Identification and characterization of fungicide-resistant strains of *Parastagonospora nodorum* in Kentucky

Carl A. Bradley*, Danilo Neves, and Nathan White
Department of Plant Pathology
University of Kentucky Research & Education Center
Princeton, KY
*Contact information for C. A. Bradley: tel: 859-562-1306; email: carl.bradley@uky.edu

Parastagonospora nodorum (formerly known as *Stagonospora nodorum* and *Septoria nodorum*) causes both Stagonospora leaf blotch and glume blotch. Stagonospora leaf blotch is one of the most common foliar diseases observed in Kentucky. When flag leaves are affected by leaf blotch, yield losses generally occur. Glume blotch also is a common disease in Kentucky, and can reduce yields and test weight. One of the most common ways to manage these diseases is through application of foliar fungicides.

The strobilurin fungicide class is one of the most common fungicide classes applied to wheat and other field crops. This class of fungicides contains active ingredients that control a wide spectrum of diseases, but has a high risk of selecting for fungicide-resistant strains of fungal pathogens.

The objective of the proposed research are:

1. Collect isolates of *P. nodorum* throughout Kentucky and evaluate their sensitivity to strobilurin fungicides
2. Characterize the mechanism of *P. nodorum*'s resistance to strobilurin fungicides
3. Develop an efficient method to identify strobilurin fungicide-resistant strains of *P. nodorum*

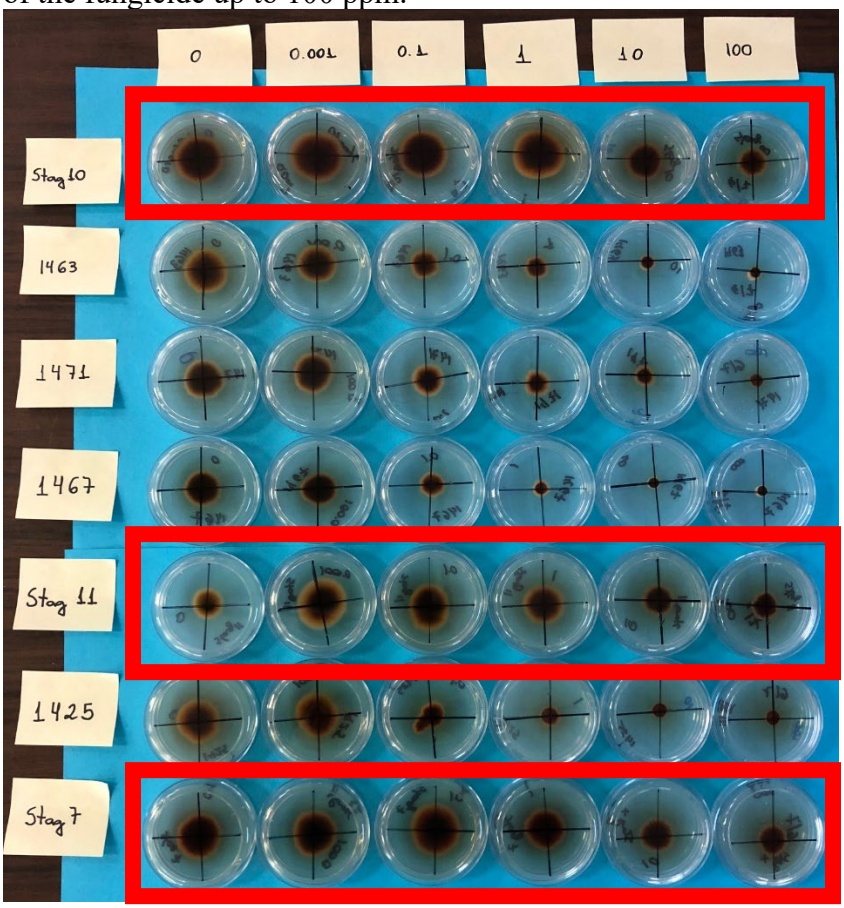
Current status of project:
Isolates of *P. nodorum* collected in 2019 were evaluated for sensitivity to the strobilurin fungicide azoxystrobin. In addition, more *P. nodorum* isolates were collected in Kentucky during the 2020 growing season. To determine if *P. nodorum* isolates are resistant to strobilurin fungicides, a molecular assay was developed to determine if known mutations were present that confer resistance to strobilurin fungicides. So far, approximately 36% of the isolates tested from Kentucky have the G143A mutation, which confers a high level of resistance to strobilurin fungicides (Table 1).

Table 1. Percent of *Parastagonospora nodorum* isolates with the G143A mutation that confers resistance to strobilurin fungicides.

County	% Isolates with G143A mutation
Caldwell	52
Fayette	50
Fulton	0
Logan	67
Woodford	13
Total	**36**

Petri dish assays were conducted to ensure that isolates with the G143A mutation are actually resistant to strobilurin fungicides. Figure 1 shows that, indeed, isolates that have the G143A mutation are resistant to strobilurin fungicides.

Figure 1. Petri dish sensitivity assays of *P. nodorum* isolates to varying concentrations of azoxystrobin fungicide. Fungicide concentrations are listed at the top and increase in strength from left to right. Seven different isolates of *P. nodorum* are shown on the left, and growth inhibition of most isolates can be observed in higher concentrations of the fungicide, with the exception of the isolates surrounded by a red rectangle, which are not affected by concentrations of the fungicide up to 100 ppm.



Preliminary conclusions:
From isolates that have been evaluated so far, approximately 36% of the *P. nodorum* isolates tested from Kentucky are resistant to strobilurin fungicides. These findings likely will have an implication on how Stagonospora leaf and glume blotch is managed with fungicides, and it highlights the need for additional fungicide chemistries to manage diseases of wheat.