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*In This Issue*

1. Aphid and virus management on vegetable crops
2. Onion Weed Control Update

## Aphid and virus management on vegetable crops

(Celeste Welty & Sally Miller)

The soybean aphid is predicted to be present in the midwestern USA in 2007, as it has been every 2 years for the past 7 years. Although its host plant is soybean, the soybean aphid can cause problems on other crops by vectoring non-persistent viruses such as cucumber mosaic virus (CMV) on peppers (Figure 1), and watermelon mosaic virus (WMV) on pumpkins and other vine crops (Figure 2). Symptoms of CMV on peppers include leaf spots and mosaic and oak leaf patterns on leaves and necrotic (brown) lesions or streaks on banana pepper fruit. Infected jalapeo fruit may appear smaller than normal and bumpy, and the fruit wall may be significantly thinner than for healthy fruit. On pumpkins, it is impossible to diagnose which virus is present based on symptoms; for either WMV or CMV, leaves can be mottled in color, or mildly or severely distorted or puckered. The leaf in Figure 2 was positive for both WMV and CMV in laboratory tests taken

after the photo was taken.



A B



C D E

Figure 1. Symptoms of cucumber mosaic virus (CMV) on pepper: A) typical oak leaf pattern on leaves; B) mosaic symptom on leaves; C) necrotic leaf spot; D) symptoms on banana pepper fruit; and E) symptoms on jalapeno fruit.



Fig. 2. Symptoms of a mixed infection of WMV and CMV on pumpkin leaf.

The soybean aphid overwinters as eggs on buckthorn, a shrub that is much more common in the upper Midwest than in Ohio and the lower Midwest. Previous outbreaks of soybean aphid have started in Michigan, Wisconsin, and Minnesota in early summer, then moved southward into Ohio later in the summer. We

expect the outbreaks to be similar in 2007.

A common question on the minds of many vegetable growers is how virus infection can be prevented. Although a common answer to this question is to apply insecticides to kill the aphid vectors, this answer is unfortunately not correct. Soybean aphid moves into an area as winged adults that are seeking their preferred host plant, which is soybean. Winged aphids typically land on many different plants. After an aphid lands on a plant, it tastes the plants by probing, which means it inserts its long sucking mouthparts into the plant. If the probe shows the aphid that the plant is not the preferred host plant, then the aphid immediately flies away and seeks another plant. Viruses like CMV are transmitted by the mouthparts of the aphid during these probes on non-host plants.

If a plant has been treated with insecticide, then an aphid that lands on the treated plant might die quickly after the feeding probe, but the virus has already been transmitted as the aphid was picking up the lethal dose of insecticide. Even if an insecticide gives 100% control of aphids, it is not likely to have any effect on viruses like CMV. Lack of effect on virus by insecticide occurs if there is widespread primary infection by virus, which results from large numbers of winged aphids arriving in a field in a short period of time. Insecticides can help in cases where primary infection occurs in a small number of plants, and there is a chance to prevent secondary spread of the virus by killing aphids, but this is not likely in the case of

soybean aphid. When the soybean aphid moves in to an area, we usually have large flights, thus widespread primary infection by virus.

Some crops such as cucumbers and squash are available in CMV-resistant varieties, but peppers and pumpkins are not. We have no reliable method of preventing virus, but there are a few ways to delay virus or to reduce the amount of virus-symptomatic fruit: plant as early as possible, use early-maturing varieties, and use reflective (silver) plastic mulch to delay initial colonization by aphids. Stylet oil can also help to physically prevent the virus particles from being transmitted from the aphid to the plant, but stylet oil takes a lot of effort with frequent sprays (twice per week) at high pressure.

Although growers should realize that insecticide is not likely to prevent virus infection, some growers plan to apply insecticides to control aphids and to attempt to reduce the spread of virus. A specific insecticide that some vegetable growers are thinking of using for aphid control is Admire Pro (4.6F) or Admire 2F or generic equivalents. Admire will give excellent aphid control when applied to the soil, where it is taken up by the roots and acts as a true systemic for several weeks. It is the best of any insecticide we have for aphid control. It can be used as a transplant drench or as chemigation through drip tubes later in the season. Which of these options is used for soybean aphid control depends on what part of Ohio is involved. In northwest Ohio where early outbreaks of

soybean aphids are possible, a transplant drench in late May should provide effective aphid control during June. In the rest of Ohio, a transplant drench would provide control during weeks when aphids are not likely to be present, so is not recommended. In most of Ohio, better timing should be obtained from chemigation, around mid-July.

In areas where aphids might arrive early, such as in northwest Ohio, a more efficient alternative to a transplant drench of Admire is a plug drench one to two days before transplanting, using Marathon II which has the same active ingredient as Admire, but targeted to greenhouse applications. Marathon is allowed for use on vegetable plants grown for resale, including peppers, tomatoes, eggplant, cole crops, and greens, but not on cucurbits. A plug drench would be relatively cheap insurance because a small amount of product will go a long way. The rate of Marathon for vegetable plug trays is 1.7 fl oz in at least 6 gallons of water to cover 3000 square feet.

Several insecticides are available for use in foliar sprays for aphid control. Provado has the same active ingredient as Admire but has only limited systemic activity; it has trans-laminar activity and is effective for about 10 days. Actara, Assail, and Venom are products with action similar to Provado, and these kill whiteflies and leafhoppers as well as aphids. MSR (metasystox-R), Orthene, Dimethoate, and Lannate are older products that do a good job of killing many aphid populations, but are less effective against some populations if resistance has

developed. Two specialized insecticides that kill only aphids and not other pests are Fulfill (pymetrozine), which has been registered since 1999, and Beleaf (flonicamid), which just was registered last November.

## Onion Weed Control Update Doug Doohan, State Specialist

Just a few days ago I realized that recommendations for weed control in onions in Bulletin 672 have not been revised for a number of years. Below are recommendations for Outlook herbicide on dry bulb- and green onions that will be of interest to all onion growers. Outlook has been used for a number of years by many growers in our state; initially, under a Section 18 Emergency Exemption. Dry onions made it onto the federal label about 2-3 years ago and green onions just in the past few months.

The new federal label allows Outlook use on dry bulb- and green onions (including leeks), dry bulb shallots, garlic, Japanese bunching onions, and green shallots. Outlook controls most annual grasses, along with pigweeds, lambsquarters, nightshades, common ragweed, common purslane and yellow nutsedge. Two to five weeks of good control can be expected, depending on soil organic matter, weed seed density in the soil surface and environmental conditions. Control from applications to

muck soils will be on the shorter end of that range.

Generally, Outlook should be applied when onions are in the 2-leaf stage. Prior to the 2-leaf stage crop injury may occur. Application rate is 12-21 fl. oz./A with the low rate on coarse textured mineral soils and the high rate on fine textured soils high in organic matter. Muck growers should use the 21 fl. oz. rate. Split applications can also be used in which 12-14 fl. oz. would be applied at the 2-leaf stage, followed by a later application of 7-9 fl. oz., as late as 30 days before harvest.

Outlook does not control emerged weeds. If emerged weeds are present Outlook must be tank-mixed with an herbicide that will provide burn-off. For dry bulb growers Goal (2-4 fl.oz./A, onions at least 3-leaf stage) is the logical tank-mix partner to kill emerged broadleaf weeds. Goal is not registered for green onions; therefore, Outlook must be applied before weed emergence or poor broadleaf control will result. For emerged annual grasses, Fusilade, Poast or Select (dry onions only) can be tank-mixed with Outlook. Label instructions for tank-mix partners (for instance NIS is needed with grass herbicides) need to be followed.

Cereal grains can be planted to Outlook treated soil 4 months after application and there are no restrictions on crop rotation the following spring.