

Potato *Fusarium* dry rot pathogen diversity in the Pacific Northwest

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Publication date: 21 April 2022

Introduction

Fusarium dry rot of potato is a fungal disease of potato tubers that can develop in storage. When the disease occurs during seed preparation or after planting, it is commonly called *Fusarium* seed decay. Several different species within the genus *Fusarium* can cause the disease. Though most potato varieties are susceptible to infection, the degree of susceptibility may differ among potato varieties. The most reliable management strategy is to minimize wounds any time potatoes are handled. Commercially available fungicide seed potato treatments also effectively minimize disease.

The information presented here is one outcome of research sponsored by the **Northwest Potato Research Consortium** and the **Idaho Potato Commission**. It highlights the importance of knowing which dry rot pathogen is predominant in a potato production operation and how this information can help inform potato variety selection.

Pathogen diversity

In the Pacific Northwest, a recent survey with collaborators from University of Idaho, Oregon State University and Washington State University showed that *Fusarium sambucinum* and *Fusarium oxysporum* were the two most prevalent species associated with *Fusarium* dry rot in the region. Other species found in the region that were shown to cause dry rot include *F. avenaceum*, *F. cerealis*, *F. culmorum*, *F. graminearum*, and *F. redolens*, among others (Table 1). The different species that cause dry rot can look very different when they are in pure culture (Figure 1). Laboratory tests can determine which pathogen is causing dry rot.

Potato varieties and their relative susceptibility to different *Fusarium* dry rot pathogens

To demonstrate how potato varieties may vary in their response to *Fusarium* dry rot, we challenged seven different potato varieties with four different species of *Fusarium* (Table 2). We found that *Fusarium sambucinum* generally produced larger lesions on most of the potato varieties we tested, forming the typical dry, crumbly dark brown phase of the disease (Figure 2). The isolate of *Fusarium oxysporum* that we used was most aggressive on the variety ‘Dark Red Norland’ compared to the other six potato

Table 2. Potato varieties and *Fusarium* dry rot pathogens tested to demonstrate differences in potato responses to different dry rot pathogens.

Potato variety	Type	<i>Fusarium</i> pathogens
Russet Burbank	Russet	<i>Fusarium culmorum</i> <i>Fusarium oxysporum</i>
Clearwater Russet	Russet	<i>Fusarium redolens</i> <i>Fusarium sambucinum</i>
Umatilla Russet	Russet	
Ciklamen	Red	
Dark Red Norland	Red	
Atlantic	Chipping	
Snowden	Chipping	

Table 1. Species of *Fusarium* associated with *Fusarium* dry rot symptoms on potatoes from the Pacific Northwest that were shown to cause dry rot in pathogenicity tests. Pathogens followed by an asterisk (*) may be considered weak since they caused few lesions that were small on the potato varieties from which they were isolated.

Pathogen (scientific name)	Origin (state where found)
<i>Fusarium acuminatum</i> *	ID, WA
<i>Fusarium avenaceum</i>	ID, WA
<i>Fusarium cerealis</i>	ID, WA
<i>Fusarium culmorum</i>	ID, OR, WA
<i>Fusarium equiseti</i> *	ID, OR, WA
<i>Fusarium flocciferum</i> *	ID, WA
<i>Fusarium graminearum</i>	ID
<i>Fusarium oxysporum</i>	ID, OR, WA
<i>Fusarium redolens</i>	ID, OR
<i>Fusarium sambucinum</i>	ID, WA
<i>Fusarium solani</i> *	ID, WA
<i>Fusarium sporotrichioides</i>	ID
<i>Fusarium venenatum</i>	WA

varieties (Figure 3). *Fusarium oxysporum* usually showed the “wet phase” of the disease, where the lesion, or a portion of it, has not yet dried up, is still firm, and (in this case) is a medium-brown color (Figure 3). The “wet phase” can occur with other species that cause dry rot, and sometimes it appears black or dark brown; it is often considered an early stage of the disease before the lesion dries and takes on the more characteristic crumbly texture. The remaining two types of dry rot pathogens that we tested against the seven potato varieties, *Fusarium culmorum* and *Fusarium redolens*, were far less aggressive on all seven potato varieties compared to *Fusarium sambucinum* and *Fusarium oxysporum* (Figures 4 and 5). The symptoms of other dry rot pathogens on selected potato varieties are shown in Figures 6-10.

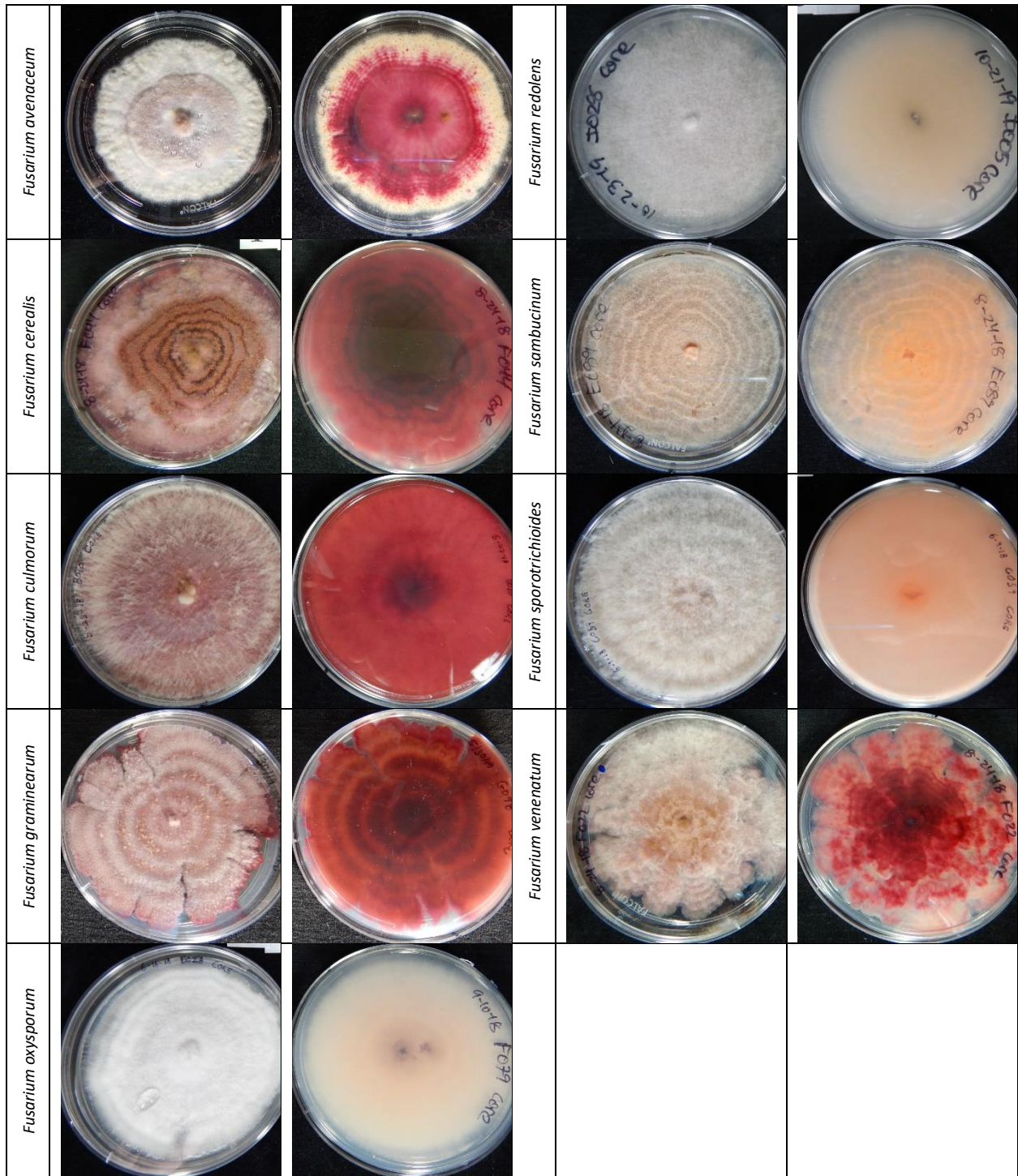


Figure 1. Appearance of different *Fusarium* dry rot pathogens when grown in pure culture on Potato Dextrose Agar. Left: appearance from the top of the culture plate; Right: appearance from the underside of the culture plate. Often, dry rot symptoms

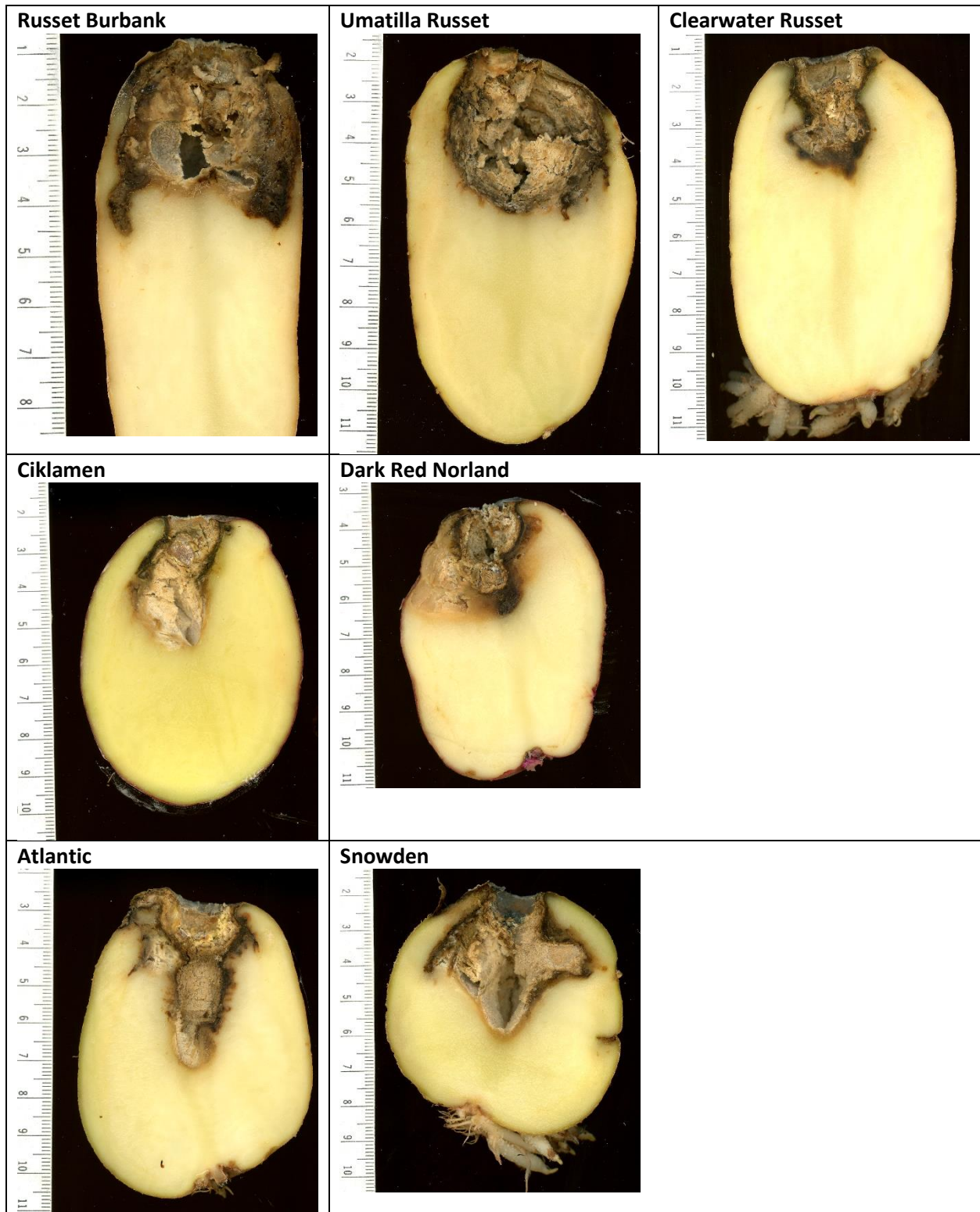


Figure 2. Appearance and relative size of *Fusarium* dry rot lesions caused by *Fusarium sambucinum* on seven different potato varieties.

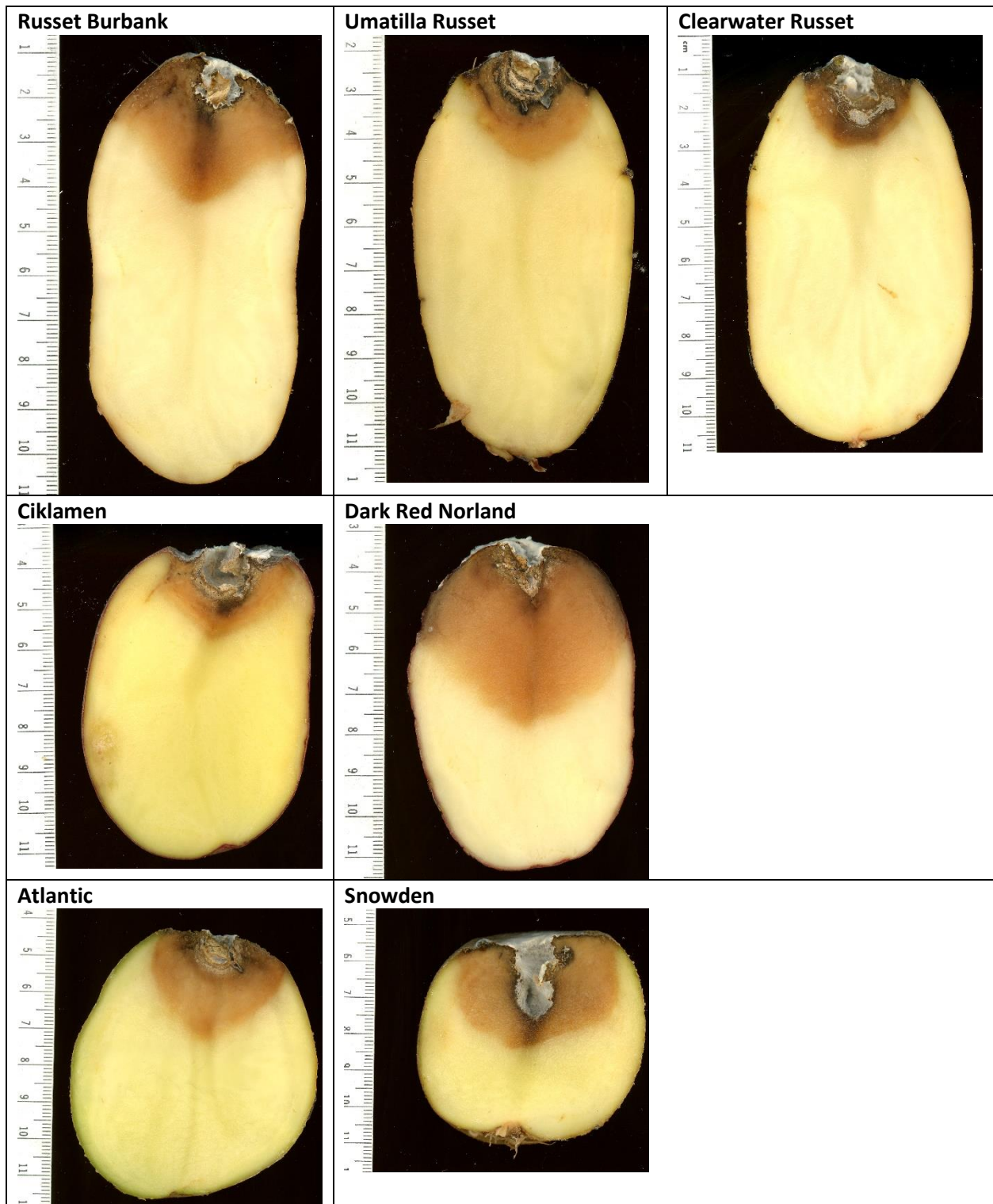


Figure 3. Appearance and relative size of *Fusarium* dry rot lesions caused by *Fusarium oxysporum* on seven different potato varieties.



Figure 4. Appearance and relative size of *Fusarium* dry rot lesions caused by *Fusarium culmorum* on seven different potato varieties.



Figure 5. Appearance and relative size of *Fusarium* dry rot lesions caused by *Fusarium redolens* on seven different potato cultivars.



Figure 6. Appearance of Fusarium dry rot symptoms on potato cv. 'Russet Burbank' caused by *Fusarium avenaceum*.



Figure 9. Appearance of Fusarium dry rot symptoms on potato cv. 'Russet Burbank' caused by *Fusarium sporotrichioides*.



Figure 7. Appearance of Fusarium dry rot symptoms on potato cv. 'Challenger' caused by *Fusarium graminearum*.



Figure 10. Appearance of Fusarium dry rot symptoms on potato cv. 'Dark Red Norland' caused by *Fusarium venenatum*.



Figure 8. Appearance of Fusarium dry rot symptoms on potato cv. 'Russet Burbank' caused by *Fusarium cerealis*.