

**UNIVERSITY OF
CALIFORNIA**

Agriculture and
Natural Resources

<http://anrcatalog.ucdavis.edu>

Navel Orange Split

Pamela M. Geisel, University of California Cooperative Extension Farm Advisor, Environmental Horticulture, Fresno County; **Carolyn L. Unruh**, University of California Cooperative Extension Fresno County staff writer; **Patricia M. Lawson**, illustrator.

Fewer things are more discouraging to the home gardener than expending time and effort throughout a full growing season only to end up with poor yields or less-than-perfect results from fruit trees. A dramatic example of this is the seemingly spontaneous splitting that occurs in citrus fruits, particularly in navel oranges. Splitting is an abiotic disorder; that is, it is a problem that cannot be attributed to any living organism, such as an insect or plant pathogen, but one that stems instead from environmental or cultural conditions. There is no chemical control for this physiological condition.

From September through November, splitting in navel oranges often occurs on green fruit. The split usually starts at the stylar, or navel, end of the fruit, the weakest point in the rind. The split may be short and shallow or it may be deep and wide, exposing the segments and juice vesicles ([fig. 1](#)).

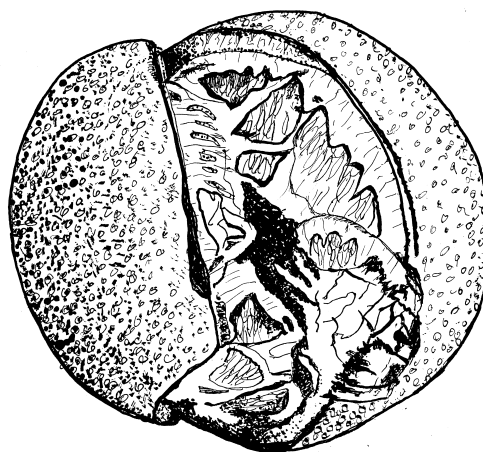


Figure 1. The split usually starts at the stylar, or navel, end of the fruit, and may be deep and wide enough to expose the segments and juice vesicles.

Splits probably occur when water and sugar are transported from the roots of the tree to the ripening fruit, and the rind is unable to expand quickly enough to accommodate the added volume. The rind bursts open under the pressure. Some citrus varieties, especially thin-skinned ones, may be more likely to split than other varieties. Rinds that have been sunburned or otherwise damaged may be less elastic than normal and therefore more apt to split.

Splitting is a long-standing problem in most areas where navel oranges are grown. The number of fruit affected by splitting varies from year to year and from one citrus-growing area to another. In some years, the percentage of split fruit is high; in other years it is negligible. Usually only a small portion of the fruit on each tree is affected.

Although the exact cause is unknown, fruit splitting is likely the result of stress to the tree. Splitting appears to be most closely related to extreme fluctuations in temperature, humidity, soil moisture, and possibly fertilizer levels, and the disorder is probably caused by a combination of these factors rather than a by single cause. For example, when hot weather is combined with high winds, the tree becomes drought stressed and begins to take water from the fruit, causing the fruit to soften and the leaves to cup. If the tree is then irrigated heavily, the dehydrated fruit swell, causing them to crack. Young trees or dwarf varieties with relatively small or shallow root systems, as well as trees grown in very sandy or porous soils that do not retain moisture well, may be more susceptible to fruit splitting.

Reasonable cultural practices to avoid extreme fluctuations in soil moisture and fertilization levels throughout the growing season may help to minimize fruit split. Trees should be irrigated regularly to assure a continuous supply of soil moisture, especially during hot or windy weather. When hot winds are anticipated, irrigate before the winds begin. After the hot winds subside, irrigate lightly for a few days and then resume a normal irrigation schedule. Instead of a single large application of quick-release fertilizer each year, smaller monthly applications throughout the growing season (February through May) may help keep nutrient levels constant. Timed-release fertilizers offer the convenience of supplying nutrients at an even rate over the length of the growing season, but they are usually more expensive than other fertilizers.

Split oranges are edible, although they are usually not ripe enough to be usable; they break down quickly and eventually drop from the tree. Damaged fruit should be removed and discarded, since they are susceptible to invading organisms that may cause disease such as *Alternaria* rot. Decaying fruit may also harbor fungi, bacteria, insects, or other unwanted pests.

FOR MORE INFORMATION

Platt, R. G. 1970. Splitting in navel oranges. One-Sheet Answer, University of California Agricultural Extension.

University of California Statewide Integrated Pest Management Project. 2000. The UC guide to solving garden and landscape problems. Interactive CD-ROM.

Visit our online catalog at <http://anrcatalog.ucdavis.edu>. You can also place orders by mail, phone, or fax, or request a printed catalog of publications, slide sets, and videos from

University of California
Agriculture and Natural Resources
Communication Services
6701 San Pablo Avenue, 2nd Floor
Oakland, CA 94608-1239

Telephone: (800) 994-8849 or (510) 642-2431, FAX: (510) 643-5470

E-mail inquiries: danrcs@ucdavis.edu

An electronic version of this publication is available on the ANR Communication Services website at <http://anrcatalog.ucdavis.edu>.

Publication 8038

Funding for this publication was made possible through a grant from the Elvenia J. Slosson Fund.

©2001 by the Regents of the University of California, Division of Agriculture and Natural Resources. All rights reserved.

The University of California prohibits discrimination against or harassment of any person employed by or seeking employment with the University on the basis of race, color, national origin, religion, sex, physical or mental disability, medical condition (cancer-related or genetic characteristics), ancestry, marital status, age, sexual orientation, citizenship, or status as a covered veteran (special disabled veteran, Vietnam-era veteran or any other veteran who served on active duty during a war or in a campaign or expedition for which a campaign badge has been authorized). University Policy is intended to be consistent with the provisions of applicable State and Federal laws.

Inquiries regarding the University's nondiscrimination policies may be directed to the Affirmative Action/Staff Personnel Services Director, University of California, Agriculture and Natural Resources, 300 Lakeside Drive, 6th floor, Oakland, CA 94612-3550; (510) 987-0096. For a free catalog of other publications, telephone (800) 994-8849. For help downloading this publication call (530) 754-5112.

pr-10/01-SB/VFG



This publication has been anonymously peer reviewed for technical accuracy by University of California scientists and other qualified professionals. This review process was managed by the ANR Associate Editor for Environmental Horticulture.