

Surface Irrigation

Surface irrigation is the oldest and widely used method of water application to agricultural land. The term 'surface irrigation' refers to a broad class of irrigation methods in which water is distributed over the field by overland flow. A flow is introduced at upper edge of the field which covers the field gradually. The water front advance is dependent largely on the differences between the inflow onto the field and the accumulating infiltration into the soil. In addition, other factors such as field slope, surface roughness, and the geometry or shape of the flow cross-section also influence advance rate.

Surface Irrigation Methods

Surface irrigation methods refer to water application through gravity flow to the cultivated land. Water is applied either the entire field (uncontrolled flooding) or part of the field (furrows, basins, border strips). For efficient application of water, it is important to select the method of irrigation which best suits the crop and soil characteristics of the field. In doing so it may be essential to use more than one method of irrigation in an area or a given farm. Irrigation Method can be broadly classified into three categories.

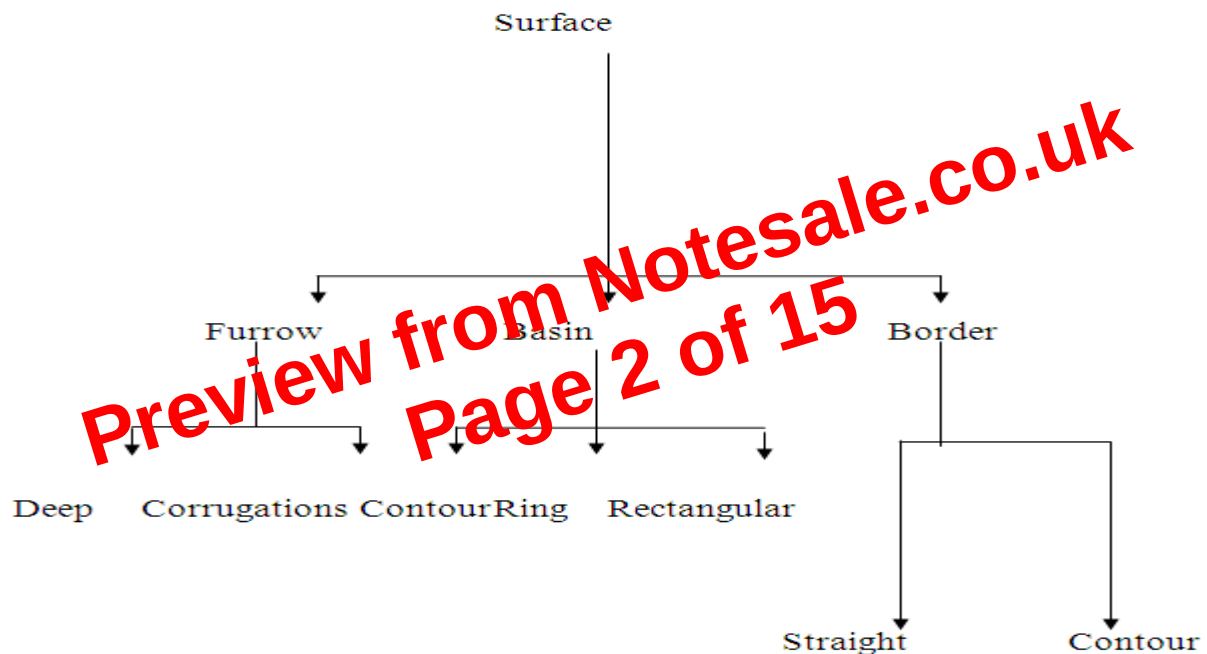


Fig. Classification of surface irrigation methods.

Surface irrigation methods can also be divided into the following two groups

1. Uncontrolled Surface Flooding
2. Controlled Surface Flooding

30.1.1 Uncontrolled Surface Flooding or Flooding

It consists of applying water to the field without any bunds to guide the flow of water wetting the soil surface completely. Generally, it is practiced only when irrigation water is abundant and where land levelling is not followed. Sometimes it is also adopted in the initial stages of

Subsurface irrigation

In sub-surface or sub-irrigation water is applied beneath the ground by creating and maintaining an artificial water table at some depth, usually 30 to 75 cm, below the ground surface. Moisture moves upwards towards the land surface through capillary action to meet requirements of the crops in plant roots. Water is applied through underground distribution system consisting of a properly designed main field ditches, laterals, laid 15 to 30 m apart. Water may be obtained from wells, streams, lakes etc. Water is introduced into soil profile through open ditches, mole drains or tile drains. Open ditches are preferred because they are relatively inexpensive and suitable for all types of soils. Tiles and mole drains are suitable only for organic soils. Sub-surface irrigation requires little field preparation and labour. It entails minimum evaporation loss and surface waste. The irrigation water is essentially required to be of good quality to prevent excessive soil salinity. The flow rate in supply ditches is required to be low to prevent waterlogging of the field. The use of sub-irrigation is limited because it requires certain soil condition that is the soil is permeable in root zone, underlain by an impervious horizon or high water table.

Essential Requirements

The essential requirements for a successful sub-surface irrigation are

- (i) Availability of adequate supply of good quality water throughout growth period of the crop,
- (ii) Field must be nearly level and smooth. Ground slope is moderate. Land is approximately parallel to water table,
- (iii) Availability of a layer of permeable soil such as sandy loam or loam immediately below the surface soil to permit free and rapid movement of water laterally and vertically,
- (iv) Availability of a relatively impervious layer at 2 to 3 m in the substratum to prevent deep percolation of water or a permanently high natural water table on which an artificial water table can be built,
- (v) A well planned distribution system of main ditches, field laterals, etc., which raises the water table to a uniform depth below the ground surface over the entire area,
- (vi) Availability of adequate outlet for drainage of the area so irrigated particularly in humid areas,