

Assessment of the Importance of Root-knot Nematodes and Northern Corn Leaf Blight in Corn in Arkansas (Year 1)

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Corn is a relative newcomer to Arkansas row crops relative to rice, cotton and soybean, and our understanding of the importance of diseases and nematodes in the profitability of the crop is somewhat limited by comparison. A three-year project (2008-2010) that was supported by the Corn/Sorghum Board demonstrated that foliar diseases of corn, particularly northern corn leaf blight (NCLB) can significantly limit yield where they are severe. Although we also suspect that other diseases such as gray leaf spot and southern rust may also suppress yield, we have little actual data on the degree of damage that might be expected. The previous project also demonstrated that commercial corn hybrids vary greatly in their resistance to NCLB and that fungicide applications may enhance yield significantly if they are applied at the right time and where disease severity is sufficiently high to justify the expenditure. We do not, however, currently have a mechanism in place to evaluate the disease resistance (or susceptibility) of new hybrids to NCLB and relying on naturally-occurring disease for hybrid evaluations is inefficient and risky since disease may not develop where variety trials have been planted. Another finding from our previous project was that properly-timed fungicides can suppress disease development and improve corn yields significantly. However, although fungicides appear to be effective now, there is reason for concern that fungicide resistance may be developing in NCLB populations. Development of resistance to currently-labeled fungicide classes could compromise our ability to manage diseases effectively in years when fungicides are warranted. It is vital that we evaluate the current susceptibility of Arkansas isolates of NCLB and that we maintain an aggressive monitoring program to detect increases in fungicide resistance in our fungal populations. Finally, because corn is a relatively recent addition to the farming operations for many growers in the state, there is little information on the relationship between plant-parasitic nematodes and corn performance. We know from experiences in other states that nematodes such as lesion, lance, root-knot, and stubby-root can be economic, but we do not know how Arkansas soil types and environment affect these species in relation to their pathogen city on corn. Surveys and experience with corn conducted by the Arkansas Nematode Diagnostic Laboratory and studies conducted in our previous project appear to indicate that corn is susceptible, but relatively tolerant to the southern root-knot nematode, *Meloidogyne incognita*, our most economically important nematode species. We have not seen a major increase in other nematodes in fields where corn is grown, but population densities of the root-knot nematode increased substantially in fields where corn was grown, posing considerable risk to potential subsequent crops such as soybean or cotton that might be grown in rotation with corn.

We have several expected outcomes from this research project. Perhaps of most importance will be to design a screening procedure for evaluating future new hybrids for resistance to NCLB. This will require considerable experimentation with crop management and irrigation management procedures to provide an environment for consistent disease development each year. If this screen can be developed and implemented, it will provide us with a way to evaluate the potential vulnerability of new corn hybrids to NCLB before they are widely planted by growers in commercial fields. This screening program will be located at the Newport Experiment Station where infrastructure exists to manage irrigation and other crop production procedures to ensure uniformly high levels of NCLB for hybrid evaluation each year. This

process will also provide a mechanism for monitoring fungicide resistance development in Arkansas NCLB populations. Our fungicide studies will also provide information in an ongoing fashion on other foliar diseases that may develop in our screens so that others with yield loss potential may be identified. A commercial farm near Bald Knob, AR that is highly infested by the southern root-knot nematode has been obtained through a lease agreement and will provide an excellent place to study the impact of corn in rotation with soybeans, including the potential for using root-knot resistant soybean cultivars to mitigate the increases in nematode population density that may occur when corn is grown. This work should lead to more functional recommendations for growers on how to manage a root-knot nematode problem to maintain the nematodes at a sub-economic levels for all crops involved.