PATHOLOGY

FOLIAR FUNGICIDE PHYTOTOXICITY RESPONSES ON THE FROGEYE LEAF SPOT SUSCEPTIBLE SOYBEAN VARIETY DYNA-GRO 37RY47

Jeffrey Mansour, Jason Bond, Trent Irby, Alan Henn, Maria, Tomaso-Peterson, Tessie Wilkerson, and Tom Allen

Frogeye leaf spot (FLS), caused by *Cercospora sojina Hara*, has historically been an important disease of soybean in the mid-Southern United States. Visual symptoms of FLS generally appear at R3; however, infection may occur at any growth stage. Foliar symptoms appear on the upper leaf surface in the upper canopy as circular to irregular lesions that have a necrotic center with reddish-brown margins. In severe situations pre-mature defoliation can be observed, as well as stems, pods, and seed becoming infected by the fungus. Yield losses associated with FLS can be approximately 30% or greater in susceptible soybean varieties when environmental conditions remain favorable for disease development. A conducive environment for FLS occurs with temperatures above 77°F and relative humidity at 90% or greater. On the underside of the leaf signs of FLS can be observed as grayish-black reproductive structures. Most soybean varieties have resistance to FLS, but there are still varieties exhibiting severe symptoms each year. In situations where FLS susceptible varieties are planted, fungicides are an effective management strategy. However, due to the initial observation of fungicide resistant isolates from Tennessee in 2010 following at least one fungicide failure, and the subsequent widespread observation of fungicide resistance in Mississippi, new importance has been placed on managing FLS. The renewed interest in FLS is the result of the G143A substitution detected within the fungal population, which renders complete resistance to the quinone outside inhibitor (QoI) class of fungicides, or the strobilurin fungicides (FRAC code II), which have been mainstays in the Mississippi soybean production system for the management of late-season diseases. In turn, this has caused growers to utilize alternative management methods that include the planting of FLS-resistant soybean varieties and application of fungicide products that contain multiple

Figure 1. *Severe phytotoxicity as a result of applying a fungicide containing a demethylation inhibitor (triazole; DMI).*

"MANAGING FROGEYE LEAF SPOT HAS BEEN MADE MORE DIFFICULT DUE TO THE WIDESPREAD FUNGICIDE RESISTANCE DOCUMENTED IN MISSISSIPPI DURING 2015. WHEN FROGEYE LEAF SPOT SUSCEPTIBLE VARIETIES ARE PLANTED, A FUNGICIDE APPLICATION IS THE MOST EFFECTIVE MANAGEMENT TOOL. HOWEVER, FUNGICIDES IN SOME CLASSES PRODUCE PHYTOTOXICITY WHICH HAS RESULTED IN CONCERNS REGARDING YIELD LOSSES."

Tom Allen

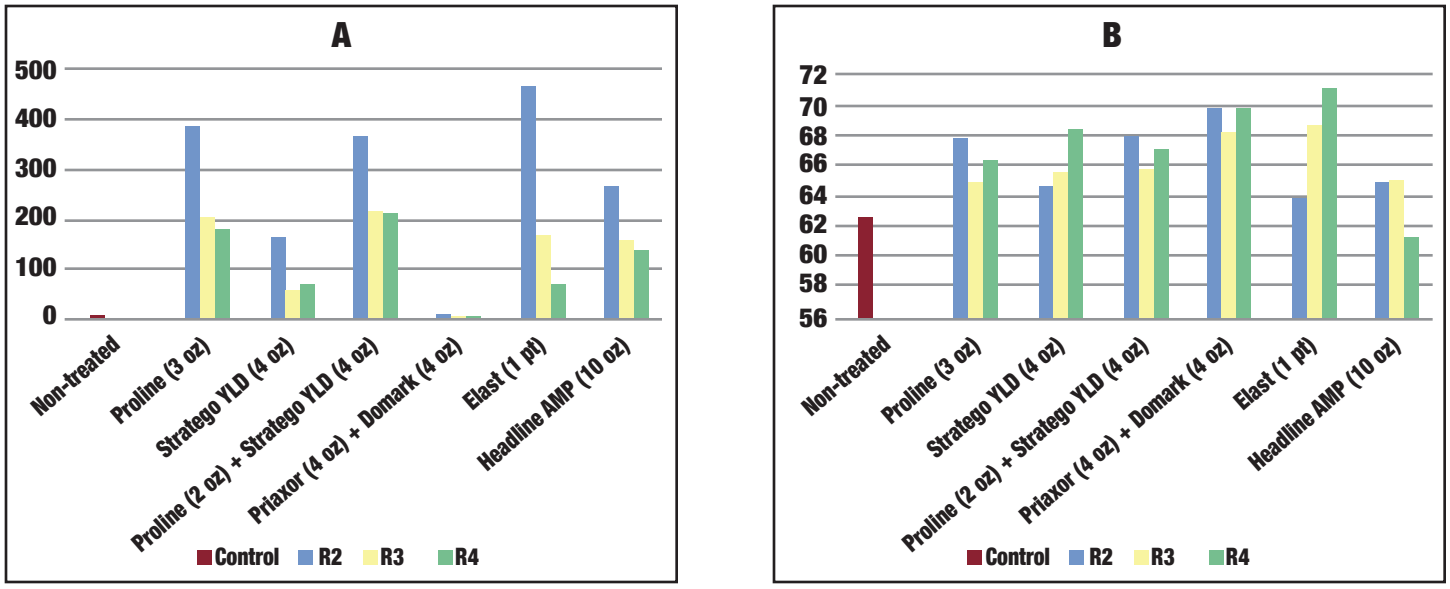

Figure 2. *(A) presentation of the area under the phytotoxicity curve which takes into account multiple ratings over a period of time and (B) yield response following treatment with fungicides that produce phytotoxicity.*

modes of action (MOA). One major drawback to applying fungicides that contain more than one mode of action can be the development of phytotoxicity on the soybean leaves. The phytotoxicity is oftentimes the result of systemic activity caused by a "curative" fungicide, generally following the application of a fungicide in the demethylation-inhibitor class (triazole; DMI; FRAC code 3).

Field trials were conducted during 2015 and 2016 using a phytotoxicity sensitive and FLS susceptible soybean variety, Dyna-Gro 37RY47, in order to determine if yield was impacted by phytotoxicity. The trial was conducted using four row plots, replicated four times, in which fungicide applications were made at R2, R3, and R4. Multiple fungicide products were selected which have previously been observed to have activity on frogeye leaf spot as well as produce phytotoxicity. Disease and phytotoxicity ratings were made pre-application as well as seven, 14, and 21 days post-application. Disease and phytotoxicity were rated using a modified 0 to 9 scale whereby 0 = no disease or phytotoxicity and 9 = severe disease and phytotoxicity. Stratego YLD and Proline both were observed to reduce frogeye leaf spot severity. Elast resulted in the greatest levels of foliar phytotoxicity as assessed by observing the leaf surface area affected across the entire plot. Averaged across the three application timings, when compared to the non-treated control, Elast, Stratego YLD + Proline, and Proline increased phototoxicity by 28.8%, 27.7%, and 26.8%, respectively. Overall, yield was not significantly reduced as a result of phytotoxicity regardless of product selection or application timing.