SILVER SCURF: UNDERSTANDING AND MANAGEMENT OF A SLOW MOVING DISEASE

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Silver scurf disease of potato is caused by the fungus *Helminthosporium solani*. The disease has gone from obscurity to serious the past few years due to a number of factors including resistance to thiabendazole fungicides, improved storages with higher humidities, lowered defect tolerances, and increased awareness. It is a blemish disease of tubers, causing a metallic discoloration of the periderm in irregular patterns. It does not cause yield losses at harvest, but does cause weight loss of stored potatoes due to increased water loss, resulting in excess shrink and flabbiness. It affects quality of all market classes of potatoes. It is a cosmetic disease of red-skinned and russet fresh potatoes, resulting in reduced consumer acceptance and rejection, and after prolonged storage turns round reds into brown rounds. Round white processing potatoes used for chips are more difficult to peel because the dehydrated and diseased periderm is difficult to peel, and remaining peel causes an undesirable edge on the chips after cooking. The disease does not affect any other part of the potato plant except the tubers, and both the teliomorph and alternate hosts are unknown.

EPIDEMIOLOGY

FIELD: Silver scurf is considered primarily a seed borne disease. After planting of infected seed pieces, sporulation can be seen on the seed pieces one week after planting, and can be recovered from soil surrounding the seed piece two week post-plant. Infection of new progeny tubers can occur as early as nine weeks after planting. It is unknown how infection moves from the seed to the new tubers; the spores are not motile, and movement to new tubers via infected stolons has not been documented. Low levels of conidia may persist in the soil form one season to the next, but prolonged soil survival has not been demonstrated. Crop rotation is an important management practice to prevent infection by this short-term soil-borne inoculum.

STORAGE: Silver scurf spreads in storage, resulting in an increase in both disease incidence and severity. Spores (conidia) are detected early and throughout the time potatoes are in storage. Spore traps placed in commercial potato storages have detected up to 25,000/day. Sporulation occurs in processing storages held at 50C (10F) and in seed storages held at 38F (4C). Sporulation is reduced somewhat by cooler temperatures. Spores are dislodged and released into the storage atmosphere when tubers are moved or handled for grading or shipping, and move throughout the piled potatoes via the air handling system. These conidia are infectious and move to uninfected parts of the tuber and cause new silver scurf lesions. Old lesions enlarge and sporulate, but only at the edge of the lesion. Germination of H. solani spores is reduced from 80% to <5% after exposure to humidities of <95% regardless of temperature (10C, 15C and 20C). Seed tubers are infected when seed is moved from the seed house, H. solani spores are dislodged into the air and infect the unprotected seed tubers.

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MANAGEMENT

CHEMICAL: Virtually all H. solani isolates collected from North America are resistant to thiabendazole (Mertect). Post-harvest application of Mertect for Fusarium dry rot control formerly provided good control of the silver scurf as a non-target organism, but is no longer effective because of resistance. Seed treatment fungicides are effective for limiting silver scurf at harvest. Recommended seed treatments include mancozeb, TOPS-MZ and Maxim. Maxim has shown suppression of silver scurf even into the storage season. Dithane ST is registered for silver scurf control going into storage, but use is limited to seed potatoes only; potatoes for food or feed cannot be treated. Fungicide application on seed potatoes as they are coming out of storage prior to shipping may be an ideal place for disease management, since seed tubers are freshly exposed to the spores, and may prevent widespread infection of seed prior to planting.

CULTURAL: Research has shown that silver scurf increases in the field with early planting and late harvest dates. The longer potatoes are in the ground after vine kill, the more silver scurf they have. The least amount of silver scurf is found when the interval between vine-kill and harvest is five days. There is no resistance to silver scurf in existing varieties in North America or Europe, so resistance cannot be used for disease management. However, eleven wild species have been identified with good resistance to silver scurf, especially in *Solanum demissum*, and this is being introgressed into domesticated potatoes by breeding programs for future varieties. The use of clean, silver scurf -free seed is not a feasible control strategy now, because virtually all seed is infected with H. solani. H. Solani free minitubers can be produced in greenhouses, but recontaminate quickly when exposed to spores released from infected tubers in storage. Consequently, even early generations of seed are infected with silver scurf. In addition, new infections are hard to see on unwashed seed, and it is difficult to grade and remove affected seed tubers.

STORAGE: Sanitation is recommended annually to get rid of spores that remain in the storage from one season to the next and are circulated to the new crop when the fans are turned on. Removal of potato debris and washing with soap and water will get rid of the majority of the overseasoning spores. Because spore germination is inhibited by humidities less than 90%, maintaining a dry storage environment of 90% for the first month after potatoes are placed into storage is recommended to delay silver scurf spread. Humidities can be increased after this time to prevent excessive shrink and pressure bruise. Separate storages with separate air handling systems for early generations of seed potatoes will prevent contamination of otherwise clean seed lots.

FUTURE: Preliminary research has shown that treatment of the storage atmosphere with chlorine dioxide may significantly reduce the infection and spread of silver scurf in storage and limit disease. Trials conducted in commercial potato storages has shown that adding chlorine dioxide in the humidification system reduces the number of silver scurf spores, and the incidence and severity of silver scurf after storage for 16 weeks. Work in this area is continuing. We have also identified a mycoparasite of H. solani that reduces sporulation, and may be useful as a biocontrol agent to reduce spread of disease in storage, but more work is necessary to demonstrate this. Other work has shown that post-harvest application of certain salts reduces silver scurf and H. solani of treated potatoes after prolonged storage. These simple salts are already used in food preservation and further work may establish their usefulness in silver scurf management.