VA @ 370 mg/strip (Bromopropylate). Fourth group was control and was kept without treatment.

Each colony was placed at a distance of two kilometer from each other. The colonies were treated for half an hour in the evening. In all, four treatments were given at four days intervals. Thirty bees per colony were sampled from each of the experimental colony before treatment, after three weeks and seventeen weeks of treatment and were dissected and examined for mite infestation. Honey produced by each colony was also estimated by the end of October 1990 (Table-1) and the results were assessed statistically using Post Hoc Test under LSD (Least Significant Difference) through SPSS software.

RESULTS AND DISCUSSION

Honey bees can be attacked by the acarine mites. The mite has spread to honeybees in many parts of the world. In Central Europe, as in other places, experience had shown that bee colonies die after few

years unless mite was treated. The mite was expected to have spread in Pakistan. Therefore a survey was conducted in September 1990 to determine the incidence of acarine mite in *Apis cerana* colonies in Swat, Mansehra, Murree and Abbottabad areas. The observations of this survey were recorded in Table-1. The bee colonies at all the surveyed sites were found to be infested with the acarine mite. The intensity of infestation was 7% in Swat, 26% in Mansehra, 23% in Murree and 53% in Abbottabad. *Apis cerana* bees were also sampled from these colonies and their tracheae were examined for the presence of mite. The bees sampled from Swat, Mansehra, Murree and Abbottabad district contained 2, 8, 7, and 16 mites per bee, respectively.

Table-1: Effect of chemicals on the degree of infestation and honey yield from treated and control colonies

Effect of Chemicals	Degree of Infestation %			Honey Yield
	Prior to Treatment	After Treatment 3-Weeks	After Treatment 17-Weeks	
Bromopropylate	7.0	0.0	1.0	7.0
	12.0	0.0	0.0	7.0
	23.0	0.0	3.2	5.0
	19.0	0.0	0.0	8.0
	24.0	0.0	3.0	8.0
Formic Acid	17.0	0.0	2.0	7.0
	17.0	0.0	1.5	6.2
	6.54	0	1.42	1.83
	14.0	8.0	13.0	3.0
	12.0	3.0	4.0	2.0
Lactic Acid	4.0	4.0	8.0	1.0
	19.0	8.0	31.0	1.0
	8.0	6.0	9.0	1.0
	6.0	4.0	11.0	2.0
	10.5	5.5	12.7	1.7
Control	5.57	2.16	9.47	0.81
	15.0	5.0	7.0	2.0
	21.0	6.0	8.0	1.0
	11.0	4.0	6.0	2.0
	6.0	2.0	5.0	2.0
AVERAGE	16.0	6.0	11.0	1.0
	12.0	3.0	12.0	2.0
	13.5	4.3	8.2	1.7
	5.08	1.63	2.78	0.51
	17.0	0.0	4.3	0.0
Standard Deviation	13.0	35.0	52.0	0.0
	20.0	28.0	68.0	0.0
	4.0	9.0	45.0	0.0
	4.0	7.0	82.0	0.0
	35.0	39.0	36.0	0.0
AVERAGE	8.0	11.0	92.0	0.0
	14.4	18.4	54.2	0.0
	10.96	15.29	29.72	0

At present, treatment against mites were carried out by means of a number of chemical substances. There were many organophosphorous and organochlorine pesticides which were tested and used for the mite control. The efficacy of three anti-Varroaosis products i.e Formic acid, Lactic acid and Bromopropylate (Folbex VA) was investigated in present study and the data was assessed using Post Hoc Test under LSD (Least Significant Difference). A significant difference ($p <$

0.05) was observed in comparative efficacy of three chemicals. Bromopropylate was found to be more suitable followed by formic acid and lactic acid (Table 1). The Formic acid treatment in controlling Varroa problem was effective but it led to high mortality of honey bees. This deviates from previous findings of Hansen *et al.*, (1988) who observed no significant loss of bees with formic acid treatment. Nevertheless, our observations of finding loss in bees might not be due to the formic acid doses but could be attributed to winter losses. *Apis mellifera* colonies, having seven frame bees, to control *Varroa jacobsoni*. The treatment of one smoke strips per hive completely killed the mite in the post embryonic stages without any harmful effects to the bees. Statistical analysis of this study indicates that bromopropylate (Folbex VA) is most effective drug in controlling mites infestation (Table-1).

Folbex VA brought about mortality of all the mites without any harmful effects on bees. The data indicate that Folbex VA gave better results, but re-infestation of mites after 17-weeks still remained a serious problem. Anyhow Folbex VA is an effective against varroa disease, but is has been used by a few bee keepers owing to non-availability in the remote areas of the country. The treatment with this chemical is quite easy and is very effective. Our observation is inline with previously reported results that Folbex VA showed the most effective and consistent results. No harmful effects of Folbex VA was noticed on adult bees or brood (Marchetti and Barbattini, 1984).

Conclusions: *Varroa jacobsoni* is very serious pest of *Apis mellifera*, but the mite infestation can be controlled with repeated application of Folbex VA. This will also lead to the better yield of Honey without the mortality of Honey bees.

REFERENCES

- Ciba-Geigy. The control of honey bee mite. Ciba-Geigy Agrochemicals, Whittlesford, Cambridge CB2 4QT (1985). ([http:// website. Lineone. net/ ~ dave. Cushman folbexva. html](http://website.Lineone.net/~dave.Cushman.folbexva.html))
- Crane, E. Honey A Comprehensive Survey, Heinemann London (1976).
- Hansen, H., and J. H. Petersen. Residues in honey and wax after treatment of bee colonies with bromopropylate. Tidsskr. Planteavl., 92 (1): 1 – 6 (1988).
- Jong D. D. Varroa Jacobsoni does reproduce in worker cells of Apis Cerana in South Korea. Apidologie. 19(3): 241 – 244 (1988).
- Laub, E., B. Metzler, A. Putz, and M. Roth. Zur Ruckstandssituation Zugelassener Varroatose be kampfungsmittem in Hoing Labensmittelchem. Gerichtl. Chem. 41:107-109 (1987).
- Marchetti, S. and R. Barbattini. comparative effectiveness of treatments used to control varroa jacobsoni oud. Apidologie, 15(4): 363 – 378 (1984)
- Morse, R.A. Honey bee pests, predators and disease. Cornell University Press, USA (1978).