

Technologies of Dryland Farming

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Dryland farming is frequently defined as crop production in areas with less than 500 mm of annual precipitation, but this definition omits a critical component of the equation, evaporation potential. Operatively, dryland farming is practiced where annual potential water evaporation exceeds annual precipitation. Dryland farming is agriculture dependent upon the vagaries of weather, especially precipitation. In its broadest aspects, dryland farming is concerned with all phases of land use under semiarid conditions. Not only how to farm but how much to farm and whether to farm must be taken into consideration. Above all else, dryland farming must emphasize the capture and efficient use of precipitation.

Dry farming depends on making the best use of the "bank" of soil moisture that was created by winter rainfall. Some dry farming practices include:

- Wider than normal spacing, to provide a larger bank of moisture for each plant.
- Controlled Traffic.
- Minimal tilling of land.
- Strict weed control, to ensure that weeds do not consume soil moisture needed by the cultivated plants.
- Cultivation of soil to produce "dust mulch", thought to prevent the loss of water through capillary action. This practice is controversial and is not universally advocated.
- Selection of crops and cultivars suited for dry farming practices.

Principles of Successful Dryland Farming

Dryland farming in India depends on 3 principles:

1. Precipitation of the land must be retained.
2. Opting of methods that can retain soil moisture to avoid evaporation or transpiration.
3. Using drought-resistant crops that aren't reliant on heavy and frequent rainfall.

Importance of Dry land Farming for India

Considering the present rate of development of irrigation facilities and also water potentiality of the country, it is estimated that at any point of time 50% of cropped area in India will remain under Rainfed farming system. Such vast areas as of now consume hardly 25% of total fertilizer consumption of the country. Due to poor level of management, crop productivity is also very low resulting in socio - economic backwardness of the people.

Food Security: Dryland farming contributes to India food security by providing a substantial portion of the country staple crops such as millets pulses, oilseeds and coarse grains.

Crop Diversity: Dryland farming encourages the cultivation of a variety of droughts resistant crops. This diversity reduces the vulnerability of agriculture to the impacts of climate change and erratic rainfall patterns.

Livelihood: A significant proportion of India population particularly in rural area is dependents on dryland farming for their livelihood. This form of agriculture support millions of farmers and labours contributing to poverty alleviation and rural development.

Biodiversity Conservation: Dryland practices such as agroforestry and mixed cropping can help conserve biodiversity by promoting the growth of a range of plants and tree species and creating habitats for wildlife.

Water resource Managements: Dryland farming encourages the efficient use of water resources. Farmers in these regions often rely on rainfed agriculture and as results employ techniques like: rainwater harvesting and efficient irrigation systems to manage water scarcity.

Characteristics of Dryland Agriculture

Dry land areas may be characterized by the following features:

- Uncertain, ill-. distributed and limited annual rainfall.
- Occurrence of extensive climatic hazards like drought, flood etc.
- Undulating soil surface.
- Occurrence of extensive and large holdings.
- Practice of extensive agriculture i.e., prevalence of mono cropping etc.
- Relatively large size of fields.
- Similarity in types of crops raised by almost all the farmers of a particular region
- Very low crop yield.
- Poor market facility for the produce.
- Poor economy of the farmers; and
- Poor health of cattle as well as farmers.

Key elements of effective combat with perils of Dryland agriculture

- Capturing and Conservation of Moisture
- Effective Use of Available Moisture
- Soil Conservation
- Control of Input Costs

Problems of Dry Farming in India

Dry Farming in India faces several problems:

1. **Erratic Rainfall Patterns:** Many drylands area in India experience erratic and unpredictable rainfall pattern with long dry spells followed by intense rainfall events. This inconsistency can lead to crop failure and reduce yields.
2. **Water scarcity:** Access to water resources is significant challenge in dryland farming area. Farmers often rely on rainfed agriculture which is highly dependent on the monsoon season. Insufficient rainfall and inadequate irrigation facilities can lead to water scarcity for crops.
3. **Soil Erosion and Degradation:** Dryland soils are susceptible to erosion and degradation due to factors like: wind, water, over cultivation. Soil erosion can reduce soils fertility disrupt root structure and lead to reduce crop yield.

4. **Low Productivity:** Dryland crop typically have productivity compare to irrigated crops. The lack of moisture and water resource restricts crop growth and limits yield potential. 5.
5. **Low Pest and Disease Pressure:** Dryland area often challenges related to pests and disease as arid condition can stress crops and make them more susceptible to infestations. Integrated Pest Management strategies are essential but can be resource intensive.6.
6. **Lack of Quality Seeds:** Access to high quality and droughts resistant crop varieties is essential for dryland farming. Many regions face challenges in obtaining such seeds limiting the potential for improved crop yields. 6.
7. **Economic vulnerability:** Dryland farmers may be more economically vulnerable on rainfall making them susceptible to income fluctuations caused by droughts or excessive rainfall.
8. **Limited Government Supports:** In some dryland regions govt. support in the form of agricultural extension services technology dissemination and financial assistance is limited which can hinder the adoption of improved farming practices.

Principal Dry Farming Zones in India

The principal dry farming zones in India include:

1. **Northwestern Region (Rajasthan and parts of Gujarat):** The northwestern region of India, including the Thar Desert in Rajasthan and parts of Gujarat, is one of the most arid areas in the country. Rainfall is very low, and farming is challenging due to water scarcity and high temperatures. Farmers in this region often practice drought-resistant crop cultivation, such as pearl millet and sorghum.
2. **Western Plateau and Hills (Maharashtra, Karnataka, and parts of Madhya Pradesh):** The western plateau and hilly regions of India, particularly parts of Maharashtra, Karnataka, and Madhya Pradesh, are characterized by semi-arid conditions. Here, dryland farming practices are common, and crops like millets, oilseeds, and pulses are cultivated. These areas often experience

rainfed agriculture with a high reliance on the monsoon.

3. **Deccan Plateau (Andhra Pradesh, Telangana, and parts of Karnataka):** The Deccan Plateau is another dry farming region where, farmers face challenges due to low and erratic rainfall. Crops like red gram (pigeon pea), groundnut, and sorghum are grown in this region. Watershed development and rainwater harvesting practices are often implemented to address water scarcity.
4. **Gangetic Plains (Parts of Uttar Pradesh and Bihar):** Some parts of the Gangetic plains, particularly in eastern Uttar Pradesh and Bihar, are prone to dryland farming conditions. These regions experience less rainfall than other parts of the Gangetic plains and require drought-resistant crops like maize, pearl millet, and pulses.
5. **Western Rajasthan:** In addition to the Thar Desert, western Rajasthan, including areas like Bikaner and Jaisalmer, is known for extreme aridity. Farmers here face severe water scarcity, and dryland farming techniques are employed to grow crops like bajra (pearl millet) and guar.
6. **Rayalaseema Region (Andhra Pradesh):** The Rayalaseema region in Andhra Pradesh is semi-

arid and experiences water scarcity. Farmers in this region practice dryland farming and grow crops like groundnut, sorghum, and sunflower.

7. **Bundelkhand Region (Uttar Pradesh and Madhya Pradesh):** The Bundelkhand region straddles Uttar Pradesh and Madhya Pradesh and is known for its dry and drought-prone conditions. Farmers here cultivate drought-resistant crops, such as chickpeas, pearl millet, and pigeon pea.
8. **Marathwada Region (Maharashtra):** Marathwada, located in the southeastern part of Maharashtra, faces recurrent droughts and water scarcity. Dryland farming is a common practice in this region, with crops like sorghum, pearl millet, and chickpeas.

Conclusion: These dry farming zones have specific agro-climatic conditions and challenges. Sustainable agricultural practices, water resource management, and crop diversification are crucial for the success of farming in these areas. Additionally, government support and initiatives for dryland farming are essential to improve the livelihoods of farmers in these regions.

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