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Effects of endophyte infection on the response of *Achnatherum inebrians* to water stress and nitrogen fertilizer under controlled growth conditions

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Key words: drunken horse grass, Xinjiang, endophyte, tillers, nitrogen fertilizer, growth

Introduction *Achnatherum inebrians*, locally known as drunken horse grass (DHG), is a toxic perennial grass found in the western Chinese province of Xinjiang. Recent research shows that DHG is infected by an endophyte that is responsible for the production of the toxic compounds in DHG. It is not clear if this fungus also influences the agronomic performance of DHG. Therefore, an experiment was conducted to test the influence of this fungus, under controlled conditions of different levels of nitrogen fertilizer and water application, on the productivity of DHG.

Materials and methods A factorial experiment consisting of 3 rates of nitrogen (N) (0, 50, 100 kg N hm⁻² as ammonium nitrate), 3 levels of water application (50, 75, and 100% field capacity), and two endophyte (E) infection levels (3% and 94%) were conducted in a glasshouse environment. Six plants were grown in each pot. The aerial dry matter (DM) and tiller numbers of E infected (EI) DHG and E free (EF) DHG were measured.

Results and discussion There were a number of significant ($P < 0.05$) interactions detected in this study. Although the mean DM production of DHG was not affected significantly by endophyte infection, at the highest level of N fertilizer, EI produced more DM than EF (Figure 1, bars representing mean values with different letters are significantly different $p < 0.05$). Similarly, at the highest water level (100% field capacity), EI DHG again produced significantly more DM than EF DHG (Figure 2). EI DHG also produced more tillers than EF DHG at highest water levels (Figure 3).

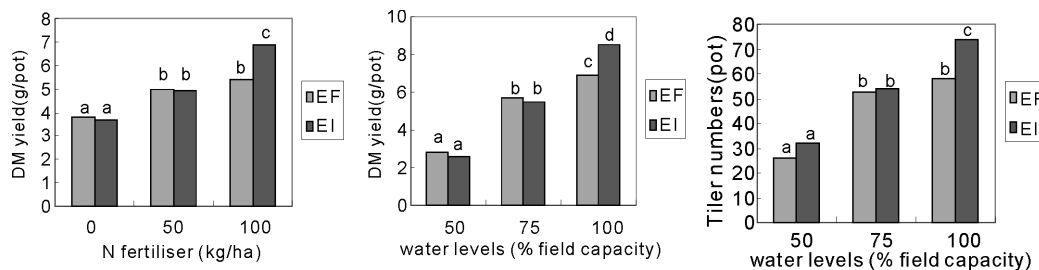


Figure 1 DM yield of tillers of EI and EF DHG.

Figure 2 DM yield of tillers of EI and EF DHG.

Figure 3 Tillers Numbers of EI and EF DHG.

Conclusions There have been few previous reports of the effect of endophyte infection on DHG growth. Studies on tall fescue indicated that the endophyte favors plant growth. However, interactions between the endophyte and other factors such as nutrient status, water and soil type make it difficult to predict a clear response of plant growth to endophyte infection. This study showed that under certain conditions, endophyte infection stimulates host plant growth. More studies are needed to reveal the mechanism of the endophyte-plant interactions.

Reference

Nan, Zh.B., Li Ch J., (2004). Roles of the grass-*Neotyphodium* association in pastoral agriculture systems. *Acta Ecologica Sinica* 24: 606-615.