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FACULTY OF AGRICULTURAL SCIENCES & ALLIED INDUSTRIES

Rainfed Agriculture and Watershed Management

Lecture -2

HISTORY OF RAINFED AGRICULTURE

A. Pre-Independence period:

From time immemorial, the chief form of agriculture in the dryland tracts of India was cultivation of drought resistant crops viz., millets for food and fodder. It used to be a gamble with rainfall. During good rainfall years, the hardships of farmers seem to have been mitigated, as surplus grain and fodder were available. But, as water is the most important single factor of crop production, the inadequacy and extremely uncertainty of rainfall often caused partial or complete failure of crops leading to periodic food scarcities and famines.

Drought was a frequent phenomenon. These factors made the economic life of the dryland cultivator extremely difficult and insecure. To address these issues, the Government of India appointed the First Famine Commission in 1880. The Commission recommended creation of protective irrigation projects in the dry tracts.

The Government of India constituted Royal Commission on Agriculture in 1928. The Commission revived the Department of Agriculture of the Government of India, and simultaneously founded the Departments of Agriculture in all the provinces. The Departments concentrated more on the best performing crops, but neglected millets and other crops of the rainfed areas. A few years of study at Manjari Farm led to the conclusion that the problem of cultivation of dryland crops was vast in extent and complex in nature. It required simultaneous in-depth research on different aspects such as conservation/collection of excess rainwater, soil characteristics and water requirements of crop plant.

The dry spells extended from 3 to more than 8 weeks during the rainy seasons. It was thus felt that for good crop production, conservation of soil moisture and minimization of surface evaporation comprised the most suitable interventions. Soil Loss and Moisture Conservation. In the Deccan Plateau, under normal cultivation, soil slope, low rate of infiltration and high intensity rainfall causes runoff. It was between 12 and 20 per cent with a concurrent upper soil loss of 10-14 t/ha/year due to erosion. During the rainy season, in the cropped fields, about 10 per cent of the rainfall was lost as runoff from black, and about 25 per cent from red soils. It was realized that the land needed some kind of vegetal cover to minimize the runoff and soil loss. *Kharif* (rainy season) crops such as pearl millet (*Pennisetum glaucum*) and pigeonpea (*Cajanus cajan*) provided cover to the soil, thus resulting in considerable reduction in runoff and soil loss. Deep ploughing, soil stirring and mulching helped to conserve soil moisture. Fallowing was also useful. Good yields were realized from sowing in wider rows with low seed rates of selected crop varieties.

The practices, thus developed were given for different dry tracts in the form of principles of dry farming applicable to Indian conditions and suggestions were made for future line of research and extension. The packages of practices were popularly known as Bombay, Madras and Hyderabad Dry Farming Practices.

The recommended practices constituted the following:

- Constructing contour bunds as the basic and essential treatment
- Occasional deep ploughing of lands, once in 3 years
- Repeated shallow cultivation of soils (4 to 5 inter-cultivations) to remove weed and conserve moisture during the rainy season, particularly for rabi (postrainy) season sorghum (*Sorghum bicolor*)
- Adding moderate quantities of Farm Yard Manure to maintain the fertility and physical conditions of eroded soil, • sowing in wider rows (45 cm row spacing for sorghum) with lower seed rate
- Adopting mixed cropping / crop rotations wherever possible
- Fallowing a part of the holding every year.

Unfortunately, the returns from the adoption of these technologies resulted in lower yields (40 to 100 kg grain/ha) probably due to: discouragement to use inputs and nonavailability of proper biological material.

1. 1923 Establishing Dryland Research Station at Manjri (Pune) by Tamhane
2. 1972 Establishment of ICRISAT
3. 1985 Birth of Central Research Institute for Dryland Agriculture at Hyderabad
4. 1970 Research Centers established under AICRPDA in 23 locations
5. 1986 Launching of NWDPRP programmes by Government of India in 15 states.
6. The average annual rainfall of India is 1192 mm where as in Andhra Pradesh it is 890 mm.

Thus, up to independence, the dryland agricultural research and development made no significant progress.

B. Post-Independence period:

Even after independence, vulnerability of dryland agriculture to droughts continued to haunt the country with ever increasing food shortages. The dryland research was also confined to long duration crops. Hence efforts were intensified to improve productivity and stability from rainfed areas. Another programme on 'Soil Conservation in the Catchments of River Valley Projects' was launched in 1962. It was later realized that this project focused more on prevention of siltation of reservoirs and controlling floods, and gave secondary importance to agronomic aspects (Randhawa, 1983). In spite of development of major and minor irrigation projects and so also improvement in the availability of inputs like seeds, fertilizers, electricity and the like since India's independence, food shortages continued, and gradually food grain imports reached 10 million tonnes by 1966. At this juncture, with international collaboration, Indian agricultural scientists developed high yielding varieties / hybrids of major crops like wheat (*Triticum aestivum*), rice (*Oryza sativa*), maize (*Zea mays*), sorghum (*Sorghum bicolor*) and pearl millet (*Pennisetum typhoides*) were introduced to the farmers during the period from early to late sixties.

C. Green Revolution

Keeping in view these continuing problems, the ICAR formulated an exhaustive programme on dryland agricultural research. Thus, the All India Coordinated Research Project for Dryland Agriculture (AICRPDA) was launched in 1970 with the support from Canadian International Development Agency through an instrument of bilateral collaboration signed between the Governments of India and Canada.

The Consultative Group on International Agricultural Research had established the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) at Hyderabad in 1972. The Krishi Vigyana Kendras (KVKs) were initiated in 1974 to demonstrate proven technologies in farmers' fields in most of the districts. The dryland agricultural research was further strengthened with the establishment of the All India Coordinated Research Project on Agro-meteorology (AICRPAM) in 1983 at Hyderabad with 12 Cooperating Centres (now 25). The modest beginning of AICRPDA resulted into establishment of a full-fledged research organization – the Central Research Institute for Dryland Agriculture (CRIDA) at Hyderabad in 1985.

The main purpose of this institute was to focus on lead research in dryland agriculture, leaving location specific problems and their solutions to AICRPDA and AICRPAM. The present mandate of CRIDA is (Anon., 2005a):

1. To undertake basic and applied research that will contribute to the development of strategies for sustainable farming systems in the rainfed areas,
2. To act as a repository of information on rainfed agriculture in the country
3. To provide leadership and co-ordinate network research with state agricultural universities for generating location-specific technologies for rainfed areas
4. To act as a center for training in research methodologies in the fields basic to management of rainfed-farming systems
5. To collaborate with relevant national and international agencies in achieving the above objectives, and
6. To provide consultancy. In order to reduce the regional imbalances in agriculture, the ICAR set up the National Agricultural Research Project in 1987 to build up infrastructure and to strengthen the zonal research stations under SAUs for conducting location specific research.
7. The impact of accelerated growth rate in agricultural production did not last very long. Almost since the 1990s, there has been a stagnation or decline in the productivity and production of many crops in the country.

In other words, rainfed agriculture is synonymous to non-irrigated agriculture. It includes rainfed wetlands (N.E. status) as well as rainfed/drylands. Drylands are therefore part of rainfed lands.