ADDITIVE EFFECTS OF TRIAZOLE FUNGICIDES AND HOST INDUCING CHEMICALS FOR THE CONTROL OF BLACK ROOT ROT ON COTTON

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Abstract

Thielaviopsis basicola, the cause of black root rot on cotton and numerous other crops, is a widespread pathogen in Arkansas. It is present in about 70% of cotton fields in the state. The disease reduces plant growth and development early in the growing season, delaying crop development and reducing yields. This pathogen is difficult to control since resistance is not available and long rotations out of cotton are not practiced. Seed treatments are universally used on cotton, but are not targeted at the management of black root rot. Myclobutanil (Systhane or Nu-Flow M) and triadimenol (Baytan), two triazole fungicides, have been shown to have some efficacy for the control of black root rot. The rates of these fungicides used on cotton, however, are directed at the control of *Rhizoctonia solani* and are generally not used at rates considered sufficient to provide significant control of *T. basicola*. Recently, acibenzolar-S-methyl (Bion), one of the systemic acquired resistance (SAR) chemical inducers, has been shown to reduce black root rot on cotton and was registered recently on cotton in Australia. The value of seed treatment with triazole and host resistance inducing chemicals was examined for black root rot control on cotton caused by *T. basicola* in both artificially and naturally infested soils. In artificially infested soil, Systhane (myclobutanil) reduced root discoloration by greater than 80%. In naturally infested soil, myclobutanil was effective in reducing root and hypocotyl discoloration over a wide range of soil population densities. Treatments containing a high rate (42 g a.i./100 kg seed) of myclobutanil provided greater reductions in disease than the low rate (21 g a.i./100 kg seed) , the rate used currently as a seed treatment, in some experiments. Bion (acibenzolar-S-methyl) applied to the seed reduced black root rot by 39 to 64% and 12 to 38% under low and high populations of the pathogen, respectively, in artificially infested soils. Rates of acibenzolar-S-methyl did not differ in efficacy. In artificially infested soil, root colonization by *T. basicola* was significantly lower when seeds were treated with both myclobutanil and acibenzolar-S-methyl than with either chemical alone indicating control can be enhanced by using more than one chemistry. In naturally infested soil under low (24 cfu/g soil) and high (154 cfu/g soil) populations of *T. basicola*, a combination of myclobutanil and acibenzolar-S-methyl resulted in the lowest root discoloration and colonization. Using the selective medium TB-CEN to quantify the colonization of the root system by *T. basicola* allowed the pathogen's importance to be evaluated in the presence of other pathogens that contribute to the seedling disease complex on cotton. This research has shown that triazole and host resistance inducing chemicals used as seed treatments are effective for the control of black root rot on cotton. In addition, this research documents the additive effects of using these chemicals.