



Effects of Overgrazing on the Physico-chemical and Biological Properties of Semi-arid Forest Soils in Western Algeria

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Abstract: In Algeria, in recent years long periods of drought have forced several breeders to ride with their herds to the north of the country to find food for their flocks. The semi-arid zone that represents the last barrier against desertification is fragile and vulnerable. The pressures exerted by these animals have an effect on the soil. In present study, the impact of overgrazing on the quality of semi-arid soils in western Algeria was estimated on the physicochemical and biological properties of a grazed area were compared with that of a protected area in an Aleppo pine forest in wilaya of Saïda. The physical properties like bulk density, moisture and retention capacity are negatively affected by overgrazing. The overgrazing has a negative effect on organic matter. Microbial biomass and basal respiration decreased in the grazed area compared with the witness. The metabolic quotient recorded a higher rate in the area affected by overgrazing than the protected area. This research shows us that overgrazing can affect certain soil characteristics and irreversibly degrades the soil continuum of the semi-arid zones.

Keywords: Aleppo pine, Forest, Overgrazing, Soil quality, Semi-arid

The conservation of forests in the mediterranean basin is a complex problem because of the heterogeneity of the situations, the multiple uses and anthropic pressures practiced by the various cultural entities of the Mediterranean for millennial (Quézel and Médail 2003). Grazing is an important factor in the structuring and functioning of ecosystems (Rossignol 2006). The degradation of ecosystems in Algeria by the drought encountered in recent years is associated with the impact of sheep grazing (Slimani et al 2010). Statistics have shown that, 60 to 80% of the flock sheep population is concentrated in the steppe and between the 1960 and 2000 the herd multiplied by four. This growth, among the fastest in North Africa, at the same time, forage production in the steppe was reduced about 30% during one of the longest periods of rainfall deficiency of the century (Aidoud et al 2006).

Soil has long been a "black box" in the functioning of the ecosystem, so taking into account the regulatory role of soil in ecosystems only appears late in the 20th century (Andrews et al 2004). Changes in use and intensive exports are among the major causes of soil degradation and directly impact or threaten human well-being (Stallman 2011). This recent and slow conscience of their rapid global destruction has led to the emergence of the need to define soil quality, coupled with the need to protect (Robinson et al 2012). Considered a mineral environment, the soil is also a place of life. It is home to a very high diversity of species (23%), macro organisms

and microorganisms that participate in the operation and the supply of ecosystem services necessary for our survival (vegetable production, biogeochemical cycles, biodegradation of organic matter, purification of pollutants, etc.) (Lucas et al 2007). Different studies have shown that herbivores, through the removal of plant biomass, soil trampling and the deposition of urine and feces, have important effects on vegetation characteristics (Fournier et al 2001, Zoffoun et al 2013) and on soil functioning (Silveira et al 2013). In the arid and semi-arid zones of North Africa, many studies (Amghar et al 2012 in Algeria, Abdallah et al 2012 in Tunisia, Acherkouk and El Houmaizi 2013 in Morocco) have described the positive effects of grazing control on biodiversity and soil properties. Most scientific research in Algeria have been oriented towards the study of overgrazing and its effects on vegetation, but studies on the impact of this pressure on the soil have been completely neglected. Therefore, the objective of this study is to estimate the effect of overgrazing on the physicochemical and microbiological properties, of forest soils populated mainly by Aleppo pine in two stations of the semi-arid zone of western Algeria.

MATERIAL AND METHODS

Study area: The study was carried out in forest (Djebel Keroua) dominated by Aleppo pine which covers an area of 760 ha and is located in the town of Ouled Khaled Saïda with an average altitude of 900 m. For reasons of homogenization,