

EFFECT OF DRIP IRRIGATION ON HYBRID COCONUT

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ABSTRACT

A field experiment was conducted in coconut from 1989 to 1996 to study the effect of methods of irrigation *viz.* drip irrigation and basin irrigation and forms of fertilizer in hybrid VHC-2 coconut. The results revealed that basin irrigation at IW/CPE ratio of 1.0 at 4 cm depth influenced the growth and yield characters and nut yield. Drip irrigation at 100% Eo (pan evaporation) also recorded increased nut yield and the yields were on par with basin irrigation at IW/CPE ratio of 1.0. The forms of fertilizers did not influence the nut yield.

KEY WORDS : Coconut, drip irrigation, effect

Tamil Nadu ranks second in terms of area and production of coconut in the country. The mean annual rainfall of coconut growing areas is very low, varying from 700 - 1000 mm and the rainfall is distributed only during monsoon months from June to December. Hence, irrigation becomes highly essential to coconut gardens. The crop water requirement for optimum growth and high yield is location specific and varies with climate, soil variety/hybrid and system of irrigation. Copeland (1931) reported that a coconut palm can absorb 28 to 46 l of water in a day. Mohandas *et al.* (1988) at Coimbatore, Tamil Nadu measured the transpiration rate of coconut leaves to be 7.5 mg/cm²/second and estimated total transpiration of 90 l/palm/day. However, the information on monthly water requirement of coconut through drip system is not available. Hence, the present study was undertaken.

MATERIALS AND METHODS

A field experiment was conducted at the Agricultural Research Station, Aliyarnagar, Tamil Nadu from 1989 to 1996 to study the effect of methods of irrigation and forms of fertilizer. The soil was sandy loam with low (182.5 kg/ha) medium (12.5 kg/ha) and high (325.0 kg/ha) in available N, P₂O₅ and K₂O per ha. The treatment comprised of five methods of irrigation *viz.*,

- 11 - Life saving irrigation (50% water as in I2)
- 12 - Drip irrigation at 33% Eo (Pan evaporation)
- 13 - Drip irrigation at 66% Eo

- 14 - Drip irrigation at 100% Eo
- 15 - Basin irrigation at IW/CPE ratio of 1.0 at 4 cm depth and two forms of fertilizer *viz.*,
- F1 - Recommended dose of fertilizer as straight fertilizer
- F2 - Recommended dose of fertilizer as slow release fertilizer (NP tablet containing 26% N and 4% P₂O₅)

The experiment was laid out in split plot design with irrigation treatments in the main plot and forms of fertilizer in the sub plot. The coconut hybrid VHC-2 was planted on 30 May 1989. The quantity of water applied for coconut through drip was calculated based on the average evaporation data for each month (Table 1). Four drippers were

Table 1. Quantity of water applied through drip irrigation (l/day/palm)

Month	Drip at 33 % Eo *	Drip at 66 % Eo	Drip at 100% Eo
January	21	41	62
February	25	50	76
March	29	57	87
April	28	55	84
May	23	46	69
June	20	40	60
July	22	44	66
August	17	35	53
September	20	40	61
October	19	37	56
November	17	34	51
December	18	36	54

* Eo - Pan evaporation.

Table 2. Effect of methods of irrigation and forms of fertilizer on growth and yield characters and nut yield of hybrid coconut

Treatments	Total leaf production/palm		Number of spadices/palm		Number of female flowers/palm		Nut yield nuts/palm/year	
	1994-95	1995-96	1994-95	1995-96	1994-95	1995-96	1994-95	1995-96
Methods of irrigation (I)								
Life saving irrigation (I1)	67.6	81.2	12.3	11.2	102	161	22.8	36.6
Drip at 33 % Eo (I2)	69.4	83.1	12.1	12.9	168	249	33.6	38.4
Drip at 66 % Eo (I3)	70.9	83.4	12.6	13.9	192	299	40.1	71.4
Drip at 100% Eo (I4)	72.6	84.0	16.2	14.2	206	284	45.0	81.1
Basin irrigation (I5)	75.0	87.4	16.3	13.9	248	356	51.3	81.1
Forms of fertilizer (F)								
Straight fertilizer (F1)	71.1	84.3	15.1	13.3	203	258	38.9	65.7
Slow release fertilizer (F2)	71.0	85.7	13.2	13.0	208	281	38.2	81.1
CD (P = 0.05)								
I	3.1	8.8	2.1	1.3	57	82	7.1	37.1
F	NS	NS	NS	NS	NS	NS	NS	NS
I at M	NS	NS	NS	NS	NS	NS	NS	NS
M at I	NS	NS	NS	NS	NS	NS	NS	NS

placed around the palm one m away from the bole in all directions to wet the active root zone of 1.8 m radius around which 80 per cent of the coconut roots are present. For basin irrigation, 407 l of water per irrigation was applied in 1.8 m radius basin whenever the pan evaporation reached 40 mm. The slow release fertilizer NP tablets were placed at the four points below the drippers by taking a pit size of 30 cm x 30 cm x 30 cm and covered and the drippers were placed above the pit. During the first year, in the seedling stage, only 25 per cent of the water required for adult palm was applied. The crop came to bearing during fifth year onwards. Growth and yield observations were recorded and discussed.

RESULTS AND DISCUSSION

The results of the years 1994-95 and 1995-96 influenced the various growth and yield characters and nut yield of coconut. Basin irrigation at

IW/CPE ratio of 1.0 with 4 cm depth recorded more total leaf production/palm, number of spadices/palm and number of female flowers/palm in both the years (Table 2). Drip irrigation at 66 per cent Eo recorded values on par with the basin irrigation in all the growth and yield characters.

Basin irrigation at IW/CPE of 1.0 and drip irrigation at 100 per cent Eo recorded more nut yield among all other treatments. The nut yield was 51.3 and 45.0 nuts/palm/year during 1994-95 and 98.1 and 89.1 during 1995-96 with basin irrigation and drip irrigation at 100 per cent Eo respectively. Since in both treatments, the palms did not face any moisture stress, they were able to utilise nutrients effectively and produced more number of leaves and spadices and thus entailed in higher nut yield. The nut yield of drip at 66 per cent Eo was on par with drip 100 per cent Eo in both the years. This might be due to the availability of sufficient

moisture in the root zone of the concerned palms in both treatments.

From this study, it is concluded that basin irrigation at IW/CPE ratio of 1.0 at 4 cm depth or drip irrigation at 100 per cent Eo on monthly basis can be recommended for young coconut palms in the western zone of Tamil Nadu.

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AGRONOMIC EFFECTIVENESS OF ORGANIC SOURCES AND MUSSOORIE ROCK PHOSPHATE TO PHOSPHORUS ECONOMY IN RAINFED GREEN GRAM

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ABSTRACT

A field experiment was conducted in red lateritic soil during *Kharif* seasons of 1993 and 1994 to study the cumulative agronomic effectiveness of various organic sources with Mussoorie rock phosphate on phosphorus economy in green gram under rainfed condition. Use of Mussoorie rock phosphate (MRP) alone could not increase the grain yield significantly. But its efficiency was increased by mixing with organic sources *viz.*, farm yard manure (FYM), enriched bio-digested slurry (BDS) and phosphobacteria inoculation. Application of MRP with seed inoculation of phosphobacteria and enriched BDS alone gave the highest benefit whereas, single super phosphate (SSP) alone was uneconomical under rainfed conditions.

KEY WORDS : Mussoorie rock phosphate, organic sources, enriched bio-digested slurry, Phosphobacteria

Rock phosphate is a good source of phosphorus in acidic soils but such mineral phosphates are not suitable for alkaline and neutral soils because of their citrate-insoluble phosphorus content (*Pathak and Tiwari, 1984*). Mixing with any organic materials or with biofertilizers greatly increases the efficiency of rock phosphates. Besides, excessive use of single super phosphate could be effectively curtailed by the combined application of Mussoorie rock phosphate (MRP) with organic sources. This combination improves the activity of symbiotic N fixing bacteria which in turn are helpful in better N uptake, nodulation, root growth and root proliferation and yield. Hence, an experiment was carried out to test the agronomic effectiveness of MRP in combination with organic sources and phosphobacteria in rainfed green gram.

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MATERIALS AND METHODS

A field experiment was carried out during *Kharif* seasons of 1993 and 1994 at the National Pulses Research Centre. The soil was red lateritic having 7.5 kg available P₂O₅/ha with pH 5.4 (strongly acidic in reaction). Treatments consisted of individual application of SSP and combinations of MRP (25 and 50 kg P₂O₅/ha) with organic sources (Table 1). All treatments were replicated thrice in randomized block design. All fertilizer materials were applied as basal. A total rainfall of 245 and 233 mm were received in 16 and 14 rainy days during crop growth periods of 1993 and 1994 respectively. Short duration green gram variety 'VGG1.' (60 days) was grown as a test variety. The crop was sown adopting a spacing of 30 x 10 cm at a seed rate of 15 kg/ha. The seeds were treated with Phosphobacteria @ 400g/ha seed rate before