

Effect of drip fertigation and polythene mulching on growth and productivity of coconut (*Cocos nucifera* L.), water, nutrient use efficiency and economic benefits



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ARTICLE INFO

Article history:

Received 17 May 2016

Received in revised form

12 December 2016

Accepted 13 December 2016

Available online 23 December 2016

Keywords:

Polythene mulching

Drip irrigation

Fertigation

Productivity

Coconut

ABSTRACT

A field experiment was conducted to study the effect of drip irrigation, fertigation and polythene mulching on coconut (*Cocos nucifera* L.) var. VHC 3. The experiment was laid out in Randomized Block Design (RBD) with seven treatments and three replications. The treatments comprised of 100% (T₁), 80% (T₂) and 60% (T₃) recommended dose of fertilizer with 100 μm thickness polythene mulch and 100% (T₄), 80% (T₅) and 60% (T₆) recommended dose of fertilizer without polythene mulch. The control was with conventional method of irrigation (basin irrigation) without mulch (T₇). The recorded data on the growth and yield of coconut revealed that the plant height, canopy development and other plant growth parameters were higher in the treatment with 100% recommended dose of fertilizer (0.50:0.32:1.20 kg of NPK tree⁻¹) with 100 μm thickness polythene mulch (T₁) when compared to other treatments. The maximum yield attributes viz., spathe length, number of inflorescence, number of bunches/palm/year and number of nuts/bunch of 127.76 cm, 13, 13 and 31, respectively were recorded in 100% of recommended dose of drip fertigation with 100 μm polythene mulching. The lowest spathe length, number of inflorescence, number of bunches/palm/year and number of nuts/bunch of 92.16 cm, 8, 8 and 12, respectively were recorded in control treatment without mulch. The number of nuts per palm, an important yield contributing trait was promising with 292 nuts/palm/year in 100% of recommended dose of drip fertigation with 100 μm polythene mulching (T₁) treatment. Likewise gradual reductions in weed population, superior water use efficiency, nutrient use efficiency and high profitability were observed in all the polythene mulch combination treatments when compared with other treatments without mulch. The study emphasised that adoption of drip fertigation with polythene mulching increases the productivity in coconut, besides ensuring the higher efficiency of water, nutrients and profitability in coconut.

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1. Introduction

Coconut (*Cocos nucifera* L.), a perennial crop is being cultivated largely in the tropics and subtropics of India, the Philippines, Malaysia, Sri Lanka, and Indian Ocean and South Pacific islands. It is a multi-utility palm and plays a noteworthy role in the 10 million farming communities in India and economy of those countries mentioned above (Naresh Kumar et al., 2008). Coconut based products demand is increasing annually and is projected to increase

to about 17 billion nuts by 2020 (Naresh Kumar, 2007). Coconut is also known as “Kalpavriksha,” a term derived from the ancient Indian language Sanskrit meaning “Heaven’s Tree” which provides humans with everything they want. It is the most important crop cultivated in states of South India (Tamil Nadu, Kerala, Karnataka and Andhra Pradesh) which plays a significant role in the agrarian economy of these States. The palm flourish well where rainfall is plentiful (>200 cm annually) and well distributed. In summer months, if rainfall is scarce, the palm needs good irrigation. Lack of irrigation is one of the major reasons attributed to the low level of productivity of coconut (Carr, 2011). Drought produces injuries to leaves of coconut palm and reduces the yield for several months. Irrigation during summer months proved to be vital for improving the coconut productivity (Nair, 1989).

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The importance of irrigating coconut for sustained yield has been emphasised by many earlier studies. Coconut palm is almost always rainfed and sometimes irrigated and when it is irrigated, it is invariably basin irrigated. Among the irrigation systems, drip irrigation is gaining importance as it maintains soil moisture availability and air balance in the root zone of coconut near field capacity throughout the dry season and saves irrigation water (Carr, 2011). In Kerala, irrigation was reported to have increased annual yields from mature coconut palms (cv. West Coast Tall) over a six-year period by, on average, an estimated 30–40 nuts palm⁻¹ (from 50 – 60–90 nuts palm⁻¹; Naresh Kumar and Kasturi Bai, 2009). In view of the sensitivity of palms to water stress, water conservation is strongly recommended. In Sri Lanka, mulching by placing a layer of vegetation (such as coconut husks) in a 1.75 m radius circle around the trunk is recommended to restrict evaporation from the soil surface (Mahindapala and Pinto, 1991). All these earlier studies indicated that irrigation and mulching resulted in improved productivity of coconut.

Lot of work was carried out on the physiology and water relations of coconut and the unfavorable effects of water stress on yield are well established (Milburn and Zimmerman, 1977; Azevedo et al., 2006; Miranda et al., 2007; Madurapperuma et al., 2009a,b). While there is demand to bring more area under assured irrigation, availability of water for irrigation is expected to diminish in coming years due to the competing demand of water for other uses. Thus the importance of scientific water management and the need to adopt advanced techniques like drip irrigation to enhance productivity and water use efficiency of field crops became imperative (Surendran et al., 2014). It has been proved over time and space that drip irrigation can result in more than 50 per cent saving in water application with high levels of water use efficiencies for a wide range of crops. Drip irrigation has the added advantage because with which 4 Rs is possible (Right time, Right quantity, Right place and Right Source). In other words, it can be used to apply any water soluble fertilizer or chemical and also water in precise amounts, as and when required to match the plant needs or any other agronomic management (Jayakumar et al., 2014, 2015). To improve upon the productivity of coconut under moisture stress conditions a package needs to be developed.

Polythene culture techniques such as drip irrigation and polythene film mulch have undoubtedly contributed to increase the productivity of agricultural and horticultural crops in many regions of the world. Hence, evaluating the effect of precision farming technologies viz., drip irrigation, fertigation and polythene mulching on plant growth and yield of coconut is imperative. However, very little research data is available on the performance of coconut palms under drip fertigation along with polythene film mulch, since being a perennial crop, the experiment needs to be conducted for many years. With this as back ground view, the following long term experiment trial has been conducted to assess the impact of drip fertigation along with polythene mulching on growth and yield parameters of coconut.

2. Materials and methods

A field experiment was conducted to evaluate the effect of drip fertigation and polythene mulching at Farms of Precision Farming Development Centre, Department of Soil and Water Conservation Engineering, Tamil Nadu Agricultural University, Coimbatore. The experiment was laid out in a randomized block design with seven treatments and three replications. Detailed lay out along with the treatment structure is shown in Fig. 1 Treatment details are T₁–100% RDF- Drip fertigation with mulch, T₂–80% RDF- Drip fertigation with mulch, T₃–60% RDF- Drip fertigation with mulch, T₄–100% RDF- Drip fertigation without mulch, T₅–80% RDF- Drip

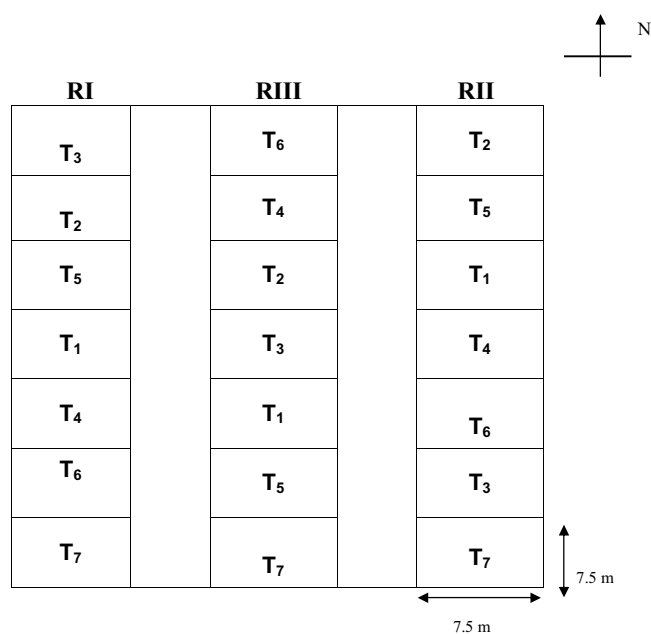


Fig. 1. Schematic Layout of Coconut drip fertigation and mulching trial. RI to RIII – Replications. T₁ to T₇ – Treatments.

fertigation without mulch, T₆ – 60% RDF- Drip fertigation without mulch, T₇–Control (conventional method of irrigation and fertilization without mulch) (RDF- Recommended Dose of Fertilizers).

The pits of 1 × 1 × 1 m were dug with a spacing of 7.5 × 7.5 m and the pits were filled with 50 kg of FYM, red earth and sand mixed at equal proportions. The treatments were allocated to each pit as per randomization principle. Thereafter, planting of 10 months age (old) uniform hybrid quality seedlings of coconut var. Veppankulam Hybrid Coconut –3 (VHC-3) was carried. After planting, 100 μm thickness black polythene mulch was laid as 1.5 m diameter from the base of the coconut as per the treatment details.

2.1. Irrigation water requirement

The average quantity of water applied as irrigation has been given as follows, First year – 16 L plant⁻¹ day⁻¹; Second year- 32 L plant⁻¹ day⁻¹; Third year onwards – 72 L plant⁻¹ day⁻¹ and for Control – Flood irrigation once in 8 days (Ring basin method). Application efficiency considered for drip irrigation is 90% and for surface irrigation it is 50% (Sivanappan 1994). The quantity of water was calculated using FAO CROPWAT Model (FAO, 2009). This model uses Penman– Monteith equation for calculation of reference crop evapotranspiration (ET₀) (FAO, 1998). The calculated “long-term averaged ET” values were subsequently used to calculate ETC by multiplying ET₀ with Crop coefficient (Kc) for coconut. Irrigation water requirement for a specific area (A) is then defined as the difference between the actual crop evapotranspiration and effective rainfall while considering the irrigation efficiency

$$IRR = ETC - PeEa \times A \quad (1)$$

Table 1
Recommended Dose of Fertilizer (RDF) for coconut.

Age	N (g tree ⁻¹)	P ₂ O ₅ (g tree ⁻¹)	K ₂ O (g tree ⁻¹)
First year	50	40	135
Second year	160	120	405
Third year	330	240	810
Fourth year onwards	500	320	1200

Table 2
Physico-chemical characteristics of the experimental field (Mean values).

Properties	Values
Mechanical analysis (International Pipette method)	
Clay (per cent)	32.4
Silt (per cent)	19.2
Course Sand (per cent)	30.9
Fine Sand (per cent)	20.4
Textural class	Sandy clay loam
Available nitrogen (kg ha ⁻¹) (Subbiah and Agija, 1956)	224.8
Available phosphorous (kg ha ⁻¹) (Olsen et al., 1954)	10.8
Available potassium (kg ha ⁻¹) (Stanford and English, 1949)	428.8
Organic carbon (per cent) (Walkley and Black, 1934)	0.24
Electrical conductivity (dSm ⁻¹) (1:2 soil: water solution) (Jackson, 1973)	0.31
pH (1:2 soil: water solution) (Jackson, 1973)	8.0

where IRR is the irrigation water requirement (m³); ETc the actual evapotranspiration (m), Pe the effective precipitation (m), Ea the water application efficiency (%), A is the area (m²).

2.2. Fertilization schedule

Monthly once fertilization has been given as per the details furnished in Table 1.

All cultural practices including gap filling, weeding, plant protection measures and other cultural practices were done as per the recommendations of Crop Production guide of Tamil Nadu Agricultural University. The various growth, yield and quality parameters were recorded at appropriate stages using standard operating procedures.

2.3. Soil analysis

Soil samples were taken from each treatment to analyze the influence of soil properties on the agronomic performance, and also to evaluate the impact of drip fertigation. One composite sample for each replication was taken from the cultivated soil layer combining 12 samples evenly distributed over the entire treatment plot. The samples were analysed in the soil laboratory of Tamil Nadu Agricultural University, for the parameters listed in Table 2. The soil of

the experimental field was sandy clay loam in texture and classified taxonomically as *Typic Ustropept* as per USDA. The soil was neutral in reaction with low in organic carbon, available nitrogen and phosphorus and high in available potassium (Table 2). The properties showed that there is no considerable variation among the physico chemical properties among the soil at the time of planting, since the comparative study was conducted in the same field. However with respect to depth subsurface soils (15–30 cm and 30–45 cm) showed lower values for soil available nutrients (data not shown). This is in accordance with the general hypothesis and reported earlier by many researchers (Jayakumar et al., 2014, 2015; Surendran and Vani, 2013; Surendran et al., 2016a,b). The average values of the meteorological parameters observed during the experimental period was shown in Fig. 2.

2.4. Water and nutrient use efficiency

The quantum of water applied, at each irrigation were added cumulatively. While computing total water use, the effective rain fall was also included and expressed in mm. Effective rainfall was calculated by following water balance sheet method. The ratio of yield from different treatments to respective water use was worked out and expressed as Water Use Efficiency (WUE).

$$\text{Water use efficiency} = \frac{\text{Coconut Yield (kg ha}^{-1}\text{)}}{\text{Total water used (m}^3\text{)}} \text{ kg ha}^{-1} \text{m}^3 \quad (2)$$

The nut yield obtained from each harvest was weighed and yield of all pickings were added and expressed in kg ha⁻¹. Nutrient use efficiency (FUE) was calculated for each treatment, which is the ratio of yield of the crop in kg ha⁻¹ and total nitrogen (N), phosphorus (P) and potassium (K) fertilizers applied in kg ha⁻¹.

$$\text{Nutrient use efficiency} = \frac{\text{Coconut Yield (kg ha}^{-1}\text{)}}{\text{Total Nutrient applied (kg ha}^{-1}\text{) as N, P and K}} \quad (3)$$

2.5. Economic analysis

The net return per hectare was worked out for all the treatments by subtracting the cost of cultivation from the gross return. The return per euro invested i.e., Benefit Cost ratio (B: C ratio) was calculated using the following equation. An average conversion rate of 1 Euro was taken as Rs. 65 Indian ruppees (INR) for the calculation

$$\text{Benefit cost ratio} = \text{Gross return (Euro ha}^{-1}\text{)}/\text{Cost of Cultivation (Euro ha}^{-1}\text{)} \quad (4)$$

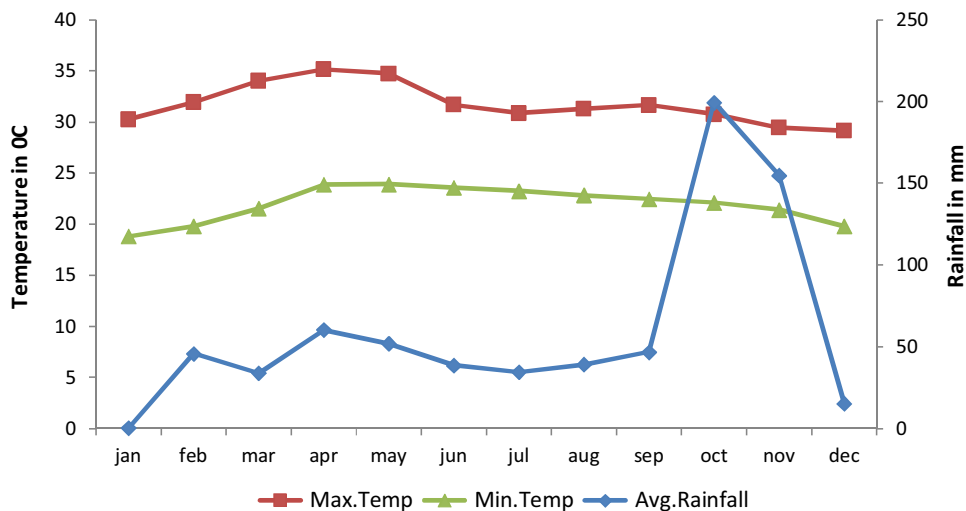


Fig. 2. Average meteorological parameters of the experimental area.

Table 3
Height of trunk, Trunk girth and number of leaves in coconut as influenced by drip fertigation and polythene mulching.

Treatments	Height of trunk (m)	Trunk girth (cm)	Number of leaves tree ⁻¹
T1 – 100% RDF- Drip fertigation with mulch	6.11	145.46	32
T2 – 80% RDF- Drip fertigation with mulch	5.72	138.12	29
T3 – 60% RDF- Drip fertigation with mulch	5.51	119.50	27
T4 – 100% RDF- Drip fertigation without mulch	5.82	123.24	28
T5 – 80% RDF- Drip fertigation without mulch	5.30	117.03	26
T6 – 60% RDF- Drip fertigation without mulch	5.27	112.70	25
T7 – Control (without mulch)	4.79	106.90	23
SEd*	0.40	2.98	1.24
CD (p ≤ 0.05)**	0.83	6.17	2.57

* SEd±: Standard Error.

** CD (p ≤ 0.05): Critical Difference at probability of ≤ 0.05.

2.6. Statistical analysis

The experimental data were pooled and the mean data are subjected to statistical scrutiny as per methods suggested by Gomez and Gomez (1984) and executed with the software AGRES by Tamil Nadu Agricultural University. Wherever the results were significant, critical differences (CD) were worked out at probability level $p \leq 0.05$ using the ANOVA (Analysis of Variance). The non-significant treatment differences were denoted as NS.

3. Results and discussion

3.1. Effect of drip fertigation and polythene mulching on coconut growth and yield attributes

In this experiment, the various plant growth parameters, yield attributes and yield of coconut were observed consecutively for 5 years from the year 2008–09 to 2012–13 (after 5 years of planting) and the results shown that the maximum growth of coconut

and nut yield were recorded in drip fertigation at 100% of recommended fertilizer dose (0.50:0.32:1.20 kg of NPK tree⁻¹) with polythene mulching compared to other treatments. In entire period of study, trees grown under polythene mulch showed a dramatic increase in trunk height, stem girth and number of leaves over trees grown under no mulch. Among different treatments, 100% of recommended dose of drip fertigation (0.50:0.32:1.20 kg of NPK tree⁻¹) (from 4th year onwards) with 100 μm polythene mulching (T₁) had registered significantly higher trunk height, stem girth and number of leaves (6.11 m, 145.46 cm and 32, respectively) and the lower was in conventional method of irrigation and no mulch trees (T₇) (4.79 m, 106.90 cm and 23, respectively) (Table 3).

Fig. 3 showed that the root zone temperature (°C) of coconut is strongly influenced by drip fertigation and mulching. In general, polythene mulches increased the root zone (soil) temperature in relation to non mulch soil and the increase was 0.50–2.30 °C. Data regarding soil temperature under different mulch treatments revealed that polythene mulches increased soil temperature significantly than non mulched control plots. Suwon and Judah (1985) also reported that soil temperature increased with the use of polythene mulch. This is because polythene mulches allowed part of the radiation to pass through it but acted as barriers against outgoing thermal radiation (Park et al., 1987). The temperature increase under polythene mulch is due to high soil moisture content, which leads to more heat flux for thermal conductivity (Robock et al., 2000; Chen and Dudhia 2001) and this might be because the black film absorbed incoming solar radiation and radiated much of this energy as sensible heat to the air (above) and soil (below). This well documented soil temperature rise is often used as an explanation for increased growth of coconut grown under polythene mulch (Davis, 1994 and Qumer et al., 2009).

As per the data shown in Table 4, drip fertigation with polythene mulching stimulated the plant growth and hastened the flowering in coconut. The maximum number of inflorescences per tree was recorded with drip fertigated along with mulched coconut compared to non mulched and conventional irrigated coconut. The drip fertigation with polythene mulching induced growth stimulation was also reflected in yield attributes and yield of coconut. The maximum spathe length and number of nuts/bunch of 127.76 cm and 31, respectively were recorded in 100% of recommended dose of drip

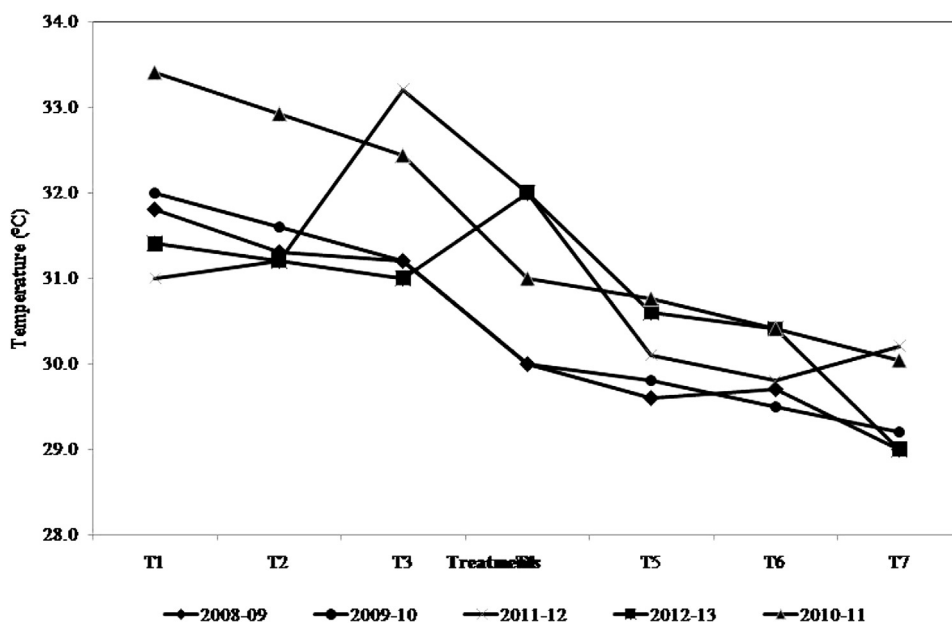


Fig. 3. Root zone temperature (°C) of coconut as influenced by drip fertigation and polythene mulching.

Table 4
Number of inflorescence in coconut as influenced by drip fertigation and polythene mulching.

Treatments	2008–09	2009–10	2010–11	2011–12	2012–13	Pooled Mean
T1 – 100% RDF- Drip fertigation with mulch	12.00	12.00	12.00	14.00	14.00	12.80
T2 – 80% RDF- Drip fertigation with mulch	11.66	12.00	12.00	13.00	13.00	12.33
T3 – 60% RDF- Drip fertigation with mulch	11.33	11.33	11.33	12.00	11.00	11.40
T4 – 100% RDF- Drip fertigation without mulch	11.33	12.00	12.00	12.00	13.00	12.07
T5 – 80% RDF- Drip fertigation without mulch	11.00	11	11.33	13.00	11.00	11.47
T6 – 60% RDF- Drip fertigation without mulch	10.60	10.60	10.60	11.00	10.00	10.56
T7 – Control (without mulch)	0.00	9.67	9.67	10.00	9.00	7.67
SEd*	0.43	0.36	0.36	0.46	0.36	0.82
CD ($p \leq 0.05$)**	0.95	0.76	0.76	0.91	0.71	1.70

* SEd±: Standard Error.

** CD ($p \leq 0.05$): Critical Difference at probability of ≤ 0.05 .

fertigation with 100 μm polythene mulching (Data not shown). The lowest spathe length and number of nuts/bunch of 92.16 cm and 12, respectively were recorded in control treatment without mulch (T₇). The maximum nuts yield of 292 numbers palm⁻¹year⁻¹ was also recorded in the 100% of recommended dose of drip fertigation along with 100 μm polythene mulching (T₁) which was higher than conventional method (125 numbers/palm/year), by enhancement of 167 nuts palm⁻¹year⁻¹ (Table 5). A study conducted by Subramanian et al. (1997) on the evaluation of drip irrigation in comparison with surface irrigation (basin) in coconut revealed that irrigation method had a significant effect on the increment in collar height, and nut yield during certain years. In coconut palms, the drip fertigation with polythene mulch increased the root zone (soil) temperature with moisture retention and changed plant microclimate in near the soil region and lowered the temperature of the canopy microclimate and thereby increased the plant growth parameters and yield attributes *i.e.* increased button nut production and nut setting and thus improving the yield.

In general, weed suppression was also higher (57% in first, 43% in second and 27% in third year) in polythene mulched plots compared to non mulched plots. Similarly, Ibe et al. (2012) obtained better weed control than the hoe-weeding method in okra cultivation. The water and fertilizer use efficiency was also increased in the above treatment of polythene mulching. The highest water use efficiency of 34 nuts tree⁻¹ m³ of water was recorded in 100% RDF drip fertigation with 100 μm polythene mulching (T₁) whereas, the lowest water use efficiency of 14 nuts tree⁻¹ m³ of water was registered in conventional flood irrigation without mulch (T₇) (Table 6). This result is in line with the findings of Seyfi and Rashidi (2007), which showed that drip irrigation with black polythene mulch markedly decreased the amount of water applied, increased water use efficiency (WUE) and increased crop yield due to increase in number of fruits per plant, fruit weight and fruit thickness in Cantaloupe. Earlier studies with drip irrigation at a rate of 40 Litres tree⁻¹ gave a saving of 40 per cent of water applied compared with surface irrigation. Drip irrigation equal to 66% of open pan evaporation (E₀) proved to be economically efficient method of irrigation with

water saving of 34% compared to 100% of E₀ through basin and drip methods in lateritic soils of Kerala (Dhanapal et al., 2003, 2004a,b).

The other studies by Nagwekar et al., 2006 and Nainanayake et al., 2008 also indicated that drip irrigation can save about 45–50 per cent water over surface irrigation without any significant reduction in yield. With the water thus saved one additional hectare can be brought under irrigation thereby increasing the net income of the farmers.

The major difference between these studies and our study is that, in these studies under some drip irrigation treatments there is a reduction in yield, even though there is saving in quantity of water used. The possible reason may be in most of the studies, only drip irrigation was practiced and there was no fertigation. However, in our study, drip fertigation along with polythene mulching resulted in higher productivity with saving of chemical fertilizers, besides ensuring the higher efficiency of water and nutrients in coconut. Besides, it is also worthwhile to mention that in our study the drip fertigation along with polythene mulching was initiated from the planting of coconut seedling till the 10th year. Since coconut being a perennial crop, this long term study confirmed that drip fertigation along with polythene mulching will definitely result in improved crop and water productivity.

3.2. Economics

The maximum BC ratio was also recorded in the 100% of recommended dose of drip fertigation along with 100 μm polythene mulching (T₁) which was higher than control (Table 7). Drip fertigation as well as polythene mulching influenced the mean net returns and BCR in a noticeable extent. 100% RDF- Drip fertigation with mulching (T₁) registered the maximum mean net returns of Euro 1641.9 ha⁻¹ and BCR of 2.80. The least mean net return (Euro 497.7 ha⁻¹) and BCR (1.84) was recorded by control (T₇). The present investigation clearly indicated that higher economic returns and profitability could be achieved by drip fertigation (Madhava Chandran and Surendran, 2016) and polythene mulching

Table 5
Number of nuts/palm/year in of coconut as influenced by drip fertigation and polythene mulching.

Treatments	2008–09	2009–10	2010–11	2011–12	2012–13	Pooled Mean
T1 – 100% RDF- Drip fertigation with mulch	282	293	302	295	288	292
T2 – 80% RDF- Drip fertigation with mulch	272	268	277	270	268	271
T3 – 60% RDF- Drip fertigation with mulch	198	210	215	208	205	207
T4 – 100% RDF- Drip fertigation without mulch	228	232	237	224	227	230
T5 – 80% RDF- Drip fertigation without mulch	190	193	198	196	194	194
T6 – 60% RDF- Drip fertigation without mulch	170	173	183	176	172	175
T7 – Control (without mulch)	0	121	128	124	126	125
SEd*	18.63	15.24	14.42	9.51	8.96	9.25
CD ($p \leq 0.05$)**	40.59	33.19	31.42	18.65	17.56	19.09

* SEd±: Standard Error.

** CD ($p \leq 0.05$): Critical Difference at probability of ≤ 0.05 .

Table 6
Water Use Efficiency and Fertilizer Use Efficiency in coconut as influenced by drip fertigation and polythene mulching.

Treatments	Water Use Efficiency (nuts ha ⁻¹ m ³ of water)	Nitrogen Use Efficiency (nuts ha ⁻¹ kg of N)	Phosphorus Use Efficiency (nuts ha ⁻¹ kg of P)	Potassium Use Efficiency (nuts ha ⁻¹ kg of K)
T1 – 100% RDF- Drip fertigation with mulch	34	584	913	243
T2 – 80% RDF- Drip fertigation with mulch	31	678	1059	282
T3 – 60% RDF- Drip fertigation with mulch	24	690	1078	288
T4 – 100% RDF- Drip fertigation without mulch	27	460	719	192
T5 – 80% RDF- Drip fertigation without mulch	22	485	758	202
T6 – 60% RDF- Drip fertigation without mulch	20	583	911	243
T7 – Control (without mulch)	14	250	391	104
SEd [*]	0.89	48	32	20
CD (p ≤ 0.05)**	1.97	100	71	44

^{*} SEd±: Standard Error.

^{**} CD (p ≤ 0.05): Critical Difference at probability of ≤ 0.05.

Table 7
Economic analysis of various treatments for Coconut (Amount in Euro ha⁻¹).

Treatments	Cost of cultivation (C)	Gross return (B)	Net return	Benefit Cost ratio (B:C)
T1 – 100% RDF- Drip fertigation with mulch	909.7	2551.6	1641.9	2.80
T2 – 80% RDF- Drip fertigation with mulch	869.7	2368.1	1498.4	2.72
T3 – 60% RDF- Drip fertigation with mulch	731.1	2325.8	1040.9	2.42
T4 – 100% RDF- Drip fertigation without mulch	763.7	2009.8	1246.2	2.63
T5 – 80% RDF- Drip fertigation without mulch	706.5	1695.3	988.8	2.39
T6 – 60% RDF- Drip fertigation without mulch	669.2	1529.2	860.0	2.28
T7 – Control (without mulch)	594.6	1092.3	497.7	1.84

in coconut irrespective of the variation in nutrient dose in treatments.

4. Conclusion

The result of the present study revealed that the plant growth parameters, yield attributes, nuts yield of coconut and profitability were enhanced by the combined effect of drip fertigation at 100% of recommended dose of fertilizer along with polythene mulching over to conventional irrigation without mulching. Hence, present study recommends the adoption of 100% RDF drip fertigation with 100 μm polythene mulching for maximizing the yield and profitability in coconut.

Acknowledgements

The authors wish to express their gratitude to the National Committee in Plasticulture Applications in Agriculture and Horticulture (NCPAH), Government of India, Ministry of Agriculture, New Delhi for providing financial support for this study. Besides, Authors wish to thank the two anonymous reviewers and editor for fine tuning the paper and their comments.

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