ATTTA
Atlantic Tech Transfer Team
for Apiculture

Condensed Report on Miticide Resistance in Atlantic Canada

Several chemical products designed to treat varroosis – caused by in-colony infestations of the invasive varroa mite (*Varroa destructor* Anderson and Trueman) – are registered for use in the Canadian beekeeping industry. Atlantic Canadian beekeepers (i.e. from New Brunswick, Nova Scotia, and Prince Edward Island*) typically rotate between the use of organic acid treatment (i.e. formic acid and oxalic acid) and synthetic acid (i.e. amitraz and fluvalinate) (CAPA, 2016). Beekeepers rely on supplementing organic acid treatment with synthetic chemical treatment due to the limited efficacy of organic acids in varying ambient conditions (Skinner et al, 2001; Elzen et al, 2004). However, the frequent and widespread application of synthetic miticides induces the development of resistance in populations of varroa mites (CAPA, 2016).

Miticides registered in Canada

Resistance to synthetic miticides has previously been reported in Canada. The first miticide registered in Canada in response to the introduction of varroa mites was the pyrethroid fluvalinate (Apistan®, Wellmark International, pictured at right). Due to its widespread use, resistance to fluvalinate was observed in *V. destructor* in 2001 in multiple Canadian provinces (Currie et al, 2010). This observance of resistance prompted the Pest Management Regulatory Agency of Canada (PMRA) to issue emergency permits for the application of an organophosphate miticide, coumaphos (Checkmite+®, Bayer, pictured below) in areas where resistance to fluvalinate had been confirmed (Currie et al, 2010). Soon after its registration however, resistance to coumaphos was observed in 2002 in Ontario and later throughout most of Canada (Currie et al, 2010).

Resistance has not yet been reported in varroa mites in Canada with amitraz (Apivar®, Vetó-pharma, pictured at right) but has been in several other countries, from Serbia (formerly Yugoslavia) (Dujin et al, 1991) to the United States (Elzen et al, 1999). Due to the current resistance to two of the three registered synthetic miticides in Canada, a fourth, flumethrin (Bayvarol®, Bayer) has been registered (Health Canada, 2016a). Like fluvalinate, flumethrin is a pyrethroid, posing the risk for cross-resistance to develop in populations of varroa mites.

*No varroa mites have been reported in Newfoundland and Labrador

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Funders and Contributors:

Bleuets NB Blueberries
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Cross-resistance

Cross-resistance between fluvalinate and flumethrin has been reported in several arthropods: in *Varroa jacobsoni* Oud – a very closely related but less damaging cousin of *V. destructor* – in Italy (Milani, 1995), in a pest species of Noctuid moth, *Helicoverpa armigera*, in China (Tan and McCaffery, 2007) and most importantly, in *V. destructor*, in England (Thompson et al, 2002). If used in rotation with other non-pyrethroid chemical mite treatments however, Bayvarol® strips can be a component of a successful varroa management program (Health Canada, 2016b). Unlike with synthetic miticides, the risk of resistance developing to natural (i.e. non-synthetic and/or organic) mite control products is low.

Future of miticide use in Atlantic Canada

HopGuardII® (BetaTec, pictured at right), a natural bio pesticide derived from hop beta acids, is a commercially available product for the control of varroa mites in the United States and is under review for registration in Canada. Hop beta acids are weak acids that occur naturally in hop plants. Trials in Western Canada have demonstrated the potential for this product to be an effective varroa control option in Canada but this has not yet been confirmed in Atlantic Canada (BetaTec, 2015).

The commercial honey bee industry in Atlantic Canada is closely associated with the wild blueberry industry due to the essential pollination service honey bees provide. Optimizing honey bee health – which includes varroa management – is therefore fundamental to sustaining the growth of the wild blueberry industry. Varroa mites are considered one of the main causes of honey bee colony mortality in Canada (CAPA, 2016). As seen in the past, populations of varroa mites develop resistance to industry standard chemical treatments and it is possible this will happen in Atlantic Canada and Canada at large with Apivar®. In the meantime, it is prudent to approve more chemicals and to test their efficacy as components of an integrated management regime for varroa mites.

Photo Credit:
Apistan® and Apivar® - www.countryfields.ca
Checkmite+® - www.ebay.com
HopGuardII® - http://coronaapicultores.blogspot.ca/

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