

Establishment of agroforestry system with conservation techniques under dryland conditions

Soil compaction may reduced water infiltration and moisture content of the soil, limiting tree growth.



Our objectives are to develop and propose new strategies for agroforestry systems in the Mediterranean region of central Chile.

The study area is located in the "secano interior" central-south Chile (35° 97S, 72° 24W) in the Mediterranean region of central Chile. The mean annual precipitation of 695mm with five months of drought. The soil is a Mollic Palexerols. The experiment started in autumn 2007. The size of each plot is 30*50m in a soil +30% slope. Each treatment consisted in multiple purpose trees: *Chamaecytisus proliiferus*, *Quillaja saponaria* and *Quercus suber*. The conservation techniques are:

► Subsoiling with banks



► Infiltration trenches (IT)



► Control (TS)



Evaluations

Soil evaluation

- Physic: Texture, aggregate stability, soil water infiltration, bulk density, soil compaction.
- Chemical: pH, CTotal, Ntotal, macronutrients.

Tree evaluations

- After the first year of establishment, every year growth dry matter of leaves, plant height, crown and trunk diameter are evaluated.

Monitoring

- Evaporation tray, rainfall, water soil infiltration (20, 40, 60, 80, 100 cm depths.)

Tree growth and soil moisture content

The Tagasaste tree (*Chamaecytisus proliiferus*) has grown faster than cork oak (*Q. suber*) and *Q. saponaria*. Higher tree growth have been observed with infiltration trenches and with subsoiling (Fig. 1).

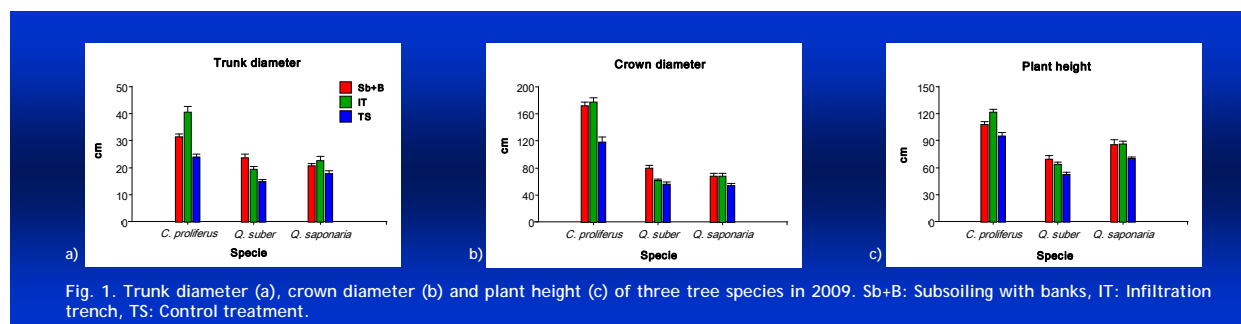


Fig. 1. Trunk diameter (a), crown diameter (b) and plant height (c) of three tree species in 2009. Sb+B: Subsoiling with banks, IT: Infiltration trench, TS: Control treatment.

Soil moisture was significantly ($P < 0.001$) higher with subsoiling and bank (Fig. 2), indicating that water infiltration has been increased with the soil treatment.

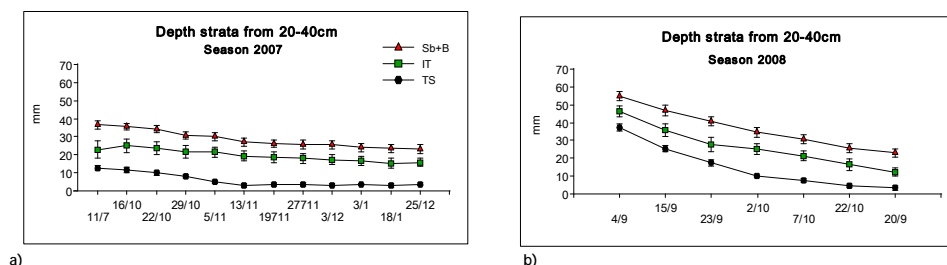


Fig. 2. Soil water content evolution at 20-40 cm depth measured after rainfall period during season 2007 and 2008. Sb+B: Subsoiling with banks, IT: Infiltration trenches, TS: Control.

Tagasaste is the specie with more potential in Mediterranean arid zone. The conservation technique of subsoiling with banks increase water infiltration and soil moisture content in depth during dryland period.



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Project results and dissemination to stakeholders

► Activities realized with farmers adopting conservation techniques in October 2009. No till wheat production, Contour ploughing (CP) with barrier hedges of *phalaris* and CP with agroforestry Tagasaste in a degraded zone located in Comuna Yumbel with slope 20-30%.

