



Plant-plant interactions in the restoration of Mediterranean drylands

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Plant-plant interactions are complex and dependent of both local abiotic features of the ecosystem and biotic relationships with other plants and animals. The net result of these interactions may be positive, negative or neutral resulting in facilitation, competition or neutralism, respectively (role of phylogeny). It has been proposed that competition is stronger between those individuals that share functional traits than between unrelated ones. The relative interaction effect of one plant on a neighbour may change in relation to resource availability – especially water in drylands. In addition, plants develop above and belowground biomass with time increasing the level and, eventually, changing the intensity and/or the direction of the interaction. In the framework of the restoration of degraded drylands, many studies have focused on the positive (nurse) effects of adult trees, shrubs and even grasses on artificially planted seedlings by improving the microclimate or providing protection against herbivores, but little is known about the interactions between seedlings of different life traits planted together under natural field conditions. In 2010 we established planting plots in two contrasted sites under semiarid Mediterranean climate and introduced one year old seedlings in different combinations of three species, two shrubs (*Olea europaea* and *Pistacia lentiscus*) and one grass (*Stipa tenacissima*). Half of the planting holes in each site were implemented with low-cost ecotechnological inputs to increase water availability by forcing runoff production and promoting deep infiltration (small plastic fabric + dry well). This resulted in four levels of abiotic stress. Biotic interactions were assessed by monitoring seedling survival and growth for three years after planting. The Relative Interaction Index (RII) of *S. tenacissima* on *O. europaea* was almost flat and close to 0 along the stress gradient since the beginning of the study suggesting limited interaction. *Pistacia lentiscus* showed facilitation on *O. europaea* in the most stressed situations and competition under the most favourable ones. We also observed mutual negative net effects between *S. tenacissima* and *P. lentiscus* as abiotic stress increased but with different sign of the slopes of RII with time: positive in the grass and negative in the shrub as plants become bigger in the most stressed conditions. These net effects and their temporal dynamics are discussed according to the specific life traits of the studied species as well as the implications for the restoration of semiarid lands.