

DISTRIBUTION AND DEVELOPMENT OF BLACK DOT,  
VERTICILLIUM WILT, AND POWDERY SCAB ON RUSSET BURBANK  
POTATOES IN WASHINGTON

by

Dennis A. Johnson and Eugene R. Miliczky

Black dot, caused by the fungus Colletotrichum coccodes, is a disease of potato that is characterized by the development of abundant, dotlike, black microsclerotia (hard fungal resting bodies) on roots, stolons, stems and tubers. Historically, C. coccodes has been considered as a weak root-pathogen of potato. However, recent evidence indicates that black dot may cause significant yield reductions and contribute towards the premature dying of Russet Burbank potato.

High levels of black dot began to be noticed in some potato fields in Washington state the last few years. However, the extent and geographic distribution of the disease, and the time of the season when infection occurs were not known. Therefore, the purpose of this work was to determine the geographic distribution and quantify the development of black dot in potato fields in Washington. Also the development of two additional diseases, Verticillium wilt (Verticillium dahliae) and powdery scab (Spongospora subterranea), was quantified during the growing season.

Ten fields of Russet Burbank potato located near George, Moses Lake, Warden, Othello, Connell, Pasco, and Alderdale were sampled weekly during the growing season in 1990 for black dot, Verticillium wilt and powdery scab. Plants were collected at random in fields, and a technique was developed and used that quantified levels of C. coccodes and V. dahliae in growing potato stems.

Black dot was distributed throughout the Columbia Basin as well as northwestern Washington. C. coccodes was first isolated during the 1990 season in the Columbia Basin from the lower stems of potato on 8 June and was frequently isolated from potato roots, stolons, vascular tissue, and above ground stems later in June. A mean of 80% of the below- and above-ground stems of plants in the fields sampled were infected with C. coccodes by 6 July (Figs. 1 and 2). A mean of 23 propagules of C. coccodes per centimeter of below ground stem was isolated from plants in early August in a field near George, Wa. A mean for all fields during the season is shown in Figure 3 for isolations from the below ground stems and Figure 4 for isolations from the above ground stems.

However, symptoms of black dot (yellowing and wilting of foliage) were not evident until later in the growing season. C. coccodes was isolated from lesions on upper stems that varied from minute pinpoint to 1/4 to 2-1/2 inches in size.

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Small lesions were black; large lesions were dark brown to black. Infected vascular tissue was discolored. Microsclerotia were observed with stem lesions and on healthy appearing below- and above-ground stems when placed in a moist chamber. Lesions on leaves resembled early blight lesions without the concentric rings.

Evidence supports the hypothesis that C. coccoodes is a latent endophyte within the potato plant. Infection occurred early in the growing season on a large proportion of potato plants; however, symptoms did not become evident until much later in the season. Soil type, soil fumigation or type of fumigant, and previously grown crops did not reduce incidence or severity of black dot.

Verticillium dahliae was first isolated 21 May. Incidence of infected plants remained below 20% until about 18 July and then increased rapidly to nearly 100% of plants in nine of the fields sampled. Disease incidence reached 60% in the tenth field. A mean of over 1000 spores of V. dahliae per centimeter of above ground stem was found in some fields. Data illustrated that V. dahliae is an extremely prevalent pathogen of potato in Washington State.

Galls on roots caused by S. subterranea were prevalent in seven of the ten fields. Over 95% of the plants in the seven fields had galls on roots by 26 July. A mean of over 100 galls per infected plant was found in a field near Pasco. The three fields that had little or no powdery scab were planted on 16 April to 24 April and the seven fields with high levels of powdery scab were planted 3 April to 16 April. Warm soil temperature reduces powdery scab and this is thought to be the main factor accounting for the reduced level of powdery scab in the three fields planted last.

Figure 1. Mean disease incidence of blackdot, verticillium wilt and powdery scab from ten fields of Russet Burbank potatoes located throughout the Columbia Basin in 1990, when disease assessments were made from the underground stem.

## MEAN DISEASE INCIDENCE (%) LOWER STEM

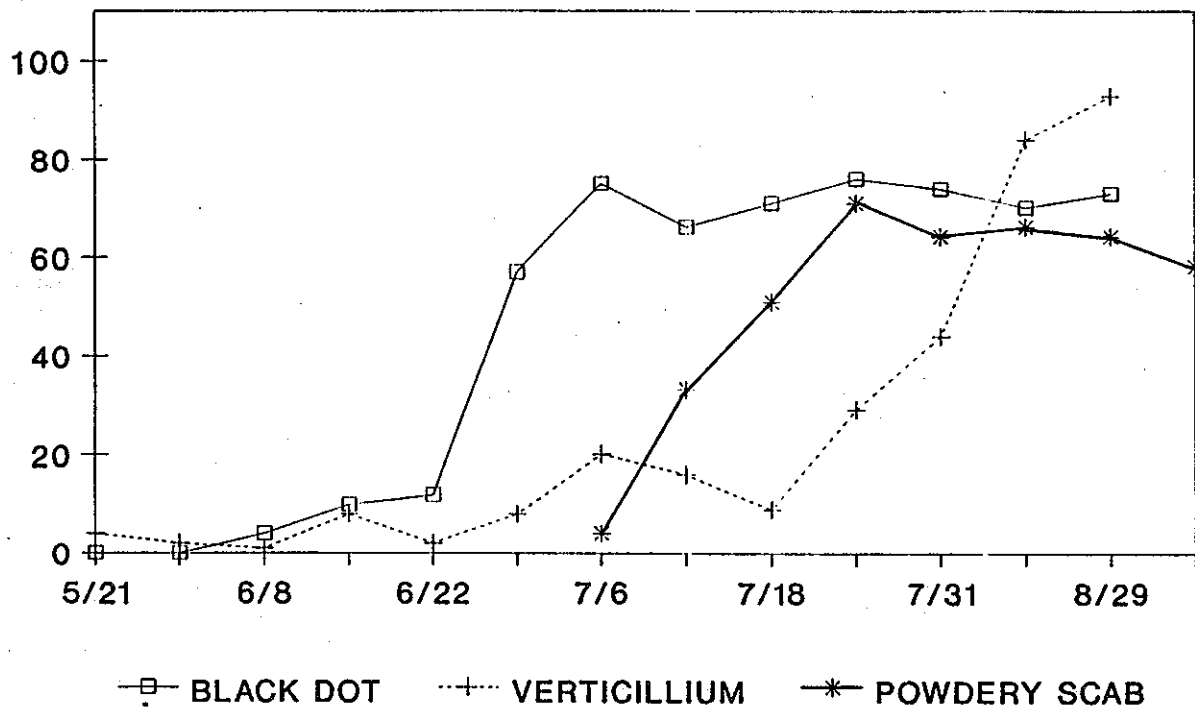


Figure 2. Mean disease incidence of blackdot and verticillium wilt from ten fields of Russet Burbank potatoes located throughout the Columbia Basin in 1990, when isolations were made from the above ground stem.

## MEAN DISEASE INCIDENCE (%) UPPER STEM

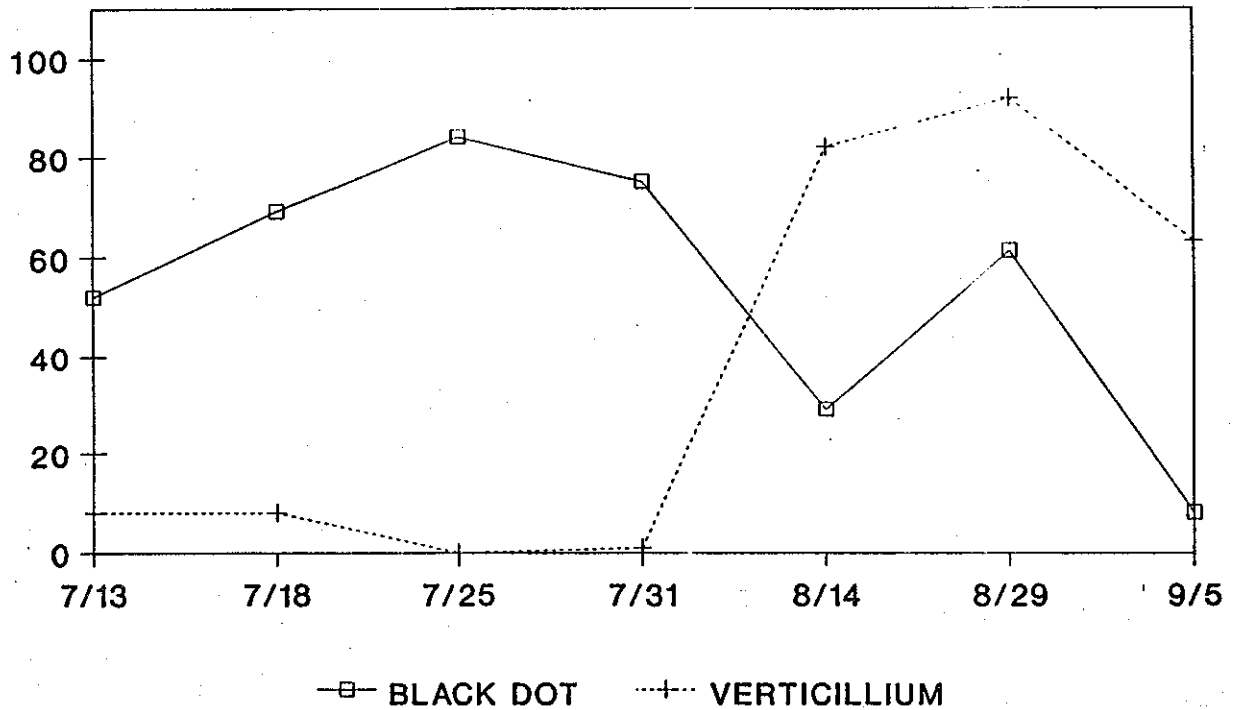


Figure 3. Mean number of colonies of *Colletotrichum coccodes* (Black dot) and *Verticillium dahliae* (Verticillium wilt) per centimeter of below-ground stems and number of powdery scab galls on roots of Russet Burbank potato in ten fields in the Columbia Basin in 1990.

## MEAN DISEASE SEVERITY - LOWER STEM

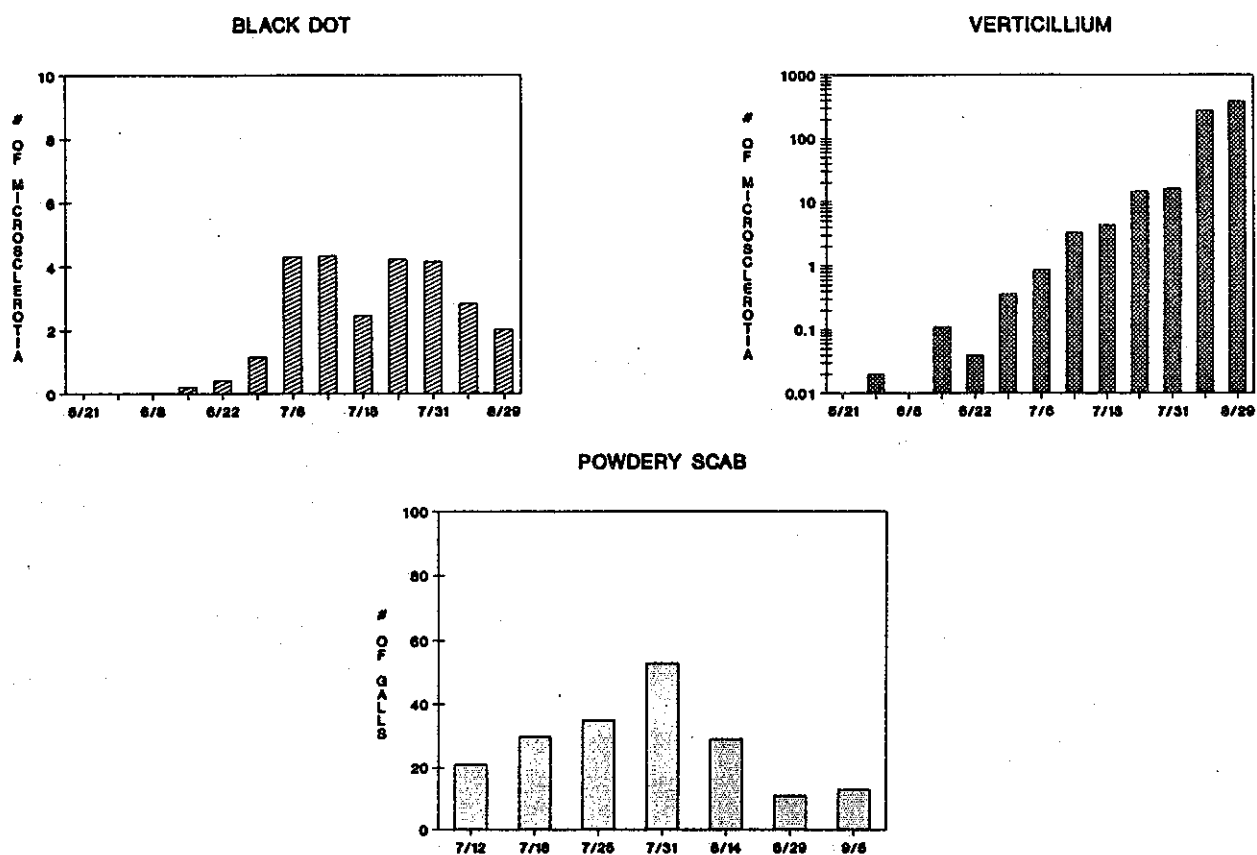


Figure 4. Mean number of colonies of Collectotrichum coccodes (Black dot) and Verticillium dahliae (Verticillium wilt) per centimeter of above-ground stems of Russet Burbank potato in ten fields in the Columbia Basin in 1990.

## MEAN DISEASE SEVERITY - UPPER STEM

