

07. Water requirement for different crops: *Irrigation schedules for field crops*

Rice

Total water requirement is 1100-1250

The daily consumptive use of rice varies from 6-10 mm and total water is ranges from 1100 to 1250 mm depending upon the agro climatic situation. Of the total water required for the crop, 3% or 40 mm is used for the nursery, 16% or 200 mm for the land preparation i.e. puddling and 81% or 1000 mm for field irrigation of the crop.

The growth of rice plant in relation to water management can be divided into four periods viz., Seedling, vegetative, reproductive and ripening. Less water is consumed during seedling stage. At the time of transplanting, shallow depth of 2 cm is adequate and maintained upto 7 days and there after 5 cm of submergence is necessary to facilitate development of new roots. The same water level is required for tiller production during the vegetative phase. At the beginning of the maximum tillering stage the entire water in the field can be drained and left as such for one or two days which is termed as mid season drainage. This mid season drainage may improve the respiratory functions of the roots, stimulate vigorous growth of roots and checks the development of non-effective tillers. Any stress during the vegetative phase may affect the root growth and reduce the leaf area.

During flowering phase 5 cm submergence should be maintained because it is a critical stage of water requirement. Stress during this phase will impair all yield components and cause severe reduction in yield. Excess water than 5 cm is also not necessary especially at booting stage which may lead to delay in heading.

Water requirement during ripening phase is less and water is not necessary after yellow ripening. Water can be gradually drained from the field 15-21 days ahead of harvest of crop. Whenever 5 cm submergence is recommended the irrigation management may be done by irrigating to 5 cm submergence at saturation or one or two

days after the disappearance of ponded water. This will result in 30% saving of irrigation water compared to the continuous submergence.

Groundnut

Total water requirement 500-550 mm

Evapotranspiration is low during the first 35 days after sowing and last 35 days before harvest and reaches a peak requirement between peg penetration and pod development stages. After the sowing irrigation the second irrigation can be scheduled 25 days after sowing i.e. 4 or 6 days after first hand hoeing and thereafter irrigation interval of 15 days is maintained upto peak flowering. During the critical stages the interval may be 7 or 10 days depending upon the soil and climate. During maturity period the interval is 15 days.

Finger millet

Total water requirement: 350 mm

Finger millet is a drought tolerant crop. Pre-planting irrigation at 7 or 8 cm is given. Third day after transplantation life irrigation with small quantity of water is sufficient for uniform establishment. Water is then withheld for 10-15 days after the establishment of seedling for healthy and vigorous growth. Subsequently three irrigations are essential at primordial initiation, flowering and grain filling stages.

Sugarcane

Total water requirement: 1800-2200 mm

Formative phase (120 days from planting) is the critical period for water demand. To ensure uniform emergence and optimum number of tillers per unit area lesser quantity of water at more frequencies is preferable. The response for applied water is more during this critical phase during which the crop needs higher quantity of water comparing, the other two phases. Water requirement, number of irrigations etc., are higher during this period. As there is no secondary thickening of stem, elongation of stem as sink for storage of sugar it is desirable to maintain optimum level of moisture during grand

growth period. Response for water is less in this stage and this will be still less in the ripening stage. During the ripening phase as harvest time approaches soil moisture content should be allowed to decrease gradually so that growth of cane is checked and sucrose content is increased.

Maize

Total water requirement: 500 – 600 mm

The water requirement of maize is higher but it is very efficient in water use. Growth stages of maize crop are sowing, four leaf stage, knee high, grand growth, tasseling, silking early dough and late dough stages. Crop uniformly requires water in all these stages. Of this, tasseling, silking and early dough stages are critical periods.

Cotton

Total water requirement: 550 – 600 mm

Cotton is sensitive to soil moisture conditions. Little water is used by plant with early part of the season and more water is lost through evaporation than transpiration. As the plant grows, the use of water increases from 3 mm / day reaching a peak of 10 mm a day when the plant is loaded with flowers and boll. Water used during the emergence and early plant growth is only 10% of the total requirement. Ample moisture during flowering and boll development stages is essential. In the early stage as well as at the end the crop requires less water. water requirement remains high till the boll development stage. If excess water is given in the stages other than critical stages it encourages the vegetative growth because it is a indeterminate plant thereby boll setting may be decreased. Irrigation is continued until the first boll of the last flush opens, and then irrigation is stopped.

Sorghum

Total water requirement: 350-500 mm

The critical periods of water requirement are booting, flowering and dough stages. The crop will be irrigated immediately after sowing. Next irrigation is given 15 days sowing to encourage development of a strong secondary root system. Irrigation prior to heading and ten days after heading are essential for successful crop production.

Pulses

Total water requirement – 200-450 mm

Mostly the pulse are grown under rainfed condition. Some pulse crops like Redgram, Blackgram, Greengram are grown in summer season as irrigated crop which need 3 to 4 irrigation at critical stages like germination, flowering and pod formation.

Water requirement of crops

S.No.	Corps	Duration in days	Water requirement (mm)	No. of irrigations
1.	Rice	135	1250	18
2.	Groundnut	105	550	10
3.	Sorghum	100	350	6
4.	Maize	110	500	8
5.	Sugarcane	365	2000	24
6.	Ragi	100	350	6
7.	Cotton	165	550	11
8.	Pulses	65	350	4