FUTURE FRUITS: CURRANT AND GOOSEBERRIES

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ABSTRACT

Berries are an increasingly important fruit group in the world while have just known inTürkiye. Currant and gooseberry have an important place in this fruit group. Wild forms of these fruits also common in forest area in Turkey and in the world. These natural populations create a rich source of genes for scientific research and studies. Today, global warming is an increasing crisis that emerges as a strong situation day by day. It is necessary to spread the culture of resistant species, which can be succeeded to grow with more limited opportunities in the future. These berries are important for human nutrition with their rich vitamin C and antioxidant activities. It is important to provide the necessary level of knowledge in terms of breeding. For the future of these fruits, first, it is expected to be widely introduced, to spread modern cultivation methods and to solve marketing problems. Generally, large quantities are processed to frozen or dried fruit, or concentrated fruit juice. A very small amount is consumed as fresh. In the review article presented here, the studies on currant (black, red and white) and gooseberry fruits in Turkey and in the world were discussed, and the problems and solutions in the cultivation of these fruit species were evaluated.

Keywords: *Ribes rubrum, Ribes grossulara*, breeding, fruit, cultivation

INTRODUCTION

Gooseberry is a fruit is widely grown in temperate European countries, Asia, Australia and North America (Okatan et al., 2017). This fruit began to recognize in London in the 16th century and started to become famous in 19th century. Currant and gooseberry are botanically inserted in the group of true grapes and is a shrub structure plant. Some of the common gooseberry varieties are named as Green Globe, Invicta, Pax and Achilles. Gooseberry varieties are classified by their color. Common produced varieties have yellow, brown, green, or red fruits.

Blackcurrant is botanically included in the group of true grapes and is a bushy plant with a few stems. It is widely grown in temperate European countries, Asia, Australia and North

America (Okatan et al., 2017). There are color and taste differences between the gooseberry varieties grown in Asia, Europe and America. This situation is determined by difference of the soil and climate conditions.

PLANT PROPERTIES

Currant and gooseberry are a small shrub approximately 1.0-1.8 m. tall and 1.0-1.2 m. wide. Most of the gooseberry cultivars have spines on their branches and their leaves are small and hairy. Currant flowers are produced in racemes known up to 8 cm long containing 10–20 flowers. Each flower has a hairy calyx with yellow glands, which are longer than the petals (Anonyms 1). Its berries are shiny, hairless. When fruit ripen turned to red, white or dark purple in color, almost black, with glossy skins and calyxes at the apex., each containing many seeds. A mature currant shrub can produce about 4.5 kilograms of fruit each year (Anonyms 2).

Gooseberry inflorescence structure is a raceme. Flowers are green, sometimes with pink tendencies, and form clusters of two to three flowers, sometimes up to 5. The sepal is green to red, the petals are green, white-pink and small. The flowers are bisexual, hairy, sessile, do not have a pedicel, are bell-shaped. Fruit maturation varied from 1.5 to 2 months due to varieties. The fruit sepal is no falling. The fruit is a multi-seeded berry. Gooseberry seedlings produces fruit on 1-year-old perennial branches and one or two flowers appear in the leaf base. The branches are covered with light reddish shoots, the leaves are lobed, the edges are toothed, covered with hairs from below. Produces broad branches with round or grooved shoots, grows fast. Gooseberry fruits are oval, the color varies from white to yellow, green, or red, and they have a hairy or smooth surface (Heiberg 2003, Pluta 2018, Nordlander 2021). Gooseberry fruits are connected to the inflorescences with an individual flower stalk. The fruits are larger and heavier than the blackcurrant fruits. Longitudinal creamy-white lines run between the lower and upper poles of the fruit. Fruits are semi-transparent and there is visible light colored very small hairs on the fruit. Remains of flower organs on the flower tip makes the fruit taste a bit irritating. Fruits are strongly connected to stalk and fruit drop is occurred if only harvesting is late. The berries of the currant (8.69-9.37 mm wide and 8.30-9.35 mm length, respectively) are smaller than the gooseberries (16.45 mm wide and 16.40 mm length, respectively) (Okatan et al. 2015).

Phenological period is similar for gooseberry and currant fruits. Foliation is started at the first week of March and finalized the last form in a month, till to first week of April. First flowering is appeared at the beginning of April and completed end of the April. Blossoming lasts 7-10 days due to varieties. After end of flowering, fruit set is occurred in 7-8 days. Fruits reach maturity period at the end of June and first week of July and then harvested (Okatan 2017).

Temperature effected the flowering parameters. When the plants are grown under controlled temperatures, percent of flowering plants and opening flowers amount are increased with the suitable degrees. Optimum temperature depends on cultivars. According to studies, flowering performance is increased with the increasing of temperatures (from 12 ℃ to 24℃ is

the maximum) (Sønsteby 2022). Frost can damage both unopened and open flowers of currant when the temperature falls below −1.9 °C. The flowers at the base of the strig are more protected by the foliage and are less likely to be damaged (Anonyms 1). Blossom of gooseberry takes place at +7 - (+ 18) ℃ temperature. The flowering period depends on the variety, local conditions, the best flowering conditions are +15 - (+ 20) ℃ temperature, 60 -65% relative humidity, 1-3m / s wind speed.

Currant and gooseberry are a honey-producing variety, pollinated by bees. Invicta and Green bottle varieties of gooseberry stand out with high yields, providing a yield of 12.0-15.0 t / ha, respectively (Nortlander 2021).

SELECTION STUDIES ON CURRANT AND GOOSEBERRY

Ribes L. is a genus within the plant family *Grossulariaceae* where black currant (*R. nigrum*), red currant (*R. rubrum*) and gooseberry (*R. uva-crispa* or *R. grossularia*) belong. There are about 150 known species of currants and gooseberries, mainly found in temperate regions of Europe and North America. European gooseberry species *R. uva-crispa* (synonym *R. grossularia*) is more distributed across the world than the North American species *R. hirtellum* (Anastasiadi et al. 2016; Pluta 2018).

A limited number of varieties are used in the breeding studies of black currant which the European subspecies (*Ribes nigrum* ssp. europeanum Yancz) and the Siberian subspecies (*Ribes nigrum ssp* sibiricum Wolf.) of black currant, dikuscha currant (Ribes dikuscha Fisch. ex Turcz.), few-flowered currant (Ribes pauciflorum Turcz. ex Pojark), wild black currant (*Ribes americanum* Mill.) and nutmeg currant (*Ribes glutinosum* Benth) (Brennan 1991, Brennan 1996).

Currant and gooseberry fruit are very common in natural forest area and selection of new types have continued in different countries. A first record of *Ribes uva-crispa* L. (*Grossulariaceae*) – a new species of the Sicilian flora – from the Madonie Mts. is reported in 2010. The autochthonous and relict new population of *Ribes uva-crispa* L. (Grossulariaceae) is found on Mount Carbonara (Madonie Mts., North-Central Sicily), which is several hundred kilometers away from the Central Apenninic and the South Mediterranean locations of its distribution range. *R. uva-crispa* shows a distribution like other taxa extending from the Euro-Asiatic area to the mountains of North Africa with disjunct populations on the main Sicilian reliefs (Madonie and Nebrodi Mts.), testifying ancient phytogeoFigureical connections. This noteworthy record adds a new species – as well as a new genus and new family – to the vascular flora of Sicily. Based on the morphological characters, the population found is to be referred to *Ribes uva-crispa* L. subsp. *austro-europaeum* (Bornm.) Bech var. *glanduligerum* (Lindberg) Maire (Gianguzzi et al. 2010).

The cultivated gooseberry is a temperate shrub originated from European. However, American species, *R. hirtellum* Michx. and *R. divaricatum* Dougl. genes were transferred to European gooseberries to increasing the resistance against to the American gooseberry mildew

disease. Most cultivars have spines on shoots and trunk that make some difficulties in cultivation treatments.

Studies on breeding of new varieties that are compatible with new technologies and resistant to diseases and pests are important. The success of the breeding program is directly related to the choice of parents. At this point, it is important for new parents to be involved in the breeding process. Selection of the source material for the creation of black currant varieties with complex resistance to diseases and pests was combined. As a result of the study, high productivity donors were identified with complex resistance to biotic factors (Bakhotskaya and Knyazev 2021).

Gooseberry buds during floral initiation was investigated by scanning electron microscopy to determine the changes taking place in developmental phase (Sønsteby et al. 2022).

EVALUATION OF CURRANT AND GOOSEBERRY

Gooseberry has a taste similar but sour than currant fruits flavor. Their fruits are consumed as cake decoration and marmalade cooking in European countries. Fruits can be used make jam and preferred in wine making in some regions. Gooseberry is not very high in calories. Fresh fruit contain a 100 g portion is only 44 calories. 100 g of frozen gooseberry is 46 calories (Anonim 1). Bakery sector use its fruit for puddings and desserts preparing.

There are industrial uses of fruits on ice cream, confectionery, flavored mineral water and liquor (Brennan, 1996). Currant berries are suitable for freezing.

HEALTH BENEFITS

Currant and gooseberry, which has an important place in folk medicine, has been used as a natural remedy for various diseases. Their fruits show benefits most in fresh form, consume it immediately after collected. Fruits can be also dried. It would be a good idea to prepare herbal tea by drying the leaves of the gooseberry. Herbal tea has a protective effect against to winter diseases in cold. Currant and gooseberry have antioxidant properties and purify body from toxic substances. It is a candidate to be the fruit of the future. Their fruits come to regulate digestion, balance blood sugar and lead you to a healthier life.

Fruits are a source of vitamin C. Therefore, both of two species fruits have a great effect on strengthening human immunity system. Their fruits serve as protector agent to diseases such as cancer and infection by protecting immunity. It is a natural source of iron, phosphorus and calcium source and makes bones healthier and stronger. Gooseberry fruit helps to decrease the pains and cramps during the menstrual period with its antioxidant effect. It helps hair grow healthier and more vibrant. Fruit eaten in its fresh form or gooseberry juice applied to the hair will prevent graying of hair, supports eyesight and prevents eye problems. Another feature of gooseberry is that it is a diuretic. Thus, edema accumulating in the body is also excreted. It works the intestines and eliminates problems such as constipation. Gooseberry, which strengthens the capillaries, also heals blood pressure by balancing high blood pressure.

Gooseberry is also good for anemia. It increases the number of red blood cells and increases the blood value (Anonyms 3).

Currant fruits are rich in vitamins A, B and C. It is very healthy, also diuretic, digestive effected.

Orsavová et al. (2019) was found that the total amount of phenolic substance contents of Red currant is 8.66 g kg-1 GAE, the total amount of flavonoid substance 8.13 g kg-1 RE, and the amount of ascorbic acid 6.20 g kg-1. Comparing of gooseberry fruit antioxidant contents with wild currant properties show the value of gooseberry fruits (Erbil et al. 2021).

However, the antioxidant activity values were higher in alpine currant, could not determine a difference between the total phenolic, flavonoid, and ascorbic acid values of gooseberry and wild alpine currant. Antibacterial effects were determined on the test bacteria in both gooseberry and mountain currant. When the antibacterial activity was examined, wild currant extract exhibited higher activity against the tested bacteria (Erbil et al. 2021).

Volatiles of gooseberries were isolated by means of vacuum-headspace-extraction, and the obtained concentrates were analyzed via capillary gas chromatoFigurey–mass spectrometry. Esters were shown to be responsible for the green and fruity character of fresh gooseberries (Hempfling et al. 2013).

Gooseberry fruit aqueous and leaf methanol extracts is a new promising source to produce anti-RSV drugs (Dogan 2020). Gooseberry fruit residues which generated in processing in the food industry suggested as an effective material for the efficient removal of iron(III) from wastewater and improving water quality. Its fruit waste effectively removes Fe(III) ions from aqueous solutions due to the content of appropriate functional groups in its composition and favorable physical and chemical properties (Kalaka et al. 2020).

MARKETING OF GOOSEBERRY AND CURRANT FRUITS

Edible gooseberry species has tasty berries (Kendir et al., 2019). This fruit are usually collected from the wild natural populations in forest areas. Recent days, people have started to make small plantation as ornamental plant or fruit production in their gardens. Increasing awareness has affected of these fruits attention on human health and has improve their production. It is a little difficult to find the gooseberry fruit in the local markets while currant a bit more common. In season, big markets and organic fruit shops sell as a special fruit. Frozen fruit is sold out of the season.

Currant and gooseberry is widely used in organic agriculture. The harvested berries can be stored for 7-10 days at a temperature of 0-0.50C and 80-85% relative humidity in fruit refrigerators. All these varieties and the local one has a multifunctional nature, are resistant to spotting. The green bottle variety stood out with the highest yield, and the round red local variety with the lowest. The round red local variety is sweet and more importantly the ripe fruits of this variety stay on the bush for a long time without falling, the Invicta and the Green Bottle

varieties stand out with pleasant acidity. The sugar content of gooseberry varieties between 8-10%, acidity between 0.5-1.0% (Gabrielyan et al. 2022).

CONCLUSION

Studies in different fields are continuing. Currants and gooseberries are increased their importance as the fruits of the future. Selection of wild productive genotypes and with contribution of this newly selected gene sources breeding studies will continue. Currant and gooseberry production amount and uses areas of these fruit will increase in near future.

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