Evaluation of Fixed Copper for Management of Target Spot and Frogeye on Burley Tobacco

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INTRODUCTION

Target spot, caused by *Thanatephorus cucumeris*, is a serious disease of burley tobacco in Kentucky, particularly in rainy growing seasons or in areas with frequent fogs or heavy dews (Fig.1). Losses can exceed 1000 lb/A in severe outbreaks, while losses ranging of between 100 to 400 lb/A may occur during less favorable conditions. Frogeye, caused by *Cercospora nicotianae*, is present in most years, but can cause significant losses in quantity and quality of cured leaf in warm, wet growing seasons (Fig. 2). Both diseases can be managed effectively with azoxystrobin (Quadris 2.08SC), although its use raises key concerns. Because of the risk of fungicide resistance developing in target pathogens, the Quadris label mandates alternation with different chemistries. Two protectant fungicides, mancozeb and fixed copper, are registered for foliar disease control on tobacco; however, mancozeb is only moderately effective and cannot be used after topping. Also, mancozeb residues are a concern to the tobacco industry and thus alternatives to the fungicide would be desirable. The effect of fixed coppers on target spot and frogeye is poorly understood.

Fig. 1. Symptoms of target spot and frogeye on burley tobacco. In severe outbreaks, as pictured above, significant loss of leaf in the lower portion of the plant can occur.

OBJECTIVES AND METHODS

The purpose of this study was to evaluate a tobacco-labeled fixed-copper, cuprous oxide (Nordox 75WG), alone and in rotation with Quadris for management of target spot and frogeye.

Location. Trials were conducted on-farm in Jessamine County in 2013, and in Harrison and Fayette Counties in 2013.

Plot size & design. Treatments at all locations were arranged in a randomized complete-block design with 4 replications. Plot size was two rows × 25 ft. Untreated buffer rows separated plots, and a 5-ft buffer was included between blocks.

Treatments. Fungicides were applied at 5, 7, and/or 9 weeks after transplanting. A CO_2-powered backpack sprayer (fitted with TSX-18 hollow cone nozzles) was used to apply treatments; spray volume was 40 gal/A at 60 psi.

Evaluation. Disease severity was rated four times between the second fungicide application and harvest, and was estimated as percentage of leaf area with symptoms of target spot or frogeye; these values were used to calculate the area under the disease progress curve (AUDPC). Tobacco was harvested and cured according to standard practices. Data were subjected to analysis of variance; mean separation was performed using Fisher's protected least significant difference test (FLSD, P=0.05).

RESULTS

Effect of fungicide programs on foliar disease control and yield. In both years and at each location, all fungicide treatments significantly reduced severity of target spot and frogeye compared to the untreated control (Figs. 2 & 3). Yields, taken in 2011 only, were greater for all fungicide treatments (Fig. 2). Comparisons between fungicide treatments are described below.

- ***Jessamine County, 2011.*** Quadris followed by Nordox, Nordox followed by Quadris, and Quadris applied twice had significantly less disease and greater yield than Nordox applied twice.

- ***Fayette County, 2013.*** No differences were seen between Nordox applied early (5 WAT) or mid-season (7 WAT), followed with Quadris at 9 WAT, and Nordox applied at 5, 7, and 9 WAT, Quadris applied at 5 WAT followed by Nordox at 9 WAT, or Quadris applied at 5 and 9 WAT. Quadris (2 sprays) alternated with Nordox (1 spray) showed greatest control of target spot and frogeye.

- ***Harrison County, 2013.*** Programs with Nordox as the first or first and second applications (5 and 7 WAT) generally provided less control of target spot and frogeye than programs where Quadris was used as the first spray (5 WAT). Quadris at 5 WAT followed by Nordox at 9 WAT was as effective against these diseases as the Quadris (5 WAT) – Nordox (7 WAT) – Quadris (9 WAT) program.

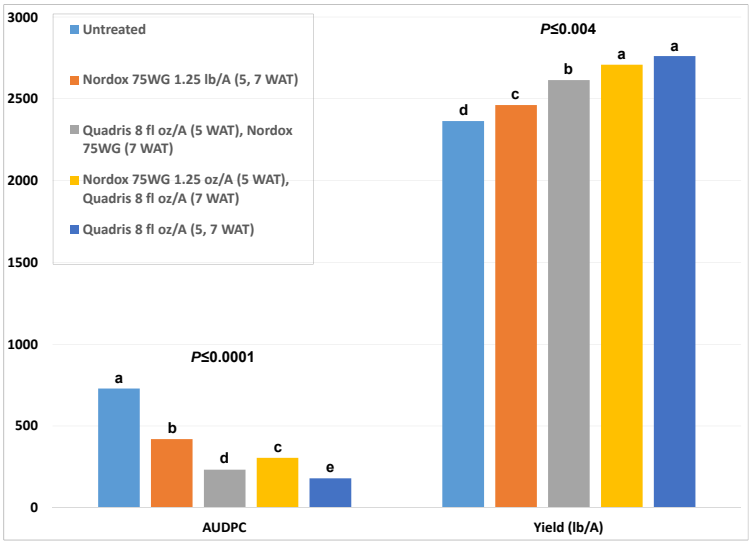

Fig. 2. Effect of cuprous oxide (Nordox 75WG) and azoxystrobin (Quadris), applied at 5, 7, and/or 9 weeks after transplanting (WAT) on severity (AUDPC) of target spot and frogeye of 'KY 14 X L8' burley and on yield of cured leaf. Test was conducted in 2011 in Jessamine County, Kentucky. Means followed by the same letter are not significantly different according to FLSD (*P*≤0.05).

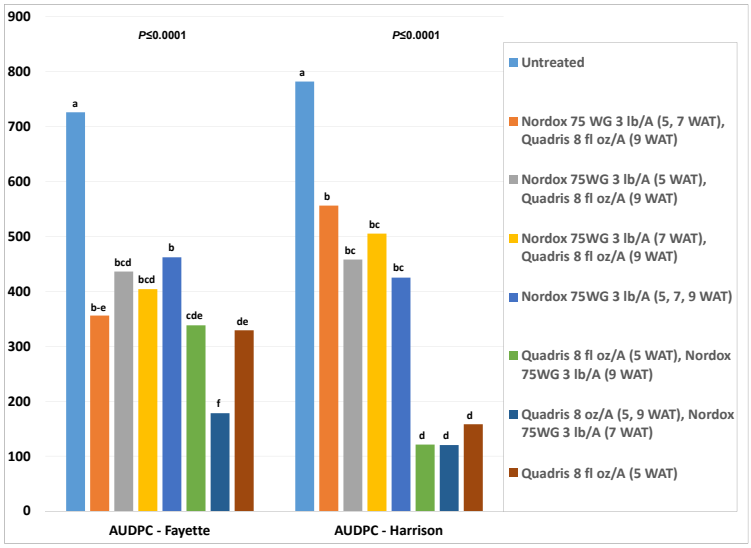

Fig. 3. Effect of cuprous oxide (Nordox 75WG) and azoxystrobin (Quadris), applied at 5, 7, and/or 9 weeks after transplanting (WAT) on target spot and frogeye of 'KT 206' burley. Trials were conducted in Fayette and Harrison Counties, Kentucky (2013). Means followed by the same letter are not significantly different according to FLSD (*P*≤0.05).

CONCLUSIONS

Results from this study indicate that Nordox can be used effectively in alternation with Quadris to manage target spot and frogeye of burley. In general, Quadris followed by Nordox was as effective as spray programs that included two applications of Quadris and this spray sequence tended to perform better than Nordox followed by Quadris. For growers who require more than one application of Quadris during a growing season to manage foliar diseases, Nordox appears to be an acceptable alternation partner for Quadris. By limiting the use of Quadris to one application during a crop cycle, the risk of resistance developing in populations of the target spot and frogeye pathogens will be minimized, along with the potential for excessive residues of azoxystrobin.

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