International Journal of Horticultural Science 2022, 28: 14-33.
https://doi.org/10.31421/ijhs/28/2022/11311

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

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Summary: Sweet cherries are slightly more demanding than sour cherries. It is grown in warmer areas around the world. The relative ecological values obtained for the varieties obtained by extensive data collection differ slightly from the leading descriptions. Warm and demanding. The woody parts tolerate the cool of the winter quite well, the flower buds are damaged by the spring frosts. Its water demand is medium, in the case of 550 mm of annual rainfall, it adorns well on loose soils with good nutrient supply. Airy ground, neutral soil (pH 5.5-7.5) is optimal, but not suitable for areas with strongly calcareous, stagnant, stagnant groundwater. From the start of ripening, sudden rainfall, stormy winds and birds can cause great damage. Highlighting the world's leading varieties in the study (Bing, Rainier, Chelan, Van and Burlat) (Iezzoni et al., 1991, Faust & Surányi, 1997) - according to relative ecological and biological values, the most popular cherries are mainly they differed from the other varieties based on TB and KB. Open pollination and with it, the productivity of the varieties exceeded the overall variety average precisely because of the breeding objectives. Certainly, the analysis of historical varieties, the oldest landscape and local varieties based on relative ecological and biological values can help further pomological-ecological research.

Surányi, D. (2022): Comparative analysis of sweet cherry cultivars on their ecological and biological indicators. International Journal of Horticultural Science 28: 14-33. https://doi.org/10.31421/ijhs/28/2022/11311

Key words: sweet cherry, cultivars, ecological indicators, biological indicators

Introduction

Sweet cherry is one of our most popular stone fruit species, its earliness and appeal promote its consumption both fresh and processed (***Figure 1***). Due to its upward-breaking shoot system and the tall stature of the tree, it lives well in the wild in mixed deciduous forests. It rarely grows root shoots, its fruit is often consumed and distributed in the forest and garden, especially by thrushes. Humid is a species of continental, warm-summer regions. Economic fruit plants of D-climates (Wilsie, 1969); in the southern hemisphere, its growing districts are currently being formed (Chile, North Africa, Australia).

The wild cherry is mainly the tree of the hornbeam-oak forests, it also occurs alone in beeches, groves and rock forests. It is a Central European, sub-Mediterranean species, more lime-loving, but very sensitive to shade, but rich in bases, loose loam and sandy soils, as well as on casting soils (e.g. Nagykörű). Its leaf blade is large, slightly wrinkled, it has two honey extractors on the petiole, and the leaf edges are roughly sawn. 4-6 of the flowers form a thistle, the wild types usually self-fertilizing, most of the noble varieties become fself-sterile. Its fruit is rounded, and among the noble types the heart shape or cylindrical shape is also common. The color of the fruit is black, red, amber or bright yellow.

Several species of the mixture are known, such as the stand-alone sour cherry (*Prunus* x *gondouini*), but it has been implicated in the development of hybrids in Duke swarms or closely related species (eg. dwarf cherries and mahaleb) in Asia Minor and Central Europe and *P. psudocerasus* in China. Since the spread of sweet cherry cultivation, spontaneous crossing with other *Prunus* species has also become more common, with birds between scattered individuals and forest related species (e.g. Buda Hills, Eger region and Borsod).

Although the domestication and cultivation history of sweet cherries have answered many questions, there are still uncertain points (Schouw, quoted by De Candolle, 1894). During the campaign against Mithridates, cherries from Trapezunt were presented in Rome, BC. In 74. Lucullus says it's a fruit we didn't have. Two cherry frescoes from Pompeii and later a single mosaic depiction are known (Rapaics 1940; Roach, 1985; Faust & Surányi, 1997; Kirker & Newman, 2021). It is not certain that the Etruscans could no longer meet him in Italy.

Theophrastos (1968) BC his writing, dated 300, mentions red fruit-bearing trees, which PLINIUS (1967) described in Historia naturalis XXXth Book, who illustrated the popularity and diversity of sweet cherries with nine varieties. This species may have been common in the Kingdom of Pontus in the past, but I came across in 2004 only a few other trees in a montane setting. Ledebour is quoted by De Candolle (1894) that it is more common in the forests around Guilan (Iran), in the South Caucasus, and in Armenia; the question is whether this is still the case today. Munby (mentioned in the same author above), the sweet cherry from southern Russia (and Ukraine) - I myself came across trees from in 1970-1972 years. According to Munby, he lives in the Mediterranean all the way to Algiers (De Candolle, 1894). Lowe & Darlington (cit. De Candolle, 1894), mention that moving away from the landscapes of Lake Caspian and the Black Sea, the stock of bird cherries is thinning, correlating with the depletion of the bird world. The

processes can only be considered as a cultural-ethnic effect, as the changes may have started from the last glaciation era.

According to Heer (quoting De Candolle, 1894 & Rapaics, 1940) wild cherry seeds are common in waste dumps in Swiss pile constructions or in peat around Lake Bourget, proving their consumption (Bertsch & Bertsch, 1949). It is a monotypic species, with high genetic stability in its range (cf. European sweet cherry rootstocks), but new possibilities for domestication have emerged: tetraploid and polyploidy forms have also emerged from diploid wild cherries.

Cherries can now be grown in suitable climate zones, the result of long selection processes and spontaneous plant migrations (cf. Vavilov, 1951; Rehder, 1964; Terpó, 1974; Zsukovszkij, 1965). The center of richness of form is the area of origin and origin of the species, but the great richness of form may refute this. Epigenetic stress memory (ESM) alone requires continuous selection, highlighting of extra variants, or variety improvement serves the same in practical organic fruit production (cf. Cullinan, 1937; Wilsie, 1969). The polyfactoric inheritance characteristic of cherries is characterized by sterility, frost resistance, fruit characteristics, disease resistance and ecological tolerance (Souty, 1961; Iezzoni et al., 1991; Faust & Surányi, 1997).

The historical past of the cherry cultivars also proves its popularity, spreading from its range in Asia Minor too much of Europe (cf. Strabon, 1977) and then disseminated around the world. In a broader sense, the 'cherry fruit character' is represented by *Prunus pseudocerasus* in China, *P. tomentosa* in Central Asia and *P. besseyi* in North America, which has certainly increased the popularity of *P. avium*. Roach (1985) notes that the Akkadian name '*karshu*', Herodotos (1969–1971) means '*poticum*', but the sources do not mention the Egyptian occurrence, the authors cited by De Candolle confirmed this floristic fact. Following Plinius (1967), sweet cherry varieties were often praised by Plutarkhos (1965), Tacitus (1977) and other Latin authors (quoting Surányi 1985).

While Neolithic core finds were found in Swiss pile structures and later in Roman military settlements (see Bertsch & Bertsch, 1949; Rapaics, 1940), descriptions of varieties can be found in English, Dutch and German sources from the early Middle Ages (Roch, 1985; Surányi 1985; Kirker & Newman). For example, the occurrence of '*ciris beam*' or cherry wood in monastery gardens can be read in several works. In 12-13th century, more and more sources described various varieties, the famous Rose Orchard Roman (Lorris & Meune cc. 1230) praises the cherry as a home garden variety. 'Flemish Red', along with other varieties (e.g. black cherries), was not only described in Gerald's Herball (cit. Roach, 1985), but also reported (***Figure 2***). Parkinson (1629, cit. Roach, 1985) has already presented 30 varieties (***Figure 3***) and many old varieties have been included in the primary since the 17th century - and have been in the collections since then. Roach (1985) due to the strong Roman influence, individual trees, monastery gardens, private gardens provided a wide range of varieties in the old orchards of Kent.

It became popular in southern Europe, and almost at the same time on the eastern shores of the Mediterranean, which also ensured its expansion into the Balkans. It was introduced by Dutch settlers around New York in 1641 and spread further to North America. Historically less well known is the introduction of *P. avium* cherries in China and Japan (Faust & Surányi, 1997). There are also 1400-1500 year old trees in Japan, one of which has been published previously, but they belong to the species *P. serrulata* and *P. pseudocerasus*. From here, however, Japanese cherry trees were first planted in Washington only in 1905.

The relative ecological and biological values are based on a large number of ecological sources and own data. The figures came from Borhidi (472 varieties are not individually labeled with the relevant data) from the following sources: Borhidi (1993, 1995); Faust (1989); Kozma et al., (2003); Mándy (1963); Gardner et al., (1952); G. Tóth (1997); Jávorka & Soó (1951); Soó (1964); Kállayné (2014); Kárpáti & Terpó (1971); Kobel (1954); Kozma et al., (2003); Mándy (1963); Larcher (1980); Papp (2003, 2004); Porpáczy (1964); Raunkiaer (1905), Simon (1988, 1991), Soltész (1998, 2014a, 2014b); Tomcsányi (1979); V. Németh (1986); 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 (1952, 1956, 1972); Brózik (1959, 1960, 1993); Brózik & Nyéki (1975); Crane & Lawrence (1956); Cullinan (1937); De Candolle (1894); Crossa-Raynaud (1972); Entz (1857-1859); Faust & Surányi (1997); Fogle (1975); Grubb (1949); G. Tóth (1997, 2001); Gyuró (1974, 1990); Hedrick (1915, 1919, 1938); Hrotkó (2003); Iezzoni et al., (1991); Jávorka & Soó (1951); Janick & Moore (1996); Kállayné (2014); Kapás (1969, 1997); Knight (1969); Kobel (1954); Kozma et al. (2003); Krüssmann (1978); Láng et al. (1983); Mándy (1963); Mcgregor (1976); Mohácsy & Maliga (1956); Moore & Barington (1991); Nyéki (1980); Nyéki & Soltész (1996); Nyéki et al. (2016); Oldén & Nybom (1968); Papp (2003, 2004); Papp & Tamási (1979); Pernesz (2020); Pór & Faluba (1982); Porpáczy (1964); Rapaics (1940); Rayman & Szabó (1966); Rehder (1954); Rjabov & Rjabova (1970); Roach (1985); Soltész (1998, 2014a, 2014b); Souty (1961); Surányi (1985, 2002, 2003, 2015, 2016, 2020); Tomcsányi (1960, 1979); Tukey (1927); Valmori (1991-1995); Verner (1957).

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). The TWR formed an ecological reference system for plant communities and to place a multidimensional ecological space (cf. Précsényi (1986), in Zólyomi (1964); Zólyomi & Précsényi (1979), cit. Borhidi (1993); Zólyomi (1987)).

Figure 1: Picking cherries (Apollo Magazine).

Figure 2: *Cerasus* praecox (Roach, 1985).

Figure 3: Old sweet cherry varieties (Roach, 1985).

Figure 4a: Sweet cherry pest - *Rhagoletis cerasi* (Source: Wikipedia).

Figure 4b: Sweet cherry pest - *Rhagoletis cingulata* (Source: Wikipedia).

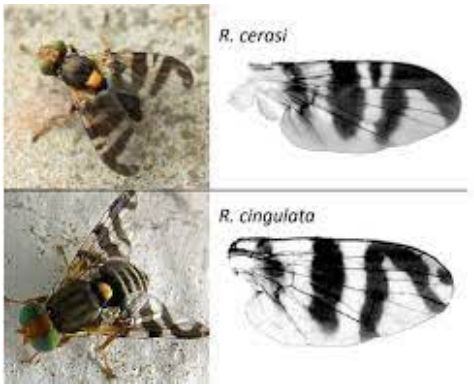

Figure 4c: Different wing pattern of cherry flies (Source: Wikipedia).

Figure 5. Bing cultivar (Source: Wikipedia).

Figure 6. Rainer cultivar (Source: Wikipedia).

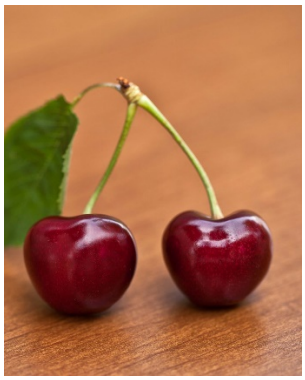

Figure 7. Chelan Rainer cultivar (Source: Wikipedia).

Figure 8. Bigarreau Burlat cultivar (Source: Wikipedia).

Figure 9. Van cultivar (Source: Wikipedia).

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: Only in soils extremely poor in mineral nitrogen, e.g. peat bog plants:

1. Plants of habitats very poor in nitrogen
2. Plants of moderately oligotrophic habitats
3. Plants of submesotrophic habitats
4. Plants of mesotrophic habitats
5. Plant of moderately nutrient rich habitats
6. Plants of soils rich in mineral nitrogen
7. N-indicator plants of fertilized soils
8. 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 (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).

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

9. Euhaline plants living on soils of very high chloride content
10. 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 (Füstös, 2012; G. Tóth, 1997, 2001; Soltész, 1998; Surányi, 1985, 2002, 2014; 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; towards Borhidi & Sánta, 1999).

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, 1973) and significance for peaches and nectarines main concern viruses Sharka sensitivity (V. Németh, 1986; Papp, 2003, 2004) to disease pathology (*Taphrina*, *Clasterosporium*, *Monilia* etc.) 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 3***). The description of the indicator values was the same as the definitions used in our previous studies; see Surányi (2014, 2015, 2018, 2020, 2021).

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 laxa* and PPV, etc.) (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)

In comparative studies, varieties are at different genetic and pomological levels. Historical and ancient varieties, local and landscape varieties, clones and hybrids, as well as various varieties are included here. The names used in the sources in analyzing were adopted without distinction. It was also hardly possible to evaluate each type from gene bank and variety collection data, which were of Hungarian or foreign origin.

Results and discussion

The ecological needs and sensitivities of sweet cherry varieties are different, the latter being proven for many varieties, varieties and clones; however, the cultivation limits of the two species also differ. The most common sweet cherries are Nw. 45-37 and Dw. 36-42 degrees latitude (Terpó, 1974; Roach, 1985; Iezzoni et al., 1991; Faust & Surányi, 1997). Of course, there are significant differences between species in fruit flesh characteristics and vegetative traits. Sweet cherries are an important species in the temperate zone, with world production of around 3.5 million tons. The largest producers (1000 tons) in 2018 were Turkey (824), United States (514), Ukraine (303), Russia (279), Poland (261), Iran (247), Uzbekistan (229), were Chile (156), Serbia (147) and Italy (122). Production growth is strongest in Poland, Chile and Serbia.

China’s sweet cherry culture differs from European and American variety use, with *P. pseudocerasus* and, increasingly, Western European yellow cherries dominating (Faust & Surányi, 1997; FAOSTAT, 2018). Top varieties in the world are Bing, Rainier and Chelan, Bigarreau Burlat and Van cherries (Iezzoni et al., 1991, Faust & Surányi, 1997; Kirker & Newman, 2021). In some parts of the international literature, Montmorency and English Morello are not classified as separate species (refuted by Iezzoni et al., 1991; Soltész, 1998).

The relative ecological and biological values of 561 varieties, sub-varieties, clones or varieties and candidate varieties are processed. Varieties show differences in temperature (TB), soil moisture (WB), towards RB and NB. Based on LB and KB, the variety is quite narrow, while the mineral salt requirement of sweet cherries is significant but very sensitive to sodium. Therefore, only a small difference can be detected with SB. The difficulties of the analyzes were exacerbated by the fact that there were sources of uncertain accuracy, although by evaluating a large number of varieties we were able to determine the characteristics of the cherry species (***Table 1***) and it will even be possible to compare the stone fruit species. From this it can be concluded that Ellenberg et al. (1991), then the evaluation system developed by Hungarian ecologists Borhidi (1993, 1995), supplemented with relative biological value measurement data - is able to evaluate and compare varieties, sub-varieties, clones, landscape and local cultivars and variants.

It is also possible to compare a group of varieties, subspecies, clones, variants and landscape varieties with different number of cases. In the current study, the number of processed data was 561 and in another (Surányi, 2022) only 115 cherry cultivars were included. Relative ecological and biological values differed by 4-8% in the two groups. Only the SB values showed a significant difference.

Open pollination (OP) well represented the fructification of the cultivars, which to a greater or lesser extent was able to modify the relative biological value due to frost effects and susceptibility to diseases, pests and the tendency of the peel to crack. In the gene bank, private garden bio-cherry cultivation after the European cherry (*Rhagolites cerasi*), the spread of American cherry (*R. cingulata*) in Europe makes quality cultivation difficult - FR values can of course change (***Figure 4a-b-c***). Data on droughts are important due to current climate change. Hangarian gene bank collection varieties also respond differently to the lack of rainfall, so the behavior of cherries in Asia Minor and Central Asia without irrigation is informative for both breeders and growers.

Highlighting 5 leading cultivars (***Figure 5-9***) among those studied (Bing, Rainier, Chelan, Van and Burlat) (Iezzoni et al., 1991) - their average values are also listed in ***Table 1***, the most popular cherries differed according to TB, WB and KB primarily. Open pollination and, with it, the productivity of the varieties exceeded the overall variety average precisely because of the breeding objectives. Certainly, the analysis of historical varieties, the oldest landscape and local varieties based on relative ecological and biological values can help ecological research.

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Table 1. Relative ecological and biological indicator values of each cultivars on sweet cherry (n=612).

SWEET CHERY CULTIVARS	TB	WB	RB	NB	LB	KB	SB	OP	FR	DR
Abbesse de Mouland	6-7	5	6	5	5	5	0	1	1-2	2
Abundance	6	5	5	5-6	5	5	0	2	2	2-3
Agatovaja	6-7	5	5-6	5-6	5	5	0	2	1-2	2
Aida (IV. 13/20)	6	5	6	5-6	4-5	4-5	0	1	2	1-2
Alba Heart	5	5	5-6	5	5	5	0	1-2	1-2	2
Alex (III. 16/45)	6-7	5	6-7	5-6	5	5	0	2	2	2
Allmän Gulrod	5-6	4-5	5	5	5	5	0	2	2	2
Alma	5	4-5	5	5	4-5	5	0	2	2	2
Altenburger Melonenkirsche	5-6	5	6	5	5	5	0	2	2	2
Altländer Hedelfingener	5	4-5	6	5	6	5	0	2	1-2	1-2
Amber Bigarreau	5	5	5-6	5-6	5	5-6	0	1-2	2	2
Amber Heart	5-6	5	5-6	5	5	5	0	2	1-2	2
Ambrunes	5	5	5-6	5	5	5-6	0	1-2	2	2
Amfurter Kirsche	5	4-5	5	5	5	5	0	2	2	1
Anita (IV. 3/41)	6	5	6-7	5	5	5	0	1	2	2
Annonay	5	5	6	6	5	5	0	2-3	1-2	3
Annus	6	5	6-7	5	4-5	4-5	0	2-3	2	2-3
Antoine Nomblot	5-6	5	5-6	5	5	5	0	2	1-2	2
Aradi fekete	6	5	6	5	5	5	0	2	2	1-2
August Heart	5-6	5	6	5	5	5	0	2	1-2	1-2
August Supreme	5-6	5	5-6	5-6	5	5-6	0	2	2	2
Axel	6-7	5	6	6	5	5	0	1	1-2	2
Bada	5-6	5	5-6	6	5	5	0	2	2	1-2
Badacsonyi óriás	6-7	5	6-7	5-6	5	4-5	0	2	2-3	2
Badeborner	6	5	6	6	5	5	0	2-3	3	2-3
Bagration Junskaya Rannyaya	5	4-5	5	5	4-5	5	0	2	2	2
Baltavári	6	5	6	6	5	6	0	2	2	2
Bánáti cseresznye	5-6	5	6	5-6	5	5	0	1-2	1	1-2
Barbara	5	4-5	5	5	4-5	5	0	2	2-3	2-3
Baschimeri	5	5	5	5	5	5-6	0	2	2	2
Basler Adlerkirsche	5-6	4-5	5	5-6	5	5	0	2	2	2
Basler Langstieler	5-6	5	5-6	6	5	5-6	0	1-2	1-2	1-2
Baumann May	5	5	5-6	5-6	5	5	0	2	2	1-2
Bedel	6	5	6	5-6	5	4-5	0	2-3	2	2-3
Bedford Prolific	5-6	5	5	5	5	5	0	2	2	2
Bella Pistoia	6	5	5-6	5-6	5	5	0	2	1-2	2
Belle de Droures	5	4-5	5	5	5	5	0	2	1-2	3
Belle de Franconville	6-7	5	6	5-6	5	6	0	2	2	2
Belle de l'Yoone	5-6	5	5-6	5-6	5	5	0	1-2	2	2
Belle d'Orléans	5	4-5	5	5	4-5	5	0	2	2	3
Berner Adlerkirsche	5	5	5-6	5	5	5-6	0	2	2-3	1
Besztercei fekete	5-6	5	6	5	5	5	0	2	2	2
Bianca	6	5	5	5	5	5	0	2	2-3	2
Bielerseegebeit	5	5	5	5	5	4-5	0	2	2	3
Big Kirsche	5	5	5	5-6	5	5	0	2	2	2
Bigarreau Burlat	6	4-5	6-7	5	4-5	4-5	0	1-2	1-2	1-2
Bigarreau Coeur de Marmotte	6-7	5	5-6	5	5	5	0	2	2	2
Bigarreau Coeur de Pigeon	6-7	5	5	5	5	5	0	2	2	2
Bigarreau Court Picou	6	5	6	4-5	5	4-5	0	2	2-3	2-3
Bigarreau de Schrenken	5-6	4-5	6	5	5	4-5	0	1-2	2	2
Bigarreau de Tigré	6	5	5-6	5	4-5	5	0	2	2	2

Bigarreau d'Oullins	6	5	6	5	5	5	0	2	2	2
Bigarreau Esperen	6-7	5	5-6	5	5	4-5	0	2	2-3	2-3
Bigarreau Frogmore Early	6	5	6	5	5	5	0	1-2	2	2
Bigarreau Gaucher	5-6	4-5	5-6	4-5	5	5	0	2-3	2-3	2-3
Bigarreau Géant d'Hedelfingen	5	5	6	5	5	5	0	2	1-2	2
Bigarreau Gros Noir	6	5	5-6	4-5	4-5	5	0	1-2	2	3
Bigarreau Guillaume	6-7	5	5-6	5	5	4-5	0	2	2	2
Bigarreau Lauermann	6	5	5-6	5	5	5	0	1-2	2	2-3
Bigarreau Marmotte	6-7	6	5-6	5	5	5	0	2	1-2	2
Bigarreau Moreau	5-6	5	5-6	5	5	5	0	2-3	2-3	3
Bigarreau Napoleon	5	5	5-6	5	5	5	0	2-3	2	2
Bigarreau Oratovskogo	5-6	6	5-6	4-5	5	5	0	2	2	2
Bigarreau Reverchon	6	4-5	5	5	4-5	5	0	2-3	2	2-3
Bigarreau Tardif de Vignola	6-7	5	5-6	5	5	6	0	3	2	1
Bing	5-6	5	6	5	5	4-5	0	2	2	2
Bingandy	5-6	5	5-6	5	4-5	4-5	0	2	2	2
Black Beauty	5	4-5	5	5	5	5	0	2	2	2
Black Bigarreau	5-6	5	5-6	5-6	5	5	0	1-2	1-2	1-2
Black Circassian	6	5	6	5	5-6	5-6	0	2	1-2	2
Black Cluster	5-6	5	5-6	5	5	5	0	2	2	1-2
Black Downtown	5	5	5	5	5	5	0	2	1-2	2
Black Eagle	5	5	5	5	5	4-5	0	1	1-2	1
Black Heart	5-6	5	5	5-6	5	5	0	2	2	2
Black Oliver	5	5	6	6	4-5	5	0	2	2	1-2
Black Tatarian	5	5	5	5	5	5	0	1-2	2	2
Blaserkirsche	5	4-5	5	5	4-5	5	0	2	2	2
Boambe di Cottnari	5	5	5	5	5	5	0	2	2	2
Bohemian Black Bigarreau	5	4-5	5	5	5	5	0	2-3	2	2
Boppardi korai	5	5	5-6	5	5	4-5	0	2	2	2
Boseni korai	5	5	5	5-6	5	5	0	2	1	2
Botond (H. 264)	5-6	5	5-6	5-6	5	5	0	2	1	2
Braunauer	5-6	5	5	6	5	5	0	1-2	1-2	1-2
Bremens Kirsche	5	4-5	5	5-6	5	5-6	0	2	2	2
Bullocks Heart	5-6	4-5	5-6	5	5	5	0	2	2	2
Burbank	5	5	5	4-5	4-5	4-5	0	2	1-2	1-2
Burcombe	5	4-5	5	5	4-5	5	0	1-2	1-2	1-2
Burdner Knorpelkirsche	5	5	5	5	5	5-6	0	2	2-3	2
Burlat	5-6	5	6	5	4-5	4-5	0	2	1-2	2
Burr's Seedling	5	4-5	5	4-5	5	5	0	2	2	2
Buschhölzer	5	5	6	5	5	5-6	0	2	2	2
Bush Tatarian	5-6	5	5-6	5	5	6	0	1-2	2	2
Bündner Herzkirsche	5	4-5	5	5	5	5-6	0	2	2	2
Büttner késői	5-6	5	5	5	4-5	5	0	2	1-2	1-2
Büttner késői piros ropogós	6	5	5-6	5	5	5	0	2	2	2
Büttners Weisse	6	5	6	5	5	5	0	2	1-2	2
California Advance	5	5	5	4-5	4-5	5	0	1-2	1-2	2
Cantieniklirsche	5	4-5	5	4-5	5	5	0	2	2	2
Carliersi	5	5	5-6	5	5	5-6	0	2	2	2-3
Carmen (III. 42/114)	5-6	4-5	6	5	4-5	5	0	1-2	1-2	2
Carnation	6	5	5-6	5	5	5	0	2	1-2	2
Carneval	5	5	5	4-5	4-5	5	0	2	2	2-3
Caroon	5-6	5	5	5	5	5	0	2	2	1-2
Caroon A	5-6	5	5-6	5	5	5	0	1-2	2	2

Caroon B	5	5	5	4-5	5	5	0	2	2	1
Casertana	6-7	5	6	5	5-6	5-6	0	1-2	2-3	2-3
Cashmera	5-6	5	5	5	5	5	0	2	2-3	2
Celeste Sampaca	5	5	6	5	6	6	0	1-2	2	2-3
Centennial	5	4-5	5	5	5	5	0	2-3	2	2
Cerna Edra	6-7	5	6	5	5	5	0-1	2	2	2
Cernoglazka	6	5	5-6	5	5	5	0-1	2	1-2	1-2
Cernokorka	5-6	5	5-6	5	4-5	5	0-1	2	2	2
Cernyj Almaz	6	5	6	5	5	5-6	0	2	2-3	2-3
Chapman	5	4-5	5	5	5-6	5-6	0	1-2	2	2
Chelan	5	5	5	5	5	5	0	2-3	2	2
Chinook	5	5	5	4-5	5	5	0	2-3	2	2-3
Circassian	6	5	5-6	5	6	5-6	0	2	2	2
Cleveland Bigarreau	5	5	5	5	5	5	0	2	2	2
Coburgi korai	5-6	5	5	4-5	5	5	0	2-3	2	2-3
Coe	5-6	5	5-6	5	5-6	5	0	3	2	2-3
Corum	5	5	5	5	4-5	5	0	2	1-2	1-2
Cosoveni	5	5	5	4-5	4-5	5	0	2	2	2-3
Crăiesti	6	5	5	5	5-6	6	0	1-2	1-2	1-2
Cristalina Sumnue	5	4-5	5	5	6	5-6	0	2	2	2
Cryall's Seedling	5	4-5	4-5	5	5	4-5	0	1-2	2-3	1-2
Csanádi fekete	5-6	5	5	5	5	5	0	1-2	2	2
Csanádi korai	5	5	4-5	5	5	5	0	2-3	2	2
Cserszegi mézes	5-6	5	5	5	4-5	4-5	0	2	2	2
Dangler	5	4-5	5	4-5	5	5-6	0	3	1	2
Dankelmann	5-6	6	5	5	6	6	0	1	2-3	2-3
Deacon	5-6	5	5	5	5-6	6	0	1-2	2	2
Del Meini	5	4-5	5	5	5	5-6	0	2	1	2-3
Dicke Haumüller	5	4-5	4-5	4-5	5-6	5	0	2-3	2	2
Dikeman	6	6	5-6	5	6	5-6	0	2	2	2
Dikkloen	5	4-5	5	5	5	5	0	1-2	1-2	1-2
Disznódi fűszeres	5	5	4-5	4-5	5	5	0	1-2	2	2
Dneprovka	6	5	5	5	5	5	0	2	1-2	1-2
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Dönissens Gelbe	5-6	5	5	5	5	5	0	2-3	2	2-3
Dönissens Gula	5	5	5	5	5	5	0	2-3	2	2-3
Drogans Gelbe	5-6	5	5	5	5	5	0	2	1-2	2
Dun Mazzard	5	4-5	4-5	4-5	5	5	0	2	1	1-2
Durome del Marca	6	5	5-6	5	4-5	5-6	0	1-2	1	2
Durome del Monte	5-6	4-5	5	5	5	5	0	2	2	2
Durome di Ceserna	6-7	5	5-6	5	5-6	6	0	1	1-2	1
Durona di Padua	6	5	5	5	5	5	0	1	1	2
Durone dell'"Anella	6	5	5	5	5	5-6	0	2	2	2
Durone Ferro II	5-6	4-5	5-6	5	4-5	5	0	2	2	2
Durone Nero I	5-6	5	5	4-5	5	5-6	0	2	2	2
Durone Nero No'	5-6	4-5	5-6	5	5	6	0	2-3	2	2-3
Duronia di Verona	6	5	5-6	5	5-6	6	0	1-2	1	2
Early Amber	5	5	5	5	5-6	5	0	2	2	1-2
Early Bigarreau	5	5	4-5	5	5	5	0	2	1-2	2
Early Birchenhayes	5-6	5	5	5	5	5	0	2	2	1-2
Early Burlat	5-6	5	5	5	5-6	5	0	2	1-2	2

Early Cluster	5	5	4-5	5	5	5	0	1-2	2	1-2
Early Lamourier	5-6	5	5-6	5	5-6	5	0	2	1	1
Early May	5	4-5	5	4-5	5	5	0	2	2	2
Early Purple	5	4-5	4-5	5	5-6	5	0	2	2	2
Early Purple Guigne	5-6	5	5	5	5	5-6	0	2	2	2
Early Rivers	6	5	5	5	5	5-6	0	1-2	1-2	1
Ebony	5	5	5	4-5	5	5	0	2	1-2	2
Edelweiss	5	4-5	5	5	5	5	0	2	2	2-3
Egri fekete	5-6	5	5	5	5-6	5	0	2	1-2	2
Egri korai rövidszárú	5	5	4-5	5	5	5	0	2	1-2	2
Egri korai hosszúszárú	5	5	4-5	5	5	5	0	2-3	2	2
Elkhorn	5	4-5	5	4-5	5	5	0	3	2	1-2
Elton	5	5	5	4-5	5	5	0	1-2	2-3	2
Emperor Francis	6	5	5	5	6	5-6	0	2	2-3	1-2
Empress Eugenie	5-6	5	5	5	5-6	5-6	0	2	2	2
English Morello	5-6	5	5-6	5	6	5-6	0	2	1-2	1-2
Erianne	5	4-5	5	5	5-6	6	0	2-3	2	2-3
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Esperen ropogós	5	5	5	5	5	4-5	0	1-2	2	1-2
Fabri	5	4-5	5	5	4-5	5	0	1	2	2
Fehér cseresznye C. 2262	5	5	5-6	5	5	4-5	0	3	2-3	2
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Ferenc császár ropogós	5-6	5	5-6	5	5	5-6	0	2-3	2-3	3
Ferenc József	5	5	5-6	5	5	5	0	2	1	2-3
Ferrovias	6-7	5	6	5	6	6	0	1-2	2	2
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Flamentiner	5	5	5	4-5	5	5	0	2	2	2
Florence	6	5	5	4-5	4-5	5	0	2-3	2	3
Flumser	5-6	5	5	5	5	5	0	1-2	2	1-2
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Forli	7	5	6	5	6	5-6	0	1-2	1-2	1-2
Freinsheimer Schloss	5	5	5-6	5	5-6	6	0	2	2	2
Fricktaler Rotstieler	5	4-5	5-6	5	5	5	0	2	1	2
Frogmore	5	4-5	5	4-5	5	5-6	0	2	2	2
Frommes Herzkirsche	5	5	5-6	5	5	6	0	2	2	1-2
Frühe Basler	5	4-5	5	4-5	5-6	5-6	0	2	2	2
Frühe Edelkirsche	5	5	5-6	5	5	5-6	0	1-2	1-2	1-2
Frühe Französische	5-6	5	6	5	5-6	5-6	0	2	2	2
Frühe Ganzler	5	4-5	5-6	5	5	5-6	0	2	2	2
Frühe Grenzacher	5	4-5	5	5	5-6	5	0	2	1-2	2
Frühe Ludwigs	5	5	5-6	4-5	5	6	0	2	2	2
Frühe Rote Meckenheimer	5	5	5	5	5	5	0	1-2	2	1-2
Frühe Natherzkirsche	5	4-5	5	5	5	5	0	2	2	2
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Gambaloisi nagy	5	4-5	5	5-6	5	5	0	2	2	2
Gamma	6-7	5	6	6	5-6	6	0	1	1-2	1-2
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Germersdorfi 1	5-6	5	5-6	5	5	5	0	2	2-3	2
Germersdorfi 3	5-6	4-5	6	5	5	4-5	0	2-3	2	2
Germersdorfi 45	6	4-5	6	5-6	5	4-5	0	2	2-3	2

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Giant	5-6	5	5-6	5	5-6	5-6	0	1-2	1-2	2-3
Gil Pack	6	5	6	5	5	5-6	0	2	2	2
Giorgia	6	5	6	5-6	5	5	0	2	1	2
Glemser	5	4-5	5	5-6	5	5	0	2	2	2
Glocker óriás	5	5	5-6	5	5	5	0	2	2	2
Gold	5-6	5	5-6	5-6	5	6	0	2-3	2-3	2
Goodnestone Black	5	5	5	5	5	5	0	1-2	1-2	1-2
Goverrnor Wood	5	4-5	5	5	4-5	5	0	2	3	3
Govnaya	5	4-5	5	5	5	5	0	2	1-2	2
Gönci cseresznye	5	4-5	5-6	5-6	5	4-5	0	2	1	1-2
Graber Kirsche	5	4-5	5	5	5	5	0	2	2	2-3
Grace Star	5-6	5	6	5-6	5	5	0	2	2-3	2-3
Gravium	5	5	5	5	5	5	0	2-3	2	2-3
Granat	5	4-5	6	6	5	5	0	2	2-3	2
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Grosse Prinzessin Kirsche	5-6	4-5	5	5-6	5	5	0	1-2	1-2	2
Grosse Rootstieler	5	5	5-6	5	5	6	0	2	2	2
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Grosse Schwarze Knospel	6	5	5-6	5	5	5-6	0	2	2	2
Grosse Weisse Knorpelkirsche	5-6	5	5-6	5	5	4-5	0	2-3	2	2
Gualbert Bousquet	5-6	5	5-6	5	5	5	0	2	2-3	2
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Lulsley Early Black	5	4-5	5	5	4-5	5	0	2	2	2
Luxburger	5	4-5	5	5	5	5	0	2	2	1
Magda	6	5	6-7	5-6	5	5	0	2	2	2
Magyar porc	5-6	5	5-6	5-6	5-6	5-6	0	2-3	2	2
Maibaer	5	4-5	5	5-6	5	5	0	2	2	2
Maiden's Blush	5	5	5-6	5	5	5	0	2	1-2	2
Maiknorpel Kirsche	6	5	6	5	5	5-6	0	1-2	1-2	2
Major Francis	5-6	5	6	5	5	5	0	1	1-2	2
Májusi korai	6	4	6	5	4-5	4-5	0	2-3	1-2	1
Malizia	6-7	5	5-6	5	5	5-6	0	1-2	1-2	2-3
Malling Black	5	5	6	5	5	5	0	2	2	2
Máramarosi rpogós	5	4-5	5	5	4-5	4-5	0	2-3	2	2-3
Marchiana	5-6	5	5	4-5	5	5	0	2	2	2
Marcianella	5-6	4-5	5	5	5	5	0	1-2	1-2	1-2
Margit (H. 66)	6	4	7	4-5	4-5	4-5	0	2-3	2	1-2
Márki korai	6	4-5	6	5	5	5	0	3	1-2	1-2
Mauro Tripoleos	7	5	5-7	5	5	6	0	1-2	2	2
May Bigarreau	5	4-5	5	5	5	5	0	2	2	2
Mednyánszky Emilia	5	4-5	5	5	5	5	0	1-2	2	2
Melitopolskaya Black	6	5	6	5	5	5	0-1	1-2	1-2	2
Melitopolskaya Dessert	6-7	5	6	5	5	4-5	0-1	2	2	2
Melitopolszkaja Csornaja	6-7	5	5-6	5	5	5	0-1	1	1-2	1-2
Merton Bigarreau	5-6	5	5-6	5	5	5	0	2-3	2	2-3
Merton Crane	5	5	5-6	5	4-5	5	0	2	1-2	2
Merton Glory	5-6	5	5-6	5	5	5	0	2-3	2-3	2-3
Merton Heart	5	5	5	5	5	5	0	2	2	2-3
Merton Late	5-6	4-5	5	4-5	4-5	5	0	2	1-2	3
Merton Marvel	5-6	5	5	5	5	5-6	0	2	2	2
Merton Premier	5-6	5	4-5	5	5	5	0	1-2	2	2
Merton Reward	5-6	5	5	5	5	5	0	2	1-2	2
Mészhegyi	5	5	5	4-5	5	5	0	3	2	2
Mezel	5-6	5	5-6	5	5	5	0	2	2	2
Mischlerkirsche	5	4-5	5	4-5	4-5	5	0	2	2-3	2-3
Moldavszaja csornaja	6	5	5-6	5	5	5	0	2	1-2	2
Molenkers	5	4-5	5	5	5	5	0	2-3	2	2
Molitorovská	5	4-5	5-6	5	5	5-6	0	2	2	2
Mollar de Cáceres	6-7	5	6	5	5	6	0	2	1-2	2
Mora di Cazzano	7	5	6	5	5	5-6	0	2	1	2

Moreau	5-6	5	6	5	5	5	0	2	2-3	2
Morella	6-7	5	5-6	5	5	5	0	2	2	1-2
Morellina	6	5	6	5	4-5	5	0	1-2	2	2
Morellone	5-6	5	5	4-5	4-5	4-5	0	2	1-2	2
Mostarka	6	5	6	5	5	5	0	2	2	2
Mumford	5	5	5-6	5	5	5	0	1-2	2	2
Mumford's Black	5	4-5	5-6	5	5	4-5	0	2	3	2
Muskotály	5-6	5	6	5	4-5	5	0	2-3	1-2	2
Münchebergi korai	5	4-5	6-7	4-5	4-5	4-5	0	3	2	2
Nagy fekete ropogós	5-6	5	5-6	5	5	5	0	2	2	2
Nagyhercegnő	5	4-5	5	5	5	5	0	1-2	1	2
Nagypáli cseresznye	6	5	6-7	5	5	5	0-1	1-2	2	2
Nagyszebeni apró	5	4-5	5-6	4-5	5	5	0	2	2	2-3
Napolitana	6	5	6	5	5	5	0	1-2	2	1-2
Negre de Bistriţa	6-7	5	6	5	5	6	0	1-2	1-2	1-2
Négus (H. 184)	6-7	5	6-7	5	5	5-6	0	2	2	2
New York Seedling	6	4-5	5-6	4-5	4-5	5	0	1-2	2	2
Newington Late Black	5-6	5	6	5	5	5-6	0	2	2	2
Noble	6	5	6	5	5	5-6	0	1-2	2	2
Noir de Guben	5-6	5	5-6	5	5	5-6	0	2	2	2
Noir de Scmidt	5	5	5	4-5	5	5	0	2	2	2
Noir de Tardiff	5-6	4-5	5	5	4-5	5	0	2	1-2	1-2
Noir de Winkler	5	4-5	5	5	4-5	5	0	2	2	2-3
Norwegian	5	4-5	5	4-5	4-5	5	0	2	2-3	2
Noszvaji fekete ropogós	6-7	5	6	6	6	6	0	2-3	2-3	2-3
Nutberry Black	5	5	5	5	5	5	0	2-3	2	1-2
Nyársardói	5-6	5	5	5	5	4-5	0	2	1-2	1
Oberdorlaer	5	4-5	5	4-5	5	4-5	0	2-3	1	2
Oberlandkirsche	5	5	5	4-5	4-5	5	0	2-3	2	2
Ochsenherzkirsche	5	4-5	5	5	4-5	5	0	2	1	2
Ogyesszai fekete	6	5	6	5	5	5	0	2	2	2
Ohio Beaty	6	5	6	5	5	6	0	2	2	2
Oksana	5	4-5	5	5	5	5	0	1-2	1-2	2
Old Black Heart	5	5	5	5	5	5	0	2	2	2
Oregon	5	4-5	5	5	5	4-5	0	2	2	2
Orsovai	5	4-5	5	5	5	5	0	2	1-2	2
Ökörszív	6-7	5	6	6	5	6	0	2-3	2	2
Pál (IV. 6/39)	5-6	4-5	5	4-5	5	4-5	0	1	1-2	2
Palermina	6	5	6	5	5	6	0	1-2	2	2-3
Parkhill	5	4-5	6	5-6	4-5	4-5	0	2	2	2
Peggy Rivers	5	4-5	5	5	5	5	0	2-3	1-2	2-3
Péter (IV. 6/5)	5-6	5	6	5	4-5	4-5	0	1-2	2	2
Petrokeraso	7	5	6-7	5	5	6	0-1	1-2	2	2
Picota Colorada	7	5	6-7	5	5	6	0	1-2	2	2
Picota Negre	6-7	5	6-7	5	5	6	0	2	2	2
Pietrosa Colorada	6-7	5	5	6	5	6	0	2	2	1-2
Pietrosa Napoleon	6	5	6	5-6	5	6	0	2	2	2
Pitesti	6	5	5-6	5	6	5	0	2	2	1-2
Planchoury	5	4-5	5	5	5	5	0	2-3	2	2
Planera	6-7	5	6	6	5	567	0	1-2	2	2
Pobjeda	6-7	5	6	5	6	5	0	2	1-2	1-2
Pomázi hosszúszárú	6-7	4-5	6-7	5	5-6	5	0	2	2	2
Pongorádi C. 1137	5	5	5	4-5	5	5	0	2-3	1-2	1-2

Pontiac	5	5	5	5	5	5	0	2	1-2	3
Pranera	5-6	5	5-6	5	5	6	0	3	2	2
Precoce della Marca	6-7	5	5-6	5	6	5	0	2	1-2	2
Precoce di Bagno Ripoli	6-7	5	5-6	5	5-6	5	0	2-3	2	2
Precoce di Cevoli	7	5-6	6-7	5	6	5	0	2	2	1-2
Preloučka Pumra	6	5-6	5	4-5	5-6	4-5	0	2	2	2
Primavera	7	5	6-7	5	6	5	0	2-3	3	2
Prinzenkirsche	6	5	6	5	5-6	5	0	2	2	2
Priusadebnaya	6	5	5-6	5	6	4-5	0	2	2-3	2
Prosser	6	5	5	5	5-6	5	0	2	2	1-2
Pünkösdi cseresznye	5	5	4-5	5	5	5	0	2-3	2	2
Querfurter Königskirsche	5-6	5	6	5	5-6	5	0	2	2	2
Rainier	5-6	5	5-6	5	5-6	4-5	0	2	2	2-3
Ramon Oliva	5-6	5	6	5	5	5	0	1-2	1-2	1-2
Rebekka	6	5	6	5	6	5	0	2	1	2
Red Clustor	5	4-5	5-6	5	6	5	0	1-2	2	2
Red Turk	6-7	5	6	5	5-6	5	0	1-2	2	1-2
Regina Mercato	5-6	5	5-6	5	5	5	0	2	2	2-3
Reidler	5	5	5	4-5	5-6	5	0	2	2-3	2
Republican	5-6	5	5-6	5	5	5-6	0	1-2	2	2
Ridevel	6	5-6	5	5	5-6	5	0	2	2	2
Rieskirsche	5	6	5	5	5-6	5	0	1-2	2-3	2
Rita (IV-5/62)	6-7	5	6	4-5	5	5	0	2	2	2
Rival	5	5	5	5	5	5	0	2	2	2-3
Rivan	5-6	5	5	5	6	5	0	2-3	2	2-3
Rockport	5	4-5	5	5	5	5-6	0	2	2	2
Rosmarin	6	5	6	5	6	5	0	2	2	2-3
Roundel	5	4-5	5	4-5	5	5	0	2	1-2	1-2
Royal Queen	5-6	5	5	5	5-6	5-6	0	2	2	2
Rozovaja	5-6	5	6	5	4-5	5-6	0	1-2	1-2	2
Röte Lamperdinger	5	4-5	5	5	4-5	5	0	2	2	2
Röte Laubiger	5	5	5	5	5	5	0	1-2	2	2-3
Rube	5	5	5	5	5	5	0	2	2	2
Rubin	5-6	5	5-6	5	5-6	5	0	2	2	1-2
Rumanjanije Sohteky	6	5-6	6	5	5-6	5	0	1-2	2	2-3
Salmo	6-7	6	6	5	6	5	0	2	2	2
Sam	5-6	5	6	4-5	5	5	0	2	1-2	2
Samba	5	5-6	6-7	5	5	5	0	2-3	2	2
Sämling von Müller	5	4-5	5-6	5	5	5	0	2	2	1-2
Sammetkirsche	5-6	5	5-6	5	5	5	0	2	2	2
Sándor (IV. 6/12)	6	5	6	5	5	5	0	2	2	2
Sandra Rose	6	4-5	6	5	5-6	4-5	0	2-3	2	2
Sanguinetti	6-7	5	6	5	6	5	0	2	2	2-3
Santina	5	4-5	5-6	5	5	5	0	2-3	2-3	2
Sárga Dragon	5-6	5-6	5-6	5	5	5	0	2	2	1-2
Sárga cseresznye	5	5	5-6	5	4-5	5	0	1-2	1	1-2
Sárga ropogós	5	5	5	5	5	4-5	0	2	2	2
Sárga szívcseresznye	5-6	5	5-6	5	5	5	0	2	2	2
Sato-Nishiki	5-6	5	6	5	5	5	0	2	1-2	2
Schägger	5	4-5	5-6	5	5	5	0	1-2	2	2
Schauenburger	5	4-5	5-6	4-5	5	5	0	2	3	2
Schmidt	5	5	5-6	5	5	5	0	2	2	2
Schmidt's Bigarreau	5	4-5	6	5	5-6	5-6	0	2	2	2

Schneiders	5	4-5	5-6	4-5	5-6	5	0	2	2	1-2
Schneiders késői ropogós	5-6	5	6	5	5-6	6	0	1-2	1-2	2
Schneiders Späte Knorpelkirsche	5-6	5	5-6	5	5	5	0	2	2	2
Schöne von Einiger	5	5	5	5	5	4-5	0	2-3	2	2-3
Schuenburger	5	4-5	5	5	5	5	0	2	2-3	2
Schumacherkirsche	5-6	5	5-6	5	5	5	0	1-2	2	2
Schümpfkirsche	5	5	5	5	4-5	5	0	2	2	2
Schüracher	5	4-5	5-6	5	5	5	0	2	2	2-3
Schwarze Kracher	5	5	5	5	5	5	0	2	2	2
Sealand Second Early Black	5	5	5	5	4-5	5	0	2	2	2-3
Seconda	5	4-5	5	4-5	5	5	0	2	2	2
Seeländer Langsteiler	5	5	5-6	5	5	5	0	1-2	1-2	2
Seewar	5	5	5	4-5	5	5	0	2	2	2
Seneca	5-6	5	6	6	5	5	0	2	1-2	1-2
Simcoe	5-6	5	6	5	5	5	0	2	2	2
Skeena	5-6	5	6-7	5	5	4-5	0	1-2	1-2	2
Skorospelka	5	5	5-6	5	5	5	0	1-2	2	2
Smă Elton	6	5	6	5	5	5-6	0	2	2	2
Smoky Dum	5-6	5	5-6	5	5	5	0	2	1-2	1-2
Smoky Heart	5-6	5	6	5	5	5	0	2	2	1-2
Sodus	5	4-5	5	5	5	5	0	2	2	2-3
Solymári gömbölyű	6	5	6	5-6	5	5	0	1-2	2	2-3
Solymári szívcseresznye	6	4-5	6	5-6	5	5-6	0	1-2	1-2	1-2
Sonata Sumleta	6-7	5	6	6	5	5-6	0	2	1-2	1-2
Souvenier des Charmes	6	5	5-6	6	5	5	0	2	2	2-3
Spänische Braune	5-6	5	6	5-6	5	5	0	2	2	1-2
Sparhawk	5	4-5	5	5-6	4-5	5	0	2	2-3	2
Spartle	5-6	5	6	6	5	5-6	0	1-2	1-2	1-2
Spanyol fehér	5-6	5	5-6	5	5	5-6	0	2	2	2
Spanyol fekete	6	5	5-6	5	5	6	0	1-2	2	2
Späte Baisler	5	4-5	5	5	5	5-6	0	2	1-2	2
Späte Jensler	5-6	5	6	5	5	5-6	0	2	2	2
Späte Spanische	6	5	5	5	5	5	0	1-2	2	2
Spitz	5	4-5	5-6	5	5	4-5	0	2	2	2
Stark Royal Purple	6	5	6	5	5	5	0	2	1	2
Starking H. G.	6	5	6	5	5	4-5	0	1-2	1	1-2
Starkrimson	6	5	6-7	5	5	5	0	2	1-2	2
Starks Gold	5	4-5	6	5	5	5	0	2-3	2	3
Stella	5	4-5	6	5	4-5	4-5	0	1-2	2-3	2
Stockton's Bunte	5-6	4-5	6-7	4-5	5	5-6	0	2	2	2
Stor Svart Bigarreau	5	4-5	6	5	5	5	0	2	2	2
Strawberry Amber	5-6	5	6	5	5	5	0	2	2	2-3
Strrawberry Heart	5-6	5	5-6	5	5-6	5	0	2	1-2	3
Sue	5	4-5	5	5	6	4-5	0	1-2	1-2	1
Sukorói cseresznye	6	5	5	5-6	5	5	0-1	2	1-2	2
Sumele	6	5	6	5-6	5	5	0	2-3	2	2-3
Sumleta	5	5	5-6	5	5	4-5	0	1-2	2	2
Summac	5-6	5	6	5	4-5	5	0	3	2-3	2-3
Summit	6-7	5	6-7	5	5-6	5	0	2	2	2
Sumste	6	5	6	5	5-6	5	0	2-3	1-2	2
Sumpaca	5-6	5	6	5	5-6	5	0	2	2	1-2
Sumtare (Sweetheart)	5-6	5	5-6	5	5	4-5	0	2	1-2	2
Sunburst	6-7	5	6-7	5	5-6	5	0	2	2-3	2-3

Sutton's Prolific	5-6	4-5	5	5	5	5	0	1-2	2	2-3
Sutton's Purple	6	5	6	5-6	5	5	0	2	2	2
Süsswelsche	5-6	5	5-6	6	5-6	5	0	1-2	1-2	2
Sylvia	5	4-5	5	5-6	5	5	0	2	2	2
Sweet Early	5	5	5-6	5	5-6	5	0	2	1-2	2
Sweetheart	6-7	5	6	5-6	5-6	5	0	2-3	2	2
Sweet September	5	4-5	6	5	5-6	5	0	2-3	2-3	2-3
Szegedi óriás	6-7	5	6	5-6	6	5	0	2-3	2	2-3
Szomolyai fekete	6-7	5	6	6	6	6	0	2	2-3	2
Szomolyai középhosszúszárú	6	4-5	6-7	4-5	5	4-5	0	1-2	2	1-2
Szomolyai rövidszárú	6-7	5	6	5	5	5	0	1-2	1-2	2
Szugnyog	5-6	5	6	5	5	5	0	2	2	2
Talaguera Brillante	6-7	5	6-7	6	6	5	0	2	2	2
Tardiff de Vignola	6	5	6-7	6	5-6	5	0	1-2	2	2
Tarka cseresznye	6	5	6	5	5-6	5	0	2	1-2	1-2
Tavričanka	6-7	5	5-6	5-6	6	5	0	1-2	2	2
Těchlovická	5	4-5	5	5	5-6	5	0	2-3	3	2-3
Teickner's Schwartze Herzkirsche	5-6	4-5	5-6	5	5	5	0	2	2	2
Terranova	6	5	6	5	5	5	0	2	2-3	2
Thamenkirsche	5	4-5	5	5	5	4-5	0	2-3	2-3	2
Tidigt Majhjärtkörsbär	5	4-5	5	4-5	5	4-5	0	2	2	3
Tieton	6	5	6	5	5-6	5	0	2	1-2	2
Tigre	5-6	5	5-6	5	5-6	5	0	2	2	2
Tiliington Black	5	5	5	4-5	5	5	0	2	2-3	2-3
Tradescant's Heart	5	4-5	5	5	5-6	4-5	0	2-3	2	2
Tragana Edessis	7	5	6-7	5	6	5	0	2	1-2	2
Tragana Volos	7	5	7	5	5-6	5	0	1-2	2	2
Tropliorichter's Schwarze	6-7	5	6	5	6	5	0	2	2	2
Truppler	5	5	5-6	5	5	5	0	1-2	2	2
Turca	6	5	6	5-6	5	5	0	2	2	3
Turfanda	6-7	5	6	5-6	4-5	5	0	1-2	1-2	2
Turkey Heart	6	5	6	6	5	5	0	2	2	2-3
Turkine	6-7	5	6	6	5	5	0	1-2	2	2
Thurn taxis	6	5	5-6	5-6	5	5	0	2	2-3	2
Tünde (IV. 13/51)	6	5	6	5-6	5	5	0	1-2	1	1-2
Twyford	5-6	4-5	6	5	4-5	5	0	2	1-2	2
Ulster	5-6	5	5-6	5	5	4-5	0	1	1	2
Unark	5	4-5	5-6	5	4-5	5	0	2-3	2-3	2
Ursula Rivers	5-6	5	6	5	5	5	0	2	2	2
Vale marei	5	4-5	5-6	4-5	5	5	0	2	2	2
Valerij Cskalov	5-6	4-5	6	5	5	5	0	1-2	1-2	2
Valeska	5	5	5-6	5	5	5	0-1	2	2	2
Van	5	5	6	5	4-5	5	0	1-2	2	2
Várkonyi	5-6	4-5	6	5	4.5	4-5	0	2	1	2
Vega	6	5	6	5	5	4-5	0	2-3	1-2	2
Velvet	5-6	5	6-7	5	4-5	5	0	1-2	2	2
Venus	5-6	4-5	6	5	5	4-5	0	2-3	2	2-3
Vera (III. 15/6)	6	5	6	4-5	5	5	0	2	2	2
Vernon	6	4-5	6	4-5	5	4-5	0	2	2	2
Vic	5	4-5	5	5	4-5	4-5	0	2	2	2
Viciani	5	4-5	6	5	5	5	0	2	1-2	2
Victor	5-6	5	5	4-5	5	5	0	2	2-3	2
Victoria Black	5-6	4-5	5	5	5	4-5	0	2	2	2-3

Virtuose Negre	6-7	5	6-7	5	5	5	0	1-2	2	2
Vista	6	5	6	5	4-5	5	0	2-3	2-3	2
Vitovka	5-6	5	5-6	5	4-5	5	0	2	1-2	2
Vörös meggy	5-6	5	5-6	5	5	5	0	1-2	2	1-2
Vystavochnaya	5	5	5-6	5	5	5	0	2	2	2-3
Waleska	5	4-5	5	4-5	5	4-5	0	2	2	2
Walpurgis	5	4-5	5-6	5	5	4-5	0	2-3	2	2-3
Waterhouse	5	5	5	4-5	4-5	5	0	2	1-2	2
Weinrebenkirsche	5	4-5	5	5	4-5	5	0	2	2	2
Weisse Spänische	5-6	5	5-6	5	5	5-6	0	2	2	2
Weisser Hertzkirsche	5	4-5	6	5	5	6	0	1-2	2	2
Weissler	5-6	5	5-6	5	5	5-6	0	2	2	2-3
Wellington A	5	4-5	5	4-5	5	5	0	2	1-2	2
Wellington B	5-6	5	5	5	5	5	0	2	2	1-2
Werderi korai	5	4-5	5	4-5	5	5	0	2	2	2
Werderi tarka szívcseresznye	5-6	5	5-6	5	4-5	5	0	2-3	2-3	2-3
White Heart	5	5	5	5	5	5	0	2	2	2
White Spanish	5-6	5	6	5	5	5-6	0	1-2	2	1-2
Will korai	5-6	5	5	5	5	5	0	3	2-3	2
Williams	5	4-5	5	5	5	5	0	2	2	1-2
Wils Tigida	5	4-5	5	4-5	4-5	4-5	0	2	2-3	2-3
Windsor	5-6	5	5-6	5	5	5-6	0	2	2	2
Winkler fehér cseresznyéje	5	5	5-6	5	4-5	5	0	2	2	2-3
Winklers Weisse Hertzkirsche	5	5	5	5	5	5	0	2	2-3	3
Wood kormányzó	6	5	5-6	5	5	6	0	1-2	2	2
Yates' Seedling	5	4-5	5	4-5	5	4-5	0	2	2	2-3
Yellow Glass	5-6	5	6	5	5	5	0	2	2	2
York Imperial	5	5	5-6	5	4-5	5	0	2-3	2	2
Zeite Frühe	5	4-5	5	5	5	5-6	0	2	2	2
Zimmermänner	5	5	5-6	4-5	5	5	0	2-3	1-2	2
Zweibalkirsche	5	4-5	5-6	5	5	5	0	2-3	2	2
Zweitfrüchte	5-6	5	5	5	5	5	0	2	2	1-2
MEAN	**5,6**	**4,8**	**5,6**	**5,0**	**4,9**	**5,0**	**0,02**	**1,96**	**1,88**	**1,98**
Top sweet cherries (5 cvs)	5,4	4,8	5,8	5,0	4,8	4,6	0	1,60	1,79	2.01