

R.P.F. III

FINAL REPORT

1. Institute Code No.

Agr. XI (231)

2. I.C.A.R. Code No

PI-89 ICI-PIC 0311

3. Name and Address of Research Institute Centre:

CPCRI
Kasaragod
671 124, Kerala.

4. Project Title:

Comparative efficiency of different systems of irrigation in coconut.

5. Name and Designation of Project Leader:

R. Dhanapal
Scientist (Sr. S)
Agronomy.

6. Name(s) and Designation(s) of Project Associates including Project Leader and work to be done:

Sl. No	Name and Designation	Time spent	Work done
1	P.Gopalasundaram (Project leader) (1992-97)	20 man months	Layout of the Experiment scheduling irrigation.
2	R. Dhanapai (Project leader) ('97 continuing)	12 man months	maintenance of experimental palms recording soil moisture status, yield data, physiological parameters.
3	A.C. Mathew (Associate)	10 man months	Studying wetting front under drip irrigation. Soil moisture depletion pattern.
4	D.V.S. Reddy (Associate)	5 man months	Maintenance soil moisture status microclimate etc..
5	Kasturi Bai	3 man months	Study of physiological parameters

7. Location of Research Project with complete address (Division Section/Sub-Centre)

Division of Crop Production
CPCRI, Kasaragod - 671 124.

(Field No. B2)

8. Date of start

1992.

9. Date of termination:

2000

10. (a). Objectives (Not more than 150 words)

Soil moisture is one of the main factors limiting the growth and productivity of coconut palms in places where there is prolonged dry spell. Coconut responds well to irrigation under such situations and different methods of irrigation such as perfo method, drip, basin and sprinkler are being adopted by the farmers. The objectives of this project are.

- i) To compare the efficiency of perfo, drip and basin methods of irrigation for coconut.
- ii) To study the wetting front under drip irrigation in sandy loam soil.
- iii) To study the soil moisture utilization pattern; and
- iv) To work out the irrigation requirement of coconut through drip and basin methods of irrigation in sandy loam soil.

(b) Practical utility including background information (Not more than 150 words)

In North Kerala, the dry spell extends for a period of about six months from November to May and coconut palms experience considerable moisture stress during the period. In experiments conducted at Regional Agricultural Research Station, Pilicode, basin irrigation with 800 L water once in a week increased the yield of coconut palms by 74.2% in sandy loam soil whereas flood irrigation with 50 mm of water once in 3 days increased the yield from 11.2 nuts palm/year to 96.6 nuts in littoral sand (Bhaskaran and Leela, 1978). At CPCRI, Kasaragod the highest yield of 128 nuts palm year was obtained when WCU palms were given perfo-irrigation at IW:CPE ratio of 1.0 and 750 : 670 : 1500 : 170 g N P K Mg palm year. While CPCRI recommends 200 L palm once in 4 days for basin irrigation, the KAU recommends quantities ranging from 600L once in 3-4 days in sandy soils to 1600L once in 9 days in silty clay soil. Preliminary results of experiments conducted at CPCRI, Kasaragod and CWRDML, Calicut indicated that for drip irrigation @ 30l palm/day may be optimum. The results of the present experiment will help to rationalize the recommendations for basin as well as drip irrigation for adult coconut palms and help to improve the water use efficiency.

CENTRAL PLANTATION CROPS RESEARCH INSTITUTE
KASARAGOD-671 124, KERALA

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11. Technical Programme:

a) Treatments

The experiment was initiated in 1992 in a twenty four year old WCT coconut plantation with the following treatments:

- T1 - No irrigation (Control)
- T2 - Drip irrigation with 16L of water/palm/day
- T3 - Drip irrigation with 32L of water/palm/day
- T4 - Drip irrigation with 48L of water/palm/day
- T5 - Drip irrigation with 64L of water/palm/day
- T6 - Basin irrigation with 200L once in 4 days
- T7 - Basin irrigation with 300L once in 4 days
- T8 - Basin irrigation with 400L once in 4 days
- T9 - Perfo irrigation with 20 mm of water at IW.CPE ratio of 1.00

Design	RBD
No of palms/plot	: 4
No of replications	: 3

b) Observations to be recorded

1. Female flower production and yield of nuts/palm
2. Nut characteristics
3. Wetting front under drip irrigation
4. Soil moisture depletion pattern
5. Micro climatic conditions and canopy temperature
6. Physiological parameters like leaf water potential, stomatal diffusive resistance, leaf temperature, transpiration, photosynthetic rate, etc.

Experimental Result:

To get the real effect of irrigation for coconut we have to compare the data only after 3-4 years of initiation of the experiment. The experiments was started in the year 1992. The yield data was recorded from 1992 onwards. Analysis of the yield data revealed that there was no significant difference between the treatments including the irrigated treatments. Even the pooled analysis data did not bring about any statistical difference between the treatments.

1996-97 and 1997-98 pooled analysis data on nut yield.

Treatment	Nuts
T1	94.33
T2	124.83
T3	127.68
T4	112.00
T5	117.33
T6	111.17
T7	108.33
T8	117.33
T9	121.67
SE plot	15.94
Year mean	114.91
C.V	13.87

Treatment difference, are not significant.

Duncan multiple range test was also tried. The result is no two groups are significantly different.

Soil Moisture

The soil moisture data revealed that there is a variation of 3 to 4% between irrigated (11 to 14.5%) and un-irrigated treatments (9.6%) before irrigation and 4 to 6% variation after irrigation. (13 to 15.7%). Since Drip irrigation is a daily irrigation, the moisture content in the wetting zone of the drip irrigated palms was higher than palms irrigated with basin and perfo method. The moisture content in the unirrigated plot was in the field capacity range. This may be the reason that there is less response for irrigation.

Physiological parameters

Physiological parameters like net photosynthetic rate (PN), stomatal conductance, transpiration rate and leaf water potential were recorded. The results indicate that the PN rate was higher under irrigation treatments (ranging from 1.98 to 4.25 μ nuts of $(02 \text{ m}^{-2} \text{ S}^{-1})$). The increase was in the range of 35-189% and the palms under perfo irrigation recorded the highest increase. However, this has not reflected in yield. No clear cut trend was evident regarding the other parameters

Nut character

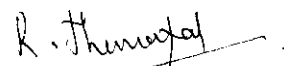
Nut weight, copra weight and shell weight were studied in different treatments. However there was no significant difference between the treatments.

Treatments	Nut weight (g nut)	Copra weight (g nut)	Shell weight (g nut)
Rainfed	871	178	122
Drip irrigation 35% Eo	912	165	121
Drip irrigation 66% Eo	851	163	118
Drip irrigation 100% Eo	723	161	109
Drip irrigation 133% Eo	948	193	136
Basin irrigation 160 liter/day	746	164	101
Basin irrigation 240 liter/day	917	179	133
Basin irrigation 320 litre/day	831	175	121
Perfo IW CPE-100	752	172	119
CD(5%)	NS	NS	NS

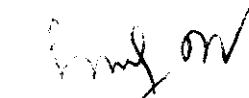
16. Comments suggestions of Project Leader regarding possible future line of work that may be taken up arising of this project:

In red sandy loam soils we can find out the soil moisture content during peak summer in the palms root zone (under rainfed condition). Only if the soil moisture is near permanent wilting point(50% ASM and less) or so we can go for irrigation experiments. Otherwise, there will be no response for irrigation.

17. Signature with name of Project Leader and Associates:


(R. Dhanapal)
Project leader


(A. C. Mathew)
Associate


(DVS. Reddy)
Associate.


(K. V. Kasturi Bai)
Associate

18. Signature (with comments, if any) of Head of Division/Section/Station.



19. Signature (with comments, if any) of Director: