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Parasitoids of Cabbage Lepidoptera in Central New York[1]

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Conservation and enhancement of naturally-occurring predators and parasitoids is often a key to successful integrated management of insect pests in crops. Determining which natural enemies are present in a crop is a necessary first step in finding ways to increase their efficacy. Knowing which species are present can also help in determining whether or not introductions of additional natural enemies via classical biological control programs might help suppress pests even further. With these long-term goals in mind, we conducted extensive surveys to determine which species of parasitoids are attacking the three major lepidopteran pests of cabbage in New York: imported cabbageworm, *Pieris rapae* L. (Pieridae); diamondback moth, *Plutella xylostella* (L.) (Plutellidae); and cabbage looper, *Trichoplusia ni* (Hübner). Central New York comprises one of the major cabbage growing areas in North America. This report is the first describing parasitism of Lepidoptera in cabbage grown under commercial conditions in this production area.

During 1979–1981 and 1991–1994 immature stages of *P. xylostella, P. rapae,* and *T. ni* were collected from a total of 31 cabbage fields in Ontario and Yates counties, NY, and reared individually on cabbage leaves in the laboratory until adult lepidopterans or parasitoids emerged or death occurred from other causes. Collections were made from commercial growers' fields, some treated with insecticides, and treated and untreated fields at the Fruit and Vegetable Crops Research Farm of the New York State Agricultural Experiment Station in Geneva, NY. The majority of the samples were collected from the beginning of July through Sept., and this corresponded with the main occurrence of these Lepidoptera. In some cases *P. xylostella* eggs from a laboratory colony were placed on the plants in the fields to ensure adequate densities of diamondback moth larvae for later collections.

In three of the fields sampled in 1991, approximately 1,500 *Cotesia plutellae* (Kurdjumov) (Hymenoptera: Braconidae) were released as part of another trial for

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biological control of diamondback moth. Only two *C. plutellae* adults were reared from the 714 diamondback moth larvae subsequently collected in these plots, however, and these comprised the only *C. plutellae* collected during the course of this study. Because *C. plutellae* were not found in collections taken before 1991 and did not appear in collections after that year, we believe that this species was not present in the area before the releases and failed to become established after the releases. Therefore, the two individuals collected during the 1991 experiments are not included with the other data presented here.

In all years *P. xylostella* were collected as larvae or pupae; however, prepupae were sometimes counted as larvae and sometimes as pupae. Therefore, in this report *P. xylostella* collections are given as total of larvae and pupae combined.

All totals and percent parasitism values presented here are for those hosts which were reared to either adult Lepidoptera or adult parasitoids and do not include any individuals dying from disease or unknown causes. Voucher specimens of the parasitoids were placed in the Cornell University Insect Collection, Ithaca, NY.

Pieris rapae. No parasitoids were produced from the 324 *P. rapae* eggs that were collected and reared. Of the 1,880 *P. rapae* larvae which were collected, 5.5% were parasitized by *Cotesia glomerata* (Muesebeck) (Hymenoptera: Braconidae), 4.1% by *Phryxe vulgaris* (Fallén) (Diptera: Tachinidae), and 0.2% by *Compsilura concinnata* (Meigen) (Diptera: Tachinidae). Four parasitoid species were reared from the 550 *P. rapae* pupae collected. These included *Pteromalus puparum* (L.) (Hymenoptera: Pteromalidae) (44.4%), *P. vulgaris* (9.5%), *C. concinnata* (0.7%), and *Coccygomimus pedalis* (Cresson) (Hymenoptera: Ichneumonidae) (0.2%).

Plutella xylostella. A total of 2,815 *P. xylostella* larvae and pupae was collected. Of these, 46.5% were parasitized by *Diadegma insulare* (Cresson) (Hymenoptera: Ichneumonidae), 7.0% by *Microplitis plutellae* (Muesebeck) (Hymenoptera: Braconidae), 2.1% by *Oomyzus sokolowskii* (Kurdjumov) (Hymenoptera: Eulophidae), and 0.4% by *Diadromus subtilicornis* (Gravenhorst) (Hymenoptera: Ichneumonidae). No *P. xylostella* eggs were collected.

Trichoplusia ni. No parasitoids emerged from the 32 eggs of *T. ni* that were collected and reared. Out of 936 larvae, 2.1% were parasitized by *C. concinnata* and 0.3% by *Copidosoma floridanum* (Ashmead) (Hymenoptera: Encyrtidae). A total of 122 *T. ni* pupae was also collected, of which 4.1% were parasitized by *C. concinnata*.

Our extensive collections over seven seasons have allowed us to determine the major parasitoid species attacking the larvae and pupae of the three major lepidopteran pests of cabbage in central New York. These include *P. puparum, C. glomerata,* and *P. vulgaris* on *P. rapae; D. insulare, M. plutellae,* and *O. sokolowskii* on *P. xylostella;* and *C. concinnata* on *T. ni.* Although our surveys revealed no egg parasitoids, more eggs should be sampled before it can be concluded that egg parasitoids are absent on these species in this area. Future research will seek to quantify the mortality inflicted by each of the parasitoid species and to find ways to maximize their effect on pest populations.

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