J. Hortl. Sci.
Vol. 13(2) : 159-163, 2018

Original Research Paper

Performance evaluation of Garlic (*Allium sativum* L.) in the plains of Kerala

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ABSTRACT

Kerala, the spice bowl of India is popular for tropical spice crops like pepper, cardamom, nutmeg etc. Garlic, an important foreign exchange earner of India is produced mostly in the states like Madhya Pradesh, Rajasthan and Gujarat. In Kerala it is grown commercially in two unique rain shadow pockets, Kanthalloor and Vattavada regions of Devikulam block of Idukki district. Although garlic is grown in the high ranges of Kerala, its cultivation in plains are not evaluated so far. Generally cool season crops performs well inplains when grown during October – March. Hence the present study was conducted to evaluate the performance of two genotypes Singapore and Mettupalayam in the plains. The two garlic genotypes were grown as pot culture during October – February in the year 2016-2017, in the plains of Thrissur district, the central part of Kerala. Among the two types Mettupalayam was found to be recorded higher Bulb weight (14.53g) and number of cloves per bulb (4.2), but it was less compared to that grown in high ranges (17.19g and 11.9 respectively). Hence the study revealed the possibilities of garlic cultivation in the plains of Thrissur district of Kerala with some refinements in agro techniques.

Key words: Garlic, plains, Kerala, performance evaluation

INTRODUCTION

Kerala having a tropical wet climate with high humidity and rainfall is popular for tropical spice crops like pepper, cardamom, nutmeg etc. Garlic, an important foreign exchange earner of India, prefers cool moist period during growth and relatively high temperature during bulbing. In Kerala it is grown commercially in two unique rain shadow pockets, Kanthalloor and Vattavada regions of Devikulam block of Idukki district. The area lies in the high ranges with annual temperature of 23.7°C and rainfall 1276 mm. "Mettupalayam", "Singapore" and "Malapoondu" are the major garlic genotypes growing in this region (Menon *et al.*, 2017). Yield contributing parameters like equatorial diameter, polar diameter and bulb weight were more in genotype Singapore grown in the hill top. Though garlic is grown commercially in high ranges of Kerala, its cultivation in plains of Kerala is not evaluated so far. In this background the present study was conducted as a preliminary evaluation to understand theperformance of this cool season spice crop in the plains.

MATERIAL AND METHODS

The present study was conducted at College of Horticulture, Vellanikkara, Thrissur district during the rabi season (October – February) of 2016 - 2017.The area lies at 10.52°N and 76.21°E and at an altitude of 2.83m above Mean Sea Level with an average rainfall of 3000mm. The soil was porous sandy loam with average pH of 4.8.

The maximum temperature during the crop period was 36.0°C and minimum 22.2°C and the average relative humidity was 64.6%. The total rainfall received was 10.4cm and the total rainy days were 8 (**Table 1**).

Table 1. The weather data during the crop period in the plains of Thrissur district

	Max temp (^{0}C)	Min temp (^{0}C)	RH %	Rainfall (mm)	No. of rainy days	Sunshine (hrs)	Wind speed (km/hr)
2016 Oct	31.5	22.7	81	37.3	4	5.5	1
Nov	32.9	22.2	69	13.8	1	5.8	1.9
Dec	32.4	22.3	69	52.9	3	6.5	2.9
2017 Jan	34.1	22.9	53	0	0	7.6	5.3
Feb	36	23.2	51	0	0	8.7	6.6

(Source: Agromet observatory,Vellanikkara,Thrissur)

The experiment was layed out in Completely Randomized Design with 15 replications. The plants were grown in earthern pots of 30 cm diameter with five plants per pot. The varieties grown were 'Singapore' and 'Mettupalayam'. The seeds were collected from the traditional growing tract of Kanthalloor panchayath. Morphological characterization of seeds was also done before the commencement of trial. The average size of seeds was 1.5-2g. The crops were raised as per POP recommendations (KAU, 2016).

The plants were selected randomly to record the observations on plant height (cm), number of leaves, leaf colour, leaf shape, leaf length (cm), leaf width (cm), plant girth (cm), stem colour, bulb weight (g), equatorial diameter (cm), polar diameter (cm), average number of cloves per bulb, clove length (cm), clove width(cm), clove weight(g) and clove skin thickness(mm). The data was analysed in WASP 2.0.

RESULTS AND DISCUSSION

Morphological characterization of seed materials: Seeds of 'Mettupalayam' and 'Singapore' collected from the traditional growing tract of Kanthalloor panchayath were characterized before planting. The bulb and cloves were cream coloured in Mettupalayam and was light purple in Singapore. The seeds of Singapore have high bulb weight, equatorial diameter, polar diameter, number of cloves and clove weight (**Table 2**).

Table 2. Morphological characterization of seed materials

Characters	Mettupalayam	Singapore
Bulb shape	Round	Oval
Bulb colour	Cream	Light purple
Clove skin colour	Yellow	Light purple
Clove flesh colour	Yellow	Yellow
Equatorial diameter (cm)	3.660	4.330
Polar diameter (cm)	3.560	4.200
Bulb weight (g)	17.193	21.781
Number of cloves per bulb	11.900	12.100
Clove weight (g)	1.654	2.035
Clove length (cm)	3.610	3.400
Clove width (cm)	1.070	1.295
Clove skin thickness (mm)	0.095	0.098

Performance evaluation in Plains

Biometric characters: The observations onplant height, number of leaves, leaf colour, leaf shape, leaf length, leaf width, plant girth and stem colour of both the genotypes were recorded at 60 days and 90 days after planting. The results revealed that highest plant height (58.40 cm) was recorded in the genotype Mettupalayam (**Table 3**). The genotype Singapore recorded better growth in respect of leaf length (50 cm), leaf width (1.9 cm) and plant girth (2.2 cm). But the number of leaves was more in Mettupalayam (8). The plant height and number of leaves are the important components of growth which helps in the accumulation of photosynthates in the bulb contributing highest yield (Umamaheswarappa *et al.*, 2014). **(Plates 1 & 2)**

Plate-1: Singapore at 60DAP

Plate-2: Mettupalayam at 60DAP

Mettupalayam is having partly curved, light green leaves, whereas, flat and dark green leaves were observed in Singapore as seen in high ranges. The pseudostem of Singapore has anthocyanin pigmentation but it was absent in Mettupalayam.

Table 3. Biometric characters of Garlic genotypes grown in plains of Kerala

Characters	Mettupalayam		Singapore	
	60 DAP*	90 DAP	60 DAP	90 DAP
Plant height	49.60	58.40	54	55
No. of leaves per plant	7	8	5	7
Leaf length	45	45	50	50
Leaf width	1.1	1.2	1.5	1.9
Plant girth	1.6	1.8	2	2.2
Leaf shape	Partly curved		Flat	
Leaf colour	Green		Dark green	
Psedostem – Anthocyanin colouration	Absent		Present	

(*DAP – Days after planting)

Qualitative characters of bulbs

The bulbs of both the genotypes were oval in shape. Bulb and clove skin colour of Mettupalayam genotype was cream whereas it was light purple in Singapore (**Table 4**). The clove flesh colour of both genotypes were yellow.

Table 4. Qualitative characters of garlic bulbs grown in plains of Kerala

	Mettupalayam	Singapore
Bulb shape	Oval	Oval
Bulb colour	Cream	Light purple
Clove skin colour	Cream	Light purple
Clove flesh colour	Yellow	Yellow

Yield attributes

Data pertaining to bulb weight, equatorial diameter, polar diameter, average number of cloves per bulb, clove length, clove width, clove weight and clove skin thickness of two genotypes are depicted in **Table 5**. Among the two genotypes Mettupalayam recorded higher bulb weight (14.53 g). The equatorial diameter, polar diameter and number of cloves per bulb were also high in Mettupalayam (**Fig 1**).

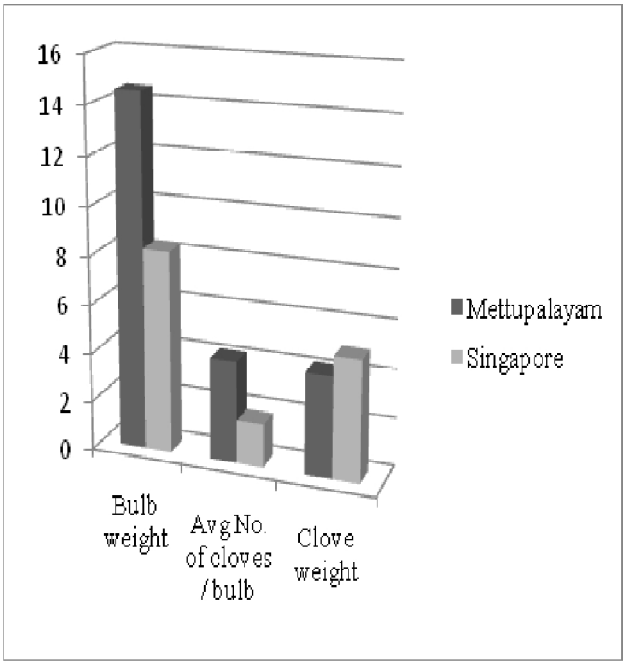

Fig 1. Comparison of yield attributes of garlic genotypes grown in plains of Kerala

Sharma *et al* (2015) reported that bulb weight, the important yield contributing character was associated with plant height, number of leaves per plant, bulb diameter and number of cloves per bulb. The genotype Mettupalayam with higher bulb weight also recorded higher plant height and number of leaves indicating a better accumulation of photosynthates under tropical humid climatic situations prevailing in the plains. Studies conducted in the non-traditional western ghat areas of Karnataka also revealed that some varieties performed significantly higher in terms of bulb and clove size (Tripathi and Karunakaran, 2015).

The bulb weight and equatorial diameter of Mettupalayam grown in the plains were on par with that grown in high ranges (**Table 6**).Bulb weight was observed as 17.19g in high ranges and 14.53g in the plains. But the number of cloves per bulb was found to be less in the plains (4.2) compared to that in the high ranges (11.9).

Table 5. Yield attributes of garlic genotypes grown in plains of Kerala

Variety	Bulb weight (g)	Equatorial diameter (cm)	Polar diameter (cm)	Average No. of cloves/bulb	Clove length (cm)	Clove width (cm)	Clove weight (g)	Clove skin thickness (mm)
Singapore	8.30^{b}	2.94^{a}	3.94^{a}	1.8^{a}	3.1^{a}	2.24^{a}	4.99^{a}	0.18^{a}
Mettupalayam	14.53^{a}	3.46^{a}	4.38^{a}	4.2^{a}	3.36^{a}	1.88^{b}	4.19^{a}	0.18^{a}
CD(0.05)	2.368	NS	NS	NS	NS	0.357	NS	NS

Table 6. Comparison of yield attributes of garlic in high ranges and plains

Sl No	Bulb characters	Mettupalayam		T value (0.01)	Singapore		T value (0.01)
		High Ranges	Plains		High Ranges	Plains	
1	Bulb weight (g)	17.19^{a}	14.53^{a}	3.012	21.78^{a}	8.30^{b}	3.012
2	Equatorial diameter (cm)	3.66^{a}	3.46^{a}	3.012	4.33^{a}	2.94^{b}	4.447
3	Polar diameter (cm)	3.56^{b}	4.38^{a}	3.012	4.2^{a}	3.94^{a}	3.012
4	Avg No. of cloves/bulb	11.9^{a}	4.2^{b}	3.012	12.1^{a}	1.8^{b}	3.012
5	Clove length (cm)	3.61^{a}	3.36^{a}	3.012	3.4^{a}	3.1^{a}	3.012
6	Clove width (cm)	1.07^{b}	1.88^{a}	3.012	1.30^{b}	2.24^{a}	3.012
7	Clove weight (g)	1.65^{a}	4.19^{a}	4.578	2.04^{a}	4.99^{a}	4.521

Plate-3: The bulbs of Singapore at 90 DAP

Plate-4: The bulbs of Mettupalayam at 90 DAP

Whereas the bulb weight of Singapore genotype was only 8.30g in plains and it was 21.78g in high ranges. It was observed that the number of cloves per bulb was low when it is grown in the tropical plains. It indicates that the genotype Singapore is not suitable for plains in the present study.

CONCLUSION

The evaluation of garlic genotypes in the plains of central part of Kerala revealed the genotype Mettupalayam as a better performer. The study also indicate that the short duration genotype Mettupalayam recorded a reasonable bulb weight which is on par with the bulb weight as recorded in the traditional high ranges. This shows the possibilities of growing garlicin the plains of Kerala during October – February with some refinement in production technology. A detailed comparative evaluation of varieties and standardization of agro techniques are required to introduce the crop Garlic in the plains of Kerala.

ACKNOWLEDGEMENT

The authors wish to express sincere thanks to Kerala Agricultural University and the farmers of Kanthalloor Panchayat for the successful conduct of study.

REFERENCE

KAU [Kerala Agriculture University] 2016. *Package of Practices Recommendations: Crops 2016* (15th Ed.). Kerala Agricultural University, Thrissur, 392p.

Menon, J.S., Shibana, S.N., Bony, B.P. and Nalini, P.V.2017. Kerala Garlic crop production profile in devikulum block of Idukki district. In: Gowda, I.N.D., Sankar,V., Kuamar,R.S., Karunakaran, G. and Mahendran,B. (eds.), *Souvenir and Abstracts, National Conference On Horticultural Crops of Humid Tropics-Diversification for Sustainability*, 20-21 May 2017, Madikeri, Kodagu, Karnataka, 190p.

Tripathi, P.C. and Karunakaran, G. 2015. Performance of garlic cultivars under Kodagu conditions of Karnataka. *Progressive Hortic*. **47**(2): 357-358.

Umamaheswarappa, P., Chandrappa, H. and Prasad, K.T.R. 2014. *Environ. Ecology* **32**(2A): 638-641.

(*MS Received 04 November 2017, Revised 10 October 2018, Accepted 21 December 2018*)