

indicate that crop residue must be carefully managed to minimize the occurrence and intensity of wind erosion from dryland oilseed cropping systems when tillage is used during summer fallow. Specifically, no-tillage may be required to manage crop residue during the fallow phase of a wheat-oilseed-fallow rotation for controlling wind erosion. A newly-published detailed report of this study is available at: Sharratt, B.S. and W.F. Schillinger. 2016. Soil Characteristics and Wind Erosion Potential of Wheat-Oilseed-Fallow Cropping Systems. *Soil Science Society of America Journal* doi:10.2136/sssaj2015.12.0427.



Long-term camelina (left) and safflower (right) cropping systems studies have been conducted at Lind and Ritzville, respectively.

## A Survey of Eastern Washington State for Blackleg Disease of Canola Caused by *Leptosphaeria maculans* and *Leptosphaeria biglobosa*



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Blackleg caused by the fungi *Leptosphaeria maculans* and *L. biglobosa* is the most important disease of canola worldwide. The pathogen can be seedborne, which is the primary way it can spread into a new area. Blackleg was discovered in canola crops in northern Idaho in 2011, and a widespread epidemic occurred in the Willamette Valley of Oregon (OR) in spring of 2014 and 2015. In spring 2015, the disease was discovered on winter rapeseed and canola in the Camas Prairie of Idaho, with infected fields located from Grangeville to Moscow. In addition, the disease was found in irrigated canola in northcentral OR. Because of these finds so close to Washington (WA), we initiated a survey of winter and spring canola fields in WA in 2015. As a result of the harsh winter of 2014-2015, most of the winter canola was winter-killed, except for some crops in Okanogan and Douglas counties. Fields were surveyed in Asotin, Douglas, Garfield, Columbia, Okanogan, and Whitman counties. In many of the fields, overwintered canola stubble was sampled, or canola leaves were examined for symptoms and pycnidia. Single-spore isolations were made from pycnidia on leaves onto water agar. Stubble samples were incubated at 100% relative humidity to induce production of fruiting bodies and spores, from which single spore isolations were made. Isolates were tested for pathogenicity on the cabbage cv. (Copenhagen Market) by wounding the base of the seedlings with a needle and inoculating with a spore suspension. Isolates were also sequenced with ITS and  $\beta$ -tubulin primers for species identification.

**Results:** Two isolates from a diseased leaf sampled from a field in Okanogan county collected in April were identified and confirmed as *L. maculans* based on DNA sequencing and pathogenicity testing. Isolates from Okanogan and Whitman county, were identified as *L. biglobosa* subsp. *australiensis*. Common saprophytes identified on stubble that produced black fruiting bodies, and that could be readily confused with the blackleg fungus included *Davidiella tassiana* (the perfect state of *Cladosporium herbarum*), and *Pleospora* spp. (the perfect state of *Alternaria* and *Stemphylium* spp.).

**Implications:** These results indicate that *L. maculans* and *L. biglobosa* are present in the inland WA, but at a limited incidence. *L. biglobosa* is mildly pathogenic on brassicas, compared to *L. maculans*, and its impact on canola in WA is unknown. In late 2015, the WA State Department of Agriculture modified existing state quarantine regulations to require testing of all brassica seed lots for the pathogen before seeds can be planted in any county east of the Cascade Mountains or in six counties in NW Washington. It is especially important that the blackleg pathogen not become established in the northwest counties of WA and the Columbia Basin, where a significant percentage of the brassica seed for the country and the world is produced. Members of the PNW Blackleg Team gave numerous extension talks in 2014-2016 throughout WA to alert growers and other stakeholders about the disease. The two pictures show the characteristic lesions on leaves, with dead (necrotic) lesions surrounded by a yellow (chlorotic) halo. Inside the lesions are tiny black dots, which are the asexual fruiting bodies of the fungus (pycnidia), which produce spores that can be dispersed by rain or irrigation.



Both show blackleg lesions on canola leaves. Note dead area in center, surrounded by yellow zone. Small black dots in center of lesion are black, asexual fruiting bodies of the fungus. Spores are produced inside of the fruiting bodies, and can be dispersed by rain and splash. Photos courtesy of Lindsey du Toit.

## Long-Term Safflower Cropping Systems Experiment Near Ritzville, WA



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We completed a 6-year experiment in 2015 to evaluate the potential for safflower (SAF) in a long-term dryland cropping systems experiment on the Ron Jirava farm located west of Ritzville, WA. Safflower was grown in a 3-year winter wheat (WW)-SAF-undercut tillage summer fallow (UTF) rotation and was compared to WW-spring wheat (SW)-UTF and WW-UTF rotations. Each phase of all rotations was present each year and there were four replicates. Individual plots were 30 ft x 500 ft. Soil water was measured in all plots after grain harvest in August and again in early April, and from UTF in early September. Treflan, a soil-residual herbicide, was applied in March or April to be rain incorporated into plots that were to be sown to SAF. Safflower was direct seeded into the standing stubble of the preceding WW crop at a rate of 40 lbs/acre + N, P, and S fertilizer in late April or early May. Excellent stands were always achieved. Grain yield was determined with a commercial-sized combine and a weigh wagon in mid-to-late September. Safflower seed yields ranged from 125 to 1130 lbs/acre and averaged 483 lbs/acre over the six years.

Due to safflower's relatively high soil water use, crops grown after SAF sometimes produced lower grain yield than those following wheat. The water shortfall carried through a year of fallow after SAF harvest compared to a year of fallow after SW or WW. At time of planting for WW in early September, fallow in the WW-SAF-UTF rotation contained an average of