WATER SAVING TECHNIQUE IN RICE

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Water is one of the most important factors in rice production. It affects the growth of the rice plants, nutrient status of the soil, and the nature and extent of the weed growth. The seasonal water requirement for rice cultivation ranges between 750mm with an average of 1200 mm where traditional continuous flooding is practiced.

Components of water loss in rice culture:

Considerable amount of water delivered to the rice crop is lost through deep percolation and lateral seepage. Studies have shown that about 50% - 75% of water is lost throuh these processes. High water requirement of rice is mostly attributed to percolation and seepage losses. A great economy in water use can be achieved if suitable measures are adopted to reduce the percolation and seepage losses.

Control of Percolation Losses:

Percolation is the vertical movement of water to the water table. Percolation losses are functions of local soils and topographic conditions. Possible methods of reducing percolation are indicated below.

1. a. Puddling:

One possible way of reducing the percolation loss is through the process of Puddling This operation breaks the natural aggregates and mixes soil with water to render it impervious. The degree of puddling depends on the land preparation practices and the nature of the soil. Use of tractors with cage wheels for the puddling operation has been more effective in reducing percolation losses compared to puddling using the country plough and manual labour. Puddling also helps in developing a plough pan or hard pan which acts as a barrier to movement of water.

b. Soil Compaction:

Through compaction, soil solids are re-arranged with compression of liquids and gaseous phases accompanied by volume change This effects the water holding characteristics of water, intake rates, and gaseous exchanges. Soil compaction, which cuts down percolation losses and reduces the water requirement of rice, can be easily achieved by repeated run of a heavy roller drawn by manpower, animal power or machinery.

c. Soil Amendments:

Percolation losses can be greatly reduced by soil amendments and almost completely stopped by barriers but the costs of these practices are generally out of the reach of most rice growers.

Introduction of clay materials into the paddy fields by flowing water in the form of muddy water is one way of improving water retension characteristics in order to reduce percolation.

2. Seepage Control

Seepage is the lateral subsurface movement within a rice growing area. Seepage losses are most important where the paddy borders a natural or artificial drainage canal In this situation water lost usually is not available in the immediate area.

Excessive seepage losses can often be traced to animal or insect burrows through bunds. The losses vary with the level of standing water, thickness of bunds, and perimeter-to-the-area ratio. Seepage losses can be greately reduced with well plastered bunds.

OTHER POSSIBILITIES TO REDUCE WATER LOSSES:

3. Land Preparation:

It is estimated that 30%-40% of the total water supplied to an irrigated rice crop is used before the crop is planted. The amount depends on the soil drainage class, number od days taken to complete the operation, and the density of weed populations. Some of the practices that could be adopted to reduce the amount of water used for land preparation are :

1. Use of residual moisure for initial ploughing.
2. Dry land preparation.
3. Use of herbicides.

4. Land Levelling:

When the levelling is poor or insufficient, more water is required to cover high spots in the field leading to over-use of water. Hence proper land levelling helps in saving water.

5. Depth of flooding at different growth stages:

Experimental evidences show that rice can be grown when the soil moisture is maintained at about saturation without adversely affecting the yield. However, practicability of this can be difficult. Therefore maintaining the lowest depth of water necessary (depending upon the growth stage) will require less water for irrigation..

6. METHODS OF IRRIGATION.

a. Intermittent irrigation

Lowland rice gives satisfactory yields under intermittent irrigation, where water is supplied at irregular intervals, to meet

the moisture requirement at different growth stages. Under this system water is supplied at irregular intervals, considering the critical stages. From the point of water economy, this practice should encouraged. On the whole, water requirement of rice under intermittent irrigation is much less than for continuous submergence.

b. Rotational method:

This means the application of water to fields in the required amounts at regular intervals during each rice growth stage. Under the rotational system, water is delivered to each user in sufficient quantities for a fixed period of time under a pre-arranged schedule. By this method it is possible to supply water in relation to the crop need for evaporation, percolation and seepage losses.

7. Use of Short Age Varieties:

Cultivation of three month varieties will result in saving considerable amounts of water as the growth period is less compared to medium and long age varieties.

8. Weed Control:

One of the main management means of obtaining more efficient water use is the elimination of weeds. Weeds compete for moisture with the crop from the early stages of its growth. It has been estimated that about 500 tons of water (equals to about 5 inches of water) could be saved per acre, if weeds are checked Therefore effective weed control is an important area in terms of reducing water losses.

9. Transplanting:

If Dapog or (highland) nursery is ued, there is no necessity for intensive land preparation for the 1/10 of an acre, and water requirement is minimal for land preparation, and rough levelling.

10. Use of Effective Rainfall -Timely Cultivation)

By commencing cultivation in time during Maha season, supplementary irrigation could be reduced and the water thus saved could be made use of to irrigate a larger extent during Yala Season.

11. Cropping Pattern:

Soil-water relations of well-drained soils are such that it requires very frequent irrigation to maintain satisfactory soil moisture conditions for rice during Yala Season.

Other field crops could be grown in these soils with less amounts of water. Therefore, it becomes necessary to follow cropping programmes that best suit the soil classes in order to make more efficient use of water.

12. Adherence to cultivation dates:

Some farmers do not follow the cultivation dates agreed on at the cultivation meeting. The delay in establishing the crop requires an extension of the period of water flow in the canal to supply water to the late-sown farmers. This supply at late stages will enter the fields where it is not required.

13. Field to Field Method of Water distribution:

A field to field system of irrigation is followed by the farmers to irrigate the fields, where the field nearest to the irrigation source is first supplied with water. This system needs heading up of water in the upper fields for it to flow down to lower ones, resulting in over irrigation. This could be avoided by having a field channel to carry water.

14. Conveyance Losses.

The losses in conveying the water to the irrigated areas are extremely variable. The losses tend to be higher when the canal is relatively long and when the maintenance is poor. Lack of measuring and controlling structures usually results in excess water delivery. It has been estimated that conveyance losses may range between 15% - 40% of the delivered flow from the source.

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