

Characterization of coniferous forest soils in the arid zone

Mohamed Zouidi^{1,2*}, Amine Habib Borsali^{1,2},
Ayoub Allam^{1,2} and Raphael Gros³

Zouidi, M., Borsali, A.H., Allam, A., Gros, R. 2018. Characterization of coniferous forest soils in the arid zone. – Forestry Studies | Metsanduslikud Uurimused 68, 64–74. ISSN 1406-9954. Journal homepage: <http://mi.emu.ee/forestry.studies>

Abstract. Arid zones are very harsh environments characterized by binding edaphic and climatic factors, their rainfall is low and irregular accentuated by high temperatures and their soils are fragile and vulnerable. In recent years, it has been noted that vegetation is regressing and that the majority of reforestation has been a failure. Our study aims to know the physico-chemical and microbiological characteristics of forest soils in the pinewoods of an area of the highlands of western Algeria (Naama). For this we analyzed several soil samples spread over five sampling stations in a forest of Aleppo pine. The results show that the forest soils of our study area are characterized by a generally sandy texture and an orange color for all the selected stations. They are characterized by: a very high C/N ratio that indicates a slow evolution of organic matter and a nitrogen deficiency that is necessary for carbon decomposition. The conductivity shows that the soil contains some salinity, its permeability is strong and its humidity fairly low with an alkaline pH (> 8) due to the increase in the limestone level in the area. Basal respiration is low compared to microbial biomass due to poor physico-chemical quality of soils and the effect of water stresses that slow down microbial activities. Soils in this arid forest are generally characterized by soil homogeneity sensitive to the influence of environmental factors mainly poverty into elements necessary for its proper functioning such as nitrogen and water that accentuate soil degradation of these forest formations, which results in the risk of degradation being triggered.

Key words: forest soil properties, pinewood, aridity, microbial activity.

Author's addresses: ¹Department of Biology, Faculty of Science. University “Dr Moulay Taher” Saïda, Algeria; ²Laboratory “Water Resources and Environment” University of Saïda, Algeria; ³Institut Mediterranean Biodiversity and Ecology, UMR CNRS IRD 7263, Team Vulnerability of Microbial Systems, 452 Service, Faculty of Sciences and Techniques of St. Jerome, Aix-Marseille University, 13397 Marseille Cedex 20, France; *e-mail: zouidibiologie20@gmail.com

Introduction

In Algeria, arid zones account for nearly 95% of the national territory, of which 80% is in the Hyper-arid zone (Halitim, 2011). These areas, characterized by a dry and most often warm climate, are highly sensitive to the warming of the atmosphere due to the increase in greenhouse gases since the end of the 19th century (IRD, 2015). The climatic conditions characterised by the low annual average rainfall (between 100 to 300 mm water per year) and by the high deficit of these in relation to potential evapotranspiration (FAO, 1992). The soil is the living and vital epidermis of the earth's

continents, the support of human activities and the place of life of many plant and animal species (Mathieu, 2009).

The soil, although it can be restored and more or less reconstituted, remains a non-renewable resource because of the long period necessary for its formation processes. This property makes it particularly susceptible to anthropogenic aggression (Gros, 2002). The knowledge of the constituents of the soil, their composition and their main physico-chemical properties, is in any case a prerequisite for the study of the soil medium. This fundamental knowledge makes it possible to undertake the study of soil formation processes (pedogenesis process)