

# Applied Research Report

## 2020 Northern Corn Leaf Blight Fungicide Trial

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### Summary

In response to a wide-spread outbreak of northern corn leaf blight (NCLB, Fig. 1), caused by the fungus, *Exserohilum turcicum*, in the Blacklands growing region during the spring of 2020, we established fungicide trials in three commercial fields to determine if this disease could cause disease loss and if loss could be economically mitigated by a fungicide application prior to significant disease development. After the application of the fungicides, weather conditions did not support additional development of NCLB. There was no difference in disease development and yield between the fungicide-treated and control plots.

### Objective

The objective of this study was to determine whether a fungicide application in response to northern corn leaf blight (NCLB) would result in an economical yield increase.



Fig. 1 Symptoms of northern corn leaf blight: Elliptical lesions with dark brown sporulation of the fungus. (Photo: T. Isakeit)

## **Materials and Methods**

The trials were done in two commercial fields in Williamson County and one commercial field in Hill County. The trials had four replicates arranged in a randomized complete block design. Each replicate consisted of two rows by 40 feet long, with 5 feet between them. There was 36" row spacing in both Williamson county fields and 38" row spacing in the Hill County field.

The fungicide used at the Williamson County locations was Revytek [1.11 lb. mefentrifluconazole + 1.48 lb. pyraclostrobin + 0.74 lb. fluxapyroxad / gal], applied with 0.25% v/v Induce (non-ionic surfactant). The rate at the Taylor location was 20.6 fl. oz./A in 14 gpa and the rate at the Hutton location was 15 fl. oz./A in 10 gpa.

Two fungicides were used at the Hill County location: Miravis Neo SE [0.63 lb. pydiflumetofen + 0.83 lb. azoxystrobin + 1.04 lb. propiconazole / gal] 13.7 fl. oz. in 10 gpa and Onset 3.6L [3 lb tebuconazole / gal] 6.4 fl.oz. in 10 gpa. The surfactant for both chemicals was 0.25% v/v Natural Oil.

The fungicides were applied with a backpack sprayer using CO<sub>2</sub> at 28 psi as the propellant. The boom had 4, XR8002VS nozzles, spaced 19 inches apart.

After the fungicide application, the plots were observed for foliar disease development at least twice before harvest.

Williamson County – Hutto (30° 32.178' -97° 27.958'): The trial was sprayed on May 15, 2020, just prior to the start of VT growth stage. The hybrid was DK67-42. There was a trace amount of NCLB on the lower leaves of a few plants. The plots were harvested July 20 by hand.

Williamson County – Taylor (30° 37.001' -97° 27.772'): The trial was sprayed May 23, 2020 at R2 stage. The hybrid was BH 8477. This field had the highest incidence of NCLB of the three locations: 80% of plants had lesions at the leaf attached to the ear and 5-10% plants with lesions on leaves higher than ear. The plots were harvested July 20 by hand.

Hill County (31° 55.989' -96° 52.627'): The trial was sprayed June 24, 2020 at R1. There were only a few lesions of NCLB on the lower leaves. The hybrid was Pioneer Brand Hybrid 2089. Plots were harvested Aug. 17 by hand.

After harvest, ears were evaluated for fungal ear rot before shelling with a machine. Shelled corn was weighed, moisture content was determined, and 1-lb samples for each plot were ground with a Romer mill. Sub-samples (50 g) were evaluated for aflatoxin content with the Vicam system and fumonisin with the Envirologix system.

## **Results and Discussion**

Cool, wet conditions in the spring prior to flowering lead to noticeable development of NCLB. There was more disease development in NCLB-susceptible hybrids, particularly in fields previously cropped to corn, especially if there was a lot of crop residue on the surface. Later in the season, after the fungicide applications, weather conditions became hotter and drier, which constrained further NCLB disease development.

The relationship of the fungicide treatments to the increase in incidence and severity of NCLB 2-3 weeks after application, and crop yield, in three locations is shown in Table 1. Disease did not increase in either the control or with fungicide treatments after 2-3 weeks, which represented a critical period in the development of the ear and yield protection.

The fungicide treatments had no effect on the incidence of *Aspergillus* or *Fusarium* ear rots and aflatoxin and fumonisin levels (Tables 2 & 3). Overall, the levels of both mycotoxins were quite low, in spite of higher levels of ear rots at some locations. Additional details for each location follow.

Williamson County – Hutto: No increase in disease was seen with the June 5 assessment. On June 26, 20 plants per plot were assessed for blighting (Figure 2). The average incidence was 91% for

both. Although there was NCLB in the leaf samples, most of the blighting of the leaf tissue was the result of a different cause, possibly drought stress. By June 29, most of the upper leaves had dried.

Table 1. The relationship of the fungicide treatments to the increase in incidence and severity of NCLB 2-3 weeks after application, and crop yield in three commercial fields in the Blacklands growing area of Texas.

Fungicide Treatment	Williamson County (Hutto)		Williamson County (Taylor)		Hill County	
	Yield (bu/A)*	NCLB Increase after 3 weeks	Yield (bu/A)	NCLB Increase after 2 weeks	Yield (bu/A)	NCLB Increase after 2 weeks
None (control)	107 ±4	No	134 ±7	No	120 ±6	No
Revytek	108 ±4	No	138 ±4	No	n/d	n/d
Miravis Neo	n/d**	n/d	n/d	n/d	113 ±8	No
Onset	n/d	n/d	n/d	n/d	121 ±3	No

\*Mean of 4 replicates with standard deviation. Adjusted to 15.5% moisture.

\*\*Fungicide not tested at this location.

Table 2. The relationship of the fungicide treatments to aflatoxin contamination (ppb) and incidence of *Aspergillus* ear rot (%) in three commercial fields in the Blacklands growing area of Texas.

Fungicide Treatment	Williamson County (Hutto)		Williamson County (Taylor)		Hill County	
	Aflatoxin (ppb)*	<i>Aspergillus</i> ear rot (%)	Aflatoxin (ppb)	<i>Aspergillus</i> ear rot (%)	Aflatoxin (ppb)	<i>Aspergillus</i> ear rot (%)
None (control)	6.5 (0-19)	4	0	19	0	3
Revytek	4.6 (0-12)	4	0	20	n/d	n/d
Miravis Neo	n/d**	n/d	n/d	n/d	0	6
Onset	n/d	n/d	n/d	n/d	0	5

\*Mean of 4 replicates with range in parentheses. PPB = parts per billion

Williamson County – Taylor: No disease increase was seen with the June 5 assessment. By June 29, leaves had dried down too much to make any further disease assessment.

Hill County: No NCLB increase was seen with the July 9 assessment. At that time, southern rust (a fungus, *Puccinia polysora*) was at a 3-5% severity on 2-4 plants per plot. On July 27, disease severity (% of leaf area covered by the pathogen) for both NCLB and southern rust were estimated for the plot, by observation of the leaf attached to the ear (Table 4). The severity of both diseases was low.

Table 3. The relationship of the fungicide treatments to fumonisin contamination (ppm) and incidence of Fusarium ear rot (%) in three commercial fields in the Blacklands growing area of Texas.

Fungicide Treatment	Williamson County (Hutto)		Williamson County (Taylor)		Hill County	
	Fumonisin (ppm)*	Fusarium ear rot (%)	Fumonisin (ppm)*	Fusarium ear rot (%)	Fumonisin (ppm)*	Fusarium ear rot (%)
None (control)	4.6 (3-7)	66	0	19	3.2 (2-5)	52
Revvytek	2.5 (2-3)	59	0	20	n/d	n/d
Miravis Neo	n/d**	n/d	n/d	n/d	3.9 (3-4)	56
Onset	n/d	n/d	n/d	n/d	2.0 (1-3)	52

\*Mean of 4 replicates with range in parentheses. PPM = parts per million

Table 4. Southern rust and NCLB ratings four weeks (July 27) after fungicide application at Hill County location.

Treatment	Southern rust severity (%)	NCLB severity (%)
Control	0.9 ±1.4	8.0 ±4.0
Miravis Neo	0.1 ±0	1.3 ±0.5
Onset	0.2 ±0.2	2.5 ±1.7

Although the severities of southern rust and NCLB are lower with the fungicide treatments than the control, the severity of these diseases in the control is also low. There were no differences in yield between the fungicide treatments and the control, suggesting that the economic threshold for disease loss was not reached during this season.

Early in the 2020, there was concern that the severity of NCLB would increase and cause yield losses. The disease has been reported to be most damaging at temperatures between 64°F and 81°F, coupled with prolonged moist conditions. High levels of disease prior to flowering and for a period of six weeks thereafter can result in yield loss. In these trials, disease never progressed from low levels during this critical period of vulnerability to the disease. There was nothing exceptional to the weather after initiation of the experiments; the weather was fairly typical for central Texas. These trials support many years of observation that, in general, NCLB is not a yield-limiting disease in central Texas. There are possibilities that this disease could cause some loss in wetter years, with very susceptible hybrids that are monocultured with reduced or no tillage. Experiments under dryland conditions in central Texas are not conducive to developing NCLB yield loss thresholds, but they do help familiarize growers with the limits of this disease.



### **Conclusions**

Fungicides applied to corn during the 2020 season in the Blacklands area, with the same timing and initial disease severity in these experiments, would be unneeded and not provide a yield benefit.

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We thank our grower cooperators.



Fig. 2. Blighting of corn leaves observed June 29 at the Williamson – Hutto location: most of the damage is not NCLB, but possibly drought stress. (Photo: T. Isakeit)

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