



**Bachelor of Biosystems Technology
Faculty of Technology
South Eastern University of Sri Lanka**

BSE 11042 Principles of Irrigation

IRRIGATION METHODS

Surface Irrigation

Wild flooding

Basin

 Rectangular

 Ring

Border

Furrow

Wild flooding

- Side of irrigation ditch is breached
- Uncontrolled flood to spread over adjacent land without levee or bund
- Breached bank is blocked after flooding
- Water application is highly uneven

Basin Irrigation

- Moderate to slow intake soils
- Deep rooted & closely spaced crops
- Crops do not tolerate flooding & soils subjected crusting
 - Raised bed /furrow planting
- Size 1m² to 16 ha
- Water is supplied through
 - Opening in dike or bund,
 - Siphon tubes,
 - Gated outlets
- Some cases size depend on the crop factor
 - (One tree per basin)
- Some cases size is limited by the amount of grading/leveling possible
- Time taken for water to cover the basin
 - 1/4 of the required intake time

Application rate

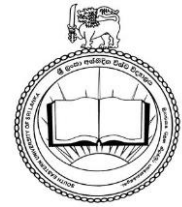
$$Q \geq 3 * I * A$$

in order to ensure better water spreading.

Q - volume/time (m³/s)

I – depth/time (m/s)

A – Area (m²)

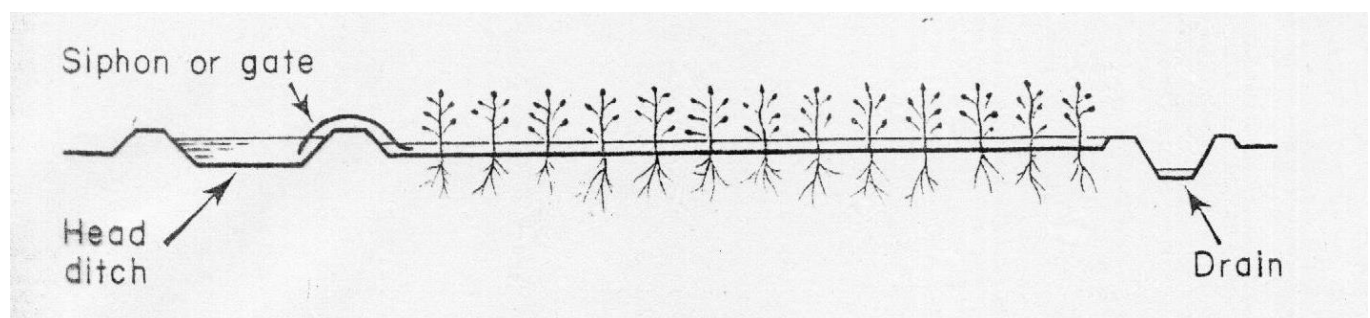


Disadvantages of Basin Irrigation

- Accurate land leveling - prerequisite to achieve high uniformities and efficiencies
- Terrace making is required on undulating land –deep soil needed
- Mechanization is difficult in small basins – bunds interfere movement
- Only applicable with smooth gentle slopes
- Small basins needed when infiltration capacity is moderately high to high
- Not suitable for crops that are sensitive to wet soil conditions around the stem
- Bunds reduce land area available for cultivation
- Reduce soil aeration
- Could breed mosquitoes
- Methane production
- Precision land leveling equipment cannot be used when basin size is small
- Difficult to remove excess water when it rains
- Small basins require extensive channel system
- Partial submergence of plants could occur
- Difficult to apply small irrigation depths
- Not suitable for soils forming crust

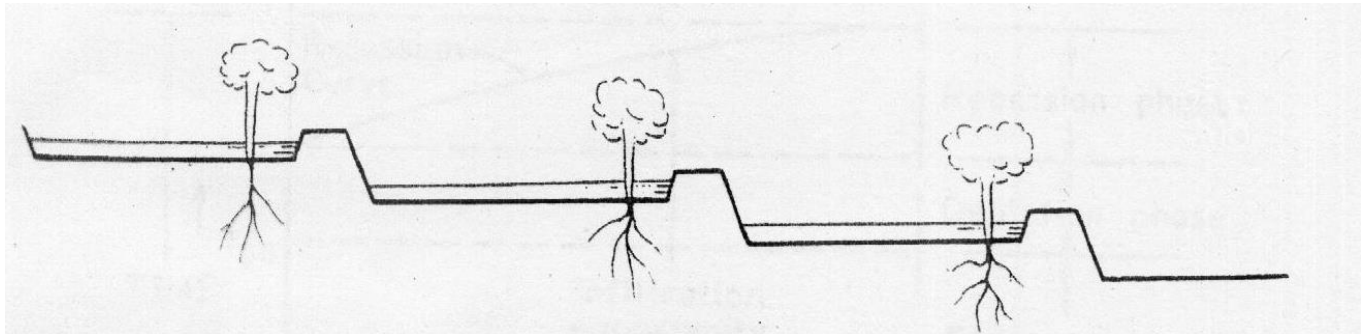
Advantages of Basin irrigation:

- Adapts to deep-rooted and closely spaced crops
- Provision of surface runoff is unnecessary unless rainfall is excessive
- Automation is easily applied
- Soils subjected to crusting can be basin irrigated by furrowing or using raised bed planting within basin
- Easy management
- Adapts well to flat topography
- Low operating cost
- Can function without adequate drainage facilities
- Easy leaching of salts
- High utilization of rainfall
- Adapts well to moderate and low infiltration soils
- Adapts well to small land holdings
- Low capital cost





A level basin



Basins as terraces

Border Irrigation

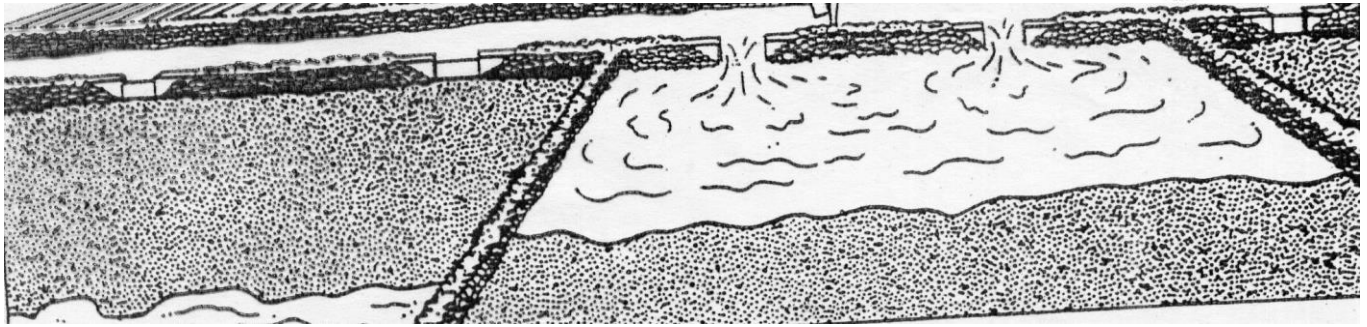
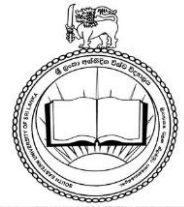
- Two ridges (paralleled) both sides
- Has a slope down the border limited cross slope
- Not blocked at the end
- Applicable to points with moderately low to moderately high intake rates
- Suited to land with slopes $< 0.5\%$
- Suited for any crop except those need prolonged flooding
- Soils should not crust
- If has cross slope - channel down irrigation water to a side leading to poor water distribution and erosion.
- Selected advance stream should be non- erosive.
- Clay soils with high velocities cause crusting.

Advantages of Border Irrigation

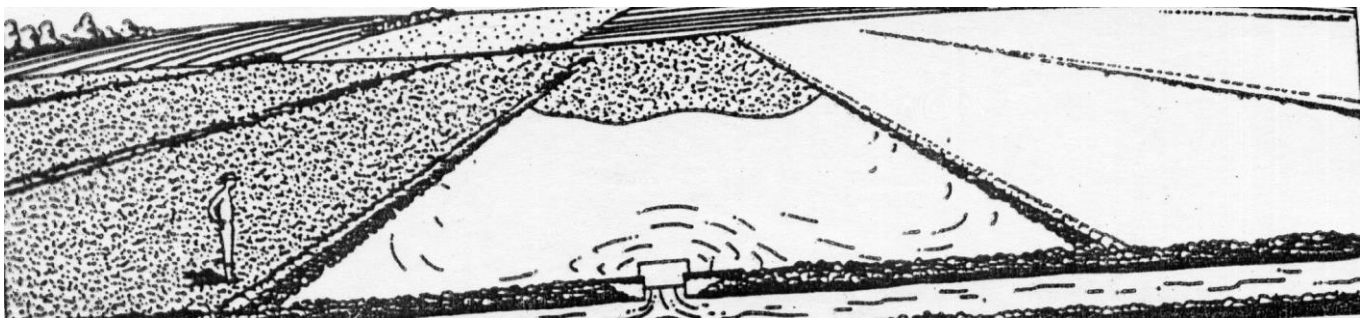
- Width of border could be multiples of machinery so that efficient machine use.
- No hindrance by bunds as in basins.

Disadvantages of Border Irrigation

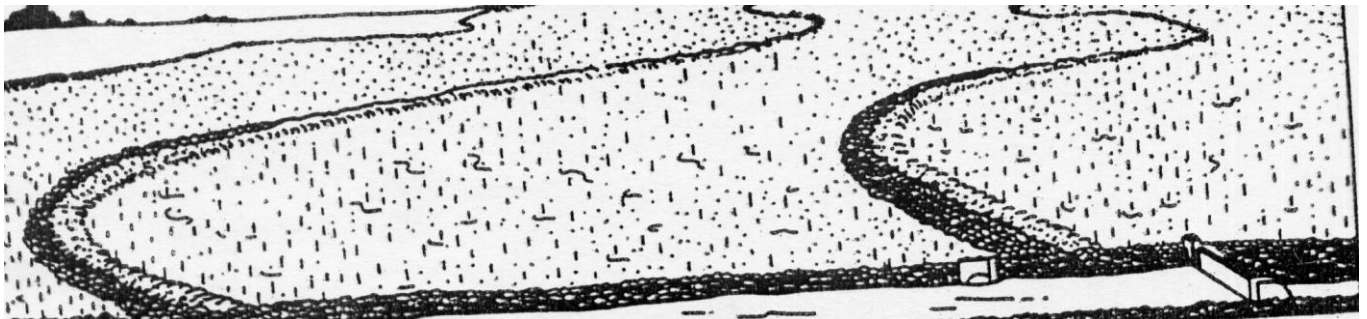
- Not feasible with high intake rates
- Soils with low intake rates need excessive time to infiltrate the requirement
- Soils that form crust are not suited
- Stream size per unit width must be large following a major tillage operation
- Initially land levelled could be costly unless land in relatively flat
- Not recommended to crops that are sensitive to wet soil conditions around stem
- Most limitations applied to basins also applies here



Graded Border



Level Border



Contour Levee