



SUSTAINABLE AGRICULTURE

**PRODUCTION MODEL FOR
SMALL FARMER IN RAINFED ARID LAND**

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Low rainfall areas (rainfall below 500 mm per year) of the country cover about 45 million ha mainly in Rajasthan (12 districts) and small parts in Gujarat, Andhra Pradesh and Tamil Nadu.

Traditionally in this region multi-component farming systems have been followed that include annuals, perennials and animal components. These default organic systems are based on recycling of local resources and help in spreading the risk of rainfall uncertainty. Although these systems sustained production under prevailing climatic uncertainties but productivity of these systems is very low due to inefficient use of local resources.

A sustainable model of production

A production system model has been developed at Model Organic Farm, CAZRI during 2011-14 that has proved to be viable for providing livelihood security to the small farmers in rainfed sandy arid land.

In this system rainwater harvesting tank of 6000 liters capacity with catchment area of 50 m² has been constructed. Cost of construction is about Rs. 14000, if the family labor is engaged. This tank can be filled with rainfall of 170 to 200 mm depending upon the effective collection of rainwater. The tank is covered with RCC roof to avoid huge loss (500-640 liters m⁻² year⁻¹) of precious rainwater due to evaporation. The roof of tanks is used for mounting inter-connected two 1000 liters HDPE overhead tanks. The harvested rainwater is manually lifted with small hand pump to these water tanks that will allow moving through drip system with gravity flow. By this way no solar device is required. Estimates given below are based on the average of data taken in the field during four years(2011-14).

During last four years rainfall in the cropping season (July-October) was 206 to 318 mm but the distribution was highly erratic and there were 26 to 38 days dry spells. On an average, 1060 to 2010 liter water was harvested in one heavy or continuous rain and that was utilized in the dry spell between two heavy rains. The harvested rain water was used for irrigating six-year-old 30 ber plants or to the crops; in 0.1 ha area (1000m²) through passive drip system if the dry spell was of more than 15 days. In the 6.0 meter inter row spaces of ber plants; mung bean and *kachra* (snap melon) are grown. There are four naturally grown. 25-year-old *khejri* trees that provide pods and leaves. If the rainfall distribution remains normal in a year then this harvested water can be used for cumin crop (a high value-low water demanding crop) cultivation in winter.

Average annual income from this system during four years (2011-2014):

Ber fruit 900 kg @ Rs 20 per kg	=	Rs. 18000/-
Ber dry leaves 90 kg @ Rs 4 per kg	=	Rs. 360/-
Fuel wood 150 kg @ Rs 5 kg	=	Rs. 750/-
Mung bean/ guar + <i>kachra</i> income	=	Rs. 5000/-
Income from four <i>khejri</i> trees (leaves+ pods+ fuel wood)	=	Rs 1500/-
Total	=	Rs 25610/-

If the labor cost of this whole system is 60% (Rs.15366/-) then a net profit of Rs. 10244/- can be earned from 0.1 ha area with this system. Practically this labor cost is also taken by the family members, and can also be indirectly added in the income of the farm family.

Since this is under organic management and all farm waste including animal waste is converted into compost

(in the compost pits in the farm) and utilized as manure, and also water extract of neem and *akra* (*Calotropis* sp.) leaves (grown on field boundary) as bio-pesticides. Therefore, no expenditure is incurred on external inputs. If the same model is replicated in one ha area, this figure of income can be Rs. 1,02,440/- per annum or about Rs. 8540/- per month of a farm family.

The beauty of this system is that no electricity, no ground water and no chemical are utilized; therefore, long term sustainability of system is ensured that too under highly variable rainfall conditions of arid land. Providing nutrition security to the farm family is the additional advantage of this model.



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