Currant, Gooseberry, and Elderberry

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Scientific Name and Introduction

Currants and gooseberries are closely related, berry-bearing deciduous shrubs in the *Ribes* L. genus of the Saxifragaceae family. Gooseberries are sometimes placed in a separate genus, *Grossularia* Mill.

The most common species are *R. sativum* Syme (red, white, and pink currants) and *R. nigrum* L. (black currant) (Harmat et al. 1990). White currant, an albino form of red currant, is of lower acidity and thus is suitable for eating fresh. Pink currants have a colorless skin and a pink flesh. Black currant fruit differ from red currants in being more astringent but having a distinct aroma, making it very desirable in processed products. Gooseberry cultivars are derived from *R. uva-crispa* L. (European gooseberry) and *R. hirtellum* Michx. (American gooseberry). The European gooseberry is much larger than the American gooseberry. European cultivars are from *R. uva-crispa,* but American cultivars are virtually all from crosses of *R. uva-crispa* and *R. hirtellum*.

A gooseberry fruit may be green, white (gray-green), yellow, or shades of red from pink to purple to almost black. Skin color is most intense on fruit in full sunlight. The four countries producing both the most currants and the most gooseberries are Germany, Czech Republic, Poland, and the Russian Federation. North American production of currant and gooseberry has been hampered by adaptation and disease problems (Harmat et al. 1990). Currant and gooseberry are available fresh from mid-May to August or longer if stored properly. Virtually all commercial production is put into processed products with only a small proportion consumed fresh.

Also, brownish-purple fruit from a native western U.S. species, *R. aureum* Pursh (buffalo currant, albol currant, golden currant) or from a hybrid of *R. nigrum* and *R. hirtellum* (jostaberry) may be available in some local markets.

Sambucus canadensis L., the elderberry, is a moderately tall deciduous shrub of the Caprifoliaceae family, native to North America. The ease in harvesting the purplish-black fruit from wild plants may in part account for the lack of commercial plantings. Most of the fruit is processed, since the uncooked berries are astringent and not very edible (Way 1981). Selection and breeding, primarily in New York and Nova Scotia, have resulted in a number of cultivars (Craig 1978, Way 1981, Stang 1990), and small-scale production has been reported in New York, Ohio, and Oregon (Way 1981).

Quality Characteristics and Criteria

Currant and elderberry fruit are produced on the plant in clusters, and gooseberry fruit are borne singly or in pairs. Ideally, fruit throughout each cluster should be firm and bright, with the proper cultivar-specific color, and free of decay or mechanical or insect injury. For the fresh market, it is also important to have large and uniform fruit throughout the cluster. A long shelf-life with retention of both firmness and flavor is also desirable for the fresh-fruit market.

Horticultural Maturity Indices

Currants and gooseberries are harvested from mid-May through August. Red currants are usually harvested before the color changes from bright red to a dull red color (Spayd et al. 1990, Audette and Lareau 1996). Soluble solids are usually about 9.5 to 14% and acidity is around 2%. Generally, entire clusters of red currant are harvested, as modern cultivars have uniform ripening of all berries on a cluster. Black currants, which at maturity have an opaque, very dark blue color with a soluble solids content of 15 to 26%, do not mature evenly in the cluster: the larger ones at the base of each cluster mature first (Audette and Lareau 1996, http://www.crfg.org/pubs/ff). The entire cluster can be harvested, or only mature berries can be picked over several harvests. At maturity, gooseberry cultivars may be green, white, yellow, or various shades of red (pink to purple to almost black). Since both immature (green) and ripe gooseberries are used, harvest maturity depends entirely on end use (Ryall and Pentzer 1982). Green gooseberries are very firm and tart, whereas some cultivars, when fully mature and soft, are quite sweet. Elderberries are harvested in late August and September, when the fruit is sufficiently large and has changed to an acceptable purplish-black color. The fruit do not mature at the same time, so several pickings are necessary over a 1- to 2-week period (Craig 1978, Way 1981). Harvesting occurs in late August and September, depending on climate and cultivar. Postharvest decay of currant, gooseberry, and elderberry can be minimized by avoiding picking wet or overripe fruit.

Grades, Sizes, and Packaging

There are no U.S. fresh fruit standards for these fruit. There is a U.S. grade standard for processing currants, based on color, attachment of stem, and freedom from decay and insect or mechanical damage. Processors, who use most of the commercial production, may have their own standards. Since fresh market volumes are not large, container sizes and packaging for the fresh market tend to be those used for similar but more common berries (for example, raspberries).

Precooling Conditions

Currant, gooseberry, and elderberry fruit are relatively perishable. Quick cooling after harvest to recommended storage temperatures is desirable, using forced-air cooling with 95% RH (Kasmire and Thompson 1992, Batzer and Helm 1999).

Optimum Storage Conditions

Since currant, gooseberry, and elderberry are not chilling sensitive, the recommended storage temperature and RH for all three are -0.5 to 0 °C (31 to 32 °F) with RH of 95% (Hardenburg et al. 1986, Story and Simons 1989). Batzer and Helm (1999) recommended slightly warmer temperatures of 0 to 1 °C (32 to 34 °C) for red currant and gooseberry and 0 to 2 °C (32 to 36 °F) for black currant, perhaps to avoid accidental freezing. With proper cooling, the storage duration can be 1.5 , 2.5, and 3 weeks for black currant, red currant, and gooseberry, respectively (Batzer and Helm 1999).

Controlled Atmosphere (CA) Considerations

As summarized by Batzer and Helm (1999) and Thompson (1998), research indicates that red currant

and gooseberry respond very well to CA, while black currant benefits only slightly. Storage duration of red currant can be extended to 8 to 14 weeks, depending on cultivar, using 18 to 20% CO_2 with 2% O_2 at 1 °C (34 °F). For gooseberry, storage duration is extended to 6 to 8 weeks using 10 to 15% CO_2 with 1.5% O_2 at 1 °C. Increasing the CO_2 up to 20% reduces incidence of storage rots (Thompson 1998, Batzer and Helm 1999), and lowering the O_2 reduces respiration rate (Robinson et al. 1975). Compared with red currant and gooseberry, black currant does not respond as well to low O_2 and its storage can only be extended to 3 weeks at 0 to 2 °C (32 to 36 °F) and 15 to 20% CO_2.

There is no known information on the effect of CA on elderberry.

Retail Outlet Display Considerations

Currant, gooseberry, and elderberry should be kept in a refrigerated display but not sprinkled with water or top-iced.

Chilling Sensitivity

Currant, gooseberry, and elderberry are not chilling sensitive (Kader 1992).

Ethylene Production and Sensitivity

No data available.

Respiration Rates

Temperature	Gooseberry	Black currant
	----------mg CO_2 kg^{-1} h^{-1}----------	
0 °C	5 to 7	16
4 to 5 °C	8 to 16	27
10°C	12 to 32	40
15 to 16°C	28 to 69	89
20 to 21°C	41 to 105	128

Gooseberry data from Smith (1967), Robinson et al. (1975), and Hardenburg et al. (1986); black currant data from Robinson et al. (1975).

To get mL CO_2 kg^{-1} h^{-1}, divide the mg kg^{-1} h^{-1} rate by 2.0 at 0 °C (32 °F), 1.9 at 10 °C (50 °F), and 1.8 at 20 °C (68 °F). To calculate heat production, multiply mg kg^{-1} h^{-1} by 220 to get BTU per ton per day or by 61 to get kcal per tonne per day.

Physiological Disorders

CO_2 above 20% results in internal breakdown and fruit discoloration in some red currant cultivars after 13 weeks of storage (Thompson 1998). Low O_2 further increases these symptoms. Smith (1967) showed that green gooseberry fruit held at 0 °C (32 °F) in air are damaged by CO_2 that was increased from 8 to 12%. Fruit turned yellow and had an abnormal flavor. Increasing the temperature from 0 to 5 °C (32 to 41 °F) eliminates the disorder.

Postharvest Pathology

The main postharvest disease is gray mold rot *(Botrytis cinerea)*, which can appear as small brown spots on currant and gooseberry fruit (Ryall and Pentzer 1982, Dennis 1983, Harmat et al. 1990). These enlarge rapidly at temperatures above 10 °C (50 °F) and gradually affect the entire berry with a soft rot. Currant and gooseberry fruit can be susceptible to American powdery mildew *(Sphaerotheca mors-uva)* (Harmat et al. 1990, Audette and Lareau 1996). Fruit that become contaminated by soil splash after heavy rain are frequently infected by *Mucor piriformis* (Dennis 1983). Dennis (1983) also reports a fruit disease in gooseberry caused by *Alternaria* and *Stemphyllum*. The infection is usually confined to the seeds enclosed in the pericarp. If, however, the fruit is stored for a few days at ambient temperatures prior to consumption or processing, the fungus invades the pericarp tissue.

Several insects can attack the fruit: currant maggot or fruit fly *(Epochra canadensis)* (North America), gooseberry fruitworm *(Zophodia convolutella)* (North America), and currant moth *(Incurvaria capitella)* (Europe) (Harmat et al. 1990). In addition, slugs and snails (*Helix aspersa* and *Cepaea* spp.) will attack fruit (North America and Europe) (Harmat et al. 1990). Diseases and insects are not generally serious on elderberries (Way 1981), perhaps because of the absence of extensive plantings. An unidentified mildew can be a problem on ripe fruit, especially if the weather is cool during ripening and there is poor air circulation around the plants (Way 1981).

Birds feeding on ripe currant, gooseberry, and elderberry fruit can be a serious pest problem (Way 1981, Harmat et al. 1990, Stang 1990). In addition to prompt harvesting of ripe fruit, various bird repellent measures may have to be considered.

Quarantine Issues

None

Suitability as Fresh-Cut Product

No current potential

Special Considerations

Ribes species are hosts for the white pine blister rust, which causes few problems for currants or gooseberries but is dangerous to 5-needle pine species. Thus, commercial production of *Ribes* species, especially black currant, may be banned in some U.S. municipalities (California Rare Fruit Growers 1996).

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