

CORNELIAN CHERRY GERMPLASM RESOURCES OF TURKEY

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A B S T R A C T

Anatolia lies within the native range of the Cornelian cherry (*Cornus mas* L.). Although the Cornelian cherry is widely grown in the north coastal areas of Turkey, it still is not as important a fruit crop as are many other fruit species. There are 1.6 million Cornelian cherry trees in Turkey, which yield 17,000 metric tons of fruit annually. Most trees are open-pollinated seedlings of wild genotypes which vary widely in terms of productivity and fruit characteristics, such as size, shape, color, flavor and nutritional value. Turkey has a rich gene pool of Cornelian cherry genotypes adapted to different local conditions in different regions of the country. However, this gene pool is threatened by genetic erosion. In this review, the distribution of the Cornelian cherry in Turkey is elucidated. The characteristics and uses of local genotypes are also discussed.

Key words: Cornelian cherry, *Cornus mas* L., Turkey, germplasm resources, genetic erosion

INTRODUCTION

Cornus is a very large genus which comprises forty species of shrubs and trees native to Central and Southern Europe and parts of Western Asia (Chamberlain, 1972). Most species are grown as ornamentals. Only a few species are grown for their fruits, chief among which is the Cornelian cherry (*Cornus mas* L.).

Recent worldwide consumer interest in health foods has increased market demand for alternative high quality fruits such as the Cornelian cherry. Cornelian cherry cultivation is slowly growing throughout the world, not only

because it bears delicious and nutritious fruits, but also because it is an attractive ornamental plant and is among the first to blossom in spring (Szendi, 2000).

Research on the nutritional value of the Cornelian cherry has focused on nutrients which play a role in preventing deficiency diseases such as scurvy. Fresh Cornelian cherry fruits contain twice as much vitamin C as oranges. The Cornelian cherry is also widely used in pharmotherapeutics. The fruits and leaves have antidiarrhetic properties, and may also be used as an astringent or febrifuge. The fruits have been used in traditional medicine. Cornelian cherry fruits are know to increase appetite (Baytop, 1984; Chiej, 1984).

Turkey has great agricultural potential because each region of the country can support the cultivation of different kinds of crops. Each region of Turkey has its own unique flora because soil and climate conditions vary widely throughout the country. This rich and diverse flora is an important source of plants which provide food, wood and pharmaceutical raw materials (Ercisli, 2004).

Turkey has a long history of Cornelian cherry cultivation and a wealth of Cornelian cherry genotypes. The Cornelian cherry is a shrub or small tree which can reach seven to eight meters in height. It bears tart purple, yellow or red fruits the size of olives (Kayacik, 1966; Yaltirik, 1981). The Cornelian cherry is becoming a more popular crop because of recent advances in breeding superior varieties which have an attractive color, low tannin content, and high sugar content (Karadeniz, 2000).

In Turkey, 97% of the Cornelian cherry crop is harvested from open pollinated seedlings of wild genotypes. The fruits are eaten fresh, dried whole, pickled like olives, or used to produce jam, jelly, marmalade, syrup or wine (Karadeniz, 2000).

Because the plants are open pollinated, they vary widely in terms of productivity and fruit characteristics, such as size, shape, color, flavor and nutritional value. Thorough evaluation of the genetic resources of the native genotypes is essential for selecting those genotypes most useful for future breeding programs designed to introduce traits such as hardiness and disease resistance from wild genotypes into cultivated varieties.

The aim of this review is to provide information on the status of the genetic resources of the Cornelian cherry in Turkey, on the distribution of the Cornelian cherry in different regions of the country, and on the characteristics and uses of genotypes from different provinces.

MATERIAL AND METHODS

This review is based on previous studies conducted in different regions of Turkey (Chamberlain, 1972; Eris et al., 1992; Karadeniz, 1995; Karadeniz, 2000; Karadeniz et al., 2001; Pirlak et al., 2003).

RESULTS AND DISCUSSION

Distribution of cornelian cherries in Turkey

The dominant *Cornus* species found in Turkey is the Cornelian cherry, known in Turkish as *kizilcik*. In Turkey, the Cornelian cherry grows as a small tree seven to eight meters in height and 25 to 45 cm in diameter (Yaltirik, 1981). The vast majority of the Cornelian cherry genetic resources in Turkey is made up of natural stands (Ercisli, 2004). Only a small portion is made up of cultivated plantations. Natural stands of the Cornelian cherry are found in approximately one third of the country, especial northern coastal regions (Tab. 1). The Ministry of Agriculture (Anonymous, 2001) reports that the Cornelian cherry grows in over thirty provinces, including the provinces of Amasya, Artvin, Balikesir, Bartin, Bolu, Bursa, Canakkale, Cankiri, Duzce, Erzurum, Giresun, Gumushane, Kastamonu, Kutahya, Malatya, Sinop, Samsun, Trabzon, Tokat, Yalova and Zonguldak (Fig. 1).

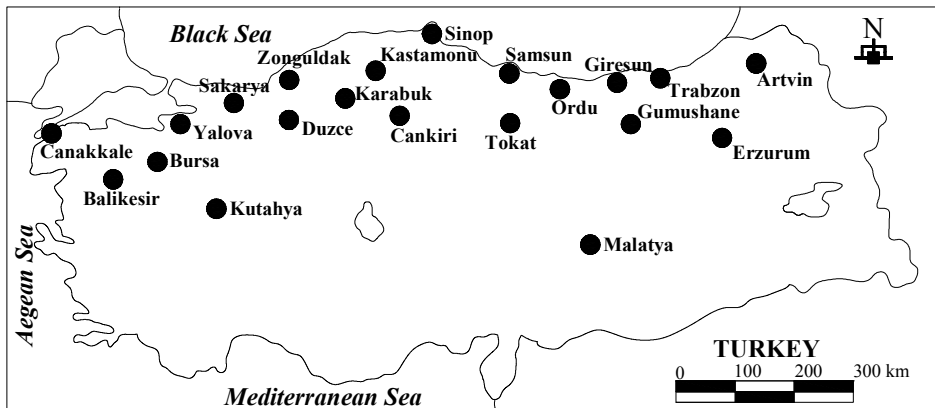


Figure 1. Distribution of the Cornelian cherry (*Cornus mas* L.) in Turkey

Table 1. Occurrence and population size of the Cornelian cherry (*Cornus mas* L.) in the nine regions of Turkey

Central	North	South	East	West	Northwest	Northeast	Southwest	Southeast
X	XX	X	X	X	XX	XX	X	x

XX – very abundant, X – abundant, x – rare

Pomological studies

In Turkey, the cornelian cherry has been propagated from seed for centuries. This has resulted in considerable genetic variability. About 97% of the trees are

open pollinated seedlings of wild varieties. Only 3% of cultivated trees are propagated by grafting, mostly in the provinces of Bursa, Malatya and Yalova. Seedling populations in different regions of Turkey are very diverse and may prove to be sources of valuable donors for future breeding programs.

Cornelian cherry breeding programs have been established in different regions of Turkey since the 1990s. Some promising selections were released in 1993. Fortunately, pests and diseases are rarely serious problems with the heterogeneous seedling populations that occur in Turkey. The main goals of these breeding programs are to improve productivity and fruit characteristics, such as size, shape, color, flavor and nutritional value (Karadeniz, 1995).

Table 2. Selected fruit properties of Cornelian cherry genotypes from Turkey

Location	Fruit weight [g]	Fruit length [mm]	Fruit width [mm]	Flesh/stone ratio	TSS [%]	Vitamin C [mg/100 ml]	Altitude [m]	References
Konya	3.65-4.57	18.31-21.23	13.79-16.10	–	–	–	1200	Turkoglu et al., 1999
Trabzon	1.31-2.88	14.32-22.35	11.29-14.57	3.20-6.90	8.0-13.5	–	300	Karadeniz et al., 2001
Zonguldak	2.28-4.07	13.87-16.42	17.97-23.51	5.00-7.25	12.1-16.9	–	300	Yalcinkaya and Eti, 2000
Malatya	1.02-4.07	14.09-23.51	9.46-16.42	2.79-7.2	11.7-22.5	49-122	1100	Yalcinkaya et al., 1999
Bursa	1.67-6.53	16.10-27.77	10.70-18.00	2.05-7.42	11.7-22.5	–	1100	Eris et al., 1992
Giresun	1.66-3.22	15.30-19.30	11.62-14.92	2.97-7.38	10.0-18.5	–	300	Karadeniz, 1995
Coruh	2.90-5.20	17.00-25.01	13.10-19.20	6.00-9.40	11.5-16.8	36-106	900	Pirlak et al., 2003

Selected fruit properties of Cornelian cherry genotypes from different provinces of Turkey are presented in Table 2. Fruit weight ranged from 1.0 to 6.5 grams, fruit length from 1.3 to 2.8 cm, fruit width from 0.9 to 2.3 cm, flesh to stone ratio from 2.0 to 9.4, soluble solids content from 8.0 to 22.5%, and vitamin C content from 36 to 122 mg/100 g. The trees were found growing anywhere from 300 to 1200 meters above sea level.

In spite of recent progress in the breeding programs, consumers are still not completely satisfied with fruit quality. Future breeding programs need to take into account the requirements of producers, distributors and consumers.

Genetic Erosion

Important sources of Cornelian cherry germplasm are being lost because stands are being cut to produce walking sticks, especially in northwestern Turkey. In other regions of the country, deforestation also threatens to eradicate Cornelian cherry populations. Special locations have to be demarcated to protect the genetic resource of native Cornelian cherry trees.

It is not known how the various Cornelian cherry genotypes in Turkey are related to each other. Genotypes have to be collected from the field and assembled in suitable locations where they can be systematically evaluated. It would also be useful to have a centralized location for evaluation, selection, breeding, propagation and distribution. Efforts are underway to establish a centralized collection at the Ataturk Central Horticultural Research Institute in Yalova.

The collection and evaluation of Cornelian cherry genotypes should be given very high priority because many genotypes are in danger of being lost. These genotypes are indispensable for increasing the commercial potential of cultivated Cornelian cherry varieties. The first step in the conservation process is to identify threatened populations and develop effective strategies to protect them. The best longterm strategy is to introduce selected productive genotypes into state and private nurseries and orchards.

Genetic resources provide a sustainable source of genetic raw material for improving cultivated varieties. They contain unique naturally selected co-adapted gene constellations which determine adaptability and productivity. Therefore, the conservation of genetic resources is of paramount importance for reliable and sustainable food production for future generations.

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ZASOBY GENOWE DERENIA WŁAŚCIWEGO W TURCJI

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S T R E S Z C Z E N I E

Anatolia jest jednym z rejonów występowania derenia właściwego (*Cornus mas* L.) w stanowiskach naturalnych. Dereń jest uprawiany na rozległych przybrzeżnych terenach w północnej części Turcji, jednak nie zyskał on większego znaczenia podobnie jak wiele innych gatunków roślin o jadalnych owocach. Szacuje się, że w Turcji rośnie 1,6 mln drzew derenia, z których rocznie uzyskuje się około 17 tys. ton owoców. Większość drzew jest siewkami lokalnych typów derenia. Dlatego ich owoce różnią się znacznie wielkością, kształtem, kolorem i innymi cechami. Państwo utrzymuje bogate zasoby genowe derenia w różnych regionach Turcji, ale istnieje zagrożenie, że ulegną one erozji genetycznej. Wraz ze znaczącym wzrostem populacji należy zabezpieczyć istniejące zasoby derenia właściwego w Turcji. W pracy przybliżono rozmieszczenie derenia (*Cornus mas* L.) w poszczególnych prowincjach Turcji oraz przedstawiono jego charakterystykę i sposób wykorzystania.

Słowa kluczowe: dereń właściwy, *Cornus mas* L., Turcja, zasoby genowe, erozja genetyczna