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Increasing NaCI- Salt Tolerance ora Halophytic Plant *Phragmites australis* by Mycorrhizal Symbiosis

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Abstract: Through biological inoculation technology, pot greenhouse experiments were conducted in attempt to increase salinity tolerance of a halophytic plants; *Phragmites australis;* by using arbuscular mycorrhizal (A11) fungus *Glomus fasciculatum* isolated from saline soil. Mycorrhizal and non-mycorrhizal plants were exposed to 0.0,50, 100, 150, 200, 250 and 300 mM ofNaCl. Plant growth was significantly stimulated at lower salinity (0 and 50 mMNaCI), but sharply decreased at higher salinity concentration (250 and 300 mM NaCI) but AM plants still much higher than that of non-Alvl one. A positive correlation was observed between plant growth and its level of succulence. Sodium ions (Na") were greatly accumulated *inPhragmites* plants by rising salinity levels however, AM plants accumulate more Na' ions in roots than that in shoots. NaCl salt-stress stimulated the levels of organic solutes such as soluble sugars and glycinebetaine. Arbuscular mycorrhizal plants significantly had higher levels of these solutes than that of non-Alvl. The results also revealed that the increase in salinity generated a decrease in water potential and osmotic potential experimented plants, with this decrease being lower in AM salinity - stressed plants. Mycorrhization also had positive effects on turger potential and osmotic adjustment of salinity - stressed plants. It is evident that amelioration of salt stress concentrations by mycorrhizal association can be related to improved osmotic adjustment but independent of salt uptake of plants. Thus the results indicated that the mycorrhizal symbiosis had a beneficial effect on the water status, accumulation of osmotica and growth of *Phragmites australis* plants under salinity - stress conditions.

Key words: Salt tolerance . halophytic . phragmites . mycorrhiza

INTRODUCTION

Salt stress has become an over-increasing threat to food production, irrigation being a major problem of agriculture fields due to gradual salinization. The most common solution to this problem is to increase the salt tolerance of conventional crop plants, but the gain in yield is generally low [1]. Another response to the salinity problem is the development of salt tolerant crops through breeding and genetic engineering. A recent approach is to use domesticated halophytes to combat the salinity problem [2]. Among the large pool of suitable plants, it is expected to find candidates for domestication. Halophytes represent an important potential as they can be used for fodder, fuel, oil, wood and pulp and fiber production. They Also can be used for land reclamation, dune stabilization and landscaping. Some of 2500 species of halophytes (graminae, shrubs and trees) occur in saline coastal environment and inland deserts. Increasing attention has been paid to research and development of halophytes utilizing undiluted seawater on a large scale for irrigation [3, 4].

The ability of plants to survive under high salt conditions is important for the ecological distribution of plant species and agriculture in semi arid, arid and salinized region. Halophytes are known for their ability to adapt to living in salty solution environment and these plants adapt to salinity by altering their energy metabolism [5-7]. The plant has to react physiologically at least to four major constraints for plant growth on saline substrates [6, 8-10]. Control mechanisms include (a) growth rate and plant morphology, (b) resistance to water stress (reduction of the water potential), (c) regulation of CO, and ReO - exchange by stomata and (d) avoidance of ion toxicity and nutrient imbalance.

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