International Journal of Advanced Biochemistry Research

ISSN Print: 2617-4693
ISSN Online: 2617-4707
IJABR 2024; 8(3): 631-638
www.biochemjournal.com
Received: 02-12-2023
Accepted: 06-01-2024

Budhesh Pratap Singh
Research Scholar, Department of Vegetable Science, CSAUA&T Kanpur, Uttar Pradesh, India

Ram Batuk Singh
Associate Professor, Department of Vegetable Science, CSAUA&T Kanpur, Uttar Pradesh, India

Pratyksh Pandey
Research Scholar, Department of Vegetable Science, CSAUA&T Kanpur, Uttar Pradesh, India

Namrata Kashyap
Krishi Vigyan Kendra Lakhimpur, Assam Agriculture University, Assam, India

Sandeep Kumar
Assistant Professor, Department of Agriculture, Galgotias University Greater Noida, Uttar Pradesh, India

Aman Mishra
Research Scholar, Department of Genetics and Plant Breeding, CSAUA&T Kanpur, Uttar Pradesh, India

Lalit Yadav
Research Scholar, Department of Vegetable Science, CSAUA&T Kanpur, Uttar Pradesh, India

Harshit Gupta
Research Scholar, Department of Seed Science and Technology, CSAUA&T Kanpur, Uttar Pradesh, India

Corresponding Author:
Budhesh Pratap Singh
Research Scholar, Department of Vegetable Science, CSAUA&T Kanpur, Uttar Pradesh, India

Studies on character association and path coefficient analysis for various qualitative and quantitative traits in bottle gourd (*Lagenaria siceraria* (Mol.) Standl.)

Budhesh Pratap Singh, Ram Batuk Singh, Pratyksh Pandey, Namrata Kashyap, Sandeep Kumar, Aman Mishra, Lalit Yadav and Harshit Gupta

DOI: https://doi.org/10.33545/26174693.2024.v8.i3h.805

Abstract
Correlation and path coefficient analysis were studied at genotypic and phenotypic levels in 100 treatments (10 parents + 45 F1s and 45 F2s) of bottle gourd for sixteen qualitative and quantitative traits during *zaid* 2021. The experimental design which is used for to conduct the experiment was randomized block design. In F1, the mean sum of squares of genotypes were observed highly significant differences among the treatments for days to first staminate flower anthesis, days to first pistillate flower, node number to first staminate flower appears, node number to first pistillate flower appears, ratio of pistillate: staminate flowers, internodal length (cm), vine length at last picking stage (m), number of primary branches per plant, average weight per fruit (kg), number of fruits per plant, fruit length (cm), total soluble solids (TSS) ^{0}Brix, specific gravity of fruits (g/cc), dry matter content (%) and fruit yield per plant (kg). In case of F2, highly significant differences were recorded among the treatments, parents, F2s and parent vs F_2 for all the characters except Specific gravity of fruits for treatments and F_2s while for days to first staminate flower anthesis, days to first pistillate flower, Internodal length, days to first fruit harvest and number of fruit /plant. Days to first staminate flower anthesis showed significant correlation at genotypic level with positive value for Days to first pistillate flower, Internodal length (cm), Vine length at last picking stage (m), Days to first fruit harvest, Average fruit weight and specific gravity of fruit. Days to first pisitillate flower expressed positive significance correlation with average fruit weight and dry matter content. Node no. To first pistillate flower appears was positively correlated with T.S.S. Internodal length (cm) exhibited positive significant correlation with Vine length at last picking stage (m), No. of primary branches per plant, Days to first fruit harvest, Avg. fruit wt. (kg), fruit length and Specific gravity of fruits (g/cc). Vine length at last picking stage (m) showed positive significant association with No. Of primary branches per plant, Days to first fruit harvest, Avg. fruit wt. (kg) and fruit length. No. Of primary branches per plant exhibited positively significant correlation with Days to first fruit harvest, Avg. fruit wt. (kg), No. of fruit/plant and fruit length. Days to first fruit harvest expressed positive association with Avg. fruit wt. (kg), fruit length and Specific gravity of fruits (g/cc). Avg. fruit wt. (kg) showed positive correlation with No. of fruit /plant and fruit length. No. of fruit /plant was positively correlated with fruit length. T.S.S. showed positive correlation with specific gravity of fruit and dry matter content at genotypic level. The path coefficient analysis revealed that Days to first staminate flower anthesis, internodal length, number of primary branches per plant, Avg. fruit wt., No. Of fruit/plant in F1 showed positive direct effect. It was also found that Days to first fruit harvest showed high indirect effect on fruit yield *via*. Internodal length (cm).

Keywords: Correlation, path coefficient, bottle gourd

Introduction
Bottle gourd is one of the most nutritive vegetable crops for human and tone up for energy and vigour, because it contains valuable source of carbohydrates, proteins, vitamins and minerals. The edible 100g fresh fruits of bottle gourd contains fats (0.5%), proteins (0.20%), carbohydrates (2.9%), Vitamin C (11 mg) and minerals (0.5%) such as calcium, iron, potassium and phosphorous (Thamburaj and Narendra Singh, 2013). Tender fruits of Bottle gourd used as vegetable and for preparation of sweets (Halva, Kheer, Petha and Burfi) and Pickles. Kofta is most popular preparation by this. Bottle gourd has cooling effect and

prevents constipation and has diuretic and cardio-tonic properties. Bottle gourd is also used in ayurvedic pharmacopoeia of India. Its fruits are traditionally used as a nutritive agent having cardio protective, cardio tonic, controlling blood pressure, general tonic, diuretic, aphrodisiac, antidote to certain poisons and scorpion stings, alternative purgative, and cooling effects. It cures pain, ulcers, and fever and used also for pectoral-cough, asthma, and other bronchial disorders. It has been used
routinely as a source of rootstock for watermelon and other cucurbits in both Korea and Japan to reduce the incidence of soil-borne diseases and to promote the vigour of the root system of the crop in low temperature conditions (Lee and Oda, 2003) [19]. Correlation studies in in the selection of suitable cultivars will provide reliable information on the nature, size and direction of selection, especially when breeders need to combine high yield potential with desired agronomic traits and grain quality traits. Path coefficient analysis is standard regression coefficient that measures the direct and indirect effect of one variable on another variable. Direct harvesting is not a safe method as it affects the environment. Therefore, it is necessary to identify the characteristics of components that can increase yield.

Materials and Methods

The research trial was conducted during *zaid*, 2021 at Main Experiment Station, Department of Vegetable Science, Kalyanpur, C. S. Azad University of Agriculture and Technology, Kanpur in randomized block design with three replications. Sixteen qualitative and quantitative traits namely, 1. Days to first staminate flower anthesis, 2. Days to first pistillate flower, 3. Node number to first staminate flower appears, 4. Node number to first pistillate flower appears, 5. Ratio of pistillate: staminate flowers, 6. Internodal length (cm), 7. Vine length at last picking stage (m), 8. Number of primary branches per plant. 9. Days to first fruit harvest, 10. Average weight / fruit (kg), 11. Number of fruits per plant, 12. Fruit length (cm), 13. Total soluble solids (TSS) ^{0} Brix, 14. Specific gravity of fruits (g/cc), 15. Dry matter content (%) and 16. Fruit yield per plant (kg) were studied for the estimation of genotypic and phenotypic correlation and direct and indirect effects.

Results and Discussion

The mean sum of square of genotypes further divided into treatments parents, parents' *vs* F1 and parents' vs F2 population. In case of F1, highly significant differences were observed among the treatments for days to first staminate flower anthesis, days to first pistillate flower, node number to first staminate flower appears, node number to first pistillate flower appears, ratio of pistillate: staminate flowers, internodal length (cm), vine length at last picking stage (m), number of primary branches per plant, average weight per fruit (kg), number of fruits per plant, fruit length (cm), total soluble solids (TSS) ^{0}Brix, specific gravityof fruits (g/cc), dry matter content (%) and fruit yield per plant (kg) at 1% significance level. Variance due to parents were recorded highly significant forall the characters is find significant difference at 1% level of significance while variance due to F1's was found highly significant for all the characters. Variance due to parent vs F1, were highly significant for Node no. To first staminate flower appears, Ratio of pistillate: staminate flower, Internodal length (cm), vine length at last picking stage (m), No. Of primary branches per plant, number of primary branches per plant, Avg. fruit wt. (kg), No. Of fruit /plant, fruit length (cm), total soluble solids (TSS) ^{0}Brix, Dry matter content (%) and fruit yield per plant (kg) at 1% level of significance, Days to first fruit harvest and Specific gravity of fruits showed significance at 5% level of significance while Days to first staminate flower anthesis, Days to first pistillate flower and Node no. To first pistillate flower appears were not found significant at any level of significance.

In case of F2 highly significant differences were recorded among the treatments, parents, F2s and parent vs F2 for all the characters except Specific gravity of fruits for treatments and F2s while for days to first staminate flower anthesis, days to first pistillate flower, Internodal length, days to first fruit harvest and no. Of fruit /plant similar finding were found by Pandit *et al.* (2008) [23] also.

Correlation coefficient

Days to first staminate flower anthesis showed significant correlation at genotypic level with positive value for Days to first pistillate flower, Internodal length (cm), Vine length at last picking stage (m), Days to first fruit harvest, Average fruit weight and specific gravity of fruit. Days to first pisitillate flower expressed positive significance correlation with average fruit weight and dry matter content. Node no. To first pistillate flower appears was positively correlated with T.S.S while this character was negatively correlated with Ratio of pistillate: staminate flower, Internodal length (cm), Days to first fruit harvest, Avg. fruit wt. (kg), No. of fruit /plant and fruit length. Ratio of pistillate: staminate flower was significantly correlated with No. of primary branches per plant and No. of fruit /plant with positive values. Internodal length (cm) exhibited positive significant correlation with Vine length at last picking stage (m), No. Of primary branches per plant, Days to first fruit harvest, Avg. fruit wt. (kg), fruit length and Specific gravity of fruits (g/cc). Vine length at last picking stage (m) showed positive significant association with No. of primary branches per plant, Days to first fruit harvest, Avg. fruit wt. (kg) and fruit length. No. of primary branches per plant exhibited positively significant correlation with Days to first fruit harvest, Avg. fruit wt. (kg), No. of fruit/plant and fruit length. Days to first fruit harvest expressed positive association with Avg. fruit wt. (kg), fruit length and Specific gravity of fruits (g/cc). Avg. fruit wt. (kg) showed positive correlation with No. of fruit /plant and fruit length. No. of fruit /plant was positively correlated with fruit length. T.S.S. showed positive correlation with specific gravity of fruit and dry matter content at genotypic level. Similar, significant, and positive correlation of fruit length have been earlier reported by Kunjam *et al.* (2019) [18] for first fruit harvest, vine length, number of fruits per plant.

Path coefficient analysis

The path coefficient analysis revealed that Days to first staminate flower anthesis, internodal length, number of primary branches per plant, Avg. fruit wt., No. of fruit /plant in F1 showed positive direct effect while Days to first fruit harvest, Ratio of pistillate: staminate flower showed significantly negative and direct effect on fruit yield per plant at genotypic level. It was also found that Days to first fruit harvest showed high indirect effect on fruit yield *via*. Internodal length (cm). Several other high indirect effects were also reported like Internodal length (cm) via. Days to first fruit harvest, Vine length at last picking stage (m) via. Days to first fruit harvest, fruit length via Days to first fruit harvest showed negative indirect effects.

Table 1: Analysis of variance for parent and F_1

Sourced of variation	DF	Days to first staminate e flower anthesis	Days to first pistillate flower	Node no. to first staminate flower appears	Node no. to first pistillate flower appears	Ratio of pistillate: Staminate flower	Internodal length (cm)	Vine length at last picking stage (m)	No. of primary branches per plant	Days to first fruit harvest	Avg fruit wt (kg)	No. of fruit /plant	Fruit length (cm)	TSS	Specific gravity of fruits (g/cc)	Dry Matter Content (%)	Fruit yield /plant per plant (kg)
Rep.	2	0.496	0.586	0.025	0.148	0.0005	0.282	0.043	0.074	7.985	0.008	0.007	5.194	0.007	0.002	0.011	0.005
Treat	54	4.108**	6.061**	6.083**	10.61**	0.0249**	3.700**	0.432**	1.725**	12.783**	0.084**	4.649**	91.468**	0.424**	0.001**	0.683**	1.936**
Error	108	0.470	0.471	0.252	0.384	0.0001	0.226	0.045	0.063	5.264	0.001	0.050	2.789	0.024	0.000	0.047	0.040
Total	164	1.668	2.313	2.169	3.749	0.0083	1.370	0.172	0.610	7.773	0.029	1.564	32.017	0.156	0.000	0.256	0.664

Table 2: Analysis of variance for parent and F_2

Sourced of variation	DF	Days to first staminate e flower anthesis	Days to first pistillate flower	Node no. to first staminate flower appears	Node no. to first pistillate flower appears	Ratio of pistillate: staminate e flower	Internodal length (cm)	Vine length at last picking stage (m)	No. of primary branches per plant	Days to first fruit harvest	Avg fruit wt (kg)	No. of fruit /plant	Fruit length (cm)	TSS	Specific gravity of fruits (g/cc)	Dry Matter Content (%)	Fruit yield /plant per plant (kg)
Rep.	2	0.153	0.749	0.188	0.098	0.001	0.377	0.001	0.056	1.313	0.001	0.002	0.07	0.035	0.002	0.036	0.012
Treat	54	3.012**	3.889**	5.621**	12.071**	0.018**	3.616**	0.455**	1.407**	11.226**	0.063**	2.596**	150.88**	0.428**	0.008**	0.797**	1.562**
Error	108	0.728	0.800	0.244	0.515	0.000	0.256	0.047	0.074	5.808	0.001	0.034	2.83	0.018	0.002	0.038	0.036
Total	164	1.473	1.817	2.014	4.315	0.006	1.364	0.181	0.513	7.537	0.022	0.877	51.54	0.153	0.004	0.288	0.538

Table 3: Analysis of variance for F_2 hybrids

Sourced of variation	DF	Days to first staminate e flower anthesis	Days to first pistillate flower	Node no. to first staminate flower appears	Node no. to first pistillate flower appears	Ratio of pistillate: staminate e flower	Internodal length (cm)	Vine length at last picking stage (m)	No. of primary branches per plant	Days to first fruit harvest	Avg fruit wt (kg)	No. of fruit /plant	Fruit length (cm)	TSS	Specific gravity of fruits(g/cc)	Dry Matter Content (%)	Fruit yield /plant per plant (kg)
Rep.	2	0.268	0.602	0.317	0.012	0.0015	0.290	0.007	0.123	7.863	0.001	0.005	0.134	0.018	0.00010	0.033	0.044
Treat	44	1.631**	2.735**	4.940**	9.276**	0.012**	1.60**	0.238**	1.191**	10.541**	0.054**	2.390**	148.863**	0.263**	0.00036**	0.800**	1.670**
Error	88	0.803	0.904	0.240	0.529	0.0001	0.259	0.047	0.076	5.897	0.002	0.036	2.866	0.019	0.00019	0.038	0.033
Total	134	1.067	1.501	1.784	3.393	0.0040	0.700	0.109	0.443	7.451	0.019	0.808	50.765	0.099	0.00025	0.288	0.571

Table 4: Genotypic correlations-F_1

Parent/Hybrids	Days to first staminate flower anthesis	Days to first pistillate flower	Node no. to first staminate flower appears	Node no. to first pistillate flower appears	Ratio of pistillate: staminate flower	Internodal length (cm)	Vine length at last picking stage (m)	No. of primary branches per plant	Days to first fruit harvest	Avg fruit wt (kg)	No. of fruit /plant	Fruit length (c m)	TSS	Specific gravity of Fruits (g/c c)	Dry Matter Content (%)	Fruit yield /plant per plant (kg)
Days to first staminate flower anthesis	1.000	1.072**	-0.440**	-0.434**	0.111	0.161*	0.188*	0.068	0.191*	0.280**	0.068	0.057	-0.092	0.188*	0.131	0.356**
Days to first pistillate flower			-0.237**	-0.293**	0.029	-0.002	0.151	-0.040	0.122	0.185*	-0.040	-0.040	-0.012	-0.009	0.184*	0.203**
Node no. To first staminate flower appears				0.872**	-0.331**	-0.183*	-0.037	-0.242**	-0.164*	-0.399**	-0.567**	-0.256**	0.341**	0.057	-0.044	-0.675**
Node no. To first pistillate flower appears					-0.288**	-0.171*	-0.139	-0.100	-0.193*	-0.360**	-0.491**	-0.286**	0.457**	0.031	0.074	-0.604**
Ratio of pistillate: staminate flower						0.027	0.111	0.448**	-0.121	0.034	0.638**	0.062	-0.190*	-0.245**	0.068	0.315**
Internodal length (cm)							0.605**	0.377**	0.923**	0.532**	0.093	0.590**	0.088	0.157*	0.008	0.422**
Vine length at last picking stage (m)								0.464**	0.572**	0.248**	0.120	0.182*	-0.114	0.142	0.042	0.215**
No. Of primary branches per plant									0.519**	0.155*	0.613**	0.224**	-0.301**	-0.207**	0.020	0.462**
Days to first fruit harvest										0.623**	-0.019	0.664**	-0.041	0.423**	-0.236**	0.526**
Avg fruit wt (kg)											0.166*	0.630**	0.068	0.048	0.124	0.661**
No. Of fruit /plant												0.238**	-0.422**	-0.289**	0.058	0.716**
Fruit length(cm)													0.080	-0.056	-0.100	0.613**
TSS														0.177*	0.231**	-0.269**
Specific gravity of fruits(g/cc)															0.028	-0.223**
Dry matter content (%)																0.018
Fruit yeild /plant per plant(kg)																1.000

*, ** Significant at 5% and 1% level, respectively

Table 5: Phenotypic correlations-F_1

Parent/Hybrids	Days to first staminate flower anthesis	Days to first pistillate flower	Node no. to first staminate flower appears	Node no. to first pistillate flower appears	Ratio of pistillate: staminate flower	Internodal length (cm)	Vine length at last picking stage (m)	No. of primary branches per plant	Days to first fruit harvest	Avg fruit wt (kg)	No. of fruit /plant	Fruit length (cm)	TSS	Specific gravity of fruits (g/c c)	Dry Matter Content (%)	Fruit yield /plant per Plant (kg)
Days to first staminate flower anthesis	1.000	0.659**	-0.370**	-0.335**	0.104	0.100	0.147	0.031	0.086	0.241**	0.070	0.031	-0.072	-0.175*	0.144	0.280**
Days to first pistillate flower			-0.206**	-0.253**	0.026	0.027	0.118	-0.043	0.061	0.155*	-0.029	-0.023	-0.023	0.051	0.122	0.192*
Node no. To first staminate flower appears				0.732**	-0.310**	-0.149	-0.048	-0.191*	-0.147	-0.363**	-0.524**	-0.269**	0.357**	0.079	-0.072	-0.632**
Node no. To first pistillate flower appears					-0.280**	-0.160*	-0.138	-0.112	-0.026	-0.327**	-0.454**	-0.248**	0.330**	0.018	0.067	-0.564**
Ratio of pistillate: staminate flower						0.009	0.098	0.413**	-0.097	0.041	0.626**	0.057	-0.171*	-0.173*	0.084	0.302**
Internodal length (cm)							0.421**	0.335**	0.364**	0.450**	0.091	0.554**	0.077	0.114	-0.082	0.405**
Vine length at last picking stage (m)								0.329**	0.269**	0.168*	0.092	0.154*	-0.015	0.038	0.085	0.134
No. Of primary branches per plant									0.211**	0.145	0.539**	0.206**	-0.269**	-0.081	-0.006	0.457**
Days to first fruit harvest										0.318**	0.006	0.232**	-0.048	0.156*	0.044	0.258**
Avg fruit wt (kg)											0.152	0.590**	0.008	0.032	0.101	0.650**
No. Of fruit /plant												0.212**	-0.373**	-0.205**	0.059	0.670**
Fruit length(cm)													0.042	-0.018	-0.159*	0.585**
TSS														0.069	0.210**	-0.294**
Specific gravity of fruits(g/cc)															-0.067	-0.109
Dry matter content (%)																-0.013
Fruit yield /plant per plant(kg)																1.000

*, ** Significant at 5% and 1% level, respectively

Table 6: Genotypic path with Grain yield per plant (g)-F_1

Parent/Hybrids	Days to first staminate flower anthesis	Days to first pistillate flower	Node no. to first staminate flower appears	Node no. to first pistillate flower appears	Ratio of pistillate: staminate flower	Internodal length (cm)	Vine length at last picking stage (m)	No. of primary branches per plant	Days to first fruit harvest	Avg fruit wt (kg)	No. of fruit /plant	Fruit length (cm)	TSS	Specific gravity of Fruits (g/c c)	Dry Matter Content (%)	Fruit yield /plant per plant (kg)
Days to first staminate flower anthesis	0.3213	-0.1064	-0.0203	0.0675	-0.0287	0.0561	-0.0197	0.0257	-0.1091	0.1340	0.0274	0.0156	0.0038	0.0105	-0.0213	0.356**
Days to first pistillate flower	0.3444	-0.0993	-0.0109	0.0455	-0.0075	-0.0006	-0.0158	-0.0152	-0.0695	0.0887	-0.0163	-0.0109	0.0005	-0.0005	-0.0300	0.203**
Node no. To first staminate flower appears	-0.1415	0.0236	0.0460	-0.1355	0.0858	-0.0636	0.0039	-0.0919	0.0933	-0.1911	-0.2302	-0.0698	-0.0143	0.0032	0.0072	-0.675**
Node no. To first pistillate flower appears	-0.1396	0.0291	0.0401	-0.1554	0.0746	-0.0596	0.0145	-0.0379	0.1100	-0.1726	-0.1994	-0.0782	-0.0191	0.0017	-0.0120	-0.604**
Ratio of pistillate: staminate flower	0.0356	-0.0029	-0.0152	0.0447	-0.2594	0.0096	-0.0116	0.1696	0.0690	0.0162	0.2592	0.0170	0.0080	-0.0136	-0.0110	0.315**
Internodal length (cm)	0.0518	0.0002	-0.0084	0.0266	-0.0071	0.3482	-0.0633	0.1427	-0.5263	0.2546	0.0379	0.1611	-0.0037	0.0087	-0.0013	0.422**
Vine length at last picking stage (m)	0.0604	-0.0150	-0.0017	0.0216	-0.0288	0.2108	-0.1046	0.1758	-0.3261	0.1188	0.0488	0.0496	0.0048	0.0079	-0.0069	0.215**
No. Of primary branches per plant	0.0218	0.0040	-0.0112	0.0155	-0.1162	0.1311	-0.0485	0.3789	-0.2960	0.0745	0.2488	0.0612	0.0126	-0.0115	-0.0033	0.462**
Days to first fruit harvest	0.0615	-0.0121	-0.0075	0.0300	0.0314	0.3213	-0.0598	0.1966	-0.5703	0.2983	-0.0079	0.1813	0.0017	0.0235	0.0385	0.526**
Avg fruit wt (kg)	0.0899	-0.0184	-0.0184	0.0560	-0.0088	0.1851	-0.0259	0.0589	-0.3551	0.4791	0.0672	0.1719	-0.0028	0.0027	-0.0203	0.661**
No. Of fruit /plant	0.0217	0.0040	-0.0261	0.0763	-0.1656	0.0325	-0.0126	0.2322	0.0111	0.0793	0.4060	0.0650	0.0177	-0.0161	-0.0094	0.716**
Fruit length(cm)	0.0184	0.0040	-0.0118	0.0445	-0.0162	0.2055	-0.0190	0.0850	-0.3789	0.3018	0.0967	0.2728	-0.0033	-0.0031	0.0163	0.613**
TSS	-0.0295	0.0012	0.0157	-0.0709	0.0493	0.0307	0.0119	-0.1139	0.0233	0.0325	-0.1714	0.0217	-0.0419	0.0099	-0.0376	-0.269**
Specific gravity of fruits(g/cc)	0.0606	0.0009	0.0027	-0.0047	0.0636	0.0547	-0.0149	-0.0784	-0.2410	0.0232	-0.1175	-0.0152	-0.0074	0.0555	-0.0046	-0.223**
Dry matter content (%)	0.0420	-0.0183	-0.0020	-0.0114	-0.0176	0.0027	-0.0044	0.0076	0.1347	0.0596	0.0234	-0.0272	-0.0097	0.0016	-0.1630	0.018

Resi- 0.0155

*, ** Significant at 5% and 1% level, respectively

Table 6: Penotypic path with Grain yield per plant (g)-F_1

Parent/Hybrids	Days to first staminate flower anthesis	Days to first pistillate flower	Node no. to first staminate flower appears	Node no. to first pistillate flower appears	Ratio of pistillate: staminate flower	Internodal length (cm)	Vine length at last picking stage (m)	No. of primary branches per plant	Days to first fruit harvest	Avg fruit wt (kg)	No. of fruit /plant	Fruit length (cm)	TSS	Specific gravity of Fruits (g/c c)	Dry Matter Content (%)	Fruit yield /plant per plant (kg)
Days to first staminate flower anthesis	0.0230	0.0802	0.0374	0.0264	-0.0146	0.0055	-0.0133	0.0038	0.0040	0.0852	0.0350	0.0055	0.0024	0.0057	-0.0062	0.280**
Days to first pistillate flower	0.0152	0.1217	0.0209	0.0199	-0.0036	0.0015	-0.0107	-0.0054	0.0029	0.0545	-0.0145	-0.0040	0.0008	-0.0017	-0.0053	0.192*
Node no. To first staminate flower appears	-0.0085	-0.0251	-0.1011	-0.0577	0.0435	-0.0081	0.0043	-0.0236	-0.0068	-0.1279	-0.2622	-0.0472	-0.0120	-0.0026	0.0031	-0.632**
Node no. To first pistillate flower appears	-0.0077	-0.0307	-0.0740	-0.0788	0.0393	-0.0087	0.0124	-0.0139	-0.0012	-0.1152	-0.2273	-0.0434	-0.0111	-0.0006	-0.0029	-0.564**
Ratio of pistillate: staminate flower	0.0024	0.0032	0.0313	0.0221	-0.1404	0.0005	-0.0088	0.0511	-0.0045	0.0144	0.3132	0.0100	0.0058	0.0057	-0.0036	0.302**
Internodal length (cm)	0.0023	0.0033	0.0151	0.0126	-0.0013	0.0544	-0.0380	0.0414	0.0170	0.1587	0.0455	0.0970	-0.0026	-0.0037	0.0035	0.405**
Vine length at last picking stage (m)	0.0034	0.0144	0.0048	0.0108	-0.0137	0.0229	-0.0902	0.0407	0.0126	0.0592	0.0461	0.0269	0.0005	-0.0012	-0.0037	0.134
No. Of primary branches per plant	0.0007	-0.0053	0.0193	0.0088	-0.0579	0.0182	-0.0297	0.1237	0.0099	0.0512	0.2695	0.0361	0.0091	0.0026	0.0003	0.457**
Days to first fruit harvest	0.0020	0.0075	0.0148	0.0020	0.0136	0.0198	-0.0243	0.0262	0.0466	0.1121	0.0030	0.0405	0.0016	-0.0051	-0.0019	0.258**
Avg fruit wt (kg)	0.0056	0.0188	0.0367	0.0257	-0.0057	0.0245	-0.0151	0.0180	0.0148	0.3527	0.0761	0.1033	-0.0003	-0.0010	-0.0044	0.650**
No. Of fruit /plant	0.0016	-0.0035	0.0530	0.0358	-0.0879	0.0050	-0.0083	0.0667	0.0003	0.0537	0.5002	0.0372	0.0126	0.0067	-0.0025	0.670**
Fruit length(cm)	0.0007	-0.0028	0.0272	0.0195	-0.0080	0.0301	-0.0138	0.0255	0.0108	0.2081	0.1061	0.1751	-0.0014	0.0006	0.0069	0.585**
TSS	-0.0017	-0.0028	-0.0361	-0.0260	0.0240	0.0042	0.0013	-0.0332	-0.0022	0.0027	-0.1868	0.0074	-0.0337	-0.0023	-0.0090	-0.294**
Specific gravity of fruits(g/cc)	-0.0040	0.0063	-0.0080	-0.0014	0.0243	0.0062	-0.0034	-0.0100	0.0073	0.0111	-0.1024	-0.0031	-0.0023	-0.0326	0.0029	-0.109
Dry matter content (%)	0.0033	0.0149	0.0072	-0.0053	-0.0118	-0.0045	-0.0077	-0.0007	0.0021	0.0357	0.0295	-0.0278	-0.0071	0.0022	-0.0431	-0.013
Fruit yeild /plant per plant(kg)	0.0230	0.0802	0.0374	0.0264	-0.0146	0.0055	-0.0133	0.0038	0.0040	0.0852	0.0350	0.0055	0.0024	0.0057	-0.0062	0.280**

Resi-0.0144

*, ** Significant at 5% and 1% level, respectively

Conclusion

Correlation studies for fruit yield per plant was found to be highest genotypic and phenotypic significant and positively correlated with No. of fruits per plant, Avg. fruit wt., fruit length, Days to first fruit harvest, No. of primary branches per plant, internodal length, ratio of pistillate: staminate flowers in F1. The path coefficient analysis revealed that Days to first staminate flower anthesis, internodal length, number of primary branches per plant, avg. fruit wt., No. of fruit /plant in F1 showed positive direct effect while Days to first fruit harvest, Ratio of pistillate: staminate flower showed significantly negative and direct effect on fruit yield per plant at genotypic level.

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