Temporal and spatial variation of arbuscular mycorrhizal fungi spores in seasonally salt stressed grassland using *Medicago sativa* for reclamation in Hexi Corridor, China

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Key words: arbuscular mycorrhizal fungi, depth, *Medicago sativa*, salinity, season

Introduction Soil salinity is a problem of grave concern because it adversely affects growth and development of plants, especially in arid and semi-arid regions. Arbuscular mycorrhiza (AM) are ubiquitous symbionts between the fungus and host plant. This relationship enhances plant growth through increasing nutrient acquisition and carbon cycling, alleviating environmental stresses, and increasing biomass production. The objective of this study was to investigate the seasonally salt stressed affecting AMF spores of taproot systems plants at the reclamation grassland.

Materials and methods This study was conducted in the Linze Ecological Research Area of Lanzhou University (N39°15′, E100°02′), located in Hexi Corridor, Northwest of China. *Medicago sativa* was planted as test materials to reclamation seasonally salt grassland in 2001, 2002, 2003 and 2004, respectively. Rhizosphere soil samples were collected at four different depth as 0-20 cm, 20-50 cm, 50-100 cm and 100-200 cm in April(Shoot), May(Growth), June(Flower), and August(Seed) in 2005. AMF spores were isolated by wet sieving followed by sucrose gradient centrifugation (Daniels & Skipper, 1982). Data were analysed using Univariate Analysis of Variance with SPSS (v13.0)

Results Our results showed that the phenological phase, soil depth, and planted years influence the AMF spores significant (Table 1). (1) The 0-20 cm layer soil has the highest numbers of AMF spores (9.39±0.21/g dry soil), deeper rhizosphere soil reduced the richness of AMF spores. (2) The longer years that *M. sativa* planted, the more AMF spores were existed. (3) To the phenological phase, the largest number of AMF spores was in June (Flower) (4.41±0.21/g dry soil), and the lowest was in May (Growth) (3.20±0.21/g dry soil).

Table 1 *Univariate analysis of variance on the effects of growth stage, depth and plant years on the numbers of AMF spores.*

Source	Sum of Squares	df	Mean Square	F	Sig
Growth Stage (S)	60.459	3	20.153	5.983	0.001
Depth(D)	3538.322	3	1194.107	354.527	<0.001
Planted Year(Y)	145.085	3	48.362	14.358	<0.001
S*D	169.116	9	18.791	5.579	<0.001
S*Y	73.579	9	8.175	2.427	0.012
D*Y	265.222	9	29.469	8.749	<0.001
S*D*Y	227.446	27	8.424	2.501	<0.001
Error	862.252	256	3.368		

Discussion Mycorrhzal symbiosis is a key compent in helping plants cope with adverse environmental condition. In this study, results showed that AMF spores could be used as an indicator to evaluate the degraded ecosystem, and *M. sativa* is a potential materials to reclamation saline soil.

Acknowledgements This study was funded by National Basic Research Program of China (2007CB108902) and Natural Science and Technology Program of Lanzhou University (582402, 582403).