Journal of Crop and Weed, 14(3): 185-188 (2018)

Evaluation of bottle gourd [*Lagenaria siceraria* (Mol.) Standl.] genotypes during post-rainy season in Red and Laterite Zone of West Bengal

M. TIRUMALESH AND J. MANDAL

Department of Horticulture and Post Harvest Technology
Institute of Agriculture, Visva-Bharati, Sriniketan-731236, West Bengal

Received : 14-10-18 ; Revised : 20-11-18 ; Accepted : 22-11-18

ABSTRACT

Twenty seven bottle gourd genotypes were assessed with the objective to find out promising genotype(s) for growing in post-rainy season under red and laterite zone of West Bengal. Among the genotypes significant variations were noted for all the studied traits. Genotypes APBG-3 and UKBG-1 were early to first fruit harvest. Average fruit number plant^{-1} and average fruit weight was noted 3.4 and 775.8 g respectively. Genotypes Kundan, Gola Lattoo, UKBG-1, PSPL and Aditi exhibited higher fruit yield plant^{-1} which varied from 3.6 to 4.0 kg, can be recommended for growing in red and laterite zone of West Bengal.

Keywords **:** Bottle gourd, fruit yield, genotypes and post-rainy season

Bottle gourd (*Lagenaria siceraria* (Mol.) Stndl.) is an important vegetable crop belongs to the family Cucurbitaceae. In 2017-18, the total area under production of bottle gourd was 156.0 thousand hectares and production of 2608.0 thousand metric tonnes in India (www.indiastat.com). Bottle gourd has pan tropical distribution. Beside India, bottle gourd is also commonly found growing in Africa, Central America and other warmer regions of the world. It is intensively grown in small kitchen gardens and commercial fields mostly for immature fruits and sometime for its green tender twigs. Dried fruits of this crop are used for making domestic utensils, water jugs, musical instruments and floats for fishing nets (Yetisir *et al.,* 2008). Bottle gourd is a preferred vegetable for its cooling effects and easy digestibility. It is also used for preparation of different types of sweets. Bottle gourd is gaining fast popularity among the health conscious urban elites, which encouraged the round year cultivation of this vegetable. Cultivation of bottle gourd throughout the year is possible except in regions where winter remains very cold. In West Bengal, bottle gourd is mostly cultivated during summer and rainy seasons. Winter in West Bengal plains is not that much severe in comparison to Northern Indian Plains. Farmers of red and laterite zone of West Bengal sporadically grow bottle gourd during post rainy season often using their own landraces. They often complain about low productivity. India is one of the centers of diversity of bottle gourd endowed with diverse germplasm (De-Candole, 1882). In bottle gourd, India possessed genetic diversity for various qualitative (Mathew *et al.,* 2000) and quantitative characters (Singh *et al.,* 2007). Evaluation of a collection of bottle gourd from different parts of India will be helpful for identifying superior genotype(s) for a specific region. Therefore, the present work had been conducted with the objective to identify superior bottle gourd genotype(s) for growing during post rainy season in red and laterite zone of West Bengal.

The field investigation was carried out in Horticulture Farm, Sriniketan during post rainy season of 2013. The 27 open pollinated genotypes of bottle gourd collected from various parts of India were laid out in randomized block design with three replications. The channel and bed system of land preparation was followed. For this, the field was divided by several irrigation channels at 2.5 m distance. The plant to plant spacing was given 50 cm. Pre-soaked bottle gourd seeds were sown on 14th September, 2013. FYM @ 20 tonnes ha^{-1} was added in the field two weeks before sowing. Nitrogen @ 30 kg N ha^{-1} (as Urea), Phosphorus @ 50 kg P_2O_5 ha^{-1} (as Single Super Phosphate) and potash @ 60 kg K_2O ha^{-1} (as Muriate of Potash) were applied as basal dose during final bed preparation. Another dose of Nitrogen @ 30 kg N ha^{-1} (as Urea) was administrated after one month of sowing. Irrigation was given and plant protection measures were taken as per requirement.

Observations were recorded for vine length (cm**),** stem diameter (mm), number of branches plant^{-1}, total number of nodes per plant, inter-nodal length (cm), days to fruit harvest, fruit length and girth (cm), number of fruits plant^{-1}, fruit weight (g) and fruit yield plant^{-1} (kg). The data thus obtained were subjected to statistical analysis. The total variation for different treatments was tested for significance by "F" test using analysis of variance technique. Critical differences were calculated for each trait to the test the significance of difference between means of different genotypes. For statistical analyses Gomez and Gomez (1984) was followed.

The analysis of variance revealed that the mean sum of squares due to genotypes for all the traits were significant indicating the presence of considerable

Short communication

Email: joydip.mondal@visva-bharati.ac.in

variation among the twenty seven bottle gourd genotypes for different traits. Variation in various traits among bottle gourd genotypes was also reported by Ram *et al.* (2005) and Pandit *et al.* (2009).

Bottle gourd genotypes with short to moderate vine length and profuse branches are desirable traits. Such genotypes require less space and thus more number of plants can be accommodated in a unit area. More number of nodes and shorter intermodal length are associated traits for compact growth habit. More number of nodes increases the flowering and fruiting sites. In this study, vine length was recorded at 105 days after sowing. Comparison among genotypes revealed that the higher vine length producing genotypes were UKBG-3 and WBG-6. On the other hand, Surbhi, Pusa Santushti, UPBG-9, WBG-1 and PSPL produced significantly less vine length (Table 1). Average vine length was noted 444.7 cm. The genotypes OBG -2 followed by APBG-3, OBG-1, Joda Bonta and Kundan were noted higher stem diameter (Table 1). Stem diameter was ranged between 8.9 to 13.4 mm with mean of 10.4 mm. Data on number of branches plant^{-1} revealed that WBG-6 followed by UKBG-1, OBG-1, APBG-3, WBG-3, Joda Bonta, Gola Lattoo and Aditi had significantly higher in number of branches plant^{-1}. Whereas minimum number of branches was noted in APBG-2, Pusa Samridhi, DBG -2, Mayur Dharidhar, PSPL, Kundan and WBG-4. Average number of branches plant^{-1} was found 8.8. This result was closed to the findings of Kumar *et al.* (2011). Higher number of nodes plant^{-1} was produced by WBG-6. On the other hand, Pusa Samridhi and DBG-2 produced significantly less number of nodes. The variation for total number of nodes per plant in bottle gourd was also noted by Yadav and Kumar (2011) and

Table 1: Growth attributes of bottle gourd genotypes

Genotypes	Vine length (cm)	Stem diameter (mm)	Number of branches plant^{-1}	Total number of nodes plant^{-1}	Inter nodal length (cm)	Days to first harvest
Aditi	427.17^{hijkl}	10.40^{defgh}	11.00^{abcde}	123.33^{ghi}	10.67^{bcdefg}	73.00^{cdef}
Arka Bahar	481.83^{cde}	10.63^{defg}	6.50^{hij}	105.00^{jk}	15.33^{j}	70.00^{bcde}
APBG-1	425.00^{hijkl}	9.10^{fgh}	10.00^{cdefg}	156.67^{bcd}	8.07^{b}	96.27^{k}
APBG-2	463.27^{cdefgh}	9.07^{fgh}	4.00^{k}	87.00^{lmn}	11.40^{cdefghi}	88.00^{j}
APBG-3	414.33^{ijkl}	12.53^{ab}	12.00^{abc}	98.00^{kl}	15.60^{j}	61.33^{a}
DBG-2	408.03^{jkl}	10.73^{cdef}	5.00^{jk}	67.67^{pq}	13.20^{ghij}	70.00^{bcde}
DBG-3	410.00^{jkl}	10.20^{defgh}	10.00^{cdefg}	94.67^{klm}	11.67^{efghi}	84.33^{ij}
Gola Lattoo	409.97^{jkl}	10.47^{defgh}	11.67^{abcd}	158.00^{bc}	10.27^{bcdef}	76.67^{fg}
Joda Bonta	407.27^{jkl}	12.47^{ab}	11.67^{abcd}	88.00^{lmn}	9.93^{bcdef}	86.67^{j}
Kundan	492.27^{cd}	12.33^{abc}	6.00^{ijk}	88.00^{lmn}	8.93^{bcde}	68.53^{bcd}
Mayur Dharidar	453.00^{defghi}	10.17^{defgh}	5.00^{jk}	73.00^{op}	13.63^{hij}	68.00^{bcd}
OBG-1	419.70^{ijkl}	12.50^{ab}	12.33^{ab}	164.33^{b}	10.87^{cdefg}	84.00^{hij}
OBG-2	498.77^{c}	13.37^{a}	8.50^{fgh}	146.00^{de}	12.33^{fghi}	86.50^{j}
PSPL	394.37^{klm}	9.47^{defgh}	5.33^{jk}	113.67^{ij}	11.37^{cdefgh}	67.67^{bc}
Pusa Samridhi	470.87^{cdefg}	10.00^{defgh}	4.00^{k}	57.67^{q}	10.07^{bcdef}	74.00^{def}
Pusa Santushti	364.83^{m}	10.07^{defgh}	8.00^{ghi}	126.00^{gh}	4.13^{a}	82.00^{ghij}
Surbhi	354.87^{m}	9.03^{gh}	8.00^{ghi}	101.67^{k}	8.67^{bc}	75.00^{ef}
UKBG-1	438.87^{fghij}	9.97^{defgh}	12.33^{ab}	114.33^{hij}	8.80^{bcd}	66.00^{ab}
UKBG-2	541.33^{b}	9.93^{defgh}	9.67^{defg}	83.00^{mno}	12.27^{fghi}	78.00^{fgh}
UKBG-3	592.33^{a}	9.30^{efgh}	10.33^{bcdef}	151.33^{cde}	15.30^{j}	86.00^{j}
UPBG-2	445.03^{efghij}	10.23^{defgh}	10.00^{cdefg}	79.33^{nop}	11.53^{defghi}	75.50^{ef}
UPBG-9	386.23^{lm}	9.53^{defgh}	8.67^{fg}	87.33^{lmn}	10.47^{bcdefg}	83.70^{hij}
WBG-1	386.73^{lm}	9.70^{defgh}	9.00^{efg}	131.67^{fg}	13.80^{hij}	76.07^{fg}
WBG-2	431.03^{ghijk}	8.93^{h}	8.67^{fg}	106.33^{jk}	14.13^{ij}	79.00^{fghi}
WBG-3	479.27^{cdef}	11.13^{bcd}	11.67^{abcd}	141.33^{ef}	9.33^{bcde}	84.00^{hij}
WBG-4	454.43^{defghi}	9.50^{defgh}	6.00^{ijk}	83.00^{mno}	9.80^{bcdef}	75.00^{ef}
WBG-6	555.87^{ab}	10.97^{bcde}	13.00^{a}	214.67^{a}	10.13^{bcdef}	83.00^{hij}
Mean	**444.69**	**10.44**	**8.83**	**112.63**	**11.17**	**77.71**
LSD (0.05)	**42.39**	**1.69**	**2.15**	**11.92**	**2.75**	**6.01**

Note: Similar alphabets in a column denote that they are statistically at par

Table 2: Yield attributes and yield of bottle gourd genotypes

Genotypes	Fruit length (cm)	Fruit girth (cm)	Fruitnumber plant^{-1}	Fruit weight (g)	Yield per plant (kg)
Aditi	35.03^{bc}	22.20^{a}	3.50^{defgh}	976.00^{a}	3.60^{ab}
Arka Bahar	34.50^{bcd}	24.57^{a}	2.87^{fghijk}	853.30^{abcde}	2.97^{cd}
APBG-1	21.33^{hij}	34.93^{de}	2.17^{jk}	754.00^{cdefgh}	2.13^{ijk}
APBG-2	15.93^{k}	38.20^{f}	2.70^{ghijk}	718.67^{cdefgh}	2.33^{ghijk}
APBG-3	27.77^{efg}	24.97^{a}	3.27^{efghi}	778.00^{bcdefgh}	2.63^{defgh}
DBG-2	24.27^{ghi}	24.77^{a}	4.40^{abcd}	670.00^{fghi}	2.83^{cdef}
DBG-3	30.30^{cdef}	23.60^{a}	4.30^{bcd}	633.33^{hi}	2.93^{cde}
Gola Lattoo	19.80^{ijk}	37.57^{ef}	4.50^{abc}	826.67^{abcde}	3.77^{a}
Joda Bonta	21.17^{hij}	38.97^{f}	2.57^{hijk}	870.00^{abc}	2.77^{defg}
Kundan	34.67^{bcd}	23.80^{a}	4.50^{abc}	862.00^{abcd}	4.00^{a}
Mayur Dharidar	31.13^{cde}	23.00^{a}	3.70^{cdef}	756.00^{cdefgh}	2.67^{defgh}
OBG-1	18.67^{jk}	39.07^{f}	2.67^{ghijk}	733.33^{cdefgh}	2.17^{ijk}
OBG-2	18.83^{jk}	39.77^{f}	2.63^{ghijk}	844.00^{abcde}	2.27^{hijk}
PSPL	36.97^{ab}	24.43^{a}	3.80^{cdef}	916.00^{ab}	3.70^{a}
Pusa Samridhi	31.67^{cde}	24.77^{a}	2.87^{fghijk}	730.00^{cdefgh}	2.47^{fghij}
Pusa Santushti	24.30^{ghi}	31.67^{bc}	3.10^{fghij}	745.00^{cdefgh}	2.40^{fghijk}
Surbhi	31.13^{cde}	23.33^{a}	4.10^{bcde}	654.70^{ghi}	2.63^{defgh}
UKBG-1	23.40^{ghij}	33.17^{cd}	5.30^{a}	710.00^{defgh}	3.73^{a}
UKBG-2	29.60^{def}	28.50^{b}	3.13^{efghij}	830.00^{abcde}	2.50^{efghij}
UKBG-3	40.77^{a}	23.83^{a}	3.10^{fghij}	755.00^{cdefgh}	2.40^{fghijk}
UPBG-2	25.70^{fgh}	24.53^{a}	3.57^{cdefg}	547.33^{i}	2.57^{defghi}
UPBG-9	29.77^{def}	22.23^{a}	4.80^{ab}	700.00^{efghi}	3.23^{bc}
WBG-1	19.43^{ijk}	34.30^{cd}	2.83^{fghijk}	807.00^{bcdefg}	2.27^{hijk}
WBG-2	35.17^{bc}	23.50^{a}	2.33^{ijk}	820.00^{bcdef}	2.00^{k}
WBG-3	25.17^{fgh}	25.17^{a}	2.53^{hijk}	750.00^{cdefgh}	2.10^{jk}
WBG-4	31.50^{cde}	22.63^{a}	3.10^{fghij}	726.37^{cdefgh}	2.70^{defgh}
WBG-6	19.50^{ijk}	38.50^{f}	2.10^{k}	980.00^{a}	2.10^{jk}
Mean	**27.68**	**28.74**	**3.35**	**775.80**	**2.74**
LSD (0.05)	**5.16**	**3.20**	**0.99**	**154.12**	**0.44**

Note: Similar alphabets in a column denote that they are statistically at par

Sharma and Sengupta (2012). Pusa Santushti had significantly minimum inter-nodal length; whereas higher inter-nodal length was noted in APBG-3, which was noted statistically *at par* with Arka Bahar, UKBG-3, WBG-2, WBG-1, Mayur Dharidhar and DBG-2.

The variation in inter-nodal length in bottle gourd was also reported by Sharma and Sengupta (2012). In this study, mean days to first fruit harvest of bottle gourd was noted about 78 days after sowing. APBG-3 and UKBG-1 were significantly early in days to first fruit harvest; whereas genotype APBG-1 took maximum number of days for first fruit harvest. These results are similar to the findings of Harika *et al*. (2012) and Tirumalesh *et al*. (2016).

Data on fruit length (Table 2) revealed that UKBG-3 closely followed by Pusa Summer Prolific Long (PSPL) had greater fruit length. On the other hand, APBG-2, OBG-1, OBG-2, WBG-1, WBG-6 and Gola Lattoo had significantly lesser fruit length. Similarly higher fruit girth was noted in OBG-2 which was noted statistically similar to OBG-1, Jora Bonta, WBG-6, APBG-2 and Gola Lattoo. In bottle gourd, fruit yield per plant was positively and correlated with fruit length and negatively correlated with fruit girth (Mandal *et al*., 2015). Genotypes UKBG-1, UPBG-9, Kundan, Gola Lattoo and DBG-2 were produced significantly higher fruit number plant^{-1}. In this study, it was noticed that on an average 3.4 number of fruits were produced by the bottle gourd. Husna *et al.* (2011) was also noted variation in fruit weight in bottle gourd. Fruit number plant^{-1} in bottle gourd was positively and significantly correlated with fruit yield plant^{-1} (Mandal *et al*., 2015). Comparison of genotypes revealed that WBG-6 followed by Aditi, PSPL, Joda Bonta, Kundan, Arka Bahar, OBG-2,

UKBG-2 and Gola Lattoo produced maximum fruit weight (Table 2). Average fruit weight was noted 775.8 g. Among the genotypes Kundan registered maximum fruit yield plant^{-1} which was noted statistically similar to Gola Lattoo, UKBG-1, PSPL and Aditi. Average yield was found 2.1 kg plant^{-1}. The variation for fruit yield per plant in bottle gourd corroborated with the findings of Yadav and Kumar (2011) and Sharma and Sengupta (2012). In bottle gourd, fruit yield plant^{-1} was positively and correlated with fruit length and negatively correlated with fruit girth (Mandal *et al*., 2015). Genotypes UKBG-1, UPBG-9, Kundan, Gola Lattoo and DBG-2 were produced significantly higher fruit number plant^{-1}. In this study, it was noticed that on an average 3.4 number of fruits were produced by the bottle gourd.

The study indicated presence of good variation among the bottle gourd genotypes. Thus, effective selections can be practiced for earliness, yield and other traits. Genotypes with higher mean value for a particular trait can also be utilized for hybridization programme or in hybrid breeding. APBG-3 and UKBG-1 were identified as early types. Kundan, Gola Lattoo and UKBG-1 produced significantly higher fruit number and fruit yield plant^{-1} having average fruit weight within 850 g and they can be recommended for commercial cultivation under red and laterite zone of West Bengal during post-rainy season. Two other genotypes, PSPL and Aditi which had average fruit weight of over 900 g and high fruit yield plant^{-1} can also be suggested for this region.

REFERENCES

De-Candolle, A. 1882. *Origin of Cultivated Plants.* Cited by Chadha, M.L. and Lal, T. 1993. *Improvement of cucurbits,* Adv. *Horticulture.* (Ed. Chadha, K.L. and G. Kalloo). Malhotra publishing house, New Delhi, pp. 151-55.

Gomez, K.A. and Gomez, A.A. 1984. Statistical Procedures for Agricultural Research. 2nd Edn. John Willey and Sons, New York. pp. 97-11.

Harika, M., Gasti, V.D., Shantappa, T., Mulge, R., Shirol, A.M., Mastiholi, A.B. and Kulkarni, M.S. 2012. Evaluation of bottle gourd genotypes [*Lagenaria siceraria* (Mol.) Standl.] for various horticultural characters. *Karnataka J. Agric. Sci.*, **25**: 241-44.

Husna, A., Mahmud, F., Islam, M.R., Mahmud, M.A.A. and Ratna, M. 2011.Genetic Variability, Correlation and Path Co-Efficient Analysis in Bottle Gourd (*Lagenaria siceraria* L.). *Adv. Biol. Res.* **5**: 323-27.

Kumar, A., Singh, B., Mukesh, K. and Naresh, R.K. 2011. Genetic Variability, Heritability and Genetic Advance Study for Yield and its Components in Bottle Gourd (*Lagenaria siceraria* M.). *Prog. Hort.*, **43**: 101-103.

Mandal, J., Tirumalesh, M. and Dhangrah, V. K. 2015. Studies on genetic variability and trait inter-relationship in bottle gourd [*Lagenaria siceraria* (Mol.) Standl]. *HortFlora Res. Spectrum*, **4**: 34-38.

Mathew, A., Markose, B.L, Rajan, S. and Peter, K.V. 2000. Genetic variability in bottle gourd, *Lagenaria siceraria* (Mol.) Stand. *Cucurbit Genet. Coop.*, **23**: 78-79.

Pandit, M.K., Mahato, B. and Sarkar, A. 2009. Genetic variability, heritability and genetic advance for some fruit characters and yield in bottle gourd (*Lagenaria siceraria* Molina. Standl.) genotypes. *Acta Hort.*, 809.

Ram, D., Singh, R.S., Pandey, S. and Rai, M. 2005. Studies of polygenic traits in off-season bottlegourd (*Lagenaria siceraria* (Mol.) Standl.). *Veg. Sci*, **32**: 189-91.

Sharma, A. and Sengupta, S.K. 2012. Evaluation of genetic variability in bottle gourd genotypes (*Lagenaria siceraria* (Mol.) Stand). *Veg. Sci.,* **39**: 83-85.

Singh, K.P., Singh, V.K. and Saha, B.C. 2007. Genetic divergence in bottle gourd (*Lagenaria siceraria* Molina) Standi. *J. Interacademicia*, **11**: 28-33.

Tirumalesh, M., Mandal, J. and Dhangrah, V.K. 2016. Variation in flowering characters in bottle gourd. *HortFlora Res. Spectrum*, **5**: 39-42.

Yadav, Y. C. and Kumar, S. 2011. Determination of variability for yield advancement in bottle gourd *Lagenaria siceraria* (Molina) Standl. *Ann. Hort.* **4**:151-64.

Yestisir, H., Sakar, M. and Serce, S. 2008. Collection and morphological characterization of *Lagenaria siceraria* germplasm from the Mediterranean region of Turkey. *Genet. Res. Crop Evol.*, **55**:1257-66.

https://www.indiastat.com /table/ agriculture-data/ 2/ horticulture/118/962279/data.aspx accessed on 09.10.2018