International Journal of Scientific Engineering and Applied Science (IJSEAS) – Volume-7, Issue-7, July 2021
ISSN: 2395-3470
www.ijseas.com

Performance of BAU Peyara (Guava) varieties at four upazila in Kurigram and Lalmonirhat Districts and BAU-GPC of Bangladesh

S.K. Malaker, M. A. Rahim, Md. Shahidul Hoque Choudhury, Md. Habibur Rahman and S. Roy

ABSTRACT

The experiment was carried out in order to study the growth and yield performance of BAU-GPC fruit varieties in the Kurigram and Lalmonirhat Districts of Bangladesh. One year old saplings were used for research. All the experiments were conducted at the Nageshwari and Bhurungamari of Kurigram and Patgram and Aditmari of Lalmonirhat and BAU-GPC (Control), Department of Horticulture, Bangladesh Agricultural University, Mymensingh during June 2010 to 42 months to find out the performance of these varieties. The experiments were laid out in randomized complete block design with three replications. Result showed that the maximum plant height (2.42m) and number of new branches/plant (16.42) were found from BAU Peyara-1 and the highest number of fruit per plant (19.92) were obtained from BAU Peyara-2 and the highest number of leaves/plant (391.96), number of harvested fruits per plant (11.50), weight of fruit (340.39g), yield (3.92kg/plant) and TSS content (13.00%) were recorded from BAU Peyara-5.

Keywords: BAU Peyara, varieties, Kurigram, Lalmonirhat, BAU-GPC, Productivity, TSS

1. INTRODUCTION

Guava (Psidium guajava) is a common tropical fruit cultivated in many trophical and sub-tropical regions including Bangladesh. Guava a berry like fruit of any of various Myrtaceous trees or shrubs of the genus *Psidium*, especially *P. guajava* (family Myrtaceae). Guava plant is quite hardy, prolific bearer and highly remunerative even without much care (Bose and Mitra, 1990). Guava stands fifth in production among the most important fruit crops of Bangladesh and can be grown all over the country. The annual production is about 181,950 metric tons in an area of about 5,076 hectare (2009-2010), 271,309 metric tons in an area of about 4,881 hectare (2010-2011) and 190,074 metric tons in an area of 4,902 hectare (2011-2012) in Bangladesh (Yearbook of Agricultural Statistics, BBS, 2012). The districts of Barisal, Pirojpur, Jhalokathi, Brahmanbaria and Chittagong are the main guava producing areas. Some of the important varieties are known by the name of the places where these are grown commercially. Thus Swarupkathi is from Barisal, Mukundapuri from Brahmanbaria and Kanchannagar from Chittagong. The plant is a shallow rooted shrub or small tree (3-10m); branching close to the ground and often producing suckers from the roots. The leaves are opposite, oblong, elliptic and hairy beneath. Flowers are bisexual, white, and 2.5 cm in

diameter, borne on new growth from mature branches, either singly or in clusters of two or three.

High-value fruits production and fruit tree adaptation requires the mastery of skill and the use of appropriate technology. But, the attempts taken so far for the development of an appropriate technology for production of good quality fruit, particularly for BAU-GPC released fruit varieties in Bangladesh are satisfactory.

2. MATERIALS AND METHODS

The present experiments were conducted at the Nageshwari and Bhurungamari of Kurigram and Patgram and Aditmari of Lalmonirhat districts and BAU-GPC of Bangladesh Agricultural University, Mymensingh during June 2010 to 42 Month to study the Performance of BAU-GPC released fruit varieties in Kurigram and Lalmonirhat region of Bangladesh.

All the experiments were conducted at the Nageshwari and Bhurungamari of Kurigram and Patgram and Aditmari of Lalmonirhat and BAU-GPC of Bangladesh Agricultural University, Mymensingh. The site falls within latitude 25° 54' 0" N and longitude 89°27'0"E and latitude 25°52′N to 25°58'N and longitude 88º56″ and 89º32″ and latitude 24º26'N and longitude 90º15'E at an elevation of 18m above the sea level.

The experimental area is situated at the sub tropical climate characterized by heavy rainfall, high temperature, long day and long sun shine period during April to August and a scanty of rainfall, low temperature, short day and long clear sun shine period during rest of the year.

The soil of the experimental site was sands, silts and silt loams to silty clay loams belonging to the Active Tista Floodplain and Old Brahmaputra Floodplain under Agro ecological Zone (AEZ) 2 and 9 having No calcareous Alluvium predominates and No calcareous Dark-Grey Soils. The analytical data of the soil sample collected from the experimental area were determined in the Soil Testing Laboratory, Department of Soil Science, Bangladesh Agricultural University, Mymensingh and Bangladesh Soil Research Institute, Mymensingh.

Sixteen different BAU-GPC released fruit varieties of 9 species were used in the present study. Among these varieties the commercial ones i.e. BAU-GPC origin were collected from

BAU-GPC, Department of Horticulture, Bangladesh Agricultural University, Mymensingh, Bangladesh, these sixteen varieties successfully cultivated for fruit production by the farmers under Bangladesh conditions. Before starting the experiments was made at the BAU-GPC, Bangladesh Agricultural University, Mymensingh. The results indicated that these sixteen varieties successfully produced fruit under Bangladesh conditions.

The main land selected for conducting the experiments was opened in late September 2009. The land break up earth was followed by spade to obtain a good planting pit. During the land preparation, weeds and stubbles were removed from the field. The planting pits was filed fertilizer were prepared around the planting pits. The planting pits were prepared as row. The planting pits were separated by 3 x 4 m distances, respectively.

The experiments conducted at the Nageshwari and Bhurungamari of Kurigram and Patgram and Aditmari of Lalmonirhat Districts and BAU-GPC of Bangladesh Agricultural University, Mymensingh. Two-factor experiment was laid out in the Randomized Complete Block Design (RCBD) with three replications.

Well-decomposed cow dung, urea, TSP, MoP, were applied @ 20 kg, 300 gm, 300 gm and 200 gm/planting pits, respectively. Urea, triple super phosphate and murate of potash were applied as the sources of N, P and K, respectively. The cow dung was applied after planting pit of the land. The entire quantity of TSP, MoP and urea were applied at the time of final planting pit preparation. For fruit production, additional doses of 150 gm urea, 100 gm TSP and 150 gm MoP/plant were used in two time different installments at every year after planting of sapling. Every fertilizer application was followed by irrigation.

The one year old of different fruit saplings were collected from BAU-GPC of the Bangladesh Agricultural University, Mymensingh. Sapling treatment was done by Bavistin @ 3g/10litter water/5decimal land area for whole sapling. Then the rows a spacing 4m but 4m in lines in the well prepared planting pit at a depth of 2ft x 2ft x 2ft for easy emergence.

The fruit plant was protected from the attack of stem borer; fruit borer and lemon butter fly by spraying Diaginon 3ml/10L of water, flowering stage, fruit setting stage and mature stage of plant growth. Some times the plant and fruit was infested by anthracnose and wilt disease at the fruit maturing and fruit setting stage and was controlled at initial stage of disease by applying Bavistin 2g/L of water.

Data on following parameters were recorded from the sample plants by measuring scale at 3 months interval from 3 months after planting during experimentation. Sixteen different fruit verities were selected randomly each garden except the border ones to avoid the border effects. Data were collected the following parameters like plant height (m),number of leaves per plant, number of new branches per plant, date of flowering, date of fruit setting, number of fruits per plant, number of harvested fruits per plant, yield (Kg/plant),weight of fruit (g), weight of pulp, peel and stone and TSS of fruits

3. Results and discussion

Performance of BAU Peyara (Guava) varieties at four upazila in Kurigram and Lalmonirhat Districts and BAU-GPC of Bangladesh

Significant variations were observed due to the variety performance on plant height, number of leaves per plant, number of new branches per plant, date of flowering, date of fruit setting, number of fruits per plant, number of harvested fruits per plant, weight of fruit, yield (kg/plant), weight of pulp, peel, stone and percentage of TSS as well as hectare of Guava.

Main effect of varieties on plant height of Guava

There was significant variation in plant height due to BAU Peyara-1, BAU Peyara-2, BAU Peyara-5. The maximum plant height (2.42m) was measured in the BAU Guava-1 at 42 month after planting (MAP) and the minimum plant height (1.28m) was measured in the BAU Peyara-5 at 9 month after planting (Fig.-1).

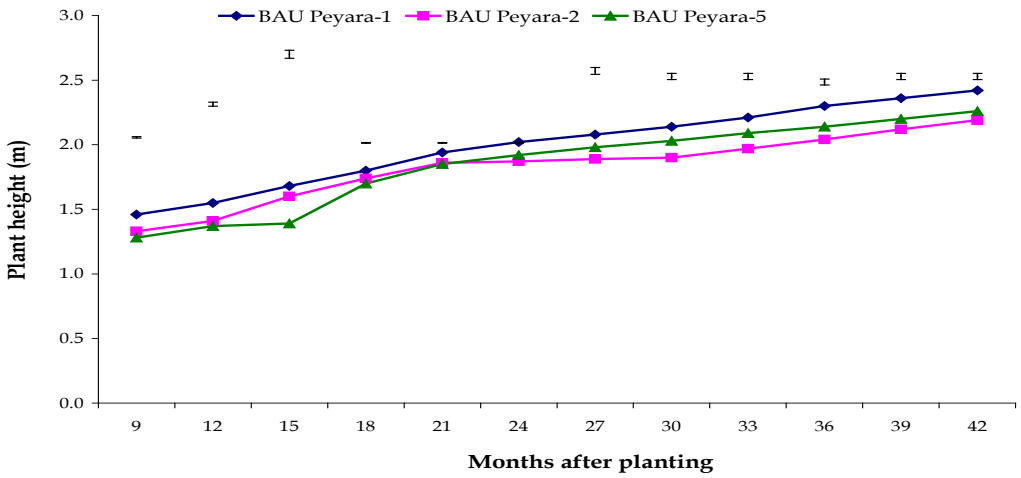

Figure 1. Effects of variety on plant height of guava at different months after planting. The vertical bars represent LSD at 5% level of significant.

Main effect of locations on plant height of Guava

The effect of locations was significant on plant height in the following location (Appendix VIII). The highest plant height was found in the location of Patgram (2.70m) at 42 month after planting and the lowest plant height was found in the location of BAU-GPC (1.22m) at 9 month after planting (Fig.-2).

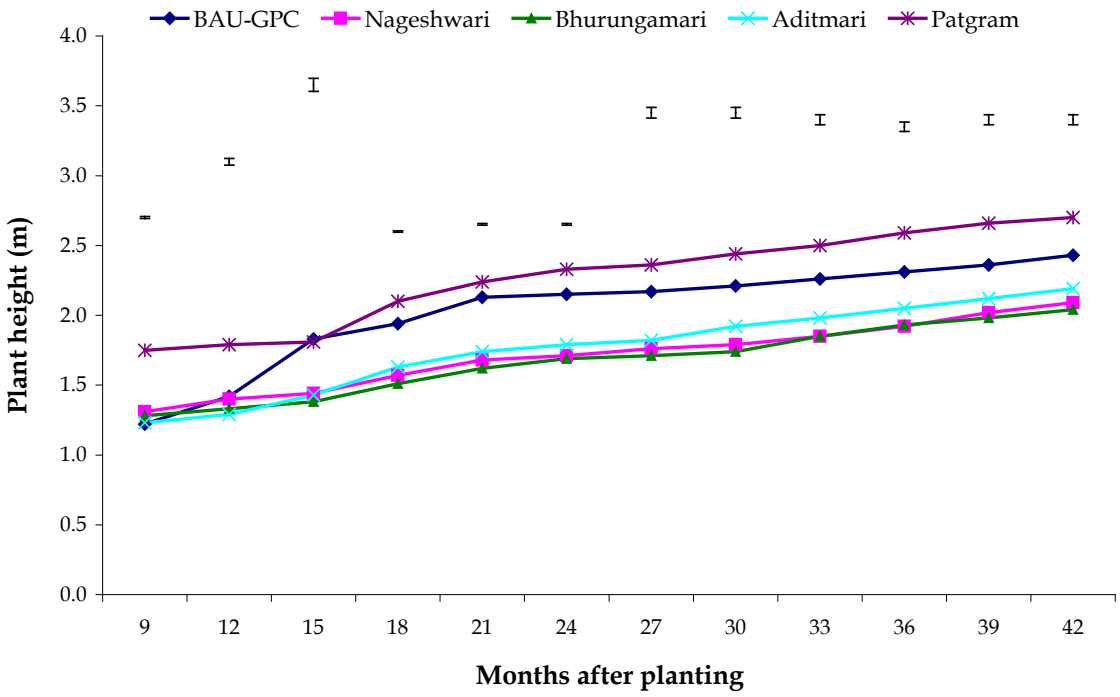

Figure 2. Effects of locations on plant height of guava at different months after planting. The vertical bars represent LSD at 5% level of significant.

Combined effect of varieties and locations on plant height of Guava

The combined effect of three guava varieties and five locations was significant on plant height in the following months after planting. The highest plant height was found from the combination of BAU Peyara-5 (3.12m) in the location of Patgram at 42 month after planting and the lowest plant height was found from the combination of BAU Peyara-5 (0.97m) with the location of Nageshwari at 9 month after planting.

Main effect of varieties on number of new branches per plant of Guava

The significant variation was observed in the varietals effect of BAU Peyara-1, BAU Peyara-2 and BAU Peyara-5. The height number of new branches per plant (16.42) was observed in the variety of BAU Peyara-1 at 21 MAP and the lowest number of new branches per plant (2.47) was found in the variety of BAU Peyara-5 at 30 MAP (Fig.-3).

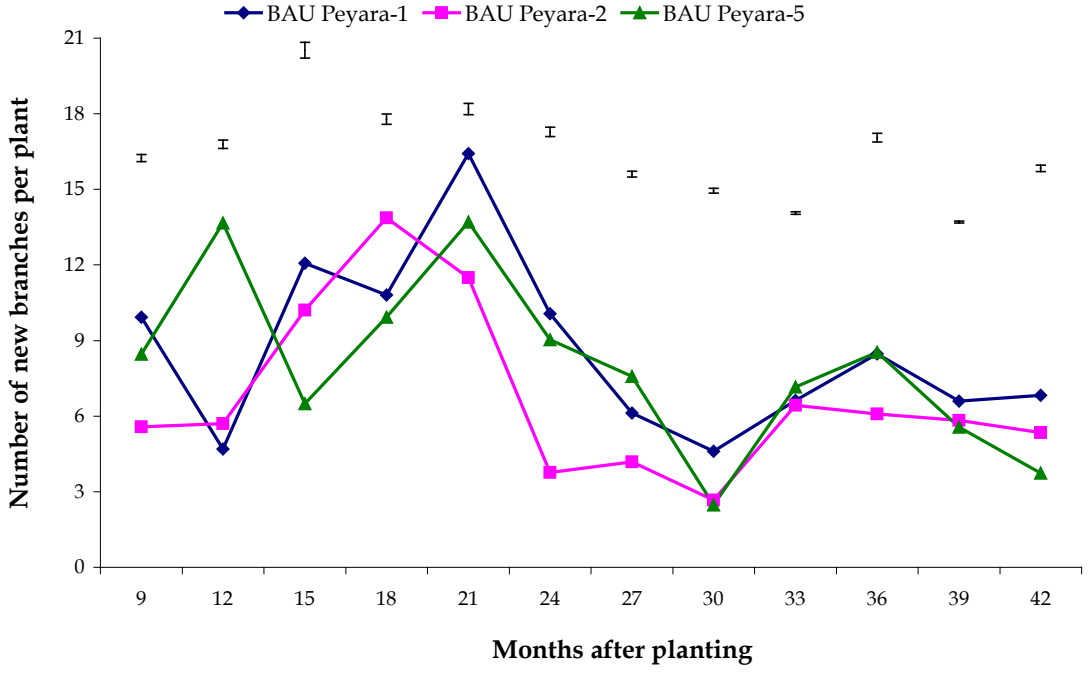

Figure 3. Effects of variety on number of new branches per plant of guava at different months after planting. The vertical bars represent LSD at 5% level of significant.

Main effect of locations on number of new branches per plant of Guava

Wide difference was observed as to the number of new branch per plant among the five locations. The maximum number of new branches per plant (32.33) was observed in the location of BAU-GPC at 15 month after planting and the minimum number of new branches per plant (1.44) was observed in the location of Nageshwari at 30 month after planting (Fig.-4).

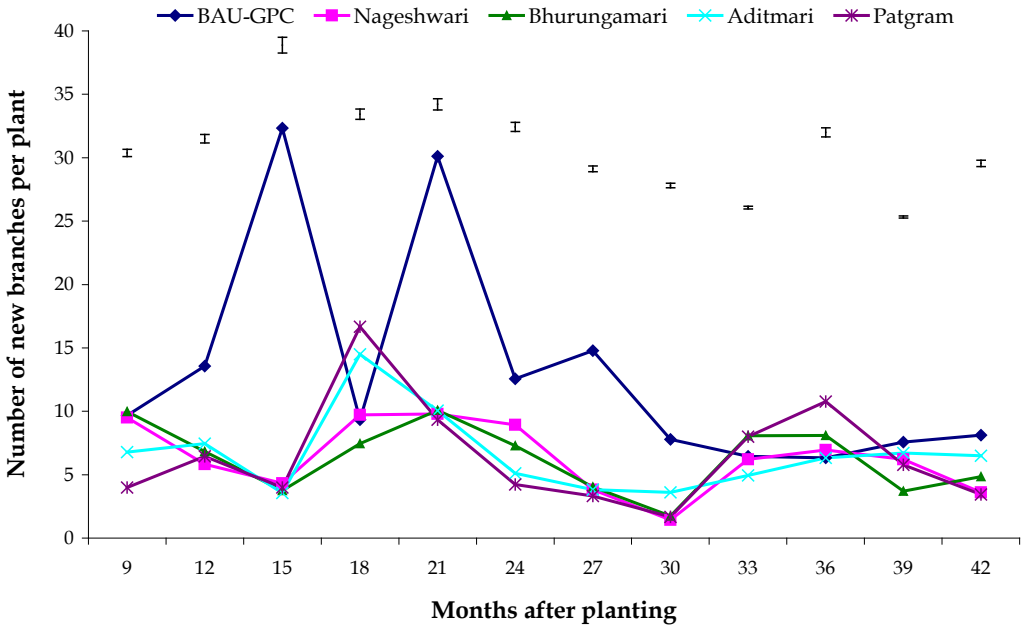

Figure 4. Effects of locations on number of new branches per plant of guava at different months after planting. The vertical bars represent LSD at 5% level of significant.

Combined effect of varieties and locations on number of new branches per plant of Guava

Significant combination was found for the number of new branch per plant of three guava varieties and five locations. Among the combination of BAU Peyara-1 gave the highest number of new branches per plant (47.00) was observed in the location of BAU-GPC at 15 MAP and the lowest number of new branches per plant (1.33) was observed in the combination of BAU Peyara-2 and BAU Peyara-5 in the location of Patgram and Nageshwari at 30 MAP.

Main effect of varieties and locations on yield characteristics of Guava varieties (BAU Peyara-1, BAU Peyara-2, BAU Peyara-5)

Main effect of variety on number of fruits per plant of Guava

Significant difference was observed as to the number of fruit per plant of BAU Peyara-1, BAU Peyara-2 and BAU Peyara-5 varieties. The highest number of fruit per plant (19.92) was observed in the BAU Peyara-2 at 3rd year and the lowest number of fruit per plant (4.13) was recorded in the BAU Peyara-5 at 2nd year.

Main effect of variety on number of harvested fruits per plant of Guava

The significant variation was found in different varieties of BAU Guava at different years. The maximum number of harvested fruits per plant (11.50) was observed in the BAU Peyara-5 at

3rd year and the minimum number of harvested fruits per plant (3.60) was observed in the BAU Peyara-2 at 2nd year.

Main effect of varieties on weight of fruit (g) and yield (kg/plant) of Guava

Significant variation was recorded regarding weight of fruit (g) and yield (kg/plant) due to the age of plant of BAU Guava in different years (Appendix XI). The maximum weight of fruit (340.39g) was observed in the BAU Peyara-5 at 3rd year and the minimum weight of fruit (264.00g) was observed in the BAU Peyara-2 at 2nd year. The highest yield (3.92kg/plant) was recorded in the BAU Peyara-5 at 3rd year and the lowest yield (0.88kg/plant) was recorded in the BAU Peyara-5 at 2nd year.

Main effect of locations on number of fruits per plant and number of harvested fruits per plant of Guava

The effect of five locations in number of fruits per plant and number of harvested fruits per plant was very significant. The maximum number of fruits per plant (43.11) was recorded in location of BAU-GPC at 2nd year and the minimum number of fruits per plant was recorded (1.41) in location of Bhurungamari at 2nd year. The highest number of harvested fruits per plant (21.78) was observed in the location of BAU-GPC at 2nd year and the lowest number of harvested fruits per plant (1.33) was observed in the location of Aditmari at 1st year.

Main effect of locations on weight of fruit (g) and yield (kg/plant) of Guava

The effect of locations was statistically significant for respect weight of fruit (g) and yield (kg/plant) of BAU Guava. The highest weight of fruit (349.89 g) was observed in the location of Bhurungamari at 1st year and the lowest weight of fruit (115.00 g) was observed in the location of Aditmari at 1st year. The maximum yield (5.28kg/plant) was found in the location of BAU-GPC at 2nd year and the minimum yield (0.69 kg/plant) was found in location of Aditmari at 1st year (table-1).

Table 1. Effect of varieties on number of fruits per plant, number of harvested fruits per plant, weight of fruit (g) and yield (kg/plant) of BAU Guava in 1st, 2nd and 3rd years

Varieties	Number of fruits per plant			Number of harvested fruits per plant			Weight of fruit (g)			Yield (kg/plant)		
	1st year	2nd year	3rd year	1st year	2nd year	3rd year	1st year	2nd year	3rd year	1st year	2nd year	3rd year
BAU Peyara-1	9.60	12.44	9.27	6.33	11.40	6.10	113.80	181.07	130.70	1.07	2.06	1.30
BAU Peyara-2	8.27	10.13	19.92	6.80	3.60	10.37	288.33	264.00	340.21	2.35	1.56	3.91
BAU Peyara-5	8.73	4.13	16.30	5.40	4.00	11.50	211.53	220.15	340.39	1.49	0.88	3.92
$LSD_{0.05}$	0.759	1.127	2.780	0.591	0.419	3.081	4.592	3.512	4.624	0.414	0.551	0.892
$LSD_{0.01}$	1.023	1.520	3.751	0.797	0.565	4.156	6.195	4.738	6.238	0.559	0.743	1.204
Level of significance	**	**	**	**	**	**	**	**	**	**	**	**

** : 1% level of Significance

Combined effect of varieties and locations on number of fruits per plant and number of harvested fruits per plant of Guava

The combined effect of varieties and locations was significant on the number of fruits per plant and number of harvested fruits per plant at different years . The height number of fruits per plant (58.00) was recorded in the combination of BAU Peyara-1 with the location of BAU-GPC at 2nd year and the lowest number of fruits per plant (2.67) was recorded in the combination of BAU Peyara-2 with the location of Bhurungamari at 1st year. The maximum number of harvested fruits per plant (47.33) was observed in the combination of BAU Peyara-1 with the location of BAU-GPC at 2nd year and the minimum number of harvested fruits per plant (1.67) was observed in the combination of BAU Peyara-1 and BAU Peyara-5 with the location of Bhurungamari at 1st year (Table 2).

Combined effect of varieties and locations on weight of fruit (g) and yield (kg/plant) of Guava

The combined effect of BAU Peyara-1, BAU Peyara-2 and BAU Peyara-5 varieties with the five different locations was significant of fruit (g) and yield (kg/plant) of Guava. The highest weight of fruit (393.67 g) was observed in the combination of BAU Peyara-5 with the location of BAU-GPC at 3rd year and the lowest weight of fruit (117.00g) was observed in the combination of BAU Peyara-1 with the location of Nageshwari at 3rd year. The maximum yield (8.05 kg/plant) was recorded in the combination of BAU Peyara-1 with the location of BAU-GPC at 2nd year and the minimum yield (0.20kg/plant) was recorded in the combination of BAU Peyara-5 with the location of Bhurungamari at 1st year (Table 2).

Table 2. Effect of locations on number of fruits per plant, number of harvested fruits per plant, weight of fruit (g) and yield (kg/plant) of BAU Guava in 1st, 2nd and 3rd years

Locations	Number of fruits per plant			Number of harvested fruits per plant			Weight of fruit (g)			Yield (kg/plant)		
	1st year	2nd year	3rd year	1st year	2nd year	3rd year	1st year	2nd year	3rd year	1st year	2nd year	3rd year
BAU-GPC	19.44	43.11	14.78	17.78	21.78	7.33	285.67	163.89	235.11	4.94	5.28	2.91
Nageshwari	21.22	10.21	10.83	9.56	11.00	6.89	272.22	281.90	244.28	2.09	3.10	2.49
Bhurungamari	3.67	1.41	19.15	2.22	3.22	10.83	349.89	277.89	269.11	0.78	0.75	3.25
Aditmari	5.13	15.11	17.61	1.33	12.33	13.56	115.00	152.12	291.44	0.69	1.88	4.09
Patgram	11.11	10.12	13.44	8.20	7.22	8.00	125.10	211.20	312.22	1.03	1.52	2.47
$LSD_{0.05}$	0.979	1.455	3.589	0.763	0.541	3.977	5.928	4.533	5.969	0.535	0.711	1.152
$LSD_{0.01}$	1.321	1.962	4.842	1.029	0.730	5.366	7.997	6.116	8.053	0.722	0.960	1.554
Level of significance	**	**	**	**	**	**	**	**	**	**	**	*

** : 1% level of Significance
* : 5% level of Significance

Main effect of varieties on percentage of TSS of Guava fruit

The performance of BAU Peyara-1, BAU Peyara-2 and BAU Peyara-5 variety different years in relation to TSS content. The variety exhibited the highest TSS content (13.00%) was found in BAU Peyara-5 at 3rd year and the lowest TSS content (10.03%) was found in the BAU Peyara-2 at 1st year (Table-3).

Table 3. Effect of varieties on fruit characters of percentages of TSS of Guava in the 1St, 2nd and 3rd years

Varieties	Percentages of TSS of fruits		
	1st year	2nd year	3rd year
BAU Peyara-1	11.96	11.82	12.24
BAU Peyara-2	10.03	10.51	11.95
BAU Peyara-5	12.54	11.10	13.00
$LSD_{0.05}$	0.198	0.140	0.212
$LSD_{0.01}$	0.267	0.189	0.285
Level of significance	**	**	**

** : 1% level of Significance

Main effect of locations on TSS of Guava fruit

The significant effect of five different locations of Guava varieties at different years in relation to TSS content (Appendix XII). The highest TSS content (13.18%) was recorded in the location of BAU-GPC at 3rd year and the lowest TSS content (10.21%) was observed in the location of Patgram at 2nd year.

Combined effect of varieties and locations on TSS of Guava fruit

The combined effect of BAU Peyara-1, BAU Peyara-2 and BAU Peyara-5 with the different locations of BAU-GPC, Nageshwari, Bhurungamari, Aditmari and Patgram on TSS of fruits from the different years. The maximum TSS content (14.94%) was observed in the combination of BAU Peyara-5 with the location of Bhurungamari at 3rd year. The minimum TSS content (10.00%) was observed in the combination of BAU Peyara-2 with the location of Bhurungamari at 2nd year (Table 5). TSS increases by increasing fruit thinning percentage reported by Tahir and Hamid (2002) which supports the present experimental results.

Table 4. Effect of locations on fruit characters of percentages of TSS of Guava in the year of 1St, 2nd and 3rd

Locations	TSS of fruits (%)		
	1st year	2nd year	3rd year
BAU-GPC	12.35	11.18	13.18
Nageshwari	10.41	12.11	12.01
Bhurungamari	12.29	11.03	11.94
Aditmari	11.18	12.00	11.82
Patgram	11.13	10.21	12.04
$LSD_{0.05}$	0.255	0.181	0.273
$LSD_{0.01}$	0.345	0.244	0.368
Level of significance	**	**	**

** : 1% level of Significance

Table-5. Combined effect of varieties and locations on fruit characters of percentages of TSS of Guava in the year of 1St, 2nd and 3rd

Varieties	Locations	TSS of fruits (%)		
		1st year	2nd year	3rd year
BAU Peyara-1	BAU-GPC	12.00	12.00	11.75
	Nageshwari	11.23	11.00	11.55
	Bhurungamari	11.57	12.10	11.77
	Aditmari	11.11	11.15	12.35
	Patgram	11.00	11.11	12.07
BAU Peyara-2	BAU-GPC	12.41	12.53	12.53
	Nageshwari	12.61	11.87	12.13
	Bhurungamari	12.62	10.00	12.11
	Aditmari	12.53	12.75	11.33
	Patgram	10.45	10.55	11.65
BAU Peyara-5	BAU-GPC	13.65	13.17	14.02
	Nageshwari	15.40	13.35	13.89
	Bhurungamari	13.67	13.00	14.94
	Aditmari	13.00	13.33	13.78
	Patgram	13.17	13.21	14.40
$LSD_{0.05}$		0.442	0.313	0.473
$LSD_{0.01}$		0.597	0.422	0.638
Level of significance		**	**	**

** : 1% level of Significance

Discussion of Guava varieties (BAU Peyara-1, BAU Peyara-2 and BAU Peyara-5)

The present study was undertaken to find out the most of the characters were statistically significant. Performance of BAU-GPC released three guava varieties studied under this experiment where BAU Peyara-1, BAU Peyara-2 and BAU Peyara-5 grown under BAU-GPC Mymensingh, Nageshwari and Bhurungamari under Kurigram district and Patgram and Aditmari under Lalmonirhat district. However, BAU Peyara-1 and BAU Peyara-2 grown under BAU-GPC and Aditmari showed better performance regarding plant growth while BAU Peyara-5 grown under Bhurungamari obtained the lowest effect on the fruit production during the study. In that case, climate condition and soil characteristics of BAU-GPC and Aditmari were more favorable for the better growth and yield of BAU Peyara-1 and BAU Peyara-2 which influenced the fruit production. Similar performance of guava under Faizabad, Uttar Pradesh, India was assessed by Hari Baksh *et al.* (2008) who found significant variation in growth parameters (plant height, spread and trunk girth), improvement in yield and yield attributing characters (fruit set, retention, and individual fruit weight) and quality of fruits, i.e. total soluble solids, ascorbic acid, reducing and non-reducing sugars was maximum increment under this condition; Mehta and Manoranjan Mitra Memorial Award (2005) also found similar result at Bihar, Uttar Pradesh and Maharastra, India condition; Similar performance of guava varieties were also conducted by Singh *et al.* (2008) under Udaipur, Rajasthan, India condition to the plant growth, flowering, fruiting and yield contributing characters.

4. CONCLUSIONS

The result of the experiment showed that the growth and yield parameters (Plant height, Number of leaves per plant, Number of fruits per plant, Number of harvested fruits per plant, Yield (kg/plant) and Weight of stone); the Similarly, BAU Peyara-1 showed better performance than the BAU Peyara-3 and BAU Peyara-5 at different location and months and years due to leaves per plant, new branches per plant, number of fruits per plant, harvested fruits per plant, yield (kg/plant) and may be selected as the best variety.

5. REFERENCES

BBS, 2012: Yearbook of Agricultural Statistics, Bangladesh Bureau of Statistics, Statistics and Informatics Division (SID), Ministry of Planning, Government of the People's Republic of Bangladesh.

Bose, T. K. and S. K. Mitra. 1990. Guava. In: Fruits Tropical and Subtropical. Ed. T. K. Bose, Nayaprakash, India. pp. 280- 303.

Hari Baksh, Rajesh Yadav, Dwivedi R 2008: Effect of INM on growth, yield, yield attributing characters and quality of guava (*P. guajava L.*) cv. Sardar. *Progressive Agriculture* **8(2):** 141-144.

Singh V, Dashora LK, Karatha KM, Ahalawat TR, Barad AV 2008: Growth, flowering, fruiting and yield of guava (*Psidium guajava* L.) cv. 'SARDAR' grown under high-density-planting system as influenced by various organic and inorganic sources. *Asian Journal of Horticulture* **3(2):** 382-385.

Tahir, F. M. and Hamid, K. 2002. Studies of physicochemical changes due to fruit thinning in Guava (Psidium guajava L.). J. Biol. Sci., 2: 744-745

Zakir MH,. Rahman MA, Islam MN, Latif MA, Bashar MA 2012: Morphological and Molecular Identification of *fusarium oxysporum* sch. Isolated from Guava Wilt in Bangladesh. *Bangladesh Journal of Botany* **41(1):** 49-54.