

Watercore of Apples

T.R. Roper

Watercore of apple is a physiologic disorder. The fruit tissue's abnormal condition is a response of some apple cultivars to adverse environmental conditions—not to a disease-causing organism. Watercore is more common in warm, arid regions, but it occurs in Wisconsin often enough to concern apple growers.

Symptoms

Ordinarily, watercore has few, if any, external symptoms. Internally the fruit tissues look glassy and water soaked around the vascular bundles near the core. The affected tissue of some apples extends from the core to near the apple's skin. Normal apples contain about 20 to 35% airspace. In watercored apples these airspaces are filled with liquid. If fruit are stored with watercore such that the intercellular spaces are filled with liquid oxygen cannot get to all cells and with sugar present fermentation frequently follows. This may give the fruit an off flavor or aroma. Growers frequently find watercore in stored apples; but watercore was almost certainly present while the apples were on the tree, especially if fruit was picked after optimum maturity.

Cause

The causes of this disorder are not fully understood. Certain factors seem to predispose some cultivars to watercore. Some cultivars are far more susceptible than others. The membrane permeability appears to increase with high temperatures, high light intensity, and maturity. Consequently cell sap leaks into the intercellular spaces. Apples directly exposed to the sun's heat and light as they mature on the tree are more apt



Typical watercore symptoms showing the soaked appearance around the core and associated vascular bundles outside of the core.



Typical watercore, not limited to the core.

to develop watercore than shaded apples. Large apples from young trees develop watercore more frequently than do apples from mature trees. Excessive thinning or partial cropping because of frost losses increases the potential for watercore. Fruit calcium is also important in watercore development. Apples with sufficient calcium are less prone to watercore than those with low calcium. This observation is consistent

with calcium's role in membrane integrity and in mediating many aspects of plant metabolism and fruit maturation.

The best hypothesis available today is the late in the season given favorable weather, sap is delivered to the fruit but the fruit cells are unable to absorb this sap quickly enough. Thus the sap that is unloaded from the vascular system fills the intercellular spaces of the fruit giving it a water-soaked appearance. This also explains why watercore is most often found around the vascular bundles surrounding the core.

Control

The primary means of control is to plant cultivars that are not susceptible. Adequate fruit calcium reduces the risk of watercore as well as other disorders like bitter pit and cork spot. Maintaining appropriate vigor through moderate fertilization and pruning will also decrease the incidence of watercore.

Thinning to maintain annual bearing will also maintain appropriate ratios of fruit to vegetative growth. After watercore develops, some cultivars break down internally. Internal breakdown is more likely if cultivars such as Jonathan and Delicious are held too long in storage. If you plan to store apples more than 2-3 weeks, harvest them at early stages of maturity. For a table of approximate harvest dates for cultivars in southern Wisconsin, see Extension publication *Apple Cultivars for Wisconsin* (A2105). This table can be adjusted by 10-15 days for Bayfield and Door counties. Although watercore is unattractive, it does not lower the fruit quality or flavor of apples if they are used before breakdown occurs.



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Author: T.R. Roper is associate professor of horticulture, College of Agricultural and Life Sciences, University of Wisconsin-Madison and University of Wisconsin-Extension, Cooperative Extension.

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