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RESEARCH ARTICLE

EFFECT OF DIFFERENT SPACING ONCLOVE (*SYZYGUIMAROMATICUM* (L.) UNDER HIGH DENSITY PLANTING

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ABSTRACT

An experiment was conducted at Horticultural Research Station, Tamil Nadu Agricultural University, Pechiparai, Tamil Nadu from 2010 to 2018. The aim of this study is to evaluate the growth performance of clove under different spacings. The experiment was laid out with five different spacings (2x2 m, 3x2 m, 4x2 m, 5x2 m and 6x2 m) along with control (6x6 m) in line planting. It was laid out in Randomized Block Design (RBD) with four replications and the results were statically analyzed. Only the vegetative characters could be recorded. Among the different treatments, T1 (2x2m) recorded maximum plant height (5.12m) during 2014-18 whereas, T₄ (5x2 m) recorded the maximum number of branches (32.70) and plant spread (215.66 cm for NS & 204.49 cm for EW) during 2014-2018.

INTRODUCTION

Clove, the dried unopened flower buds of the evergreen tree, *Syzygium aromaticum* is an important spice noted for its flavour and medicinal values. The important clove growing regions now in India are Maharashtra, the Nilgiris (Burliar, Gudalur), Tirunelveli (Courtalam, Tenkasi), Kanniyakumari (Keeriparai, Black Rock, Maramalai and Balamore areas and Mahendragiri) districts of Tamil Nadu, Calicut, Kottayam, Quilon and Trivandrum districts of Kerala and South Kanara Districts of Karnataka and Andaman. Food processing industry uses both whole and ground form of clove in various preparations viz., Sauces, Ketchup, Pickle, Cake, Chocolate etc., Clove oil is used in perfumeries, pharmaceuticals and flavouring industries. Clove oleoresin is also increasingly used in the food processing industry. So there is a good scope for leaf production also.

MATERIALS AND METHODS

An experiment was conducted at Horticultural Research Station Tamil Nadu Agricultural University, Pechiparai, Tamil Nadu from 2010 to 2018 to evaluate the growth performance of clove under different spacings.

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The experiment was laid out with five different spacings (2x2 m, 3x2 m, 4x2 m, 5x2 m and 6x2 m) along with control (6x6 m) in line planting and it will be pruned when it reaches 5 m height. It was laid out in Randomized Block Design (RBD) with four replications and the results were statically analyzed. Only the vegetative characters could be recorded viz., plant height, number of branches, plant spread (NS) and plant spread (EW).

RESULTS AND DISCUSSION

2010-13: The project was initiated by planting clove seedlings as per the treatment schedule. As clove is a sensitive plant, establishment of the same was cumbersome. However with great difficulty, a permanent establishment has been made by way of gap filling the plants.

2013-14: Among the treatments T1 (2x2 m) has recorded maximum plant height of (3.8m) whereas maximum number of branches (6.7) was recorded by T₅ (6 x 2 m) (Table 1 to 9).

2014-15: Among the treatments T1 (2x2 m) has recorded maximum plant height of (5.3m) whereas T₄ (5x2 m) recorded highest number of branches (34), highest plant spread (NS-152.10 cm & EW-143.73cm) (Table 1 to 9).

2015-16: Among the spacing treatments, T1 (2x2 m) has recorded maximum plant height of (5.4m) whereas T₄ (5x2 m) recorded the highest number of branches (38) and highest plant spread (NS-166.52 cm & EW-153.44 cm) (Table 1 to 9).

2016-17: Among the spacing treatments, T1 (2x2 m) has recorded maximum plant height of (5.6m) whereas T₄ (5x2 m) recorded the highest number of branches (40) and higher plant spread (NS-211.0 cm & EW-198.8 cm) (Table 1 to 9).

Table 1. Plant height (m) and Number of branches during 2013-14

Treatments	Plant Height (cm)	No of Branches
T1 - 2x2	3.8	5.9
T2 - 3x2	3.6	5.8
T3 - 4x2	3.5	6.3
T4 - 5x2	3.2	6.5
T5 - 6x2	3.2	6.7
T6 - 6x6	3.0	6.3
SEd	2.15	1.10
CD (0.05)	NS	1.36

Table 2. Number of branches and Plant spread during 2014-15

Treatments	Plant height (m)	No of branches (cm)	Plant spread	
			NS	EW
T1 - 2x2	5.3	18	113.72	114.55
T2 - 3x2	5.1	17	112.89	108.50
T3 - 4x2	5.1	31	131.69	122.98
T4 - 5x2	5.0	34	152.10	143.73
T5 - 6x2	4.9	24	94.03	89.20
T6 - 6x6	4.7	17	99.98	102.35
SEd	0.021	1.15	1.84	1.98
CD (0.05)	NS	1.64	2.95	4.52

Table 3. Number of branches and Plant spread during 2015-16

Treatments	Plant height (m)	No of branches	Plant spread (cm)	
			NS	EW
T ₁ - 2x2 m	5.4	22	118.50	122.73
T ₂ - 3x2 m	5.3	21	114.50	110.75
T ₃ - 4x2 m	5.1	33	125.62	115.13
T ₄ - 5x2 m	5.1	38	166.52	153.44
T ₅ - 6x2 m	4.8	29	110.46	98.30
T ₆ - 6x6 m	4.8	19	106.72	115.45
SEd	0.027	1.21	1.95	2.10
CD (0.05)	NS	1.84	3.24	5.18

Table 4. Number of branches and Plant spread during 2016-17

Treatments	Plant height (m)	No of branches	Plant spread (cm)	
			NS	EW
T ₁ - 2x2 m	5.6	26.00	124.7	126.5
T ₂ - 3x2 m	5.4	21.00	114.8	115.3
T ₃ - 4x2 m	5.3	34.50	197.8	190.8
T ₄ - 5x2 m	5.1	40.00	211.0	198.8
T ₅ - 6x2 m	5.0	31.00	114.8	108.0
T ₆ - 6x6 m	4.8	23.70	111.0	120.5
SEd	0.025	1.34	2.43	2.90
CD (0.05)	NS	2.99	5.42	6.28

Table 5. Number of branches and Plant spread during 2017-18

Treatments	Plant height (m)	No of branches	Plant spread (cm)	
			NS	EW
T ₁ - 2x2 m	5.5	29.00	135.7	135.0
T ₂ - 3x2 m	5.3	25.00	125.0	128.0
T ₃ - 4x2 m	5.2	38.50	210.0	225.0
T ₄ - 5x2 m	5.2	40.00	215.0	228.0
T ₅ - 6x2 m	5.0	36.00	126.0	125.0
T ₆ - 6x6 m	4.8	28.70	129.0	130.0
SEd	0.026	1.39	2.85	3.20

CD (0.05)	NS	3.12	6.13	6.85
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Table 6. Pooled mean of plant height during 2013-18

Treatments	2013-14	2014-15	2015-16	2016-17	2017-18	Pooled mean
T1 - 2x2	3.8	5.3	5.4	5.6	5.5	5.12
T2 - 3x2	3.6	5.1	5.3	5.4	5.3	4.94
T3 - 4x2	3.5	5.1	5.1	5.3	5.2	4.84
T4 - 5x2	3.2	5.0	5.1	5.1	5.2	4.72
T5 - 6x2	3.2	4.9	4.8	5.0	5.0	4.58
T6 - 6x6	3.0	4.7	4.8	4.8	4.8	4.42
SEd	2.15	0.021	0.027	0.025	0.026	0.449
CD (0.05)	NS	NS	NS	NS	NS	NS

Table 7. Pooled mean of Number of branches during 2013-18

Treatments	2013-14	2014-15	2015-16	2016-17	2017-18	Pooled mean
T1 - 2x2	5.9	18.0	22.0	26.0	29.0	20.18
T2 - 3x2	5.8	17.0	21.0	21.0	25.0	17.96
T3 - 4x2	6.3	31.0	33.0	34.5	38.5	28.66
T4 - 5x2	6.5	34.0	38.0	40.0	40.0	32.70
T5 - 6x2	6.7	24.0	29.0	31.0	36.0	25.34
T6 - 6x6	6.3	17.0	19.0	23.7	28.7	18.94
SEd	1.1	1.15	1.21	1.34	1.39	1.24
CD (0.05)	1.36	1.64	1.84	2.99	3.12	2.19

Table 8. Pooled mean of plant spread (cm) (NS) during 2014-18

Treatments	2014-15	2015-16	2016-17	2017-18	Pooled mean
T1 - 2x2	113.72	118.50	124.70	135.70	123.16
T2 - 3x2	112.89	114.50	114.80	125.00	116.80
T3 - 4x2	131.69	125.62	197.80	210.00	166.28
T4 - 5x2	152.10	166.52	211.00	215.00	215.66
T5 - 6x2	94.03	110.46	114.80	126.00	111.32
T6 - 6x6	99.98	106.72	111.00	129.00	111.68
SEd	1.84	1.95	2.43	2.85	2.27
CD (0.05)	2.95	3.24	5.42	6.13	4.44

Table 9. Pooled mean of plant spread (cm) (EW) during 2014-18

Treatments	2014-15	2015-16	2016-17	2017-18	Pooled mean
T1 - 2x2	114.55	122.73	126.50	135.00	124.70
T2 - 3x2	108.50	110.75	115.30	128.00	115.64
T3 - 4x2	122.98	115.13	190.80	225.00	163.48
T4 - 5x2	143.73	153.44	198.80	228.00	204.49
T5 - 6x2	89.20	98.30	108.00	125.00	105.13
T6 - 6x6	102.35	115.45	120.50	130.00	117.08
SEd	1.98	2.1	2.9	3.2	2.55
CD (0.05)	4.52	5.18	6.28	6.85	5.71

2017-18: Among the spacing treatments, T1 (2x2 m) has recorded maximum plant height of (5.5m) whereas T₄ (5x2 m) recorded the highest number of branches (40) and higher plant spread (NS-215.0 cm & EW-228.0 cm) (Table 1 to 9). Results similar to present findings are reported earlier by Gaikwad et al. (1981), Mitra et al. (1984), Kundu et al. (1993) in guava, Kumar et al. (2010) in apricot and Dalal et al. (2012) in kinnow. Phillips (1969) reported that the closest spaced trees in Florida, 702 ha⁻¹ were significantly taller as compared to 216 trees ha⁻¹. Bharad et al. (2012) reported that plant height would not be directly related to planting density in guava. The plant spread decreased with increasing plant density, while the height of plant increased with increase in plant population in guava (Yadav et al., 1981; Bharad et al., 2012). The volume of tree showed decreasing trend with increasing tree density while tree height increased with increasing tree density in Allahabad Safeda in guava (Kumar and Singh, 2000). Increase in plant density marked increased the plant height while, the girth of the plant and spread of the crown decreased in guava cv. L-49 (Kundu, 2007). Singh et al. (2007) recorded maximum plant height and trunk circumference, while minimum canopy spread

(NS/EW) in closely spaced guava trees (1.5x3.0m). A possible explanation is the competition for water and soil nutrients but mainly the competition for light being under high planting density canopies overlap into the rows, reducing light incidence on leaves. Consequently, great part of the canopy contributes little or nothing to the synthesis of carbohydrates necessary for growth. Thus the competition between plants for light, water and nutrition under closer spacing resulted to less increase in gain of shoot after pruning, spread of the plant. Further under closer spacing, increase in height might be due to competition for light because of insufficient space. Trees spaced at 6x6 m intercepted significantly higher radiation on per tree basis than 6x5 m and 6x4 m spaced trees (Singh and Dhaliwal, 2007). Better light penetration was observed in trees planted at 6x6 and 3.0x6.0 m than the other distances (3.0x3.0 and 3.0x1.5 m) at NS/EW canopy edge, inside tree centre, centre between tree in the rows and centre between rows in guava (Singh et al., 2007).

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