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Performance Evaluation of Some Garlic Genotypes in Bangladesh

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Abstract: Twenty two garlic genotypes of local and exotic origin was trailed during the period from November 27, 2000 to March 31, 2001 at SRC Bogra. The results indicated that the germplasm differed significantly as to the different morphological attributes, yield and other desirable traits. The height of plants varied from 42. 50-67. 33 cm whereas, there was no difference as to the number of leaves/plant. Length and width of individual bulb differed from 2.40-3.20 and 2.10-2.71 cm, respectively. The number of cloves/bulb and individual bulb weight were also varied significantly. The entries showed variable degree of pungency. Per hectare yield (t) of garlic genotypes varied from 2.18-6.29, being lowest in GC003 and highest in GC007. Considering pungency as a positive trait of selection and yield potentiality also with other parameters, the lines GC002, GC006, GC007, GC010, GC011, GC016, GC017 and GC021 were found promising.

Key words: Garlic, genotypes, performance, evaluation, traits

INTRODUCTION

Among the spices grown in Bangladesh, garlic (*Allium sativum* L.) is undoubtedly one of the important crop cultivated during cool season. Inspire of using as condiment for food and a popular remedy for various ailments and physiological disorders, garlic can also be used for preparing pickles^[1,2]. It is also reported that powder, oil and a kind of salt are being prepared from garlic and utilized in the pharmaceutical industries^[3]. It occupies an area of 1,2597 ha with a total production of 37965 tones, the average yield being only 3.01 t ha⁻¹ [4] which is very low compared to some other developing counties like India. Lack of even one recommended or released variety in the country, topped the list of the factors encountered for the lower yield of this crop. With a view to develop high yielding garlic variety, the "Spices Research project, Bogra" of the Bangladesh Agricultural Research Institute, Joydebpur, Gazipur, collected a good number of genotypes from within the country and from abroad. The present investigation was therefore, undertaken to evaluate the performance of the 22 garlic germplasms in respect of yield and other desirable traits.

MATERIALS AND METHODS

The investigation was carried out at the Spice Research Centre, Bogra, of the Bangladesh Agricultural Research Institute, Joydebpur, Gazipur during the period

from November, 27, 2000 to March 31, 2001. The experiment was laid out in a randomized complete block design with three replications. Twenty-two garlic genotypes were collected from home and abroad, (Table 1) comprised 22 different treatments of the study. Unit plot size was 2.00x0.60 m. Cloves of uniform size were selected in case of each of the germplasm for planting. Planting was done on 27 the November, 2000 following 20x10 cm spacing; thus accommodation 60 plants per unit plot in three rows, each accommodating 20 plants.

The crop was fertilized with cowdung, Urea, TSP and MP @ 5000, 260, 130 and 160 kg ha⁻¹, respectively. The entire quantity of cowdung and TSP were applied at the time of final land preparation. Urea and MP were applied in two equal splits, 20 and 50 days after planting. Irrigation along with other intercultural operations were done as and when required. The crop was free from the attack of any major insect pests and diseases during the growing period. Twenty plants were selected at random

Table 1: Place of Collection of local and exotic garlic genotypes

Genotypes	Place of collection	Genotypes	Place of collection
GC001	Manikgonj	GC016	Sylhet
GC004	Chitagong Hill Tract	GC017	Sylhet
GC005	Chitagong Hill Tract	GC018	Khulna
GC006	Dhaka	GC019	Khulna
GC007	Barisal	GC020	Khulna
GC008	Barisal	GC021	Mymensingh
GC009	Barisal	GC022	Rangpur
GC010	Barisal	GC002	Thailand
GC011	Barisal	GC003	China
GC014	Dhaka	GC012	Pakistan
GC015	Dhaka	GC013	Japan

from each unit plot for collection of data on different morpho-agronomic and yield attributes. The organoleptic quality of the genotypes pertaining to pungency was estimated by a panel of judges comprised 12 persons of different age group. The recorded data were analyzed statistically and the treatment means were separated by DMRT for interpretation of results.

RESULTS AND DISCUSSION

The result of the study indicated that the leaf color of the genotypes were light green, medium green and green. Only one germplasm GC002 showed the green colored leaves. Five lines out of 22, produced leaves of erect in nature while others were medium erect. Variability was observed among the genotypes in respect of bulb as well as clove skin color as indicated in Table 2. Three different core colors were observed among the entries. Clove flesh color varied from white, snow white and light cream. Fruits of 8 genotypes were very pungent while others were medium pungent to pungent in nature, These variations among the characters mentioned above could be utilized by the plant breeder for the improvement of desired traits. The investigation also revealed that all the parameters except the number of leaves/plant were significantly influenced among the different germplasms.

The plant height of the lines varied from 42.50-67.33 cm. Plants of GC007 were the tallest (67.33 cm) and it was shortest in case of GC003 (42.50 cm). In a study conducted by Ahmed and Hoque^[5] the plant height of the lines ranged from 46.70 to 58.30 cm.

The number of leaves per plant did not vary significantly. However, it differed from 8.33 to 9.59, being lowest in GC003 and highest in GC007. Variation was found as to the length of leaves among the entries that differed from 30.06 (GC015) to 35.13 (GC007). The germplasms GC007 and GC010 were statistically at par in respect of leaf length but different from that of GC015.

Significant differences were noticed among the lines pertaining to the length and width of individual bulb (Table 3) which varied from 2.40-3.20 and 2.10-2.71 cm, respectively. In both the cases the genotype GC007 performed better as compared to the other lines. The bulb length was lowest in case of GC018 and width in case of GC003. Ahmed and Hoque^[5] also reported variation in bulb size in their study.

The entries of garlic under investigation produced bulbs in which the number of cloves per bulb and 100 clove weight were observed to vary from 10.06-16.60 and 52.84-71.66 g, respectively (Table 3). These differences indicated that the yield potentialities of the accessions might vary from each other which was supported by

Table 2: Morpho-agronomic characteristics of 22 garlic genotypes

Genotypes	Leaf color	Leaf erectness	Bulb skin color	Clove skin color	Bulb core color	Clove flesh color	Pungency
GC001	Light green	Medium erect	White	Outer-white, Inner-cream white	Light cream	White	Medium pungent
GC002	Green	Medium erect	Silky white	Outer white, Inner cream white	White	Snow white	Pungent
GC003	Medium green	Erect	Silky white	Outer white and cream Inner-white	Light cream	Light cream	Medium Pungent
GC004	Medium green	Medium erect	Silky white	Outer white to pinkish, inner-white	Light cream	White	Medium pungent
GC005	Light green	Medium erect	White to pink	Outer-white to light pink, Inner-white	White	White	Very pungent
GC006	Light green	Medium erect	Silky white	Outer-white to light, pink, Inner-white	White	White	Very pungent
GC007	Medium green	Erect	Silky white to slight pinkish	Outer-white to light, pink, Inner-white	White	White	Medium pungent
GC008	Medium green	Medium erect	Silky white to slight pinkish	Outer-white to light, pink, Inner-white	White	White	Medium pungent
GC009	Medium green	Medium erect	White but neck is pinkish	White outer	Light cream	Light cream	Medium pungent
GC010	Medium green	Medium erect	White	Outer-white Inner-cream white	White	White	Very pungent
GC0012	Medium green	Medium erect	Silky white to pink	Outer white, Inner cream	Snow white	White	Medium pungent
GC0013	Medium green	Medium erect	Silky white to pink	Outer-Light cream Inner-cream	Snow white	White	Pungent
GC0014	Medium green	Erect	Silky white to pink	Outer-Pinkish white, Inner-white	Light cream	Light cream	Medium Pungent
GC0015	Light green	Medium erect	Pinkish white	Outer-Creamy white Inner-Light cream	White	White	Medium pungent
GC0016	Medium green	Medium erect	White to pink	Outer-white Inner-Light cream	Light cream	Light cream	Very pungent
GC0017	Medium green	Medium erect	Silky white	Outer-white, Inner-Light cream	Light cream	Light cream	Very pungent
GC0018	Medium green	Erect	White to pink	Outer-white, Inner-light cream	White	White	Medium pungent
GC0019	Medium green	Erect	Creamy white	Outer-whitish cream Inner-creamy white	Light cream	White	Medium pungent
GC0020	Medium green	Medium erect	Silky white	Outer-white, Inner-light cream	White	White	Medium pungent
GC0021	Medium green	Medium erect	Silky white	Outer-white, Inner-light cream	Light cream	White	Very pungent
GC0022	Light green	Medium erect	Silky white to pink	Outer-white, Inner-creamy white	Light cream	White	Medium pungent

Table 3: Yield and its contributing characters of 22 garlic genotypes

Genotypes	Plant height (cm)	No. of leaves plant ⁻¹	Length of leaf (cm)	Bulb weight (g)	Bulb length (cm)	Bulb width (cm)	No. of cloves bulb ⁻¹	100 clove weight (g)	Yield (t ha ⁻¹)
GC001	49.53d-g	9.20	33.40ab	11.66bcd	2.86ab	2.46a-f	14.53a-d	68.33abc	4.14b
GC002	52.80cd	9.14	34.46ab	12.20bcd	2.96ab	2.56a-d	15.13ab	70.00ab	4.36b
GC003	42.50i	8.33	30.86ab	9.33d	2.66ab	2.10h	10.06g	52.84h	2.18c
GC004	44.60f-i	8.60	31.53ab	10.11bcd	2.56ab	2.23f-h	11.80d-g	60.00ef	3.73b
GC005	46.73e-i	8.93	32.13ab	11.00bcd	2.70ab	2.36b-g	12.86b-g	63.33cde	3.97b
GC006	49.86d-g	9.20	33.46ab	12.00bcd	2.90ab	2.46a-f	14.66a-d	68.33abc	4.18b
GC007	67.33a	9.59	35.13a	16.33a	3.20a	2.71a	16.60a	71.66a	6.29a
GC008	44.40ghi	8.40	31.13ab	10.10bcd	2.46ab	2.20fgh	11.66efg	58.33fg	3.72b
GC009	46.06e-i	8.80	32.00ab	10.52bcd	2.66ab	2.26e-h	12.13d-g	61.66def	3.92b
GC010	58.67b	9.53	35.13a	13.23b	3.00ab	2.65ab	15.40ab	70.84a	4.95b
GC011	56.56bc	9.33	34.53ab	12.99bc	2.96ab	2.60abc	15.26ab	70.74a	4.89b
GC012	46.53e-i	8.86	32.13ab	11.00bcd	2.70ab	2.34c-h	12.26c-g	63.33cde	3.93b
GC013	45.86e-i	9.13	32.80ab	11.33bcd	2.80ab	2.46a-f	13.80a-f	66.66a-d	4.01b
GC014	48.73d-h	9.06	32.46ab	11.15bcd	2.76ab	2.43a-f	13.33b-f	66.66-a-d	4.01b
GC015	46.13e-i	9.19	30.06b	10.92bcd	2.70ab	2.30d-h	12.80b-g	63.33cde	3.96b
GC016	48.06d-i	9.00	32.26ab	11.11bcd	2.70ab	2.40b-g	13.20b-f	65.00bcd	4.01b
GC017	51.00de	9.26	33.86ab	12.01bcd	2.93ab	2.55a-e	15.00abc	68.33abc	4.32b
GC018	43.33hi	8.40	31.03ab	9.87cd	2.40b	2.13gh	11.20fg	55.00gh	3.58b
GC019	47.33d-i	8.93	32.20ab	11.00bcd	2.73ab	2.40b-g	13.20b-f	63.33cde	4.01b
GC020	45.86e-i	8.80	31.60ab	10.66bcd	2.63ab	2.23fgh	11.93d-g	60.00ef	3.92b
GC021	50.66def	9.20	34.40ab	11.68bcd	2.93ab	2.53a-e	15.00abc	68.33abc	4.32b
GC022	49.46d-g	9.13	32.90ab	11.50bcd	2.83ab	2.46a-f	14.33a-e	66.66a-d	4.10b
CV%	9.4	13.15	10.13	9.44	8.33	7.55	11.10	10.55	9.83

In a column means followed by common letters are not significantly different from each other at 1% level of probability

Hari om and Srivastava^[6], Korla and Rastogi^[7], Moenir^[8] and Andrade *et al.*^[9] while comparing some selected varieties.

Bulb weight of different lines differed from as high as 16.33 in GC007 to as low as 9.33 g in GC003. It was observed that increased bulb weight was associated with the increased plant height, higher number of leaves per plant, greater bulb size, higher number of leaves per plant, greater bulb size, higher number of cloves per bulb and 100 clove weight. This is in consonance with the finding of Ahmed and Hoque^[5]. It is worth while to mention the reports of Mann and Minges^[10] and Thompson and Kelly^[11] in this connection. They reported that higher yield in garlic is correlated with higher number of leaves produced by the plants before bulbing. Similar trend was also found in the present study.

The yields (t ha⁻¹) of the genotypes ranged from as low as 2.18 in GC003 to as high as 6.29 in GC007. The yield potentiality of the other genotypes was not significantly varied but they differed in respect of pungency. Since pungency is one of the important traits, considered on the basis of consumers' likeliness, need to be taken into consideration for variety development. Considering yield potentiality, pungency and other desirable attributes, the genotypes GC002, GC006, GC007, GC010, GC011, GC016, GC017 and GC021 are considered promising and can be selected preliminarily for further trial with a view to develop variety(ies).

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