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The importance of Hungarian melon (*Cucumis melo* L.) landraces, local types and old varieties

(Review)

Szamosi, Cs.

Corvinus University of Budapest, Faculty of Horticultural Sciences, Department of Vegetable-and Mushroom Growing

Summary: While supermarkets devote whole aisles to hybrids, traditional varieties are hard to find, and becoming scarcer day by day. Unfortunately, countless old melon varieties have already been lost. Luckily we succeded in collecting most of these varieties, and thus conserving them in Gene Banks. Landraces, local types, and old breed races show many characteristics that could be useful in organic farming. It is important to get acquainted with these varieties and cultivars, because they have greatly adapted to the climatic and pedological conditions of the Carpathian basin. Therefore their conservation is essential for the protection of Hungarian genetic variability. With the help of utilising our landraces in organic farming; careful selection; and the usage of marketing strategy in order to enhance quality features, such as unique flavour; we could reclaim the one-time excellent reputation of Hungarian melon.

Key words: landrace, local type, old variety, *Cucumis melo*, organic farming, flavour

Introduction

In the last decades, plant breeders have created hybrids with tremendous production capacity in intensive cultivation. After the accession to the EU, the number of available varieties increased significantly. On the other hand, we do not known exactly which of these could be grown succesfully within the diverse Hungarian conditions.

Although it increased average yields, the spreading of intesive farming methods resulted in many negative effects. Due to the usage of inappropriate agricultural technology and genetical factors, the soil has been eroded and the crop quality has declined. Accumulation of chemicals in soil, ground-water and products is an increasing problem, while sustainable agricultural economy requires appropriate usage of resources. The diversity of crop species and cultivars, which is the basic principle of agriculture, is endangered by the modern intensive farming methods. Uniform varieties used on large areas have reduced the cultivation of many ancient phenotypes and local strains. Some of these old types – showing many characteristics useful in organic farming – have been collected and maintained in Gene Banks. Such characteristics are: adaptation to extensive farming methods, rapid initial growth, better inner features, and a higher amount of flavour content. Moreover these strains provide richer realized yields within extensive conditions (*Holly*, 2003).

Heirloom*vs. Hybrid

The seed industry promotes hybrids whether they are genuinely better or not because they make far more money. The bottom line is that first generation (F1) hybrids are proprietary inbreds that yield unreliable seed. Open-pollinated heirloom varieties, on the other hand, will produce offspring that are true to type, unless they are cross-pollinated. (*Heirloom fruits and vegetables are treasures from the past, carefully tended and preserved by generations of farmers and gardeners.) As the utilisation of seeds from hybrids has greatly unpredictable results, it is necessary to invest in fresh seeds every year. The business success achieved by seed companies distributing hybrid seeds is not necessarily equalled by the profit made by the farmers that buy from them.

When they speak about melons, even plant breeders admit that hybrids are not at all superior to heirlooms when it comes to taste. The culinary value of heirloom varieties has not escaped the restaurant industry. Many gourmet restaurants in New York and Paris now offer dishes featuring heirloom fruits and vegetables. Top chefs are attracted to heirlooms because they offer far greater possibilities. We have all seen melons that are netted, wrinkled, striped, or ribbed; but there are melons that look like snakes or bananas (*Figure 1*); others that smell like pineapple, mango, peach, lichee, or perfume. These are extraordinary heirlooms. But the delight of melons that taste sublime is only one reason to maintain heirloom fruits and vegetables. The other is because their germplasm is vital to the prospects of agriculture. It is

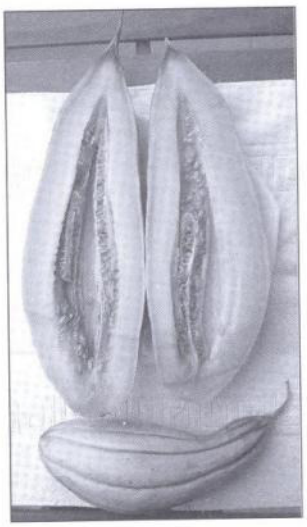

Figure 1 Banana melon (*Cucumis melo* L.) variety

their genes that will help fend off the potato famines and corn blights of the future. Whithout their genetic diversity, mankind will be prey to ever-more virulent pests and diseases (*Goldman*, 2002).

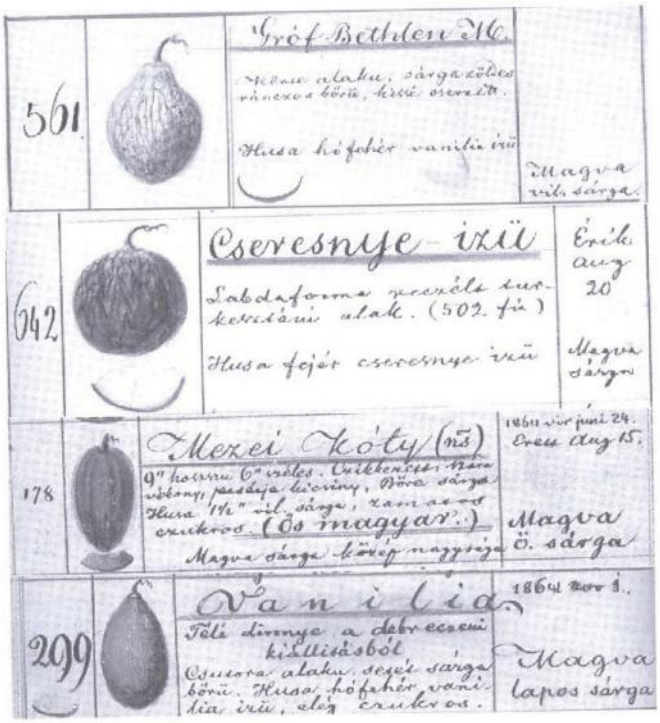

Figure 2 Selected fragments from the Register of the Hungarian Melon landraces and varieties (Girókuti late 1880')

The history of melon cultivation in Hungary

According to the latest archeological studies, we can surely state that Hungarians already knew melons during their migrations. Hungarians called melon *dinna* (the form used today is *dinnye*) in the early 11th century, which indicates an early trade and cultivation of melon in medieval Central Europe, nevertheless cultivation of melon in Europe is considered to have started in the 13th century (*Szabó* et al, 2005).

During the years of Turkish occupation (16th century) the number of cultivated varieties was enriched with new ones from Adrianople and Izmir (Smyrna). Hungarians took over several growing methods from the Turkish gardeners (*Somos*, 1983). That was the hey day of Hungarian melon (*Takáts*, 1917).

There were printed materials about growing methods available in the mid 18th century. From these it is clear that melon was one of the major nutritional plants of the time. In summertime melon was the daily food of the rural society. Later the production was driven by landlords, who competed in producing better and earlier fruits (*Somos*, 1973). This way melon became a real *hungaricum*, grown throughout the country (*Nagy*, 2003).

There are many publications about melon production from the 19th century. That was the time when the Hungarian Melon-Growers Society (Magyar Dinnyész Egylet) was established. In 1864 it recommended 84 of the examined 283 melon varieties for cultivation (*Nagy*, 1981).

In the Register of the Hungarian Melon landraces and varieties, Girókuti (late 1880's) described 715 different melon-varieties. According to the descriptions and illustrations it is clear that all taxonomical categories could be found in his exhibition garden (*Figure 2*).

According to literature *Csanády* (1867) was probably the first who pointed at the deterioration of our melon strains and the fact that this way only a few of these strains could be found in their original forms. Later on *Angyal* (1907) called our attention to the fact that the quality of melons was declining, and the reason for that was the new varieties being imported without any control. These new varieties crossed with the old ones resulted in genetic deterioration. In 1913 Németh complained about the loss of export markets.

After the decline following the 1st World War, production still could not increase. Growers neglected the warnings, because the prices did not show the differences in quality. The earlier the fruit could be harvested, the more income could be obtained (*Zatykó*, 1981). Early ripening types on the other hand presented a much lower quality (*Velich*, 1972). Selection of varieties based on earliness caused the neglect of quality features, such as sugar- and flavour-content. As a consequence, both internal and external demand diminished.

Muskmelon breeding

Melon breeding does not belong to the most successful branches of plant breeding. Despite the successful American and European breeding for resistance, Hungarian researchers could not reach any resounding success (*Kapás*, 1997), however *Bisztray* et al (1998) have obtained encouraging results.

The lack of success is rather the result of financial difficulties than professional deficiency. Hungarian breeders

Table 1 Melon (*Cucumis melo* L.) landraces, open pollinated varieties and selected breeds in Hungary in the 20th century

Landrace	open pollinated variety with foregin origin	Hungarian selected breed (year of national acceptance)
Cserhéjú	Charentais	Monori Togó (1935)
Jászkincs	Bellegardi kantalup	Magyar kincs (1956)
Jég	(Cantalup de Bellegarde)	Muskotály (1958)
Kősárga	Párizsi kantalup	Ezüstananász (1964)
Pocok kóty	(Prescott de Paris)	Hibrid 7 F1 (1967)
Telelő	Kolorádó királynője	Homok kincse F1 (1971)
Téli	(Queen of Colorado)	Tétényi csereshéjú (1979)
Téli cukor	Togo	Hógolyó (1981)
Tiszagyöngye	Vöröshúsú ananász	Dixi (1984)
Turkesztán	(Orange-fleshed Pineapple)	Javított Zentai (1984)
Zentai	Zöldhúsú ananász	Topáz (1990)
	(Green-fleshed Pineapple)	Fortuna (1990)

created several varieties with extraordinary flavour, using at least one old landrace or local strain as a basic material.

The Hungarian-bred and at one time most commonly grown, open-pollinated varieties and landraces are shown in *Table 1*, based on the work of *Csanádi* (1867), *Szántó* (1950), *Komjáti* (1952, 1963), *Vigh* (1956), *Mozsár* (1962), *Velich* (1967), *Molnár* (1960, 1973), *Zatykó* (1981), *Zatykó & Tuza* (1986), and *Kapás* (1997).

Nowadays only 4 nationally accepted varieties still exist: Muskotály (Muscat), Tétényi csereshéjú (Tétényi netted), Hógolyó (Snowball), Topáz (Topaz).

One of our most unique melon variety is probably the 'Muskotály' which different parameters (earliness, yield, sugar content, etc.) were thoroughly investigated by *Bársony & Bisztray* (1996).

Maintaining biodiversity, and the usage of landraces in the future of agriculture

Well-organized and efficient Gene Bank programmes form the basics of sustainable agricultural production. As the breeding-techniques have developed and the demand for

Table 2 Hungarian local melon (*Cucumis melo* L.) population

local population	origin	collection site	melon types*	accession number (ABI Tápiószele)
1.	HUN	Túrkeve	I	RCAT034792
2.	HUN	Sáránd	R	RCAT034793
3.	HUN	Nagykálló	?	RCAT034877
4.	HUN	Kömörő	?	RCAT034879
5.	HUN	Máriapócs	?	RCAT034882
6.	HUN	Nagyecsed	?	RCAT034884
7.	HUN	Szirma	R	RCAT034885
8.	HUN	Heves	C	RCAT034887
9.	HUN	Nagycserkesz	R	RCAT034890
10.	HUN	Csárdaszállás	C	RCAT035118
11.	HUN	Tarnaméra	R	RCAT035119
12.	HUN	Nyíregyháza	?	RCAT035121
13.	HUN	Oros	?	RCAT035122
14.	HUN	Taktaharkány	R	RCAT035157
15.	HUN	Nyírbátor	R	RCAT035161
16.	HUN	Penyige	I	RCAT035330
17.	HUN	Ilk	?	RCAT035331
18.	HUN	Kiskőrös	I	RCAT035689
19.	HUN	Miskolc	?	RCAT035704
20.	HUN	Nyíribrony	C	RCAT035801
21.	HUN	Tura	C	RCAT035923
22.	HUN	Hegykő	R	RCAT035925
23.	HUN	Kistelek	R	RCAT035927
24.	HUN	Kállósemjén	R	RCAT036190
25.	HUN	Nagyszekeres	?	RCAT036195
26.	HUN	Muhi	R	RCAT036339
27.	HUN	Soponya	I	RCAT036341
28.	HUN	Pusztadobos	C	RCAT035332

*C – cantalupensis, I – inodorus, R – reticulatus (taxonomical classification adopted from *Szabo* et. al, 2005)

safe, high quality food has grown, Crop Genetic Resources have become the major natural resources. The genetic material of extinct varieties, cultivars or related species cannot be recovered or reproduced. This is the reason why international programmes, in conjunction with other local organisations, support the conservation and usage of agro-biodiversity as a priority (*Anonym.*, 2005).

With the purpose of creating special landraces easily adaptable to a specific region, on-farm selection has been examined world wide in the last few decades. Landraces still under cultivation and Gene Banks provide excellent raw material for this programme. Experiences show that varieties adapted to local conditions and methods tend to withstand the attack of pathogenic agents better, and can be more easily protected using traditional techniques. These varieties serve as raw material for special products (melon jam, candied melon) including organic, bio-products (*Holly*, 2003). The disadvantage of lower potential productivity can be compensated by better adaptation – resulting in bigger relative yield under extensive cultivation and better internal features compared to hybrids.

Gene Bank Resources provide basic materials rich in phenotypes and genotypes for breeders. Hungarian breeders have successfully used landraces and local populations adapted to ecological conditions. According to a survey from 1981, 50% of the nationally accepted varieties were selected from landraces, or had at least one landrace / old Hungarian-bred variety as a parent. There are varieties already dropped out and others still in use that are worth trying in ecological production, besides the landraces and local strains mentioned above.

The Institute for Agrobotany (TABI), established in Tápiószele in 1959, became the crop genetic resource conservation centre in 1993. Its main activities are exploration and collection of germplasm of field and vegetable crops with special emphasis on Hungarian local material; characterization and evaluation of germplasm collections according to internationally accepted descriptor lists; documentation, medium- and long-term conservation of germplasm in cold stores and in meristem cultures in the case of vegetatively propagated crops. Tasks also include the isoclimatic regeneration of Hungarian landraces, ecotypes, and local populations close to their original places of occurrence (*Anonym.*, 2005).

Another task done by the Institute is the conservation of melon germplasm. The database of the Institute has 188 different types of melon seeds, from which 33% are landraces and local populations. In *Table 2* you can see the data of seeds collected at different sites.

The Department of Genetics and Plant Breeding at the Corvinus University of Budapest is also taking part in the Gene Bank activities. Among other Cucurbits, more than thousand melon (and watermelon) germplasm items are maintained, including also breeding materials. Unfortunately this precious collection is seriously endangered of destruction due to the lack of financial sources. It's an intolerable situation that the largest melon Gene Bank of the country has not been participated in even the most essential pecuniary assistance for several years.

In summary, while the number of hybrid varieties lacking in genetic diversity is constantly increasing, traditional local varieties are in the danger of disappearing. The landraces, local types and old breed races that have been conserved in Gene Banks can be used for conventional-, or organic plant breeding, and also in organic farming. The reputation of Hungarian melon could be restored by utilising these melon types as these are the ones that can adapt to the Hungarian climatic and pedological conditions most successfully, and they possess outstanding internal features, such as their unique flavour. With a bit of steadiness within a few years we could become the 1st organic melon producing country in Europe.

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