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COLLECTING DIVERSITY IN EGGPLANT GERMPLASM FROM NORTH - CENTRAL INDIA

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Three explorations were undertaken in north-central parts of India covering 39 districts in Uttar Pradesh, 14 in Bihar, 7 in Madhya Predesh and 4 in Maharashtra during 1990 and 1991 for the collection of eggplant diversity including its wild relatives. A total of 486 accessions, comprising cultivated eggplant (*Solanum melongena* L) (451) and related wild species viz., *S. violaceum* Ortega (12), *S. surattense* Burm. (5), *S. nigrum* L (4), *S. viarum* Dunal (5), *S. torvum* Sw (5), *S.sisymbrifolium* Lam (1), *S.gigantium* Jacq. (1); *S. memmosum* Lind. (1) and *S.hispidum* Pers (1) were collected. A wide range of diversity in agrobotanical and morphological characters was observed in *S. melongena* and *S. violaceum.* A good number of landraces/primitive cultivars developed as a result of continuous selection by the farmers in different belts were also sampled. Most notable donor genotypes include **Bundelkhand Desi** for drought tolerance, **Ramnagarawa** for large size fruits, **Jethuwa baingan** for growing in hot summer and **Kuchbachia baingan** for early bearing and hot summer crop.

Key words : Eggplant, *Solanum* sps, distribution, diversity, promising landraces

Eggplant (*Solanum melongena* L) is an established crop of commercial significance, grown round the year in almost all parts of India, extending upto 1100 m. above m.s.l. On the basis of distribution of variability, Vavilov (1926) regarded the crop to be of Indian origin and stated that China is the secondary centre of diversity. It is one of the oldest vegetable crop of India as is evident from the ancient literature. Efforts made in the past to develop promising types through selection/improvement have resulted in a number of new varieties. Adoption of such high yielding varieties/hybrids pose threat of erosion to primitive cultivars/landraces/genetic diversity which could be of great significance in present context for crop improvement. However, most of these varieties lack in resistance to specific biotic and abiotic stresses. Therefore, areas in north-central parts of the country possessing rich diversity, were surveyed and eggplant germplasm including their wild relatives were sampled.

REGIONS SURVEYED AND SAMPLING STRATEGIES

The diverse agro-ecological habitats, including parts of humid western Himalayan region; Bundelkhand region; sub-Himalayan *tarai* belts of Uttar Pradesh and Bihar; Gangetic plains of Uttar Pradesh and Bihar; Chhotanagpur region; Satpura hill ranges and Narmada river beds were extensively surveyed. The entire region is located between latitude 16.50° to 30.10° N and longitude 77.12° to 87.02°E. In all, 64 districts in north-central parts of India, comprising 39 in Uttar Pradesh, 14 in Bihar, 7 in Madhya Pradesh and 4 in Maharashtra were surveyed for collection of diversity in *Solanum melongena* and its wild relatives. The explorations were undertaken when crops were in full fruiting stage and had also started physiological maturity. Observations on important morphological traits of the plants and fruit characteristics were recorded before sampling. District horticulture/Agriculture officers and progressive vegetable growers were contacted to get first hand information about the genetic diversity/landraces/primitive cultivars available in the specific pockets and accordingly exploration, route was followed (Arora, 1981). Diverse genotypes within the landrace/primitive cultivars were separately sampled avoiding duplicates. Random sampling was done from the farmers field, kitchen gardens, and bulk from farm store in cases where the crop was not available in the field. Biased sampling was done in case of particular landrace/primitive cultivar/genotype (Sinha, 1981). Exploration route map is depicted in Fig. 1 and a list of the state/district covered during the exploration is presented in Table 1.

Table 1 : The states/districts surveyed and germplasm collected

Explorations	States/Districts covered
Exploration I (18 Jan. to 2 Feb '90)	**Madhya Pradesh** - Seoni, Jabalpur, Narsinghpur, Hoshangabad and Betul. **Maharashtra** - Amravati, Nagpur, Akola and Wardha
Exploration II (17 March to April '90)	**Bihar** - Ranchi, Hazaribagh, Giridih, Dumka, Bhagalpur, Munger, Begusarai, Samastipur, Chhapra, Siwan, Gopalganj, Sasaram, Aurangabad and Gaya
	Uttar Pradesh - Deoria, Gorakhpur, Siddhartha Nagar, Basti, Faizabad, Jaunpur, Allahabad and Varanasi
Exploration III (16-30 March '92)	**Uttar Pradesh** - Ghaziabad, Meerut, Muzaffarnagar, Saharanpur, Rampur, Hardwar, Dehradun, Bijnaur, Moradabad, Bareilly, Shahjahanpur, Kheri, Sitapur, Lucknow, Unnao, Kanpur, Fatehpur, Banda, Hamirpur, Jhansi, Orai, Jalaun, Farrukhabad, Mainpuri, Etawah, Etah, Firozabad, Agra, Mathura, Aligarh and Bulandshahr
	Madhya Pradesh - Chhattarpur and Tikamgarh

Fig. 1. Exploration route for collection of eggplant and its wild relatives from parts of Bihar, Uttar Pradesh, Madhya Pradesh and Maharashtra

DISTRIBUTION AND DIVERSITY PATTERN

A total of 436 germplasm accessions of cultivated and related wild species of *Solanum* comprising *S. melongena* (451), *S.violaceum* (12), *S.surattense* (5), *S.nigrum* (4) *S.viarum* (5), *S.torvum* (5), *S.sisymbrifolium* (1), *S.giganteum* (1), *S.memmosum* (1) and *S.hispidum* (1) were collected during three explorations conducted in north-central India, viz., parts of Uttar Pradesh, Bihar, Madhya Pradesh and Maharashtra.

Eggplant is grown in almost all places for its immature fruits. *S.violaceum* was also seen growing in natural habitats in most of the places alongwith undisturbed flora, under the trees and shrubs, its distribution is concentrated in humid western Himalayan region, and Satpura hill ranges. The species *S. surattense* was occasionally seen growing in sandy soils throughout the exploration route along the roadside. It appears to be a drought tolerant species since it was growing well where the surrounding weed flora had dried. The distribution of *S.viarum* is localised in humid Western Himalayan belt and also in Satpura hill ranges. *S.nigrum* was found to be most adaptable

species growing in humid places particularly along the channels and under the tree shade. *S.torvum* was seen growing on roadside and in undisturbed forest flora in humid western Himalayan belt, and one accession was collected from the kitchen garden in tribal belt of Chhotanagpur area. It was reported that the fruit of this species is fried and consumed in constipation. One accession each of *S.giganteum* and *S. sisymbrifolium* was located in Jabalpur in Madhya Pradesh and *S.memmosum* in Varanasi (U.P.) which were grown for ornamental purpose. One accession of *S.hispidum* collected from Dehradun (western Himalayan belt) is characterised by tall growth (up to 2.5m.) and profuse branching from the ground.

The germplasm exhibited wide range of variability in plant height, growth habit (bushy, spreading, tall), branching pattern, pubescence on stem and leaf; spininess on stem, leaf, petiole and calyx; leaf size, flowers per cluster (1-8); flower colour (white, light purple, deep purple), fruiting habit (solitary/cluster); fruits per cluster; fruit shape (round, oval, oblong, long); size (very small to large) and colour (white, light green, green, deep green, whitish green, light purple, purple, deep purple and stripes on surface). Variability was also observed among "Cluster type", in fruits per cluster (2-7); fruit shape (round, oval, oblong, long); colour (milky white, green, purple), fruit size (small, medium, large). However, cultivation of "Cluster type" eggplant is concentrated in eastern Uttar Pradesh, north Bihar, south Bihar, Chhotanagpur and adjoining areas.

Table 2 : Important primitive cultivars/landraces sampled

Areas covered	Germplasm collected
Parts of Madhya Pradesh and Maharashtra	Wange, Bhathai local, Bhatia baingan, Jabalpur local baingan, local bhata, Narmada bhata, Baingan Lamba, Hara lamba baingan
Parts of Bihar and Uttar Pradesh	Hara Chugalia, Safed Hara Desala baingan, Safed baingan,Satputia baingan, Jafrabadi baingan, Jafrabadi baingan II, Jafrabadi bhatani, Hara Jafarabadi, Jafrabadi Desi, Bhatania, Patanahia baingan, Balfahawa Jethuwa bhata, Banarasi Desi, Siliguri Local,Gola baingan, Ramnagarwa Local, Desi Bhatia, Dudhia baingan, Desi bhatania, Dudhia Gola baingan, Safed bhatani, Jethuwa baingan
Parts of Uttar Pradesh and adjoining area of M.P.	Gola baingan, Surkha baingan, Baingani bhata, Golaki bhata, Nariyal baingan, Desi Gola, Desi baingan, Maru baingan, Kala baigan, Kala Gola, Gola Hara, Desi bhati, Desi baigan, Nawari bhata, Desi baigan, Lambi bhati, Dhamaria Bhanta, Desi bhata kali, Bundel khand Desi, Desi safed bhata, Neelam Bhanta, Bhatia baigan, and Baramasi bhata

The colour and shape of fruits was observed to be associated with regional preferences. Continuous selection by farmers for desirable types in particular agro-climatic region has resulted in developing several landraces/genotypes. It was noted that light purple to deep purple fruits in round, oval and long shape are most esteemed in western Himalayan region, sub-Himalayan *tarai* belts of Uttar Pradesh and Bihar; green fruits in different shapes in Bundelkhand and Chhotanagpur region; green and green with purple stripes in Satpura hill ranges and in parts of Maharashtra. Small size round to oval fruits in purple, green and white colour were also preferred in eastern Uttar Pradesh, north and south Bihar. Light-green fruits in round to oval shape were commonly grown in Varanasi and nearby area. A number of landraces/primitive cultivars popular for their quality and adapted in different eggplant growing belts were sampled (Table 2) during the explorations.

In *S. violaceum,* wide range of diversity in plant morphological traits and vegetative characters was observed. Variability in fruit colour (orange and black) was recorded in *S.nigrum*. Less variability was observed in *S. viarum* Dunal and *S. torvum* in vegetative and fruit characteristics.

Table 3 : List of *Solanum melongena* and its wild relatives sampled from different states

Species	States/Number of germplasm collected				Total
	Uttar Pradesh	Bihar	Madhya Pradesh	Maharashtra	
Solanum melongena L.	283	113	41	14	451
S. violaceum Ortega	6	3	1	2	12
S. surattense Burm. f.	5	-	-	-	5
S. nigrum L.	4	-	-	-	4
S. viarum Dunal	4	1	-	-	5
S. torvum Sw.	2	1	-	-	5
S. sisymbrifolium Lam.	-	-	1	-	1
S. giganteum Jacq.	-	-	1	-	1
S. memmosum Lind.	1	-	-	-	1
S. hispidum Pers.	1	-	-	-	1
Total	306	118	46	16	486

PROMISING LANDRACES/PRIMITIVE CULTIVARS

Bundelkhand Desi : A primitive type, cluster bearing, light green to deep green with whitish stripes on the tip, in different shapes of fruits was collected from Bundelkhand region (Hamirpur, Banda, Orai and Jhansi). This genotype is said to be drought tolerant. Local preference and long storage life are the main attributes.

Dudhiya baingan : It is another primitive type grown in eastern Uttar Pradesh and adjoining areas of Bihar. The plant is tall growing upto 1.2m. and non spiny, fruits in cluster of 4-6, smaller (45 to 70 g), milky-white, and round to oval resembling an egg. These were preferred for frying.

Ramnagarwa baingan : This is one of the most popular primitive cultivar grown in fertile river belt of Ganges in Varanasi and nearby area. It bears large light green fruits in different shapes. Because of large fruit size it is also known as "Varanasi Giant". Variability in fruit shape, size, and colour was observed among the Ramnagarwa, which may be due to segregation from natural crossing with adjoining cultivars.

Jethuwa baingan : Fruits mature during the month of *Jeth* (June-July) when other brinjal cultivars are not available in the market. Its cultivation is concentrated in 'Sawai Pattidari' area of Varanasi district. The plant is highly bushy with dense spines on stem, leaf, lamina, petiole and calyx. The round to oval purple colour fruits have thick skin suitable for long distance transportation but contain more seeds. It is grown in off season (hot summer) when availability of green vegetables is less. It is also preferred because of better quality for curry purposes. It is consumed locally and sent to long distance market because of better keeping quality.

Kuchbachia baingan : It is one of the most important primitive cultivar grown in large area as winter and summer crop in Muzaffarpur and Samastipur district of Bihar. It is an early bearing genotype, suitable for long distance transportation. It bears light-purple fruits in clusters of 3-5; medium in size (40-80g); round to oval in shape.

Jafrabadi baingan : It is a primitive cultivar developed at Jafrabad area in Muzaffarpur district of Bihar. The fruits are deep purple; round oval and long in shape weighing 250-400g and contain less seeds. It is most popular in Muzaffarpur and adjoining areas.

Balfahwa Jethuwa bhanta : Cultivation of this genotype is concentrated in Allahabad district of the central Uttar Pradesh for local consumption as well as for long distance markets like Tata Nagar, Patna, Calcutta and Delhi during March to June. The plant is tall growing (1.4 to 1.8m), with profuse branching, hence planting is done at a distance of 1.5m between the rows and 80-100cm within the row. The deep purple fruit is round to oval in shape

and of medium size (80-100g). The fruit is having better shelf storage life and suitable for long distance transportation.

Siliguri baingan : It is an introduction from Siliguri, West Bengal. It bears long slender fruits of attractive deep purple colour, weighing 200- 300g. It is preferrred due to its better taste and less seed.

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