

Characteristics of Arid Soils and Some Management Alternatives

Chapter

9

Sushil Kumar, Rahul Dev, Shamsudheen Mangalassery and Devi Dayal

ICAR-Central Arid Zone Research Institute, Regional Research Station, Kukma – 370 105, Bhuj, Gujarat, India

ABSTRACT

Arid and semi-arid climatic regions cover 30 percent of earth's land surface, a larger land area than any other climate. These climates are characterized by harsh environmental conditions such as low and erratic rainfall, intense solar radiation, high wind velocity and high evapotranspiration. During most part of the year, evapotranspiration remains always more than annual rainfall. Besides, the productivity and production is lower, and sometimes, crop production fails due to deficient irrigation or erratic rainfall. The soils of arid zone are coarse, structure-less with low water holding capacity. Moreover, the nutrient status of these soils is poor because of poor organic carbon status and poor physical characteristics. The salient features of these soils are discussed in this chapter. Proper management of arid soils is needed to arrest its further degradation. Many measures for management of arid soils located at different parts of world are being practised. However, management of these soils by growing of natural vegetation is more sustainable and economically viable, as vegetation provide long duration surface cover with minimal cost and also add sufficient amount of organic matter into the soil. The vegetative material also provides feed material for livestock which is the backbone of livelihood for inhabitants of arid region.

1 INTRODUCTION

Arid soils are those which have almost no water available for soil formation (pedogenesis) and for the growth of mesophytic plants for long periods. The arid areas have been classified as hyper-arid (less than 100 mm annual rainfall), arid (rainfall between 100 and 200-250 mm) and semi-arid areas (rainfall between 200-250 and 500 mm); however, most of these boundaries are set rather arbitrary (Dhir, 1984). Other definitions and criteria are used as well. The non-availability or near absence of water in these soils can have two reasons: a climatic reason linked

- Shankarnarayan, K.A., Harsh, L.N and Kathju, S. 1987. Agroforestry in the arid zones of India. *Agroforestry Systems*, 5: 69-88.
- Smith, G.D., Coughlan, K.J., Yule, D.F., Laryea, K.B., Srivastava, K.L., Thomas, N.P. and Cogle, A.I. 1992. Soil management options to reduce runoff and erosion on a hardsetting Alfisol in the semi-arid tropics. *Soil and Tillage Research*, 25: 195-215.
- Van Eekeren, N., Bos, M., De Wit, J., Keidel, H., & Bloem, J. (2010). Effect of individual grass species and grass species mixtures on soil quality as related to root biomass and grass yield. *Applied Soil Ecology*, 45(3): 275-283.
- Wani, S.P., Mc Gill WB Haugen-Koyzra, K.L., Robertson, J.A. and Thurstson, J.J. 1994. Improved soil quality and barley yields with faba-beans, manure, forages, and crop rotation on a gray luvisol. *Canadian Journal of Soil Science*, 74: 75-84.