

Hungaricum as a quality of fruits and fruit products

Soltész, M.¹, Nyéki, J.², Szabó, Z.² and Papp, J.³

¹College of Kecskemét Faculty of Horticulture, H-6000 Kecskemét, Erdei Ferenc tér 1–3, Hungary

²University of Debrecen, Centre of Agricultural Sciences, H-4236 Debrecen, Böszörményi u. 138, Hungary

³Szent István University, Faculty of Horticulture, H-1118 Budapest, Villányi út 35–43, Hungary

Summary: The territory of the Hungarian state is largely suitable for the purpose of growing fruits of the temperate zone species. During the next decennia, the annual volume of Hungarian fruit production is expected to be around 1.1–1.3 million tons, from which some 15% is considered to be a produce of Hungary or "Hungaricum" (90 thousand tons of sour cherry, 50 thousand tons of apricot, 20 thousand tons of raspberry, 10 thousand tons of walnut). These fruits symbolise the country's special quality, which are worth to catch the interest the foreign consumers. The category of Hungaricum involves almost exclusively varieties of Hungarian origin as sour cherries, apricots, raspberries and walnuts, and they are representing outstanding qualities on the international markets. As for the fruit products the fruit brandies are eligible to be "Hungaricum" and are called exclusively "Pálinka". The Pálinka, provided to be distinguished with a geographic mark and will be competitive on the world market. Smaller quantities, though significant produce is represented by the deep frozen raspberry.

Key words: apple, cherry, nutritional status, pruning, crown size, fruit position, shoot tip removal, fruit thinning

Introduction

The climatic conditions of Hungary are favourable for the fruit production of every temperate-zone fruit species, securing mostly special market qualities (Soltész, 2003a). Those special qualities are based mainly on the chemical composition (taste, flavour, smell, etc.). The special quality of fruits or fruit products alone does not imply to be a Hungaricum. Its significance as a symbol of Hungarian fruit growing depends on the effects realised in meeting demands. The primary aim of producing a Hungaricum is to strengthen our position, to conquer new markets and to call the attention of foreign consumers. The last target involves not only the increasing export but also the stimulation of public catering and inland tourism. However the expanding market and acceptance of a particular Hungaricum is largely dependent on the consumption habits of the "Hungarian" population itself.

The countries producing large masses of a relatively low number of moderate zone fruit species enjoy somewhat more favourable conditions, because they may offer their produce with a characteristic identity on the world market (e.g. New-Zealand, Chile, Argentina, Spain, Greece). Whereas Hungary offers a broad scale of diversity due to the variable climatic conditions and growing sites, thus the goods are rather frittered on the market (Soltész, 1998a). As Hungarian specialities, only a few produces may deserve the epithet of "Hungaricum" (Table 1). Those are the "foreriders" or "flag-ships" of the fruit market branch. The distinction "Hungaricum" is valuable in promoting the trade of a particular fruit or product, which may extend its favourable effect on other related produces by calling attention upon the

Table 1 Ratio of fruits produced by "Hungaricum varieties" in relation to the domestic as well as to the world's production on the average of the years 2003–2010. (after Soltész et al., 2000)

Fruit species	Yearly produced volume in Hungary tons	Percent related to the domestic yield of 1.3 million tons	Percent related to the world's fruit production of that fruit species	Export planned in percent of domestic production
Sour cherry	90000	7.0	8.2	60
Apricot	50000	3.8	2.5	10
Raspberry	20000	1.5	5.0	30
Walnut (unshelled)	10000	0.8	1.0	40
Sum	170000	13.1	3.8	40

goods furnished by Hungarian companies and increase their competitiveness.

Fruits and other products as "Hungaricum" may become beneficial for the image of the whole country. Their influence will be combined with and integrated to other Hungaricum showing up in other sections of the market, catering, gastronomy and tourism. A kind of synergism is expected to develop in building up the national image of Hungary on the world market. It is of outstanding interest to establish a list of competitive Hungaricum offered consequently with attractive and fixed attributes (Andrásfalvy, 2001). The Hungaricum should not rival on the market but support and strengthen each other as members of the same complex network of the country's image. By the promotion of the rural development, improvement of life

quality, environmentally conscious agriculture and husbandry, the Hungaricum considered to be an important component of prosperity. Fruits, which are considered as Hungaricums are also important in building up the image of Hungary as one of the "Orchards of Europe". It is a matter of controversy whether the public declaration of Hungaricum may impair the interests of the country by showing targets for the competing regions. However, according to our conviction the publication of our values facilitates the spreading of information to the potential consumers and recruits committed adherents.

The fruits and products as Hungaricum deserving state support should be cautiously selected with utter responsibility. It should be an opportunity to stimulate innovation, dynamic adaptation and the building out of an infrastructure of Hungaricum. Decisions either good or bad will be susceptibly reflected in the development of the branch. Thus, our interests are obviously concentrated to the sooner or later advantageous exploit of the Hungaricum business.

As a special opportunity the Hungaricum value of the fruit varieties are bred and grown in Hungary (Soltész, 1998b). Gene sources found and utilised in our country may contribute the improvement of new varieties abroad, thus they are convincing testimonies of quality of Hungarian fruit production too (Table 2). Although some varieties are not grown any more in commercial plantations, they should deserve more attention as Hungaricum (Surányi, 2002). It is of national interest to preserve and offer those gene-sources for the advancement and benefit of mankind (Csoma, 2002), as it was stated in Rio (Agreement of Biodiversity of Rio, FAO Agreement of Gene Conservation, etc.).

Table 2 Hungarian fruit varieties as gene sources for breeding purposes on the international scale (varieties of Hungaricum value are listed separately)

Fruit species	Improved Hungarian varieties
Apple	Ceglédi piros, Egri piros, Fertődi téli, Húsvéti rozmaring, Jonager, Kovaguszt, Kovmulti, Kovsztár, Mizsei, Nyári fontos, Nyári zamatos
Pear	Bohusné vajkörtéje, Fehérvári körte, Ilonka, Komélia, Lőrinc kovács, Mézes körte, Mogyoródi óriás körte, Mosoly körte, Szűcsi körte
Quince	Bereczki bőtermő, Mezőtúri
Medlar	Szentesi rózsa
Peach	Remény
Plum	Debreceni muskotály, Penyigei szilva
Sweet cherry	Aida, Alex, Anita, Badacsonyi óriás, Carmen, Katalin, Kavics, Pál, Péter, Rita, Sándor, Solymári gömbölyű, Szomolyai fekete, Tünde, Vera
Mandula	Budatétényi 70, Szigetcsépi 92, Tétényi bőtermő, Tétényi keményhéjú, Tétényi rekord
Chestnut	Iharosberényi 2, Iharosberényi 29, Kőszegszerdahelyi 29, Nagymarosi 22, Nagymarosi 37, Nagymarosi 38
Strawberry	Fertődi 5, Kortés
Gooseberry	Debrecz, Pallagi óriás, Piros ízletes
Red currant	Fertődi hosszűfűtű
Black currant	Aranka, Dyana, Fertődi 1, Hidasí bőtermő
Elderberry	Fertődi 33, Fertődi 479, Fertődi 480, Fertődi 481

Criteria of fruits and fruit products to be a Hungaricum

The complex of products, which are important and influence the image of a country of their origin and are eligible to become a symbol of the state is changing continuously. According to our conviction, we have to postulate criteria as conditions to select a fruit or fruit-product to become a Hungaricum:

- It should reflect the traditions of the country or a region within Hungary, known to represent remarkable patterns of horticultural or technological activities, experiences and innovations added.
- Unic and particular, moreover distinct. It should be particularly Hungarian.
- It should be outstanding and highly esteemed by Hungarian consumers.
- The consumers of foreign countries are also acquainted with it and they are aware of its Hungarian peculiarity.
- The fruit or fruit product should be available on the market in due quantities. The fruit for fresh consumption in its customary, or possibly prolonged season, whereas the fruit-product all year around.
- The trade mark and the geographic origin should be a guarantee of quality and durability. Its shelf-life should be as generally expected by the consumers.
- Attention has to be paid to the growing technology, which should be environmentally conscious. The safeguarding of quality is bound to the consequent tracing of its technology.

The first six criteria are essentially recognised since long in a more or less explicit form. The last criterion is an obligation derived from the offering position, because the new system of safeguarding requires it. In the future, only those Hungaricum fruits will be accepted on the world market, which meet the requirements and are guaranteed by any of the ecological growing systems. Requirements of Hungaricum fruit products are even more seriously supervised as not only their raw material must be checked, but also its technology of packing included its environmental compatibility.

Quality is understood as the sum of all attributes, which are related with the utilisation of the fruit (Soltész, 1998b). The adjective Hungaricum is to be judged from the point of view whether the fruit or its derived product is suitable to symbolise the country. Fruits or fruit products representing Hungary duly may represent a specificity (Nyéki & Papp, 2001). Those fruits (sour cherry, apricot) and products (fruit brandies), which earned already a good fame and fulfilled the criteria, are recognised as Hungaricum. Other fruits and fruit-products are also eligible to be qualified, should be declared as Hungaricum in order to increase their influence

on the market provided sufficient quantities are offered (e.g. raspberry and walnut).

The circle of *Hungaricum* is open and could be widened. That distinction may comprise all kind of fruits and fruit-products, which fulfil the criteria required above, moreover, being stable and available in sufficient volume. We consider as reserves of representing the symbol of Hungary all fruits and fruit-products, which are significant components of the national economy but cannot be marked with that attribute because of the low volume to be exported, but with a trade mark may symbolise high quality of fruit growing and consumption (Soltész et al., 2000).

We should not misinterpret the low fruit yield of the last year, as the general tendency is the oversupply of the world market. The globalisation and its consequence of highly concentrated markets will aggravate the sales. We are confronted with hard and ruthless competition since according to the regulations of the international agreements, GATT/WTO custom's frontiers will be abolished in 2003. Thus, Hungarian fruit production ought to be developed in a well co-ordinated system. Consequently, *Hungaricum* (and potentially all goods eligible to become *Hungaricum*) deserve much more attention as hitherto. The logistic co-ordination of production and sale should be begin first with those items:

- The growers' organisations as EU-conform structures should be initiated and supported in the concentration of the supplies of uniform quality. This will strengthen the sales' positions on the market as well as new markets will be explored.
- Outstanding promotion of ecological horticulture, its organisation including research and development (R&D), extension service as well as supervision.
- Development of regional production and parallel introduction of geographic trade marks on products.
- Initiation of a policy favouring the production of *Hungaricum* with research caring for varieties, nurseries and the development of technologies.
- Sales promotion for favouring the home consumption of *Hungaricum* as a safe basis to back up foreign trade.
- Regularly organised exhibitions in Hungary and abroad on international fairs presenting the utility of *Hungaricum*.
- The production-track of *Hungaricum* as commodities from the grower through the processing industry and trade. Participants of the whole process ought to be integrated into professional and interdisciplinary organisations safeguarding the interests and to promote responsibility.

Important role should assigned to *Hungaricum* in the formation of a competitive horticulture according to the requisites of the EU in Hungary during the following

decennia (Nyéki & Papp, 2001). The development and maintenance of *Hungaricum* is consequently conditioned by safeguarding the trade mark of *geographic origin*, which expresses a tight, exclusive relation between the product or fruit (its quality and technological procedure) and the locality of its origin connected. Whereas the *geographic sign* does not claim absolute relations but the allusion explains some characteristics of the product derived from and/or some phases of the preparation were performed in the respective region (Ósz, 2002). The meaning of a *trade mark* is more specific, it refers to one grower or producer, enterprise or association. A geographic sign comprises larger circles, thus it is by its larger mass more apt to represent a *Hungaricum*.

Each *Hungaricum* should be called by a designation, which may be Hungarian as well as either well known and/or easy to spell. It may also utilised in the logo, which should have some traits common with other, related *Hungaricum* (Dibuz & Soltész, 1998).

Fruit and fruit products as *Hungaricum*

Sour cherry

There is little doubt that priority should be given to the Hungarian sour cherry. Hungary is unrivalled with its sour cherry on the world market. Traditions of its growing, the assortment of varieties, the technological equipment and the sites are well developed and enjoy general acceptance.

Sour cherry has been known since antic times and grown in Hungary thousand years ago by our ancestors in the Carpatian basin (Rapaics, 1940). Here is the most abundant supply of sour cherry genes. Ecological conditions are favourable and combine with the national and local traditions (Mohácsy & Maliga, 1956). There are many communities bearing the Hungarian name of the sour cherry: meggy (e.g. Nyírmeggyes, Meggyaszó, Meggyes etc.) expressing its popularity (Szabó, 2001).

The world's production is more than 1 million tons per year, which can be increased by 50% in the near future. About half of that mass comes from Europe, mainly East-Europe. Poland produces 150 thousand tons per year mainly for the canning industry (Kállayné & Apostol, 2001).

Hungary is famous with the variety 'Pándy meggy' since the second half of the 19th century and it had served as model of quality up to the present. If there were no problems with yield because of insufficient fertility, it should be a *Hungaricum* in the future too. To improve the yields, new varieties have been developed by crossbreeding during the last thirty years by Pál Maliga (e.g. 'Érdi bőtermő', 'Érdi jubileum', 'Maliga emléke' etc.). In addition some local varieties have been selected in N-E-Hungary (e.g. 'Újfehértói fürtös', 'Kántorjánosi', 'Debreceni bőtermő' etc.). Those varieties are recognised and grown as *Hungaricum* on a world-wide scale (Table 3).

Table 3 Main characters of the sour cherry varieties registered and bred in Hungary
(after Soltész, 1998b, Szabó, 2002, Apostol, 2003)

Variety	Ripening dates	Fruit characters diameter, mass, colour, etc.	Utilisation	Growing characteristics	Origin
Du-1	May 15–20	22–24 mm, 5.5–6 g	Fresh consumption	Auto-incompatible, needs association with pollinisers, fruiting shoots are short. Not exposed to develop barren shoot sections	unknown
IV-3/48	May 20–22	20–21 mm, dark purple, dying juice, peduncle without bracts	Fresh consumption	Self fertile, productive. At full maturity the fruit is detached dry from the peduncle. Only for hand picking, without barren shoot sections. Could be trained also to spindle crown	Cross of 'Érdi bőtermő' x 'Meteor korai'
IV-2/152	June 1–4	24–26 mm, 7–8 g, medium dying juice, no bracts on the peduncle	Fresh consumption	Slightly self fertile, planting with polliniser is recommended. The fruit is detached dry from the peduncle. Only for hand picking. Without barren shoot sections. Could be trained also to spindle crown	Cross of 'M 221' x 'Meteor korai'
Meteor korai	June 2–5 prolonged	21–22 mm, 4.5–5.5 g, peduncle rarely with bracts	Fresh consumption	Self fertile, at full maturity the fruit is detached dry from the peduncle. Only for hand picking. The crown is well branched, could be trained also to spindle crown, less tended to barren shoots	Cross of 'Pándy' x 'Nagy angol meggy'
Fortuna *	June 3–5	sweet, soft, without character, 18–20 mm	Fresh consumption	Self fertile, profusely, dependably yielding, but difficult to transport. Only for hand picking	
Csengődi *	June 5–8 prolonged	21–22 mm, 5 g, high content in soluble solids, peduncle without bracts	Fresh consumption	Self fertile, the fruit is detached dry from the peduncle at full maturity only. For hand picking, cannot harvested mechanically. Resistant to Monilia and Blumeriella leaf spot. Does not tend to get barren shoots	unknown
Korai pipacs-meggy	June 10–12	21–22 mm, 5–6.5 g, light red, juice does not dye	Fresh consumption	Self fertile, regular, dependable yields. Fruit is detached dry from the peduncle at full maturity only. Majority of fruits is grown on short shoots. Severe, regular pruning is not needed	'Pándy' x 'Császár'
Favorit *	June 10–15 prolonged	23–24 mm, 6 g, light red, juice not dying. Peduncle with low tendency to bear bracts	Fresh consumption	Self fertile, regular, dependable yields. The detached fruit is not dry. Susceptible to wind damage. Short fruiting shoots. Low tendency to become barren shoots	'Pándy' x 'Montreuille'
Érdi nagygyümölcsű	June 12–14	23–25 mm, 6–6.5 g, sweet. Hardly any bracts on the peduncle	Fresh consumption	Auto-incompatible, needs association with pollinisers. Intermediate yielding capacity. Well branching crown does not get barren shoots. No regular pruning needed	Seedling of the open pollinated variety 'Hankovszky korai'
Kőrösi korai *	June 12–14	20 mm, dark red, rather sour, slightly bitter, Peduncle with strong bracts	Fresh consumption	Self fertile. Not adapted to mechanical harvest, nor for hand picking without peduncle	unknown
M 18 *	June 14–18	21–23 mm, 4.5–5 g, dark purple, juice dying	Fresh consumption	Self fertile. Fruit is detached dry from the peduncle. Branches are thin and tend to grow densely. The crown is branching profusely, therefore needs regular pruning	Cross of 'Pándy' x 'Császár'
Érdi jubileum	June 15–25 prolonged	20–23 mm, 4–5.6 g, hard consistency, high soluble solid content, dying juice. Peduncle few bracts	Fresh consumption juice, bottled fruit, deep freezing	Self fertile. Fruit is detached dry from the peduncle. Trees tend to get barren, therefore need regular pruning	Cross of 'Pándy' x 'Eugenia'
Érdi bőtermő	June 16–20	20–23 mm, 5.5–6 g. Medium dying juice, sweet-sour. Peduncles with few and small bracts	Fresh consumption juice, bottled fruit or deep freezing	Self fertile. High yield. Fruit is detached dry from the peduncle at full maturity Trees tend to get barren, therefore need regular pruning	Cross of 'Pándy' x 'Nagy angol meggy'

Continuation of Table 3

Variety	Ripening dates	Fruit characters diameter, mass, colour, etc.	Utilisation	Growing characteristics	Origin
Cigány meggy clone No. 404 Cigány meggy clone No. 7 Cigány meggy clone No. 59	June 16–22 prolonged	14–20 mm, dark red, strong dying juice, marked acidity, long peduncles often with bracts	For juice and brandy	Self fertile. Fruit is detached dry from the peduncle. Easy to shake, but for mechanised harvest the crown must be trained carefully. Trees tend to get barren on the hanging branches, therefore need to be pruned regularly. Less susceptible to diseases.	unknown
Maliga emléke	June 22–24 prolonged	23–25 mm, 6.5–7.5 g, not dying juice, peduncle without bracts	Fresh consumption	Self fertile, regular and abundant yields. Fruit is detached dry from the peduncle. Only for hand picking. Growth is compact and weak. No tendency to get barren shoots. Crown is easy to form, trained also to spindle	Cross between 'Pándy' x 'Eugenia'
M 71 *	June 21–25	23–24 mm	Fresh consumption	Self fertile, very well yielding. Hanging branches need regular pruning	Cross between 'Pándy' x 'Eugenia'
Pándy meggy clone No 48 Pándy meggy clone Bb 119. Pándy meggy clone No 279	June 24–30 prolonged	22–25 mm, 6–8 g, not dying juice, sour-sweet, peduncle with bracts	Fresh consumption or bottled	Auto-incompatible. Low yields, cannot used even as polliniser, but polliniser is needed in association with other varieties. Detachment of the peduncle is dry. Getting barren shoots, therefore needs regular pruning	<i>Prunus avium</i> x <i>P. cerasus fruticosa</i> spontaneous hybrid
Debreceni bőtermő	July 1–3	18–22 mm, 5–5.8 g, slightly dying juice	Fresh consumption or as bottled fruit and deep freezing	Self fertile, regular, good yielder. Peduncle is detached dry. Tree could be shaken easily. Tendency to get barren shoots, therefore regular and severe pruning is needed. Grows also on its own roots with small crown.	unknown
Kántorjánosi 3	July 3–5	18–22 mm, 5–5.7 g, intermediate dying juice with high acidity	Fresh consumption and bottled fruit, deep freezing	Self fertile, regular and abundant yields. Dry detachment of fruit, suitable for mechanised harvest, i.e. shaking. Tendency to get barren shoots, so regular pruning is needed. Susceptible to Monilia, less susceptible to Blumeriella leaf spot.	unknown
Újfehértói fűrtös	July 3–8 prolonged	18–23 mm, 5–5.6 g,	Fresh consumption and bottled fruit, deep freezing	Self fertile. Dry detachment of fruit. Crown is vigorous, upright, well branching. Needs regular pruning. Very good ecological tolerance.	unknown
M 63 *	July 5–9	22–23 mm, dying juice	Fresh consumption and for market	Self fertile. Dry detachment of fruit. Easy to shake. Tendency to get barren shoots, so regular and severe pruning is needed.	Cross between 'Pándy' x 'Montreuil'
LPP 4/1 T	July 7–15	5.1–5.7 g, 20–23 mm, moderately dying juice, sour, firm consistency	Fresh consumption bottled fruit, deep freezing	Self fertile, regular and abundant yields. Dry detachment of fruit, Tree vigorous, upright later spreading, less tendency to get barren.	unknown
LPP 4/1 D	July 8–15	5.2–5.6 g, 20–24 mm, slightly dying juice, high acidity, firm consistency	Fresh consumption bottled fruit, deep freezing	Self fertile, regular and abundant yields. Dry detachment of fruit, Tree vigorous, upright later spreading, less tendency to get barren.	unknown
LPP 4/1 R	July 9–17 prolonged	20–23 mm, 5.2–5.8 g, slightly dying juice, firm consistency	Fresh consumption, bottled fruit, deep freezing	Self fertile, regular and abundant yields. Dry detachment of fruit, Tree vigorous, upright later spreading, less tendency to get barren.	unknown

* Remark: Mainly for gene source in cross breeding

Plantations starting a quarter of century ago produced around 80 thousand tons during the 1980-ies and in 1989 approached even 90 thousand tons (Kállayné & Apostol, 2001). During the last decennia the production diminished and has stabilised around 50 thousand tons yearly. Due to that quantity Hungary has though leading position in Europe (and in the world), but possibly 90–100 thousand tons would have a safe market.

Solution of some problems of sour cherry production would be one of the main bursting point in Hungarian fruit growing. However, a successful development depends on a co-ordinated attempt to strengthen the Hungaricum-character of the item. The following agenda should be considered:

1. As the cultivation of sour cherry in Hungary enjoys general acceptance regarding either consumption or willingness of planting, the whole country has been judged to be a single "sour cherry growing region". In this case, there is a unique opportunity of using the same tagging (trade mark) for all sour cherry items sent to abroad, according to some examples of other countries. The uniform trade mark is also compatible with a closer indication of geographic origin. Counties of major sour cherry production may keep their own marking (thus: Pest, Szabolcs-Szatmár-Bereg, Bács-Kiskun, Heves, Fejér, Baranya, Somogy, Tolna), and represent occasionally distinct qualities as well as separate defence of geographic origin may be introduced. All those may strengthen the Hungaricum character too. As the majority of varieties have already received international registration, thus cannot be protected by licence any more, but the trade marking would be a favourable solution (Kállayné & Apostol, 2001).
2. The purposeful production and marketing policy should be renewed according to the actual tendencies of consumption. One of the up to date agenda requires the development of processing capacities in order to facilitate the export of the processed product (with trade marking) instead of the raw material becoming anonymous after canning. Sour cherry as a Hungaricum may appear on the world market in a wide diversity of processed fruit products. The co-operation of growers and an ambitious organisation of the processing industry, like the integration of the whole sour cherry business is needed. As long as these purposes are not verified, Hungary is obliged to keep observing the requirements of the main importer, the German market of sour cherry for canning purpose. The competition of the northern neighbouring countries could be met mainly with offering earlier ripening fruit (last week of June).
3. Sour cherry is registered in the world trade generally as a fruit for processing, which is mainly harvested mechanically. The main advantage of the leading Hungarian sour cherry varieties is their excellent quality as fruits for fresh consumption (table fruit). It is expected in the near future that table fruits will be increasingly preferred. Fruit quality of those varieties ought to be near to the standards of 'Pándy meggy' with a diameter of 22–25 mm and do not burst, moreover the trees should be facilitate hand picking, thus trained to a spindle. Competitive varieties are expected to be rather late ripening after the main season of sweet cherries and they will be exempt of maggot damage. That is an attractive purpose, which should be exhausted by utilising the rich genetic resources and it will be a promising novelty on the world market (Soltész, 2003b).
4. Cross breeding of new varieties should deserve further support as well as inquiry to find favourable local varieties. For defined purposes as well as for double utility alternative varieties are to be recommended with different ripening periods according to market preferences, disease resistance or tolerance, adapted to mechanised or manual harvest. International co-operations may also contribute to the utilisation of local resources, e.g. the variety 'Oblacsinszka' (Szabó, 2001).
5. The technological development required to recognise a variety-specific technology and growing system, because phytosanitary operations, harvest, manipulation, shelf life, transport and storing facilities are all considered in the technology. The integrated sour cherry system has been first developed in Hungary (Inántszy, 2002). Some of our varieties (e.g. 'Csengődi', 'Pipacs 1' etc.) have good chances due to the extended family-enterprises of introducing bio-production as an environmentally conscious possibility, which will be promoted in the future.
6. In order to develop sour cherry cultivation we have to initiate special programs. Thus the GEM-program (Guaranteed Healthy Sour cherry) is pointing to the ecological production. Fresh and preserved sour cherry are both items of the folk-medicine since long. Possibilities in consumption do not know quantitative restriction and its sanitary effect is widely recognised. The program of the so called 5 M (the five "M" are initials: Magyarországon Meggyet Mindenkinék Minden Mennyiségben = All quantities of sour cherry in Hungary for everybody) would initiate a movement also abroad for extending sour cherry consumption.

Apricot

It is generally claimed that apricots are grown in the Carpatian basin since antique Roman times (Rapaics, 1940). The first fossil stones are dated to the 3rd or 4th century in Hungary. Its value as Hungaricum rivalled that of sour cherry and earned high esteem as fresh fruit as well as its products (first of all as marmalade and brandy) on the international market (Nyujtó & Tomcsányi, 1959). Since the 16th century foreign reports called the apricot fruits in Hungary as "big" and "best", and that opinion has been persevered. During the years of 1950-es and 1960-es production exceeded in some years the 100 thousand tons. The last decennia experienced a regression of apricot

production in Hungary. It means a sensitive problem that the northern border of apricot growing causes some uncertainty. The quality of Hungarian apricots though being excellent, the growers of southern countries enjoy substantial advantages in productivity, fruit size, colour as well as yield security (Nyéki et al., 1997). In spite of these difficulties, the Hungaricum value of apricots cannot be ignored. Breeding and exploration of growing sites offer further approach in improving yields and security as well as better adaptation to market requirements by co-ordinating ripening times with those of

potential competitive regions. In *Table 4* the most important traits of Hungarian apricot varieties are summarised, which are to be considered in developmental policies.

Extended apricot growing started during the Turkish occupation (16th and 17th century) in the region between the rivers Danube and Tisza. In the 19th century railway construction as well as the root aphid of grape stimulated apricot production. In the 20th century mixed apricot-grape cultivation prevailed, whereas demands of the canning industry stimulated production in the Danube-Tisza region

Table 4 Main characteristics of apricot varieties issued by Hungarian breeders (according to Nyujtó & Surányi, 1981; Kerek & Nyujtó 1998)

Variety	Harvest time	Fruit characters	Utilisation	Growing characteristics	Origin
Harmat *	20–25 days earlier than 'Magyar kajszai'	Small or medium size. Bulging stigmatic point, texture fine, free stone.	Fresh consumption	Slightly self fertile, therefore polliniser recommended. Tree vigorous, few branches, fruiting on short short shoots, frost susceptible also to Monilia and Gnomonia.	unknown
Mk 132-5	14-15 days earlier than 'Magyar kajszai'	Medium size, slightly conical, crimson-red blur on the sunny side, flesh texture is fine semi-firm, juicy	Fresh consumption-processed products	Sel fertile, prolonged blooming Tree semi-vigorous, stiff branching system, tolerant to the virus Sharka.	Cross of 'Késői rózsza' x 'Rakovsky'
Korai piros	10–24 days earlier than 'Magyar kajszai'	Small, crimson blur, somewhat sour taste	Deep freezing, fresh consumption, brandy	Weak self fertility, needs polliniser. Ecological adaptation is good.	unknown
Korai zamos	7–10 days earlier than 'Magyar kajszai'	Medium size, oval shape, light red blur on the sunny side. Medium firm, clingstone.	Fresh consumption	Fertile, but polliniser is recommended. Mediocre yield. Tree vigorous, loose crown, bearing also on long shoots. Susceptible to Monilia and Gnomonia.	Őpen pollinated seedling of 'Jubilar'
Ceglédi Piroska	5–7 days earlier than 'Magyar kajszai'	Round, medium size fruit with red blur, flavour is developing at full maturity, only	Fresh consumption	Auto-incompatibility needing polliniser, its small crown is dense bearing also on long shoots. Fruit thinning is necessary, tolerant to Monilia.	Cross of 'Magyar kajszai' x 'Ceglédi óriás'
Ceglédi óriás *	3–5 days earlier than 'Magyar kajszai'	Large fruit, vivid crimson on the sunny side with fine puncture Juicy.	Fresh consumption, canning for marmalade	Auto-incompatible, needs polliniser. Frost resistant, slightly susceptible to Sharka virus. Inclined to branch necrosis.	unknown
Szegedi mammut *	4–5 days earlier than 'Magyar kajszai'	Large fruit with crimson cover. Fibrous and strongly juicy tending to softening.	Fresh consumption and processing	Auto-incompatible, needs polliniser. Mediocre yields. Trees are vigorous straight growing, then forming half-globular crown. Frost susceptible.	unknown
H-II. 19/39	3–4 days earlier than 'Magyar kajszai'	Large, somewhat long fruit with faint crimson puncture. Texture firm, juicy, tasty.	Fresh consumption, also for processing	Auto-incompatible needing polliniser. Mediocre yielding. Tree grows straight vigorously. Tolerant to Sharka virus.	Cross of 'Korai piros C 508' x 'C 326'
H-II. 16/1	2–3 days earlier than 'Magyar kajszai'	Large, knobby fruit with firm texture . Juicy.	Fresh consumption and processing	Auto-incompatible needing polliniser. Intermediate vigour, dense crown must be pruned regularly. Tolerant to Sharka virus.	'Magyar kajszai C 302' x 'Mandulakajszai'
Magyar kajszai C 235	Mid of July this is the standard variety for maturity	Medium size, round or blunt conical fruit with crimson blur. Juicy, tasty, aromatic.	Fresh consumption, different processed products	Self fertile, abundant yields. Bearing mainly on short shoots. Frost susceptible. Trees are semi-vigorous, the crowns are entangled.	Selected clone of the local variety 'Magyar kajszai'
Gönci magyar kajszai	Mid of July	Mediocre size, round-conical, somewhat compressed. Fine downy skin, texture fine-fibrous, juicy, excellent flavour.	Fresh consumption, different processed products	Self fertile, abundant yields. Bearing also on long shoots. The crown is more compact and less entangled.	Selected clone of the local variety 'Magyar kajszai'

Continuation of Table 4

Variety	Harvest time	Fruit characters	Utilisation	Growing characteristics	Origin
H-II. 45/45	1–2 days after 'Magyar kajszzi'	Mediocre size, stigmatic point conspicuous. Texture elastic, dark crimson blur, juicy.	Fresh consumption processing	Weakly self fertile, needs polliniser. Trees are semi-vigorous, somewhat upright crown.	'Kaukázusi vadkajszzi' x 'Ceglédi óriás'
Ceglédi bíborkajszzi*	1–5 days after 'Magyar kajszzi' prolonged	Large, showy fruits with crimson blur, juicy, special flavour, uneven ripening.	Fresh consumption, juice and other products	Self fertile, abundant yielder. Vigorous growth, tendency to get barren on the lower parts. Very susceptible to frost.	unknown
Ligeti óriás *	2–4 days after 'Magyar kajszzi'	Large fruits covered with crimson puncture, juicy.	Fresh consumption, processing	Auto-incompatible. Few flowers are produced. Trees require intense light, tendency to get barren on the lower parts.	unknown
Rakovszky	4–7 days after 'Magyarkajszzi'	Mediocre size, slightly compressed fruit, juicy and very tasty.	Fresh consumption	Self fertile, abundant yielder. Trees are threatened by cancer.	unknown
1553/54 *	4–7 days after 'Magyar kajszzi'	Small, velvet skinned, rather crimson blur, texture slightly fibrous, high soluble solids content.	Brandy and juice	Reliable yielding, relatively frost resistant. Trees grow vigorously.	Seedling of the open pollinated variety 'Badem Erik'
H-II. 45/26 *	5 days after 'Magyar kajszzi'	Medium size, crimson blurred fruit very juicy texture, characterless taste.	Processing	Self fertile, abundant yields. Short fruiting shoots. Relatively frost tolerant, less susceptible to Sharka virus.	'Kaukázusi vadkajszzi' x 'Ceglédi bíborkajszzi'
Pannónia	5–6 days after 'Magyar kajszzi'	Large fruit, crimson on the sunny side, slightly fibrous, juicy.	Fresh consumption and processing	Self-fertile tending to oversetting, bearing also on long shoots. Regular pruning and fruit thinning needed. Tree is growing weakly, crown is spreading.	'Magyar kajszzi' x 'Késői rózsa'
Mandulakajszzi	5–7 days after 'Magyar kajszzi'	Large, elongated fruit with crimson blur and puncture.	Fresh consumption, bottled fruit	Should be planted with polliniser variety. Ecological adaptability is sufficient.	unknown
H-II. 25/37	5–7 days after 'Magyar kajszzi'	Medium size, slightly conical fruit with crimson blur, texture finely fibrous, juicy.	Fresh consumption and processing	Self fertile, good yielder. Tree medium vigorous, loosely branching. Low susceptibility to Gnomonia, mediocre to Sharka virus.	'Kései rózsa C 320' x 'Ceglédi bíborkajszzi'
Ceglédi arany	6–7 days after 'Magyar kajszzi'	Large, round fruits with crimson blur on one side. Fine flavour uniform ripening.	Fresh consumption, processing	Self fertile, very productive. Vigorously growing tree with few branches, therefore careful training is needed. Tolerant to the Sharka virus.	'Ceglédi óriás' x 'Rózsabarack C. 1668'
H-I. 4/25 *	6–7 days after 'Magyar kajszzi'	Large, hardly visible stigmatic point with fine crimson blur. Juicy and fine fibres.	Fresh consumption, processing	Weak self fertility, polliniser needed, mediocre yielder. Frost susceptible, tolerant to Sharka virus.	Seedling of 'Ceglédi óriás'
H-II. 25/62	7–10 days after 'Magyar kajszzi'	Mediocre size, crimson blur with red puncture. Texture is firm, fine fibres, juicy.	Fresh consumption, processing	Auto-incompatible, polliniser is needed. Mediocre yields. Tree is vigorous, scarcely branching. Very tolerant to Sharka virus.	'Kései rózsa C 320' x 'Ceglédi bíborkajszzi'
H-II. 25/65 *	7–12 days after 'Magyar kajszzi' prolonged	Mediocre, slightly conical, showy fruit with crimson blur. Texture juicy, scented, free stone.	Fresh consumption also for processings	Self fertile. Tree is semi-vigorously growing. Susceptible to Sharka virus.	'Kései rózsa C 320' x 'Ceglédi bíborkajszzi'
Ceglédi kedves	8 days after 'Magyar kajszzi'	Mediocre size, slightly compressed and elongate, light crimson blur, texture firm and elastic.	Fresh consumption, and for processing	Self fertile, very good yields. Tree size is mediocre, densely branching with hanging branches. Relatively tolerant to Sharka virus.	Open pollinate seedling of 'Ceglédi óriás'
H-II. 20/6	12 days after 'Magyar kajszzi'	Mediocre size, slightly compressed, knobby, showy fruit. Texture is firm, finely fibrous, tasty.	Processing and fresh consumption	Self fertile, good yielding. Tree is semi-vigorous bearing also on long shoots. Susceptible to Sharka virus.	'Magyar kajszzi C 1646' x 'Ceglédi bíborkajszzi'

Continuation of Table 4

Variety	Harvest time	Fruit characters	Utilisation	Growing characteristics	Origin
Rózsakajszi C. 1406 *	12–14 days after 'Magyar kajszi'	Mediocre size, asymmetric, compressed fruit with crimson blur on the side, fine fibres, juicy.	Processing	Self fertile, inclined also to oversetting. Tree is vigorous, light dependent, tending to get barren, requiring regular pruning. Very susceptible to Sharka virus.	unknown
Budapest *	13–16 days after 'Magyar kajszi'	Large, compressed fruits with orange bright red puncture on the sunny side, free stone, less juicy, acid.	Fresh consumption and processing	Self fertile, the tree is weakly growing with dense branching. The branches are liable to split down. Less susceptible to Sharka virus.	Seedling of the variety 'Nancy'
H-II. 36/26 *	13–16 days after 'Magyar kajszi' prolonged	Mediocre size with crimson blur.	Fresh consumption and processing	Self fertile bearing only on short shoots, susceptible to pox virus.	Open pollinate seedling of 'Rózsabarack C. 778'
Borsi-féle kései rózsza *	14 days after 'Magyar kajszi'	Small or mediocre size fruit orange with bright red puncture, free stone, fibrous, less juicy.	Fresh consumption and processing	Self fertile, inclined also to oversetting. Tree is light dependent, tending to get barren.	unknown

* Remark: Mainly for gene source in cross breeding

mentioned earlier, which was considered the only apricot growing site (*Nyujtó & Surányi*, 1981). At the Research Station of Cegléd contributed substantially to the development of the production by breeding varieties. However, later with the large scale plantations the weak points of the production showed up soon, because smaller ecological micro-regions have been ignored. Even the best Hungarian varieties did not guarantee the security of the yield required, as the frequent winter- and spring frosts rendered production uneconomical (*Gyuró*, 1990). Today we do not maintain that opinion, though the production of some traditional micro-regions still cannot be ignored (Kecskemét, Nagykőrös, Cegléd, Tizakécske, Lakitelek, Tiszaalpár, Kiskunhalas etc.). The valuable varieties and variety candidates of Cegléd and their earlier Hungarian status also should be taken into account. The irregular yields of the Danube-Tisza region render hopeless the development of markets for fresh consumption. However the famous apricot brandy gradually became a national symbol with different designations "híres" and "füttyölős". This and other fruit products, as marmalade and similar easy to preserve commodities are suitable to supply the off years and keep the markets.

New plantations have preferred the more protected hillsides instead of the plain of Central Hungary or to moderate climates in proximity of large water surfaces (e.g. Pécs, Dunavecse, Ceglédbercel, Balatonboglár, Pomáz, Gyöngyös etc.). It was stated that the early death of trees is equally expected on the southern and south-eastern slopes because the excessively variable temperatures. Finally, the region of Gönc (N-E Hungary) proved to be much more reliable, the winter temperature is more stable, buds burst and bloom later, drought is less deleterious as at any other

parts of the country. The length of vegetation period and irradiation are sufficient to attain the quality required in the internal composition. The increasing plantations of the Gönc region will be a safe basis of representing a Hungarian with their 40–50 thousand tons of production (*Szabó et al.*, 2001).

At Gönc, back to 1850-es, mainly sweet cherry has been grown. Apricot appeared later, first of all as a substitute for the declined vineyards after the calamity of the root aphid. The slow development facilitated the strengthening of the growing traditions, but the decisive change started about the mid of the 20th century. Larger plantations appeared in the 1960-es (*Soltész et al.*, 2000) and the motivation of planting prevailed in that region. In 2002, around 1000 ha area has been noted, (*Szabó et al.*, 2001). The higher safety in yielding is the basis of prosperity, thus the processing industry has been also stimulated.

For the sake of increasing the competitiveness of apricot as a Hungarian, the following measures are suggested:

1. The top requirement is the safety of yields. All means are centred to increase it. The choice of variety, decision of micro regions or growing sites, nursery and growing system, association of varieties, prevention of frost damages or phytotechnical procedures and special methods as the protection against spring frosts (delaying bloom by water sprays, wind blasts, irrigation, smoke, heating, etc.)
2. Varieties of good quality for fresh consumption and also for processing with reliable yielding as Hungarian varieties (e.g. 'Pannónia', 'Gönci magyar kajszi' etc.), introduced (e.g. 'Bergeron') and promising ones (e.g. 'Serena', 'Sirena'). Further criteria may be the tolerance

to the virus disease "sharka" and the increasing rate of the ripening period of late July and August. That period would be preferable for, fresh consumption as well as supplying the processing industry.

3. A co-ordinated system of innovation and extension service should be built out along the whole growing and processing itinerary of apricots. Special emphasis is put on the interests of the growers extended to the industrial processes too. Apricot as a Hungaricum cannot be maintained without the concentration of growing and increasing the reliability. Growers are to be integrated into organisations, which control the industrial processing too.

Raspberry

Raspberry has traditions in Hungary. More intense cultivation started some 70–80 years ago and the production grew yearly. Between 1960 and 1980 the average mass attained 10 thousand tons, whereas in the last ten years it exceeded 20 thousand tons. The growth was steady though some difficulties have impaired it. Conditions have been more prosperous than in other fruits, mainly the export secured economic advantages (Papp & Nyéki, 2002).

The present total volume as well as export means significant position on the world market. The maintenance, nay the expansion of the present competitiveness postulates a thoughtful co-ordination of development. Raspberry is a potential Hungaricum, which waits to be exploited in the near future:

- A variety representing the traditional Hungarian offer is well adapted, suitable for deep freezing e.g. 'Fertődi zamatos', but there are other Hungarian bred varieties and promising variety candidates ('Fertődi, Kármin', 'Fertődi Venus', 'Fertődi Zenit', etc.) too (Kollányi, 1998). Growing sites should be explored (as balanced climate, sufficient soil moisture and air humidity).
- More careful planting designs (replanting criteria, soil disinfecting, healthy i.e. virus free planting stocks, training system for manual picking, etc.).
- Environmentally conscious technologies (irrigation, phytotechnics, integrated growth system, etc.)
- As primary purposes deep freezing but also fresh consumption should be considered. The whole process of growing, marketing, freezing, transport and processing should be integrated into the same organisation as a condition of balanced co-operation.

Walnut (*Juglans regia*)

The development of walnut growing owes plenty of reserves. At present 6–7 thousand tons of nuts are grown, which means 0.5% of the world's production. Regions suitable for walnut growing are traditional (counties: Szabolcs-Szatmár-Bereg, Somogy, Baranya and Vas), where the production could be increased within 5–6 years to yearly 10

thousand tons. However, there are, other sites in the country, where walnuts would be grown favourably. The assortment of varieties, selected local clones as well as bred by purposeful cross breeding did not exhaust the potentials of the country yet. On the long run even 15–20 thousand tons could be produced country wide. The development of walnut growing up to attain a Hungaricum status, the most urgent measures are to be observed (Szentiványi et al., 2001):

- In the new plantations Hungarian selected local varieties ('Alsószentiványi 117', 'Milotai 10', 'Tiszacsécsi 83') as well as new bred varieties (e.g. 'Alsószentiványi kései', 'Milotai bőtermő', 'Milotai kései' etc.) should be planted in about equal rates, however spring frost danger could be avoided preferably by the late bursting of new bred varieties.
- Competitiveness is bound to grafted plantations absolutely. For that purpose the nursery capacity should be developed as well as a traditional and alternatively intense training system has to be elaborated. At the same time the most productive alternatives of the association of varieties should be explored.
- A high level of growing technology should be introduced, which postulates an efficient harvesting procedure, cleaning, preparation of the commodity, e.g. shelling and cooling store.
- Intense marketing activity should promote the domestic consumption as well as the international acceptance of the Hungarian walnut. The defence of geographic origin and marking of the nuts should be introduced.
- Alternative possibilities of the utilisation of walnuts, as special Hungarian products in gastronomy and nutrition are to be considered carefully.

Fruit brandies

At this moment and perhaps also in the long run fruit brandies may fulfil the role of the main Hungaricum of fruit products. The main criterias are as follows:

- Fruit processing of Hungary suffers from many problems. The majority of the processing industry is owned by foreign entrepreneurs. Therefore it is of prime interest to utilise the quantity of Hungarian fruit produced, by strengthening the co-operative relations between growers and users. As for the manufacturing of concentrates, there is still considerable Hungarian interest. Because of the buyer's market, a substantial fall in prices is expected on the other handing the concentrate is not an end product, cannot be a Hungaricum.
- Up to now, the manufacturing of brandy is still under Hungarian control, that means the capacity could be developed with domestic capacities.
- Hungary was able to achieve the defence of the designation: „pálinka” means the name is reserved to Hungarian products exclusively.

- The pálinka drinks represent the products of Hungarian fruit growing. Thus an integrated system of grower's organisations may easily achieve a uniform marking of geographic origin on the label for a sufficiently large quantity of the produce on the international market.
- The pálinka has considerable sanitary advantages as proved by gastronomic arguments of course at moderate consumption.

The designation pálinka is limited to the brandies originating and distilled from fruits at 100%. Alcohol, aroma or other tastes as additions are not admitted. One of the most important consequences of this criterion is a distinct quality differentiating from the commerce spiritual drinks and is sold by higher prices. This has a positive effect on production and security of sale.

A pálinka provided with geographic marking are especially suitable to promote production in the different growing regions (apple of Szabolcs, plum of Szatmár, peach of Kecskemét, apricot of Gönc, plum of Békés, pear of Halas etc.).

The responsibility of pálinka manufacturers is great. Strong traditions promised a rich future and the fate of the production is also dependent on them. A slight slackness would heavily compromise the whole industry and also growing.

References

- Andrásfalvy, A. (2001):** Hungaricum as a quality mark of commodities of horticultural origin (Manuscript).
- Apostol, J. (2003):** A fontosabb meggyfajták ismertetése. In: Hrotkó K. (ed.), Cseresznye és meggy. Mezőgazda Kiadó, Budapest, 74–90.
- Csoma, Zs. (2002):** A hungarikumok szerepe és történetük. Magyar Mezőgazdaság, 28. (december 11.)
- Dibuz, E. & Soltész, M. (1998):** A fajták elnevezése, a fajtanevek használata. In: Soltész M. (ed.), Gyümölcsfajta -ismeret és -használat. Mezőgazda Kiadó, Budapest, 13–16.
- Gyuró, F. (1990):** Gyümölcsstermesztés. Mezőgazdasági Kiadó, Budapest.
- Inántszy F. (2002):** Meggytermesztés integrált módszerekkel. ÚGyKSz Kht, Újfehértó.
- Kállay, T.-né & Apostol, J. (2001):** A hazai meggytermesztés tájai és a piacra jutás elősegítése. MTA-Agrártudományok Osztálya, Budapest (Manuscript).
- Kerek, M.M. & Nyujtó, F. (1998):** Kajszi. In: Soltész M. (szerk.), Gyümölcsfajta ismeret és -használat. Mezőgazda Kiadó, Budapest, 234–253.
- Kollányi, L. (1998):** Málna, szeder és szeder málna. In: Soltész M. (szerk.), Gyümölcsfajta-ismeret és -használat. Mezőgazda Kiadó, Budapest, 371–384.
- Mohácsy, M. & Maliga, P. (1956):** Cseresznye és meggytermesztés. Mezőgazdasági Kiadó, Budapest.
- Nyéki, J. & Papp, J. (2001):** A kertészeti hungarikumok termesztésének fejlesztése, különös tekintettel a termékpályákra és a lehetséges felvevő piacokra. „Magyarország az ezredfordulón” stratégiai kutatások a Magyar Tudományos Akadémián, Budapest (Manuscript).
- Nyéki, J., Soltész, M. & Szabó, Z. (1997):** A gyümölcsminőség tényezői a csonthéjasok integrált termesztésében. „AGRO-21” Füzetek 15:57–71.
- Nyujtó, F. & Tomcsányi, I.P. (1959):** A kajszi. Mezőgazdasági Kiadó, Budapest.
- Nyujtó, F. & Surányi, D. (1981):** Kajszi. Mezőgazdasági Kiadó, Budapest.
- Ősz, K. (2002):** Az agrártermékek földrajzi eredetvédelme Magyarországon 2002-ben. Kertészet és Szőlészet 49:14–15.
- Papp, J. & Nyéki, J. (2002):** A magyar málnatermesztés jelene és fejlesztési lehetőségei. MTA-Agrártudományok Osztálya, Budapest (Manuscript).
- Rapaics, R. (1940):** A magyar gyümölcs. Királyi Magyar Természettudományi Társulat, Budapest.
- Soltész, M. (1998a):** A minőségi gyümölcsstermesztés ugrópontjai. „AGRO-21” Füzetek 25: 6–10.
- Soltész, M. (1998b):** A fajták megválasztása. In: Soltész M. (szerk.), Gyümölcsfajta-ismeret és -használat. Mezőgazda Kiadó, Budapest, 59–74.
- Soltész, M., Nyéki, J., Papp, J., Hunyady, M. & Szabó, Z. (2000):** A gyümölcsstermesztés korszerűsítésének feladatai. Int Journ. Hort. Sci. 6(2):29–44.
- Soltész, M. (2003a):** Gyümölcsök. In: Glatz F. (szerk.), Magyarország növény-és állatvilága (Növények, állatok, élőhelyek). MTA Társadalomkutató Központ, Kossuth Kiadó, Budapest, 85–92.
- Soltész, M. (2003b):** Meggy. In: Papp J. (ed.), Gyümölcsstermesztés II. Mezőgazda Kiadó, Budapest.
- Surányi, D. (2002):** Gyümölcsöző sokféle. Akcident Nyomdaipari Kft., Cegléd.
- Szabó, T. (2001):** Meggytermesztés az észak-keletmagyarországi termőterületen. MTA Agrártudományok Osztálya, Budapest (Manuscript).
- Szabó, T. (2002):** Meggyfajták és alanyok. In: Inántszy F. (szerk.), Meggytermesztés integrált módszerekkel. ÚGyKSz Kht, Újfehértó, 3–23.
- Szabó, Z., Nyéki, J., Molnár, B.-né, Berta, B. & Németh, L. (2001):** A gönci kajszi termőterület rekonstrukciója. MTA-Agrártudományok Osztálya, Budapest (Manuscript).
- Szentiványi, P., Kállay, T.-né & Bujdosó, G. (2001):** A magyar diótermesztés helyzete, fejlesztésének lehetőségei. MTA-Agrártudományok Osztálya (Manuscript).