Pest e-alerts

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Update on Black Leg Disease of Canola

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Black leg of canola, also known as Phoma stem canker, was first identified on canola in Oklahoma in the 2009-2010 crop in a few fields. The disease causes leaf spots on rosette stage canola in the fall and early winter, and stem cankers in spring after bolting. The stem canker phase of the disease reduces yield when cankers advance to girdle stems prior to maturity. However, the black leg fungus has a much longer history in this state as it was first reported on cabbage in Payne and Seminole counties by D.A. Preston in the 1945 publication "Host index of plant diseases". The vegetable industry first developed seed certification programs and hot water treatment of seed to reduce the chances of introducing the black leg fungus into new production areas.

In December, black leg was again found on canola in Oklahoma in the central part of the state. The canola field was adjacent to a wheat field that was previously planted to canola and where canola stubble was left standing (Fig 1). The stubble was covered with fruiting bodies of the black leg fungus (Fig 2). When these fruiting bodies were picked off the stubble, each one examined under a microscope was filled with asci (Fig 3), finger-like sacks filled with ascospores (Fig 4). All of the fruiting bodies on the stubble contained ascospores and are thus termed perithecia. Ascospores are the result of sexual recombination and cause the first infections of the new crop. Sexual recombination in the black leg fungus is gives rise to new races of the pathogen. Ascospores are released into the air following rain events and periods of high humidity. While ascospores can travel long distances in air currents, disease levels are highest in close proximity to the infested stubble and steep gradients of declining disease with distance away from the stubble typically occur. Such was the case in this field where leaf spots in the canola were numerous adjacent to the stubble, but were much harder to find on the distant side of the field.

Leaf spots (Fig 5) produced on rosette stage canola contain a second kind of fruiting body called pycnidia. Pycnidia produce asexual or clonal spores caused conidia. Conidia are released in a gelatinous matrix, producing sticky strands called that eventually become dispersed in water from splashing rain or runoff (Fig 6). These spores serve to reinfect plants and increase level of disease in fields. In canola however, most disease is thought to originate from ascospores. I was surprised to find such a heavy ascospore load remaining in the stubble during December. I would have guessed that most of the spores would have been released in the fall during the rosette stages of crop development. This may be a normal part of the disease biology in Oklahoma or the dry fall and winter months may have delayed spore development and release from the stubble. In Europe where winter canola is planted in the fall, most ascospores are released between September and November. In the northern U.S. and Canada where spring canola is grown, most of the ascospores are released from May through July. In these diverse production regions, releases of ascospores coincide with susceptible seedling and rosette stages of crop development.

The potential of black leg becoming a serious problem in Oklahoma is uncertain. Some speculated that we had black leg problems in last year's crops because of the unusually wet fall. However, we have identified black leg this year following an unusually dry fall. The fact that black leg is established in crop stubble and is producing airborne spores suggest that unless farmers are willing to abandon no-till or minimum-till agriculture and revert back to plowing fields to destroy crop stubble, we are going to have to deal with this disease. Fortunately, all of the varieties being grown have some level of black leg resistance. We hope to learn more about the damage potential of black leg from management trials we have out this year that will address stages of crop susceptibility, variety resistance, and fungicide efficacy.

Fig 1. Wheat and canola planted in adjacent fields with canola stubble from the previous crop standing in between the fields.

Fig 2. Canola stubble covered with fruiting bodies of the black leg fungus that produce airborne ascospores (perithecia).

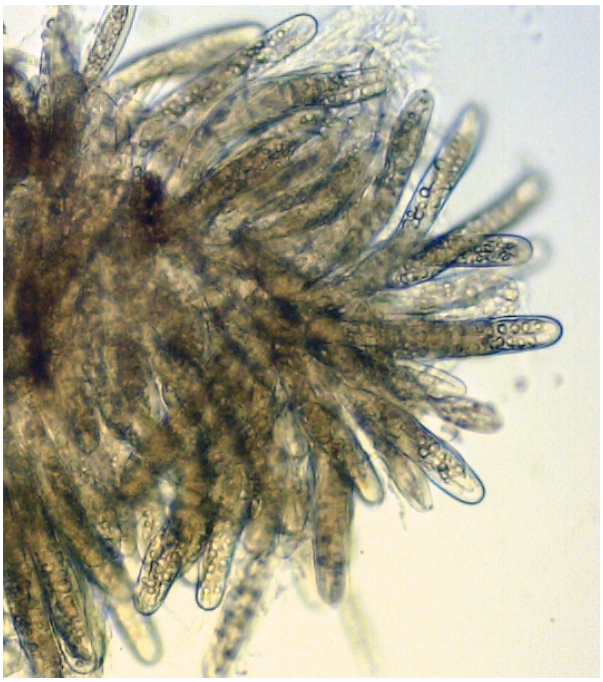

Fig 3. A crushed fruiting body (perithecium) from canola stubble filled with finger-like sacks (asci) that each contain eight ascospores

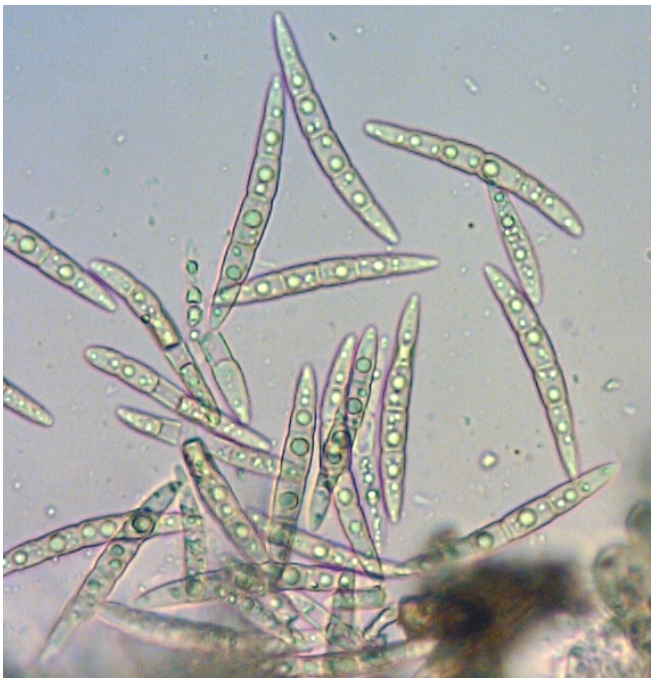

Fig 4. Airborne ascospores produced on canola stubble.

Fig 5. Leaf spot phase of black leg disease on rosette-stage canola with fruiting bodies (pycnidia).

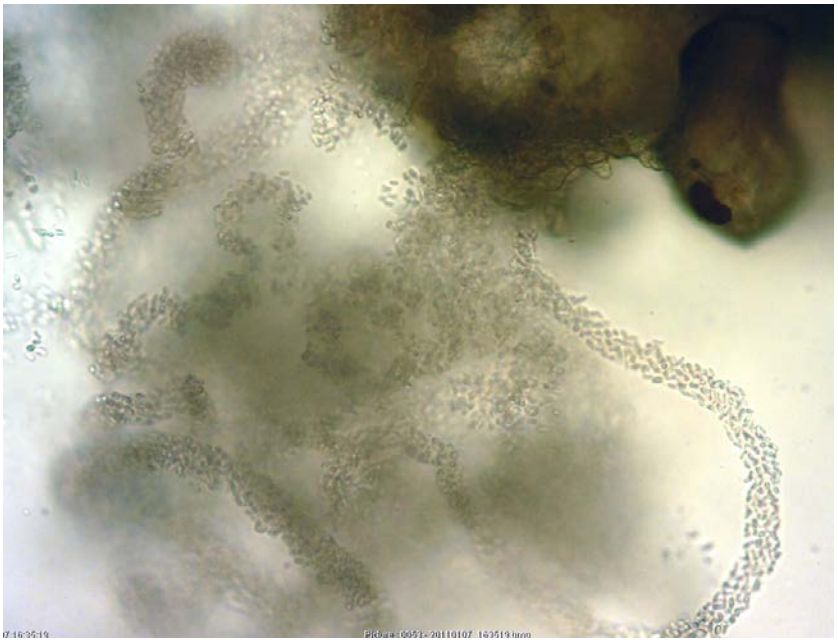

Fig 6. Tendrils of splash dispersed, asexual spores (conidia) released from pyndidia produced in leaf spots.

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