Extreme weather events could compromise one of our best disease management tools in vegetables

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This article is going to be a follow-up to the one Gordon Johnson did a couple of weeks ago about how flooding and waterlogged soils can create extra challenges in our vegetable crops. An example of an extreme weather event is a downpour of 4-10 inches of rain in a matter of hours, which results in flooded fields and standing water, possibly for days. This is occurring and is predicted to occur more frequently not only in our area but throughout the Midwest. Gordon’s article explains some of the physiological effects on plants that occur in a field when there is standing water for any length of time. But there are other problems that could occur when growers use grafted plants to protect their crop from certain soil diseases.

Grafting vegetable crops has increased dramatically in the last 10 years to the point where most growers are producing at least one grafted vegetable crop. Most grafting is done to manage a soil disease problem such as Fusarium wilt, Fusarium crown and root rot, southern wilt, corky root rot or root knot nematodes. There are even root stocks that can be selected to help the crop tolerate a flooding episode. In the past when growers were faced with a soil disease problem they would fumigate with methyl bromide (MBr). When MBr was removed growers turned to grafting preferred scions such as an heirloom tomato variety that has no Fusarium wilt resistance onto root stocks with resistance to that disease. The problem is, and it has become yearly that I see it, when we have one of these extreme rain events and the field floods and the flood waters become high enough (or plants are too low in the plant hole) to over-ride the graft on the plants and the scion can become infected with the disease the root stock is resistant to (fig. 1). Another potential problem is when flood waters sit in the field for 48-72+ hrs. and various root rots caused by Rhizoctonia or Pythium species infect the grafted root system which is not resistant to these pathogens. At other times when a tomato plant sits in water-logged soil for days it starts to put out adventitious roots and these roots can develop from the base of the scion when grafted to some rootstocks. These adventitious roots could come into contact with the soil and introduce soil-borne pathogens into the scion, which can result in loss of resistance.

The frustrating part for growers in all of this is that this little 2-3 hour event in the 5-month or more production cycle of this crop could disrupt much of the work the grower has put into managing the crop. Bottom line is that grafting is a great way of managing some soil-borne diseases for our vegetable crops and has become very common place as a tool growers can utilize. However, even if growers use grafted tomato or cucurbit plants, they need to understand that they may not be “home-free” from these soil diseases and need to include some cultural practices that help alleviate the possibility of flooding or standing water in a field (see Gordon’s previous article). One possible cultural practice that helps with soil disease management is using crop rotations. Unfortunately, this practice is usually not possible for most growers especially in the mid-Atlantic because of the price of land and development encroachment; growers simply do not have enough land to do the rotations for the needed amount of time.
Fig. 1 Row of grafted heirloom tomatoes wilting due to a soil disease from a flooded field