

Lauchlin W. Titus, CPAg
AgMatters
1063 Main Street
Vassalboro, ME 04989
Office 207 873-2108 Cell 207 314-2655
ltitus1@verizon.net

Managing Common Scab in Potatoes: A Multiyear Systems Approach

I traveled to Guelph, Ontario, Canada in early March 2007 to attend the International Potato Common Scab Conference. This was an excellent conference, organized by Dr. Eugenia Banks, with speakers from Australia, South Africa, Scotland, United States, and Canada. Attendees included potato growers, researchers, consultants, and industry representatives. A common theme of presenters was the difficulty that farmers have all around the world in dealing with this problem. There is no one silver bullet approach to reducing or eliminating common scab—if there was, then there would not be a need for so many people to travel so far to discuss and learn about the issue. I will try in this summary to tell you about some of the strategies that seem to work as well as some that don't.

It was reported that a survey of Canadian potato growers rated common scab of potato as their third priority disease of concern—with late blight first and bacterial ring rot second. With late blight everybody knows they can get it but we also know pretty well how to monitor for it and manage it. Not many growers see ring rot now—but everyone fears it. It is a good example of a disease that has been greatly reduced by sanitation and good management. Common scab is a disease of concern because it is poorly understood and seldom “managed”. Ask five folks like me how to manage common scab and you will probably get six answers! What works in one field may not work in an adjacent field on the same farm. There is no one factor that consistently works in your town, or Maine, or North America, or the world.

Common scab of potatoes is caused by several species of the genus *Streptomyces*. The most common species is *S. scabies* but there are other species that cause the problem. These species that cause common potato scab exist in all agricultural soils of the world and are also found in forest soils and other non-agricultural areas. It needs to be noted that there are thousands of species of *Streptomyces* and that there may be as many as two hundred species present in any one field. Many of the antibiotics used today are derived from various *Streptomyces* species. *Streptomyces spp.* are filamentous spore and toxin producing bacteria. The toxin that causes the common scab symptoms that many of us are all too familiar with is called thaxtomin. It disrupts the development of cell walls and results in scab lesions. The balance of *Streptomyces spp.* in a soil may be such that the scab causing species are suppressed. Factors that disrupt this balance may cause a field that never produced scabby potatoes to suddenly produce potatoes with so much scab that the field may be abandoned to potato production. The opposite has happened as well. Examples cited were two mid-western U.S. university sites that were used repeatedly to screen potato varieties for scab resistance. The crop of scabby potatoes was turned back into the soil every year. Then a year came that, surprisingly, there was virtually no common scab present on even highly susceptible varieties. In both cases these soils had become scab suppressive and remained so. Soils that are compacted, have poor soil structure, and are low in organic matter tend to have a higher incidence of scab. Some of the

practices described later may work largely due to the improvements that they make to soil quality and soil health.

Practices that reduce the incidence of common potato scab are numerous. These include the use of resistant varieties, crop rotations with various cover crops, and certain nutrient and fertility practices, and fumigation. No one of these generally work alone, but a holistic approach that incorporates several of them is probably the best way to manage for common scab. I will attempt to explain in a bit more detail each of these management tools.

Resistant variety development is probably the area of most benefit for growers with persistent problems with common scab. There was an excellent display of over one hundred potato cultivars at the conference. They ranged from highly resistant to highly susceptible and were rated on a scale of 0 (resistant) to 5 (susceptible). Even highly resistant varieties like Russet Burbank can get common scab though. Some of the Australian work is to find and develop strains of Russet Burbank that are even more highly resistant to the problem.

A couple of our presenters at the conference talked about their work with crop rotations and the use of various cover crops. A common theme was that brassica crops or brassica cover crops (mustard, canola, rape, broccoli) prior to potatoes tended to reduce the incidence of common scab more so than other materials. Sorghum X Sudan looked pretty good too. They probably “work” for different reasons though. The brassicas work as a result of the bio-fumigant activity of the breakdown of the crop—many of us have heard Peter Sexton talk about this at the winter potato seminars in Caribou. The sorghum X sudan produces a lot of sugars and other components that are readily digested by soil microbes thus feeding the good species to the detriment of the “bad” species of *Streptomyces*. Rye, both winter rye and annual rye, did not work to suppress common scab.

The nutrient and fertility discussion was of particular interest to me, as that is an area that I do a lot of work with. There was a lot of science presented as to why the following suggestions work and I am not going to go into those details here, but instead cut to the chase and tell you what has been observed to be useful in reducing common scab. Lime spreading got a bad rap by several presenters. Adequate lime spreading to provide calcium and magnesium nutrition is important but high levels of lime spreading just prior to potatoes may cause some short term soil chemistry changes that can result in increased scab incidence. Remember, scab is a result of cell wall disruption, so adequate calcium to build strong cell walls may be helpful. Gypsum can be also be used to provide calcium nutrition. There were several nutrient and fertilizer messages that I think may be useful for some growers. Have adequate soluble phosphorous in your fertilizer. Foliar applied phosphorous in one trial reduced scab by 20%. Use an ammonium source of nitrogen. Have adequate magnesium. Do not have excessive potassium. The ratio of potassium to magnesium percents of base saturation should be less than .5 and a range of .3-.4 seems to provide both increased yield and scab reduction. This was from A & L Labs information. Adequate manganese is important as well. The speaker indicated that high carbon residues (small grain straw or corn stover) can bind up manganese in the short term and this micronutrient may need to be considered for inclusion in the fertilizer material.

The work with fumigation in Michigan generated the most questions and discussion (quest for a silver bullet?). A banded application of chloropicrin in the fall or spring prior to planting dramatically reduced the incidence of common scab and resulted in some good yield increases as well. Similar results came out of Ontario research. There are some management challenges to fumigation. Soil temperatures need to be over fifty degrees Fahrenheit and potatoes can not be planted for about two weeks after a spring application. Potatoes need to be

planted over the treated band with minimal disturbance to the treated soil. Fumigation with Vapam (metam sodium) does not control scab, so not all fumigation products work on all soil organisms.

And of course there are lots of other things that don't work. We fondly refer to many of these items here as "Snake Oil" products. The speaker from Scotland told me that their term for similar materials is "Muck Abouts". Most growers have tried one or more of these types of products in the quest for something, anything, that may help to control common scab. I know this to be so because I have sold and/or recommended some of these materials in an earlier phase of my career! Several of our speakers at the conference told about products in this category that they have trialed in their work. Most did not work and some produced more scab than the untreated control. Try to remember the old adage, "If it sounds too good to be true....." This is especially true for this complex, difficult to manage disease common scab of potato.