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## The use of sustainable agronomic practices and grazing to manage organic olive orchards in western Australia

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**Key words** : organic management , root length , biomass , native pasture

**Introduction** The massive destruction of native forest plants and the planting of annual, herbaceous plants through "ley farming" on a surface of over 20 million hectares, has resulted in distinctly adverse environmental changes in Western Australia. There has been a dramatic rising of the water table due to the shallow root systems of herbaceous plants and the removal of deep rooted native trees. This has led to substantial salt accumulation on the soil's surface on approximately five million hectares. It is likely that this salt affected area will double in the next few decades (W.A.Gov., 1996). In order to prevent further environmental degradation, agronomic practices such as intensive re-forestation with trees and shrubs of both native and exotic species should be implemented (AAVV, 1998). In addition, perennial tree consociation with annual crops and pasture is also necessary. The olive is an ideal species to be consociated with deep-rooted perennial herbaceous species (Faiello et al., 2003). The plant's vigorous root system develops extensively, absorbing substantial water and thereby contributing to reduction of the water table. The initial competition between the olive and herbaceous species could be reduced by livestock grazing. This would contribute to diversifying farm production-i.e. the implementation of organic and sustainable agronomic systems resulting in high quality productions.

**Materials and methods** Six olive groves aged from six months to 55 years were chosen for this experiment: The younger the plants, the greater the management input to reduce the impact of competing weeds. The agronomic practices implemented in these orchards were: a) total organic management; b) total inorganic management; c) soil cultivation at planting only; d) soil cultivation on a yearly basis.

Measurements included the botanical composition through linear analysis; root depth through trench digging; and plant biomass through a sample weighing.

**Results and discussion** Results indicated the presence of a higher number of grasses and other species in the olive groves managed with the organic method. *Festuca arundinacea* and *Dactylis glomerata* were the deepest rooted grasses: These species are interesting perennial forages, despite not being very common in Western Australia. Although plant species with deep root systems were found in all four management scenarios, these species had deeper roots in the groves cultivated organically or with no cultivation (35-40 cm), than those cultivated yearly (25-30 cm). Biomass production varied from 3.6 to 5.6 t DM ha<sup>-1</sup> throughout the groves.

**Conclusions** In conclusion, olives growing with spontaneous grasses in groves managed organically result in a more balanced pasture with a higher number of species and deeper root systems than those olive groves managed with conventional methods, subsequently having a greater impact on the water table. Some perennial deep rooted grasses, naturally occurring in some groves, can be utilized for sowing.

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