Potato Progress

Research and Extension for Washington's Potato Industry
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Andrew Jensen, Editor. Submit articles and comments to: ajensen@potatoes.com
108 Interlake Rd., Moses Lake, WA 98837; Fax: 509-765-4853; Phone: 509-765-8845.

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Potato Commission Research Review

Final Research Review, February 16-17, 2010
Best Western Hotel, Pasco

Purpose: Hear results from 2009 potato commission research projects and listen to proposals for 2010 research

Who's Welcome: All Washington potato growers and other potato industry members

Location: Best Western Hotel, Pasco, near the airport

Time: February 16, 8:00 am - 5:30 pm; February 17, 8:00 am - 1:00 pm

Pesticide Re-certification Credits: Will be available both days.

RSVP appreciated for meal planning purposes to Andy Jensen, ajensen@potatoes.com or 509-765-8845.

IPM Supplies Reminder

The commission is once again offering free supplies to WA growers for trapping leafhoppers and tuberworm. We are also supplying WA growers with free beating sheets. We have both all black and two-sided white and black. The beating sheets are $25 for non-WA growers and others. These supplies are pictured below.

To receive these supplies, simply call the commission office, or send an email to ajensen@potatoes.com specifying how many fields you need to monitor and/or how many traps you need, and whether you want a beating sheet. For help with insect identification or any other aspect of insect monitoring, call (509-765-8845) or email Andy Jensen at the commission office.

Resistance to Black Dot in Native Cultivars of *Solanum tubersosum* Group. *Andigena*

Nadav Nitzan[1], Will Hutson[1], John Bamberg[2] and Chuck Brown[1]
[1]USDA-ARS, Prosser, WA; [2]USDA/ARS, Sturgeon Bay, WI

Black dot is caused by the soil-borne, tuber-borne, and potentially air-borne fungus *Colletotrichum coccodes*. This disease is prevalent in potato production regions and can be of economic concern by itself, or as a part of the potato early dying syndrome. Since 2006 our breeding program has been screening potato germplasm for resistance to black dot with success, identifying resistance in advanced potato germplasm. In 2007, in order to enlarge the genetic pool available, we decided to look for the presence of resistance in the population of the primitive potato *Solanum tuberosum subsp. andigenum* ("andigena"). These are primitive cultivated potatoes grown and used by native farmers in North, Central, and South America. They can be found in Mexico, Guatemala, Venezuela, and southward along the Andes to northwestern Argentina. Andigena is genetically related to the common potato *S. tuberosum L. subsp. tuberosum*, and therefore is an important gene pool in potato breeding. This group has demonstrated ability to confer resistance to potato diseases such as late blight, *potato virus X*, *potato virus Y*, and nematodes.

The screening took place in the greenhouse located at the Washington State University / USDA-ARS Research Station near Prosser, WA. The study was carried out in pots. Initially, true potato seeds (not tubers) of 40 accessions of *S. tuberosum subsp. andigenum* (Table 1) from the core collection were obtained from the U.S. National Plant Germplasm System (NPGS, USDA-ARS Potato Introduction Project, 4312 Hwy 42, Sturgeon Bay, WI, 54235 USA). Plants were grown from the seeds, and 15 plants were selected to represent each accession. The first screening trial was carried out during 2007, with Russet Burbank and Ranger Russet as industry standards for comparisons. Among the 40 accessions screened, 5 demonstrated less ($P<0.05$) disease on both root and stem compared to the standard cultivars. These accessions were: PI-189473, PI-230475, PI-161683, PI-243367 and PI-230470 (Figs. 1&2). These 5 accessions were considered "potentially resistant" to black dot, and in 2009, a fresh batch of 100 seeds of each of the "potentially resistant" accessions was obtained from NPGS. The seeds were grown into plants, each a unique genotype, and from each accession 10-15 genotypes were selected based upon their vigor. The genotypes were propagated into multiple copies (clones) and were maintained as plants in the greenhouse, as tissue cultures and as tubers. The genotypes were screened with 8 to 26 replications each; and resistance was recorded based upon stem colonization in comparison to Russet Burbank, Shepody and Umatilla Russet that were used as industry standards. Five black dot resistant clones were identified from the accession PI243367 as follows: 243367-2, 243367-4, 243367-7, 243367-9, 243367-10; and 2 from the accession PI230470 as follows: PI230470-5 and PI230470-10. To our knowledge this is the first report indicating the presence of resistance to black dot in andigena accessions, and the selection of resistant genotypes. These findings will make it possible to incorporate a newly discovered gene pool into advanced potato germplasm present at the Tri State breeding program.

The authors wish to extend their sincere gratitude to Mr. Tom F. Cummings, from the Dept. of Plant Pathology at Washington State University, for taking the time to assist with the statistical analysis.

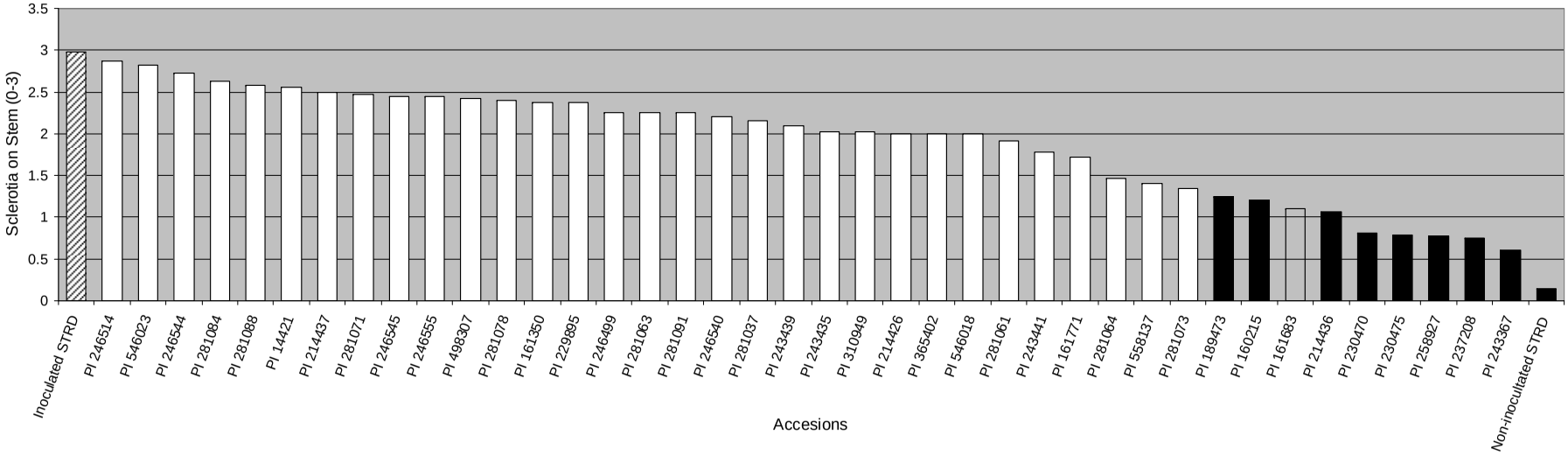


Figure 1. The amount of black dot on roots of 40 accessions of *Solanum tuberosum subsp. andigenum* that were inoculated with *Colletotrichum coccodes* in the greenhouse in the first screening stage. Disease severity on roots was recorded visually as sclerotial density using a 0 to 3 scale where 0 = no sclerotia, 1 = 1-30% coverage of roots, 2 = 31-60%, and 3 = >60%. Accessions represented by black bars had significantly less ($P < 0.05$) sclerotia on the roots than the inoculated susceptible standards (patterned bar) based on Tukey's Standardized Range (HSD) test ($\alpha = 0.05$).

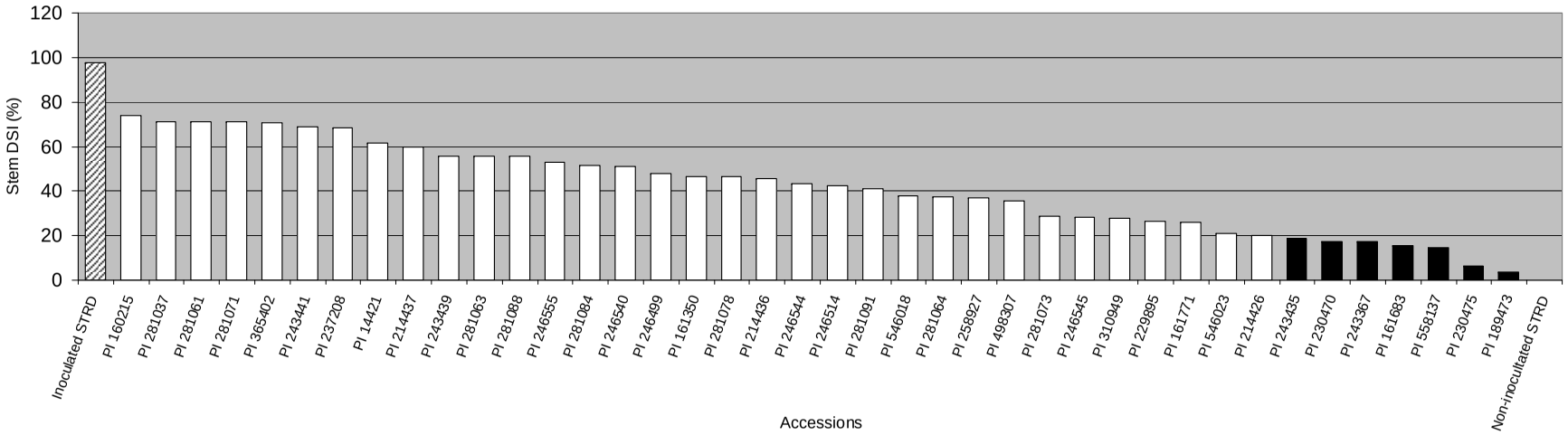


Figure 2. The amount of black dot on stem of 40 accessions of *Solanum tuberosum subsp. andigenum* that were inoculated with *Colletotrichum coccodes* in the greenhouse in the first screening stage. The disease severity index (DSI) on the stem was evaluated by removing stem discs from 2, 6, 10 and 14 cm above ground and transferring onto PDA. Fungal presence was recorded as a binomial response, where 0 = absence of *C. coccodes*, and 1 = presence of *C. coccodes*. A sum of the outcome (0 or 1) multiplied by the height of the segment (2, 6, 10 or 14 cm) was produced. The sum was divided by 32, which was the maximum value the sum could obtain, and was multiplied by 100 to transform the index into percentage (%) of disease severity. Hence, the disease severity index (DSI) on stem was calculated as follow: {[2*(0 or 1) + 6*(0 or 1) + 10*(0 or 1)] + 14*(0 or 1)/32}*100. Accessions represented by black bars had significantly less ($P < 0.05$) disease on stem than the susceptible standards (patterned bar) based on Tukey's Standardized Range (HSD) test ($\alpha = 0.05$).

Table 1. Country of origin, quantity and plant introduction (PI) number of *S. tuberosum subsp. andigenum* accessions that were tested for resistance to *Colletotrichum coccodes* in the first screening stage in the greenhouse in 2007.

Country of Origin	Quantity of Accession	Accession Plant Introduction (PI) Number [a]
Argentina	1	558137
Bolivia	4	258927; 498307; 546018; 546023
Colombia	4	243367; 243435; 243439; 243441
Costa Rica	1	230475
Ecuador	3	230470; 237208; 229895
Mexico	7	160215; 161350; 161683; 161771; 189473; 281037; 365402
Peru	20	214426; 214436; 246499; 246514; 246540; 246544; 246545; 246555; 281061; 281063; 281064; 281071; 281073; 281078; 281084; 281088; 281091; 310949; 214421; 214437

[a] Accessions of *Solanum tubersosum subsp. andigenum* were obtained as true potato seeds (not tubers) from the U.S. National Plant Germplasm System (NPGS, USDA-ARS Potato Introduction Project, 4312 Hwy 42, Sturgeon Bay, WI, 54235 USA).

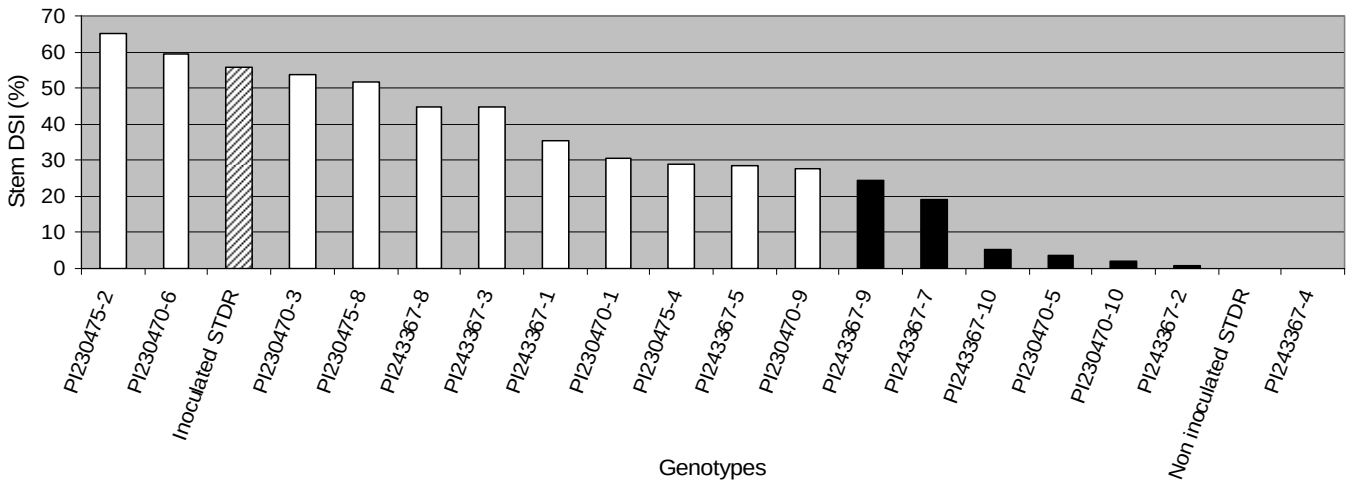
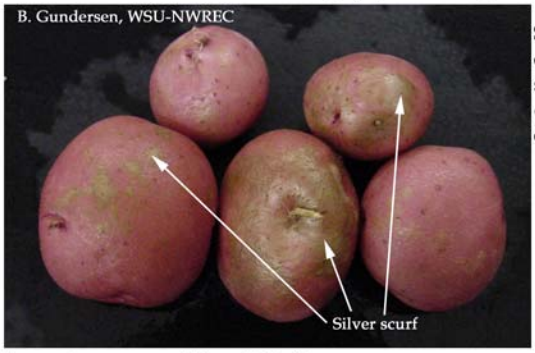


Figure 3. The amount of black dot on stems (Stem DSI) of genotypes selected from "potentially resistant accessions" of *Solanum tuberosum subsp. andigenum* that were inoculated with *Colletotrichum coccodes* in the greenhouse in the second screening stage. Genotypes represented by black bars had significantly less ($P < 0.05$) disease on stem than the susceptible standards (patterned bar) based on Dunnet's test ($\alpha = 0.05$).

Tuber Blemish Diseases: Silver Scurf

See also: http://www.potatoes.com/research.cfm

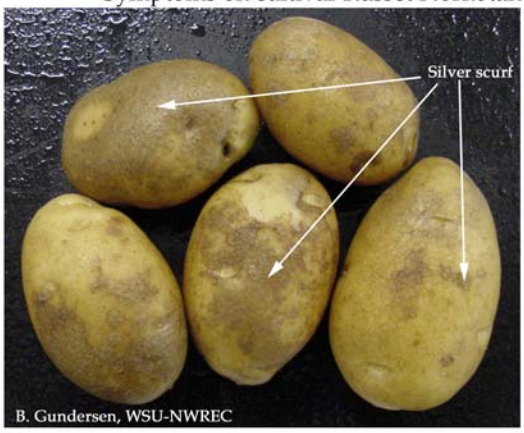


Symptoms on cultivar Chieftan

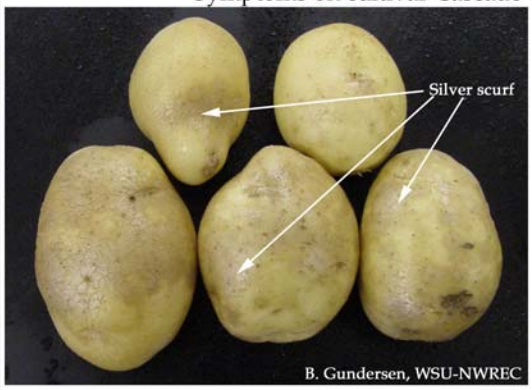
Silver scurf lesions can vary from brown to silvery grey in color, depending on potato cultivar.

Silver scurf conidiophores on tuber surface bearing spores -- very different from black dot fruiting structures.

Symptoms on cultivar Russet Norkotah



Symptoms on cultivar Cascade



Management

1. Buy seed without silver scurf infections. If in doubt about your seed, have it tested.
2. Seed treatments containing thiophanate-methyl (e.g. TopsMZ) or fludioxonil (e.g. Maxim) can reduce infection on daughter tubers, but do not guarantee a clean crop if grown from heavily infected seed.
3. Disinfect storage buildings and all seed handling machinery.
4. Harvest soon after skin set to avoid infection of additional tubers.
5. Storage: avoid mixing lots with low and high infection rates; minimize storage time for infected lots; avoid opening & closing storage buildings containing infected lots.

General Information

Causal agent: *Helminthosporium solani*

Biology: *H. solani* is a fungal pathogen of potato tubers, but can likely survive in the soil as a saprophyte. Infection occurs during the growing season from either seed-based inoculum, or from soil inoculum. Damage by silver scurf worsens during storage by spreading on and between tubers.

Dispersal: Silver scurf is distributed mostly on seed tubers, and is in fact commonly found on them. It is suspected to also move via contaminated soil.

Washington State Potato Commission (Phone: 509-765-8845)