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Characterization of brinjal (*Solanum melongena* L.) genotypes for growth, yield and quality traits under foothill condition of Nagaland

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ABSTRACT

A field experiment was conducted during rabi season of 2017-18 at the Experimental Farm, Department of Horticulture, School of Agricultural Sciences and Rural Development, Medziphema Campus, Nagaland University to evaluate the growth, yield and quality of different genotypes ofbrinjal under foothill condition of Nagaland.Forty six genotypes of brinjalwere evaluated withthree replications inrandomized block design.Results revealed that genotype IIVR-7 exhibited maximum plant height (108.7 cm), branches plant^{-1} (22.5) and number of fruits plant^{-1} (33.8) while IIVR-10 recorded maximum number of leaves plant^{-1} (175.0). Shortest crop duration (134.3 days) was recorded in genotype IIVR-21. Genotype IIVR-1 recorded maximum fruit length (19.8cm) while, genotype IIVR-38 exhibited maximum fruit diameter (12.6 cm). Genotype IIVR-31 exhibited maximum fruit volume (396.6 cc), fresh weight of fruit (316.1 g) and fruit yield ha^{-1} (399.1 q ha^{-1}). Anthocyanin content was found to be highest (153.4 mg 100g^{-1}) in genotype IIVR-42. Based on the experimental results, it can be concluded that genotype IIVR-31 was proved to be potential yielder under foothill condition of Nagaland.

Keywords: Brinjal, genotypes, growth, quality, yield

INTRODUCTION

Brinjal (*Solanummelongena* L.*)* also known as egg plantor auberginebelongs to family Solanaceae. Brinjalis an important indigenous vegetable crop of India. It is grown mainly for its tender and immature fruits and has great potential as raw materials for pickle making and dehydration industries for vast domestic market as well as for export. It is typical day neutral plant and often cross pollinated crop.Fruit shape varies from long to oval, oblong and round. It is rich source of vitamin B and in minerals i.e. Ca, Mg, P, K, and Fe. It is good source of vitamin B. Purple variety has higher copper content and polyphenol oxidase activity whereas iron and catalase activity is highest in the green cultivars. Pigmented, dark purple brinjal has more vitamin C than those with white skin. Anthocyanin pigment present in the fruit is responsible for purple colour of fruit skin. Amino acid content is higher in purple variety. Bitterness in brinjal is due to presence of glycoalkaloids i.e. solasodine. Generally high amount of glycoalkaloids (20 mg 100g^{-1}fresh weight) produces a bitter taste and off flavour. White brinjal is said to be good for diabetic patients. It can cure toothache if fried brinjal fruit in tin oil is taken and acts as an excellent remedy for those suffering from liver complaints (Kanaujia*et al.,* 2017).The estimated area and production of brinjal in India are about 0.66 million hectare, and 12.40 million tonnes, respectiively(NHB, 2017). Nagaland is blessed with diverse agro-climatic conditions, varied soil types and abundant rainfall which enable the cultivation of various types of vegetable crops. Brinjal is cultivated in the state but only in small quantity. The potential of brinjal as fresh vegetables is not exploited yet. Before recommendation of any cultivars suited for this region, it is pertinent to evaluate cultivars giving emphasis on the aspects of genotypic suitability and yield. The performance of the varieties of brinjal varies from place to place with respect to agro-climatic conditions of the regions. Considering all the above mentioned facts, a pertinent need was felt to undertake an experiment on the evaluation of brinjalgenotypes under foothill condition of Nagaland so as to identify, the best genotype suited for the agro-climatic condition of foothill of Nagaland.

MATERIALS AND METHODS

The present investigation was carried out at Experimental Farm of Horticulture, School of Agricultural Sciences and Rural Development, Nagaland University, Medziphema Campus, Nagaland during rabi season of 2017-18. The

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experimental site is located at an altitude of 310 m above mean sea level with geographical location of $25^0$45'43"N latitude and $93^0$33'04"E longitude. The experimental material comprised forty six genotypes *viz.* IIVR-1, IIVR-2, IIVR-3, IIVR-4, IIVR-5, IIVR-6, IIVR-7, IIVR- 8, IIVR-9, IIVR-10, IIVR-11, IIVR-12, IIVR-13, IIVR-14, IIVR-15, IIVR-16, IIVR-17, IIVR-18, IIVR-19, IIVR-20, IIVR-21, IIVR-22, IIVR-23, IIVR-24, IIVR-25, IIVR-26, IIVR-27, IIVR-28, IIVR-29, IIVR-30, IIVR-31, IIVR-32, IIVR-33, IIVR-34, IIVR-35, IIVR-36, IIVR-37, IIVR-38, IIVR-39, IIVR-40, IIVR-41, IIVR-42, IIVR-43, IIVR-44, IIVR-45 and Localvariety.All the forty six genotypes were evaluatedin a randomized block design with three replications. Nursery was raised under low cost polyhouse. Sowing of seed was done on 15th October, 2017.Thirty days old,healthy and uniform seedlings free from insect pests and diseases having good root system of about 10-15 cm height having 3-4 true leaves were transplanted to the wellprepared raised beds in the main field.Plot size and spacingwas maintained 1.8 x 1.8m and 60x60 cm, respectively. Recommended cultural practices and plant protection measures were followed.Observations were recorded for plant height, number of leaves plant^{-1}, number of branches plant^{-1}, days taken from transplanting to 50% flowering,days taken from flowering to fruit set,**c**rop duration,fruit length, fruit diameter,fruit volume, fresh weight of fruit, number of fruits plant^{-1}, fruit yield andAnthocyanincontent as given by Rangana (1999). Harvesting was done 100 days after transplanting when the fruits developed good colour and marketable size but still immature. Fruits were harvested usually in the afternoon to avoid sun scalding.Experimental data were statistically analysed as suggested by Panse and Sukhatme (2000).

RESULTS AND DISCUSSION

Growth attributes

The data obtained on growth parameter revealed significant differences under all the genotypes (Table 1). The plant height of all the forty six genotypes was ranged between 52.5-108.7 cm.The genotype IIVR-7 recorded the highest plant height of 108.7 cm followed by IIVR-1 which recorded 94.5 cm, while minimum plant height of 52.5 cm was recorded in genotype IIVR-30. Number of leaves plant^{-1} showed significant difference among the genotypes varied from 38.0 to 175.5. The genotype IIVR-10 produced maximum number of leaves plant^{-1} (175.5). While genotypes IIVR-30 produced minimum number of leaves plant^{-1}(38.0). Different genotypes showed variable behaviour on the number of branches plant^{-1}. The number of branches among the studied genotypes ranged from 11.5 to 22.5. Among the genotypes, IIVR-7 exhibited maximum number of branches plant^{-1}(22.5), whilegenotype IIVR-30 exhibited the lowest number of branches plant^{-1}(11.5). Data showed that the genotype differ significantly in number of days taken for 50% flowering. It varied from 55.6 to 77.0 days. The genotypes IIVR-25 recorded minimum number of days (55.6), while genotype IIVR-38 recorded highest number of days (77.0).Number of days taken from flowering to fruit set varied among different genotypes. It varied from 7.0to 9.6 days. The genotype IIVR-4 recorded the maximum number of days (9.6), while genotypes IIVR-8, IIVR-24 and local variety recorded minimum number of days (7.0). Crop duration was found significantly different among the genotypes. The genotype IIVR-44 recorded the maximum crop duration of 164.6 days. While minimum was recorded from genotype IIVR-21 (134.3 days). Similar findings were reported byPandit*et al.* (2010), Singh *et al.* (2011), Kanaujia and Phom (2016) and Kanaujia*et al.*(2018).Results revealed that the number of branches plant^{-1}has direct effect on the number of leaves plant^{-1}. The attainment of highest and lowest records in growthattributes maybe due to genetic makeup of the plant which indirectly governs the morphology of the plant. Since all the varieties are grown in same climatic condition.

Table 1: Performance of brinjal genotypes for growth attributes

Genotypes	Plant height (cm)	Number of leaves plant^{-1}	Number of branches plant^{-1}	Days taken from transplanting to 50% flowering	Days taken from flowering to fruit set	Days taken from fruit set to marketable stage	Crop duration (days)
IIVR- 1	94.5	101.0	19.8	66.2	7.5	15.5	150.3
IIVR- 2	82.3	64.8	16.0	74.0	9.0	20.3	156.0
IIVR- 3	77.6	75.3	12.5	75.6	9.4	20.6	155.3
IIVR- 4	92.6	44.8	13.9	63.0	9.6	20.0	156.3
IIVR- 5	89.6	47.5	14.8	64.6	8.3	17.6	154.6
IIVR- 6	101.0	59.0	15.0	65.7	7.6	17.6	148.6
IIVR- 7	108.7	156.0	22.5	65.6	7.3	17.0	149.3
IIVR- 8	81.4	131.6	16.1	69.0	7.0	15.6	156.6
IIVR- 9	60.6	41.6	11.5	56.3	8.6	16.9	149.0
IIVR- 10	83.3	175.5	18.5	66.3	8.3	18.6	149.6
IIVR- 11	76.5	89.3	16.9	76.0	8.3	20.0	158.6
IIVR- 12	73.6	89.3	17.0	72.3	9.0	20.6	163.6
IIVR- 13	92.0	85.6	18.0	67.3	9.0	21.3	158.0
IIVR- 14	81.1	88.5	15.9	66.0	7.3	19.6	151.3
IIVR- 15	72.0	52.6	14.7	61.3	7.6	21.3	139.6
IIVR- 16	81.7	64.0	17.2	64.6	8.3	23.0	143.0
IIVR- 17	82.4	67.3	16.0	67.0	8.6	20.3	138.6
IIVR- 18	76.4	82.8	14.1	71.6	8.6	20.6	146.0
IIVR- 19	73.0	77.9	13.5	67.0	8.0	21.6	147.0
IIVR- 20	71.0	76.7	13.6	70.3	8.0	19.6	151.6
IIVR- 21	80.5	81.7	15.0	67.0	8.0	20.4	134.3
IIVR- 22	86.4	60.9	15.9	66.6	7.6	21.0	135.0
IIVR- 23	75.7	118.8	14.1	70.0	8.3	19.6	136.3
IIVR- 24	75.3	89.6	12.6	65.6	7.0	16.2	138.3
IIVR- 25	83.8	63.7	13.0	55.6	7.6	18.0	146.3
IIVR- 26	79.3	75.6	14.5	59.3	7.6	16.9	139.3
IIVR- 27	89.6	141.6	13.1	55.7	7.6	16.8	139.3
IIVR- 28	74.0	140.8	14.0	56.3	7.6	15.6	136.3
IIVR- 29	74.7	98.6	13.9	57.6	9.0	15.0	139.0
IIVR- 30	52.5	38.0	11.5	66.3	8.3	16.5	141.3
IIVR- 31	81.3	66.6	14.7	63.3	8.6	15.3	146.0
IIVR- 32	71.6	103.3	15.0	69.0	7.6	18.0	141.0
IIVR- 33	86.8	58.3	16.9	66.0	8.0	18.0	150.0
IIVR- 34	79.7	99.0	16.3	67.5	7.6	19.6	152.6
IIVR- 35	84.7	82.1	14.9	65.4	8.3	19.0	155.3
IIVR- 36	83.5	139.5	15.9	60.1	8.0	21.3	150.6
IIVR- 37	75.3	96.3	18.1	62.6	7.6	21.6	151.6
IIVR- 38	94.2	81.8	18.2	77.0	8.3	23.0	147.3
IIVR- 39	81.8	37.0	18.1	56.3	7.6	21.3	148.0
IIVR- 40	75.5	56.6	15.0	56.8	8.3	19.6	140.6
IIVR- 41	93.2	118.6	15.8	59.6	8.3	19.0	148.0
IIVR- 42	70.5	94.8	14.6	64.0	8.3	19.0	155.0
IIVR- 43	84.6	52.1	19.0	65.0	9.0	18.2	160.0
IIVR- 44	86.4	43.0	15.9	68.0	8.3	19.3	164.6
IIVR- 45	71.6	62.0	15.0	69.0	8.0	21.0	153.0
Local variety	82.3	39.0	16.3	56.0	7.0	20.8	151.3
C.D.(P=5)	3.8	14.1	0.9	2.5	1.2	1.2	11.1

Yield and yield attributes

The observation showed that different genotypes differed significantly in regard to yield attributes of brinjal (Table 2). Fruit length varied from 6.4 to 19.8 cm, the longest fruit length (19.8 cm) was exhibited bygenotype IIVR-1,while shortest fruit length (6.4 cm) was recorded in IIVR-20.

Table 2: Performance of brinjal genotypes for yield and quality attributes

Genotypes	Fruit length (cm)	Fruit diameter (cm)	Fruit volume (cc)	Number of fruit plant^{-1}	Fresh weight of fruit (g)	Number of seeds fruit^{-1}	Fruit yield hectare^{-1} (q)	Anthocyanin content(mg 100 g^{-1} of fruit)
IIVR- 1	19.8	4.7	186.0	20.6	133.6	60.0	254.6	68.9
IIVR- 2	12.9	5.2	116.0	15.5	125.2	268.3	188.4	20.9
IIVR- 3	19.2	3.4	137.6	17.9	132.6	123.0	213.9	21.2
IIVR- 4	14.0	3.9	106.6	19.8	102.8	210.6	186.9	6.4
IIVR- 5	13.7	4.9	137.6	16.6	122.0	204.6	184.8	29.6
IIVR- 6	13.9	4.4	124.0	14.2	123.0	161.0	171.1	10.7
IIVR- 7	13.5	4.6	127.8	33.8	98.0	149.3	376.4	5.7
IIVR- 8	14.0	3.5	97.8	18.0	62.6	192.6	111.1	100.6
IIVR- 9	11.2	3.5	67.3	10.1	62.0	134.6	65.3	124.5
IIVR- 10	7.4	5.9	174.5	15.0	137.6	118.0	172.2	44.0
IIVR- 11	7.97	5.4	202.5	15.2	177.6	154.3	221.0	43.9
IIVR- 12	11.0	8.7	247.3	16.2	156.3	203.3	229.1	14.7
IIVR- 13	8.1	7.7	250.8	16.2	179.0	251.3	261.4	119.8
IIVR- 14	11.3	9.5	255.3	16.1	184.0	254.3	253.3	36.1
IIVR- 15	10.2	6.5	181.0	13.8	157.4	220.6	213.7	35.0
IIVR- 16	8.5	6.6	209.5	15.0	196.8	227.3	222.9	24.8
IIVR- 17	9.0	5.3	181.1	14.6	156.4	173.6	211.0	12.3
IIVR- 18	9.9	8.1	156.1	17.6	153.5	186.6	232.8	43.3
IIVR- 19	6.7	9.4	70.1	19.1	59.8	190.6	122.8	36.3
IIVR- 20	6.4	11.0	66.1	17.6	56.3	192.6	119.2	32.8
IIVR- 21	8.3	4.4	37.5	24.6	42.3	204.0	153.4	80.6
IIVR- 22	6.9	4.0	85.3	26.6	75.8	208.6	186.7	119.8
IIVR- 23	7.8	4.4	82.8	14.9	70.5	235.6	137.5	22.4
IIVR- 24	7.4	9.2	73.6	16.8	45.9	226.0	147.3	87.6
IIVR- 25	8.4	8.7	122.0	15.1	86.5	233.0	145.6	11.9
IIVR- 26	15.0	4.2	106.0	18.1	74.5	262.3	148.5	13.9
IIVR- 27	14.4	4.8	144.0	20.3	117.3	255.0	182.4	30.2
IIVR- 28	16.1	4.3	91.0	21.0	79.3	216.0	168.0	94.9
IIVR- 29	15.2	3.3	90.0	19.1	71.8	195.0	157.2	90.2
IIVR- 30	10.5	2.9	44.6	9.0	43.1	248.0	58.1	94.4
IIVR- 31	15.5	8.6	396.6	12.1	316.1	254.6	399.1	35.7
IIVR- 32	14.1	4.6	103.1	16.0	80.3	221.0	148.1	100.9
IIVR- 33	16.2	3.5	104.8	17.1	85.3	224.3	177.0	7.7
IIVR- 34	15.3	4.8	107.3	23.3	96.1	257.0	231.4	36.7
IIVR- 35	10.9	5.6	293.0	14.4	170.0	250.3	235.2	36.7
IIVR- 36	11.7	7.4	306.0	13.5	202.3	237.0	228.5	89.7
IIVR- 37	11.4	7.5	258.1	15.9	187.3	230.3	274.8	51.9
IIVR- 38	10.8	12.6	284.1	15.0	197.6	217.3	277.7	12.7
IIVR- 39	11.3	6.2	277.3	16.0	185.7	238.3	268.4	50.67
IIVR- 40	10.3	6.0	268.0	14.7	175.7	242.6	240.7	20.3
IIVR- 41	11.0	8.0	273.0	15.3	184.4	249.6	247.2	14.7
IIVR- 42	11.2	7.9	285.3	13.4	194.0	250.3	223.0	153.4
IIVR- 43	11.2	8.8	223.3	15.4	199.3	248.0	311.6	17.7
IIVR- 44	9.5	8.4	83.0	21.7	75.8	214.6	157.2	34.3
IIVR- 45	14.1	5.8	138.3	16.0	80.3	231.6	177.0	63.0
Local variety	11.0	7.3	145.0	15.7	101.6	232.6	160.4	50.0
C.D.(P=5)	0.3	0.2	14.7	0.9	2.5	18.9	6.9	1.2

Quality attributes

The maximum fruit diameter (12.6cm) was obtained from genotype IIVR-38, whereas minimum were recorded from genotypeIIVR-30 (2.9cm). Fruit volume varied from 44.6 cc to 396.6 cc. Genotype IIVR-31 exhibited the maximum fruit volume (396.6 cc) which is found to be significantly superior than the other genotypes. Whereas IIVR-30 recorded the least fruit volume (44.6 cc).All the genotypes differed significantly in regard to number of fruits plant^{-1}. The number of fruit plant^{-1} ranged from 9.0 to 33.8. Maximum number of fruit plant^{-1} (33.8) were recorded in genotype IIVR-7 followed by genotype IIVR-22 with 26.6 fruits plant^{-1}, while minimum number of fruits plant^{-1}(9.0) was recorded in genotype IIVR-30. The fresh weight of fruit exhibited wide variation among the different genotypes ranging from 42.3 to 316.1g. The genotype IIVR- 31 exhibited maximum fresh weight (316.1g), while genotype IIVR-21 recorded minimum fresh weight (42.3g). The data showed significant differences in number of seeds fruit^{-1} between different genotypes. The number of seeds ranged from 60.0 to 268.3. The least number of seeds fruit^{-1}(60.0) was found in genotype IIVR-1,while maximum seedsfruit^{-1} (268.3) were found in genotype IIVR-2. The results were similar with the findings of Kumar *et al.* (2012), Ralte and Kanaujia (2015) and Kanaujia*et al.* (2018). Fruit yield is the most important complex trait in brinjal. Different genotypes showed significant effect on fruit yield. The fruit yield of all the forty six genotypes was ranged between 58.1 to 399.1qha^{-1}. Genotypes IIVR-31 recorded the maximumfruit yield (399.1 qha^{-1}) followed by genotype IIVR-7 (376.4 qha^{-1}), while genotype IIVR-30 recorded the minimum fruit yield (58.1qha^{-1}). It is found that fruit volume and fresh weight fruit plant is directly related to fruit yield. It is influenced by genetic and environmental effects. The results were in close conformity from the findings of Kanaujia and Phom (2016), Yimchunge *et al.* (2018) and Kanaujia *et al.* (2018).

Data (Table 2)showed that the different genotypes differed significantly in regard to anthocyanin content. The anthocyanin content ranged from 5.7 to 153.4 mg100g^{-1}.Maximum anthocyanin content of 153.4 mg100g^{-1}was recorded from the genotypes IIVR-42 which was significantly superior over the other genotypes. Whereas the genotype IIVR-7 recorded minimum anthocyanin content (5.7 mg100g^{-1}). The resultsare in conformity from the findings of Kumari*et al.* (2018).

On the basis of our findings, it can be concluded that the genotypeIIVR-31 was found superior for high yield and good for fresh marketing.Thus, from the results it can be concluded that genotype IIVR-31is recommended as better genotype for commercial cultivation and further crop improvement programme underfoothill conditions of Nagaland.

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REFERENCES

Kanaujia, S. P., Maiti, C. S. and Narayan, R.(2017) Text Book of Vegetable Production, Today and Tomorrow Printers and Publishers, New Delhi.

Kanaujia, S. P. and Phom, M. (2016) Performance of various genotype of tomato under foot hill condition of Nagaland*. Annals of Plant and Soil Research***18**(1):33-6.

Kanaujia, S. P., OinamBidyalaxmi Devi, Jha,A. and Ananda,A.(2018) Evaluation of brinjal (*Solanummelongena* L.) genotypes under foothill condition of Nagaland.*Current Advances in Agricultural Sciences* **10**(1):55-57.

Kumar, S. R., Arumugam, T. and Premalakshmi, V. (2012) Evaluation and variability studies in local types of brinjal for yield and quality (*Solanummelongena*L.).*Electronic Journal of Plant Breeding***3**(4):977-982.

Kumari, A., Chawla, N and Dhatt, A. S. (2018) Genotypic differences for anthocyanins in different parts of eggplant (*Solanummelongena* L.). *International Journal of*

*Advanced Research in Biological Sciences***5**(1):22-15.

NHB, (2017) Horticultural Statistics at a Glance. Indian Horticulture Database, NHB, Gurgaon, Haryana.

Pandit, M. K., Thapa, H., Akhtar, S. and Hazra, P. (2010) Evaluation of brinjal genotypes for growth and reproductive characters with seasonal variation.*Journal of Crop and Weed***6** (2):31-34.

Panse V G and Sukhatme P V, (2000) Statistical methods for agricultural workers.ICAR. New Delhi.

Ralte, L. and Kanaujia, S. P. (2015) Performance of various genotype of capsicum under foothill condition of Nagaland. *Agriculture for Sustainable Development.***3**(1):83-86.

Rangana, S. (1999) Handbook of analysis and quality control for fruits and vegetable products. *Tata McGraw-Hill Publishing Co. Ltd,* New Delh.

Singh, A. K., Singh, K., Mishra, R. and Rai, V. K. (2011) Evaluation of brinjal (*Solanummelongena* L) genetic pool for various characters.*Environment and Ecology***29**(3): 1204-1206.

Yimchunger, T. L. Sarkar, A. and S. P. Kanaujia (2018) Evaluation of different genotypes of cherry tomato (*Solanumlycopersicum* var. *cerasiforme*) under foothill condition of Nagaland.*Annals of Plant and Soil Research* 20(3):228-232.