

Short Communication

## Spatial Distribution of Soil Organic Carbon under Agroforestry and Traditional Cropping System in Hyper Arid Zone of Rajasthan

M.L. Soni, R.K. Beniwal, N.D. Yadava and H.S. Talwar

Central Arid Zone Research Institute, Regional Research Station, Bikaner 334 004, India

Traditionally, the farmers of arid region are growing sole crops of moth bean and clusterbean under rainfed conditions. Sole cropping under traditional cropping system (TCS) is successful once in three years. Even in good cropping season, the land utilization does not exceed four months in a year. This practice of cultivation exposes the soil to extremes of climates such as high temperature and high wind velocity, which results in lowering of the soil fertility and land productivity levels. On these marginal soils, silvopasture/agroforestry systems not only contribute in preventing land degradation, but helps in improvement of soil fertility also. This improvement is considered in terms of organic C and other soil quality parameters. The soil organic carbon (SOC) is of critical importance as it increases infiltration rate, the ability of soil to store nutrients and the ease with which the roots can penetrate soil (Breman and Kressler, 1997). Hence a comparative study was undertaken to evaluate the status of SOC under agroforestry and TCS.

The study was carried out at the research farm of Central Arid Zone Research Institute, Regional Research Station located at Bikaner in northwestern Rajasthan. The region has an average annual rainfall of 247 mm with 40-60% coefficient of

variation. Mean monthly air temperature ranges from 7.1°C (minimum temperature) and 23.7°C (maximum temperature) in January to a high of 29.3°C (minimum temperature) and 42.9°C (maximum temperature) in May. The soil of the experimental site was loamy sand in texture (85.7% sand, 10.8% silt and 3.8% clay) with 1.5 g m<sup>-3</sup> bulk density. Eighteen-year-old plantations of five tree species of arid zone viz., *Daschrystus nutan*, *Colophospermum mopane*, *Acacia nilotica*, *A. senegal* and *Prosopis juliflora* were planted in rows at a distance of 5 x 6 m. The inter row spacing of each tree species was tilled for the sowing of rainfed crops moth bean (*Vigna aconitifolia*) and clusterbean (*Cyamopsis tetragonoloba*) for the last three years while the intra row spacing was not tilled. Representative soil samples in three replications were collected from four different depths (0-5, 5-10, 10-15 and 15-30 cm) at three lateral distances (0.5, 1.0 and 1.5 m) from the tree trunk within the rows and between the rows to compare the organic carbon under cultivated and uncultivated soils. Replicated soil samples from same depth (0-5, 5-10, 10-15 and 15-30 cm) were also collected from surrounding fields, which were under cultivation of sole crops of moth bean and clusterbean under TCS. There were three