J. Mountain Res. P-ISSN: 0974-3030, E-ISSN: 2582-5011 DOI: https://doi.org/10.51220/jmr.v21-i1.22
Vol. 21(1), (2026) 201-112

Morphological Characterization of Brinjal Genotypes Adapted to Sub-Tropical Valley Conditions of Garhwal Himalaya

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Received:15.04.2026; Revised: 31.5.2026; Accepted: 1.6.2026

Abstract: A total of 51 (*Solanum melongena* L.) brinjal genotypes were collected from the different agro-climatic zones of India, the collected genotypes were evaluated in a Randomized Complete Block Design (RCBD) with three replications. The experimental trial was conducted at Horticultural Research Centre, Chauras Campus, Department of Horticulture, HNB Garhwal University, Srinagar (Garhwal), Uttarakhand, India, during summer season, 2025. The primary aim of study was to assess the morphological variation among the collected genotypes based on various qualitative characters. All the morphological qualitative traits were analysed as per PPV&FRA (2001) and UPOV (2019) guidelines. The results revealed that, the genotypes showed huge amount of variation across the most of the evaluated parameters. The traits related to leaf, 60.78% genotypes dominant in anthocyanin pigmentation in hypocotyls, 50.98% showed dominance in medium leaf width and 82.35% genotypes fall in class of sinuate leaf margin. The traits i.e., non-spiny (31.37%), green leaf blade colour (62.75%) and green vein colour (62.75%) showed dominancy over other genotypes. The majority of genotypes found in 76.47% genotypes cluster bearing inflorescence, in 33.33% genotypes frequent purple flower colour and in 76.47% genotypes found medium days to first flowering nature. The results related to fruit characterization revealed that, the 68.63% of genotypes fall in the class of medium fruit length, 56.86% in medium fruit diameter and 33.33% in class of globular shape fruit. The diverse nature of collected genotypes revealed their true breeding value in future breeding programmes.

Keywords: Brinjal • Diversity • Dominant • Genotypes • Morphological

Introduction

Food is a fundamental and universal human necessity. In the 21st century, meeting this basic need has become a pressing and complex challenge as populations confront persistent hunger and food insecurity. Human ingenuity has repeatedly produced innovations intended to improve livelihoods and increase food availability; however, over time many of these solutions have generated new problems or exerted significant impacts on related domains such as the environment, biodiversity, and animal health. Consequently, food and nutritional security now rank among the foremost concerns for this generation. Worldwide, millions still suffer from hunger, malnutrition, and inadequate food supply. Horticultural crops-particularly vegetables-can help mitigate these issues to some extent because they deliver essential nutrients including carbohydrates, vitamins, proteins, dietary fiber, and protective phytochemicals.

Within the vegetable realm, the Solanaceae family occupies a central role in global diets. Key solanaceous crops such as potato, tomato, chilli, and capsicum constitute dietary mainstays across cultures and regions, contributing carbohydrates, vitamin C, lycopene, fiber, and other vital nutrients by diverse culinary and non-culinary uses. Among these, brinjal (*Solanum melongena* L.) stands out as a widely consumed and palatable vegetable within the Solanaceae. Known by numerous regional names across India-Aubergine, Badane, Baingan, Begunin, Bengena, Kathirikkai, Vangi, Vazhuthana, and

Vankaya brinjal is predominantly cultivated in warm, humid climates typical of tropical and subtropical zones (Singh et al. 2025).

Taxonomically, brinjal is a diploid species with a chromosome complement of 2n = 2x = 24. Its center of origin is the Indian subcontinent, a region rich in wild relatives and diverse wild forms that coexist with cultivated types (Daunay & Janick, 2007; Meyer et al. 2012). The genus *Solanum* is among the most species-rich plant groups, encompassing over 1,500 species globally. Within this genus, *S. melongena* is one of the most extensively cultivated species and includes several subspecific groups distinguished principally by fruit size. Related species such as *Solanum incanum* L., *S. torvum* Sw., and *S. sisymbriifolium* L. have been identified as valuable rootstock materials and genetic resources, offering traits for disease resistance and stress tolerance (Plazas et al. 2014).

Morphological characterization remains a foundational and indispensable method for capturing the extant variability within germplasm collections. Breeding and crop improvement efforts depend fundamentally on available variability, which provides the raw material for developing new varieties with desirable agronomic and quality attributes. Brinjal demonstrates a wide spectrum of phenotypic variation across collected genotypes, making morphological evaluation particularly informative. Morphological descriptors possess clear taxonomic significance and practical agronomic relevance within production systems. For instance, pigmentation of the leaf blade and veins often reflects anthocyanin accumulation, a trait linked to stress tolerance and nutritional quality (Stommel & Whitaker, 2003). Likewise, the degree of spininess on vegetative parts influences ease of harvesting and management. Fruit-related characteristics-fruit length, diameter, shape, colour, and stripe patterns are critical determinants of consumer preference, market acceptance, and postharvest longevity. Plant architecture, governed by growth habit, plant height, planting density, and mechanization needs, further shapes production strategies.

A systematic and comprehensive assessment of morphological descriptors across diverse brinjal genotypes yields robust, precise, and scientifically grounded information for genotypic characterization, varietal identification, and the selection of superior lines for future breeding programs.

Materials and Methods

The experimental research work was conducted at Horticultural Research Centre, Department of Horticulture, Chauras Campus, H. N. B. Garhwal University, Srinagar (Garhwal), Uttarakhand, India, during the summer season of 2025. A total of fifty-one genotypes were evaluated in the present study. The experiment was laid out in a Randomized Complete Block Design (RCBD) with three replications to ensure precision and minimize experimental error. All the recommended and important package and practices for brinjal cultivation wren followed during the entire research trail. The characterization of traits was carried out using standardized descriptor codes as prescribed by Protection of Plant Varieties and Farmers' Rights Authority (PPV&FRA, 2001) and International Union for the Protection of New Varieties of Plants (UPOV, 2019). All the data were recorded each and every selected plant at the specific phenological conditions. In case, the fruit related traits were examined at specific horticultural maturity stage.

Result and Discussion

All the observation related to morphological characterization of qualitative parameters of brinjal (*Solanum melongena* L.) is presented Tables 1 and 2. The anthocyanin pigmentation of hypocotyls at seedling stage was not equally distributed among the strains. The 60.78% of strains showed the anthocyanin colouration and 39.22% strains had no sign of pigmentation. The pigmentation is the factor, which is associated in some extent of

resistance capability against the various biotic and abiotic factors (You et al. 2023 & Toguri et al. 1993).

The leaf of a plant is the primary source for accumulation of food in plant body, which are significantly influences by numbers, size, shape, texture and other factors (Mishra et al. 2024). The number of leaf, leaf area, leaf shape, leaf size, venation of leaf, leaf texture etc., play very vital role in various biological process, resistance against biotic & abiotic factors, adoption, canopy structure, flower bearing capability, bearing capacity and bearing holding capacity/fruit load capacity, these all components are directly or indirectly associated to improves the total yield per plants (Mishra et al. 2025). Among collected genotypes, 41.18% genotypes fall medium leaf length, 33.33% in large leaf length, while 25.49% strains fall in small leaf length (Sharma et al. 2024).

Brinjal leaf width distribution comprised 43.14% small, 50.98% medium, and 5.88% large. The strong positive genotypic correlation between leaf blade width and fruit yield emphasizes medium and large width genotypes as key targets for selection in yield improvement programs (Toguri et al. 1993). In leaf margin distribution, 82.35% in genotypes in sinuate, 17.65% in entire and no genotypes are fall in dentate leaf margin. The systematic observation in multi-trait parameters in primitive cultivars are very helpful for classifications, selection of parents, enhancement in adoption, tolerance against pest with high yielding cultivars (Mishra et al. 2025). The spines are also found in many land races as well as in well adopted commercial cultivars. The 31.37% genotypes found with non-spiny traits, while 68.63% genotypes exhibited spiny leaf characters. The presence or absence of spines in brinjal might be influences several commercial traits such as management practices, fruit yield, harvesting efficiency, parental selection and hybrid development. Now in the present era, most of the consumers and breeders first choice is the selection of spineless genotypes for development of advance variety (Mishra et al. 2025; Singh et al. 2023; Kim et al. 2022).

The intensity of spininess in leaf significantly influences the management practices in field, harvesting and acceptance of spininess variety by farmers. But, spininess gives one of the major benefits against chewing pests. The 43.14% genotypes showed medium intensity, 31.37% fall in weak intensity and 25.49% in strong spininess (Morero et al. 2021; Younas et al. 2022; Mishra et al. 2025).

From, leaf blade colour point, brinjal has generally two types of *i.e.*, green and purple. These characters fall in the category qualitative traits and it significantly showed their influences in anthocyanin biosynthesis. Out of 51 genotypes, 62.75% genotypes showed green leaf and 37.25% showed purple foliage colour. On the other hand, purple leaf is most preferred phenotypic parameters for improving nutraceutical property, climatic resilience and varieties rich in anthocyanin (Manickam et al. 2025; Lyu et al. 2024; Rathod et al. 2023; Lyngdoh et al. 2025)

The 62.75% of collected genotypes exhibited green leaf vein colour due to non-functional regulatory alleles or by suppressed MBW components. The purple colour in vain indicating that, the production of anthocyanin in systematic direction, which acts as a protection against stress tolerance and increase the nutritional quality of fruits. While only 37.25% showed purple leaf vein colouration in brinjal (Manickam et al. 2025; Kaur et al. 2023).

The number of flower and style of length one of the most crucial traits to increase the fruit yield and quality of fruits in brinjal. The 76.47% genotypes produced 1-3 flower/inflorescence and 23.53% genotypes produced more than 3 flowers/ inflorescence. On the other hand, solitary inflorescence with long styled flower showed high (70-85%) fruit set percentage, while clustered types showed less fruit set percentage comparison to solitary inflorescence (Rylski et al. 1984; Banik et al. 2018; Chattopadhyay et al. 2011; Mohanta et al. 2025).

The collected genotypes fall all the classes of descriptor, the colour of flower play very important in cross pollinated crops. The colour of flower is the primary source of attraction of insects to complete the pollination process, so that bright and attractive flower is basic need in cross pollinated crops. The 33.33%, 24.41%, 21.57%, 15.69% genotypes flower falls in purple colour, light purple, dark purple and greenish-white respectively. The most dominant flower colour is purple types, associated with purple fruits, superior yields and high vitamin C (Oladosu et al. 2021).

The early flowering is a key characteristic of any variety, which is very helpful to improving duration of flowering and fruiting. Among the genotypes, 76.47% genotypes fall in medium, 13.73% fall in early and 9.82% fall in late flowering types (Younas et al. 2021). This parameter is associated with adoption, yield potential, marketing timing and heterosis in improvement programmes.

The fruit length is the most desirable trait of brinjal according to consumer preference. Among the genotypes, 68.63% classified as medium fruit, 23.53% as long fruit and 7.84% as short fruit. The short fruit types enhance fruit number and increased fruit set intensity (Singh et al., 2021). The results revealed that, 56.86% genotypes produced medium size fruit, 35.29% genotypes produced short diameter fruit and 7.84% genotypes had long diameter fruit. The medium size fruits are most preferred fruit size in Indian market, while long diameter fruits boost the fruit weight but also lower the yield without cluster per weight selection (Chinthagunti et al. 2021).

Brinjal is one of the most diversified vegetable in shape of fruits, in this research 33.33% genotypes in class of globular, 25.49% in obovate class, 11.76% in ovoid class, 9.80% in cylindrical class, 7.84% in pear shaped class, 7.84% in ellipsoid class and 3.92% in club shaped class. In India, most favour globular, glossy medium fruits (Shinde et al. 2025; Tripathy et al. 2025)

in this research work, 78.43% collected genotypes fall in the purple colour class, 17.65% genotypes green in colour and 3.92% genotypes white in colour. The purple colour skin fruits of brinjal dominated all over world due to high anthocyanin's pigments, but the intensity might be varying environmental conditions. Generally green colour fruits preferred by Indian and Southeast Asia (Sharma & Katoch, 2023). The white skin fruit lacking behind the pigments, suitable for diabetic, low glycaemic content (Hazra, 2023). Among the genotypes, 82.35% genotypes showed non striped fruit and 17.65% genotypes exhibited stripe fruits. The strip formation is the result of pigmentation on fruits. The uniform pigmentation always dominant most of commercial cultivar in India, these varieties are stable and consumer appeal (Tripathy et al. 2025).

The growth habit one of the major traits in brinjal, which significantly influences yield and quality related parameters via direct or indirect ways. In this research experiment, 68.63% genotypes exhibit the semi-spreading types, 21.57% showed erect growth habit and 7.84% found spreading type habit, whereas 5.88% genotypes fall in the class of horizontal growth habit. The erect growth habit is suitable for high-density planting, mechanized operations and vertical architecture. Semi-spreading habits optimize higher yield, balanced canopy structure, but always causes challenges for harvesting. The spreading type habit, maximizes the number of fruits, need of staking, waterlogging problems, serve as a wild germplasm source (Jayavalli et al. 2024 & Das et al. 2017)

The height of plant manipulated from genetically structure, climatic factors, soil, photoperiodic and their interaction influences the internodes length and primary branches per plant. Among the collected genotypes, 74.51%, 19.61%, 3.92% and 0.00% fall in tall, medium, small and short plant height respectively. Among three types of growth habit, medium height most dominating types all over India, due to good photosynthetic

ability, timely flowering & fruiting for standard yield. On the other side, tall type plants showed extensive branching habits, late flowering & fruiting, which delay harvesting and reducing number of pickings.

The skin colour of fruit at physiological maturity is the indication of harvesting of fruit for the seed purpose. Most of the genotypes (88.24%) fall in the class of yellow, 11.76% fall in orange colour and no genotypes reported in the class of brown colour. The colour change is due to pigment change via progressive ripening of brinjal fruits. The yellow colour of fruits due to early and high accumulation of carotenoids especially lutein & bet-carotene chlorophyll loss; brown colour due to oxidative browning with help of lignified seed and hard flesh, while yellow/ orange stage of maturity optimises for hybrid seed production (Younas et al. 2022).

The estimation of time to attain physiological ripeness obtained that, the most of strains reach the maturity early (76.47%), whereas a small number of genotypes exhibited late (13.73%) and less (9.80%) number of genotypes reach at maturity at medium time. The medium ones are well aligned with economic fruit retention with suitable seed quality. Late picking for higher yield per plant despite slower maturation (Younas et al. 2022).

Conclusion

The collected genotypes revealed vast morphological variation for various qualitative traits. These qualitative traits had great potential in future breeding programmes. The genotypes showed the desirable combination of parameters as well as non-spiny habit, medium flowering duration, purple fruits and semi-spreading growths are considerable as a parental line in hybridization programmes for development of high yielding, wide adoption with biotic & abiotic stress tolerance varieties.

Figure 1.
Short length fruit (<10 cm)

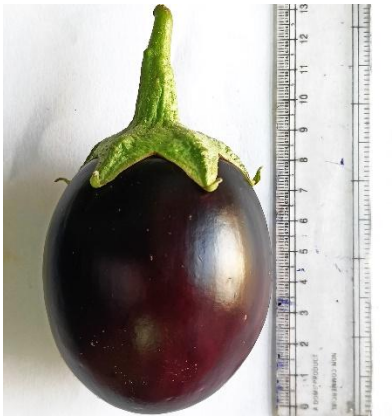

Figure 2.
Medium-length fruit (10-20 cm)

Figure 3.
Club-shaped fruit

Figure 4.
Greenish white colour flower

Figure 5.
Light purple colour flower

Figure 6.
White fruit colour of skin at commercial harvesting

Figure 7.
Purple colouration of leaf veins

Figure 8.
Medium intensity leaf spininess

Figure 9.
Change in fruit skin colour from green at commercial harvesting stage to orange at physiological maturity

Table 1. Morphological characterization of brinjal genotypes based on qualitative descriptors

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Vol. 21(1), (2026), 201-112

SN	Genotypes	Leaf: Anthocyanin colouration of hypocotyl	Leaf: Length	Leaf: Width	Leaf: Margin	Leaf: Spininess	Leaf: Intensity of spininess	Leaf: Blade colour	Leaf: Colour of vein	Inflorescence: Number of flowers	Flower: Colour	Flowering: Time (days after seed sowing)	Fruit: Length	Fruit: Diameter	Fruit: General shape	Fruit: Colour of skin at commercial harvesting	Fruit: Stripes	Plant: Growth habit	Plant: Height	Fruit: Colour of skin at physiological maturity	Time of physiological ripeness (days after fruit set)
1.	Birodi Local-1	1	3	3	5	1	3	1	2	1	3	3	7	5	3	3	1	5	7	1	1
2.	Birodi Local-2	9	3	3	5	9	5	2	2	2	3	5	5	5	1	3	9	9	7	1	5
3.	Birodi Local-3	9	5	3	1	9	5	1	1	1	4	7	7	5	3	3	1	5	5	1	1
4.	Black Long	1	5	3	5	9	5	1	1	2	3	5	5	3	2	3	1	1	7	1	1
5.	Black Purple Round	9	5	5	5	1	3	1	1	2	3	5	5	7	1	3	1	5	7	1	1
6.	Brinjal (Normal Round)	1	5	5	5	1	3	2	2	1	4	5	5	7	1	3	1	5	5	1	1
7.	Dark Green Long	9	3	3	5	9	7	1	1	2	4	5	5	3	2	2	1	5	7	1	1
8.	Green Round brinjal	1	7	5	5	9	7	1	1	1	2	5	5	5	3	2	1	5	7	1	1
9.	Jaipur local-1	9	7	5	5	9	5	1	1	1	4	5	5	3	7	3	1	5	7	1	3
10.	Jaipur local-2	9	5	3	5	9	5	1	1	2	3	3	5	5	1	3	1	5	5	1	1
11.	Light Green	9	3	3	5	9	7	2	2	1	2	5	5	5	1	2	1	5	7	1	1
12.	Light Purple	9	3	3	5	9	5	1	1	2	3	5	5	5	3	3	9	5	7	1	1
13.	Long Cover Purple-17	1	3	3	5	9	5	2	2	1	4	5	5	3	2	3	1	5	7	1	1
14.	Manipur Local	9	7	3	1	9	7	1	1	1	1	7	3	5	2	2	9	5	7	2	1
15.	Nawalgarh Local-1	1	7	5	5	9	7	1	1	2	4	3	7	5	3	3	1	1	7	1	1
16.	Nawalgarh Local-2	9	3	3	5	1	3	2	2	1	1	5	5	5	4	3	1	5	7	1	5
17.	Nawalgarh Local-3	1	5	5	5	9	5	1	1	1	1	5	7	3	1	3	9	1	7	1	5
18.	Nawalgarh Local-4	9	3	3	5	1	3	2	2	1	2	5	5	5	3	3	1	9	7	1	5
19.	Nawalgarh local-5	9	5	5	1	9	7	1	1	1	3	5	5	5	4	3	1	5	5	1	1
20.	Odisha local-1	1	5	5	5	9	5	2	2	1	2	5	5	3	7	3	1	7	7	1	1
21.	Odisha local-2	9	3	3	1	9	5	1	1	1	3	5	5	5	1	3	1	5	5	2	1
22.	Odisha local-3	1	5	5	5	9	5	1	1	1	1	5	5	5	1	3	1	1	7	1	1
23.	Pusa Purple Brinjal	9	3	3	5	1	3	1	1	1	2	5	5	5	3	3	1	5	7	1	1
24.	Sikar Local-1	1	5	5	5	1	3	2	2	1	1	5	5	5	1	3	1	5	7	1	1

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25.	Sikar Local-2	9	3	3	5	9	5	1	1	1	2	5	5	5	1	3	1	5	7	1	1
26.	Sikar Local-3	9	3	3	5	9	7	1	2	1	2	3	5	3	6	3	9	9	7	1	5
27.	Sikar Local-4	1	7	5	5	9	5	1	1	1	3	5	5	5	1	3	1	5	7	1	5
28.	Thorny Brinjal	9	5	5	5	9	7	2	2	1	4	5	3	5	1	3	1	5	7	1	1
29.	Tripura Local-1	1	7	7	5	9	7	1	1	1	3	3	7	5	3	3	1	1	7	1	1
30.	Tripura Local-2	9	7	5	1	1	3	1	1	1	1	5	5	5	3	3	9	5	3	1	3
31.	Tripura Local-3	1	7	5	5	9	7	1	1	1	2	5	5	5	1	3	1	5	7	1	1
32.	U. P. Local-1	9	7	5	5	1	3	2	2	1	2	5	5	3	6	3	1	1	7	1	1
33.	U. P. Local-2	9	5	5	5	9	5	1	1	1	4	3	5	7	1	3	1	7	5	1	1
34.	U. P. Local-3	1	7	7	5	9	7	1	2	1	3	5	5	5	3	3	1	7	7	1	1
35.	U. P. Local-4	9	7	5	5	9	5	1	1	1	2	5	7	3	6	1	1	1	7	2	5
36.	White Brinjal	1	5	5	5	9	5	2	2	1	1	5	5	3	6	1	1	1	7	1	1
37.	VSKNS1	9	7	5	5	9	5	2	2	1	4	3	5	7	1	3	9	5	7	1	1
38.	VSKNS2	1	5	3	1	1	3	1	1	1	1	5	5	3	2	3	1	1	3	2	1
39.	VSKNS3	9	7	5	5	9	7	1	2	1	3	5	5	5	3	3	1	5	7	1	1
40.	VSKNS4	9	5	3	1	9	5	1	1	1	3	7	5	5	4	2	1	5	5	1	3
41.	VSKNS5	1	5	5	5	9	5	1	1	2	2	5	3	3	7	2	1	5	7	1	1
42.	VSKNS6	9	7	7	5	9	5	1	1	2	2	5	5	3	4	3	1	5	3	1	1
43.	VSKNS7	1	5	5	5	1	3	2	2	1	3	5	7	3	5	2	9	5	7	1	1
44.	VSKNS8	9	5	5	1	1	3	1	1	2	2	7	7	3	7	3	1	5	5	2	3
45.	VSKNS9	1	5	3	5	1	3	1	2	1	4	5	7	3	7	2	1	5	7	1	1
46.	VSKNS10	9	7	3	5	9	7	1	1	2	2	5	3	5	1	3	1	1	7	1	1
47.	VSKNS11	9	7	5	5	9	5	1	1	1	4	7	7	5	3	2	1	5	5	2	1
48.	VSKNS12	9	5	3	5	9	5	1	1	1	2	5	7	5	2	3	9	1	7	1	3
49.	VSKNS13	9	3	3	1	1	3	1	1	1	3	5	7	3	5	3	1	7	7	1	1
50.	VSKNS14	1	7	5	5	1	3	1	1	1	3	5	5	5	1	3	1	5	7	1	1
51.	Pant Samrat	9	5	5	5	1	3	2	2	2	3	5	5	3	3	3	1	5	5	1	1
Status of Characteristics according to minimal descriptors of Vegetable Crops		Absent- 1 Present- 9	Small (<10 cm)- 3 Medium (10-20 cm)- 5 Large (>20 cm)- 7	Small (<10 cm)- 3 Medium (10-20 cm)- 5 Large (>20 cm)- 7	Entire-1 Dentate- 3 Sinuate- 5	Absent- 1 Present- 9	Weak (<5)- 3 Medium (5-10)- 5 Strong (>10)- 7	Green- 1 Purple- 2	Green- 1 Purple- 2	1 to 3-1 >3- 2	Greenish white- 1 Light purple- 2 Purple- 3 Dark purple- 4	Early (<60 days)- 3 Medium (60-80 days)- 5 Late (>80 days)- 7	Short (<10 cm)- 3 Medium (10-20 cm)- 5 Long (>20 cm)- 7	Small (<5 cm)- 3 Medium (5-10 cm)- 5 Large (>10 cm)- 7	Globular- 1, Ovoid- 2 Obovate- 3, Pear shaped- 4 Club shaped- 5, Ellipsoid- 6 Cylindrical- 7	White- 1 Green- 2 Purple- 3	Absent- 1 Present- 9	Erect- 1 Semi spreading- 5 Spreading- 7 Horizontal- 9	Very Short (<30 cm)- 1 Short (30-60 cm)- 3 Medium (61-100 cm)- 5 Tall (101-150 cm)- 7	Yellow- 1 Orange- 2 Brown- 3	Early (<65 days)- 1 Medium (65-75 days)- 3 Late (>75 days)- 5

Table 2: Characterization of brinjal germplasm based on descriptor defined qualitative traits

Characteristics	States	Note	Number of Genotypes	Frequency (%)
Seedling: Anthocyanin colouration of hypocotyl	Absent	1	20	39.22
	Present	9	31	60.78
Leaf: Length	Small (<10 cm) 3	3	13	25.49
	Medium (10-20 cm)	5	21	41.18
	Large (>20 cm)	7	17	33.33
Leaf: Width	Small (<10 cm)	3	22	43.14
	Medium (10-20 cm)	5	26	50.98
	Large (>20 cm)	7	03	5.8
Leaf: Margin	Entire	1	9	17.65
	Dentate	3	0	0.00
	Sinuate	5	42	82.35
Leaf: Spininess	Absent	1	16	31.37
	Present	9	35	68.63
Leaf: Intensity of spininess	Weak (<5)	3	16	31.37
	Medium (5-10)	5	22	43.14
	Strong (>10)	7	13	25.49
Leaf: Blade colour	Green	1	37	72.55
	Purple	2	14	27.45
Leaf: Colour of vein	Green	1	32	62.75
	Purple	2	19	37.25
Inflorescence: Number of flowers	1 to 3	1	39	76.47
	>3	2	12	23.53
Flower: Colour	Greenish white	1	08	15.69
	Light purple	2	15	29.41
	Purple	3	17	33.33
	Dark purple	4	11	21.57
Flowering: Time (days after seed sowing)	Early (<60 days)	3	07	13.73
	Medium (60-80 days)	5	39	76.47
	Late (>80 days)	7	05	9.80
Fruit: Length	Short (<10 cm)	3	04	7.84
	Medium (10-20 cm)	5	35	68.63
	Long (>20 cm)	7	12	23.53
Fruit: Diameter	Small (<5 cm)	3	18	35.29
	Medium (5-10 cm)	5	29	56.86
	Large (>10 cm)	7	04	7.84
Fruit: General shape	Globular	1	17	33.33
	Ovoid	2	06	11.76
	Obovate	3	13	25.49
	Pear shaped	4	04	7.84
	Club shaped	5	02	3.92
	Ellipsoid	6	04	7.84
	Cylindrical	7	05	9.80
Fruit: Colour of skin at commercial harvesting	White	1	02	3.92
	Green	2	09	17.65
	Purple	3	40	78.43
Fruit: Stripes	Absent	1	42	82.35
	Present	9	9	17.65
Plant: Growth habit	Erect	1	11	21.57
	Semi spreading	5	35	68.63
	Spreading	7	04	7.84
	Horizontal	9	03	5.88
Plant: Height	Very Short (<30 cm)	1	00	0.00

	Short (30-60 cm)	3	02	3.92
	Medium (61-100 cm)	5	10	19.61
	Tall (101-150 cm)	7	38	74.51
Fruit: Colour of skin at Physiological maturity	Yellow	1	45	88.24
	Orange	2	06	11.76
	Brown	3	00	0.00
Time of physiological ripeness (days after fruit set)	Early (<65 days)	1	39	76.47
	Medium (65-75 days)	3	05	9.80
	Late (>75 days)	5	07	13.73

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