DISEASE CONTROL | By Phillip S. Wharton & Kasia Duellman, University of Idaho

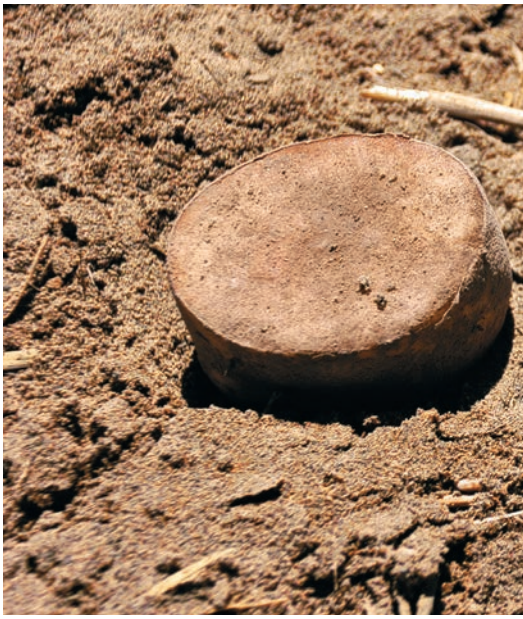
Early Start

Pre- and early-season control measures for potato diseases

Seed-borne diseases of potato represent a significant constraint to potato production in the U.S. Pathogens such as *Fusarium sambucinum* (Fusarium dry rot) and *Phytophthora infestans* (late blight) are major potato pathogens, affecting tubers in storage and seed tubers and sprouts after planting. In severe outbreaks, the pathogens may completely rot seed pieces or kill developing sprouts outright, resulting in delayed or non-emergence. The use of an effective seed treatment in combination with good management practices during cutting and seed storage prior to planting is essential to reducing Fusarium dry rot and preventing late blight, as well as secondary bacterial soft rot.

Good management practices begin with the control of volunteer potatoes (those left in the field during the previous season's harvest and have survived the winter). Volunteer potatoes have become an important perennial weed in many potato-growing regions. Potato sprouts emerge from overwintered tubers and grow rapidly in the spring. This rapid growth, combined with the tuber's ability to re-sprout, makes them very difficult to control, even with multiple control measures. Volunteer potatoes act as hosts for a number of important pests and diseases, including late blight, Colorado potato beetle, potato leafroll virus, potato virus Y and nematodes such as stubby root nematode (which transmits tobacco rattle virus, the causal agent of corky ringspot disease). Winters in the northern U.S. have become warmer over the last few years, which may favor overwinter survival of volunteer and cull potatoes. With the recent trend for warmer winters, more volunteers and cull pile potatoes are surviving the winter and acting as sources of disease inoculum in the spring.

Cull potatoes are those potatoes deemed unusable for the fresh market, processing or dehydration, or disposed of for some other reason, such as overproduction or waste (slivers) from seed production. Research has shown that the temperature within discarded cull piles may influence core tuber tissue temperatures affecting the survival of tuber tissue and thus *P. infestans* mycelia in infected tubers. Consequently, the risk of initiation of an epidemic of late blight from cull piles is closely related to the temperature experience of overwintered potato culls. Although the potatoes at the top and bottom of a cull pile may freeze over the winter when ambient air temperatures fall below freezing,



research has shown that the temperature in the middle of the pile remained stable regardless of cull pile size (from 1 to 15 tons). Since cull piles in excess of 1 tons may enhance the survival of tubers and *P. infestans* mycelia even in the coldest winters, it is important to follow cull and waste potato management guidelines (see University of Idaho bulletin CIS 814, "Cull and Waste Potato Management").

Infected seed may be the most important source of primary inoculum for diseases like Fusarium dry rot and late blight. Seed treatments are easily applied and are generally inexpensive compared to foliar sprays. Additionally, research has shown that plant growth will be more vigorous and the crop will produce greater yields if seed pieces are free of pathogens.

When using a seed treatment to control late blight, it is essential to ensure that one or more of the fungicides components has efficacy against *P. infestans*; numerous available seed treatments do not protect against late blight but are very effective against other seed-borne diseases such as Fusarium dry rot and Rhizoctonia. Some of these include fludioxonil (Maxim 4FS), penflufen (Emesto Silver) and flutolanil (Moncoat). In general, any seed treatment product containing mancozeb will provide effective control against seed-borne late blight. Seed treatments currently registered for use on potato in Idaho that contain mancozeb include Maxim MZ, Moncoat MZ and Nubark Mancozeb. Although Emesto Silver doesn't contain mancozeb, the label does recommend "a mancozeb-containing product specifically designed for application to potatoes in place of the inert absorbent."

Seed treatments provide a chemical barrier around healthy seed pieces and also reduce the number of spores produced on the cut seed surface of infected seed pieces, thereby reducing the number of spores that can be spread during the seed-cutting and handling operation. In addition to maintaining seed health after cutting and re-storage before planting, these products will also improve emergence and reduce incidence of bacterial soft rot and blackleg, as they also reduce secondary infection by bacterial pathogens.

Effective management of seed-borne diseases requires the implementation of an integrated disease management approach, including all of the above practices. Such an integrated approach can significantly reduce the chances of a late blight outbreak and protect against diseases such as Fusarium dry rot and Rhizoctonia.