

Relative Yield, Profit and Water Productivity of Crops in IGNP Stage-I

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Abstract: The choice of an appropriate crop and cropping systems is essential for achieving higher yield, profit and resource use efficiencies. Yield, returns and water productivity are important factors for determining suitability of crops and cropping systems in hot arid environment. A two-year (2012-13 and 2013-14) study was conducted in IGNP stage-I command area to determine productivity, profitability and water productivity of different crops and cropping systems. Yield, profit and water productivity varied markedly among different crops and cropping systems. The economic yield of crops varied from 1.6 Mg ha⁻¹ to 4.2 Mg ha⁻¹; and biomass yield varied from 5.8 Mg ha⁻¹ to 10.1 Mg ha⁻¹. The net return varied from Rs. 31421 ha⁻¹ to Rs. 213680 ha⁻¹. The clusterbean had highest profit followed by cotton, wheat, barley and Indian mustard. Clusterbean and wheat was the most profitable crop of kharif and rabi season, respectively. Among the kharif season crops, the clusterbean was 1.4-times more water productive than cotton, and among rabi season crops, barley was 1.3- and 1.6-times more water productive than wheat and Indian mustard, respectively. Cotton-wheat cropping system had highest yield followed by cotton-barley, clusterbean-wheat, cotton-mustard, and clusterbean-mustard systems. The clusterbean based cropping systems were more profitable and water use efficient than cotton based cropping systems.

Key words: Arid region, cropping system, IGNP command area, water productivity, yield.

Achieving sustainability in crop production will ultimately depend on the efficient use of natural resources. Land and water, the basic inputs of crop production are becoming scarce (Horrigan *et al.*, 2002; Falkenmark and Rockstrom, 2004) due to increasing population and competition from industrialization and urbanization. In future, higher agricultural production must come from the natural resource base that is currently available. This requires a process of sustainable intensification by increasing land use and water use efficiency (FAO, 2005). The problem of ensuring an adequate supply of agricultural products and protecting natural resources is particularly acute in arid regions, which cover around 32% of world's land area and is home to about 21.2% of the human population (Safriel and Adeel, 2005). Identification of suitable crops/cropping systems that make the best use of available resources and provide higher yields is important if the diverse needs of farming communities and environmental sustainability in arid regions are to be catered for (Joshi *et al.*,

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2009, Rathore *et al.*, 2009, 2010). Comprehensive assessment of yield, profits and resource use efficiencies of different crops/cropping systems under existing crop management practices under given pedo-climatic conditions is pre-requisite for identifying suitable crop or cropping system diversification options (Rathore *et al.* 2014a). Water productivity along with profitability and productivity, are important criteria when comprehensively assessing crops/cropping systems. To date, very little information is available regarding the productivity, profitability and water productivity of contrasting irrigated crops/cropping systems in the IGNP stage-I command area of the hot arid region of India. The present study was conducted with the objective of assessing yields, returns, water productivity of different crops and cropping systems in IGNP stage-I command area.

Materials and Methods

Study site

The study was undertaken during 2012-13 and 2013-14 in village Mainawali (74°20'34"-