Effects of *Neotyphodium* sp. Endophytes on Tall Fescue Tolerance to Abiotic Stresses

Plots of summer-dormant and summer-active tall fescue with or without endophyte at Vernon, TX

Rationale

In summer-active tall fescue types, the *Neotyphodium coenophialum* fungal endophyte may increase host-plant persistence in hot and humid environments by triggering an array of biochemical processes in the host plants, leading to increased tolerance to biotic and abiotic stresses when compared with non-infected plants (Malinowski and Belesky, 2000). A related *N. coenophialum* sp. endophyte has also been found in many summer-dormant accessions of tall fescue, yet its ecological role for the grass host is not well understood.

Summer-dormant tall fescue already possesses a mechanism of drought resistance that operates efficiently regardless of endophyte presence. Endophyte infection increases tolerance to mineral imbalances in summer-dormant tall fescue in a similar way as in summer-active tall fescue (Malinowski et al., 2004). Some of alkaloids produced by endophyte-infected summer-dormant tall fescue, that is, lolines, may contribute to a better protection from insect feeding than in non-infected plants. This, however, needs to be investigated in the future. Our observations (Malinowski et al., unpublished data, 2007) do not indicate any differences in insect feeding on summer-dormant tall fescue in response to endophyte infection. We also could not evidence significant, long-term effects of novel endophytes on productivity and persistence of summer-dormant tall fescue (Malinowski et al., 2005b). Further research with a broad range of summer-

dormant tall fescue accessions and cultivars is needed to determine the role of endophyte infection on plant productivity and persistence.

In this experiment, conducted in cooperation with Dr. Chuck West (formerly University of Arkansas, currently Texas Tech University) we determine the effect of endophyte infection and summer dormancy trait on persistence of tall fescue in hot and humid (Arkansas) and hot and dry (Texas) environments in 2006 (Underwood et al., 2008).

Objectives

1. Determine effects of endophyte infection on expression of summer dormancy and survival in tall fescue.
2. Determine relationships between biochemical protectants and drought survival in field-grown tall fescue as modulated by host summer-dormancy capacity.

Summary of Results

Guerber , C.A. , J.L. Underwood, C.P. West, D.P. Malinowski, and B.C. Grigg. 2009. Biochemical responses to water deficit in summer-dormant and summer-active tall fescue. International Workshop on Summer Dormancy in Grasses. 6-8 April 2009. Ardmore , OK .

West, C.P., J.L. Underwood, D.P. Malinowski, and C.A. Guerber, and B.C. Grigg. 2009. Dormancy indices, growth stages, and forage quality of summer-dormant and summer-active tall fescue. International Workshop on Summer Dormancy in Grasses. 6-8 April 2009. Ardmore , OK .

West, C.P., Underwood, J,L., and D. Malinowski. 2009. Trade-offs in growth, persistence, and quality of summer-active and summer-dormant tall fescue. *In* Proc. ASA-CSSA-SSSA Int. Annual Meeting. November 1-5, 2009. Pittsburgh , PA.

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