PROJECT DETAILS

- **Title**: Integrated Management of Cabbage Seedpod Weevil and Overwintering Biology of Canola Pests
- **Funders:** Alberta Canola, SaskCanola, Manitoba Canola Growers
- **Research program:** Canola Agronomic Research Program
- **Principal investigator:** Lloyd Dosdall
- **Collaborators/additional investigators:** Hector Carcamo, Jennifer Otani and Doug Moisey
- **Year completed:** 2004

Final report

Several experiments were undertaken in 2001-2002 to develop an integrated management strategy for cabbage seedpod weevil in canola, and to investigate aspects of overwintering biology of lygus bugs and cabbage seedpod weevil. Research on integrated management of cabbage seedpod weevil focused on host-plant resistance, cultural control and biological control. In the host-plant resistance component of the project, research was conducted to evaluate susceptibilities of different species and varieties of Brassicaceae to infestation by cabbage seedpod weevil, and to assess *Sinapis alba x Brassica napus* interspecific hybrids for resistance to the weevil. Differences in susceptibility to infestation by cabbage seedpod weevil were observed among and within species of Brassicaceae. The order of susceptibility to infestation by C. obstrictus was *B.rapa*> *B.napus* ≥ *B.juncea* > *S.alba.* Considerable variation occurred in levels of susceptibility to cabbage seedpod weevil infestation among the *S.alba x B.napus* intergeneric hybrids evaluated. One genotype had no weevil exit holes, and 17 genotypes had only 1 to 5 exit holes per 100 pods. Of the remaining intergeneric hybrid genotypes, the frequency of exit holes per 100 pods ranged from 6 to 72. Research was also conducted in 2001 to investigate effects of canola crop canopy manipulation and trap cropping on infestations of cabbage seedpod weevil. Increasing the seeding rate to five pounds per acre, from one and three pounds per acre, resulted in greater weevil infestation levels and damage; however, seed yields were still greatest at the highest seeding rate> seeding in early May resulted in greater weevil infestation levels than seeding in mid-May; however, yields of early seeded plots were similar to those of plots seeded later. Insecticide applications were effective for reducing cabbage seedpod weevil infestations. Planting trap border strips of early flowering canola surrounding fields of plants that flowered later concentrated cabbage seedpod weevil adults on field edges. This facilitated edge spraying, which reduced input costs and damage to non-target beneficial insects. Trap cropping therefore holds great promise for sustainable management of cabbage seedpod weevil. Biological control initiatives for cabbage seedpod weevil resulted in the discovery of an ectoparasitoid of weevil larvae; the identity of the parasitoid remains to be confirmed, but it appears to be the wasp species *Trichomalus perfectus* (Walker). Studies on *Microctonus melanopus* (Ruthe), a parasitoid that attacks adult weevils,

determined that the species is now widespread in mixed weed patches near Lethbridge, AB. It appears to overwinter as a larva or embryo. More lygus bug and cabbage seedpod weevil adults overwintered in tree shelters than in roadside ditched or alfalfa fields. Microcosm cages used to enclose weevils and lygus bugs and retrieved at varying intervals during winter indicated high levels of survival (ca. 70%) in both fields and treed areas. Although ambient air temperatures can vary widely, soil temperatures showed much less variance. At depths occupied by overwintering lygus bugs and cabbage seedpod weevil adults, mean minimum soil temperatures did not exceed –5 °C.

Substantial research progress was achieved during this first year of study. Brassicaceae species having high levels of resistance to infestation by cabbage seedpod weevil were identified, and include *Sinapis alba*, *Crambe abyssinica*, and *Brassica carinata*. Of 236 intergeneric hybrids developed from crosses of a resistant parent (*S.alba*) with a susceptible parent (*B.napus*), 18 were found to have high levels of resistance (< 5 weevil exit holes per 100 pods). Manipulating canola plant stands by seeding early and increasing seeding rate resulted in higher levels of infestation by cabbage seedpod weevil. However, improved seed yields occurred at higher seeding rates and earlier seeding dates, indicating that canola can compensate for attack by this pest. Trap borders of canola that flowered earlier than the main crop were effective for concentrating cabbage seedpod weevil adults, enabling growers to spray just the borders and not the entire crop. Even when two border sprays were required for adequate weevil control, growers could obtain an economic benefit from trap crops, and damage to non-target and beneficial insect species was minimized with this approach. A parasitic wasp, previously unknown to Alberta, has apparently dispersed here and now attacks larval weevils feeding within pods. Tree shelters, rather than other habitats, appear to hold the key role in sustaining overwintering populations of lygus bugs and cabbage seedpod weevil. Research proposed for 2002-2003 will be directed toward making further progress in each of these areas.

Find more information on this project and many other relevant canola studies on the Canola Research Hub.
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