

WATER REQUIREMENTS OF CHILLI

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Crop diversification in paddy fields in the dry zone during *yala* season has spread into many irrigation projects in the island. Chilli has emerged as an important crop mainly due to its economic advantages. Therefore, water management in chilli production has been given high priority in the research programmes of the department.

Experiments were conducted to update data available on crop water requirement of chilli at the Agricultural Research Station, Maha Illuppallama during *yala* 1989. Guidelines for irrigation of the chilli crop based on the experimental results are reported in this paper.

EXPERIMENT

Twelve drainage lysimeters with cross sectional area of 5.8 m² were used for the study. Water use under four irrigation

treatments were tested in a completely randomized block design replicated three times. The irrigation treatments were as follows:

1. Daily irrigation to keep the root zone at field capacity (T1).
2. Irrigation once in 5 days to keep the root zone above 25% depletion level (T2)
3. Irrigation once in 10 days to keep the root zone above 50% depletion level (T3)
4. Irrigation once in 15 days to keep the root zone above 75% depletion level.

Three growth stages of the chilli crop were assumed. At each irrigation, pre determined amount of water was applied. The root zone depths assumed (Nayakakolrala, 1991) and the amount of predetermined quantity of water applied at each stage are given in Table 1.

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Table 1: Root zone depth, duration of irrigation period and amount of water applied at each irrigation (Yala 1989, Maha Illuppallama)

Growth (*) Stage	Duration of Irrigation (DAP) **	Root Zone Depth (mm)	Amount of water applied per application (mm)			
			T1	T2	T3	T4
1	0 - 25	300	2	10.5	21.0	31.5
2	25 - 50	750	3	26.3	52.5	63.0
3	50 - 120	900	6	31.5	78.8	94.5

* The crop growth period was from mid May to mid September

** Days after planting

It was not possible to maintain the irrigation treatments during some periods of the experiment due to occasional rains. Due to the civil disturbances that took place in the island during this period, irrigation dates were advanced or delayed by one or two days to adjust with the situation.

RESULTS

Yields of chilli pods (dry weight) in different replicates under the different treatments

and the treatment means are given in Table 2.

The yield differences among the different treatments were not statistically significant. This may be due to high variability of the yields in different replicates.

Furthermore the occasional rains also would have nullified the effect of the treatments. The evapotranspiration values measured during different growth periods are presented in Table 3.

Table 2 : The weight of dry chilli in different replicates under the different treatments and treatment means (Yala 1989, Maha Illuppallama)

Treatment	Yield (kg/ha)			
	Rep1	Rep2	Rep3	Mean
T1	3819	3576	3078	3491
T2	2934	2740	3533	3068
T3	2991	2564	2040	2532
T4	2175	2807	3021	2668

Based on the Et values and the other data on rooting depth and

available soil moisture, computed values are given in Table 4.

Table 3 : Evapotranspiration values
(Yala, 1989, Maha Illuppallama)

Days after planting		Et (mm/day)
0	- 5	2.4
5	- 15	1.9
15	- 25	3.0
25	- 35	4.3
35	- 45	5.3
45	- 55	6.9
55	- 65	5.5
65	- 75	5.5
75	- 85	5.5
85	- 95	6.5
95	- 105	5.9
105	- 115	5.9
Total for 120 days - 585 mm		

Table 4: Computed total water requirement of chilli in RBE soil based on evapotranspiration, rooting depth and available soil moisture

Period Days after planting	Et mm/day	Root depth (mm)	Irrigation Interval (days)	Amount of water applied per irrigation (mm)	Total No. of Irrigation for the period	Total amount of water required for the specified period (mm)
0 - 15	2.0	150	5	14	3	42
15 - 30	3.0	200	5	21	3	63
30 - 60	5.5	450	6	47	5	235
60 - 90	5.5	600	7	55	4	220
90 - 120	6.1	600	7	61	4	244
120 - 135	5.5	600	7	55	2	110

Following values were used in determining the total water requirement

- Allowable soil moisture depletion level - 50%
- Irrigation efficiency (Ea) -70%
- Irrigation per application

$$= \frac{\text{Total Et}}{\text{Ea}}$$

$$= \frac{\text{Et (mm/day)} \times \text{Irrigation interval (No. of days)}}{\text{Ea}}$$

- Irrigation interval (days)

$$= \frac{\text{Aw} \times \text{D} \times \text{d}}{\text{Et}}$$

- Aw = Available moisture (mm per metre)
- D = Rooting Depth (mm)
- d = allowable soil moisture depletion level
- Et = evapotranspiration (mm/day)

The above figures provide some guidelines for deciding irrigation interval, amount of water per application and total water requirement for the crop.

CONCLUSIONS

The Et requirement of chilli when grown in DL1 agro-ecological region during *yala* (May to September) can be considered around (585 ± 65) mm. The soil moisture properties, rooting habits of chilli on RBE (well drained) and Et conditions in the region necessitate that the crop should be irrigated once in 5 days during the first month of growth to prevent moisture stress. However, during the rest of the crop growth period, the crop will fit into a weekly rotation of irrigation.

REFERENCE

- H.B.Nayakakorala, (1991), Root penetration and activity patterns of some upland crops grown on RBE soils. *J. Soil Sci. of Sri Lanka* 7: 18 - 33.