

*Corn and Grain Sorghum Promotion Board
2014 End-of-year Report*

Title: Assessment of fungicides applied at an early growth stage for suppression of NCLB and importance of lesion nematode in corn.

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Objectives:

1. Compare fungicides at early growth stages to standard VT/R1 applications for control of NCLB.
2. Evaluate isolates of NCLB for resistance to strobilurin fungicides.
3. Survey for lesion nematode in Arkansas corn as well as other diseases.

Objective 1:

Three trials were conducted at three locations (Newport, Hope, Rowher) to evaluate the effect of fungicide applied at an early stage of growth. Corn hybrids were selected based on susceptibility to NCLB and adapted to the specific area of the state. Trials were planted a little later than commercial production in each area to increase the probability of foliar diseases (Table 1). Weeds were controlled in plots based on recommendations by University of Arkansas Extension Service. Plots consisted of four, 25-ft-long rows spaced 30-in apart. The experimental design was a randomized complete block design with four replications separated by a 5-ft fallow alley. Plots at Newport were inoculated at V8 stage of growth with NCLB inoculum produced on sterilized oat and applied on 22 July in one row (2nd) at rate of 120 cc inoculum per 25 ft of row. Sporulating inoculum was observed 3 d later on seed that lodged/stuck to in corn collars and leaves. The treatments were: 2.0 oz Statego YLD/ac applied at an early stage of growth, 3.0 oz Statego YLD/ac applied at a standard stage of growth (VT/R1), the combined of both treatment timings, and a non-treated control. NCLB and southern rust disease incidence (DI) were rated at 14 and 20 d after R1 treatment (DART). The rating scale used at each location differed slightly. At Newport location, the total number of lesions per plant (above ear leaf) was divided by the total number of plants per plot (ca. 98). A 10-point disease rating scale for NCLB and SR was used to determine DS in the upper canopy at Hope and a 10-point rating scale for SR was used to determine SR on the ear leaf at Rowher. Both scales provide a level of disease severity equivalent to the rating scale (i.e. 1 = 10% DS). Plots were harvested at each location and grain moisture was adjusted to 15.5% moisture. Data was subject to ANOVA using Agricultural Research Manager Software (version 9.0).

Table 1. Hybrid and fungicide application data at Newport, Hope, and Rowher

Location	Hybrid	Inoculated (NCLB)	Planting date	Early Growth Stage, application date	Standard Growth Stage, application date	Spray volume (GPA)
Newport	DeKalb 69-29	Yes	18 June	V10, 1 Aug	VT/R1, 13 Aug	15
Hope	P1883YHR	No	16 July*	V6-V7, 11 July	R1, 4 Aug	18
Rowher	P2089YHR + Mycogen V707	No	24 May*	V6, 18 June	VT, 8 July	

*Estimated based on early growth stage

Results: No foliar disease was observed at early growth stage at any location. The earliest NCLB symptoms were (~ 1 mo. after inoculation) detected in inoculated plots at Newport. The NCLB disease incidence (DI) was numerically lower ~14 DART (26 August) at Newport on all fungicide treated plots compared to the NTC (Fig. 1). The effect of fungicides applied at V10 stage of growth provided a numerically lower NCLB DI compared to the NTC (Fig. 1). Thus, fungicides applied shortly after sporulation (7 d) are more effective at suppressing NCLB development than R1 alone application, which was ~14 d after symptoms were first observed. No other foliar disease was observed at Newport. At the

Hope location, NCLB and Southern Rust (SR) were observed 14 DART. Numerically, a higher level of NCLB severity was observed 23 DART on all fungicide plots compared to the NTC whereas, fungicides lowered ($P \leq 0.05$) SR severity on all plots compared to the NTC. At Rowher, southern rust was observed 44 DART at a higher DS on fungicide treated plots than the NTC. Overall, weather conditions were cool during the summer which is more favorable for NCLB than SR in commercial corn fields and in these experiments.

Yield from all fungicides treatments was higher than NTC at Newport and Hope, in contrast, the opposite was observed at Rowher. Given, NCLB was observed at Newport and Hope early enough to cause yield loss these fungicide treatments were effective at protecting yield potential whereas fungicides applied in the absence of disease had a negative impact on yield at Rowher. Corn yield was numerically higher (+10 bu/ac) at Newport when a fungicide was applied at an early growth stage, but the opposite was true for Hope which had a negative impact on yield (-3 bu/ac). This could have been related to the lack of disease at the early-growth stage compared to Newport. Although fungicides applied at early growth stages was inconsistent in protecting yield potential at all three locations it was apparent that fungicides applied in the presence of disease was more beneficial than when disease is absent.

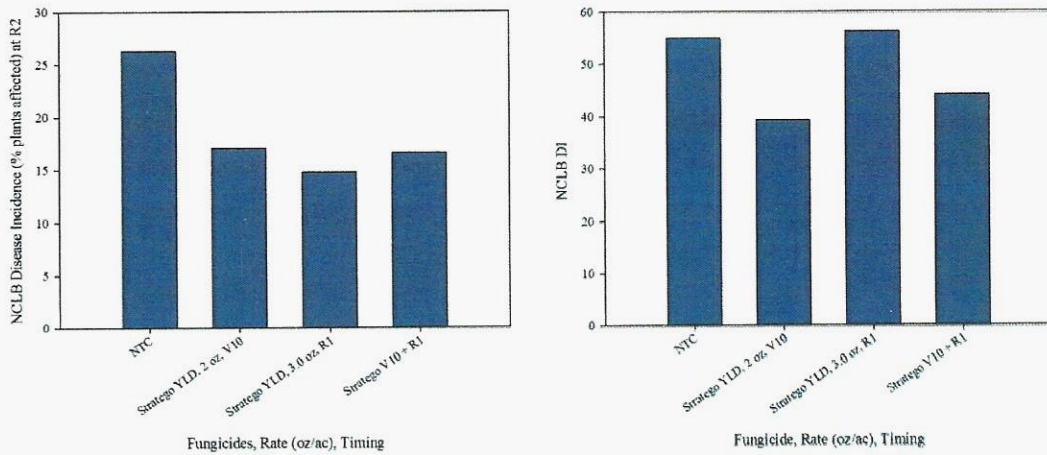


Figure 1. Disease incidence of NCLB 14 (left) and 34 (right) d after R1 application at Newport.

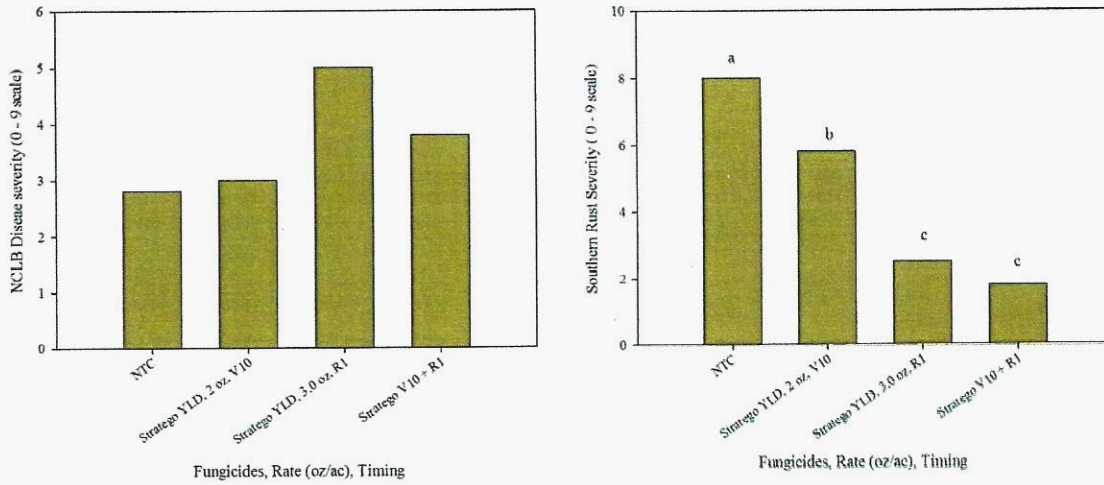


Figure 2. Disease severity of NCLB (left) and southern rust (right) 23 days after R1 fungicide application at Hope.

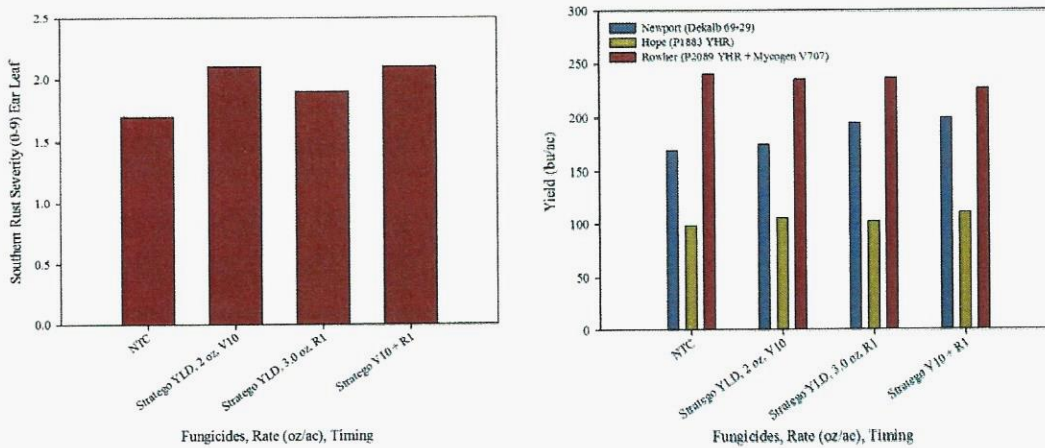


Figure 3. Severity of southern rust 23 d after R1 treatment at Rowher and yield for all treatments at all locations.

Objective 2:

Ten isolates of NCLB were collected in the 2014 cropping season and evaluated for sensitivity to strobilurin fungicides (i.e. Quadris or Headline) in vitro. None of the isolates expressed any hyphal growth on media amended with 0.1 µg azoxystrobin/ml. Thus, no resistant was identified among these isolates.

Objective 3:

Lesion nematode counts were higher in continuous corn production, but collection assays need to be modified to optimize LN collection and quantification.