

Production potential of arid legumes under grass based strip-cropping system in arid rainfed condition of western Rajasthan

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Abstract

An experiment was conducted to study effect of grass based strip-cropping system on production potential of arid legumes (Mothbean and clusterbean), their ability to check soil erosion and fertility improvement under rainfed condition of western Rajasthan. The results indicated that grain and straw yield of clusterbean and Mothbean was more in strip cropping with grass over their sole cropping. Highest clusterbean equivalent yield (CEY) was recorded with grass + clusterbean (5:15 m) strip cropping system. Both the crops have shown same productivity in terms of land equivalent ratio under strip cropping with grass. Soil loss/gain under each production systems revealed that maximum soil loss occurred in arable cropping system. Strip cropping of legumes with grasses reduced the soil loss in comparison to their sole cropping. Strip cropping of arid legumes with grass showed highest available nitrogen over sole pasture as well as sole cropping of legumes.

Keywords: Clusterbean, mothbean, *Lasiurus indicus*, *Cenchrus ciliaris*, strip cropping, soil erosion

Introduction

Arable cropping is a gamble in arid western Rajasthan due to monsoon vagaries and long dry spells during cropping season. It also put the field without crops open to severe wind erosion from February to June. The climatic vagaries of low rainfall and its erratic distribution lead to low yield and frequent failure of crops. Hence there is need to develop appropriate farming system which are more sustainable, can meet the fodder need, stabilize the income and protect the environment. Inclusion of easily propagated perennial grasses viz. *Lasiurus indicus* and *Cenchrus ciliaris* are considered as

one of the best options. These perennial grasses have better rooting ability, bind the soil particles, check soil erosion and add soil fertility. Growth of grasses promotes the development of water stable crumbs, reduces the risk of erosion and improves water transmission characteristics(1). Researches have shown that growing location specific crop and tree/grasses combination can increase resource use efficiency (2). The inclusion of perennial components in the cropping system provides a soil cover during lean period, reduces the soil erosion and can help increase in crop yield. Hence, the present study was undertaken with the objective to get maximum production per unit area, improve soil fertility and check soil erosion.

Material and methods

The experiment was conducted at the research farm of Central Arid Zone Research Institute (CAZRI), Regional Research Station, Bikaner during Kharif 2005 on alkaline, non-saline, loamy sand soil with Organic Carbon = 0.10%, pH=8.5, EC₂=0.22 dS m⁻¹ and water retention at field capacity = 8.1% (w/v). The Climatic condition of the area is hyper aridic with low rainfall, high temperature and high evaporation. The average rainfall of the region is 275 mm with 57% coefficient of variation. The year 2005 was a normal rainfall year with 269.7 mm. rainfall. The experiment was laid in a randomized block design with three replications and five treatment combinations i.e (i) Grass + moth bean, (ii) Grass + clusterbean, (iii) Sole mothbean (iv) Sole clusterbean (v) Sole grass. All the cultural practices and fertilizer application were done as per the recommendation of individual crops. The required observation on grain and straw yield of crops and grass biomass was recorded at harvest. After the harvest of crops/grasses, soil samples were collected from each treatment and analyzed for available nitrogen (3). For the compa-