



## Enhanced maize production under rainfed agriculture

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### Introduction:

India defines “dry farming areas as those which receive annual rainfall ranging from 375 mm- 1125 mm and very limited irrigation facilities” as per document of 4<sup>th</sup> five year plan (1967-74). Water conservation, sustainable crop yields, limited inputs of fertilizer and both wind and water erosion are major hurdles to be deal with in dryland agriculture.

In India, rainfed farming is practiced in nearly two thirds of arable land (97 mha) In the absence of adequacy of water resource for irrigation. The gross cropped area of the country is 182 mha. Out of an estimated 140 mha of net cultivated area about 67% is rainfed and only 46 mha is irrigated. The National Commission on Agriculture predicted that even when full irrigation potential is harnessed, over 50% arable land would continue to remain rainfed in the foreseeable future. So far, much of the agricultural growth achieved in the past decades occurred in irrigated areas. It is in the rainfed belt where cultivation of coarse cereals (91%), pulses

(91%), oil seed (80%) and cotton (65%) predominates. About 44% of the total production is contributed by rainfed areas and it supports 40% of the country’s population. The rainfed areas are increasingly being warranted to help to meet the rising demand for food, pulses, oilseed, fuel, feed, fruits and vegetables. Maize crop now a day’s occupies a prominent place in terms of production in agricultural scenario. For enhancing maize productivity in rainfed areas, efficient management of resources is crucial, as these regions heavily rely on rainfall for crop growth. Some key strategies for managing resources efficiently in rainfed areas to maximize maize productivity include soil conservation and moisture retention, crop selection and variety choice, conservation agriculture, efficient water management, nutrient management, integrated weed and pest management, weather forecasting and risk management, farmer capacity building and knowledge sharing. Implementing soil conservation practices such as contour

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ploughing, terracing, and conservation tillage to reduce soil erosion and retain moisture. These practices help prevent water runoff and increase water infiltration, ensuring that the soil retains moisture for longer periods. Mulching with organic materials or crop residues can also help conserve soil moisture by reducing evaporation. As a prime input, selection of maize varieties that are well-suited to rainfed conditions, with traits such as early maturity, drought tolerance, and good yield potential be made. Local or improved drought-tolerant maize hybrids or varieties can be chosen based on their performance in similar agro-climatic conditions.

To overcome the risk of complete failure of crop consider diversifying crops by incorporating legumes or cover crops that enhance soil fertility and moisture retention. A key principle for attaining increased production in rainfed tracts is to adopt conservation agriculture principles it includes minimum soil disturbance, permanent soil cover, and diversified crop rotations. Zero or reduced tillage practices help conserve soil moisture and improve soil structure, while maintaining crop residue cover protects the soil from erosion and evaporation. Diversifying crop rotations can break pest and disease cycles and enhance soil fertility.

A crucial input i.e. water requires its optimization. Water use by adopting efficient

irrigation techniques when supplemental irrigation is available can help the crop growth a lot. Techniques like micro-irrigation systems (such as drip or micro-sprinklers) can deliver water directly to the root zone, minimizing water loss through evaporation. Proper timing and scheduling of irrigation based on crop water requirements and soil moisture monitoring are essential for efficient water management. For a good harvest managing nutrients efficiently is the next important factor determining crop growth and production under limited water supply of rainfed areas.

Implement site-specific nutrient management practices to ensure optimal nutrient availability for maize. Conduct soil tests to determine nutrient deficiencies and apply fertilizers accordingly. Use organic amendments like compost or manure to improve soil fertility, nutrient retention, and water-holding capacity. Consider utilizing slow-release fertilizers to provide nutrients gradually over the crop's growth stages.

Weeds are major deterrents to yield of a crop and can lower the production to the tune of 40% or more. Timely implement integrated weed and pest management practices to control weeds, insects, and diseases effectively. Integrated weed management involves a combination of practices such as crop rotation, mulching, and targeted herbicide applications. Use pest-resistant maize

varieties, biological control agents, and cultural practices to manage pests and diseases, minimizing reliance on chemical pesticides. Timely predictions of weather and forecasting of abnormalities could help in better risk management. By making the use of weather forecasting tools and services to anticipate rainfall patterns, drought conditions, and pest outbreaks. Early warning systems can help farmers make informed decisions regarding crop planting, irrigation scheduling, and pest management. Diversifying income sources through crop insurance and exploring risk management strategies can help mitigate potential losses due to weather uncertainties.

Lastly by educating the mass population, especially the farmers could make a big difference in over all scenario of production in the rainfed areas. Promoting farmer training programs, workshops, and extension services to enhance knowledge and skills related to rainfed maize production. Encourage the adoption of best management practices through farmer field schools, demonstration plots, and knowledge-sharing platforms. Farmers can benefit from peer learning, access to updated research findings, and understanding local climate trends. By implementing these strategies, farmers can efficiently manage resources in rainfed areas, optimize maize productivity, and build resilience to varying rainfall patterns and

climate challenges. It is important to adapt these practices to the local agro-climatic conditions and seek guidance from agricultural extension services or experts in the region.