



The net effect of abiotic conditions and biotic interactions in a semi-arid ecosystem NE Spain: implications for the management and restoration.

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Degradation in arid and semiarid lands can be irreversible without human intervention, due to a positive plant-soil feedback where the loss of vegetation cover leads to soil degradation, which in turn hampers plant establishment. Human intervention in restoration actions usually involves the amendment of the degraded abiotic conditions, revegetation of bare areas, or both. However, abiotic amelioration is often expensive and too intrusive, and revegetation is not successful in many cases. Biotic interactions between plants, and more specifically facilitation by a “nurse” plant, have been proposed as a new way to take profit of improved abiotic conditions without intervention, and to increase the success rate of revegetation actions. But “nurse” plants can also interfere with others (i.e. by competition for resources or the release of allelopathic compounds), and the net balance between facilitation and interference could depend on plant types involved. We present recent observational and experimental studies performed in the semiarid ecosystems of the Middle Ebro Valley (NE Spain) about the role of abiotic conditions and biotic interactions in the productivity, dynamics and diversity of plant communities under different stress conditions (aridity and grazing). We found that all plant types studied (shrubs and perennial grasses) improved abiotic conditions (soil temperature and water availability for plants) with respect to open areas. However, only some shrubs (mainly *Salsola vermiculata*) had a positive net balance in the biotic interactions between plants, while other shrubs (*Artemisia herba-alba*) and perennial grasses (*Lygeum spartum*) showed interference with other plants. Moreover, the net balance between facilitation and interference among plants in the community shifted from competitive to neutral or from neutral to facilitative with increasing aridity. Grazing status did not strongly change the net biotic interactions between plants. Our results suggest that the success of the restoration actions with “nurse” plants will be highly dependent on the plant type involved and the abiotic site conditions, fact that needs to be considered in restoration plans.