

# Irrigation water saving measurements

## Surface Irrigation Phases

- Advanced phase
- Storage phase
- Depletion phase
- Recession phase

## Irrigation water amounts and system component losses

- $D_p$  = Total amount of water for hole project
  - Water loss starting from pumping point
- $D_f$  = amount of water enter specified for the farm
  - Water loss through conveyance
- $D_a$  = amount of water for consumed in the farm
  - Water loss by evaporation and runoff
- $D_i$  = amount of water infiltrated the soil
  - Water loss by deep percolation
- $D_{au}$  = amount of water available for the plant

## Irrigation Efficiencies

- Water application efficiency ( $E_a = \frac{D_{au}}{D_a} \times 100$ )
- Water requirement efficiency ( $E_r = \frac{D_{au}}{D_u} \times 100$ )
- Water conveyance efficiency ( $E_c = \frac{D_a}{D_f} \times 100$ )
- Water farm efficiency ( $E_f = \frac{D_{au}}{D_f} \times 100$ )
- Water project efficiency ( $E_p = \frac{D_{au}}{D_p} \times 100$ )
- System application efficiency ( $E_{sa} = 95\% \text{ of } E_a$ )
- Operation system application efficiency ( $E_{ao} = \frac{E_a}{E_{sa}} \times 100$ )

## Improve irrigation efficiency

- Conveyance pipe
- Gated pipe
- Mulching technique
- Shading technique

## Water measurements

- Soil moisture measure
- Water discharged (pump and pipe network)
- Water velocity measure for open channel (current meter, colors, salts methods)
  - o Chezy equation
  - o Manning equation
- Amount of irrigation water added (applied as depth)
- Abstracted groundwater vs diesel consumption
- Declining rate of groundwater table level

## Sustainable irrigation techniques

- Deficit irrigation
- Supplemental irrigation
- Surge irrigation
- Selecting best suited crops and cropping methods