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Correlation matrix among different parameters of bottle gourd genotypes

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ABSTRACT

Correlation matrix among different parameters of twenty eight bottle gourd genotypes was studied. It revealed the significant variation among the genotypes for most of the parameters such as days to 1st male flowering (FMF) and female flowering (FFF), 1st harvest (FH), sex ratio (M:F), single fruit weight (FW) and fruit diameter (FD), total yield (TY), number of fruits/plant. Total yield (TY) was positively correlated with 1st male flowering (FMF) and female flowering (FFF), 1st harvest (FH), sex ratio (M: F), single fruit weight (FW) and fruit diameter (FD). On the contrary, TY was highly negatively correlated with to edible maturity (EM) and fruits / plant (FPP). Fruits / plant also showed was significantly and negatively correlated with FMF, FFF and FH revealed that early flowering and harvesting accelerated the degree of fruit setting.

Key words: *Lagenaria siceraria*, correlation coefficient

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INTRODUCTION

Bottle gourd (*Lagenaria siceraria L.)* belongs to the family Cucurbitaceae. The cultivated species is commonly known as bottle gourd, birdhouse gourd, trumpet gourd, calabash gourd and white flowered gourd. Bottle gourd originated in Africa and from there it spread all over the world (Whitkar and Davis, 1962). Bottle gourd fruits are used as cooked as vegetables. Its leaves and tender stems are used as delicious and nutritious vegetables. It is reported as an easily digestible vegetable which keeps the body cool and prevents constipation (Haque, 1985). Each 100g bottle gourd contain protein 1.1g, carbohydrate 15.1g, fat 0.1g, minerals 0.6g and some Vitamins (Seshadri and Parthasarathy, 2002). Bottle gourd is a very popular vegetable in Bangladesh. It is widely cultivated throughout the country during winter season. But the average yield is only 8.6 tons / hectare (Anon. 2003), which is very low compared to other bottle gourd producing countries. Several factors are responsible for this low yield. Lack of high yielding variety is the most important among them. Although bottle gourd is an important vegetable of Bangladesh, so far, there is scanty of well acceptable recommended variety with high yield potential and better quality. Further, very limited attempt had been made for genetic improvement of this crop. Many authors have studied correlation between yield and yield contributing characters of bottle gourd. According to Falconer (1964) and Ashri et al. (1974), the strength and direction of correlation depend on the nature of experimental maturity and growing conditions. Fruit yield is the result of many characters, which are interdependent. The analysis of the relationships among these characters and their associations with fruit yield is essential to establish selection criteria in a population. Positive and significant association between yield per plant and seeds per fruit both at phenotypic (r=0.569) and genotypic (rg= 0.621) level was reported by Tyagi (1972) in bottle gourd. Main vine length was positively and significantly

correlated with branches per plant at phenotypic (r=0.268) and genotypic (rg=0.594) level and seeds per fruit phenotypic (r=0.394) and genotypic (r=0.426) level whereas negative but significant only at genotypic level with hundred seed weight (r=-0.291). There is noticeable variability among the existing bottle gourd germplasms of Bangladesh. An understanding of the nature and magnitude of the variability among the genetic stocks of bottle gourd is of prime importance for the breeders. A good knowledge of genetic wealth might also help in identifying desirable cultivars for commercial cultivation because of its nature of high cross-pollination, hardly any genetically pure strain is available to the growers. Therefore the present study was undertaken to explore the correlation matrix among different parameters of bottle gourd genotypes in Bangladesh.

MATERIALS AND METHODS

The experimental material comprised 28 genotypes of bottle gourd collected from different parts of Bangladesh (13 from Plant Genetic Resources center, Bangladesh Agricultural Research Center, 6 from Comilla, 4 from Mymensingh and 5 from Noakhali). The experiment was conducted in the research field of Horticulture Research Center, Bangladesh Agricultural Research Institute, Joydebpur, Gazipur during the period from September 2007 to March 2008. The seedlings were raised in ploythene bags. Two- week-old healthy seedlings were transplanted in the previously prepared pit. Plant to plant distance was 2m. Three seedlings were transplanted in each pit. The recommended cultural practices were followed to produce a better crop. The experiment was laid out in a Randomized Complete Block Design with three replications. Data were recorded on ten plants from each genotype. The observations recorded were leaf length, breadth, petiole length, lobe number, days to first male and female flower, nodal position of first female flower, days to edible maturity, sex ratio, fruits/plant, fruit weight (kg), fruit length and diameter (cm), yield/plant (kg), number of seeds/fruit, 1000-seed weight (g), days to seed maturity, seed length, breadth and thickness (mm).

RESULTS AND DISCUSSION

Correlation coefficient analysis revealed the significant variation among the genotypes for most of the parameters under study which are presented in Table 1 and 2. Correlation co-efficient was highest for nodal position of first female flower opening followed by yield/plant, sex ratio among the genotypes.

Total yield (TY) was positively correlated with 1st male flowering (FMF) and female flowering (FFF), 1st harvest (FH), sex ratio (M:F), single fruit weight (FW) and fruit diameter (FD) indicating that the genotypes having early bearing habit could perform better as bottle gourd variety. Rahman et al. (1986) found significant association between days to maturity and fruit yield / plant in bottle gourd (r=0.662). On the contrary, TY was highly negatively correlated with to edible maturity (EM) and fruits / plant (FPP) which indicates that delay in harvest or longer time to edible maturity reduce the total yield of bottle gourd. This might be due to uptake of more nutrients by the fruits from plant body for longer time resulting hampered the further fruiting. Fruit length (FL) also negatively correlated with TY. FPP showed positive correlation with EM, sex ratio indicating that number of fruit per plant increased with the frequent harvest of fruit and high sex ratio advanced the FPP. Rahman et al. (1986) found significant association between days to maturity and fruit yield per plant in bottle gourd (r=0.662) while Reddy and Rao (1984) and Swamy et al. (1984) reported negative association between the traits in ribbed gourd (r= -0.718) and muskmelon (r= -0.025). Fruits / plant also showed was significantly and negatively correlated with FMF, FFF and FH revealed that early flowering and harvesting accelerated the degree of fruit setting. First male flowering (FMF) showed direct and positive effect on first female flowering (FFF),

Table 1
The range, mean and Coefficient of Variation- CV (%) of different parameters of 28 bottle gourd genotypes

Parameters	Range		Mean±SE	CV (%)
	Maximum	Minimum		
Leaf length (cm)	24.3	17.32	21.04± 0.08	0.67
Leaf breadth (cm)	34.07	20.81	27.31± 0.09	0.6
Leaf petiole length (cm)	25.83	8.5	15.62± 0.18	2.02
Leaf lobe number	8.78	5	6.64± 0.09	2.32
Days to 1st male flower opening	83.5	43.33	56.51±0.17	0.53
Days to 1st female flower opening	86.33	48.25	61.93± 0.34	0.95
Nodal position of first female flower	25.33	7.67	17.99±0.32	22.75
Days to edible maturity	33.33	15.33	23.42± 0.41	3.02
Sex ratio (M:F)	10.78	0.85	3.06± 0.14	7.74
Fruits/plant	11.33	3.33	6.74± 0.07	1.8
Fruit weight (kg)	3.77	1.33	2.88± 0.09	5.75
Fruit length (cm)	46.77	20.58	34.97± 0.14	0.69
Fruit diameter (cm)	24.45	9.82	13.75± 0.08	0.96
Yield / plant (kg)	27.83	7.33	19.67 ± 0.43	8.67
No. of seeds/fruit	1144.33	87.83	559.57± 25.57	7.91
1000-seed weight (g)	253.67	129.7	198.41± 0.68	0.6
Days to seed maturity	192.33	103	153.50± 0.35	0.39
Seed length (mm)	19.54	15.13	17.42± 0.13	1.26
Seed breadth (mm)	16.82	8.18	9.73± 0.10	1.78
Seed thickness (mm)	4.07	2.96	3.40± 0.09	4.43

first harvest (FH), edible maturity (EM), sex ratio, fruit weight (FW) and total yield (TY). It had also negative effect on fruit / plant (FPP), fruit length (FL) and fruit diameter (FD). First female flowering (FFF) had highly significant positive effect on first harvest (FH) and at the same time it has strongly significant negative effect on fruit / plant (FPP). Fruit / plant (FPP) had positive effect on fruit weight (WF) and fruit length (FL) and negative effect on fruit diameter (FD) and total yield (TY).

Correlation co-efficient matrix and fruit yield in bottle gourd is the final character, which is contributed by a complex chain of interrelating characters. Association of this yield-contributing character with yield and among its components is important for making selection in the breeding program.

Table 2
Correlation matrix among different characters of twenty eight bottle gourd genotypes

	FMF	FFF	FH	EM	Sex ratio	FPP	FW	FL	FD	TY
FMF	1.00	0.865**	0.650**	0.161	0.194	-0.539**	0.095	-0.008	-0.239	0.093
FFF		1.00	0.831**	0.113	0.358	-0.547**	0.249	-0.004	-0.143	0.176
FH			1.00	0.015	0.222	-0.532**	0.274	0.121	-0.251	0.167
EM				1.00	0.026	0.118	-0.013	0.146	0.005	-0.082
SEX RATIO					1.00	0.021	0.303	-0.161	0.056	0.473*
FPP						1.00	0.042	0.172	-0.038	-0.019
FW							1.00	-0.033	0.139	0.869**
FL								1.00	-0.685**	-0.146
FD									1.00	0.124
TY										1.00

FMF= 1st male flowering (days)
FFF=1st female flowering (days)
FH= 1st harvest (days)
EM= edible maturity (days)
M:F=M:F ratio
FPP= fruit/plant
FW = fruit weight
FL= Fruit length
FD= Fruit diameter
TY= Total Yield

* Indicate 5% level of significant (using mean values) with degree of freedom 26
** Indicate 1% level of significant (using mean values) with degree of freedom 26

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