

American Farmland Trust/EPA

Organophosphate reduction project

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Methamidophos (Monitor 4) is a restricted use organophosphate insecticide registered for use on potatoes, tomatoes and cotton. Monitor 4 is commonly used to control green peach aphid, the most efficient vector of *Potato virus Y* and *Potato leafroll virus*, in seed potato fields. On average 640,000 lbs of the active ingredient, methamidophos, is applied nationally with potatoes accounting for 87% or 556,000 lbs of its usage (EPA 2002). Traditionally, control of green peach aphid in seed potato fields involved applying Monitor 4 to the entire field at 1.5 to 2 pints an acre. However, green peach aphid does not initially colonize potato fields uniformly. Studies of green peach aphid distribution in potato fields conducted during the 2000, 2001 and 2002 growing seasons show that initial colonization of green peach in potatoes primarily occurs along the field edges. It is estimated that for the first 10 days following initial detection of green peach aphid in potato, more than 90% of the aphids are within 18 m of the field margins. This suggests that insecticides applied to only field margins would largely eliminate colonizing green peach aphids and reduce the amount of Monitor 4 insecticide used for the first application by 70-80%.

In 2003, we requested help from the potato growing community to formally test this hypothesis. Twenty seven seed potato fields volunteered by Minnesota and North Dakota growers were used in this project. Each of the 27 potato fields was sampled for aphids in the first 18 meters at either end and in the field interior (24 hours prior to treatment, 72 hours post-treatment and 7-days post-treatment). A single aerial application of Monitor 4 was applied in an 18 m spray swath at each end of the field (where the crop and headland interface was most obvious and where we expected to find most green peach aphids). Each border area was sampled by selecting one leaf from 30 randomly selected plants in the 18 m border area for 60 leaves total. The field interior, defined as the area beginning at least 30 m from the field edges, was sampled by selecting one leaf from 40 randomly selected plants throughout the interior area. Aphid species, numbers and forms (winged or wingless) were recorded for all samples.

Pretreatment samples of green peach aphid in 27 seed potato fields indicate that of the 1,432 green peach aphids recorded, 91% were encountered in the border area (Figure 1). Samples collected 72 hours post-treatment found 265 green peach aphid in the border area and 111 in the interior of the field (Figure 1). Samples collected from 24 fields 7 days after application detected 475 green peach aphids in the border areas and 406 in the field interior (Figure 1).

Closer inspection of the sample data revealed that two seed potato fields contributed more than half of the green peach aphids found in the 72-hour post treatment samples. Additionally, closer inspection of field interiors revealed a previously unconsidered site for green peach aphid to colonize: power line poles in the field interior. The area around power line poles that are located in the field interior are left unplanted and provide a contrast between the crop and soil that is attractive to aphids.

Our results indicate that for at least the first application of Monitor 4, a border application would effectively control colonizing green peach aphids in seed potato fields and would benefit the grower through reduced application costs.

Figure 1. Number of green peach aphids detected in the border and the interior of seed potato fields.

