International Journal of Horticultural Science 2021, 27: 7-28.
https://doi.org/10.31421/ijhs/27/2021/9810

Comparative analysis of sour cherry cultivars on their ecological and biological indicators

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Summary: Sour cherries developed in the northern hemisphere, an alloploid hybrid of dwarf sour cherries (*Prunus fruticosa*) and bird cherries (*P. avium*), born in the confluence of the two species. However, the ecological and, above all, cold tolerance of the ancestor of cultivated sour cherries is higher than that of wild cherries (De Candolle, 1894; Rehder, 1954; Terpó, 1974; Iezzoni et al., 1991; Faust & Surányi, 1997). The cultivation limits are in the northern hemisphere 38-44. degree. The Carpathian Basin, the Balkans and Asia Minor are considered to be the main birthplaces for sour cherries. The genetic and morphological diversity of sour cherries is greater than that of the basic species (Iezzoni et al. 1991; Faust & Surányi, 1997). In the study, 472 sour cherry cultivars were compared based on 7 relative ecological indicators and 3 biological values. Compared to other *Prunus* species, we mostly found less variability in sour cherries - not counting their salt tolerance (SB). The partial similarity between open pollination (OP), frost tolerance (FR) and disease resistance (DR) - partly true in terms of varieties, but also reflected the effects of purposeful breeding and selection. The cultivars together - in comparison, showed balance, but in the highlighting, the differences of the 3 cultivar groups became significant. Indeed, the differences between the species of the former Hungarian cultural flora are clearly different (Surányi, 2004), which is also the case when comparing a large number of apricot (Surányi, 2014), plum (Surányi, 2015) and peach (Surányi, 2020) varieties.

Surányi, D. (2021): Comparative analysis of sour cherry cultivars on their ecological and biological indicators. International Journal of Horticultural Science 2021, 27: 7-28. https://doi.org/10.31421/ijhs/27/2021/9810

Key words: sour cherry, ecological indicators, biological indicators

Introduction

The shapes of cherries (wild, cultivated and escape) are a hybrid of cherries and drip cherries. The former (wild cherry) is a Central European, sub-Mediterranean species, its range stretches from central France to northern Iran: Nw. 52-39. degrees. The area of dwarf sour cheery is narrower (Nw. 50-46. degrees), it occurs up to southern Siberia. It lives in limestone, warm soil, in dry forest steppes. Eurasian is, flat and hilly species. The sour cherry as alloploid hydride is of medium size, although according to Zsukovszkij (1964) is not found in Asia Minor into zone of wild (*Quercus cerris*) oak, Nw. 44-38. degrees (Terpó, 1974, Faust & Surányi, 1997).

De Candolle (1894) reported valuable, different floristic data on, among other things, the endemic nature of sour cherries. Hohenacker (De Candolle, 1894) the met wild sour cherry trees near the Caspian Sea, Koch ((De Candolle, 1894)) in the northeastern part of Asia Minor. Ledebour (De Candolle,1894) noticed him in Jeliszavetpul and Yerevan. Grisebach (De Candolle, 1894) also saw it in Bithinia and found it endogenous in Macedonia. He believes it could occur from the Caspian Sea to surroundings of Constantinople, although Boissier (De Candolle, 1894) and Csihacsev (De Candolle, 1894) were not identified on Pontus. Considered native to Crimea, Steven (De Candolle, 1894) met its cultivated specimens, Rehmann (De Candolle, 1894), with *Prunus chamaecerasus*.

Fraas (De Candolle, 1894) thought it was wild form in Greece, Heldreich (De Candolle, 1894) accepted it only for Dalmatia, which was Marasca cherries. Theophtrasthos, Plinius and other ancient authors mention only the sour cherry. However, according to De Candolle (1894), the Albanian and old Italian names really refer to cherries. Vergilius (Georg. II. 17) two lines, or two frescoes known from Pompeii, appear to be sour cherries. Heer & Sordelli (De Candolle, 1894) observed the difference between the stone seeds of cherries and sour cherries, so that the differences between the two species could be clarified later from the seed finds. And De Candolle (1894) rightly assumed that cherries may have been known in Italy before the cherry (cf. Etruscan tomb walls), but Lucullus BC. in 64, cherries from Trapezunt (Trabzon) became much more popular (De Candolle, 1894).

Rehder (1954) divided the subgenus *Cerasus* Pers. into 7 sections, of which *Microcerasus* Pers., *Pseudocerasus* Koehne, *Eucerasus* Koehne, and *Mahaleb* Focke represent mainly pomological value. There are within *Eucerasus*, *Prunus avium* L. (2n = 16, 24, 32), *P. fruticosa* Pall. (2n = 16, 32) and *P. cerasus* L. species. According to Zwintscher (1962) two are conception in the formation of sour cherries. One, the autotetraploid shape of cherries, which is questioned by the cherry nature of polyploid hybrids, and the other that is a natural hybrid of two cherries and dripping - this is the concept adopted today, which was also confirmed by Oldén & Nybom (1968) test crosses (***Figure 1-4***).

The origin of sour cherries was studied by Horváth et al. (2008) found that the genome of P. avium is diploid and that of *P. fruticosa* is tetraploid, and *P. cerasus* to confirm the association between unreduced *P. avium* and *P. fruticosa* gametes using cpDNA and genomic (SSR) markers from

different European countries. There were examined samples of sweet, dwarf and sour cherries. Some *P. cerasus* haplotypes are identical to some *P. fruticosa* haplotypes (mainly in Hungarian samples), suggesting that *P. fruticosa* may have participated in the *P. cerasus* genome as a maternal partner. Looking at the genome markers, some *P. cerasus* alleles were shared with either *P. avium* or *P. fruticosa* samples, indicating that the latter were indeed involved in the *P. cerasus* genome. Relative ecological and biological value figures showed sour cherries belonging to some other species, such as half cherries (*P. gondouini* Rehd. as cv. Eugenia) and known to *Microcerasus* (*P. besseyi* Bailey, *P. pumila* L., *P. tomentosa* Thunb., *P. pseudocerasus* Lindl.) (Rehder, 1954, Terpó, 1974, Faust & Surányi, 1997).

Faust & Surányi (1997) earlier classified sour cherry varieties into four types: 1. *acida, frutescens* and *collina*; 2. *vulgaris, cerasus* and *caproniaca*; 3. *morello, austera; and* 4. *marasca*. Other types of sour cherries have a role among ornamental plants, morphologically the shapes forming "layered flowers" (the phenomenon of diaphysis) (Filarszky, 1911; Gracza, 1980, oral communication) and non-white-petalled *Prunus cerasus*. Potential fertile (self-fertile, self-sterile) sour cherries appeared in Asia Minor and South-Eastern Europe (Terpó, 1974; Faust & Surányi, 1997), and for the most part their cultivation remained here, although it has already become a world species.

The relative ecological and biological values are based on a large number of ecological sources and own data. The figures came from Ellenberg & Borhidi (472 varieties are not individually labeled with the relevant data) from the following sources: Faust (1989), Kozma et al. (2003), Mándy (1963), Gardner et al. (1952), G. Tóth (1997), Jávorka & Soó (1951), Soó (1964), Kárpáti & Terpó (1971), Kobel (1954), Kozma et al. (2003), Mándy (1963), Larcher (1980), Papp (2003, 2004), Porpáczy (1964), Raunkiaer (1905), Soltész (1998, 2014), Tomcsányi (1979, V. Németh (1986) and Wilsie (1969).

The new, additional, so-called relative biological indicators in determining the source of these included: Angyal (1926), Bereczki (1877-1887), Bordeianu et al. (1965, 1969), Brooks & Olmo (1972), Brózik (1960, 1993), Brózik & Nyéki (1975), Crane & Lawrence (1956), De Candolle (1894), Crossa-Raynaud (1972), Entz (1857-1859); Faust & Surányi (1997), Fogle (1975), G. Tóth (1997, 2001), Gyuró (1974, 1990), Hedrick (1915, 1919, 1938), Hrotkó (2003), Iezzoni et al. (1991), Jávorka & Soó (1951), Kállayné (2014), Kapás (1969, 1997), Knight (1969), Kobel (1954), Kozma et al. (2003), Krüssmann (1978), Mándy (1963), Mcgregor (1976), Mohácsy & Maliga (1956), Moore & Barington (1991), Nyéki (1980), Nyéki & Soltész (1996), Nyéki et al. (2016), Papp (2003, 2004), Pernesz (2020), Pór & Faluba (1982), Porpáczy (1964), Rapaycs (1940), Rayman & Szabó (1966), Roach (1985), Soltész (1998, 2014), Surányi (1985, 2002, 2003, 2015, 2016 And 2020), Tomcsányi (1960, 1979).

Materials and methods

The expression of the ecological experiences in form of relative indicator values is not a new classification experiments to compare the ecological species. In this paper we consistently use Borhidi (1993, 1995) fundamental work of the ecological values of the indigenous flora of data it. At first, Iversen (1936) applied relative indicator values for characterizing salt-resistance of coastal plants, suggesting a three-grade scale. Ellenberg (1950, 1952) worked out the ecological indicator values of a larger number of meadow plants and different weeds for several ecological factors and the first experiment for applying these indicator values in typing plant communities. Ellenberg (1963) were applied 5-grade scales and the moisture scale was amplified later to a 10-grade scale.

The development of the indicator values, an important contribution was made by Zólyomi's TWR system (1964) and that improved their staff (Zólyomi et al., 1967).

The TWR-system consisted of a 10-grade temperature scale (T), an 11-grade water content or soil moisture scale (W) and a 5-grade soil reaction scale (R), which was worked out to 1400 native species of the Hungarian flora and weeds (Kárpáti, 1978) and with some critical taxonomic groups (Borhidi, 1969, and others). The TWR formed an ecological reference system for plant communities and to place a multidimensional ecological space (cf. Précsényi, in Zólyomi 1964, Zólyomi 1987).

Ellenberg (1974) was elaborated an ecological behavior indicator values with regard to the seven main environmental factors; three of them are climatic ones: temperature (T), light (L), and continentality (C), further three indicators related to soil factors, i.e. moisture or water supply (F), acidity or soil reaction (R) and nitrogen supply (N), the salinity has been recently actualized (Ellenberg et al., 1991). Although the indicator values of Ellenberg were not used in the Hungarian botanists, it had been included into the Synopsis of SOÓ (1964-1985): the TFRN-values of SOÓ can be obtained by dividing the Ellenberg's figures. Kovács (1979) elaborated the Ellenberg's indicator values of 1300 plant species of Romania and a register of other biological characteristics too. Borhidi (1993, 1995) are found the ecological indicator values of the Hungarian flora in the following order, which we applied in recent study of pomological species. In the following, we take the figures as defined in Borhidi (1993, 1995) study, as well as extend the cultivated fruit varieties in Hungarian cultural flora.

TB: The relative *temperature figures* reflecting the heat supply of the habitats where the species occur (mainly based on the distribution according to the latitudinal vegetation zones and altitudinal belts). The temperature figures of Ellenberg's 9-grade scale (T) applied by Borhidi (B) to the Hungarian flora. The relative figures indicate the following heat-climate belts or the corresponding microclimate conditions:

1. Subnival or supraboreal belt
2. Alpine, boreal or tundra belt
3. Subalpine or subboreal belt
4. Montane needle-leaved forest or taiga belt
5. Montane mesophilous broad-leaved forest belt
6. Submontane broad leaved forest belt
7. Thermophilous forest or woodland belt
8. Submediterranean woodland and grassland belt
9. Eumediterranean evergreen belt.

WB: The relative *moisture figures* (occurrence in relation to soil moisture or water table) according to the 12-grade F-scale of Ellenberg. The scale is very similar to the W-scale of Zólyomi, but the water plants have a more detailed categorization, as follows:

1. Plants of extremely dry habitats or bare rocks
2. Xero-indicators on habitats with long dry period
3. Xero-tolerants, but eventually occurring on fresh soils
4. Plants of semidry habitats
5. Plants of semihumid habitats, under intermediate conditions
6. Plants of fresh soils
7. Plants of moist soils not drying out and well aerated

8. Plants of moist soils tolerating short floods
9. Plants of wet, not well aerated soils
10. Plants of frequently flooded soils
11. Water plants with floating or partly emergent leaves
12. Water plants, most wholly submersed in water.

RB: *Reaction figures*, according to the nine-grade Ellenberg's scale, reflect to the occurrence of the plants in relation of the soil reaction of the habitats (Tüxen & Ellenberg, 1937). In the 5-grade Zólyomi's scale calciphilous and salt tolerant or even halophilous plants are equally treated as basiphilous plants. Here the two groups are differentiated by their positive or negative *salt figure* category. A comparison of the reaction value scales according to Ellenberg's versus Zólyomi's classification was carried out by Pichler & Karrer (1991, cit. Borhidi, 1995). The correspondent degrees are:

1. Plants of extremely acidic, explicitly calciumfree sites
2. Intermediate type between 1 and 3
3. Acidifrequent plants, mostly in acid soils
4. Plants of moderately acidic soils
5. Plants of slightly acid soils
6. Mostly on neutral soils but also in acid and basic ones, generally widely tolerant, more or less indifferent plants
7. Basifrequent plants, mostly on basic soils
8. Plants of basiphilous sites
9. Plants of explicitly calcareous sites and ultrabasic specialitsts
10. This scale slightly differs from the original Ellenberg's scale, due to the greater variety of the calci- and basiphilous habitats occurring in the warm-dry subcontinental and submediterranean climates. E.g. in the Ellenberg's scale 7 is the figure of the neutral habitats.

NB: *Nitrogen figures* according to Ellenberg's 9-grade scale, based on the occurrence in relation to the ammonia and nitrate supply of the habitats. Degrees:

1. Only in soils extremely poor in mineral nitrogen, e.g. peat bog plants
2. Plants of habitats very poor in nitrogen
3. Plants of moderately oligotrophic habitats
4. Plants of submesotrophic habitats
5. Plants of mesotrophic habitats
6. Plant of moderately nutrient rich habitats
7. Plants of soils rich in mineral nitrogen
8. N-indicator plants of fertilized soils
9. Plants only on hyperfertilized soil, extremely rich in mineral nitrogen (indicating pollution, manure deposition).

LB: *Light figures* according to ELLENBERG's 9-grade scale, based on the occurrence of plants in relation to relative light intensity during summer time. Degrees:

1. Full shadow plants, often receiving less than 1%, rarely receiving more than 30 % of the full day light
2. Very shadow-tolerant plants; photosynthetic minimum at 1 to 5% of full day light
3. Shadow plants; photosynthetic minimum under 5% relative light intensity, but survive more illuminated places
4. Shadow-half shadow plants; photosynthetic minimum between 5 and 10% relative light intensity
5. Half shadow plants receiving more than 10% but less than 100% relative light intensity
6. Half shadow-half light plants; photosynthetic minimum between 10 and 40% relative light intensity
7. Half-light plants, mostly living in full light but also shadow tolerant
8. Light plants; photosynthetic minimum above 40% relative light intensity, less only in exceptional cases
9. Full light plants of open habitats not receiving less than 50% of relative light intensity.

KB: *Continentality values* according to Ellenberg's nine-grade scale based on the main distribution of plants according to degree of continentality of the general climate (see Meusel & Schubert, 1972) with emphasis on maximum and minimum temperature. Degrees:

1. Eu-oceanic species, reaching Central Europe only in the extreme West, not in Hungary.
2. Oceanic species, mainly in West Europe and western Central Europe.
3. Oceanic-suboceanic species are in whole Central Europe.
4. Suboceanic species, mainly in Central Europe but reaching to East.
5. Intermediate type with slight suboceanic-subcontinental character.
6. Subcontinental, main area in eastern Central Europe.
7. Continental-subcontinental species main area in East-Europe.
8. Continental species reaching only eastern part of Central Europe.
9. Eucontinental species, main area in Siberia and East Europe reaching scarcely the eastern part of Central Europe.

SB: *Salt figures* for indicating plant occurrence in relation to the salt concentration of the soils in a 9-grade scale, according to Scherfose (1990).

0. Halophob species not occurring in salty or alkalic soils.
1. Salt tolerant plants but living mainly on non-saline soils.
2. Oligohaline plants living on soils of extremely few chloride content.
3. Beta-mesohaline plants living on soils of few chloride content.
4. Alfa/beta mesohaline plants living on soils of intermediate chloride content.
5. Alfa-mesohaline plants living on soils of middle chloride content (0.7-0.9%).
6. Alfa-mesohaline to polyhaline plants living on soils of middle to high chloride content.
7. Polyhaline plants on soils of high chloride content (1.2-1.6 %).
8. Euhaline plants living on soils of very high chloride content.
9. Euhaline to hypersaline plants living on soils of extremely high chloride content.

The ecological conception by Borhidi diverts was same with the ecological figures of Ellenberg, although methodologically and in general concept follows it completely.

Analysis of 472 cultivated varieties and processed rootstocks grown, these features can be found in the basic pomological and enumeration work (Fésűs, 2012; G. Tóth, 1997, 2001; Soltész, 1998; Surányi, 1985, 2002; Tomcsányi, 1979). We wanted to

answer the question, in addition to the natural species of cultivated varieties is possible to characterize, describe Borhidi's system (1993, 1995).

It was developing new added relative value numbers that have been introduced in the fruit-bearing species, based on wild species (Iversen, 1936; Tüxen & Ellenberg, 1937 etc.). We first presented in open pollination, the flower buds and bark frost sensitivity (Childers & Sherman, 1988; Gyuró, 1974, 1990; Kobel, 1954; Nyéki et al., 1980; Nyéki & Soltész, 1996; Porpáczy, 1964; Schwanitz, 1967) and significance for peaches and nectarines main concern viruses Sharka sensitivity (V. Németh, 1986; Papp, 2003, 2004) to disease pathology (taphrina, clasterosporium, monilia) characterization among the peach cultivars (Hedrick, 1917; Tomcsányi, 1960; Knight, 1969). The pathological data are new compared to the apricot, peach and plum varieties (***Figure 5-6***). The description of the indicator values was the same as the definitions used in our previous studies; see Surányi (2015, 2018, 2019).

OP: Measuring of *open pollination* (Crane & Lawrence, 1956; Mcgregor, 1976; Brózik & Nyéki 1975; Kozma et al., 2003; Nyéki et al., 2016):

1. over 35% of open pollination
2. 20-35% of open pollination
3. 2-20% of open pollination
4. below 2% of open pollination

FR: Degree of *frost resistance* (Kobel, 1954; Kozma et al., 2003; Larcher, 1980; Nyéki et al., 2016; Porpáczy, 1964; Quamme et al., 1982; Wilsie, 1969):

1. frost tolerant (over 5 % of flower bud and bark damage)
2. moderately frost sensitive (15-40 % of damages)
3. frost sensitive (about 50 % of frost damages)

DR: Measuring of *disease resistance* (namely *Taphrina deformans*, *Clasterosporium carpophyllum*, *Monilia fruictigena* and PPV) (Hedrick, 1915; Faust et al., 2011; Tomcsányi, 1979; Wilsie, 1969):

1. resistant to disease (0= no symptoms on the trees)
2. moderately sensitive (cc. 30% of leaves or fruit symptoms)
3. sensitive (over 50% of leaf symptoms and fruit falling)

Results and discussion

Cherries are one of the most popular and marketable fruit species in the temperate zone, although they are preceded by cherries in consumer taste. According to its ecological needs and biological stamps, compared to cherries, sour cherries show a different picture, because what is a serious disease or pest in one species may not be in the other. In environmental factors, however, it tolerates greater cold than cherries, although its area is more southern.

World production of cherries in 2011 was 1.3 million tons (FAO data), while that of cherries was about 2.5 million tons. Leading cherry-producing countries: Russia (190.7), Turkey (182.2), Poland (175.0), Ukraine (172.9), USA (105.1), Iran (102.6), Serbia (90.6) and Hungary (61.8) - in thousand tons. In our comparative analysis, there are 472 sour cherry varieties, about half of which are Montmorency, Schattenmorelle, one of the Pándy sour cherries (Nyéki et al., 2016) and the basic variety, clone varieties and variants of Gypsy sour cherries (Mohácsy & Maliga, 1956). In recent breeding work, they played a role as one of the parental partners; or various varieties not clarified in origin, also wild forms (about 40%), as well as many varieties and forms whose origin is uncertain (15%) (cf. Faust & Surányi, 1997; Soltész, 2004, Nyéki et al., 2016).

Table 1 shows the relative ecological and biological values of each variety, as we will see, the varieties differed to a different extent on the basis of stamps that were not examined in detail. Four types of crowns have been described, which play a role in crown formation and pruning method:

a. breaking cone (Érdi nagygyümölcsű, Meteor korai)
b. corymbose form (Pándy meggy, Debreceni bőtermő)
c. spreading sphere (Érdi bőtermő, Császármeggy)
d. hanging sphere (Cigánymeggy, Latosmeggy) (***Figure 7-10***) (G. Tóth, 1997, 2001).

The fruit color of the cherries is also typical: black (Black cherries), red (Ferracida) and yellow (Georgian) (***Figure 11-13***). In manipulation, it is important (if the fruit is picked with a stalk and by hand) that the stalk is leaf-bladed or bare (***Figure 14-15***). The subject may play a role in selection, the tendency of the subject (root shoot) or the base (noble shoot) of the noble variety to form root shoots (***Figure 16-17***).

As Hedrick (1915) stated, the development of sour cherry had to happen farther west or from southern Russia. This can be substantiated by the localization of land races. These can be characterized by specific descriptions under which many slightly clones can be grouped (Iezzoni et al., 1991). Kolesznikova (1975) suggested that such land races of cherries developed in response to environmental factors in Asia and Europe. Such land races are Pándy (Crisana, Karaser Wechsel) and Cigány (Gypsy, Zigeuer) (***Figure 18-19***) predominantly developed in Hungary; Oblacsinszka is land rice in Serbia; Mocanesti (Shepard's sour cherry) is a land race in Romania; Strauchwechseln and Weinweichseln in Germany; Stevensbaer a land race in Demark; and Vladimirszkaja is a land race in Moldavia. These land races indicate a large area as native sour cherry territory (Surányi, 1985, Faust & Surányi, 1997).

However, we have much less knowledge of landscape varieties in Asia Minor, Iran, and Central Asia, and the landscape historical data behind the names are also missing.

Table 1 shows the relative ecological indicators and biological values that can be determined from cultivar's descriptions. The data of apricots, plums and peaches (Surányi, 2014, 2018, 2019) and previously presented with few representative varieties of Hungarian cultivated plants of flora (Surányi 2006, 2014) are well connecting with Borhidi's papers (Borhidi, 1993, 1995) using experience from other species (Faust & Timon, 1995; Faust & Surányi 1997, 1999; Faust et al., 1998).

The comparison of sour cherry varieties with the previously developed analytical method is important in Hungary: in addition to the increasing total yield and the clarification of the fertilization conditions of new varieties born in successful breeding work, the knowledge of ecological indicators can also help to select new production sites (***Figure 20-21***). The study includes nearly 500 sour cherry cultivars, the source of the characteristic data of which is presented in the Introduction. Since cherries became a "world species" representative varieties from 42 countries were included in ***Table 1*** (cf. Iezzoni et al., 1991; Ramming et al., 1991; Faust & Surányi, 1997; Janick, 2011).

The study did not examine the varieties according to their role in cultivation, nor could we evaluate their botanical origin. Ornamental cherries would certainly have widened the range of indicators and value figures, so they were processed only as

examples (e.g., spherical cherries). Compared to the previous ones (apricots, plums, peaches), the ecological interval of the cherry cultivars is smaller than the biological values (cf. ***Table 1***), and in terms of pomology and flower morphology (Surányi, 1986), as larger differences can be observed. Some sour cherries cultivated in salt tolerance (SB), these (n = 29) were of Carpathian Basin or Asia Minor origin.

The variance in biological numerical values is also greater than in ecological indicators because the former has already been influenced by breeding work; the OP (open pollination) value therefore moves in a narrow range. Highlighting 3 cultivar groups, the equalization between cultivars was less pronounced in the case of biological values, but more so in the case of ecological indicators (***Table 2***). The equalization together, based on 472 cultivars, is shown in ***Table 3***, so the average variance experienced in the cultivar ranges of ***Table 2*** was more moderate. The figure material belonging to the study – in spite of everything – proves the diversity of sour cherry varieties, which expands the biological and pomological characteristics of fertilization in cultivation, e.g. due to climate change, in warming uptrend and reduction of precipitation will bring drought and salt tolerance to the fore (***Figure 22***).

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Table 1. Relative ecological and biological indicator values of each cultivars on sour cherry (n=472)

Sour cherries and others	TB	WB	RB	NB	LB	KB	SB	OP	FR	DR
Abbesse de Mouland	5	5	5	5	6	5-6	0	2-3	1-2	2
Abesse d'Oignies	5-6	5	5-6	5	6	5	0	2	2	2
Advance	5	5-6	5	5	6	5	0	2	2	2
Agat (Achat)	5-6	5	6	5	6	5-6	0	1-2	1-2	1-2
Akebono	6	6	5	5-6	6	5	0-1	2	2	2-3
Alămîi	5	5	5	5	6	5-6	0	1-2	1-2	2
Allers Späte	5	6	5-6	5-6	5-6	6	0	2	2	2
Altländer Blanke	5	5	5	5	6	6	0	2	2-3	2
Altländer Hedelfingener	6	6	4-5	5	6	6	0	2	2	2-3
Amanogowa	5	5	5	5	6	5-6	0	2	2	2
Amarasca	6	6	5	5-6	6	6	0-1	1-2	2	1-2
Amarena	5	5-6	5	5	6	5-6	0	1-2	2	2
Amarena di Francavilla	6	6	5-6	4-5	6-7	5	0	1	2	1-2
Amarena di Pescara	6-7	6	5	4-5	6-7	5-6	0	1-2	2	2
Ametyst	5	5	4-5	5	6	6	0	2	2-3	1-2
Amorel' Rozovala	5	5-6	5	5-6	6	5	0	2	2	2
Anadol'skaja	6	5	5	5	6	6	0-1	1-2	1-2	1-2
Ando	5	6	6	4-5	6	5	0	2	2	2-3
Anglaise Hative	5-6	6	6	4-5	6	5	0	1-2	2	1-2
Anglaise Tardive	5-6	6	5	5	5-6	5	0	2	2	2
Antonovka Kostyce Viskaja	5	5	5	5	6	5-6	0	1-2	1-2	1-2
Aprilka	5	5-6	5	5-6	6	6	0	2	2-3	2
Apuhtinskaja	5	5	5-6	5	6	6	0	2	2	2
Aratómeggy	6	5	6	5-6	6-7	6	0	1	1	1
Arborétumi díszmeggy	7	6	6	5-6	6-7	6-7	0-1	3-4	2	2-3
Arch Duke	5	5	5	5-6	6	5-6	0	2	2-3	2
August Supteme	5	5	5	5	6	5-6	0	2	2	2
Bada	5-6	6	5-6	4-5	6	5	0	2-3	2-3	1-2
Badeborner	5	5-6	6	5	6-7	5-6	0	2	2	2
Bagrjanaja	5	5-6	5	5	6	6	0-1	2	2	2
Barbara	5-6	6	5	4-5	6	6	0	2	2	1-2
Barryessa	5-6	5-6	5	5-6	6	6	0-1	1	2	1-2
Bastard Ceresni	5	5	5	5	5-6	6	0	2	1-2	2
Bell Montmorency	6-7	5	6	5-6	6	6	0	1-2	2	1-2
Belle de Chatenay	6	5	5-6	6	5	6	0	3	2	2
Belle de Choisy	6	5	5-6	5	6	6	0	3-4	2	1-2
Belle Magnifique	6	5-6	5	5-6	7	5-6	0	2-3	2	2
Beni-higan	6-7	6	5-6	5	5-6	6	6	2	1-2	2-3
Berliner Morelle	5-6	5	5	5	6	5-6	0	1-2	2	2
Berryessa	6-7	6	5-6	5	5-6	6	0	1-2	2-3	2
Bessarabian	6-7	5-6	5	5-6	5-6	6	0-1	2	2	2
Beste Werderkirsche	6	6	5	5-6	6	5	0	2	2	1-2
Beutlspacher Rexelle	5-6	5-6	5	5	5	5-6	0	1-2	2	4

Bianca	5-6	5-6	5	5	5-6	6	0	2	1-2	2
Bigarreau Grant	6	6	5	5	5	6	0	2	2	2
Birjulevo	5	5-6	4-5	5	5-6	5-6	0	1-2	2-3	2-3
Black Flame	5-6	5-6	5	5	5	5	0	1-2	2	1-2
Black Sour	6	6	5	5	5-6	5-6	0	2	2	2
Bladoróżowa	5	5	4-5	5	5-6	6	0	2	1	1
Bloor's Heart	5-6	6	5	5	6	6	0	2	2	2-3
Bolbačanska	6	6	5	5-6	5-6	5-6	0	1-2	2	2
Bolium	5-6	5-6	5	5-6	5	5-6	0	2	2	1
Bosnyák meggy	6	5-6	6	5	6	5-6	0-1	1-2	1-2	1
Botan Zakura	5	6	5-6	5	5-6	6	0	1	2	2
Bounty Merton	5-6	5	5	5	5-6	5-6	0	2	2	1-2
Bowyer Heart	5-6	5	5	6	6	5	0	2	2	1-2
Bozeşti	5	5-6	5	5	6	6	0	1	1-2	1
Bradbourne Black	5	5-6	5	5	5-6	5-6	0	2	1-2	2
Brassington	5-6	5	4-5	5	5-6	5	0	2	2	1-2
Brooks	6	6	5	5-6	5-6	6	0	2	2	2
Bulatnikovskaya	5-6	5-6	5	6-7	5-6	5-6	0	1-2	1-2	2
Burjana	5	5	5	4-5	5-6	6	0	2	1-2	2
Büttners Rote	6	5	5	6	5	6	0	2	2	2
Čačanska Rubin	6	6	5	5	5	6	0	1-2	2	2
Carolin	6	5-6	6	5	6	5-6	0	2-3	1-2	1-2
Cerella	6-7	5-6	5	5	5-6	5-6	0	2	1-2	1-2
Cerise	6	6	5-6	5	6	5-6	0	1-2	2	2-3
Cerise Belle Magnique	5-6	6	6	5	6	5-6	0	1-2	1-2	2
Cerni Orel	6	5-6	4-5	5	5-6	6	0	2-3	2	2
Cernokorka	6	6	5	5	5-6	5-6	0-1	2	2	1-2
Cernoplodnaja	6-7	6	5	5-6	6	5-6	0	2	2	2
Cerny Alémaz	6	5-6	5-6	6	5-6	6	0	1-2	1-2	2
Chatenay szépe	6	5	6	5	6	6	0	3-4	2	3
Choisy meggy	6	5	5-6	4-5	6	6	0	3-4	2	1-2
Cigachica	6	5-6	6	5	5-6	5-6	0	2	1-2	1-2
Cigančica	6-7	5	5-6	5	6	5-6	0	2	1-2	1-2
Cigánymegy	6	5	6	4-5	6	6	0	2	1	2
Cigánymeggy 3	6	5	6	4-5	6	6	0	2	1	2
Cigánymegy 7	6-7	5	6	4-5	6	6	0	1	1	2
Cigánymegy 59	6-7	5	6	4-5	6	5-6	0	1-2	1	2
Cigánymegy 60	6-7	5	6	4-5	6	5-6	0	2	1	2
Cigánymegy 215	6	5	6	4-5	5-6	5	0	2-3	1	2
Cigánymegy C. 404	6	5	5-6	4-5	5-6	6	0	1	1	2
Cikana	6	5-6	6	5	5-6	5-6	0	1-2	1	2
Cisnade	6	5	6	5	5-6	5-6	0-1	2	2	2-3
Cluj 23/22	6	5-6	6	5	6	6	0	1-2	2	1-2
Cluster	5-6	5	5-6	5	6	5-6	0	2	2	2-3
Coadĭ Lŭngă	6	5	5-6	4-5	5-6	5-6	0	2	2	2

Coadî Scurtă	6	5-6	5-6	5	5-6	5-6	0	2	2	2
Cooper	5-6	5-6	5-6	5	6	6	0	2	2	2
Corolin	5-6	5	6	5	6	6-7	0	2-3	2	1-2
Coronation	5-6	5-6	5	5	5-6	5-6	0	2-3	2	2
Crafthead Early	6	5-6	5	5	6	5-6	0	2	2-3	2
Crane Merton	6	5-6	6	5	6	6	0	1-2	2	2
Crişana 1	6	5-6	6	5	5-6	6	0	4	1-2	3
Crişana 2	6	5-6	6	5	5-6	6	0	4	2	1-2
Cryall's Seedling	6-7	5-6	6	5	5-6	6	0	2	2	2-3
Császármeggy	6	5	6	4-5	6	6	0	1	1-2	2
Csengődi	6-7	5-6	5-6	5-6	6	6	0	1	1	1
Csernokorka	6	5	6	5	5-6	5-6	0	2	2	2
Czudo wisnia	6	6	5-6	5-6	5-6	5-6	0	2	2	2
D-076	6	5-6	5-6	6	5-6	5-6	0	1	1-2	1-2
Dabazlija	5-6	5	5-6	5	6	6	0	1-2	2	1-2
Dankelmann	5-6	5-6	6	5	5-6	6	0	2	2	2
Danube	6	5-6	5-6	5	6	5-6	0	1-2	1-2	1-2
Debreceni bőtermő	6	5	6	5	6	6	0	1	1	2
Del Meini	6-7	5-6	6	6	6	6	0	2	2	2
Depelte Natte	6-7	5-6	6	6	6	6-7	0	2	2-3	2-3
Diament	5-6	5	6	5	5-6	5-6	0	2	2	2
Döge ("D"-klón)	6	5	5-6	5	5-6	6	0	2	1-2	1-2
Double Glass	5-6	5	5-6	5	5.6	5-6	0	2	1-2	1-2
Drademe	5-6	5-6	6	5	5-6	6	0	2	2	1-2
Dropmore	5	5	5-6	5	5	6	0	2	2	2
Ducat (Du-1)	6	5-6	5-6	5	5-6	5	0	3-4	1-2	2
Dubele Gorsem Kriek	5-6	5	5-6	5	5-6	5-6	0	3	1-2	1-2
Duceasa Palluau	6	6	6	5	6	6	0	2	1	1
Dwarf Meteor	5	5	5-6	5	5-6	5-6	0-1	2	1-2	2
Dwarf Northstar	5-6	5	5-6	4-5	6	5	0-1	2	1-2	2
Dwarf Rocky Mountain	5-6	5	5-6	4-5	6	5	0-1	2	1.2	2
Dwarf Siberian	5	5	5	5	5-6	5	0	2	2	2
Dwarfrich	5	5	5	5	5	5	0	2-3	2	2
Dyehouse	5-6	5-6	5-6	5	5-6	5-6	0	2	2	2-3
Early Richmond	5	5-6	6	5	5-6	5	0	2-3	2	2-3
Egri meggy	6-7	5	6	5	6	5-6	0	2	1-2	2
Ekowis	6	5-6	5	5	5-6	6	0	1-2	2	2-3
Elmer	5-6	5-6	5-6	5	6	6	0	2	1	2
Engleze Timpuriu	5-6	5	6	5	6	6-7	0	1-2	1-2	2
English Morello	5-6	5	5-6	5	5-6	6	0	1-2	2	1-2
Érdi bíbor	6	5-6	5-6	5	6	5-6	0	1-2	1	1-2
Érdi bőtermő (M 145)	6	5	6	5	6	6	0	1-2	1-2	2
Érdi ipari	5-6	5	6	5	5-6	6	0	1	1-2	1-2
Érdi jubileum (M 136)	6	5	6	5	6	6	0	1	1	1-2
Érdi kedves	6	5-6	5-6	5	5-6	6	0	1-2	1-2	1

Érdi nagygyümölcsű	6-7	5	6	5	6	6	0	3	1-2	2
Erianne	6	5	5-6	5	5-6	5-6	0	2	2	2
Erika	6-7	5	6	5	6	6	0	1-2	1-2	1
Erstfrühe	5-6	5	5-6	5	6	6	0	1-2	1-2	1
Eugénia császárné	5-6	5-6	5-6	5	6	5	0	3-4	3	2
Éva ("T"-klón)	6	5	6	5	6	6	0	1-2	1-2	2
Fanal	6	5	6	5	6	6	0-1	1	1-2	1-2
Favorit (M 24)	5-6	5	6	5	6	6	0	1	1	1-2
Favourite Merton	6	5	6	5	6	5-6	0	1-2	1-2	1-2
Feketicsi meggy	6-7	5-6	6	6	6	5-6	0-1	1-2	2	1
Fernwood Montmorency	6	5	6	5-6	6	6	0	1-2	1-2	1-2
Ferracida	5-6	5-6	6	5	6	6	0	1	1	1
Fertilal ui Miciurin	5	5	5-6	5-6	5-6	5-6	0	1	1	1
Flamentiner	6	5-6	6	5-6	6	6	0	1-2	2	2
Florinis	6-7	6	6	5-6	6	5-6	0	2	1-2	1-2
Fortuna	6-7	6	5-6	5	6	6	0	3-4	1-2	1
Fraoula Volon	6-7	6	6	5-6	6	7	0	2	2	1
Frumuseţea nordului	5-6	5	5-6	5-6	5-6	6	0-1	3	2	2-3
Fugenzo	6	5-6	5-6	6	5-6	6	0	2	2	2
Galenaş	5-6	5-6	5-6	5-6	6	5-6	0	2	2	2
Gelly	6	5	6	6	5-6	6	0	2	1-2	2
Gerema	6	6	5-6	6	5-6	6	0	2	2	2-3
Gezena	6-7	6	6	5-6	6	6	0	1-2	2	2-3
Gilbert Montmorency	6	5-6	5	6	6	6	0	1-2	1-2	1-2
Glory Merton	5-6	5-6	6	6	5-6	5-6	0	1-2	2	2
Gorškova	5-6	5	5	5-6	5-6	5-6	0	2	1-2	1-2
Gömbmeggy	6-7	5	5	5-6	5-6	6	0-1	3	2	2
Granda	6-7	6	5-6	6	6.7	5-6	0	2	2	2-3
Griotte de Provence	6-7	6	5-6	6	6	6-7	0	2	1-2	2
Grosenkaja	5	5-6	5	5-6	5-6	6	0	1-2	2	2
Günther's Weichsel	5-6	6	5-6	6	6	5-6	0	2	2	2-3
Halyag meggy	6-7	5-6	6	5	6	6	0-1	2	1-2	1-3
Ham Green Black	5-6	5	5	5-6	6	6	0	1-2	2	2
Hankovszky korai	6-7	5-6	6	5	6	6	0	1-2	1-2	2
Hartai meggy	6-7	5	5-6	5-6	6	6-7	0	1	1-2	2
Heart Merton	6	5-6	6	5-6	5-6	6	0	2	2	2
Heideggar	6	5	6	5	6	5-6	0	2-3	2	2
Heimann's Konservenweichsel	5	5	5-6	5-6	5-6	6	0	4	1-2	1-2
Heimann's Rubin	5-6	5-6	5	5-6	6	6	0	1	1-2	1
HM 101	6	5-6	5-6	5-6	6	6	0	1	1-2	1-2
Hocker's Black	5	5	5-6	5-6	5-6	5-6	0	2	2	2
Horkai meggy	6	5-6	5-6	5	6	5-6	0	3-4	1-2	1-2
Hortensia királyné	6	5-6	5-6	5	6	6	0	3-4	1-2	1-2
Ilva	6	5	5-6	5	6	5-6	0	2	2	2
Immenseer	6	6	6	5-6	5-6	6	0	2-3	2	2-3

IV-3/48	6-7	6	5-6	5-6	6	5-6	0	1	1-2	2
Izbite	5-6	5-6	5	5-6	5-6	5-6	0	2	2	2
Izsáki CT. 424	6-7	6	5-6	5	6	6-7	0	2	1-2	2
Jade	5-6	5-6	5-6	5t	5-6	6	0	2	1-2	1-2
Javított Ostheimi	6-7	5-6	6	5	6	6-7	0	3	1-2	2
John Innes Seedlings	5-6	5	5-6	5	6	6	0	2	2	2
Jordan	6	5	5-6	5-6	5-6	6	0	1-2	2	2-3
Jósika meggy	6	5	6	5	6	6-7	0	2-3	1	2
Jubilee	5-6	5-6	5-6	5-6	6	5-6	0	1-2	1-2	2
Juznaja	6-7	5-6	6	5-6	6	5-6	0	2	2	2
Kanaris	7	5-6	6	5-6	6	6	0	2	2	2
Kántorjánosi 3	6	5	5-6	5	6-7	6-7	0	1-2	1	1-2
Karneol	5-6	5	5-6	5	6	5-6	0	2-3	1-2	2
Kavricka	6	5-6	6	5-6	6	6	0-1	2	2	2-3
Keceli 1	5-6	5	5	5	5-6	6	0	2	2	1-2
Kecskeméti meggy CT. 101	5-6	5	5-6	5	6	6	0	2-3	2	1-2
Keleris 16	5-6	5	5-6	5	6	6	0	3-4	1-2	1-2
Keleris (W-31)	5-6	5	5-6	5	6	6	0	3	2	2
Kései 2/32	6-7	6	6	5-6	6	5-6	0	2	1-2	2
Kései 22/70	8-7	5-6	6	5-6	6	6	0	2	1-2	2
Kései Kántorjánosi	6	5-6	5	5	6	6	0	1-2	1	1-2
Kései vörös meggy	6-7	5-6	5	5	5-6	6	0	2	1	2
Késői Pándy	6-7	5	6	5-6	6	6-7	0	3-4	1-2	2
Királyi Amarella	6	5	6	5	6	5-6	0	2	2	2
Kleparowska	5-6	5	5-6	5	6	6	0	2	2	1-2
Knolkers	5-6	5	6	5	5-6	5-6	0	1-2	2	2
Kolia	6	5	6	5	6	6-7	0	2	2	2
Korai angol	6	5	6	5	6	6-7	0	1-2	1-2	2
Korai pipacsmeggy (M 152)	5-6	5	5	5	6	6	0	1	1	2
Korai vörös meggy	5	5	5-6	5	5-6	6	0-1	1	1-2	2
Koral	5-6	5-6	5-6	5-6	5-6	6	0	2	2	2
Kőrösi korai	5	5	5-6	5	6	5-6	0	2	1	1-2
Kőrösi meggy	5-6	5-6	5-6	5	5-6	6	0	1-2	2	2
Kőrösi CT. 404/a	5	5-6	5	5	5-6	5-6	0	1-2	2	2
Korpádi meggy	6	5	5	5	5-6	6	0	2	1	2
Korund	5	6	5	5	6	5-6	0	1	2	2
Krasnij Flag	5	5-6	5-6	5	6	5-6	0	1-2	1-2	2
Krassa Severa	6	5	6	5-6	6	5-6	0	2	1-2	2
Krassavica	6	5	6	5-6	6	6	0-1	2	2	2
Kutahya	6-7	6	6	5-6	5-6	5-6	0	2	1-2	1-2
Kütahya	7	5-6	5-6	5	6	5-6	0	1-2	1-2	1-2
Kvarnaja krupnaja	6	5	6	5	5-6	6	0	2	2	1-2
Labe Merton	5-6	5	5-6	5-6	5	6	0	2-3	2	2-3
Lacroix	6-7	4-5	6-7	4-5	5-6	6-7	0	4	2	2
Lambush	5-6	5	6	5	5-6	6	0	1-2	1-2	2

Larion	6	5	6-7	5	5	6-7	0	1-2	1-2	2
Laštočka	6	5	6	5	5	6	0	2	1-2	1
Latos meggy	6	5	5	5	6	6-7	0	1-2	2	2
Latvijas Zemais	5	5	5-6	5-6	6	6	0-1	2-3	2	2
Leitzkauer	5-6	5	5-6	5	5-6	6	0	2	2	2-3
Lenka	6	4-5	6-7	4-5	6	6-7	0	2	1-2	2
Ljubskaja	5-6	5	6	5	5-6	6	0	1-2	2	2
Lotova	5-6	4-5	5-6	5	5-6	5-6	0	2	2	3
Lucyna	5	5	6	5	6	6	0	2	1-2	2
Luisley Early Black	5	5	6	5	5-6	6	0	2-3	2	2
Łutówka	5-6	5	6	5	6	5-6	0	2	2	2
Luxburger	5-6	5	5-6	5	5-6	6	0	2	2	2-3
M. 18	6	4-5	6	5	6	6	0	1	1-2	1
M. 34	6	4-5	6-7	5	6	6-7	0	4	2	2
M. 45	6	5	6	4-5	6	6-7	0	3-4	2	2
M. 58	6	4-5	6	5	6	6-7	0	4	2	2
M. 63	6	4-5	6	4-5	6	6	0	1-2	1-2	1-2
M. 71	6	5	6	4-5	6	6-7	0	3	2	2
M. 89	6	4-5	6	5	6	6	0	1	2	2
M. 95	6	4	6	5	6	6-7	0	2	1-2	2
M. 106	6-7	4-5	6	4-5	6	6	0	1-2	1-2	1-2
M. 109	6	4-5	6	5	6	6	0	1	1	1-2
M. 112	6	5	6	4-5	6	6	0	3	2	2
M. 126	6	5	6	5	6	6-7	0	2	2	1-2
M. 136	6	5	6	5	6	6-7	0	1-2	2	2
M.152	6	4-5	6	5	6	6	0	1	2	2
M.154	6	5	6	4-5	6	6	0	1-2	2	2
M.172	6	5	6	4-5	6	6	0	1-2	1-2	2
M. 180	6	4-5	6	4-5	6	6-7	0	1-2	2	2
M. 223	6	5	6	5	6-7	6	0	4	2	2
M. 279	6	4-5	6	4-5	6	6	0	4	1	2
MacMar	6	5	5-6	5	5-6	5-6	0	2	2	1-2
Mailot	5	5	6	5	6	5-6	0	2-3	2	1-2
Májusi korai	5-6	5	6	5	6	6	0	4	2	2
Maliga emléke	6	5	6	5	6	7	0	1	1-2	1-2
Marasca	7	6	6	5	6	6	0	1	1	1
Marasca Moschata	7	6	6	5	5-6	6-7	0	1	1	1
Maraska Bilaja Polozita	6-7	5	6	5	5-6	6	0	1	1	1-2
Marcianella	7	6	6	5	6	6-7	0	1-2	1.2	1-2
Mari de Ardeal	5-6	5	5-6	5	5-6	6	0-1	2-3	2	2
Mari Timpuriu	5	5-6	6	5	5	5-6	0	3	1-2	2
May Duke	5	5	5-6	5	5-6	5-6	0	4	2	2
Maynard	5	5-6	6	5	5-6	5-6	0	2-3	3	2
McKee	5	5	6	5	5-6	6	0	2	2	1
McLain Montmorency	6	5-6	5	5	5	5-6	0	2	2	1

Mej Djuk	5	5-6	5	5	6	5-6	0	2	2	2
Meikers	5-6	6	5-6	5	6	5-6	0	1-2	1-2	2
Meikers Volga	5-6	5	5-6	4-5	6	6	0	1-2	2	23
Mesabi	6-7	6	6	5	6	5-6	0	2	1-2	2
Meteor USA	6-7	5	6	5	6	6	0	2	1-2	1-2
Meteor korai (M 14)	6	5	6-7	5	6	6	0	1	2	2
Mezel	7	6	6	5	6	7	0	1	2	2
Mičurin hybrid	5	5	5	5	5-6	5-6	0	1-2	1	1
Miklóstelepi CT. 219	5-6	5	6-7	5	5	6	0	2	1-2	1-2
Ministry von Podbielski	6	5-6	6	5	6	6	0	3	2	1-2
Mocănesti 16	5-6	6	6	5	6	5	0	1-2	2	1-2
Mocăneşti 16/4	5-6	6	5-6	5	5	6	0	1	2	1-2
Molodyozhnaya	5	5	5-6	5	5-6	5-6	0	2	1-2	1-2
Moncalera	6-7	6	6	5	6	6-7	0	1-2	2	2-3
Monomach	6	5-6	6	5	5-6	5-6	0	2	1-2	1-2
Montearly	5	5	5	5	6	5-6	0	2	2	2
Montlate	6	5-6	5-6	5	6	5-6	0	2	2	2
Montmorency	6	5	5-6	5	6	6	0	1-2	1-2	1-2
Montmorency 1	6-7	5	6	5	5-6	6	0	1-2	1-2	1-2
Montmorency 3	6-7	5	6	5	5-6	6	0	1-2	2	1-2
Montmorency Court Quevet 2	6	5	6	5	6	6-7	0	2	2	2
Montmorency Dayton	6-7	5	6	5	6	6-7	0	2	2	2
Montmorency de Sauvigny	6	5	5-6	5	6	6	0	2	1-2	1-2
Montmorency Short Stark	6	5	6	5	6	6	0	2	2	2
Montreuli	6-7	5	6	5-6	6-7	6-7	0	2-3	2	2
Moreau	6-7	5	6	5	6-7	6	0	2	2	2
Morela neagră Tîrzie	6	5-6	6	5	6	6	0-1	1-2	2	2
Morella	6-7	5	6	5-6	6	6-7	0	2	1-2	2
Morellenfeuer	6	5	6	5	6	6-7	0	2-3	2	2-3
Morina	6	5	6	5	6	6	0	2-3	1-2	2
Morozowka	5-6	5	5-6	5	5-6	6	0	1-2	2	2-3
Musselmen Montmorency	6-7	5	6	5-6	6	6-7	0	1-2	2	2
N 15 GR	7	5-6	6	5-6	6	6	0	1-2	2	2
Naden	6	5	6	5	6	6	0	2	2-3	2
Nagy angol	6	5	5-6	5	6	5-6	0	2	1-2	1-2
Nagy Gobet	6	5	6	5	5 -6	5-6	0	2	1-2	1-2
Nana	6	5	5	5	6	6	0	2	2	2
Napolitana	6-7	5-6	5	5-6	6-7	6-7	0	1-2	2	2
Naumburger Ostheimer	6	5	5-6	5	6	6	0	2	2	2
Nefris	6-7	5	6	5-6	6	6	0-1	2	1-2	2
Negricioase	6	5	6	5	6	5-6	0	2	2	2
Neirana	6	5-6	6	5	6	6	0	1-2	2	2-3
Nežybkaja	6	5	5-6	5	5-6	6	0	2	2	2
Northstar	6	5-6	6	5-6	5-6	6	0	1-2	1-2	2
Novoszibirszki 1	5	5	5	5	5-6	5-6	0	2-3	1-2	2

Novoszibirszki 2	5	5	5	5	5-6	6	0	2	2	2
Oblačinska	7	5	6	5-6	6	6	0	1	1	1-2
Ohridska V.	6-7	5-6	5	5-6	6	6-7	0	1-2	2	2
Oksana	6	5	6	5	6	6-7	0	2	2	2
Oliver Long Stem Bing	5-6	5	5-6	5	6	6	0	1-2	2	2-3
Olivet	6	5	5	5	6	6	0	2	1-2	2
Orel	5-6	5	5	6	6	6	0	2	1-2	1-2
Orient	6	5-6	5	5	6	6-7	0-1	2	2	2
Orlica	5-6	5	5-6	5-6	6	6	0	2	2-3	2
Ostheim No. 2	6-7	5	5	5	6	6-7	0	2-3	1-2	2
Ostheimi meggy	6	5	6	5	6	6	0	3-4	1-2	2
Öregszőlők CT. 80/a	6	5	5-6	5-6	5-6	6	0	4	1-2	2-3
Öregszőlők CT. 80/b	5-6	5	6	5-6	6	5-6	0	3-4	1-2	2-3
Pándy 7	6	5-6	6	5	6	6	0	4	1-2	3
Pándy 9	6-7	6	6-7	5	6	6	0	4	1-2	3
Pándy 10	6	5	6	5	6	6	0	4	1-2	3
Pándy 12	6	5-6	6	5	6-7	6	0	4	1-2	3
Pándy 26	6-7	5	6	5	6	6	0	4	1-2	3
Pándy 29	6-7	5	6-7	5	6-7	6-7	0	4	1-2	3
Pándy 31	6	6	6	5	6	6-7	0	4	1-2	3
Pándy 33	6	5	6	5	6	6	0	4	1-2	2-3
Pándy 35	6-7	5	6-7	5	6-7	6	0	4	1-2	3
Pándy 38	6	6	6	5	6-7	6-7	0	4	1-2	3
Pándy 48	6	5	6-7	5	6-7	6-7	0	4	1-2	3
Pándy 50	6	5	6	5	6	6	0	4	1-2	3
Pándy 55	6	5	6	5	6	6	0	4	1-2	3
Pándy 115	6-7	6	6-7	5	6	6	0	4	1-2	3
Pándy 149	6-7	6	6	5	6-7	6-7	0	4	1-2	3
Pándy 279	6-7	6	6-7	5	6	6-7	0	3-4	1-2	3
Pándy Bb. 119	6	5	6-7	5	6-7	6	0	3	1-2	2-3
Pándy Bb. 152	6	5	6	5	6	6	0	3-4	2	2
Pándy Bb. 159	6	5-6	6-7	5	6	6	0	3-4	1-2	2
Pándy C. 101	6-7	6	6	5	6	6	0	4	1-2	3
Pándy C. 513	6	6	6-7	5	6	6-7	0	4	1	2-3
Pándy üvegmeggy	6	5	6-7	5	6	6-7	0	3-4	1	2
Parasztmeggy	6-7	5	6	5-6	6	6-7	0	1	1	2
Paul Rose	6	5-6	6	5-6	6	6	0	1-2	2	2
Peerless Lambert	5-6	5	6	5	6	6	0	1-2	2	2
Petri ("R"-klón)	6	5	6	5	6	6	0	1	1-2	2
Piast	6	5	6	5-6	6	6	0	1-2	2	2
Pipacs 1	6-7	5	6	5	6	6	0	1	1-2	2
Pipacs 2	6	5	6-7	5	6	6	0	1-2	1-2	2
Piramis (IV 2/152)	6	5	6	5	6-7	6	0	2	2	2
Pisa 12/100	6-7	5-6	6	5-6	6	6	0	1-2	2	1-2
Pisa 13/122	6-7	5-6	6	5-6	6	6-7	0	1-2	1-2	1-2

Pitic de Iasi	6	6	6	5	6	6	0-1	1	1-2	2
Plodorodnaja Michurina	5-6	5-6	6	5-6	6	6	0	1-2	2	1-2
Podbielski 1	6-7	5-6	6	4-5	6	6-7	0	3-4	1-2	2
Polevka	5	6	5-6	5-6	6	6	0	2	1-2	1
Polnische grosse Weichsel	6	5	5-6	5	6	6	0	1	2	2
Polzhir	5-6	5	5	5	6	5-6	0-1	2	2	2
Popiel	6	5	5-6	5	5-6	5-6	0	2	2	3
Premier Merton	5-6	5-6	5	5	5-6	6	0	2-3	2	2-3
Prin korai	6	5	6	5	6	5-6	0	2	2	2
Querfürter	5-6	5-6	5-6	5	5	6	0	2	2	2
Rannaja Rozovaja	6	5	5	5	6	5-6	0	2-3	2	2
Ranson	5-6	5	5	5	6	6	0	2-3	2	1-2
Ratafia polonica	5-6	5-6	5-6	5	5	6	0	1-2	2	1-2
Ravsor	6	6	6	5	5-6	6	0	1-2	1-2	2
Rebačkaja Krasaviča	5-6	5-6	5	5	5-6	5-6	0	2	2-3	2
Red Clustor	6	6	5	5-6	5-6	5-6	0-1	1-2	1-2	2
Reichard's Ostheimer	6	5	6	5	6	6	0	2	1	2
Reinbow Stripe	5-6	5	5	5	5-6	6	0	2-3	2	2-3
Rekseler	7	6	6	5	6	6-7	0	1	1	1
Réti sommeggy	6	6	6	5	6	6	0	2	1-2	1
Revard Merton	6	5-6	5-6	4-5	6	5-6	0	2	2	2
Rexelle	6	5-6	5	5	5-6	6	0	1-2	2	2
Rheinische Shattenmorelle	5-6	5-6	5-6	5	5-6	5-6	0	1-2	2	2
Richmorency	6	5	5	5	5-6	5-6	0	1-2	1-2	1-2
Rode Mountain Dwarf	5	5	5-6	5	5-6	6	0	2	2	2
Röhrings Weichsel	5	5	5	5	6	6	0	1-2	2	2
Rokytnica	5	5	5	4-5	5-6	5-6	0	1-2	1-2	1-2
Rons	5	5	5-6	5	5	5-6	0	1-2	2	1-2
Roşii di Istriţa	6	6	5-6	5	6	5-6	0	1	2	2
Röte Lamperdinger	5-6	5	5	5	5-6	5-6	0	2	1-2	2
Röte Laubiger	5	5-6	5-6	5	5-6	6	0	2	2	2
Rozalaja	5	5	5	5	6	6	0	2	2	2
Rubin	5-6	6	5-6	4-5	6	6	0	1	1-2	1-2
Rumanjanije Sohteki	5	5	5	5	5-6	5-6	0	1-2	1-2	2
Russian Morello	5-6	5	5	5	5-6	5-6	0	2	2	2
Sämling von Müller	5	5-6	5-6	5	6	6	0	2	2	1-2
Sanguinetti	6-7	5	5	4-5	6	6-7	0	2	1-2	2
Schattenmorelle 1	5-6	5	5-6	5	6	5-6	0	1-2	2	3
Schattenmorelle 3	5-6	5	5-6	5	5-6	6	0	2	2	3
Schuenburger	6	5-6	5	5	5-6	5-6	0	1-2	1-2	2
Sciutti Tatarian	5	5	5	5	5-6	5-6	0	2	2	1
Seeländer Langsteiler	5-6	5-6	5	5-6	6	5-6	0	2	2	2
Seewar	6	5-6	5-6	6	6	5-6	0	2	2-3	2
Seneca	6-7	6	5-6	5-6	5-6	6-7	0	2	1-2	2-3
Shadow Amereth	6	5-6	5-6	6	6	6	0	2	1-2	2

Sipotreb Cernaja	6	6	6	5-6	5-6	6	0	2	2	2
Skirpotreb Rannyaya	5-6	5-6	5	5-6	6	6-7	0	2	2	2
Skublics meggy	6-7	6	5-6	6	5	6-7	0	1-2	1-2	1-2
Skyggemorelle	6	6	5-6	5	6	5-6	0	2	2	2
Sladkoplodnaja	5	5-6	6	5-6	5-6	6	0	1-2	2	2
Slianka	5-6	5	5	6	5-6	5-6	0	2	1-2	1-2
Sokoladnica	6-7	5-6	5-6	5	5	6	0	2	2	2
Sokówska Serocka	5-6	5	5	5-6	5	5-6	0	1-2	2	1
Solga Siska	5	5	5	6	5-6	6	0	1-2	1-2	1-2
Souvenier des Charmes	6	5-6	5	6	5-6	6	0	2	1-2	2
Spalding	5-6	5-6	5	5-6	5-6	5-6	0	3-4	2	2-3
Spanca	6-7	6	5-6	5	6	6-7	0	2	2	1-2
Spänische Braune	6-7	6	5	6	6	6	0	2	2	2
Spanka Rannaja	6	5	6	5	6	6-7	0	2	1-2	2
Spanyol meggy	6-7	5	6	5	6	6-7	0	2	1-2	1-2
Sparhawk	5-6	5-6	5	5-6	5-6	6	0	2	2	2
Späte Spanische	7	5	6	5	6	6-7	0	2-3	2	2
Spinell	5-6	5-6	6	5-6	5-6	6	0-1	3-4	1-2	1-2
Starks Gold	5	5	5-6	5-6	5-6	5-6	0	2-3	2	2
Stark Montmorency	6	5	6	5	6	6	0	2	2	2
Stevnsbaer Brigitte	6	5	6	5-6	6	5-6	0	2	2	1-2
Stevnsbaer 24	5-6	5	6	5	6	6	0	1-2	2	1-2
Stevnsbaer 34	6	5	6	5	6	6	0	1-2	2	1-2
Stevnsbaer F. R.	5-6	5	6	5-6	5-6	6	0	1-2	2	1-2
Stevnsbaer Viki	5-6	5	6	5	6	6	0	1	1-2	1
Subinka	5-6	5	5	5-6	5-6	5-6	0-1	2-3	1-2	2
Successa	6-7	5	5-6	5-6	5-6	6	0	2	2	1-2
Suda Hardy	5-6	5-6	6	5	6	6	0	1-2	2	1
Sumadinska	5	5	5-6	5	5-6	6-7	0	2	1-2	2
Sylvana	5-6	5-6	6	5-6	5	6	0	1-2	2	2-3
Swioux	5-6	5	5	5-6	5-6	6	0	2	2	2
Szakter óriás	6-7	5-6	6	5	6	6-7	0	3-4	1-2	2
Szapora meggy	6	5	6	5	6	6-7	0-1	1	1	1-2
Szegedi rubin	6	5	6	5	6	6	0	2	1-2	2
Széktói CT. 1199	5-6	5	5-6	5	6	5-6	0	1-2	1-2	2
Szentesi meggy	6	6	5-6	5	6	6	0	4	1-2	3
Szentlőrinci meggy	6	5-6	6	5	6-7	6	0	2	1-2	2
Szilágyi meggy	6	5-6	5-6	5	6	6-7	0	2	1-2	2
Tamaris	6	5	5-6	5	6	6	0	1-2	2	2
Tarina	5-6	5-6	6	5	6	6	0	3-4	2	2
Timpuriu de Cluj (HV)	6	5-6	6	5	6	6	0	2	2	2
Timpuriu Engleze	6	5	6	5	6	6-7	0	2	2	2
Timpuriu Richmond	5-6	5	5-6	5	5-6	6	0	2	1-2	2
Tîrzii de Bucureşti	6	5	5-6	5	5-6	6	0	1-2	2	2
Török meggy	7	6	6	5	5-6	6	0	2-3	1-2	1-2

Törpe meggy	6	5-6	5-6	5	5	5-6	0	2	2	1-2
Tripoleos	7	6	6	5	5-6	5	0	2	2	2
Turceşti	6-7	6	5-6	5	5-6	5	0	2-3	2	2
Turgenewka	6	6	5-6	5	5-6	5	0	1-2	2	2
Új királyi meggy	6	5-6	6	5-6	6	6	0	2	1-2	2
Újfehértói fürtös	6	5	6	5	6-7	6	0	2	1	2
Unark	5-6	5	6	5-6	6	5-6	0	2	2	2-3
Üvegmeggy	6	6	6-7	5	6	6	0	3-4	1	2-3
Váltva érő meggy	5-6	5-6	5-6	5	5-6	5-6	0	2-3	2	2
Visciola Nera	6-7	6	5-6	5-6	6	5-6	0	2	1-2	2
Viska Marcela	5	5	6	5-6	5-6	6	0	2	2	1-2
Vissino Episkopis	7	6	6	5	5	6-7	0	1	2	2
Vitova	6	6	5-6	5-6	6	6	0-1	1-2	1-2	2
Vladimirskaya	5	5	5	5	5	5	0-1	2	2	2-3
Wanda	5-6	5-6	6	5-6	5-6	5-6	0	2	1	2
Werder üvegmeggy	5	5	5	5	5-6	5-6	0	2	2	2
Wilena	5-6	6	5-6	5	5-6	6	0	1-2	2	2
Wilga	6	5-6	5-6	5-6	6	5-6	0	1-2	1-2	2
Winer	5-6	5-6	6	5	5-6	6	0	2	2	1
Wisok	5-6	5	5-6	5	5-6	5	0	2	1-2	2
Wyweny Zwaigzde	5-6	5	5	5	5-6	5	0	1-2	2	1-2
Zentenes	5	5	5	5-6	5	5	0	1-2	1	1-2
Zukowskaja	5-6	5	5-6	5	5-6	5	0	1-2	1	1-2
Zsíroshegyi CT. 1270	5-6	5	5	5-6	5	5	0-1	1-2	1-2	1-2

Table 2. Comparison of main sour cherry types

Indicators, values	**Cigánymeggy**	**Pándy meggy**	**Montmorency**
	n=15	n=18	n=13
TB	6.01	6.05	6.11
WB	5.47	4.72	5.13
RB	5.71	6.03	5.75
NB	4.73	5.08	5.25
LB	5.68	6.12	5.78
KB	5.62	6.28	6.11
SB	0.118	0	0
OP	1.65	1.72	1.66
FR	1.37	1.75	1.76
DR	1.95	1.78	1.63

Table 3. Relative ecological and biological indicators and values of sour cherry cultivars (together)

Indicators, values	Intervals	Mean	CV,%
TB	5-7	5.85	10.68
WB	4-6	5.33	9.74
RB	5-6	5.62	8.55
NB	4-6	5.17	9.36
LB	5-7	5.76	8.76
KB	5-7	5.88	9.44
SB	0-1	0.015	273.37
OP	1-3	1.99	41.46
FR	1-3	1.69	29.88
DR	1-3	1.88	30.42

Figure 1. Flowering tree of *Prunus fruticosa*

Figure 2. Flowering tree of sour cherry

Figure 3. Fruit tree of *Prunus fruticosa*

Figure 4. Fruit trees of sour cherry

Figure 5. Monilia symptoms in sour cherry trees

Figure 6. Blumeriella symptoms in sour cherry trees

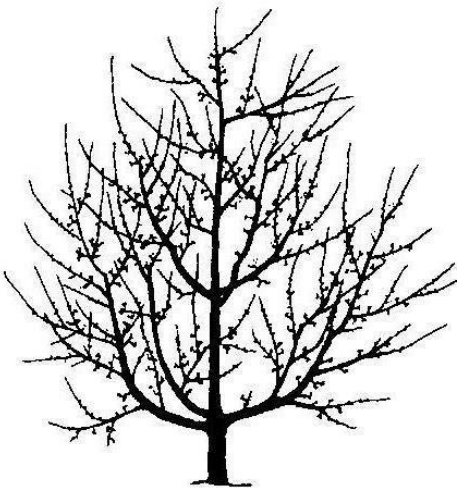

Figure 7. Breaking cone canopy type (G. Tóth, 2001)

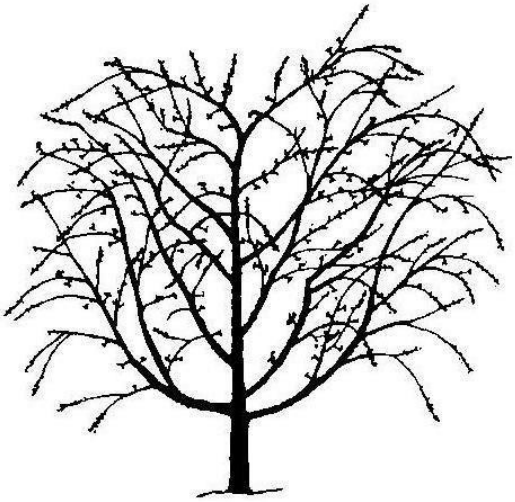

Figure 8. Corymbose form (G. Tóth, 2001)

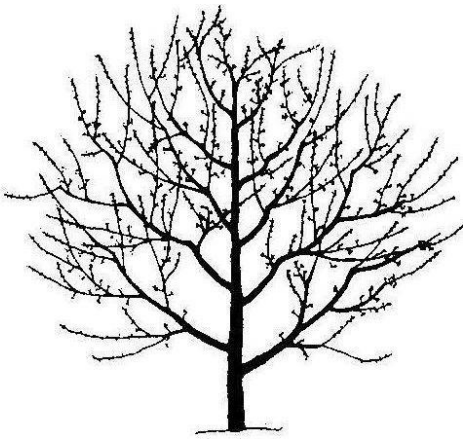

Figure 9. Spreading sphere canopy type (G. Tóth, 2001)

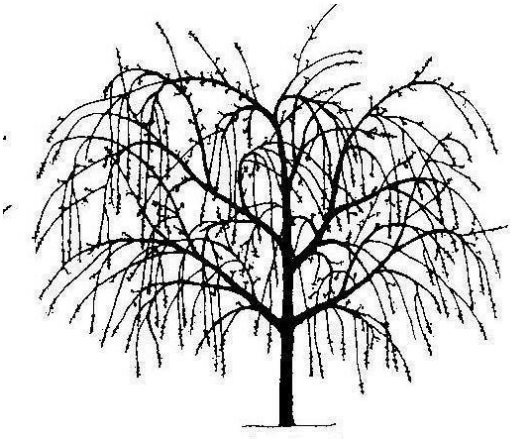

Figure 10. Hanging sphere canopy type (G. Tóth, 2001)

Figure 11. Feketicsi meggy

Figure 12. Érdi bőtermő

Figure 13. Georgia fehér meggy

Figure 14. Fruit stalk with little leaf

Figure 15. Fruit stalk without leaf

Figure 16. Sour cherry trees with root shot

Figure 17. Sour cherry trees without root shot (Csihon et al., 2015)

Figure 18. Cultivar 'Morello'

Figure 19. *Prunus cerasus rhexii*

Figure 20. Sour cherries on Transsylvanian cemetery (Kunt, 1980)

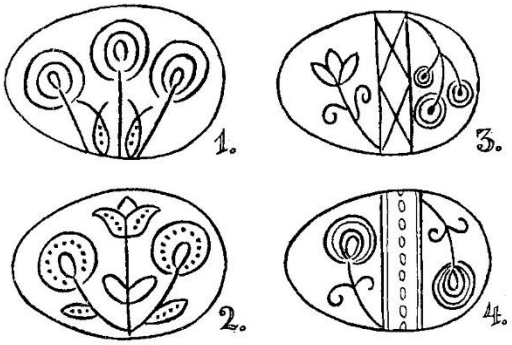

Figure 21. Sour cherry twig on eggs (Lükő, 1942)

Figure 22. Rippl Rónai: Sour cherry trees in blossom (1909)