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Checklist for Managing Late Blight Infected Tubers in Storage

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Late blight was present this growing season in scattered potato fields through out the Columbia Basin. Infected tubers are inevitably being harvested and placed in some storages. Following is a check list for managing potatoes in storages that may contain late blight infected tubers. These suggestions also apply for pink rot and Pythium leak. Additional information can be found at http://classes.plantpath.wsu.edu/dajohn.

1. Continue late blight fungicide applications until harvest
2. Harvest only during dry weather
3. Harvest when tuber pulp temperature is 45-65 F
4. Store known infected tuber lots separate from non-infected lots
5. Store known infected tubers lots where they can be easily obtained for processing
6. Sort for rot going into storage - Provide sufficient light and people to do the job
7. Provide adequate air flow rate through out the storage (25 cfm/ton)
8. Cool and dry the tubers as quickly as possible
9. Cure tubers at the lowest temperature possible (50 F) or eliminate the curing period, depending on the amount of rot
10. Cool the pile to the final storage temperature as quickly as possible - about 38 F for seed, 42 F for tablestock, 45 F for French fry processing and 50 F for potato chips. It may be necessary to cool and hold tubers for processing and chips below the typically recommended temperatures.
11. Do not humidify
12. Run fans continuously. Re-circulate air through the tubers at all times, even when outside air is not being introduced
13. Keep the piles shallow to promote air movement and removal of hotspots
14. Monitor the storage daily. Determine temperature of the piles at various depths and locations. Serious late blight problems usually show up within 6 weeks of storage.
15. Do not expose cold tubers to outside air or any tubers to air at or below freezing

Relative Role of Infected Seed Tubers in Verticillium Wilt of Potato

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Introduction

Verticillium wilt of potato is a disease of major economic importance to potato growing regions in North America and the Columbia Basin in particular. The primary causal agent of Verticillium wilt in the Columbia Basin is *Verticillium dahliae*, a soilborne fungus with a wide host range of over 200 species of broad leaved plants. Symptoms of Verticillium wilt of potato include wilting, chlorosis and premature plant senescence, with documented yield reductions up to 50% (2) . The fungus favors temperatures greater than 77° F and disease symptoms can be more severe during periods of heat stress or when root lesion nematodes (*Pratylenchus penetrans*) are present.

Inoculum of Verticillium wilt consists of microsclerotia, resistant resting structures which form during plant senescence and can persist in soil for a decade or more. Microsclerotia are stimulated to germinate in response to host root growth and the fungus colonizes host roots and vascular system. A short saprophytic phase occurs at host senescence, during which *V. dahliae* produces microsclerotia in colonized tissue. Crop debris infested with microsclerotia can increase inoculum levels if incorporated into the soil. In addition to soilborne inoculum, one study found up to 29% of the lots and 3.6% of certified seed tubers intended for Washington potato production fields were infected with *V. dahliae* (1). Despite the prevalence of *V. dahliae* in certified commercial seed lots, the contributions of infected seed tubers in the development and epidemiology of Verticillium wilt are not fully understood. The objectives of this study were to determine the role of infected seed tubers in the development of Verticillium wilt symptoms in the potato cultivar "Russet Burbank" and assess the potential contributions of infected seed tubers to overwintering soilborne inoculum.

Materials and Methods

A greenhouse study was conducted in 2007 and 2008 to determine the relative role of infected seed tubers in the development of Verticillium wilt symptoms and inoculum. Seed tubers naturally infected with *V. dahliae* were obtained by assaying seed lots of the potato cultivar "Russet Burbank" from certified seed sources. Seed tubers were cut crosswise and then lengthwise into four equal sized pieces (approximately 2 oz.) with at least two eyes each. Experimental blocks consisted of four seed pieces derived from one infected tuber and four seed pieces derived from one disease-free tuber; both seed tubers within a block were obtained from the same lot. Seed pieces were either planted in noninfested soil (control) or soil infested with *V. dahliae*. Chlorosis and necrosis were assessed at 65 days after planting and approximately weekly thereafter and ratings converted to area under senescence progress curves (AUSPC). Stems and progeny tubers were assayed for *V. dahliae* infection by plating onto semi-selective media and colonization of crop debris by microsclerotia was measured.

Results and Discussion

Significant inoculum effects were only observed in the presence of soilborne inoculum. Mean AUSPC were similar for infected and noninfected tubers grown in noninfested soils (Fig. 1). Plants from infested soils had significantly higher AUSPC than those from noninfested soil, but AUSPC did not differ for infected and noninfected tubers grown in infested soils. *V. dahliae* was isolated from 94% of plants grown in infested soils and 8% of plants from infected tubers grown in noninfested soil. Mean microsclerotia colonization was 47% total stem height for plants grown in infested soil and 0.4% for infected tubers grown in noninfested soils. Infected progeny tubers were only recovered from plants grown in infested soil. The results of this study indicate that *V. dahliae* infection of seed tubers does not significantly contribute to current season symptoms in the potato cultivar "Russet Burbank". In addition, plants grown from infected tubers alone did not result in the production of infected progeny tubers or significant inoculum production in plant debris, thus management strategies should focus on soilborne inoculum. However, the possibility exists that soilborne *V. dahliae* inoculum can be introduced into a field solely from infected seed pieces, which could be important if the fungus, or novel strains of the fungus, are introduced into soils not previously used to grow potatoes or where a management practice such as fumigation has been applied to reduce soilborne inoculum. Furthermore, infested soil carried on the surface of seed tubers may contribute to Verticillium wilt symptoms. A combination of control methods, including resistance, preplant monitoring, crop rotation, green manures, proper sanitation and other cultural practices will likely be necessary to sustainably manage potato production fields affected by Verticillium wilt in the future.

Fig 1. Area under senescence progress curves (AUSPC) for potato plants grown from *V. dahliae*-infected and noninfected tubers in infested and noninfested soil.

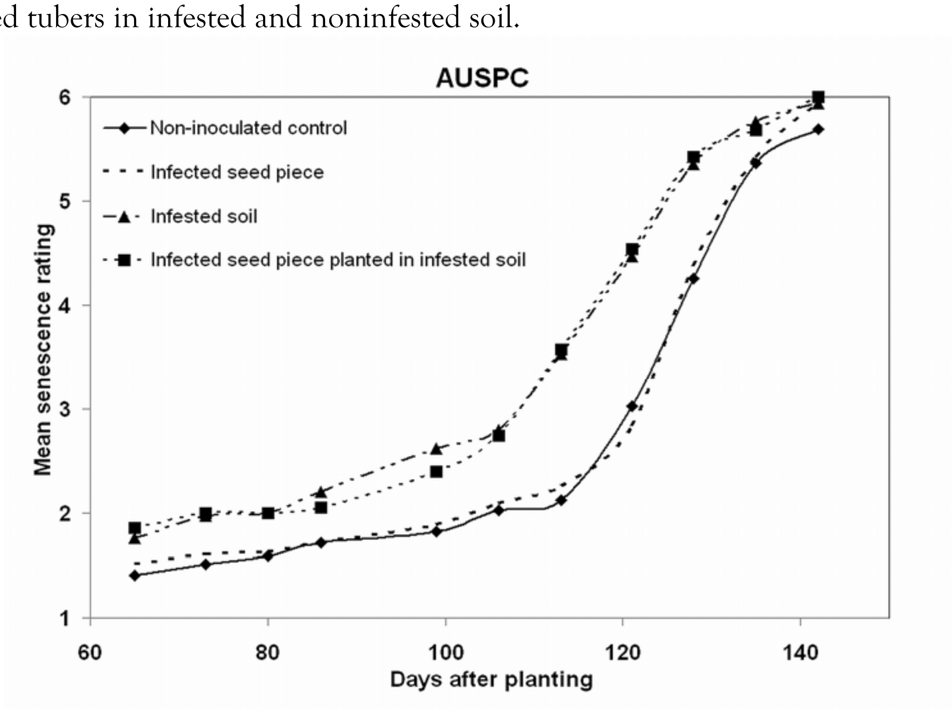
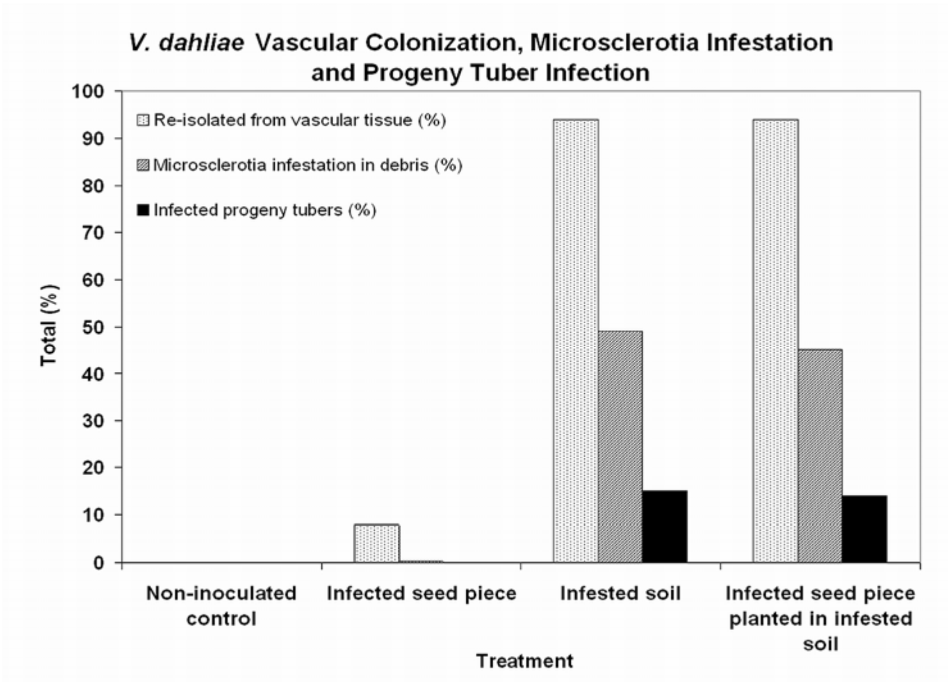


Fig. 2. Vascular colonization, microsclerotia production and progeny tuber infection in "Russet Burbank" potato plants grown from infected and noninfected seed tubers in the presence and absence of soilborne inoculum.



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