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Evaluation of physical parameter, carbohydrate and chlorophyll content on different variety/genotypes of brinjal (*Solanum melongena* L.)

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Abstract
The present study was conducted to evaluate 20 variety/ genotypes of brinjal for quality parameters. The sample was collected from vegetable trial field of CSAUA & T, Kanpur as well as after grading of the sample and the quality analysis in the laboratory was conducted as per standard procedures in the laboratory of the department of agricultural biochemistry. A significant variation was detected in all trait's studies. There was considerable variability among varieties. Data on carbohydrate content of various cultivars of some genotypes of brinjal are significantly from 3.91- 4.05%. Chlorophyll content of various cultivars of some genotypes of brinjal are significantly from 1.024-1.061%. Fruit length of various cultivars of some brinjal genotypes are 8.99-27.99 cm and Fruit width of various cultivars of some brinjal genotypes are 3.13-11.35 cm.

Keywords: Carbohydrate, chlorophyll, fruit length, fruit length

Introduction
Eggplant or brinjal (*Solanum melongena* L.; 2n = 2x = 24) is important vegetable crop and is considered a rich member of the family Solanaceae, which contains approximately 1300 species it can be grown in diversified climatic conditions of various ecological regions. It possesses high species richness with considerable flexibility of phenotypic adaptability that made the species the most important vegetable economically. Eggplant is a general term for various Solanum species cultivated for their fruits, including the East Asian aubergine (*S. melongena* L.) and the two African native eggplants, Scarlet (*S. aethiopicum* L.) and Gboma (*S. macrocarpon* L.). Brinjal or eggplant (*Solanum melongena* L.) is one of the important solanaceous vegetable crop having diploid chromosome number 2n=2x=24. One hundred gram edible portion of brinjal fruit contains 92.7% moisture, 24.0% calories, 4.0% carbohydrates, 1.4 g protein, 0.3 g fats, 1.3 g fibres, 124.0 (I.U.) vitamin A and 12.0 mg vitamin C (Chen and Li, 1996). It also contains 52.0 mg chlorine, 47.0 mg phosphorus, 44.0 mg sulphur and other minerals (Aykroyd, 1963) [6]. Plant height (cm), days to 50% flowering, primary branches per plant, fruit weight (g), fruit circumference (cm), fruits per plant, fruit length (cm),). were estimated according to Searle (1961). Brinjal has high nutritive value when compared with tomato. It contains high amount of carbohydrates (6.4%), protein (1.3%), fat (0.3%), calcium (0.02%), phosphorus (0.02%), iron (0.0013%) and other mineral matters (Kandoliya *et al*., 2015) [3].
The chlorophyll a, chlorophyll b and total chlorophyll content in uninfected leaf were 0.082 mg/g, 0.136 mg/g and 0.536 mg/g respectively however these chlorophyll substances were decreased in Epilachna infected brinjal leaves were 0.012 mg/g, 0.01 mg/g and 0.025 mg/g respectively.

Materials and Methods
Total carbohydrate content
Total carbohydrate was determined by the difference method formula. The following formula used for determining the total carbohydrate percent is as follow:

Total carbohydrate% = 100 – (Protein% + Ash% + Ether extract %)

Chlorophyll content in leaves

The chlorophyll content of leaves was determined at 40 days after sowing. The representative fresh leaf samples were taken. These were washed with distilled water and dried with blotting paper. Out of this, 100 mg fresh leaves were taken in mortar and ground well by pestle with 5 ml 80 percent acetone and centrifuged at 2000 rpm for 10 minutes and filtered through Whatman filter paper No. 1. Volume of supernatant was made to 10 ml with 80 percent acetone. The resultant intensity of colour was measured on Spectronbic-20 at Absorbance (A) of 652 nm. Total chlorophyll content was calculated with the help of following formula and expressed in mg g-1 fresh weight of leaves (Arnon, 1949) [22].

$$\text{Total chlorophyll (mg g1 leaf weight)} = \frac{\text{A(652) x 29 X Total volume (ml)}}{\alpha \text{ x 1000 x Weight of sample (g)}}$$

Fruit length (cm)

Length of five randomly selected mature fruits at marketable stage was measured in centimeter from the base of calyx to tip of fruit with the help of measuring tape in long fruited progenies and with vernier calipers in round fruited progenies and the average was computed.

Fruit width/ circumference (cm)

Fruit circumference of edible fruits were recorded on same five randomly selected fruits of each tagged plant in each replication on which fruit length was measured. The measurement of fruit circumference at the thickest portion of the fruit was taken with the help of measuring tape in centimetre and mean value was worked out.

Results and Discussion

Carbohydrate content of various cultivars of some genotypes of brinjal significantly from 3.91-4.05%. The genotype of Azad Kranti showed the maximum carbohydrate content (4.05%) followed by genotype- C-5623(4.04%), C-7864-1 (4.03) and KS-55(4.025%). The minimum carbohydrate content was noted in genotype of KS-331 (3.91). The genotype of Azad Kranti superior than the genotype of KS-331. The results are supported by Sanga *et al.*, (2017) [7].

Chlorophyll content of various cultivars of some genotypes of brinjal significantly from 1.024-1.061%. The genotype of Azad Kranti showed the maximum chlorophyll content (1.061%) followed bygenotype- C-9015 (1.060%), C-7864-1 (1.054%) and KS-235(1.053%). The minimum chlorophyll content was noted in genotype of C-8841 (01.024%). The genotype of Azad Kranti superior than the genotype of C-8841. The results are supported by Sundareswari C and DNP Sudarmani (2019) [21].

Fruit length of various cultivars of some brinjal genotypes are observed that the fruit length genotype C-8841 showed the maximum fruit length (27.99 cm) followed by genotype KS-331 (27.80 cm), C-9006 (26.90 cm) and C-8502-1 (25.95 cm). The minimum fruit length was noted in genotype C-9013 (08.99 cm). Fruit length C- 8841 were significantly superior than C-9013. These results are in close agreement with the reports Makasare *et al.*, (2020) [8].

Fruit width of various cultivars of some brinjal genotypes are observed that the fruit width genotype C-9015 showed the maximum fruit width (11.35 cm) followed by genotype C-9012 (11.14 cm), C-7864-1 (11.13 cm) and C-5623 (10.52 cm). The minimum fruit width was noted in genotype C-9013 (03.13 cm). Fruit length C-9015 were significantly superior than C-9013. The results are supported by Makasare *et al.*, (2020) [8].

Table 1: Carbohydrate and chlorophyll content in brinjal genotypes

S.N.	Varieties	Carbohydrate content (%)		Pooled mean	Chlorophyll content (%)		Pooled mean
		2021	2022		2021	2022	
0	KS-235	3.85	4.05	3.95	1.064	1.043	1.064
2	KS-454	3.91	4.06	3.98	1.034	1.031	1.034
3	KS-456	3.85	4.08	3.96	1.024	1.028	1.024
4	KS-453	3.95	4.04	3.99	1.048	1.050	1.048
5	KS-224	3.91	4.07	3.99	1.029	1.032	1.029
6	KS-554	3.89	4.04	3.96	1.034	1.049	1.034
7	KS-555	3.97	4.09	4.03	1.052	1.037	1.052
8	KS-556	3.94	4.06	4.0	1.048	1.046	1.048
9	KS-331	3.96	4.08	4.02	1.047	1.056	1.047
10	C-9011	3.93	4.06	3.99	1.024	1.047	1.024
11	C-9012	3.94	4.02	3.98	1.027	1.045	1.027
12	C-9013	3.98	4.06	4.02	1.028	1.035	1.028
13	C-9015	3.83	4.03	3.93	1.067	1.054	1.067
14	C-9006	3.89	4.07	3.98	1.045	1.042	1.045
15	C-8502-1	3.79	4.02	3.90	1.027	1.034	1.027
16	C-8841	4.05	3.79	3.92	1.021	1.027	1.021
17	C-5623	4.09	3.88	3.98	1.031	1.037	1.031
18	C-7864-1	4.02	4.01	4.01	1.052	1.057	1.052
19	C-8805	4.01	4.00	4.00	1.025	1.028	1.025
20	Azad Kranti	4.08	3.92	4.02	1.067	1.056	1.067
	Mean	3.94	4.02	3.98	1.03	1.04	1.03
	S.E. m±	0.52	0.54	0.52	0.14	0.14	0.14
	C.D. (5%)	1.49	1.54	1.49	0.4	0.4	0.4

Table 2: Physical Characteristics (Fruit length and Fruit width) of Brinjal Genotypes

S.N.	Varieties	Fruit length (cm)		Pooled mean	Fruit width (cm)		Pooled mean
		2021	2022		2021	2022	
1	KS-235	12.05	12.25	12.15	08.25	08.15	08.20
2	KS-454	11.45	10.55	11.00	08.64	08.44	08.54
3	KS-456	12.26	11.36	11.81	09.11	09.21	09.16
4	KS-453	10.42	10.65	10.54	10.11	10.01	10.06
5	KS-224	11.43	10.53	10.98	10.25	10.15	10.20
6	KS-554	22.41	22.61	22.51	03.45	03.25	03.35
7	KS-555	23.15	23.55	23.35	03.65	03.45	03.55
8	KS-556	25.65	24.85	25.25	04.15	04.05	04.10
9	KS-331	28.25	27.35	27.80	03.75	03.55	03.65
10	C-9011	09.35	09.55	09.45	03.18	03.28	03.23
11	C-9012	12.65	12.25	12.45	11.09	11.19	11.14
12	C-9013	08.54	09.44	08.99	03.11	03.01	03.06
13	C-9015	11.35	10.55	10.45	10.45	10.25	11.35
14	C-9006	27.25	26.55	26.90	03.16	03.18	03.17
15	C-8502-1	26.55	25.35	25.95	03.26	03.06	03.16
16	C-8841	28.54	27.44	27.99	03.42	03.22	03.32
17	C-5623	10.41	10.61	10.51	10.62	10.42	10.52
18	C-7864-1	12.15	11.15	11.65	11.23	11.03	11.13
19	C-8805	23.25	23.55	23.40	03.47	03.27	03.37
20	Azad Kranti	24.15	24.45	23.30	03.35	03.15	03.25
	Mean	17.56	17.229	17.4	6.385	6.266	6.326
	S.E. m±	1.94	1.94	3.41	0.96	0.95	1.68
	C.D. (5%)	5.57	5.56	10.13	2.76	2.71	5.00

Conclusion

1. Brinjal genotype Azad Kranti, C-5623, C-7864-1 and KS-554 showed the maximum carbohydrate content, 4.05%, 4.04%, 4.03% and 4.025% respectively. While the minimum carbohydrate content was found in genotype KS-331 (3.91%).
2. Brinjal genotype Azad Kranti, C-9015, C-7864-1, and KS-235 showed the maximum chlorophyll content (01.061%), (1.060%), (1.054%) and (1.053%) respectively. While the minimum chlorophyll content was noted in genotype of C-8841 (01.024%).
3. The genotype C-8841, KS-331, C-9006 and C-8502-1 showed the maximum fruit length (27.99 cm), (27.80 cm), (26.90 cm) and (25.95 cm) respectively. The minimum fruit length was noted in genotype C-9013 (08.99 cm).
4. The genotype C-9015, C-9012, C7864-1 and C-5623 showed the maximum fruit width (11.35 cm) (11.14 cm), (11.13 cm) and (10.52 cm) respectively. The minimum fruit width was noted in genotype C-9013 (03.13 cm).

On the basis of results recorded during investigation of brinjal quality characteristics of 20 recommended genotypes entitled "Quality characteristics of some genotype of brinjal available in the market None of the brinjal genotypes had all the desirable quality traits as well as physical and biochemical characteristics but some of the recommended brinjal genotypes possessed most of the desired quality parameters.

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