

Indian Scenario: Dryland Agriculture

A.Senthilkumar¹, B. Bhakiyathu Saliha², S. Sheeba³, R. Balamurugan⁴, Geethu Jacob¹ and J. Vinoth Raj¹

¹Department of Soils Science and Agricultural Chemistry, The Indian Agriculture College, Radhapuram

²Department of Agronomy, Agricultural College and Research Institute, Madurai

³Department of Soils and Environment, Agricultural College and Research Institute, Madurai

⁴Department of Agronomy, Indian Agriculture College, Radhapuram

SUMMARY

Maintaining India's food security in the coming decades is a challenging task. Since productivity in irrigated areas is reaching a plateau (3.2 tonnes per hectare), the bulk of rising food demand must be met from drylands. Eroded and degraded soils with multiple nutrient deficiencies and low water-holding capacity, declining groundwater table, etc. contribute to reduced crop yield in drylands. Managing land resources through a multidisciplinary approach in devising the most remunerative and environmentally appropriate land use characterizes the approach for maximizing crop productivity, profitability and sustainability of dry lands. Key strategies to achieve these goals are integrated watershed development, characterizing bio-physical and socio-economic resources using GIS and remote sensing, developing strategies for improving rainwater-use efficiency through appropriate mechanisms in terms of rainwater storage, delivery and application, and contingency crop planning to minimize loss of production at times of drought. Diversification of agriculture by growing high-value crops such as aromatic and medicinal plants, spices; inclusion of sericulture and livestock farming to minimize climatic risks; alternate land uses such as agroforestry, agri-horticulture, silvi-pasture, horti-pasture, agri-silvo-pastoral systems, etc. to maximize returns and minimize risk could be other viable strategies for the development of these areas. Apart from these, improving credit availability and input supply systems, an extension of crop insurance and launching of on-farm research cum pilot projects in farmers' participatory mode also need to be focused.

INTRODUCTION

According to the National Bureau of Soil Survey and Land Use Planning (NBSSLUP), 52% of cultivated area in India is occupied by dryland agriculture (75 million ha) and supports 40% of the human and 60% of the livestock population. It meets 42% of the country's food requirement, thus has and will continue to play a critical role in India's food security (Singh *et al.* 2020). Almost 80 percent of maize, 90 percent of Bajra, approximately 95 percent of pulses and 75 percent of oilseeds are obtained from dryland agriculture. Physiographically, dryland agriculture encompasses the desert terrain of Rajasthan in the northwest, the alluvial plains of the Ganga-Yamuna River Basin, the plateau region of Central India, the Central Highlands of Gujarat, Maharashtra and Madhya Pradesh; the rain-shadow region of Deccan in Maharashtra, the Deccan Plateau in Andhra Pradesh and the Tamilnadu Highlands. One of the major constraints in drylands is erratic rainfall which results in frequent droughts that adversely affect resource-poor farmers. An area of 75 million hectares where dryland agriculture is practiced in India comes under four categories based on the rainfall received; the arid region receives 1150 mm rainfall per annum zone. Low yields and crop failures due to lack of soil moisture often lead to food and fodder scarcity resulting in a near-famine situation across the drylands (Singh, 2018). Alfisols, Aridisols, Vertisols, Entisols and associated soils dominate the dryland areas. These soils are mostly coarse-textured, highly degraded with low water retentive capacity and have multiple nutrient deficiencies.

Dryland Agriculture: Characteristics

One of the common definitions for dryland agriculture is "growing of crops entirely under rainfed conditions". The United Nations Economic and Social Commission for Asia and the Pacific classified dryland agriculture into mainly two categories; dryland and rainfed farming (Stewart and Thapa, 2021).

Constituent	Dryland farming	Rainfed farming
Rainfall	<800 mm	>800 mm
Moisture availability to the crop	Shortage	Enough
Growing season (in days)	<200	>200

Growing regions	Arid and semi-arid as well as uplands of sub-humid and humid regions	Humid and sub-humid regions
Cropping system	Single crop or intercropping	Intercropping or double cropping
Constraints	Wind and water erosion	Water erosion

Dryland Agriculture: Constraints and Solutions

Farmers face a lot of problems when dealing with the cultivation of crops in drylands such as,

1. Gamble of monsoon (Late onset and early cessation of rains)
2. Prolonged dry spells during the crop period
3. Low moisture retention capacity
4. Rapid runoff, undulated topography
5. Salinity
6. Low productivity of crops and low input use efficiency
7. Average size of land holdings is small
8. Rapid degradation of soil and loss of soil fertility and nutrient levels
9. Infrastructure facilities for the supply of quality inputs are also not adequate
10. Poor resource base of farmers
11. Draught power or energy is meager in rainfed areas.

Considering the constraints faced by farmers in arid and semi-arid areas, dryland agriculture is practiced in India giving key emphasis on three aspects mainly (Figure 1).

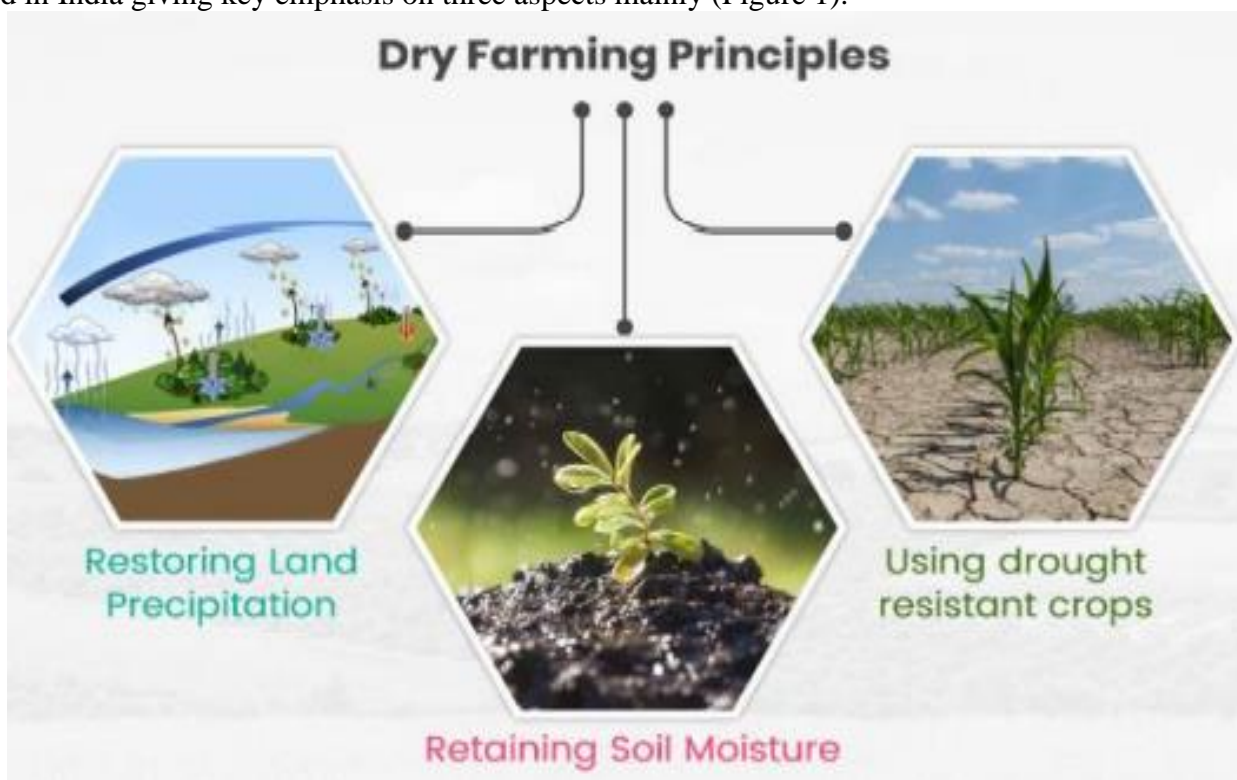


Figure 1

Measures to be Taken

- Cultivation of drought-tolerant crops such as millets, oil seeds, pulses like gram, pigeon pea and lentil
- Use of early maturing dwarf/mini cultivars
- Selection of proper cropping systems suitable for the area, use of better cropping patterns for specific locations, proper plant protection and weed control practices
- Drylands can be managed by stabilizing the land through agroforestry and pasture which will help in reducing soil erosion
- Opting for land use systems like the agro-silvo-pastoral system will help in the optimum use of land and the grass cover helps in moisture conservation and organic matter addition

- Contingent crop planning
- Use mulches like stubble mulch, straw mulch, and soil/dust mulch to conserve soil moisture
- Vertical mulching is practiced in drylands where narrow trenches are created across the field and these trenches are covered with crop residues to promote rainwater retention and infiltration
- Windbreaks and shelterbelts- will protect the crops grown, prevent evaporation and soil loss
- Use of anti-transpirants.

REFERENCES

Singh, H. P., Sharma, K. D., Subba Reddy, G., & Sharma, K. L. (2020). Dryland agriculture in India. Challenges and strategies of dryland agriculture, 67-92.

Singh, R. P. (2018). Sustainable development of dryland agriculture in India. Scientific Publishers (India).

Stewart, B. A., & Thapa, S. (2021). Dryland farming: concept, origin and brief history. In Innovations in Dryland Agriculture (pp. 3-29). Springer, Cham.

www.adda247.com/upsc-exam/dryland-farming-in-india/

www.thehindu.com/news/national/andhra-pradesh/focus-should-be-on-dryland-farming-to-increase-foodgrainproduction/article36215649.ece

www.tractorjunction.com/blog/what-is-dryland-farming-in-india/