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Research Article

Variability in *Solanum* species: Morphological characterization

Neeraja Puthiamadom and Jiji Joseph*

Plant Breeding and Genetics, Kerala agricultural University
***E-Mail**: jiji.joseph@kau.in

Abstract
Twenty seven accessions of *Solanum* belonging to six different species were morphologically characterized using IPGRI descriptor. The wild types could be easily distinguished from the cultivated types based on fruit size and shape. *S. viarum* was characterized by mottled light green fruits with white stripes which are small sized and globular in shape. Fruits of *S. exarmatum* (JJK/16-1) were globular, short, dark green in colour with rounded apex that turned scarlet red at physiological maturity. The accessions JRPH 15/176 and 15/111 of *S. aethiopicum* were characterized by green globular fruits which turned scarlet red on maturity. JJNS 15/21 belonging to *S. insanum* were characterized by obovate fruits which were dark green with white stripes. The accessions JP13/74, JP13/70, JRPH 15/108, JRPH 15/41 and JRPH 15/21 belonging to *S. incanum* were characterized by ovoid, dark green fruits with white stripes. Small, round, dark green fruits with white nets were observed in *S. indicum*. A wide variability was observed in *S. melongena* accessions for fruit characters. Cluster analysis grouped the accessions into eleven clusters at 70 per cent similarity. *S. melongena* accessions that bear large fruits and are free from prickles can be selected for heterosis breeding.

Keywords: *Solanum,* morphological traits, variability

INTRODUCTION

Brinjal (*Solanum melongena* L.) is an important Solanaceous crop preferred by the people around the world, owing to its medicinal and nutritive significance. Brinjal has a large number of wild relatives that harbour genes for resistance to a wide range of pests and diseases (Behera and Singh, 2002). The important allied species of *S. melongena* are *S. incanum* L. (thorn apple), *S. viarum* Dunal (tropical soda apple), *S. indicum* Linn. (Indian night shade), *S. gilo* Raddi (scarlet egg plant), *S. macrocarpon* L. (Gboma eggplant) *etc.* Germplasm is the basic grist for any crop improvement programme. Conservation and utilization of genetic resources have a great significance with respect to crop improvement and pre-breeding. The precise evaluation of genetic material and dissemination of findings is important for their utilization in breeding programme (Dash *et al.*, 2019). The basic method used for crop improvement is selection from allied wild relatives. Collection of germplasm, and its evaluation for economically important traits is a prerequisite for initiating any breeding programme (Ansari *et al.*, 2010). Moreover, to circumvent the huge production loss and crop damage caused by insect pest complex of brinjal, it is important to understand the host preferences (Nasif and Siddiquee, 2020).

Morphological traits play a vital role in plant breeding and further genetics analysis. Alleles useful for crop improvement may be present in the few open pollinated cultivars still in existence. However, if the germplasm is to be used it should be collected and characterized. Characterization of morphological variability will allow breeders to identify accessions with desirable characteristics such as earliness, resistance, or improved fruit characters. Characterization and grouping of

germplasm will allow breeders to avoid duplication in sampling populations. Also, in the absence of pedigree records or information on combining ability it would be useful to organize the collection based on morphology. The extent of genetic variability existing in a crop is of great importance, since greater the genetic diversity, wider is the scope for selection. In any crop improvement programme, knowledge of the extent of genetic variability and their heritable nature is essentially important to embark selection based on phenotype (Vidhya and Kumar, 2015). The phenotypic variability among a collection of germplasm gives an indication of potential genotypic variability; however, the quantitative characters are greatly influenced by the environment. Therefore, selection of the important traits for a sound breeding programme should be based on the extent of variability. This may allow breeders to identify potential combining ability groups (Ravilla and Tracy, 1995).

Many tools are now available to study relationships among cultivars, including various types of molecular markers; however, morphological characterization is the first step in the description and classification of germplasm (Smith and Smith, 1989).

Hence, the present study was taken up with an objective to characterize 27 accessions of *Solanum* belonging to various species based on morphological parameters.

MATERIALS AND METHODS

The experiment was carried out in the experimental field of Department of Plant Breeding and Genetics, College of Agriculture, Vellanikkara during Aug 2018 – March 2021 (Latitude, 10° 32′ 53″ N, Longitude, 76° 16′ 58″ E). The details regarding the experimental materials and the methodology followed for the present investigation are described below.

Twenty plants each of 27 accessions belonging to various species of *Solanum*, collected from NBPGR Regional Station, Vellanikkara, Thrissur and *S. melongena* varieties released from KAU and IIHR comprised the material for the study (**Table 1**). Before raising nursery, the seeds of all the wild types were treated with one per cent KNO_3 solution for one hour and washed thoroughly in distilled water three to four times to enhance germinability. The seedlings were transplanted at two leaf stage into the field as well as grow bags of size 35 x 25 x 20 cm in a replicated fashion. The agronomic practices as per the Package of Practices Recommendations by KAU (2016) was followed. Observations were recorded from twenty plants for vegetative, floral and fruit characters (IPGRI, 1988). Five leaves, five fruits and 10 flowers from each plant were tagged for observation. Parameters *viz*., leaf length and plant height were measured using measuring scale and measuring tape, respectively, while plant breadth was measured using a twine.

Binary values were assigned to various morphological characters and cluster diagram was drawn using UPGMA method in an NTSYS PC 2.0 version software.

RESULTS AND DISCUSSION

The observations on various vegetative, floral and fruit characters were recorded from the 27 accessions of *Solanum* which includes high yielding varieties of brinjal and allied wild relatives.

The observations on qualitative characters of plant *viz.,* cotyledon colour, seedling anthocyanin content of hypocotyl, stem anthocyanin content, plant growth habit, plant branching and plant height are depicted in **Table 2**. Cotyledon colour was green in all the accessions of brinjal. This was contrary to the reports by Seremba *et al*. (2017) where they observed greenish white cotyledon in plants belonging to *Solanum aethiopicum*. Cotyledon colour could not be considered as a morphological marker to distinguish between *Solanum* accessions. Seedling and stem anthocyanin content of hypocotyl was green in Arka Shirish, A Kusumkar, Arka Harshitha, JP 13/70, JRPH 15/94, JRPH 15/176, JRPH 15/111, JRPH 15/109 and , JRPH 15/103, while it was purple in the other accessions. In JRPH 15/8 and JRPH 15/22, hypocotyl colour was purple, while stem colour was green. In 15/108 and 15/152 hypocotyl colour was green while, stem colour was purple. Presence of anthocyanin is found to have some significance in the defense mechanism of the plant. Plant parts rich in anthocyanin might serve as aposematic (warning) colouration for chemical-based unpalatability (Yadun and Gould, 2020). Scott (1999) reported that plant tissues containing anthocyanins are often resistant to drought stress.

Plant growth was erect in all the accessions. The erect growing types are believed to have evolved from the prostrate types through continuous natural selection and domestication (Meyer and Purugannan, 2013). Plant branching was observed to be weak in Vengeri, A Shirish, JJNS 15/21, JP 13/70, JRPH 15/108, JRPH 15/152, JRPH 15/94, JRPH 15/41, JJNS 15/176, JRPH 15/21 and JRPH 15/8. Intermediate branching was noted in the *S. viarum* accession 15/22 and strong branching was observed in *S. indicum* accession (JRPH 15/39). Plant height was very short in the *S. exarmatum* accession Maya (JJK 16/1). Isahaque and Choudhary (1984) suggested that the plants with better spread and more stature were less vulnerable to *L. orbonalis* than those with less spread and dwarf structure.

Being primary centre of origin, India has accumulated wide range of variability in this crop. Further, the crop exhibits rich genetic diversity and scope for improvement for various horticultural traits (Lokesh, 2013).

Observations on eleven qualitative leaf characters *viz.,*leaf length, leaf width, leaf margin, leaf blistering, lobing of leaf

Table 1. Materials used for the study

S. No.	Genotypes	Source
	S. aethiopicum	
1	JJNS 15/176	NBPGR, RS, Vellanikkara
2	JRPH 15/111	NBPGR, RS, Vellanikkara
3	JRPH 15/54	NBPGR, RS, Vellanikkara
	S. incanum	
4	JRPH 15/108	NBPGR, RS, Vellanikkara
5	JRPH 15/21	NBPGR, RS, Vellanikkara
6	JRPH 15/41	NBPGR, RS, Vellanikkara
7	JP13/70	NBPGR, RS, Vellanikkara
8	JP13/74	NBPGR, RS, Vellanikkara
	S. insanum	
9	JJNS 15/21	NBPGR, RS, Vellanikkara
	S. exarmatum	
10	JJK 16-1	NBPGR, RS, Vellanikkara
	S. viarum	
11	JRPH 15/22	NBPGR, RS, Vellanikkara
12	JRPH 15/8	NBPGR, RS, Vellanikkara
	S. indicum	
13	JRPH 15/39	NBPGR, RS, Vellanikkara
	S. melongena	
14	JJNS 15/33	NBPGR, RS, Vellanikkara
15	JRPH 15/152	NBPGR, RS, Vellanikkara
16	JJNS 15/89	NBPGR, RS, Vellanikkara
17	JRPH 15/94	NBPGR, RS, Vellanikkara
18	JRPH 15/109	NBPGR, RS, Vellanikkara
19	JRPH 15/103	NBPGR, RS, Vellanikkara
20	Arka Harshitha	IIHR, Bangalore
21	Arka Nidhi	IIHR, Bangalore
22	Arka Keshav	IIHR, Bangalore
23	Arka Neelkanth	IIHR, Bangalore
24	Arka Shirish	IIHR, Bangalore
25	Arka Kusumkar	IIHR, Bangalore
26	Vengeri brinjal	IIHR, Bangalore
27	Surya	KAU, Thrissur

blade, leaf tip angle, leaf spininess, petiole colour, petiole length, leaf blade colour as well as colour of leaf vein are depicted in **Table 3**.

Vengeri brinjal was characterized by long and wide leaves, sinuate margin, weak lobing, intermediate leaf tip angle, few spines, violet coloured short petiole, dark green leaf blade and green leaf vein. Leaves of Arka Kusumkar and Arka Harshitha were short and narrow with sinuate margin, weak lobing, acute leaf tip, green coloured short petiole, light green leaf blade and green coloured leaf vein. Arka Keshav and Arka Nidhi were characterized by short and narrow leaves, sinuate margin, strong lobing, acute leaf tip angle, no spines, dark violet coloured very short petiole green leaf blade and violet leaf vein. Leaves of Surya were medium long and medium wide with green coloured medium long petiole, green coloured leaf blade and leaf vein. Lobing of leaf was very weak in Surya.

Accession JJK16/1 of *Solanum exarmatum* were characterized by short and narrow leaves, sinuate margin, no prickles, but weak prickle like appendages on the leaf. Anilkumar *et al*. (2015) reported that spines are present occasionally on the petiole and the lower surface of the leaves of *S. exarmatum* but they are slender. Leaves of JRPH 15/8, and 15/22 belonging to *S. viarum* were broad with sinuate margin, very strong lobing, very acute leaf tip, large number of prickles, green colored very short petiole, light green leaf blade and white leaf vein. According to Chandra (2012) *S. viarum* is a perennial herb with broad oak like leaves, dwelling in forest habitat. The entire plant is loaded with straight prickles.

Table 2. Phytographic features of various accessions of *Solanum*

S. No.	Accessions	Cotyledon colour	Seedling anthocyanin content of hypocotyl	Stem anthocyanin content	Plant growth habit	Plant branching	Plant height
1	A Neelkanth	3	5	5	3	1	5
2	Vengeri Brinjal	3	5	5	3	3	7
3	Keshav	3	5	5	3	1	3
4	A shirish	3	3	3	3	3	5
5	A Kusumkar	3	3	3	3	1	5
6	A Harshitha	3	3	3	3	1	3
7	JJNS 15/21	3	5	5	3	3	3
8	JP 13/70	3	3	3	3	3	3
9	JRPH 15/41	3	3	3	3	3	3
10	JRPH15/108	3	3	5	3	3	3
11	JRPH15/152	3	3	5	3	3	5
12	JRPH15/94	3	3	3	3	3	5
13	JRPH15/176	3	3	3	3	3	5
14	JRPH15/21	3	5	5	3	3	3
15	JRPH15/39	3	5	5	3	7	5
16	JRPH15/111	3	3	3	3	1	3
17	JJNS15/89	3	5	5	3	1	3
18	JRPH15/109	3	3	3	3	1	7
19	JRPH15/103	3	3	3	3	1	5
20	JP13/74	3	5	5	3	1	3
21	JRPH15/54	3	5	5	3	1	3
22	A Nidhi	3	5	5	3	1	3
23	JJK 16/1	3	5	5	3	1	1
24	JJNS15/33	3	5	5	3	1	3
25	JRPH15/8	3	5	3	3	3	3
26	JRPH15/22	3	5	5	3	5	5
27	Surya	3	5	5	3	1	3

Leaves of 15/54, 15/111 and 15/176 belonging to *S. aethiopicum* were medium long and medium broad with sinuate margin, intermediate lobing, acute leaf tip, green petiole and light green leaf blade. Leaves were devoid of prickles. Plazas *et al.* (2014) observed *S. aethiopicum* with smaller leaf blade (leaf blade length and leaf blade breadth), less lobed leaves (leaf blade lobing), flatter leaf surface (leaf surface shape), and less prickly leaves (leaf prickles). Leaves of JJNS 15/21 (*S. insanum*) were devoid of prickles.

Presence of prickles was the most distinguishing feature between the accessions belonging to various species. The presence of thin stem, more branches, lower third leaf length and width, more spines, rough leaf surface area and heavily lignified thick cuticle may be responsible for lower infestation of shoot and fruit borer and *vice versa* in case of higher infestation (Hossain *et al*., 2002).

Observations on six qualitative flower characters *viz.,* corolla colour at the time of anthesis, change in corolla colour on the day prior to anthesis, prickles on calyx, number of flowers per inflorescence, flower size as well as days to flower after sowing are depicted in **Table 4**.

Flower size was small in JJK 16/1, 15/22 and 15/8. While, it was large in all the other accessions. Corolla colour varied from light violet to bluish violet in most of the accessions. While, it was white in A Kusumkar, A Harshitha, JJK16/1, 15/111, 15/176, 15/8, 15/22 and 15/109. Purplish white coloured flowers were observed in JRPH15/54 belonging to *S. aethiopicum*. Plazas *et al.* (2014) reported that corolla colour in *S. aethiopicum* varied from greenish white to bluish violet. Naujeer (2009) reported that flower (corolla) colour intensity increased from pale violet to light violet in *Solanum* genotypes.

A few prickles were present in the calyx of Vengeri brinjal, JRPH 15/41, JRPH 15/21 and 15/152. Moderate number of prickles were present in the accessions JRPH 15/108, JRPH 15/41, JP 13/70 and JP 13/74 belonging to *S. incanum* and JJK 16/1 belonging to *S. exarmatum*. Large

Table 3. Leaf characters of various accessions of *Solanum*

S. No.	Accessions	LL	LW	LM	LB	L	LTA	LS	LC	PC	LBC	CLV
1	A.Neelkanth	3	3	3	0	7	3	0	1	1	3	7
2	Vengeri Brinjal	7	7	3	0	3	5	1	3	3	5	3
3	A.Keshav	3	3	3	0	7	3	0	-+1	1	3	7
4	A. Shirish	7	5	3	0	1	5	0	5	1	3	3
5	A. Kusumkar	3	3	3	0	3	3	0	5	3	1	3
6	A .Harshitha	3	3	3	0	3	3	0	5	3	1	3
7	JJNS 15/21	3	3	3	0	3	5	0	7	1	5	7
8	JP 13/70	3	3	3	0	3	3	5	5	3	3	3
9	Jp13/74	3	3	3	0	3	3	5	5	3	3	3
10	JJNS 15/41	3	3	3	0	3	3	5	5	3	3	3
11	JRPH15/108	3	3	3	0	5	3	5	7	3	5	3
12	JRPH15/152	3	3	3	0	5	5	5	5	3	5	3
13	JRPH15/94	5	5	3	0	5	5	0	5	3	3	11
14	JRPH15/176	5	5	3	0	5	3	0	5	5	1	3
15	JRPH15/21	3	3	3	0	3	5	5	5	3	5	3
16	JRPH15/39	3	5	3	0	9	5	5	5	3	7	3
17	JRPH15/111	5	5	3	0	5	3	0	5	5	1	3
18	JJNS15/89	3	5	3	0	5	3	0	7	3	7	9
19	JRPH15/109	3	3	3	0	7	1	5	5	3	9	3
20	JRPH15/103	5	3	3	0	7	1	5	5	3	9	3
21	Surya	5	5	3	0	1	5	0	5	5	3	3
22	JRPH15/54	5	5	3	0	5	3	0	5	5	1	3
23	A Nidhi	3	3	3	0	7	3	0	1	1	3	7
24	JJK16/1	3	3	3	0	3	3	0	5	1	5	5
25	JJNS15/33	5	5	3	0	3	3	0	1	1	5	3
26	JRPH15/8	5	7	3	0	9	1	9	5	1	1	1
27	JRPH15/22	5	7	3	0	9	1	9	5	1	1	1

LL: Leaf length, LW: Leaf width, LB: Leaf blistering, L: Lobing of leaf, LTA: Leaf tip angle, LS: Leaf spininess, PC: Petiole colour, PL: Petiole length, LBC: Leaf blade colour, CLV: Colour of leaf vein

number of prickles were present in the calyx of *S. viarum* accessions (JRPH 15/8 and 15/22). All other accessions were devoid of prickles. According to Mishra *et al.* (1988) presence of spines on leaves, stem and calyx renders the plant unaffected by brinjal shoot and fruit borer, the most devastating pest of brinjal. However, Hybridization operations will be difficult in accessions bearing flowers with prickles on calyx. Flowers were borne in clusters in all the accessions except Vengeri brinjal and JJNS 15/33. According to Chinthagunti *et al.* (2018) plants with clustered bearing yields more number of fruits compared to plants with solitary bearing.

Observations on fifteen qualitative fruit characters *viz.,* are depicted in **Table 5**. *S. viarum* was characterized by mottled light green fruits with white stripes which are small sized and globular in shape. Cross section was circular. Fruits were borne upright. This observation was in accordance with the study by Saha and Datta (2014) where they reported that the fruits are striped green and light green in unripe condition and yellow in fully ripe condition.

Fruits of *S. exarmatum* (JJK/16-1) were globular, short, dark green in colour with rounded apex that turns scarlet red at physiological maturity. The accessions JRPH 15/176 and 15/111 of *S. aethiopicum* were characterized by green globular fruits which turned scarlet red on maturity. While, the accession 15/54 of *S. aethiopicum* was characterized by purplish white fruits at commercial and physiological maturity.

JJNS 15/21 belonging to *S. insanum* were characterized by obovate fruits which were dark green with white stripes. The accessions JP13/74, JP13/70, JRPH 15/108, JRPH 15/41 and JRPH 15/21 belonging to *S. incanum* were characterized by ovoid, dark green fruits with white stripes. The fruits turned deep yellow in colour at physiological maturity. The fruits of JJNS 15/39 were small, round and dark green in colour with white nets. Fruits turned red in colour at physiological maturity.

A wide variability was observed in *S. melongena* accessions for fruit characters. The fruits of Kusumkar, Shirish and Harshitha were long, club shaped, and pale

Table 4. Floral features of various accessions of *Solanum*

S. No.	Accessions	Corolla colour	Change in corolla colour on the day before anthesis	Prickles on calyx	Number of flowers per inflorescence	Flower size	Days to flower after seed sowing
1	A.Neelkanth	9	0	0	3	7	3
2	Vengeri Brinjal	7	0	1	1	7	7
3	A.Keshav	9	0	0	4	7	3
4	A. Shirish	3	0	0	2	7	3
5	A. Kusumkar	3	0	0	2	7	3
6	A. Harshitha	3	0	0	2	7	3
7	JJNS 15/21	7	0	0	2	7	7
8	JP 13/70	9	0	5	2	7	7
9	JP13/74	9	0	5	2	7	7
10	JJNS15/41	9	0	3	2	7	7
11	JRPH15/108	3	0	3	2	7	7
12	JRPH15/152	1	0	3	2	7	7
13	JRPH15/94	1	0	0	2	7	7
14	JRPH15/176	3	0	0	2	7	7
15	JRPH15/21	9	0	3	2	7	7
16	JRPH15/39	9	0	0	2	7	7
17	JRPH15/111	3	0	0	2	7	7
18	JJNS15/89	7	0	0	2	7	5
19	JRPH15/109	3	0	5	4	7	7
20	JRPH15/103	7	0	0	2	7	7
21	JRPH15/54	11	0	0	2	7	7
22	Arka Nidhi	7	0	0	2	7	3
23	JJK16/1	3	0	5	2	3	7
24	JJNS15/33	7	0	0	1	7	5
25	JRPH15/8	3	0	7	4	3	7
26	JRPH15/22	3	0	7	4	3	7
27	Surya	7	0	0	4	7	7

green in colour with elliptic cross section. The fruits turned yellow at physiological ripeness. The fruits of Neelkanth were purplish black in colour at commercial maturity and dark brown in colour at physiological maturity. Fruits of Nidhi, Keshav and JJNS 15/94 were club shaped, purple in colour at commercial maturity and dark brown in colour at physiological maturity. Fruits of vengeri were cylindrical with sickle shaped curvature, elliptic cross section and purplish brown colour.*S. melongena* accession JRPH 15/152 was characterized by obovate shaped purplish black colour fruits. Fruits of JJNS 15/33 were club shaped, green with purple pigmentation on one side and white stripes on the other side. Fruits of JJNS 15/89 were obovate, purple in colour with white stripes. Round shaped fruits with smaller diameter were more resistant to borer infestation compared to the long and slender fruits (Shoukat *et al.*,2018). In this regard, the accessions belonging to all the wild types may be considered as sources of resistance to brinjal shoot and fruit borer. Fruit characters as well as the presence or absence of prickles are the most distinguishing features between the wild and the cultivated types. Plants with large sized fruits that are free from prickles are preferred in breeder's perspective.

Cluster analysis grouped the accessions into eleven clusters at 70 per cent similarity (**Fig. 1**). The accessions 15/111 and 15/176 (*S. aethiopicum*) formed a single cluster and JRPH 15/54 belonging to the same species joined this cluster at 74 per cent similarity. This difference can be attributed to the difference in flower and fruit colour. The accessions JP13/70 and JP13/74 (*S. incanum*) and JRPH 15/8 and 15/22 (*S. viarum*) formed two separate clusters. A Harshitha, A Shirish and A Kusumkar formed a single cluster. This similarity can be attributed to the similarity in fruit characters. Surya and *S. insanum* accession JJNS 15/21 formed a single cluster. This similarity is due to the similar vegetative features as well as fruit shape. A. Neelkanth and A. Keshav formed a single cluster, owing to the similarity in vegetative, floral and fruit characters. Vengeri brinjal formed a distinct cluster that joined with the cluster connecting all other clusters at 45 per cent similarity. The fruits of Vengeri brinjal was extra long and was much different from the fruits of other accessions.

Presence of prickles and fruit size can be considered as an important marker trait that distinguish between the wild and the cultivated types. Every wild species

Table 5. Fruit characters of different species of *Solanum*

S. No.	Accessions	FL	FB	L/B	SHAPE	FC	FCS	PBP	F A	FCL	FCD	PR	FFD	RCL	CP	FP
1	A Neelkanth	7	9	9	1	5	1	1	3	8	1	10	9	5	0	1
2	Vengeri Brinjal	11	9	9	2	8	1	7	3	11	1	10	9	5	3	1
3	Keshav	9	7	9	2	7	1	5	3	13	1	10	9	5	0	1
4	A Shirish	7	7	8	1	7	1	7	5	0	1	11	9	5	0	1
5	A Kusumkar	7	7	8	1	5	1	7	5	0	1	11	9	5	0	1
6	A Harshitha	7	7	8	1	5	1	7	5	0	1	11	9	5	0	1
7	JJNS 15/21	5	7	5	3	0	1	5	5	15	7	2	9	7	0	1
8	JP 13/70	3	5	3	5	0	3	5	5	15	15	2	9	7	3	1
9	JP13/74	3	5	3	5	0	3	5	5	15	7	2	9	7	3	1
10	JJNS15/41	5	5	5	5	0	1	3	5	15	7	2	9	7	7	1
11	JRPH15/108	5	5	0	0	0	1	5	5	2	1	2	9	7	3	1
12	JRPH15/152	5	5	0	0	0	1	5	1	8	1	10	9	7	3	1
13	JRPH15/94	5	5	7	1	8	1	7	5	11	1	10	9	7	0	1
14	JRPH15/176	5	9	1	7	0	3	5	7	1	1	7	9	9	0	1
15	JRPH15/21	5	9	5	5	0	1	1	5	15	7	2	9	7	3	1
16	JRPH15/39	1	1	3	7	0	3	5	5	15	7	12	9	9	0	1
17	JRPH15/111	5	9	1	7	0	1	5	7	1	1	7	9	9	0	1
18	JJNS15/89	5	9	5	9	0	1	5	5	16	7	10	9	7	0	1
19	JRPH15/109	3	5	3	7	0	1	5	5	17	3	2	9	9	7	1
20	JRPH15/103	5	7	3	1	0	1	5	5	7	1	10	9	7	0	1
21	JRPH15/54	5	9	1	7	0	3	5	7	17	9	13	9	9	0	1
22	A Nidhi	7	7	8	1	3	1	5	5	7	1	10	9	5	0	1
23	JJK16/1	3	3	3	7	0	3	5	5	1	1	7	9	9	0	3
24	JJNS15/33	7	7	8	1	8	1	7	1	18	7	1	9	5	0	1
25	JRPH15/8	3	5	3	7	0	3	5	5	19	3	2	9	9	7	3
26	JRPH15/22	3	5	3	7	0	3	5	5	19	3	2	9	9	9	3
27	Surya	5	9	5	3	0	1	5	5	7	1	10	9	7	0	1

FL: Fruit length, FB: Fruit breadth, L/B : Length by breadth ratio, Shape: Fruit shape, FC: Fruit curvature, FCS: Fruit cross section, FA: Fruit apex, FC: Fruit colour, FCD: Fruit colour distribution, PR: Colour at physiological ripeness, FFD: Fruit flesh density, RCL: Relative fruit calyx length, CP: Calyx prickles, FP: Fruit position

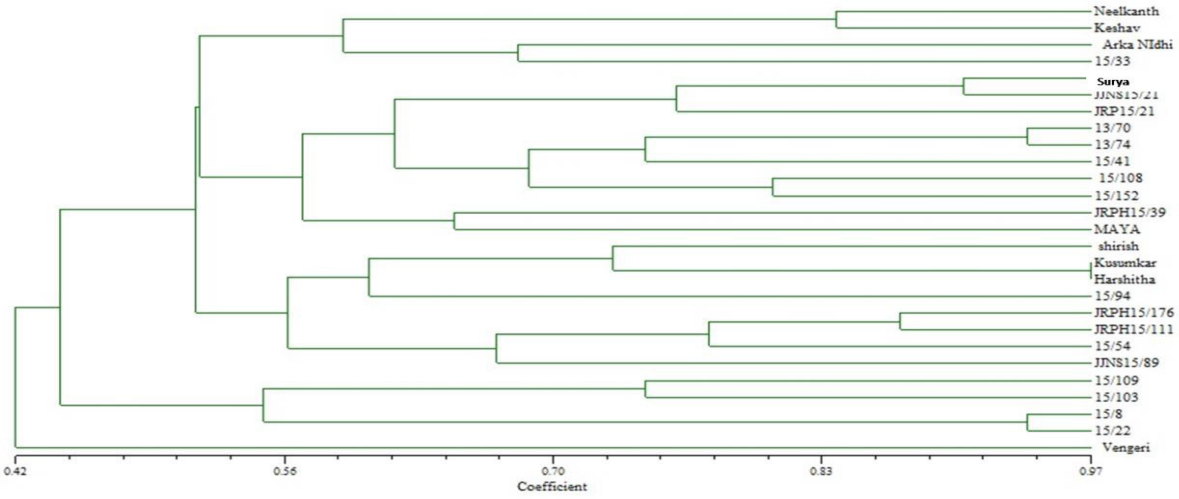

Fig. 1. Dendrogram based on phytographic, leaf, floral and fruit characters

exhibited distinct fruit characters. A wide variability was observed among various accessions of *S. melongena* with respect to fruit characters. The fruits of *S. viarum* were green with white mottles that turned deep yellow at physiological maturity. *S. aethiopicum* was characterized by tomato like fruits which turned red on physiological maturity. However, the accession 15/54 of *S. aethiopicum* was characterized by purplish white fruits that remained the same on physiological maturity. *S. incanum* was characterized by green fruits white striped that turned deep yellow on physiological maturity. Fruits of *S. insanum* JJNS 15/21 were medium sized, obovate, green with white stripes that turned deep yellow at physiological maturity. Fruits of *S. exarmatum* were globular, green in colour that turned red at physiological maturity. In the present era, biodiversity is in the verge of extinction and researchers should take utmost care to tap the genetic diversity, conserve the germplasm and finally utilize them in prebreeding programmes.

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