Lotus Newsletter (2007) Volume 37 (1), 17-18.

Abstract, Workshop held at Chascomús, Argentina, 31 May-1 June 2007

Effect of salt stress and symbionts on root architecture of *Lotus tenuis*

MARIELA ECHEVERRIA[1*], ANALÍA SANNAZZARO[1], OSCAR MASCIARELLI[2], VIRGINIA LUNA[2], OSCAR RUIZ[1] and ANA MENÉNDEZ[1]

[1]*Lab. de Estrés Biótico y Abiótico en Plantas (UB3)–IIB–INTECh (UNSAM-CONICET). CP 164. Camino Circunvalación Laguna Km 6. Chascomús. Buenos Aires. Argentina (B7130IWA)*

[2]*Laboratorio de Fisiología Vegetal. FCEFQyN-UNRC. Ruta 36 Km 601. Río Cuarto. Córdoba. Argentina (5800)*

[*] *Corresponding author*

click here for Spanish version

Lotus tenuis (*L. glaber* Mill.) establishes symbiotic associations with the arbuscular mycorrhizal fungus *Glomus intraradices* and with the nitrogen fixing bacteria *Mesorhizobium loti*. Studies performed in our laboratory have shown an increase of salt-stress tolerance in sensitive and tolerant *L. tenius* genotypes inoculated with *G. intraradices*. Although the association of *L. tenuis* with *M. loti* did not improve plant growth under saline condition, the presence of both symbionts in roots promoted synergistically that growth. Plant architecture, morphology and physiology are factors determining plant ability to explore nutrient resources in the soil and hence, its productivity. Many environmental factors such as water availability and nutrients in soil may influence plant architecture. In turn, this influence is the result of a complex process coordinated by hormones. Cytokinins are among hormones altering plant growth pattern. They are produced in root meristems and transported via xylem to the shoot. On the other hand, auxins also alter plant growth. Plants have a basipetal transportation of the auxins synthesized in shoot meristems and young leaves to the root. While cytokinins produce their effect fundamentally on apical meristems, increasing new cells production, auxins promote cell enlargement. The hypothesis of this work is that salinity and symbiosis with the mentioned organisms alter plant architecture, particular root architecture and that this alteration is regulated by auxins and cytokinins. To test this hypothesis, two factorial experiments were carried out being the factors: 1-salinity (0 and 150 mM NaCl) and 2- symbiosis (without symbionts, with *G. intraradices*, with *M. loti*, with both symbionts). Morphological parameters were recorded in roots and shoots and root AIA and Zeatine contents determined after 5 and 18 days of salt treatment. Our results indicate that salinization diminished the fresh weight of uninoculated plants, as well as those inoculated with *M. loti*. However, this treatment didn't affected mycorrhizal and co-inoculated plants. Salt stress has negatively affected the length of the shoot, being this effect more pronounced in control and *M. loti*-inoculated plants. On the other hand, the number of total ramifications was only diminished in the control and rizobacteria-inoculated ones. With the exception of *G. intraradices*-inoculated plants, the length of the principal root and the total length of the root were reduced by the presence of salt. On the other hand, in absence of salt, symbiosis with *M. loti* diminished the total length of the root compared with

the mycorrhizal treatments. Salinization also diminished the number of total root ramifications (magnitude) and the quantity of "internodes" in the principal root (altitude), especially in the control and the co-inoculated treatments. The altitude and magnitude *M. loti*-inoculated plants are not diminished in control conditions, indicating that the decrease in the length of the root is the consequence of shorter internodes instead of fewer ones. In all cases salinity decreased Zeatine levels after 5 days of salt treatment. Similar difference was also observed after 18 days of salinization in non-inoculated and in mycorrhizal plants, but not in those nodulated with *M. loti*, since Zeatine level of nodulated plants also decreased at 0 mM NaCl. Alter 5 days, salinity lowered AIA contents in control and mycorrhizal plants, whereas there were no changes in the AIA level of nodulated plants. The salinity diminished the number of nodules; nevertheless, when the mycorrhizas are present (co-inoculated treatments) the quantity of nodules is not affected. The presence of salt affects the growth and, consequently, the productivity of *L. tenuis*. The salt stress alters the root topology making it more dichotomous and less herringbone shape. The salt stress diminishes contents of AIA and Zeatine in roots of *L. tenuis*. For this reason, roots are shorter and more branched. This change in root topology reduced the volume of soil to explore, thus diminishing plant productivity. The co-inoculation of *G. intraradices* and *M. loti* would be the best treatment to overcome salt stress effects on *L. tenuis* productivity.