

* Classification of crops & crop seasons

1. Agricultural classification

Field crops : wheat, Rice, Maize, Gram pulses etc.

Commercial crops : Sugar-cane, Cotton, tobacco, hemp, sugar beets

Oil-seed crops : Mustard, groundnut, sesame, linseed, castor

Horticulture crops : Fruits, vegetables & flower crops

Plantation crops : Tea, coffee, cacao, coconut, rubber etc.

Forage crops : Grass, fodder crops

Miscellaneous crops : Medical crops, aromatic crops, sericulture crops, condiments & spices (मसालाएँ)

2. Crop seasons

Rabi : These crops are sown in autumn (Oct-Nov.) & are harvested in spring (Feb-March)

Winter - Examples : Gram, wheat, barley, peas, potato etc.

Kharif : These crops are sown in (Jun-July) & are harvested in Oct-Nov.

Monsoon - Examples : Rice, Maize, Sorghum, groundnut, Cotton

Summer : These crops are sown in between March & June

Perennial crops: These type of crops, the water is required throughout the year \rightarrow sugarcane, fruits & vegetables

Eight months crops: water required for eight months like cotton

3.) Irrigation requirements

Dry crops: They do not require water for irrigation only rain water is sufficient

Wet crops: They can not grow without irrigation

Garden crops: They require irrigation throughout the year

* Water requirement of a crop.

- The total quantity of water & the way of water application to the crops from the time of sowing to harvesting of crop is called water requirement of that particular crop.

* Crop period / Define crop period

- The time period of crop from instant of its sowing to the instant (harvesting) of its harvesting is called crop period

- Example :- Maize has 120 days crop period

* Base period / Define base period (B)

- The time period of crop at the time its sowing to its last watering before harvest is called the base period

- Example :- Maize has 105 days base period

Note: Crop period (C.P.) is slightly more than the base period.

$$C.P. >>> B.P.$$

* Crop ratio / Kharif - Rabi ratio

- The area irrigated in Kharif season to the area irrigated in Rabi season, this ratio is called crop ratio or Kharif - Rabi ratio.

- The area irrigated in Rabi season is generally more than the Kharif season

- It is varies from

$$\frac{\text{Kharif season irrigated area}}{\text{Rabi season irrigated area}} = \frac{1}{2}$$

* Paleo irrigation

- It can be defined as the first water in the field before sowing of the crop.

- It is done to add the sufficient amount of water to the soil for initial growth of crop or for germination.

* Kor - Watering

- The first watering which is given to a crop, when the crop is a few centimeters high is called Kor-watering.

* Kor - Period.

- The time required to apply the kor-water is called Kor-period.

* Cash Crops

- A crop which are grown to be sold (बिक्री) rather than direct consumption (सीधे खाने) by growers or farmers is called Cash crop

- Example: Tea, Cotton, tobacco, Sugarcane etc.

Note 1. The food crops (खाने के पौधे) like wheat, rice, barley & maize are not Cash Crops because it can directly consumed by farmers.

* Crop rotation.

- An alteration (बदलाव) of crops, one after the other in the same field is called crop rotation

- It is useful to balance the nutrients & salts in the field.

* Leguminous Crop

- The crops which provide the nitrogen to the soil from atmosphere are called leguminous crops

- Example: All pulses (दाल) crops like gram

* Optimum water depth

- The quantity of water at which the yield is maximum is called the optimum water depth.

& base period

* Define duty & Δ of a crop & give the relationship between them.

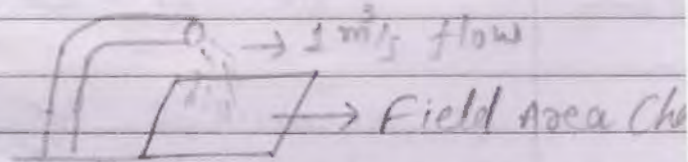
Delta (Δ)

- The depth of water required by a crop from sowing to maturity is called the delta (Δ) of that crop.

- Example: It is expressed by depth (cm, mm) or by volume (ha-cm)

- Example: Rice = 120 cm = 1200 mm
Maize = 45 cm = 450 mm

Duty (D)



- It is the relation between area (hectas) & volume of water flow (m^3/s , cumec)

- It can be defined as the number of hectares that can be irrigated by a constant flow of 1 cumec ($1 m^3/s$) throughout the base period is called duty.

- Let, 3 cumec flow irrigate the 5100 hectares through base period

so,

$$\text{Duty of irrigation} = \frac{5100}{3} = 1700 \text{ ha/cumec}$$

Base period (B)

- The time period of crop at the time of its sowing to its last watering before harvesting is called the base period.

Relationship

- Suppose a crop having base period is B days & applying water of 1 cumec (m^3/s) to that crop for B days

- The volume of water apply to that crop during B days are given by

$$\text{Volume} = \text{Discharge (Q)} \times \text{Time (t)}$$

$$= 1 \text{ cumec} \times B\text{-days}$$

$$= 1 \text{ m}^3/s \times (B \times 24 \times 60 \times 60) \text{ - seconds}$$

$$= 1 \times B \times 24 \times 3600 \left(\frac{m^3}{s} \times s \right)$$

$$V = 86,400 \text{ m}^3 \quad \text{--- (1)}$$

Now, the delta (Δ) is the depth of water applied to the field crop throughout its growing period (base period (B)) of the Δ -hectare of.

So,

$$\text{Depth (}\Delta\text{)} = \frac{\text{Volume (V)}}{\text{Area (A)}}$$

$$= \frac{86,400 B \text{ (m}^3\text{)}}{\Delta \text{ ha}}$$

where,

Δ = Depth of water, (m)

Q = Duty (ha/cumec) = $\frac{86,400 B \text{ (m}^3\text{)}}{\Delta}$

B = Base period (days) = $\frac{10,000 \times Q \text{ (m}^2\text{)}}{\Delta}$

$$\Delta = \frac{8,640 B \text{ (m)}}{Q} = \frac{864 \times B}{Q}$$

By other way → It's easy

1.) Suppose, we have D -hectare land & applying Δ -meters depth of water in that field
(Volume as per area & depth)

So,

$$\begin{aligned} \text{Volume (V)} &= \text{Area} \times \text{depth} \\ &= D \text{ (ha)} \times \Delta \text{ (m)} \\ &= D \times 10^4 \text{ (m}^2) \times \Delta \text{ (m)} \end{aligned}$$

$$V = D \times \Delta \times 10^4 \text{ m}^3 \quad \text{--- (1)}$$

2.) For same field of D -hectares, if we applying I (cumec (m³/s)) flow of water during its base period (B)

(Volume as per discharge & time)

then

$$\text{Volume (V)} = \text{Discharge} \times \text{Time}$$

$$= I \text{ (m}^3/\text{s)} \times B \text{ (days)}$$

$$= I \times 24 \times 60 \times 60 \times B \left(\frac{\text{m}^3}{\text{s}} \times \text{s} \right)$$

$$V = 86,400 B \quad \text{--- (2)}$$

Equating eqⁿ (1) & (2)

$$D \times \Delta \times 10^4 = 86,400 B$$

D = Area (ha/acre)

$$\Delta = \frac{86,400 \times B}{D \times 10^4} = \frac{8.64 B}{D} \text{ (m)} = \frac{864 B}{D} \text{ (cm)}$$

B = Base period (days)

Ex-2.3 Find the delta for a crop when its
 (23) duty is 864 ha/cumec on the field, the
 base period of this crop is 120-days

Solⁿ:- Given data;

$$D = 864 \text{ ha/cumec}$$

$$B = 120 \text{ - days}$$

$$\Delta = ?$$

- we know that

$$\Delta = \frac{864 \times B}{D}$$

$$= \frac{864 \times 120}{864}$$

$$\Delta = 120 \text{ cm}$$

Ex-3.9 Find the delta for a crop if the duty for
 Punarnia a base period of 110-days is 1400 ha/cumec (68)
 (64)

Ex-3.10 A crop requires a total depth of 92cm of water
 Punarnia for a base period of 120-days. Find the duty of
 (64) water

$$\Delta = \frac{864 \times B}{D}$$

$$D = \frac{864 \times B}{\Delta} = \frac{864 \times 120}{92} = 1127 \text{ ha/cumec}$$

Example

Calculate the duty of water for rice crop of 130-day duration - whose water requirement is 100 cm.

Lenka

(104)



Given data

$$A = 100 \text{ cm}$$

$$B = 130 \text{ days}$$

$$D = ?$$

- we know that

$$A = \frac{864 B}{D}$$

$$D = \frac{864 B}{A} = \frac{864 \times 130}{100} = 1123.2 \frac{\text{ha}}{\text{cumec}}$$

Calculate the water requirement of Rice Crop of 130-days duration if duty is 1123.2 ha/cumec.