Effects of Abiotic Stresses on *Achnatherum inebrians* by Symbiotic Endophyte of *Neotyphodium gansuense*

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Key words : drunken horse grass ,*Neotyphodium* endophytes ,drought resistance ,salt tolerance

Introduction Drunken horse grass (*Achnatherum inebrians*) is an intoxicating grass that grows in the native grasslands of Northwest China , with high infection rate by endophyte *Neotyphodium gansuense* (Li *et al* . , 2004a ; Li *et al* . , 2004b) . The response to this grass by biotic stresses , i .e . : grass pathogenic fungi and pests , have been reported (Li et al . , 2007a) . In this paper , the responses to abiotic stresses of drought and salt were studied .

Materials and Methods

1 .Endophyte-infected (E+) and endophyte free (E-) plants of *Achnatherum inebrians* were established from seeds collected from Yuzhong , Gansu , China .

2 .Plant growth and physiological characteristics on *A . inebrians* were studied under light drought (40% water holding capacity , WHC) and strong drought (20% WHC) stresses and their recovery effects after strong stresses by pot experiment under controlled watering conditions .

3 .Plant growth and physiological characteristics on *A . inebrians* were studied under salt stresses of 100 , 200 , 300 mmol/L NaCl in 1/2 Hoagland solution and their recovery effects after strong stresses by pot experiment under controlled watering solution conditions .

Results and Discussion

Drought stress Under drought stress conditions , the oxidative damage of E+ plants from arid area was significantly lower than that of E-plants ($p<0.05$) , the superoxide dismutase (SOD) activity of E+ leaves was significantly lower than that of E-leaves ($p<0.05$) . Endophyte could obviously promote leaf proline accumulation and underground biomass accumulation ($p<0.05$) , increase or maintain underground biomass , change biomass pattern by redistributing root and shoot ratio . However , the effects of endophyte on tiller number , leaf growth and leaf relative water content (LRWC) of *A . inebrians* were not significantly different ($p>0.05$) .

Endophyte could enhance *A . inebrians* recovery by increasing tiller and leaf growth , slowing down the degradation of proline after strong drought stress .

Salt stress Under salt stress conditions , compared with E-plants , E+ plants had better vegetative growth and water protection . Tiller number , plant height and LRWC were significantly increased ($p<0.05$) .

Endophyte could improve *A . inebrians* recovery after strong salt stress by increasing plant growth and water protection . Tiller number , plant height and LRWC of E+ plants were significantly increased ($p<0.05$) under salt stress conditions .

Conclusions

1 .*Neotyphodium* endophytes could increase drought resistance to *A . inebrians* and its recovery after strong drought stress .

2 .*Neotyphodium* endophytes could increase salt tolerance to *A . inebrians* and its recovery after higher NaCl stress .

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