Irrigation Water Management

Water management for rice in coastal saline soils

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Experiments on wet season rice studied different water regimes: rainfed and submergence at 2.5, 5.0, 7.5, 10.0, and 12.5 cm continuous water to maturation. Submergence was maintained by irrigation or by draining the plots manually. Jaya rice was grown with 150-60-60 kg NPK/ha in a randomized block design.

Analysis of growth and yield-attributing characters and straw and grain yields indicate a direct relationship to water depth (see table). The rainfed crop manifested adverse effects. Tillers/ hill declined with increased water depth; percentage effective tillers increased only up to 10.0 cm water. Percentage grain sterility decreased with increased submergence. Variation in panicle length did not vary significantly; grain test weight was statistically higher with submergence than in the rainfed crop.

Growth, yield attributes, and yield of rice under different levels of submergence in coastal saline soils, India.[a]

Submergence level	Plant ht (m)	Tillers/ hill	Effective tillers (%)	Sterility (%)	1000-grain wt (g)	Straw yield (t/ha)	Grain yield (t/ha)
Rainfed	94.0	13.3	61.3	29.1	24.8	5.2	4.5
2.5 cm	96.8	15.8	87.1	27.5	26.0	7.7	5.6
5.0 cm	97.0	13.4	71.6	26.4	25.3	8.3	4.8
7.5 cm	97.6	14.3	79.8	27.4	25.2	8.1	4.7
10.0 cm	98.7	12.9	88.9	22.2	26.1	7.1	5.4
12.5 cm	98.1	12.5	82.7	19.0	25.5	6.3	5.1
CD at 0.05	4.2	0.9	15.2	2.8	0.7	0.79	0.58

[a] Pooled data, 2-yr trials.

Grain yields were higher with 2.5 cm and 10.0 cm submergence levels. Higher and lower water levels lowered yields. Straw yields were highest from 2.5 to 10.0 cm water depths.

ECe (3.93-5.05 dS/m) and pH (7.3-7.65) did not vary with water regime, although ECe values were lower at all stages of crop growth with increased submergence. □

Soil and climate-based irrigation schedules for rice

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Field experiments in 1985 kharif and 1986 summer studied irrigation schedules based on soil and climate. Crop evapotranspiration (ET) was calculated using pan evaporation reading; percolation loss was estimated based on soil hydraulic conductivity. The cumulative water loss by ET and percolation for a week was replaced with irrigation water at 0.5, 1.0, and 1.5 times the loss and compared with 5 and 7 cm water applied per week.

Irrigation equivalent to the loss of water by ET and percolation was sufficient to obtain maximum yield (see table). More water did not improve yield. Irrigating to half the water lost used the least amount of water but reduced yield considerably. Applying 5 cm water/wk also was sufficient for yield. □

Effect of irrigation regime on yield (IR50) at Coimbatore, India.

Treatment	Kharif		Summer	
	Total water applied (mm)	Yield (t/ha)	Total water applied (mm)	Yield (t/ha)
1.5 $\sum_{1}^{7}$ (ET + HC)	1256	5.0	1439	5.2
1.0 $\sum_{1}^{7}$ (ET + HC)	960	4.9	1028	5.1
0.5 $\sum_{1}^{7}$ (ET + HC)	665	4.1	618	4.3
7 cm/wk	986	5.0	1040	5.1
5 cm/wk	780	4.7	800	4.9
CD 5%	–	0.4	–	0.2