Spinosad reduces the population of flea beetle (*Altica sylvia* Malloch) larvae in lowbush blueberry

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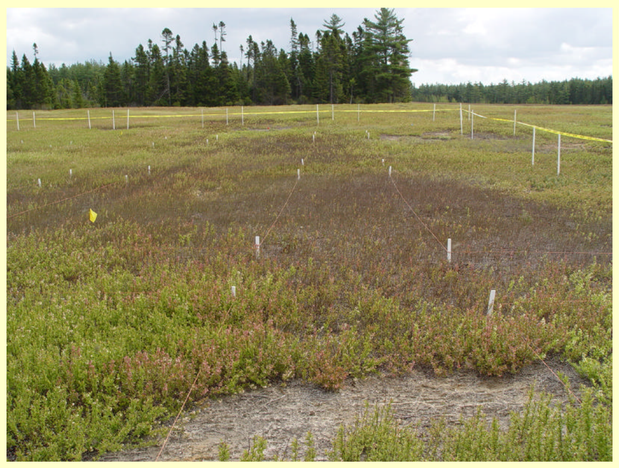
Abstract:

Lowbush blueberry (*Vaccinium angustifolium* Ait.), grown on more than 23000 ha in eastern Canada, suffers yield losses when the flea beetle *Altica sylvia* (Malloch) feeds on its leaves and buds. Trichlorfon is registered to control blueberry flea beetles, but with no import tolerance in the US, Canadian growers cannot use it on fruit destined for south of the border. An AAFC Pest Management Centre study evaluated the efficacy of spinosad, a reduced risk insecticide, in reducing flee beetle populations in lowbush blueberry at two sites in northeastern New Brunswick in 2006. At each site, a check-plus-standard-plus-factorial design with four replicates was established. The check plots were untreated. The standard consisted of trichlorfon (Dylox 420L) applied according to label instructions. The other treatments were spinosad (Success 480SC) in combinations of timing (targeting larvae or adults), rates (79.2 or 105.6 g a.i. ha^{-1}) and number of applications (1 or 3). Analysis of variance showed that spinosad reduced larval populations below those of the untreated check and sometimes below those of the trichlorfon-treated plots.

Methodology:

In 2006, two trials were established in commercial production year lowbush blueberry fields with known histories of flea beetle infestation. At each site, the trial consisted of a randomized complete block design comprising four blocks. Within blocks, treatments (Table 1) were replicated once. Data collection included: initial larval population prior to treatment application, insect (larval or adult) populations in each plot prior to and following all application events, and yield. Insect population measurements were carried out by drawing an insect sweep net through each plot in three 180°-strokes. Larvae/adults in the net were counted from each set of three sweeps. Count data required square-root transformation prior to statistical analysis. Analysis of variance was performed using a check-plus-standard-plus-factorial model, with initial larval population as a covariate to adjust for initial variability of pest infestation in the test sites.



One of two field sites in New Brunswick. Note the defoliation by flea beetle larvae (grey areas in mid-ground).

Sweep net was used in plots to scout larval and adult population pressure.

A mass of larvae in sweep net at heavily infested site. Inset pictures show larvae and adult flea beetles.

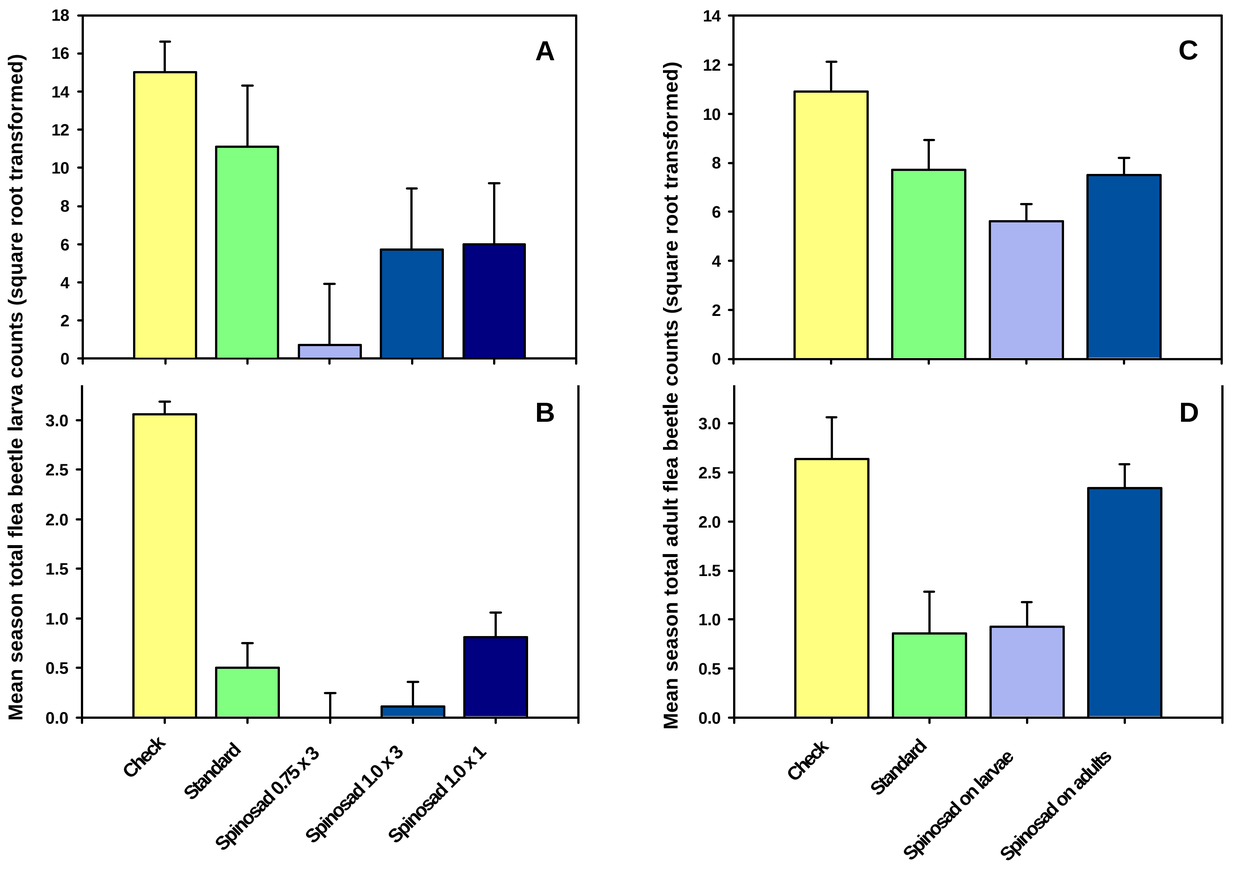
Treatments were applied using a CO_2 backpack sprayer.

Blueberries were harvested for yield measurements.

Results:

Mean season total flea beetle larva counts at sites with A) high pest pressure, and B) low pest pressure, in 2006 in untreated plots, and plots treated with trichlorfon or with spinosad applied at the larval stage one to three times at two different rates.

Mean season total adult flea beetle counts at sites with C) high pest pressure, and D) low pest pressure, in 2006 in untreated plots, and plots treated with trichlorfon or with spinosad applied at larval or adult stage.



Discussion:

Spinosad at both rates reduced flea beetle populations below those of the untreated check. Moreover, it reduced populations of larvae to levels equivalent to or below those in plots treated with the current industry standard, trichlorfon. These results confirm the findings of studies conducted in Maine, where spinosad (SpinTor 2SC) reduced larval populations when applied to young instars[1,2]. Our study also suggests that when pest pressure is low, multiple applications provide better control than a single one, and that targeting the larval stages is more effective than targeting the adults. Untreated plots were characterised by reduced yield (F prob. = 0.06) compared with treated plots, whereas yields in trichlorfon-treated plots and spinosad-treated plots were similar.

Table 1: Treatment applications used in two field trials to evaluate the efficacy of spinosad against blueberry flea beetle.

Treatment	Control product	Rate (g a.i. ha^{-1}) per application	Timing of first application	Timing of subsequent applications	Number of applications
Check	untreated	n/a	n/a	n/a	0
Standard	trichlorfon	1155	at appearance of larvae	at appearance of adults	2
Spinosad 0.75 x 3 L	spinosad	79.2	at appearance of larvae	7-day intervals	3
Spinosad 0.75 x 3 A	spinosad	79.2	at appearance of adults	7-day intervals	3
Spinosad 1.0 x 3 L	spinosad	105.6	at appearance of larvae	7-day intervals	3
Spinosad 1.0 x 3 A	spinosad	105.6	at appearance of adults	7-day intervals	3
Spinosad 1.0 x 1 L	spinosad	105.6	at appearance of larvae	n/a	1
Spinosad 1.0 x 1 A	spinosad	105.6	at appearance of adults	n/a	1

Conclusions:

Spinosad appears to be an effective alternative to trichlorfon with the accompanying benefits that it poses less risk to human health, is non-toxic to bee pollinators as soon as it dries, can be compatible with organic agriculture, and has import tolerance in the United States.

References:

[1] Collins, J.A. and F.A. Drummond. 1999. Blueberry: *Vaccinium angustifolium* Aiton 'lowbush' Blueberry flea beetle (FB); *Altica sylvia* Malloch. Arthropod Management Tests. *Vol. 24*: C3.

[2]Collins, J.A. and F.A. Drummond. 2000. Blueberry: *Vaccinium angustifolium* Aiton 'lowbush' Blueberry flea beetle (FB); *Altica sylvia* Malloch. Arthropod Management Tests. *Vol. 25*: C2.

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