

Crop diversification under fruit based cropping system in arid zone of western Rajasthan

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Abstract

The experiment conducted at farmers field in Bikaner district on sandy soil during *Kharif* season of 2003 and 2004 under canal command area for crop diversification in different fruit based cropping systems revealed that the maximum plant height of mothbean and groundnut was recorded under the intercropping with Bael where as clusterbean maximum plant height (49.8 cm) was recorded maximum with Ber. Mothbean intercropping with Bael produced 14.61 and 27.24 per cent higher total dry matter (26.99 q/ha) and grain yield (10.40 q/ha), respectively than its intercropping with Ber (23.77 and 8.98 q/ha). Among the entire intercrop highest mean root dry matter addition (2.49 q/ha) to soil after crop harvest was observed in groundnut intercropping, which was significantly higher over the intercropping of mothbean and clusterbean. However, the mean highest system productivity (8.71 q/ha) was observed under the intercropping of groundnut with the fruit trees which was 15.09 and 9.82 per cent higher over intercropping of mothbean and clusterbean, respectively. Highest total income (Rs. 35,172/ha), net profit (Rs.30,162/ha) and cost: Benefit ratio (6.02) was observed under the intercropping systems of Bael + mothbean.

Key words: *Fruit trees + crops intercropping, crop diversification, arid zone, cropping system*

Introduction

The Low and erratic rainfall with high variability in its quantity and occurrence, high temperature during summers (as high as 48°C) and low in winters (up to -3 °C). High wind velocity (10-13 km /hr) and high annual evapotranspiration (1527 mm /year) hinders arable cropping in this region. The introduction of canal in the area, opened new vistas thus allowing the choice for more number of crops which can be included in cropping system. The major canal network in the region is IGNP passing through Ganganagar, Bikaner and Jaisalmer districts in which water availability is @ 5.24 m /ha from 1982-86. The flow values of main canal varies from $1.727 \times 10^6 \text{ M}^3$ to $2.961 \times 10^6 \text{ M}^3$ in different season (Khan, 1996). However, the untimely and irregular availability of canal water along with reduced quantity again put a question to think for inclusion of low water requiring, perennial crops and fruit trees in the cropping system for its sustainability even under adverse condition. Inter cropping of legumes with Ber produced higher grain yield of intercrops by 5-20 per cent over their

sole cropping (Singh et al., 2003). Thus, intercropping of annual crops with the perennial trees provided the extra income to the farmer when fruit trees are in their juvenile phase along with the assured production from the system. Keeping the above points in view an experiment was conducted to find out the productivity of different crops intercropped with different fruit trees under canal-irrigated condition.

Materials and Methods

The experiment was conducted at farmers field in Pugal tehsil of Bikaner district in sandy soil during *Kharif* season of 2003 and 2004 under canal command area.

The experimental site is characterized as hyper arid with highest mean monthly temperature of 39.7°C in month of July during 2004 with a minimum of 11.6°C in month of November 2003. The highest wind velocity was 10.06 km/hr in month of July during the crop season, which increased the evaporation of water loss during the study period which had impact on the period for water availability to the plant after the irrigation, which seems to be very less.

The soil situation of the experimental site was loamy sand in texture, calcareous alkaline in reaction with normal EC (0.21 dsm^{-1}) low in organic carbon with very low in

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