VEGETABLE CROPS HOTLINE

A newsletter for commercial vegetable growers prepared by the Purdue University Cooperative Extension Service

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http://www.entm.purdue.edu/entomology/ext/targets/newslett.htm

IN THIS ISSUE

ADMIRE INSECTICIDE FOR GREENHOUSE CUCUMBER AND TOMATO - (*Frankie Lam*) – Some growers have questions about applying Admire insecticide for the control of insect pests in the greenhouse. Admire is recommended for application on mature plants of cucumber and tomato in the greenhouse for the control of aphids and whiteflies, respectively. Phytotoxicity may occur if Admire is applied on immature plants.

The recommended rate for the application of Admire in the greenhouse is 1.4 fl oz per 1,000 plants with a minimum of 16 gallons of water for tomatoes and 21 gallons of water for cucumbers. The dosage can be applied by using soil drenches, micro-irrigation, drip irrigation, or hand-held or motorized calibrated irrigation equipment. However, certain varieties of cucumber and tomato may show more sensitivity to the chemical, treatment to a few plants is recommended before application is made to the whole greenhouse. Admire should not be applied more than once per season, but can be applied up to the day of harvest. In addition, application of Admire on plants may have negative effects on some beneficial insects, such as insidious flower bug and minute pirate bug and repellency of pollinators.

The active ingredient of Admire is imidacloprid, which belongs to the chemical group chloronicotines. According to the mode or target site of action, the chemical binds to neural receptors (nicotinic acetylcholine receptors), which disrupts nerve transmission. Admire is usually applied as soil insecticide in the field for the management of insect pests on vegetables and tree fruit crops. Consult the label for complete information on restrictions and application recommendations before using any pesticides.

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ROOT KNOT-NEMATODES - *(Andreas Westphal and Daniel S. Egel)* - Root knot nematodes, belonging to the species *Meloidogyne*, are microscopic round worms, they live below ground and feed on roots of their host plants. While there are several kinds of root knot nematodes, they all cause root deformations, called galls or knots, which can be seen with the naked eye. Early in the season, high root knot nematode infestations can be devastating (Figure 1). When such unthrifty

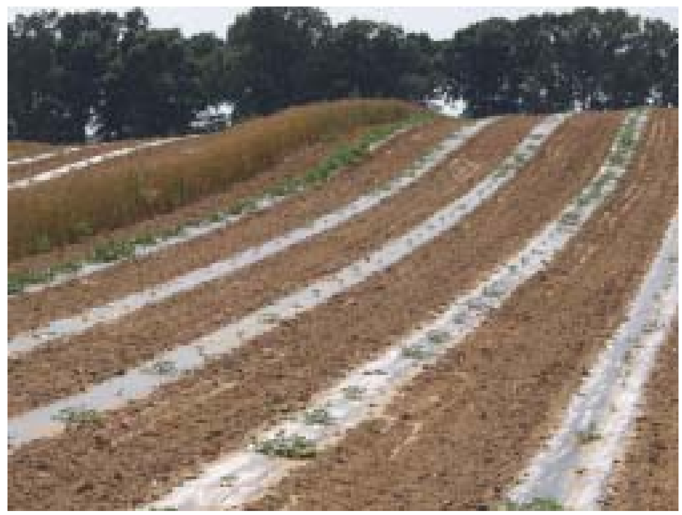

Figure 1. Watermelon field infested with root knot nematodes. Note the very poor plant stand. (Photo by Andreas Westphal)

watermelon plants are recovered the taproot is entirely galled, thereby limiting the function of the plant (Figure 2). Late summer after harvest, it is still a good time to

Figure 2. Watermelon seedling dug from the field with unthrifty growth. Note the severe galling of the main roots. Such a root system is not capable to provide the necessary water and nutrients to the plant. (Photo by Andreas Westphal)

check for nematode problems in watermelon or muskmelon fields. While much of the melon acreage has started to senesce, growers probably still remember areas of reduced growth and overall reduced plant vigor. Such sites are prime candidates for nematode infestation hot spots. Nematode attack can occur at various soil depths; it is necessary to dig the root systems from the soil with a shovel or spade at least to the depth of regular soil tillage (or at least 1 foot deep). Roots can then be examined for the nematode-induced galls (Figure 3). While the presence of root knot nematodes is not always associated with economic yield loss, it is important to know if fields are infested.

Fig. 3. Severely galled watermelon root system close to harvest. (Photo by Dan Egel)

Management of root knot nematodes is difficult. Cropping sequences and variety selection can be improved by avoiding susceptible host plants in infested fields. This strategy will reduce plant damage due to nematodes and reduce the long-term population densities in particular fields. This strategy is hampered by the fact that root knot nematodes can infect a number of plants, including beans, canola, cereals, corn, potato, soybean and tomato. Experience from other areas in the United States has demonstrated the benefit of incorporating resistant varieties of host crops into the sequences in reducing damage on the sensitive crop when non-hosts are not available. A project to identify soybean varieties with higher levels of resistance to root knot nematodes, supported by the Indiana Soybean Board, has been initiated at Purdue University. One objective of the current project is to identify resistant soybean varieties and use them to manage the population densities at a low level within melon fields.

Chemical control options can be considered and tested in a limited area in fields with root knot nematode infestations. Growers need to be aware that successful fumigation will depend on good fumigation conditions. The soil needs to be warm and dry enough when fumigants are applied. It is critical to observe the minimum waiting period following fumigation before laying plastic and planting. If such precautions are not observed, adverse effects of the fumigants on plant growth may be possible. Fumigant labels warn of negative effects on plant growth if fumigation conditions are unsuitable or when insufficient waiting periods are observed. While air temperatures in spring rise quite fast, soil temperatures lag behind. A check of soil temperature and moisture at the depth of fumigant application will help to ensure good conditions for a successful fumigation.

Recent field visits have confirmed root knot nematodes on soybean and corn. Root knot nematodes expected in Indiana can infect some plants with only limited damage, but may increase in number under these same crops to damage subsequent sensitive crops. This is part of the reason for the Purdue project on soybean. The key point is that root knot nematodes can only be a problem if they at some point have been introduced into a particular field. Plant-parasitic nematodes move actively only in the range of about 1 foot. Passive transport on agricultural equipment, on muddy shoes or other implements will carry them further. Also for this reason, it is good practice to have only clean equipment enter a field. In particular after working an infested field it is imperative to clean equipment of soil and crop residue before entering new fields.

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Tomato Fruit Color and Potassium Nutrition - *(Chris Gunter)* - Yellow shoulder disorder (YSD) of tomato is distinguished by discolored regions under the skin of ripe fruit (Figure 1) compared to normal mature

Figure 1. Tomato fruit with yellow shoulder. (Photo by Chris Gunter)

red fruit (Figure 2). The severity of symptoms range from internal white tissue associated with vascular bundles to distinct yellow or green sectors. The disorder

Figure 2. Normal tomato fruit. (Photo by Chris Gunter)

involves abnormal fruit development and is not a delay in fruit ripening. This problem is characterized by a reduction in cell size and a more random arrangement of cells in the sectored tissue. The green chloroplasts in YSD tissue fail to develop into red chromoplasts (Francis et al., 2000). It's triggered very early in fruit development and is not reversed by delaying harvest. In fact, delaying harvest to let colored sectors continue to ripen is ineffective and the subsequent delay will reduce the quality of unaffected fruit by increasing the amount of culled fruit lost due to over ripening.

Understanding that YSD involves altered fruit development rather than delayed fruit ripening is critical to the development of management strategies for growers. Unfortunately the causes of YSD are not yet well understood; nutritional status, weather, and plant genetics have all been implicated. Most physiological disorders are difficult to "solve" because they involve an interaction between many factors. Choice of variety is important. The Ohio Agricultural Research and Development Center's tomato genetics and breeding research program has spent considerable effort on developing selection strategies and new varieties with improved color and improved color uniformity. Current recommendations from Ohio are that fields with a history of YSD should not be planted to PS696 or Ohio 8245. Varieties such as Heinz 9423, TR12, and OX23 are excellent alternatives.

Location effects that have been demonstrated concern available potassium (K), which is affected by available magnesium (Mg), available calcium (Ca), soil pH, and soil fixation capacity. Uniform color requires more available K than is necessary for yield alone. The most complete study to date (Hartz et al., 1999) demonstrated that the incidence of YSD varied among fields from 0% to 68% of fruit affected. In their California studies the incidence of YSD was lower in fields with high K status of both soil and plant. The measure of soil K availability most closely correlated with percent YSD was the soil exchangeable K/ (Square root Mg) ratio. This ratio has been called the 'Hartz ratio'. Fields with an extractable K greater than 0.7 cmol/kg and an exchangeable K/ (Square root Mg) ratio of greater than 0.25 had a low probability of YSD. Soil application of either K or gypsum ($CaSO_4$), to increase {K/(square root Mg)} ratio reduced YSD. These results indicate that there are soil conditions where managing K may help reduce YSD, initial studies characterizing Midwestern soils for YSD susceptibility are underway and look promising. You can determine the 'Hartz ratio' for your soil by entering the values in the 'Hartz ratio' calculator, which is available on the web at <www.oardc.ohio-state.edu/tomato/HartzRatioCalculator.htm>.

Current management strategies for reducing the incidence of YSD come largely from recommendations based on soil types in California. Because soil conditions in the Great Lakes region are far more diverse than those found in California, applying those recommendations to our soils has been difficult. Preliminary recommendations are available at the above website. The management goal is to increase available K and/or decrease available Mg. Magnesium may be reduced by adding Ca as an antagonist or by reducing soil pH below 6.5. Sources of lime can be dolomitic (containing Ca and Mg) or calcitic (containing Ca). Adjusting the pH of soils to 6.5 or higher with dolomitic lime will be counterproductive to management of YSD due to the addition and possible increased availability of Mg. Adding K or gypsum may be cost prohibitive or ineffective on soils with high Mg, high K fixation capacity, or a pH > 6.5. It is possible that some fields and soil types should be avoided. Finally, it should be noted that management of YSD through soil nutrition must be done far in advance of fruit set in order to minimize the incidence of YSD. Treating YSD, after it appears in the field, with supplemental K^+ will not reverse the disorder in effected fruit.

Francis, D.M.; Barringer, S.A., Whitmoyer, R.E. 2000. Ultrastructural characterization of yellow shoulder disorder in a uniform ripening tomato genotype. HortScience 35 (6): 1114-1117.

Hartz, T.K.; Miyao, G.; Mullen, R.J.; Cahn, M.D.; Valencia, J.; Brittan, K.L. 1999. Potassium requirements for maximum yield and fruit quality of processing tomato. J-Am-Soc-Hortic-Sci. 124 (2): 199-204.

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Tomato Blossom End Rot - (*Chris Gunter*) - Blossom end rot is a physiological disorder caused by a deficient supply of calcium to the developing fruit. It is a common problem on tomatoes, but can also occur on peppers, eggplants, and melons.

Blossom end rot appears first as a small darkened or water soaked area around the blossom end of the fruit (Figure 1). This spot darkens, enlarges and dries out as fruit matures. This area is an open wound on the fruit surface that may be invaded by secondary decay causing organisms. This disorder is caused by a

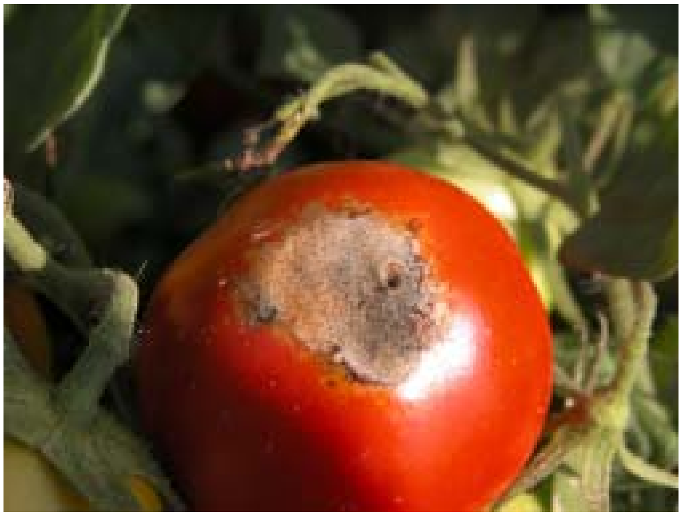

Figure 1. Early blossom end rot on processing tomato fruit. (Photo by Chris Gunter)

combination of both cultural and climatic factors including nitrogen, calcium and soil moisture. Prevention is the best way to avoid losses from blossom end rot.

Avoid excessive nitrogen, which promotes vegetative growth that will compete with the developing fruit for an adequate supply of calcium. Remember that the calcium necessary for plant growth moves to the roots in the soil water. It is transported from the roots to the leaves and fruit through the xylem. Any interruption of water supply to the roots, for example during hot dry weather, can cause a temporary calcium deficiency in the developing fruit. Low pH can also cause calcium to be less available, maintain pH between 6.0 and 6.8. Be aware that foliar applications of a calcium containing products, which are frequently advocated, may be of little value because calcium has poor absorption and remobilization to the fruit where it is needed. If a spray is applied, follow label directions carefully to maximize effectiveness.

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UPCOMING EVENTS - Mark your Calendar for the Following Events

September 14, 2004 **-** Pumpkin Variety Plot Tours in NE Indiana. Between 2 and 4 p.m. rout pumpkin plots near Columbia City. From 5 to 8 p.m. tour pumpkin plots east of Fort Wayne and enjoy dinner after the tour. Purdue specialists will participate at both locations. Watch the next issue of this newsletter for driving directions.

September 16 2004 **-** Commercial Fruit and Vegetable Plot Tour, Throckmorton Purdue Ag Center. See over twenty jack-o-lantern pumpkin varieties and talk with Purdue Vegetable Specialists about pumpkin production. See over 50 grape varieties, training system research, and herbicide injury symptoms. Come and see twenty new apple varieties and how they perform under Indiana conditions. Also see dwarf apple tree pruning and training.

Come out and see the latest varieties, find out what's hot and what's not and talk with Purdue specialists at these upcoming meetings.

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