



Soil carbon changes after plantation of autochthonous species in a semi-arid Mediterranean old-field in Sardinia

Giovanbattista de Dato and Paolo De Angelis

DISAFRI Department of Forest Environment and Resources - University of Tuscia, Viterbo, Italy (gdd@unitus.it, 0761 357 389)

Forested areas are important in arid and semi-arid regions primarily to combat desertification, but also to increase carbon sinks. According to the last Italian National Inventory of Forest and Carbon INFC dated 2005, Mediterranean *maquis* and shrublands cover about 690,100 ha, in Italy. Considering their vast diffusion, efforts should be done to evaluate the potential of these ecosystems in sequestering C in order to achieve the Kyoto Protocol commitments and dampen desertification processes.

The aim of this work was to present preliminary observations on soil C accumulation and release in a planted Mediterranean semi-arid shrubland. During the first three years particular effort was done to quantify the plant growth and soil CO₂ emission, to test if species-specific responses could be detectable and relevant for the C-budget.

The experimental area is located in North West Sardinia, and is characterized by a Mediterranean climate. The revegetation was set up in February 2006, in an old-field, planting local species (*Juniperus phoenicea*, *Pistacia lentiscus* and *Rosmarinus officinalis*) in mono-specific or mixed plots. Soil total organic carbon and nitrogen was measured at the same time of plantation and after 3 years, collecting soil cores (144 samples) at two depths (0-20 cm and 20-40 cm). Moreover, in order to measure soil CO₂ emissions, 4 collars are inserted into the soil at 30-60-90-120 cm from 3 plants per each species. Measurements have being made monthly since July 2006 by a portable IRGA.

Presently, soil C in the studied area is about 0.7 - 0.8 t ha⁻¹. Based on soil CO₂ emissions measurements (≈ 7 t C ha⁻¹ yr⁻¹) and on the low biomass accumulation (0.25-0.60 t ha⁻¹ yr⁻¹), the plantation is at the present a net C source. This is an effect of the low plant growth, very little input from litter, and the contemporary mineralization of old C deriving from the preceding agricultural phase (priming effect).