

What's New with Vine Crop Diseases and their Management

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With several diseases occurring regularly and others sporadically in cucurbit crops growing in the northeastern US, disease management often is needed to avoid reduction in yield or fruit quality.

Powdery mildew management program often needs adjustments each year as the pathogen and management tools change. An integrated program with fungicides applied to resistance varieties is recommended to minimize selection pressure for pathogen strains able to overcome either plant resistance genes or fungicides. The pathogen has exhibited adaptation to both tools.

A new pathogen race has been detected in the south able to affect melon varieties with resistance to races 1 and 2. Fortunately these resistant varieties are still providing good suppression in the north. The resistance genes in squash and pumpkin are different from those in melon. With most crop types (exception being butternut), varieties with resistance from both parents (homozygous) have been less severely affected by powdery mildew than varieties with resistance from one parent (heterozygous). Another exception is varieties from Hollar Seeds, which have a different major gene for resistance.

Mobile fungicides currently recommended for powdery mildew are Quintec (FRAC Group 13), Rally or Procure (both Group 3), and Pristine (Groups 7 + 11). The Quintec label was expanded in 2009 to include pumpkin, winter squash, and gourd. Melon was labeled in 2007. Quintec is not labeled for use on edible-peel cucurbits. In 2009 it was again the most effective fungicide in efficacy experiments. Performance of other products has been affected by resistance developing in the pathogen. It is critical to apply Quintec in alternation with the other mobile fungicides for resistance management and to comply with label restrictions. The label specifies no more than 2 consecutive applications plus a crop maximum of 4 applications. Also each of the mobile fungicides should be tank-mixed with a protectant fungicide to manage resistance and to ensure effective control. Quintec, Rally, and Procure are only effective for powdery mildew. Procure was more effective than Rally in a fungicide evaluation conducted at LIHREC in 2009. The highest label rate of Procure contains almost twice as much active ingredient as Rally. Both of these DMI fungicides were more effective than Inspire, a new DMI fungicide; similar results were obtained in GA. It was anticipated that this new generation DMI fungicide would be inherently more active than Rally and Procure, just as these are more effective than the first DMI fungicide Bayleton, which is no longer labeled. Laboratory testing of isolates confirmed that the cucurbit powdery mildew fungus is less sensitive to the active ingredient in Inspire than Procure and Rally, and is more sensitive to the active ingredient in Quintec. A few isolates of the pathogen collected in PA and NY in 2008 were found to be completely resistant to both active ingredients in Pristine. However, Pristine was as effective as Procure in 2009 in both the NY and GA efficacy experiments. But it did not perform well in an experiment conducted in NJ. There are new, highly effective fungicides in development for powdery mildew. Hopefully these will

be registered before the pathogen has developed resistance to Quintec so that all can be used together in a fungicide resistance management program.

Downy mildew has continued to be important every year during the growing season. Before 2004 this disease occurred sporadically in the northeast and often late in the season. Now it can occur before fruit production is done, when loss of leaves, which can occur quickly when downy mildew is not managed, can impact yield and fruit quality. An important tool for managing downy mildew is the forecasting web site at <http://cdm.ipmpipe.org>. The risk of downy mildew occurring throughout the eastern US is forecast and posted three times a week. Plans for the future include customizable alerts that growers can subscribe to receive by e-mail or text message. The main management tool is fungicides. It is not possible to avoid the wind-dispersed spores. Cucumber varieties with resistance to the old pathogen strains provide significant but insufficient suppression. There are several mobile fungicides with different modes of action: Ranman (FRAC Group 21), Forum (40), Revus (40), Presidio (43), Curzate (27), Tanos (27), Gavel (22), and Previcur Flex (28). Alternating among fungicides in different FRAC Groups and tank-mixing them with a protectant fungicide is generally recommended. Curzate and Tanos have some curative activity but limited residual activity (about 5 days).

Phytophthora blight management has been improved with the recent registration of several mobile fungicides with different modes of action that have targeted activity for this group of pathogens. These fungicides are Ranman (FRAC Group 21), Forum (40), Revus (40), Presidio (43), Tanos (27), Gavel (22), and phosphorous acid fungicides (ProPhyt, Phostrol, Fosphite, etc)(33). These are also effective for downy mildew, thus growers applying these fungicides for blight have not had foliage loss to downy mildew. In recent years blight has been effectively controlled in fields where blight previously caused substantial yield loss by using an integrated program that also includes practices for managing soil moisture. Some growers have been starting the fungicide program with an application of a phosphorous acid fungicide along with Admire in the furrow at planting. It is critical to alternate among fungicides with different modes of action (in different FRAC Groups) to minimize selection pressure for fungicide resistance. Use either Forum or Revus since these are in the same Group.

Mustard and other plants with biofumigant activity have been found effective for Phytophthora blight through research conducted at LIHREC. Caliente 199 mustard was grown during spring prior to a cucurbit crop. Fertilizer (100 lb/A N) was applied to obtain adequate growth. This variety was selected because it has a high concentration of glucosinolates, which breakdown as the plant decomposes into allyl-isothiocyanate, which is similar to methyl isothiocyanate, the active ingredient in the chemical fumigant Metam Sodium. Several weeks after the start of flowering, when plants were about 5-ft tall, they were flail chopped and immediately incorporated by rototilling, then the soil surface was sealed by rolling with a cultipacker followed by irrigation. When done early in the morning and quickly, loss of biofumigant through volatilization will be minimized.

Fusarium crown and fruit rot has been increasing in occurrence in pumpkin, especially where there is minimal rotation (e.g. u-pik fields). In some pumpkin fields it has become more important than Phytophthora blight. Affected plants wilt. They usually are scattered in a field similar to the distribution for bacterial wilt, in contrast with Phytophthora blight, which tends to affect groups of plants. The crown area of affected plants generally appears firm, lacking the

collapsed, dark, water-soaked appearance of crown rot due to *Phytophthora*. The crown area may feel soft when squeezed and it will usually break near the soil line when the plant is pulled up, revealing brown rotted tissue inside the crown. There may be a thin layer of white fungal growth on part of the surface of affected crowns. *Phytophthora* can also produce white fungal growth on affected crowns. Crown tissue of plants affected by bacterial wilt will appear healthy and will not break when the plant is pulled up. In addition to causing a crown rot, *Fusarium* also causes round, brown spots on the side of fruit lying on the ground. Affected fruit will eventually completely rot. Labeled fungicides include the biofungicide Actinovate, which can be applied to soil, and Topsin M. Since the white fungal growth is mostly spores and the pathogen survives on affected plant debris, it may be worthwhile where incidence is low to physically remove affected tissue. Only the affected crown tissue needs to be physically removed from the field, but since the crown will break when the plant is pulled, a trowel will be needed to remove the part left in the soil. Deep plow immediately after harvest, clean equipment after working in affected fields, and rotate out of cucurbits for at least three years.

Please Note: The specific directions on fungicide labels must be adhered to -- they supersede these recommendations, if there is a conflict. Any reference to commercial products, trade or brand names is for information only; no endorsement is intended.