Tall fescue ( Lolium arundinaceum, Schreb. , S. J. Darbyshire) thrives in agro-ecosystems when infected with Neotyphodium coenophialum (Morgan-Jones and Gems, Glenn, Bacon, and Hanlin) endophyte. This is attributed in part to drought stress avoidance or tolerance (Morgan-Jones and Belesky, 2000), and improved nitrogen-use efficiency (Lyons et al., 1990). Both features are likely to influence photosynthetic capacity of plants harboring endophytes. Ecophysiological experiments with plants clipped to simulate grazing, are not common because of the confounding influences of environment and management. Collecting numerous and often disparate measurements from plants at various times is difficult. Consequently, conclusions are based on instantaneous measurements made at fixed points. Stable carbon isotope discrimination (Δ) can provide an integration of responses to management and environment (Jumpponen et al., 2005) and could link responses with agro-ecosystem function. Significant determinants of Δ include stomatal function and ribulose-1,5-bisphosphate carboxylase/oxygenase (RuBP) activity (Farquhar et al., 1989). Since the integrative measure of ambient relative to internal CO2 concentration is associated with water and nitrogen use efficiency, and endophyte seems to benefit tall fescue in this respect, Δ might be a way to distinguish infected and non-infected plant responses.

OBJECTIVE
Determine if host-endophyte associations interacting with microsite and management influence Δ.

H0: Carbon isotope discrimination does not vary with host-endophyte association

H1: Carbon isotope discrimination is associated with host-endophyte association

RESULTS
Environment & Management

Microsite (environment) and defoliation (management) influenced Δ. Season-long mean Δ increased from OP (full sun) to SE (most shade) as available light decreased. A reflectance resource availability and canopy management. Tall fescue–endophyte associations did not differ in Δ as a function of microsite, residual height, or time.

ET1 was about six times greater at OP compared to SE, irrespective of residual clipping height. This occurred in part because growth interval duration differed for each microsite and residual clipping height. Δ decreased as ET1 increased, which suggests possible decreased water use efficiency at OP.

We expected that host-endophyte associations would differ in Δ and were surprised when no differences in Δ were observed.

The similarity in Δ might be attributable, in part, to benign growing conditions at the site. Equally surprising was the wide range in Δ occurring as a function of microsite.

INTRODUCTION
Ergoalkaloids were present in J+ only. Ergoalkaloids act as deterrents in shade. Protectants in full sun, and alkaloids as herbivory deterrents in shade. The opposite was true for foliar carbon isotope composition in monocultures and mixtures. J. Ecol. 93, 1136-1147.


The positive relationship of Δ with LDMC and herbage energy increased as available light decreased. Phloem carbon isotope discrimination was used to determine responses of associations to environment and management.

The positive relationship of Δ with LDMC and herbage energy – protein (TDN:CP) links physiological efficiency with system function. A field experiment to determine if a tall fescue cultivar that was devoid of or infected with a native or a novel non-ergoalkaloid producing endophyte was influenced by environment and forage management practices. Stable carbon isotope discrimination was used to determine responses of associations to environment and management.

• Endophyte helps tall fescue tolerate atic stress. A means to assess to this is needed to understand how host-endophyte associations function across landscapes and with management practices.

• A field experiment to determine if a tall fescue cultivar that was devoid of or infected with a native or a novel non-ergoalkaloid producing endophyte was influenced by environment and forage management practices. Stable carbon isotope discrimination was used to determine responses of associations to environment and management.

• Host-endophyte associations did not differ in Δ. Similar Δ for host-endophyte associations might be attributable to benign growing conditions at the site. The TDN:CP of tall fescue herbage was related inversely to Δ. Trends indicate that Δ can serve as an indicator of nutritive value; an agro-ecosystem product that is as important an herbaceous dry matter production in pasture.

SUMMARY

• Endophyte helps tall fescue tolerate atic stress. A means to assess to this is needed to understand how host-endophyte associations function across landscapes and with management practices.

• A field experiment to determine if a tall fescue cultivar that was devoid of or infected with a native or a novel non-ergoalkaloid producing endophyte was influenced by environment and forage management practices. Stable carbon isotope discrimination was used to determine responses of associations to environment and management.

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LITERATURE CITED


