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Performance of Brinjal Genotypes with Special Reference to Ner

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Introduction:

India has diverse agro-climatic zones with distinct seasons, making it possible to grow a wide range of vegetables. Vegetables are important components of Indian agriculture due to their nutritional, medicinal, industrial value and export potential. Vegetable is a natural protective food as their consumption prevents several diseases and plays a vital role in human body. All essential nutrients are available in vegetables especially minerals and vitamins which are required for normal functioning of human metabolic activity. India has made quantum jump in vegetables production and emerged as the second largest producer of vegetables next to china and share 18% of world production.

Brinjal (*Solanum melongena* L), also known as egg plant and aubergine, belongs to family Solanaceae having chromosome no.24 (2n=24). Fruit is called berry and often cross pollinated due to heterostyled. It is a non tuberiferous species of solanum and typical day neutral plant. It was originally domesticated from the wild nightshade species thorn or bitter apple, *Solanum incanum*. It is native to South East Asia(India).The eggplant is a delicate, tropical perennial plant often cultivated as a tender or half-hardy annual in temperate climates. The stem is of often spiny. The flowers are white to purple in colour with a five-lobed corolla and yellow stamen. Purple colour of eggplant is due to presence of anthocyanin while white fruit lack this pigment. Some common cultivars have fruit i.e., egg-shaped, glossy and purple with white flesh and a spongy meaty texture. Fruits are borne either singly or in clusters. Fruits of cluster type varieties are small. The round or egg-shaped cultivars are

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grouped under var. *esculentum*. The long, slender are included under var. *serpentinum* and dwarf brinjal plants are put under var. *depressum*. The cut surface of the flesh rapidly turns brown when the fruit is cut open (oxidation).

Brinjal is most commonly grown vegetable in India and is almost available throughout the year. Brinjal is valued for its tender unripe fruits used as a cooked vegetable. White brinjal is said to be good for diabetics patients. It is also used in pickle making and dehydration industry and also an excellent remedy those suffering from liver complaints. The eggplant has a special place in folklore. In 13th century Italian traditional folklore, the eggplant can cause insanity and in 19th century Egypt, insanity was said to be" more common and violent" when the eggplant is in season in the summer. Because of the plant's relationship with various other nightshades, the fruit was at one time believed to be extremely poisonous. The flowers and leaves can be poisonous if consumed in large quantities due to the presence of Solanine. Bitterness in brinjal is due to presence of glycoalkaloids.

Raw eggplant is composed of 92% water,6% carbohydrates,1%protein and negligible fat. It provides low amounts of essential nutrients with only manganese having a moderate percentage(11%) of the daily value. Minor changes in nutrient composition occur with season, environment of cultivation (open field or greenhouse) and genotype.

Brinjal is a warm season crop and susceptible to severe frost. It adapted to a wide range of climatic condition. It requires a long warm growing season for its successful cultivation. A daily average temperature of 13 to 21^{0}C is most favourable for optimum growth and yield. The brinjal seed germinates at 25^0 C. Brinjal can be grown in all types of soils varying from light sandy soil to heavy clay. The ideal soil should be a deep, fertile and well drained. Light soils are good for a healthy crop but heavy soils are suited for high yield. For better growth and development the preferable soil pH range is 5.5-6.8.If the soil is acidic (pH<5.0), liming is advocated.

Statistical analysis:

India ranks second in production of brinjal next to china. Presently vegetable occupies 10.259 million hectare with production of 184.394 million tones and with productivity of 17.97 tonnes/ha. Out of which brinjal occupies 730hectare with production of 12801 tonnes.

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STATE-WISE AREA AND PRODUCTION OF BRINJAL IN NER:

Production in '000MT Area in '000Ha

Sl No.	STATES	AREA	PRODUCTION
1.	ARUNACHAL PRADESH	0.32	1.82
2.	ASSAM	17.76	286.35
3.	MEGHALAYA	1.08	15.21
4.	MIZORAM	2.39	19.33
5.	NAGALAND	0.48	3.80
6.	SIKKIM	0.54	3.32
7.	TRIPURA	3.62	77.88

Prospects of brinjal cultivation in NER:

Present production of vegetable is not sufficient to meet the requirement of 300g vegetables/capita/day. On average Indian consumes only 237 g vegetables/capita/day is much below the actual requirement. So, to meet these requirements there is lot of scope to grow vegetables in this region. The climatic conditions of NER are diverse which varies from temperate to tropical with fertile soil and abundance rainfall. All types of vegetable can be grown throughout the year in one part or the other part of the region. Brinjal can be grown throughout the year and it is valued for its tender unripe fruits used as cooked vegetable. White brinjal is said to be good for diabetic patients. It is also used in pickle making and dehydration industry and also an excellent remedy those suffering from liver complaints. People are being more health conscious and seeing the growing demands of the vegetable there is a great potential for cultivation of this crops.

Research Findings:

Venkataswarlu and Verma (2001) evaluated the performance of 9 local aborigine lines(selection-1 to selection-9) at Jharnapani, Nagaland, India, in 1996 and 1997. Selection-3 and selection-9 produced the tallest plants(78.66 and 89.31 cm respectively). Selection-6 recorded the highest fruit yield per plant (2.02 kg) and per hectare (282.48 q). Fruit girth was

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highest in selection-2 (5.45 cm). Damage by fruit borer(*Leucinodesorbonalis*) was highest on 24 December 1996(33.84%) and 4 January 1997(30.42%) and lowest on 20 January.

Kafaytullah (2009) carried out experiment on studies on genetic variability for yield and quality traits in brinjal. High PCV, GCV and high genetic advanced were observed. Correlation studies indicated positive significant correlation. The studies revealed that simultaneous improvement of single fruit weight, no. of fruits per plant and fruit length enhance the fruit yield maximum contribution towards divergence was by fruit yield per hectare and fruit yield per plant based on performance of genotypes for fruit, the genotypes viz., Arka Shirish, R-2587 and L-3271 were found to be promising.

Pandit *et al.* (2010) carried out an evaluating involving twelve genotypes of brinjal to evaluate their performance out to find out cultivars suitable for summer-rainy and autumn-winter season of southern Bengal. In general all the genotypes performed better in the autumn-winter season. In high temperature and high moisture condition fruit development was lower, which might have happened due to excessive vegetative growth and subsequent retarted partition of photosynthates to the economic sink. Higher ratio of long/medium/pseudoshort style flower and fruit no. per plant, along with better fruit weight were found to be premium traits for better yield. BCB-23, 38 and 57 yielded better in the autumn-winter season while BCB-43 was found to be the best yielder in summer-rainy season.

Rathi *et al.*(2011)conducted on Breeding Potential of Brinjal Genotypes Using D^2Analysis.On the basis of mean performance of different clusters, genotypes having high yield along with fruit diameter, fruit index and average fruit weight were observed in cluster V having genotypes like DBR-31 (Delhi), Green Long(Kalyani), KS-335(Kalayanpur),G-190 (IARI, New Delhi),DBR-8(IARI,New Delhi),SL-91-2 (Pantnagar), SL-190-10-12(Panipat), Swarna Shree (Ranchi), ABR-1(Anand).

Nayak and Nagre (2013) conducted trail on Genetic Variability and Correlation studies in Brinjal (*Solanum melongena* L).Variability studies revealed that highly significant differences were recorded among varieties for all characters. Correlation and path analysis revealed that fruit length, diameter, weight influenced the fruit yield in plant with high direct effect and significant positive correlation. Therefore, fruit length, diameter, height are an

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important characters which may be included in selection criteria for improvement in fruit yield per plant.

Devi *et al.* (2014) conducted an experiment on screening of some brinjal cultivars for resistance to percent infestation of shoot and fruit borer (*Leucinodesorbonalis*). Minimum mean infestation in fruit was found in genotype Punjab Sadabahr, 2010 BRLVAR-3, 2010/BRLVAR-1, 2010/BRLVAR-4 while maximum mean infestation in fruits was recorded in Swarnamani. The calyx diameter and fruit diameter was significantly positive association with fruit infestation. Greenish purple colour was the least preferred by fruit borers with fruit damage of 5.21 % and highest fruit damage (28.27) was noticed on infested fruits in the variety of dark purple with white colour.

Dhruv *et al.* (2014) conducted experiment on biochemical and morphological traits of different cultivars of brinjal fruits growing in Anand. Mean performance showed that AB-07-02 registered the highest fruit length followed by GBL-1. In case of fruit girth, fruit weight and fruit volume data were recorded higher for GOB 1. From the nutrient point of view, Doli-5 for higher ascorbic acid and lower amount of glycoalkaloid, AB-09-01 for maximum acidity and total carbohydrates and AB-07-02 for higher anthocyanin were found. Hence these genotypes/varieties could be better utilized for further breeding programme.

Shende *et al.* (2015) performed on Genetic Variability and Response to Selection in Brinjal (*Solanum melongena* L.).High heritability coupled with genetic advance was recorded for fruit yield/plant revealed that the presence of lesser environmental influence and prevalence of additive gene action in their expression.

Reshmika*et al.* (2015) A field investigation was undertaken to evaluate yield and quality characters in 36 genotypes of brinjal (*Solanum melongena* L.). The study revealed that high significant differences were observed for all the traits. Superior genotypes in terms of yield/ha were were Jawahar Brinjal-347 (41.74t) followed by IC-90123 (36.00t), IC-90933 (32.92t) and ABSRA-2(29.69t). The genotypes Swetha recorded highest phenol content of 470mg/100g followed by Rajendra Brinjal and no. of trichomes per cm^2 were highest on the leaf of the genotype IC-354666 (4027.20). Per cent of dry matter of fruit range from 7.34 (IC-90123) to 14.20% (IC-545920). Stability of these genotypes can be assessed and utilized for further breeding for improvement of fruit yield and quality characters.

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Sharma and Banyal (2016) studied on evaluation of brinjal genotypes under low hill conditions of Himachal Pradesh. Maximum yield per plant was observed in Pant Samrat (2076.53 g) followed by Punjab Sadabahar (1883.08). The highest nos. of fruits per plant (35.66) was recorded in Pant Samrat followed by Neelima (34.66). Highest fruit length (198.33 mm) was recorded in LS-7 followed by LS-12 (172.50) Least no. of days to first picki8ng were observed in LS-7 (68.00 days) followed by LS-1 (76.00 days).

Sanga *et al.* (2017) analysed an experiment on assessment of wild brinjal (*Solanum gilo*) genotypes of NER. Among all the genotypes fruit weight (27.86g), total carbohydrates (375.78mg/100g), ascorbic acid content (16.73mg/100g),total alkaloids (4.68mg/100g) was found highest in CHFG-4. CHFG-5 had highest no. of fruits per plant (93.66), fruit yield per plant (1.97kg), total phenol (15.27mg/100g). Hence, for fruit yield and quality characteristics, the genotypes CHFG-4 and CHFG-5 were best suited for cultivation in different parts of NEH region.

Sanga *et al.* (2017) Fifteen genotypes of brinjal (*Solanum gilo*) were evaluated for genetic diversity using Mahalanobis D^2 statistics for various morpho physiological traits during 2015-2016. The data were recorded on the basis of Mahalanobis D^2 statistics, all the 15 genotypes of the present genotypes were grouped into four clusters. Maximum number of genotypes (6) were included in cluster 3 followed by cluster 1 (5) and remaining 2 each. Considering the inter cluster distance, it was highest between cluster 2 and 3 (12829.31) whereas it was lowest between cluster 1 and 2 (4944.95). Among the 19 characters studied protein content, total carbohydrates, steroid content, total phenol, fruit yield/plant and number of fruits/plant contributed maximum towards the total divergence and were found to be responsible for primary differentiation.

Gogoi*et al.*(2017) evaluated five varieties viz., Ketan, Vijay Kiron,Utkal Green, NV2035 Sarpan Bharata and two local cultivars viz., JC-1, Longai at Horticultural Research Station, Kahikuchi, Guwahiti as late rabi crop during 2014-16 for plant growth paramaters, fruit yield and bacterial wilt incidence. Utkal Green performed well wrt to fruit yield (2.32kg/plant)and other growth parameters with resistant reaction to Bacterial Wilt, with 12.44% incidence compared to other varieties which had good growth parameters but with yield reduction due to bacterial wilt (ketan-62.22% & Vijay Kiron-57.78%). Local cultivars exhibited moderate resistant reaction(JC-1-40%, Longai-34.44%) to bacterial wilt.

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Kanaujia*et al.* (2018) conducted an experiment for evaluation of brinjal genotypes under foothill condition of Nagaland. Eighteen genotypes of brinjal were evaluated with three replications in RBD. It revealed that BRLVAR-12 exhibited maximum number of leaves/plant (85.37), number of branches/plant (24.77), number of fruits/plant (52.20) and fruit yield (416.35 q/ha) but BRLVAR-15 gave maximum plant height (101.63 cm). BRLVAR-13 recorded maximum leaf area index (3.34), fruit diameter (7.89 cm), fresh weight of fruit (299.51g) and vitamin c content ((8.57 mg/100g). BRRVAR-6 exhibited the least number of seeds/fruit while highest TSS was found in Azad Brinjal (5.19^0B). However, none of the genotypes were found resistance to major pest and disease. Thus, from these results it can be conclude that genotypes BRLVAR-12 were found to be potential yielder under foothill condition of Nagaland.

Syed *et al.* (2018) carried out an experiment to evaluate the performance of fifty genotype of brinjal for yield, quality and resistance to bacterial wilt. The highest no. of fruits per plant were recorded in genotype A42 (39.07), genotype A19 (214.50) gave maximum fruit yield per plant. A5 recorded the highest ascorbic acid content (9.11 mg/100g) and the genotype A48 recorded the lowest incidence of bacterial wilt (1.33%).

Kumar *et al.* (2018) conducted an experiment on 50 genotypes of brinjal bearing fruits of different colours (purple, pink, green and white) were evaluated for anthocyanin content in peel, flesh part and whole fruit in fresh tissue. It was found out that the peel content highest anthocyanin content followed by whole fruit and flesh part. The fruits of green and white colour were found to have low or negligible anthocyanin content in peel. The genotypes showing highest anthocyanin content in peel, flesh and whole fruit were SR-132 (purple), SR-308) and SR-303 (purple) respectively. Negative correlation between weight of fruit and anthocyanin content present in peel were exhibited while there was positive correlation between anthocyanin content in peel and whole fruit.

Konyak *et al.* (2019) conducted an experiment on characterization of brinjal genotypes for growth, yield and quality traits under foothill condition of Nagaland. From the results obtained genotype IIVR-7 gave the maximum plant height (108.73cm), branches/plant (22.5)highest no. of fruits per plant (33.83), maximum anthocyanin content (153.43mg/100g) was recorded in genotype IIVR-42, and maximum yield per plant (3846.58g), maximum yield per plot (12.93kg) and maximum projected yield/ hectare (399.12q/ha) were recorded in

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genotype IIVR-31. Shortest crop duration 9134, 33 days) was recorded in genotype IIVR-21. Study on path analysis revealed that maximum positive direct effect on yield is exerted by fresh weight of fruit (1.08) and number of fruits/plant (0.407). Hence, it was concluded that the genotypes IIVR-31 was found promising under foothill condition of Nagaland.

Conclusion:

Vegetables being low calories foods are rated the best to check obesity and related disorders, it gives more economic return to the growers due to their high productivity and more net return/unit area than any other crops. North eastern region has diverse agro-climatic condition which gives an advantage to grow any vegetables throughout the country in one part or another part of the country.

Brinjal is one of the most commonly grown vegetables and considered as one of the most important crop among the vegetables as it adapted to a wide range of climatic condition. It can be used as cooked vegetables or pickle making and dehydration industry. White brinjal is used for diabetic patients.

Seeing the growing demands of the vegetable and to meet its demand it is important to do a proper research so as to recommend the cultivars best suited to a particular region which will lead to better production and income of the farmers.

Promising genotypes for NER: CHFG-4 and CHFG-5 in NEH region (Sanga *et al*, 2017), Utkal Green in Guwahati (Gogoi*et al*, 2017), BRLVAR-12 in Nagaland (Kanaujia*et al*, 2018), IIVR-31 in Nagaland (Konyak *et al.*, 2019).

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