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Short communication

Impact of irrigation on cardamom production

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Cardamom (*Elettaria cardamomum* Maton) is generally grown as a rainfed crop and soil moisture is one of the limiting factors in augmenting the productivity of the crop (Sulikeri, 5). Irrigation in summer months is an important management factor for maintenance of yields levels (Raju, 3). For realising the yield potential of any cardamom variety it is essential to raise the crop with irrigation in summer (Sivanappan, 4). Since the roots of the cardamom are shallow, moisture at the root zone does not last long, and hence it is essential to irrigate the crop during January to May (Sivanappan, 3). Gurumurthi *et al.* (2) reported that plots irrigated from December 15th to February 15th yielded more than plots irrigated after February. Micro-irrigation systems help in saving more than 25-30 per cent water over conventional methods (Govindan, 6). No information is available on the influence of micro-irrigation in cardamom.

The experiment was conducted at Indian Institute of Spices Research, Cardamom Research Centre, Appangala with four treatments. T1 = Control-mulching with local material (Protective irrigation) T2 = Drip irrigation- 8 l plant^{-1} daily T3 = Sprinkler irrigation once in 12 days (25 mm rain) T4 = Sprinkler irrigation once in 15 days (25 mm rain) with five replications in randomized block design. Shade was regulated to 50 per cent before planting. 1.5' × 1.5' × 1.5' size pits were opened at spacing of 2 m × 2 m and filled with farm yard manure and soil up to surface. Planting unit consist of one young and one old suckers of cardamom of variety IISR Kodagu Suvasini (CCS1) of Malabar type. Pit was filled with 15 g carbofuran 3G, 45 g rock phosphate was added to pits at the time of planting in October. Suckers were planted with support stick. Protective irrigation was given for establishment in first two year, Irrigation treatments were imposed during cropping season from January 15th onwards. Soil moisture content was recorded by gravimetric method at 0-15 and 15-30 cm depth. Recommended package of practices were followed for growth and development of crop.

The weather pattern in the region indicated that the tract receives 2617.68 mm mean annual rainfall in 123.7 rainy days. South west monsoon (June to September) alone contributed 80.94% annual rainfall and July was rainiest month (799.6 mm) with 28.38 rainy days. Though the tract receives high rainfall, there is moisture stress between December to March and adequate moisture conservation (or irrigation wherever possible) is essential particularly for perennial crops (Ankegowda *et al.*, 1).

Soil moisture content was determined by gravimetric method at 0-15 and 15-30 cm depth. Soil moisture content was decreased in general all treatment in December to April. Drip irrigation treatment maintained relatively higher soil moisture content compared to other treatments (Fig. 1). Higher soil moisture content in March due to protective irrigation in the form sprinkler to sprinkler treatments including control to protect the plant from the moisture stress. Data on plant height, number of tillers per plant and number of leaves per plant during third year (1st year yield) are presented in Table 1. Drip irrigation 8 l daily and sprinkler irrigation once in 12 days recorded relatively higher plant height and number of tiller per plant compared to other treatments. Number of tillers per plant and number of leaves per tiller recorded significant variation between treatments during fourth year (2nd year of yield) (Table 2). Irrigated treatments recorded relative higher plant height, number of tillers per plant and number of leaves per tillers compared to control. Number of tillers per plant and number of leaves per tiller were on par between treatments.

Significant variation was recorded between treatments for capsule dry yield (Table 1) as maiden crop due to sucker planting. Drip irrigation - 8 l daily recorded significantly higher yield 84.52 kg/ha compared to other treatments followed by sprinkler irrigation once in 12 days. The yield parameters recorded during second year (fourth year of planting) are presented in Table 3. Significant variation in yield parameter such as number of panicles per plant, number of capsules per plant and capsule dry yield (kg/ha) has been recorded between different irrigation treatments. Irrigation treatments recorded higher number of panicle per plant, number of capsule per plant and yield per hectare. Drip irrigation and sprinkler irrigation once in 12 days recorded higher number of panicle per plant compared to sprinkler irrigation once in 15 days. Number of capsules per plant significantly higher in drip irrigation compared to other treatments. Sprinkler irrigation once in 12 days and once in 15

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Table 1. Influence of different irrigation treatments on growth and yield parameters in cardamom.

Treatment	Plant height (cm)		No. of tillers per plant		No. of leaves per tiller		Yield dry (kg/ha)
	1st year*	2nd year**	1st year	1st year	2nd year	1st year	1st year
Control (T_0)	169.4	174.4	18.1	21.3	11.6	10.7	24.6
Drip irrigation (8 l per day) (T_1)	175.9	204.8	23.0	27.2	12.4	14.4	84.5
Sprinkler - 12 days (T_2)	179.2	214.5	21.9	27.2	12.4	14.4	63.1
Sprinkler - 15 days (T_3)	160.0	193.0	16.6	29.0	12.7	14.3	48.8
CD at 5%	NS	NS	NS	5.6	NS	2.2	15.5

*- 1st year = third year of planting, **2nd year = fourth year of planting.

Table 2. Influence of different irrigation treatments on yield parameters of cardamom.

Treatment	No. of panicles (per plant)	No. of capsules (per plant)	Yield dry (kg/ha)
Control (T_0)	9.9	655	224.0
Drip irrigation (T_1)	17.5	1600	575.5
Sprinkler - 12 days (T_2)	18.4	1050	396.2
Sprinkler - 15 days (T_3)	14.9	1049	378.7
CD at 5%	6.2	85.5	43.9

days recorded similar capsules number per plant. Drip irrigation treatment recorded significantly higher capsule dry yield (575.58 kg/ha) compared to all other treatments. Sprinkler irrigation once in 12 days (396.2 kg/ha) and sprinkler irrigation once in 15 days (378.72 kg/ha) which are on par with each other and significantly higher to control. Similar response for irrigation was reported by Raju (3), Sivanappan (4) and Sulikeri (5). Drip irrigation treatment recorded 156.92 per cent higher yield followed by sprinkler irrigation once in 12 days 76.85 per cent compared to control.

In spite of early initiation of panicle and poor setting at early stage, drip irrigation 8 l per plant daily leads to higher yield due to good growth of plant. Irrigating cardamom during summer with drip 8 l per plant daily or sprinkler irrigation (25 mm) once in 12 days leads to higher yield in cardamom.

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