Sour Cherry Breeding in Eastern Europe[1]

A. F. Iezzoni[2]

INTRODUCTION

The origin and center of diversity for sour cherry (*Prunus cerasus* L.) is believed to be in the territory surrounding the Caspian, Black, and Adriatic Seas (2). The wealth of sour cherry germplasm in this area is undoubtedly a major reason for the success of the sour breeding program in the Eastern European countries. Over the centuries, superior trees were propagated by suckers and by grafting thereby establishing the local varieties. At first, emphasis was placed on the collection of the better strains of local varieties and selection among these strains. These selections were subsequently crossed with cultivars, usually from Western Europe, which generally had better fruit quality Such breeding programs have proven highly successful and the first series of hybrids have been released and commercially accepted. The second breeding cycle will surely result in the release of even more promising hybrids.

The objective of this report is threefold: 1) to describe the original germplasm which formed the base of the breeding programs in Yugoslavia, Bulgaria, Romania, Hungary, and Poland; 2) discuss the objectives of the breeding programs in those countries; and 3) characterize the cultivars which have been most recently released.

The information presented was gathered while the author was on a sour cherry germplasm collection trip in Yugoslavia, Bulgaria, Romania, Hungary, and Poland. Sour cherry pollen was collected from elite cultivars and second test selections to be used as pollen parents in the sour cherry breeding program at Michigan State University. The trip was from March 19 to April 23, 1983, to overlap with bloom in those countries.

General Objectives of the Sour Cherry Breeding Programs

The goal of the Eastern European sour cherry breeding programs is to produce productive cultivars with superior fruit quality which span the maximum potential ripening season. Emphasis is placed on self-fertile cultivars of sufficient hardiness to crop regularly. Desirable characteristics are low vigor and limited height, heavy spur development, and fruit production only on spurs. Genotypes with willowy wood bearing few spurs or lateral branches are discarded. Frequently, the hybrid seedlings are screened for tolerance to target leaf spot caused by *Coccomyces hiemalis* or brown rot caused by *Monilinia*. There are also strict fruit quality standards for such characteristics such as size, firmness, sugar/acid ratio, pit freeness, color, and processing quality. A dark-juiced morello cherry is favored. With the anticipation of mechanical harvest, selections are tested for ease of separation of the fruit and pedicel.

Occasionally, superior cultivars have resulted from strain selection within local varieties; however, more frequently, the superior seedlings have arisen from controlled crosses between the local varieties and foreign cultivars. Generally, the objective has been to improve the fruit quality of the local varieties. Three dark-juiced cultivars, Schattenmorelle, Nefris, and Northstar, are widely grown in East-

[1]Michigan Agricultural Experiment Station Journal Article No. 10982.
[2]Assistant Professor, Department of Horticulture, Michigan State University, East Lansing, Michigan 48824-1112.

ern Europe and are currently being used extensively as parents in the breeding programs. Schattenmorelle, which is probably the most widespread, originated in Germany and continues to be the most popular sour cherry in Western Europe. It is late ripening, and fully fertile with good fruit quality. Much of its success can be attributed to its hardiness and productivity. Unfortunately, it has willowy wood and is susceptible to *C. hiemalis* and Necrotic Ringspot Virus. Nefris is an old Polish cultivar which is very productive and fully fertile, with large, dark fruit of good quality. Unfortunately, it also has willowy wood and is susceptible to *C. hiemalis* and *Pseudomonas syringae,* the causal agent of bacterial canker. Northstar was selected at the University of Minnesota from a cross between English Morello and a sour cherry seedling obtained in Yugoslavia in 1918 (1). The Yugoslavian seedling transferred target leaf spot resistance to Northstar. Northstar is a small tree with hardy wood and buds; however, the fruit tends to be small and rather acid.

Yugoslavia

Of the 15 million sour cherry trees in Yugoslavia, 9 million are Oblacinska, a collective name for the sour cherry native to Yugoslavia. Trees of Oblacinska are small statured. The diminuitive fruits are difficult to shake from the trees. As regards flower morphology, the style and anthers are the same length so bee activity is not essential for fruit set. Oblacinska is easily propagated on its own roots, which impart some growth control, hardier flower buds, and higher productivity in comparison with seedling rootstocks. At 10 years of age Oblacinska can yield 10-20 kg/tree at a spacing of 1.2m. x 4m. When used as a rootstock, Oblacinska induces early bearing, some trees fruiting in the second year; however, it suckers badly and the roots are somewhat weak so the tree has problems when shaken. Dr. Asen Stancevic, the cherry breeder at the Fruit Growing Institute in Cacak, has established a planting of Oblacinska strains to determine which has the best fruit quality and is the most productive. Because of the limited range in fruit size within Oblacinska, Dr. Stancevic is also continuing a sour cherry breeding program with material from Western Europe. Sumadinka is the newest sour cherry released (Table 1).

Bulgaria

Approximately 30 years ago, the major sour cherry in Bulgaria was Anadolska, a local variety which is distributed as far south as Turkey. It is propagated by suckers and blooms later than most cultivars. The tree is easy to recognize because of its upright growth habit and great height, resembling a poplar. It is reported to be tolerant to target leaf spot, and wet, acid soils. Because of the limitations with the tree form of Anadolska and the desire for cultivars with superior fruit quality, a major test planting encompassing 70 sour cherry cultivars has been located near the Fruit Growing Research Institute at Plovdiv, Bulgaria, under the supervision of Dr. Hrasto Baer. Currently the recommended cultivars include Schattenmorelle, Nefris, and Oblacinska. Included in this collection are several hardy selections from the Soviet Union, (Lubskaja, Skorospelka, Jukowska), which may have potential as parents in hybrid combinations.

Romania

Planted at the Research and Production Institute for Fruit Growing in Pitesti, Romania, is the National Cherry Collection consisting of 200 sour cherry cultivars representing the local varieties from across Eastern Europe,

Table 1. New sour cherry cultivars from Yugoslavia, Romania, and Hungary.

Country of Origin	Cultivar	Parents	Description
YUGOSLAVIA	Sumadinka	Seedling of Heimann's Conserve	Late ripening. Willowy wood. Large dark fruit of good quality.
ROMANIA	Nana	Seedling of Pandy. The pollen parent is believed to be Schattenmorelle	Self-fertile. Ripens mid-season. Willowy wood. Dwarf. Very productive. Dark red fruit averaging 4-4.5 gms.
	Mocãnesti 16	———	Self-fertile. Standard to high vigor. Dark red fruit averaging 5 gms. Fruit is good for fresh consumption.
	Dropia	Seedling of Vladimir, a Russian cultivar.	Self-fertile. Late ripening. Hardy. Dark red fruit which is easily shaken from the tree.
	Ilva	———	Self-fertile. Low to medium vigor. Precocious, fruiting in the 2nd or 3rd year. Late-blooming. Fruit averages 5 gms. Fruit is tolerant to *Monilinia*.
	Timpurii de Cluj	———	Partially self-fertile. Performs well in cool areas. Resistant to *Monilinia*.
HUNGARY	Meteor Korai	Pandy x Nagy Angol	Self-fertile. Ripens the first week of June in Budapest. Fruits only on spurs. Strong branch system. Resists cracking.
	Érdi Nagygyümolcsü	Seedling of the local variety Hankonkowsky	Self-fertile and is pollinated by Meteor Korai. Ripens June 12 in Budapest. Fruits only on spurs. Vigorous tree. Fruit is black, 27 mm in diameter with a high sugar content; good for fresh market.
	Favorit	Pandy x Nagy Gobet	Self-sterile. Ripens June 15 in Budapest. Fruit is sweet, 24-26 mm in diameter, light-juiced and used for fresh market.
	Jubileum	Pandy x Nagy Gobet	Self-fertile. Ripens June 15 in Budapest. Fruit is firm, 25-27 mm in diameter. 18% soluble solids. Has a small pit and dry stem scar.
	Sárándi	Selection of Pandy	Earliest self-fertile selection of Pandy. Fruit quality similar to Pandy.
	Érdi Bötermö	———	Self-fertile. Ripens June 20 in Budapest. Fruit is 20-24 mm in diameter and shakes easily from the tree.
	Uféhérto Furtös	Selection of Pandy	Self-fertile. Ripens the first week of July in Budapest. smaller fruit size than Pandy. Consistent cropper.
	Kántorjánosi	Selection of Pandy	Self-fertile. Ripens June 20-30 in Budapest. Most hardy. Not infected with Necrotic Ringspot Virus or Prune Dwarf Virus.

plus named cultivars from Western Europe and the Soviet Union. Dr. T. Gozob, the cherry breeder at Pitesti, uses this wealth of genetic diversity in his breeding program. Each year, 200,000 to 300,000 cherry flowers are crossed and the resulting seedlings are screened in the nursery for tolerance to *C. hiemalis*. The newest releases are Nana, Mocanesti 16 and Dropia (Table 1).

A second cherry breeding program is located at the Research and Production Station for Fruit Growing in Bistrita. The climate in Bistrita is cooler and wetter than Pitesti with an average annual temperautre of 8°C and a mean yearly rainfall of 678 mm. The cherry breeder, Dr. I. Ivan, has recently released 2 cultivars, Ilva, (synonym Autofertile de Bistrita) and Timpurii de Cluj, which are adapted to the cold winters in Bistrita (Table 1).

Hungary

Sour cherry breeding in Hungary began 15 years ago, at which time there were 2 local varieties, Pandy[1] and Cigany. Pandy has good fruit quality but is self-sterile and was therefore planted along with the self-fertile Cigany, which has poor fruit quality. Pandy is the name of a family of fruit strains and includes a range of sour cherry phenotypes which have similar fruit shape and color, generally good quality, but which differ in tree size, and in date of bloom and harvest. Pandy was once propagated by suckers, but now it is grafted on *P. mahaleb* rootstocks. Cigany also encompasses several strains. Its clones differ in blossoming time, fertility, and crown size; however, the fruit is always small and dark and the tree is weak and willowy. Orchards planted with specific Pandy and Cigany strains were unproductive because the blossom time of the chosen Pandy and Cigany strains did not always overlap.

In 1914, Dr. Maliga Pal began studying selfsterility in Pandy, using Pandy as the female parent and 9 other cultivars as the male parent. The objective was to obtain self-fertile hybrids having the good fruit quality of Pandy but a range of ripening times. Nine pollen parents were used: Nagy Angol, Korai Angol, Ostheimi, Csasar Meggy, Eugenia, Nagy Gobet, Kiralyi Amarelle, Montreuilli, and Korai Majusi Piros. Between 1954 and 1957, 160,000 crosses were made, 5700 seedlings were grown and evaluated, and 330 elite seedlings were propagated for further testing. The following cultivars have been named, released, and are currently in production: Meteor Korai, Favorit, Erdi Nagygyumolcsu, Jubileum, and Erdi Botermo (Table 1). Other promising clones are being evaluated by the cherry breeder, Dr. Apostol Janos. Among the elite seedlings still under test are hybrids which span a 40 day ripening season, have clear juice, fruit only on spurs, and have a fruit diameter of 30 mm.

A second cherry research program is located at the Research Station for Fruit Growing in Ujfeherto, Hungary. Dr. Sabo Tibor, who conducts the cherry breeding, has released Ufeherto Furtos, Kantorjanosi and Sarandi (Table 1).

Poland

Before the introduction of sour cherries from other countries, the major local varieties in Poland were Jedlinsk, which resembles Schattenmorelle in fruit quality and ripening date, and Pozog 29 which is winter hardy, late flowering, extremely productive and a vigorous tree. The fruit of Pozog 29 has black juice and a long pedicel. These local varieties have now been largely replaced by Schattenmorelle, Northstar, and Nefris. Schattenmorelle is planted 3 x 2.5 meters because trees are of relatively low

[1]Pandy is called Crisana in Romania and Koroser Weichsel in Germany.

vigor and the orchards are kept for 12-24 years.

Discussion

The new sour cherry cultivars developed in Eastern Europe have an impressive list of improved characteristics. Cultivars are available which ripen over a 40-day period. Some are hardy and perform well under the severely cold and fluctuating temperatures in Poland. All the sour cherry hybrids in the Romanian breeding programs are screened as seedlings for tolerance to *C. hiemalis* and some are screened for *Monilinia*. Some cultivars may be tolerant to Prune Dwarf Virus and Necrotic Ringspot Virus. The attractive fruit tends to be of a large size, with high sugar and a good sugar/acid ratio. Part of the emphasis on fruit quality arises from the diversity of products for which sour cherries are used: canned compote, juice, jams, pastries, and fresh fruit. With the anticipation of mechanical harvest some cultivars have been developed which are firm, have a small blossom scar, and are easily shaken from the tree. There are clones with a small tree habit and some which are completely spurred resulting in a highly productive tree. Lastly, the cultivars are fully fertile and therefore highly productive.

By contrast, the entire sour cherry industry of the United States is based on one French cultivar, Montmorency, which is 400 years old. Consequently, Montmorency produces erratically because of limited adaptability to abiotic and biotic pressures in the production areas of the United States. Recurrent crop losses to spring frosts make it extremely difficult to maintain markets. Because most of the sour cherries are mechanically harvested and are processed, new pressures for performance are put on the 400 year old cultivar.

Only limited sour cherry germplasm is available in the United States to search for solutions to the problems facing Montmornecy. Local varieties do not exist. The University of Minnesota cherry breeding program was disbanded and the genetic material which gave rise to Northstar was lost. In 1972, the federal facility for fruit introduction and maintenance at Chico, California, was closed, and much of their sour cherry germplasm lost. Plant material entering the country has barely begun to fill this deficit.

Pollen collection has allowed the rapid introduction of the superior qualities of the Eastern European sour cherries into the breeding population at Michigan State University. Pollen samples collected were used in crosses at the Horticulture Experiment Station in Clarksville, Michigan, in the spring of 1983, and the hybrid seed was harvested in July. Additional pollen has been stored at −18°C for crosses next year.

The initial dilemma facing sour cherry breeding in the United States is the narrow germplasm base and the continued importation of pollen and budwood is a necessity. With these materials, North American breeders can develop sour cherry cultivars adapted to our climatic conditions and cultural practices. The potential value of sour cherry breeding has been demonstrated in Eastern Europe; we must now catch up with our colleagues there who are a 15-year step ahead.

Literature Cited

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