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Productivity of arid legumes on deposited and eroded soils under arid rainfed situation of western Rajasthan

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Abstract

A field experiment conducted at Central Arid Zone Research Institute, Regional Research Station, Bikaner on loamy sand soil under rainfed condition of western Rajasthan during 2003 revealed that the deposited sand has an incremental effect on the growth and yield of mothbean and clusterbean than the eroded soil. An increase in plant height to the tune of 57 & 36% in moth bean and 56 & 73% in clusterbean at 45 days after sowing (DAS) and at harvest was observed on sand depo-sited over eroded situation., respectively Higher dry matter yield (17.46 q ha^{-1} and 17.9 q ha^{-1}) of moth bean and cluster bean was observed on deposited over eroded (5.62 & 13.9 q ha^{-1}) situations. The percentage increase in total dry matter production and grain yield was 240 & 190.06% in moth bean where as it was only 30.66 & 62% in clusterbean, respectively.

Key words: Arid legumes, sand deposition, arid rainfed, western Rajasthan.

Introduction

The arid zone soil and climatic situations are very adverse for rainfed crop production. The poor and erratic rainfall (100-270 mm annum^{-1}) with high coefficient of variation (>48%) high temperature high, wind velocity and dust storms during summers always restrict the productivity of arable cropping in the region. The poor sandy soils with low water holding capacity and high vulnerable to the wind erosion becomes a problem for both the situation i.e. From where the soil is eroded and at the places it is deposited. In western Rajasthan shifting of surface soil through speedy winds is a very common phenomenon. The deposition of soil have although a beneficial effect on plant growth but can detriment plant stand if occurs at initial stage of crop establishment. Erosion of surface soil reduces soil fertility and increases the compactness on the eroded surface, which ultimately affects the growth and yield of crop [1]. Since the little data is available regarding the actual crop performance under these two situations, therefore the present investigation was carried out to find the arid legumes grown as rainfed in western Rajasthan situation under both deposited and eroded soil situations.

Material and methods

The present investigation was carried out at research farm of Central Arid Zone Research Institute, Regional Research Station, Bikaner, during kharif season of 2003 under randomized block design with 3 replications. The moth bean and cluster bean were grown on the same field under the deposited and eroded soil situations under rainfed conditions. The soil physico-chemical properties have been analyzed for assessing variations in their properties occurring due to erosion. The growth and yield data of the crops were recorded at 45 days after sowing (DAS) and harvest. The total of 178.5 mm rainfall was received with a distribution of 122.4, 10.5and 45.6 mm in Month of July, August and September where as in October there were no rains. The temperature varied 31-37°C maximum and 19.8-33.4°C minimum with a wind velocity of 3.18 to 8.97 km hr^{-1} from July to October

Soil physico-chemical characteristics

The soil of experimental site was loamy sand in nature with higher silt + clay content at lower depths. Percent sand in deposited situation was more at 15 cm surface soil thereby changing its surface to sandy (Table 1). Higher soil organic carbon (SOC) in surface soil under deposited situation (1.4 g kg^{-1}) was recorded as compared to