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Cultivated eggplants – origin, breeding objectives and genetic resources, a review

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ABSTRACT

Brinjal eggplant (*Solanum melongena* L.) is an agronomically important non-tuberous crop of *Solanaceae* family, native to southern India, and widely grown in Americas, Europe and Asia. Its close relatives: *S. aethiopicum* (scarlet eggplant) and *S. macrocarpon* (Gboma eggplant) are of African origin. Brinjal eggplant is a new vegetable in Poland. Until recently it was grown only in glasshouse conditions. Breeding of new eggplant cultivars and improvement of growing technology resulted in the increase of both cultivation acreage and consumption scale in Poland. For an efficient development of eggplant breeding programmes it is necessary to collect information concerning the characteristics and variety of eggplant genetic resources. The present publication includes detailed taxonomy of eggplant and its relatives, their origin and history of growing. The information connected with eggplant worldwide genetic resources and breeding objectives have been presented. Different propositions for cultivar grouping and the characteristics of selected cultivars have been taken into consideration.

Taxonomy

Solanaceae is a plant family comprising about 2300 species, nearly one-half of which belong to the genus *Solanum*. Most species within this genus are endemic to the Americas, only 20% are Old World species. Family *Solanaceae* has been the source of many morphologically different domesticated species. Doganlar et al. (2002b) explained this phenomenon with the fact that only a few conserved major loci are responsible for the dramatic phenotypic changes that accompanied domestication in this family. Like tomato and pepper, eggplant is an autogamous diploid with 12 chromosomes. A molecular genetic linkage map based on tomato cDNA, genomic DNA, and EST markers was constructed for *S. melongena* (Doganlar et al. 2002a, SOL Genomic Network 2006). The comparison of the eggplant and tomato maps revealed that chromosomal evolution since their divergence from the common ancestor has proceeded primarily through inversion of otherwise conlinear segments of the genome. Overall, eggplant and tomato are differentiated by 28 rearrangements, which could be explained by 23 paracentric inversions and five translocations during evolution from the last common ancestor of the species. Eggplant and tomato are diverged three- to six fold more than tomato and potato (Fig. 1). The domestication of the *Solanaceae* has been driven by mutations in a very limited number of target loci with major phenotypic effect. Selection pressures were exerted on the same loci despite independent domestication of the crops on different continents. The conservation of gene function among the *Solanaceae* indicates that the wealth of knowledge of genetic analysis of tomato, potato and pepper can be used as a springboard for rapid advancement of eggplant genetics (Frary et al. 2003).

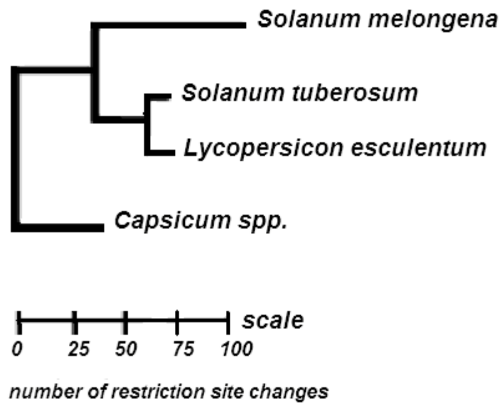

Fig. 1. Dendrogram of crop plants from *Solanaceae* family (Olmstead and Palmer 1997)

The genomics in genus *Solanum* are evolving at a moderate pace compared to other plant species (Doganlar et al. 2002a). The species of *Solanum* subgenus *Leptostemonum* comprise almost one third of the genus and are distributed worldwide. The members of this monophyletic subgenus are defined by their sharp epidermal prickles, thus they are commonly referred to as the 'spiny solanums'. The subgenus *Leptostemonum* includes a number of economically important species such as the cultivated eggplants (Levin et al. 2005, Levin et al. 2006).

The common name 'eggplant' encompasses three closely related cultivated species, endemic to the Old World, belonging to the genus *Solanum* L., subgenus *Leptostemonum* (Dunal) Bitter and two sections:

1. Section *Melongena*
   - *S. melongena* L. (brinjal eggplant, aubergine) – synonyms: *Solanum cumingii* Dunal, *Solanum pressum* Dunal, *Solanum undatum* Poiret sensu Ochse;
   - *S. macrocarpon* (Gboma eggplant) – synonyms: *Solanum integrifolium* Poiret var. *macrocarpum*, *Solanum melongena* L. var. *depressum* Bail.
2. Section *Oliganthes*
   - *S. aethiopicum* L. (scarlet eggplant, jaxatu) – synonyms: *Solanum integrifolium* Poiret, *Solanum integrifolium* Poiret var. *microcarpum*, *Solanum gilo* Raddi, *Solanum naumannii* Engl., *Solanum pierreanum* Pailleux & Bois, *Solanum zuccagnianum* Dunal.

Historical and modern attempts of eggplant and its relatives' classification were in detail presented by Mace et al. (1999). The historical difficulties and confusions connected with *Solanum* species classification is reflected by the fact that 1000-1400 *Solanum* species have been described under more than 3000 binominal names (Daunay and Lester 1988). Proper classification of eggplant cultivars and accessions collected all over the world is possible to achieve with the use of molecular methods, such as supplementation of morphological analyses. The other parameters (morphological features, crossability, F_1 fertility) are insufficient, because of the high morphological variability in large and complex genus *Solanum*, and the possibility of crossing between distantly related species (Daunay and Lester 1988, Furini and Wunder 2003).

According to Karihaloo et al. (2002), all members of the eggplant complex were revealed to bear very high similarity to each other, based on studies of the seed protein profiles by SDS-PAGE. On the other hand, Furini and Wunder (2003) reported that the eggplant complex showed a very large morphological variation, to some extent reflected in the unrooted tree based on the AFLP data. The authors explained such a high degree of variation by using, in their analyses, the accessions derived from Asian countries where the greatest diversity is found. Also, their DNA analyses were based on AFLP markers which proved to be more informative than RAPD markers and allozymes. Furini and Wunder (2003) suggested that while all members of the eggplant aggregate cluster together, sufficient genomic flexibility has been created within the group to adapt to changes in the environment.

S. melongena may have been indirectly derived from the wild *S. incanum,* domesticated in India and Southeast of China. *S. aethiopicum* and *S. macrocarpon* were domesticated in Africa from their wild relatives *S. anguivi* and *S. dasyphyllum* (Lester 1998).

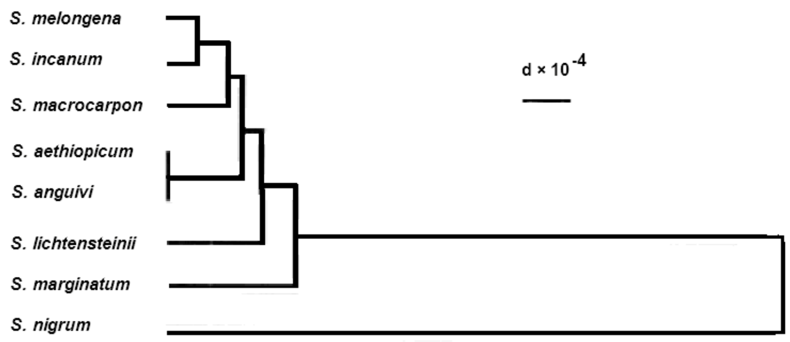

Fig. 2. Dendrogram of *Solanum* species by UPGMA based on the genetic distance of Nei and Li (Sakata and Lester 1997)

From the dendrogram constructed by the unweighted pair-group method, Sakata and Lester (1997) suggested that *S. incanum* is a species close to *S. melongena*, and the next close species is *S. macrocarpon* (Fig. 2). High genetic identities between *S. melongena*, *S. incanum* (wild form) and *S. insanum* (weedy form) were proved by Karihaloo and Gottlieb (1995) on the base of enzyme electrophoretic studies, and Karihaloo et al. (1995) on the base of the random amplified polymorphic DNA (RAPD) variation. Close genetic relationship between *S. melongena* and *S. incanum* was confirmed by Singh et al. (2006) using RAPD technique. *S. melongena* and *S. macrocarpon* were included to the section *Melongena* and *S. aethiopicum* to the section *Oliganthes* (Doganlar et al. 2002a). The results of Karihaloo et al. (2002) based on the seed protein study, and Furini and Wunder (2003) based on the amplified fragment length polymorphism (AFLP) markers indicate that *S. macrocarpon* is more related to *S. aethiopicum* (section *Oliganthes*) than to *S. melongena*. Similar results were obtained by Mace et al. (1999) based on the AFLP analysis of genetic relationship among the cultivated eggplants and wild relatives. The authors confirmed the close relationship between *S. macrocarpon* and *S. dasyphyllum*. The fact that *S. macrocarpon* and *S. aethiopicum* were domesticated and are cultivated mainly in Africa supports their relatively similar topology in the dendrogram (Furini and Wunder 2003).

Origin, domestication and economic importance

S. melongena occurs in wild or semi wild form in India. Various data indicate, that from the several species that evolved in Africa, one (*S. incanum*), gave rise to a distinct species which spread to South-East Asia as the wild ancestor of *S. melongena* (Lester 1998). India or Indochina are recognized as the centre of the eggplant diversity. Primitive eggplant characters are tall plants with large, spiny leaves, flowering in clusters with andromonoecy. Their fruits are small, green, and bitter in taste, with thick skin and hard flesh. Domestication, mutation, natural intercrossing, human selection and hybridization brought extensive genetic diversity of eggplant cultivars grown all over the world. Cultivar differences concern mainly the colour, shape and height of fruits, but chemical composition of fruits, the earliness of fruiting, yielding, environmental requirements, etc. are also taken into consideration. Fruit colour varies from light to dark purple, almost black, green, or white. Fruit length is between 4-45 cm, and thickness 2-35 cm, at different shapes and weight ranging between 15-1500 g. The fruits are set as single or in clusters, up to 5 fruits. Physiologically ripe fruits become brown, red or yellow (Swarup 1995).

S. aethiopicum is a fruit and leaf vegetable. It is a herbaceous shrub with hairy or glabrous leaves and hermaphroditic flowers, self or cross pollinated, single or in clusters. The fruits are consumed raw or cooked. They are light to dark green, white or blackish in colour, with a bitter taste that varies depending on saponin content. The fruits shape is round, elongate-round or oval with smooth or grooved surface and taste varying from sweet to bitter, particularly in the case of oval-fruit cultivars. At full maturity, the fruits turn red or reddish-orange due to high carotene content. Fruit surfaces vary from smooth to grooved or ribbed. The leaves are often consumed in the same way as spinach (Seek 1997, Macha 2005).

S. macrocarpon is grown for large, glabrous leaves (50 × 30 cm), used as a green vegetable. Fruits have large, often clasping calyx. They are sub spherical and large (3-10 cm in diameter, 2-6 cm long), cream white, green-white or green. Fruits are sweeter in taste (in comparison to *S. aethiopicum*), and most preferred. At full maturity fruits turn yellow, orange or brown with cracked surface (Bukenya 1994, Macha 2005).

Brinjal eggplant was described in India in 3rd century B.C. There were at least 33 sanskrit names for eggplant in ancient Indian literature, the most common being Varttaka, Bhantaki and Nattingan (Swarup 1995). The growing of eggplant small-fruited characters began in 4th century in China, and in 9th century in Africa. Although cultivated from prehistorical times, eggplant appears to have been unknown to the Western World for many centuries. Numerous Arabic and African names for eggplant, and the lack of ancient Greek and Roman names indicate that the vegetable was carried into the Mediterranean by the Arabs relatively late, probably in 7th century. *Melongena* was an Arabic name for one of eggplant cultivars. Avicenna, “the father of modern medicine”, mentioned it as a medicinal and vegetable plant. Eggplant was established in Poland by 15th century, initially as ornamental and medicinal species.

At present brinjal eggplant is the third, after potato and tomato, most important crop from *Solanaceae* family. Greatest eggplant producers are China (17 mln tons per year), India (8 mln tons), Egypt (1 mln tons) and Turkey (0.9 mln ton) (FAOSTAT Data 2006). In Poland, like in many Central European countries, eggplant is still an exotic vegetable but in Asia and the Mediterranean it is an important and valuable nourishment component, the so-called ‘the king of vegetables’.

African eggplants – *S. aethiopicum* and *S. macrocarpon*, are the most popular native, traditional vegetables in West and Central Africa, but the productivity of these crops is still relatively low and the growing area and yields have not been statistically evaluated. The centre of these eggplants diversity is Western Africa. African eggplants are grown mainly in gardens and small fields near villages. *S. aethiopicum* is widely grown in South America, and *S. macrocarpon* in Asia and tropical America, too.

Genetic resources

Genetic resources of eggplants have been collected methodically only in some European and Asian countries, and there is no comprehensive collection dedicated to the germplasm of eggplants available worldwide. Gene banks for eggplant and related species have been collected by the partners of EGGNET project in Europe: INRA-Montfavet, France; Botanical and Experimental Garden, University of Nijmegen, The Netherlands; Birmingham University Botanic Gardens, Birmingham, United Kingdom; Plant Research International (PRI), Centre for Genetic Resources (CGR), Wageningen, The Netherlands; Biotechnology Department (Genetics), Polytechnic University of Valencia (UPV) Valencia, Spain; Department of Vegetables, Agricultural Research Centre of Macedonia and Thrace (ARCMT), Thermi-Thessaloniki, Greece; Istituto del Germoplasma (IDG), Consiglio Nazionale delle Ricerche, Bari, Italy; Institute of Plant Genetic and Crop Plant Research (IPK), Gatersleben, Germany, and Institut National d’Horticulture (INH), Angers, France. EGGNET connects all the European collections and creates one European collection, including more than 1700 accessions of *S. melongena* L., 750 accessions of *S. aethiopicum* and 210 accessions of *S. macrocarpon* (Daunay et al. 2003, 2006, ECP/GR Eggplant Database 2006).

The greatest gene banks of eggplants in other world regions have been collected, among the others, in the National Germplasm Resources Laboratory in Beltsville, Maryland, USDA / ARS National Genetic Resources Program (GRIN) – 770 accessions of *S. melongena*, 60 of *S. aethiopicum* and 4 of *S. macrocarpon*; National Bureau of Plant Genetic Resources, New Delhi, India; Chinese Academy of Agricultural Sciences, Institute of Crop Germplasm Resources, National Gene Bank of China (NGBC) – 1300 accessions of *S. melongena*; National Institute of Agrobiological Sciences, Japan – 561 accessions of *S. melongena* and 31 of *S. aethiopicum*; Asian Vegetable Research and Development Center, Shanhua, Taiwan – 1777 accessions of *S. melongena*, 30 of *S. aethiopicum* and 133 of *S. macrocarpon*, and Vavilov Research Institute of Plant Industry, St. Petersburg, Russia – 238 accessions of *S. melongena* (Mueller et al. 2005, SOL Genomic Network 2006).

Breeding objectives

S. melongena is an object of intensive breeding programs mainly in the countries with intensive production of this species (Western Europe, Turkey, India, China, Japan). Many F_1 hybrids, with differentiated phenotypes are the result of breeding works held in the last thirty years. New *S. aethiopicum* cultivars are bred in some African countries, but on a small scale, due to economic, sociological, and political situation in this region. *S. macrocarpon* cultivars are improved locally by growers, mainly in Africa.

Cultivated *S. melongena* genotypes often have insufficient levels of resistance to biotic and abiotic stresses. Genetic resources of this species have been assessed for resistance to its most serious diseases and pests. The attempts at crossing eggplant with its wild relatives resulted in limited success due to sexual incompatibilities. Eggplant tissues present a high morphogenetic potential, useful for developmental studies as well as establishing biotechnological approaches to produce improved varieties, such as embryo rescue, *in vitro* selection, somatic hybridization and genetic transformation (Collonnier et al. 2001, Magioli and Mansur 2005). Eggplant *in vitro* regeneration can be induced from different explants with the use of distinct growth regulators and morphogenetic pathways, as it was summarized by Magioli and Mansur (2005). For induction of embryogenesis or organogenesis hypocotyl, epicotyl, cotyledon, stem nodes, leaf, and roots were used (Sharma and Rajam 1995, Magioli et al. 1998, Magioli et al. 2001, Franklin and Lakshmi Sita 2003). In addition, the availability of efficient transformation protocols favors gene regulation studies, in particular those related to embryogenesis, with advantages over other species. From this perspective, eggplant can be considered as alternative model plant for studying different aspects of plant biology (Magioli and Mansur 2005). Kashyap et al. (2003) summarized the efforts to improve eggplant genetics with emphasis on the use of biotechnology to introgression genes from wild species into cultivated eggplant. For example, populations derived from the cross between *S. linnaeanum* and *S. melongena* may be useful for future mapping of disease resistance and abiotic stress loci and for transfer of these resistances to cultivated eggplant (Frary et al. 2003). Tolerance to

Verticillium wilt was found in a wild relative of eggplant, *Solanum torvum*. To transfer this tolerance to eggplant (*S. melongena*), protoplast fusions between eggplant and irradiated *S. torvum* protoplasts were performed by Jarl et al. (1999).

The main *S. melongena* breeding objectives are:

– resistance to diseases, insects and nematodes (Fusarium wilt *Fusarium oxysporum*, Verticilium wilt *Verticillium dahliae*, Bacterrial wilt *Pseudomonas solanacearum*, eggplant fruit borer *Leucinodes orbonalis*, melon aphid *Aphis gossypii*, leafhopper *Amrasca biguttula*, root-knot nematode *Meloidogyne* spp., etc.),
– resistance or tolerance to abiotic stress (drought, low or high temperatures, salinity),
– parthenocarpy,
– resistance to herbicides,
– yield and its quality (the world average 15.7 t ha^{-1}, Africa 19.2 t ha^{-1}, North America 23.1 t ha^{-1}, South America 13.1 t ha^{-1}, Asia 15.1 t ha^{-1}, Europe 28.3 t ha^{-1}. The yield of F_1 hybrids often exceeds 40-50 t ha^{-1} and is characterized by early maturity, uniform harvest, rich colour, taste and aroma, and great storage quality),
– nutritive value (high dry matter, sugars, anthocyanin and total phenol contents, low level of polyphenol oxidase activity and orthodihydroxy phenolic compounds to avoid browning of cut fruits),
– market needs and consumer preference (Swarup 1995, Farooqui et al. 1997, Kumar et al. 1998, Donzella et al. 2000, Acciarri et al. 2002, Prabhavathi et al. 2002, Rahman et al. 2002, Pessarakli and Dris 2004, Sidhu et al. 2005).

Some specific objectives of *S. aethiopicum* breeding programs are: developing of hybrids and open pollinated cultivars resistant to mites, *Stemphylium* and *Alternaria* complex; improvement of yield and fruit quality (colour, size, shape etc.) (Anaso et al. 1990, Seek 1997). Omidiji (1983) evaluated the cultivars and F_1 hybrids of *S. aethiopicum* for the yield and its components in Nigeria. The results of breeding for high yield of berries and improved yield attributes of homozygous lines of *S. aethiopicum* were presented by Anaso et al. (1990). Carvalho and Ribeiro (2002) presented the results of combining ability analysis in diallel crosses among three Brazilian *S. aethiopicum* cultivars.

S. aethiopicum and *S. macrocarpon* are of interest for genetic improvement of *S. melongena,* considering the presence of several traits of agronomic interest in its germplasm (Alba et al. 2005). Daunay et al. (1993) reported the possibility of production and characterization of fertile somatic hybrids of *S. melongena* and *S. aethiopicum* Aculeatum group. Schaff et al. (1982) suggested the possibility of the transfer of genes for resistance to two-spotted spider mite from *S. macrocarpon* to *S. melongena*. The interspecific hybridisation was used to transfer the resistance to *Pseudomonas solanacearum* from *Solanum aethiopicum* to *S. melongena*. With this method it was possible to obtain a large variation in the shape and colour of the fruits (Ano 1989). Gowda et al. (1990) used the interspecific hybridisation between *S. macrocarpon* and *S. melongena* to obtain hybrids resistant to shoot and fruit borer (*Leucinodes orbonalis*). Rizza et al. (2002) obtained dihaploid plants through anther culture of somatic hybrids between *S. melongena* and *S. aethiopicum* Gilo group which were characterized by complete resistance to fungal wilt caused by *Fusarium oxysporum* f. sp. *melongenae*.

Cultivars

S. melongena is characterized by great morphological diversity. Martin and Rhodes (1979) cited the classification proposed by Choudhury (1976) who divided brinjal eggplant cultivars into three botanical varieties on the basis of the shape of the fruit:

– *S. melongena* var. *esculentum* Dunal (Nees) – round, oval or egg-shaped fruits,
– *S. melongena* var. *serpentinum* L. – long slender fruits,
– S. *melongena* var. *depressum* L. – small, miniature fruits, dwarf, and early types.

Martin and Rhodes (1979) classified 475 eggplant cultivars from the world collection assembled by the U.S. Department of Agriculture into 11 groups, by 18 characteristics, using numerical taxonomic methods:

I. Tubefrut – dark purple, long fruits, region of origin from India to Turkey,
II. Spinigrene – spiny foliage, greenish fruits – from India and Pakistan,
III. Cluster – fruits in clusters, often white and long,
IV. Oldster – long-lived plants with greenish or light purple fruits – from India and Pakistan,
V. Pretiblum – dark, purple flowers – from India and Pakistan,
VI. Talgro – low yields, long, dark purple fruits – from Turkey,
VII. Stipe – streaked fruits – from India to Turkey,
VIII. Earlymot – high yields, early flowering – from India to Turkey,
IX. Lakluster – early flowering, low vigor, mottled fruits – from India to Turkey,
X. Lateg – fruits often ovoid, late flowering – from India to Turkey,
XI. Violeaf – dark purple foliage and stems, long, dark purple fruits – unclear origin.

The cited authors found that some similarity groups were composed of cultivars from various countries from India to Turkey. This fact suggests a wide distribution of the principal character associations. Also cultivars from Europe, Africa and New World tended to fall into several different similarity groups, which suggests their diverse origins. Geographical groups can be characterized, in some cases, by distinctive characteristics as determined from group means, which clearly reflect preferences in the case of some countries, i.e. USA or Japan (Martin and Rhodes 1979).

Prohens et al. (2005) studied the molecular and morphological diversity of 28 Spanish traditional cultivars of eggplant, collected in four groups: "round", "semi-long", "long", and "listada de Grandia". The authors found that eggplant cultivars groups showed some genetic differences, and no individual AFLP (amplified fragment length polymorphism) markers specific and universal to one cultivar group could be found. "Round" cultivars were genetically more diverse than other groups. The results suggested that evolution of eggplants in Spain has involved frequent hybridizations and frequent movement and exchange seeds. The structure and diversity among the regions indicate that most of the diversity can be collected in single selected regions (Prohens et al. 2005).

The mentioned types of eggplant cultivars, differentiated on the base of the shape and colour of the fruit and the origin, are often used in popular and professional literature.

Dark purple eggplants (western eggplants) are typical for America and Europe, but introduced into Asia. Plants are less vigorous but very productive. Fruits come in two basic shapes, oval and elongated and are usually large (200-600 g).

– oval: 'Black Beauty', 'Bonica F_1', 'Classic F_1', 'Epic F_1', 'Galine F_1', 'Sonata F_1', 'Nadia F_1', 'Tudela F_1', 'Gostbuster F_1'(white), 'Listada de Grandia' (purpure stripped with white), 'Neon F_1' (pink purpure), 'Rosita' (pink lavender), 'Zebra F_1' (violet stripped with white).
– elongated: 'Baluroi F_1', 'Black King', 'Fabina F_1', 'Ichiban F_1', 'Long Purple', 'New Purple', 'Nite Lady F_1', 'Lavender Tough F_1' (white), 'Casper' (white), 'Cloud Nine F_1' (white), 'Antigua' (white stripped with lavender), 'Fairy Tale F_1' (lavender with white strikes), 'Louisiana Long Green' (green).

Miniature eggplants (Italian, baby, finger eggplants) – few inches long, narrow or rounded; they are generally sweeter and more tender than the larger varieties; they also have thinner skins and contain fewer seeds ('Baby Bell' – black-purple, 'Bianca Rosa' – white with lavender streaks, 'Prosperosa' – cherry eggplant, round, violet, 'Violetta di Firenze' – violet).

Oriental eggplants, native to tropical Asia, are very popular in Japan, China, India, Thailand and the Philippines. Plants are early and vigorous. Fruits could be purple, violet green, with or without stripes; round or slender in shape. Tender and sweet in taste, they are cooked without peeling or salting, stuffed or baked in India, tempura in Japan, stir-fried or boiled in China. In South-eastern Asia many primitive varieties are cultivated, with small green fruits and slight anthocyanin pigmentation. Oriental eggplants are divided into the following groups (SeedQuest 2006):

– Chinese eggplants – usually long, violet, purple lavender-bluish white, especially low in seeds, tender and sweet, plants are vigorous and prolific ('Little Fingers F_1' – purple, 'Long White Angel F_1' – white, 'Ma Zu Purple' – purple, 'Megadok F_1' – purple, 'Ping Tung Long' – dark-purple, 'Lucky Green' – green,

- Japanese eggplants are firmer and heavier, sweet in taste, violet to inky-purple, long or egg-shaped (‘Kurume Long Purple’ – dark purple, ‘Kyoto Egg F_1’ – dark purple, round, ‘Milionaire F_1’ – dark purple, long, ‘Senryu Ni Gou F_1’ – dark purple, elongated, ‘Shoya Long F_1’ – dark purple, very long,
- Thai eggplants come in two groups: small, round, tomato-like ones (40-80 g – ‘Green Doll F_1’ – white with green stripes, ‘Kermit F_1’ – green/white, ‘Thai Round Green’ – green, ‘Violet Prince F_1’ – violet, ‘White Ball F_1’ – white, ‘Puangyok Thai Pea’ – green cherry eggplant) or very elongated (10 inches , about 100-200 g – ‘Rolex F_1’ – green, ‘Tai Long Green F_1’ – green). They are mild and sweet, dense, with thick skin, and many seeds. Plants bearing lots of fruits are very attractive and often grown as ornamentals,
- Indian eggplants – small 30-100 g, oval, violet to purple, sometimes with stripes (‘Apsara F_1’ – purple with white stripes, ‘Chu Chu F_1’ – red purpure, ‘Manjari’, ‘Ratna’ – dark purple, ‘Rhim Jhim’ – purple with white streaks, ‘Hari F_1’ – long, green, ‘Bali F_1’ – long, purple) or medium sized (200-300 g) (‘Bharata Star F_1’ – round, dark purple, ‘Suphal’ – dark purple, oval, ‘Supriya’ – round, violet).

Only two eggplant cultivars have been entered into The Polish National List of Vegetables: ‘Classic F_1’ (Clause Tézier) and ‘Epic F_1’ (Seminis Vegetable Seeds, Inc.) and one cultivar applied for addition to the NLI and accepted for testing ‘2RGD-86’ (IW, Skierniewice) (COBORU, 2006).

S. aethiopicum is a phenotypically diverse species. *S. aethiopicum* cultivars could be divided into four groups:

- Gilo Group – with hairy, inedible leaves, and fruits differentiated in shape (round, elongated, egg-shaped or spindly), colour and size (from a few to several dozen grams),
- Shum Group – with glabrous leaves eaten as a green vegetable and very small, inedible, small, elongated fruits,
- Kumba Group – with glabrous, large leaves, eaten as a green vegetable, 5-10 cm in diameter fruits also edible,
- Aculeatum Group – ornamentals with hairy leaves and large fruits, often used for disease resistance breeding under the synonym *S. integrifolium* (Lester 1986, Caruso 2001, Lester and Daunay 2003).

The Gilo cultivar group might have evolved from the Shum cultivar group through hybridization and selection (Anaso 1991). Stedje and Bukenya-Ziraba (2003) studied the variation in 39 polymorphic RAPD markers for 18 populations of *S. anguivi* and *S. aethiopicum* Gilo and Shum Group. The variation among the species and groups was less than 10%, whereas the variation within the species and groups was more than 90%. The Gilo and Shum Groups of *S. aethiopicum* kept morphologically distinct by a strong man-made selection pressure.

Superior varieties of *S. aethiopicum* have yet to be identified or developed. The researches on new, promising varieties are led at the African branch of the Asian Vegetable Research and Development Center (AVRDC). The best known indigenous cultivars are: 'Manyire Green' – a popular cultivar of East Africa, characterized with round, green ripening to red fruits, 'Tengeru White' – round, half green, half white fruits, 'Jaxatu Soxna' – flat, ribbed fruits, light green to white, 50-80 g, 'N'Goyo' – flat, ribbed, dark-green fruits, 70-80 g, 'N'Galam' – flat, ribbed, light-green fruits, 120-180 g. In Europe and Americas the most widely grown are: 'Turkish Orange' – small, orange spherical fruits, about 6 cm in diameter, with an excellent sweet taste, 'Sweet Red' – small, attractive fruits, about 2.5 cm in diameter, with the green skin with dark-green stripes, turning red with dark-red stripes at maturity, 'Small Ruffled Red' – small, deeply creased fruits, about 5 cm in diameter, with orange-red skin, 'Comprido Verde Claro' and 'Morro Redondo' – small ribbed fruits in a bright, acid green, widely grown in Brazil, 'Sweet African Egg' with small, gently ribbed white fruits that mature to a glowing orange, both decorative and tasty.

S. macrocarpon is less morphologically diverse than *S. melongena* and *S. aethiopicum*. Bukenya and Carasco (1994) recognized four groups of *S. macrocarpon* complex in Uganda: *S. macrocarpon* (semi wild group), *S. macrocarpon* 'Mukono' cv. Group and *S. macrocarpon* 'Nabingo' cv. Group. With the use of morphological and experimental methods they found the considerable variation within the two major cultivar groups, in particular 'Munoko'. The variation within *S. macrocarpon* complex is attributable to genotypic differences and environmental factors (Bukenya and Hall 1987).

Eggplants are species of economic importance mainly in Asian and African countries. They are widely cultivated in America and Europe. Professional growers see the necessity of introducing new varieties, particularly hybrids, breeding for very high quality production, in different climatic zones. Eggplants are used for the treatment of many diseases i.e. diabetes, bronchitis, asthma, dysuria, dysentery, etc. For an effective breeding program, information concerning the extent and nature of genetic diversity within the crop species is essential (Singh al. 2006). It is useful for characterizing individual accessions and cultivars and as a genetic guide in the selection of the parents for hybridization.

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OBERŻYNA – POCHODZENIE, KIERUNKI HODOWLI I ZASOBY GENETYCZNE, PRACA PRZEGLĄDOWA

Streszczenie: Oberżyna (*Solanum melongena* L.) jest ważnym gospodarczo gatunkiem z rodziny *Solanaceae*, pochodzącym z południowych Indii, a szeroko uprawianym w Ameryce Północnej i Południowej, Europie i Azji. Spokrewnione z tym gatunkiem *S. aethiopicum* i *S. macrocarpon* pochodzą z Afryki i tam są uprawiane. Oberżyna jest nowym warzywem w Polsce, do niedawna uprawianym tylko w warunkach szklarniowych. Hodowla nowych odmian i doskonalenie technologii produkcji spowodowały zwiększenie areału upraw i wzrost popularności oberżyny wśród konsumentów. W publikacji przedstawiono szczegółową systematykę oberżyny i gatunków pokrewnych, ich pochodzenie oraz historię uprawy. Zestawiono informacje na temat zasobów genetycznych na świecie i najważniejszych kierunków hodowli gatunku. Zaprezentowano wybrane grupy odmian i charakterystykę najważniejszych kreacji hodowlanych.

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