

Blackberry

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Scientific Name and Introduction: Blackberries (*Rubus sp.*) are a member of the Rosaceae family and are grown as a perennial crop. Blackberries are widely grown in the south central and northwestern U.S. and are found as three plant types. Trailing blackberries and dewberries are thorny and must be trellised. Semi-erect blackberries are generally thornless and have long trailing lateral branches. Erect blackberries can be found as thorny or thornless cultivars and have upright growth with lateral branches that remain upright. Blackberry-raspberry hybrids include tayberry, loganberry, youngberry, and boysenberry (Jennings, 1988). Blackberries are compound fruits, made up of many drupelets, attached to a receptacle. The fruit detaches from the pedicel and the receptacle remains fleshy and firmly attached to the drupelets. Berries are soft and juicy. The commercially important cultivars are: Chester Thornless, Triple Crown, Kotata, Shawnee, Navaho, Kiowa, Brazos, Thornless Evergreen and Arapaho.

Quality Characteristics and Criteria: High quality blackberries are free of injury, decay, calyxes (caps) and sunscald, are fully black in color, appear and feel turgid, and are of regular shape. To meet U.S. Grade 1, $\leq 1\%$ of the lot must be free from mold and 5% free of other defects.

Horticultural Maturity Indices: For fresh market, blackberry maturity can be determined by fruit color, gloss, and ease of detachment. Fully black berries should pull easily from the pedicel yet be firm, not mushy. Blackberries lose acidity with ripening and are quite astringent if harvested partially colored. Some varieties must be harvested only when fruit are dull black ('Chester Thornless'), otherwise they are too acid to eat.

Grades, Sizes and Packaging: Generally, 1 to 2 pt and occasionally 1 qt containers are used. The most common packaging is vented plastic 'clamshell' boxes, packed in units of 12 per carton.

Pre-cooling Conditions: Forced-air cooling to 5 °C within 4 h is recommended for best shelf-life. Blackberries should be shipped with refrigeration at temperatures < 5 °C. A similar protocol is used for fruit destined for processing and fruit are processed within 24 h of harvest.

Optimum Storage Conditions: Blackberries can be held 2 to 14 days, depending on cultivar, at -0.5 to 0 °C (31.1 to 32 °F), with $> 90\%$ RH.

Controlled Atmosphere (CA) Considerations: Blackberries benefit from 10 to 20% CO₂ + 5 to 10% O₂ to reduce decay and softening (Kader, 1997).

Retail Outlet Display Conditions: Blackberries should be stored and displayed at the coldest refrigeration temperature possible, with no mist. As little as 1 day at room temperature can stimulate growth of gray mold.

Chilling Sensitivity: Blackberries are not known to be chilling sensitive.

Ethylene Production and Sensitivity: Stimulation of *Botrytis cinerea* (gray mold) growth can occur on blackberries in the presence of ethylene. Ethylene production by blackberries is widely variable with cultivar and can be as little as 0.1 $\mu\text{L kg}^{-1} \text{h}^{-1}$ or as high as 2 $\mu\text{L kg}^{-1} \text{h}^{-1}$ (Burdon and Sexton, 1993).

Respiration Rates:

Temperature	mg CO ₂ kg ⁻¹ h ⁻¹
0 °C	18 to 20
4 to 5 °C	31 to 41
10 °C	62
15 to 16 °C	75
20 °C	100 to 130

To get mL 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 metric ton per day. Data are from Perkins-Veazie et al. (1996) for 'Navaho,' 'Shawnee,' 'Choctaw' at 20 °C (68 °F) and from Robinson et al. (1975) for 'Bedford Giant' at other temperatures.

Physiological Disorders: The major disorders are: red drupelet disorder (areas of red drupelets on fully ripe berry); weight loss (shriveled); and leakers (berries with leakage of juice) (Mitcham et al., 1998; Perkins-Veazie et al., 1996).

Postharvest Pathology: The most common postharvest diseases are gray mold (*Botrytis cinerea*) and Rhizopus rot (*Rhizopus stolonifer*) (Ellis et al., 1991; Jennings, 1988).

Quarantine Issues: None known.

Suitability as Fresh-cut Product: Blackberries are incorporated into fruit cups and fruit plates.

Special Considerations: Damage easily; can develop red areas after storage that may be due to loss of pigment from water contact or from cultivar-dependent red drupelet disorder.

References:

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