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Salt driven interactions between *Salsola inermis* and *Pistacia lent*

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Key words : salinity, *Pistacia*, *Salsola*

Introduction In the live germplasm collection of *Pistacia* spp. (Anacardiaceae), at the Jacob Blaustein Institutes for Desert Research, Ben-Gurion University of the Negev, Israel, *Salsola inermis* (Chenopodiaceae) grows around trees of *Pistacia* spp. (60~100 cm from the trunk), but its growth in the vicinity of *P. lentiscus* was inhibited. *P. lentiscus* is an evergreen aromatic big Mediterranean shrub, rich in resin and essential oil, composed mainly of the monoterpenes α -pinene, limonene, sabinene, and the sesquiterpene germacrene D (Barazani et al. 2003). Monoterpenes and sesquiterpenes such as α and β pinene, camphene, limonene, α -phellandrene, pulegone and camphor are known to possess phytotoxic effect. Moreover, the allelopathic effect of some plants was reported to be associated with the release of essential oil to the soil.

S. inermis is an annual which germinates in the beginning of winter, develops during summer, flowers and produces seeds in autumn. It grows in big patches, and its distribution is limited to saline and disturbed habitats in arid regions. It was assumed that allelopathy is involved in growth inhibition of *S. inermis* around *P. lentiscus*. In this study, we aimed to test the nature of these interactions.

Materials and methods The *Pistacia* spp. germplasm collection field is located in the Negev desert highland of Israel. The average yearly rainfall is 90 mm, concentrated in the winter months (November to March). Summer and winter maximum and minimum temperature averages are 35 and 20 °C and 15 and 0 °C, respectively. Plants of *Pistacia* were planted during autumn of 1996 and are growing in loess soil, under the same environmental conditions for the last 10 years (Golan-Goldhirsh and Kostiukovsky, 1998). During the dry season (April-November), plants are irrigated by drip irrigation (Netafim, Israel) twice weekly, and as necessary during winter. Germination of *Salsola inermis* occurs during winter. Then, wide patches of seedlings are observed in the field. All analyzes reported were conducted during the growing season of *S. inermis* in summer of 2002.

Results and discussion The growth of *Salsola inermis* plants is inhibited in the vicinity of the evergreen *Pistacia lentiscus*, but not around deciduous *P. atlantica* and *P. chinensis*. The study of this observation at the *Pistacia* spp. germplasm collection at the Jacob Blaustein Institute for Desert Research, Israel, is reported in this paper. *In vitro* bioassays did not reveal allelopathic effect. Moreover, germination of *S. inermis* seeds on filter paper moistened with *P. lentiscus*-soil filtrate was twice as high as that in deciduous trees-soil filtrates. Nevertheless, fresh and dry weights of mature *S. inermis* growing next to *P. atlantica* and *P. chinensis* was 2.9 to 4.8 times higher than that of plants growing in the vicinity of *P. lentiscus*. Conductivity measurements in summer, during the growth season of *S. inermis*, indicated that soil salinity beneath deciduous *Pistacia* trees was 16.5~17.5 mS and below *P. lentiscus* was 2.5 mS. It is therefore proposed that salt depletion in the vicinity of *P. lentiscus* inhibits its growth, pointing to the halophytic nature of *S. inermis*.

In an hydroponic experiment, young seedlings of *P. lentiscus* grew for a month in a medium containing NaCl at 50 and 100 mM, not showing stress symptoms. In addition, no significant differences ($p > 0.05$) were found in stomatal conductance between plants growing in control and in salt treatments, although a trend of decline was obtained at 100 mM. The results indicated that *P. lentiscus* is able to tolerate and accumulate salt, which contributes to its wide distribution along the Mediterranean coast.

References

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