How can we "rein in" scab infection during these monsoon-like conditions?

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Cool weather for the last few weeks (April 12-26) has slowed tissue development in apple and also slowed release of primary apple scab spores. That's ancient history now. Rains, and heavy rains including intermittent intense rain showers have already occurred last night and are predicted over the next few days, combined with warming temperatures. These warming temperatures will facilitate more rapid tree development this week as well, meaning more unprotected susceptible tissue. Scab infection periods with average temperatures in the 50's require between 10 and 14 hours of wetting. I am anticipating a heavy scab infection event from today's (Apr 26) rains that could be prolonged over the next few days.

We are severely limited in Michigan regarding available scab fungicides due to fungicide resistance. Resistance is essentially complete and distributed throughout the state to strobilurins (Flint, Sovran). Our recent surveys have also revealed very high levels of resistance to sterol inhibitors (SI's; Rally, Procure, Vintage, Topguard). Resistance to dodine is present in some orchards and can be predicted to be present if dodine (Syllit) has been applied in the past few years. In many cases, individual scab fungal isolates are resistant to all of these fungicides.

Okay, that's the bad news, what other news is there?

First of all, all orchards should have been covered prior to the rain event of April 26. Apple scab is best controlled with fungicides applied with a protectant strategy, i.e. fungicides present on susceptible tissue in advance of infection periods. I heard many reports and spoke to several growers that had applications of copper and/or EBDC fungicides on trees put on during Monday's lull before the storm. That's great, and those trees should be protected through this current rain event.

However, prior to the next onslaught of rain, those trees will likely need another application of a protectant fungicide. I realize that there is a lot of standing water in orchards and there is a reluctance or inability to move equipment through. We do need to understand though that with current (2011) scab populations in Michigan, *fungicides applied prior to infection events are so much more effective than fungicides applied post infection*. Pre-infection applications will always be the best strategy for scab control.

If a switch to post-infection control efforts is necessitated, I have some guidelines on these strategies below.

The SI fungicides have historically been the best bet for post-infection activity and arrest of scab infection once the fungus has penetrated the leaf. However, SI fungicide resistance has essentially wrecked this option. There are three fungicides options currently available for post-infection control. *It is critical to acknowledge in advance that none of these options will be as effective as the SI's once were*. Thus, use of these fungicides now will not preclude an intensive implementation of protective fungicide applications in the forthcoming weeks. This increased care will be necessary to protect susceptible tissue from primary scab spores as well as secondary conidia that will be produced from any scab lesions originating from infections occurring this week.

<u>The three fungicide choices are</u>:

1. Anilinopyrimidines – Vangard and Scala – these fungicides posess about 48 hours of post-infection activity. In the 2011 Michigan Fruit Management Guide, I rate these fungicides as *good to very good* for scab control when used in a protective strategy. These ratings should be reduced at least a notch to *good* for post-infection control. These fungicides also appear to be highly locally

systemic in that they do not redistribute well and do not control fruit scab well, meaning applications later in the primary scab season are discouraged.

2. 2nd-generation SI's – Inspire Super and Indar – the 2nd-generation SI's are supposed to control SI-resistant scab strains. Inspire Super is a premix of the 2nd-generation SI difenoconazole and Vangard. We do not have data on the post-infection effectiveness of 2nd-generation SI's, but do not expect it to be equivalent to what was originally observed with SI's years ago. All scab isolates that we tested in 2010 were susceptible to difenoconazole, suggesting that these compounds can be used without problem in 2011.

However, my estimate on the potential longevity of these 2nd-generation SI's is that they will be susceptible to fungicide resistance development sooner rather than later. My reasoning for this is that we already have extensive, high-level resistance to the 1st-generation SI's signifying that the fungus has already done the heavy-lifting in SI resistance development. The step for the fungus to take to resistance to the 2nd-generation materials may be only a 100 meter dash compared to the half-marathon that was required to get to resistance to the 1st-generation compounds. Post-infection use will only hasten that resistance development.

3. Dodine – Syllit – dodine definitely has a place as a rescue fungicide for apple scab within about 24-48 hr after infection. The only difficulty with using dodine is the potential that dodine-resistant scab strains are present in your orchard. The percentage of dodine-resistant scab strains typically decreases over time in orchards when this fungicide is not applied. However, resistant strains can rapidly arise following use. A rule of thumb for dodine is if the fungicide has not been used in the previous 5 years, it can be applied as a rescue treatment.

Any of these fungicides (1 to 3 above) should be tank-mixed with an EBDC at 3 lb/A. The use of the EBDC protectant will have no effect on post-infection control but will protect newly-developing tissue and will be somewhat of a hedge for resistance management.

As soon as possible after this week, we need to get back to a protectant strategy for scab control. Always remember that the scab fungus never rests. Always remember the "blanket" strategy for coverage of susceptible tissue that I discussed a few weeks ago (CAT ref from April 12th article). As new tissue is developing more rapidly, the classic protectants (EBDC's and Captan) when used in combination provide advantages for the "blanket" strategy in that they provide a highly-effective barrier to infection and combine very good retention and redistribution properties with no risk of fungicide resistance development.