POTENTIALLY IMPORTANT BIOLOGICAL CONTROL ORGANISMS: SAMPLING GENERALIST PREDATORS IN APPLE ORCHARDS

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The SARE (Sustainable Agriculture Research & Education) project is investigating the feasibility of apple production without the input of broad-spectrum neural-active pesticides. In our phase of that study we employed pitfall traps to survey for generalist, primarily ground inhabiting, predatory insects. Traps were placed in six orchards, five in Washington (Bridgeport, Chelan, Orondo, and two in Yakima), and one in Oregon (The Dalles). Each of these orchards contains two, ten acre designated plots, one which is managed by conventional means (C) and a second managed without the use of neural active pesticides (N). Pheromones are the primary control in the N-blocks. Six traps were placed in each block within tree rows, and at a minimum of ten rows in from the margins. Ten ounce plastic cups containing glycol were placed into a sleeve of PVC pipe that was buried in the soil; and plywood covers were suspended above these traps with 8 penny nails hammered into the corners of the plywood. The traps were collected every three weeks for the remainder of the growing season, with the last collection 13-15 September. A total of four collections were made.

Carabidid beetles (Coleoptera: carabidae) were consistently trapped at significantly higher rates in the N-blocks of all orchards than in the C-blocks. Graph 1 shows the mean number of carabids sampled for each collection in both treatments. At least three carabid species have been shown to feed on fifth instar larvae of codling moth (*Cydia pomonella* L.) in apple orchards: *Pterostichus melanarius* Illiger, *Harpalus aeneus* L., and *Amara aena* DeGeer. Other lepidopteran species, such as noctuid and tortricid leafroller larvae, may also be attacked by these generalist predators. Selected samples of the carabids collected in the 1996 SARE pitfall traps are currently being identified. Experiments are being planned that will test the capabilities of the different carabid species to control various lepidopteran pest species. These experiments will be performed using field trapped carabid beetles.

Other generalist predators collected included: spiders (Aranae), centipedes (Chilopoda), earwigs (Dermaptera), ants (Formicidae), big eyed bugs (Lygaeidae), and harvestmen (Opiliones). These predators were also consistently found at higher population levels in the N blocks than in the conventional blocks. Carabids, spiders, earwigs, and centipedes are all large enough to prey on orchard lepidopteran and homopteran pests. Centipedes and earwigs will also be identified, and will be included in the lepidopteran host experiments being conducted with the carabids. Graphs 2 and 3 show the mean centipede and earwig trap catches, respectively, for all orchards for 1996. Spiders collected will be identified by Dr. Gene Miliczky, USDA, Wapato. Whereas the carabid populations were consistently higher in the N-blocks of all orchards, the difference in population densities of these other predators in the two treatments was much more pronounced in some orchards than others. The type and density of groundcover in the different orchards is one possible reason for these differences. Ground cover characteristics will be examined in the 1977 growing season.

Our objective is to better understand the shifts in predator/prey populations at SARE sites that are a result of reduced pesticide use. We want to determine whether generalist predator populations in apple orchards will increase over time with continued avoidance of broad spectrum, neural active

mid-September.





graph #1

2

1

.4



graph #2



- PIT TRAPS

DERMAPTERA 1996

graph #3

pesticides. Sampling for 1997 will begin 17 March, and will continue every three weeks through