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Cooperative Extension Service

Institute of Food and Agricultural Sciences

PACKINGHOUSE NEWSLETTER

Mark Ritenour
Indian River REC
2199 South Rock Road
Ft. Pierce, FL 34945-3138
Phone: (772) 468-3922
FAX: (772) 468-5668
Email: mritenour@ifas.ufl.edu

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All previous and present Packinghouse Newsletters (PHNL) are available on the Internet at the University of Florida's postharvest web site (<http://postharvest.ifas.ufl.edu>) and can also be accessed through our citrus resources web site (<http://flcitrus.ifas.ufl.edu>).

Blossom-End Clearing of Grapefruit

Mark A. Ritenour, Indian River REC, Ft. Pierce
Huating Dou, Florida Department of Citrus, Lake Alfred
Ed Etxeberria, Citrus Research and Education Center, Lake Alfred

Symptoms. Blossom-end clearing (BEC) is characterized by the translucent, watersoaked appearance of the fruit peel (most commonly at the blossom end) caused by internal bruising and juice leakage from juice vesicles (Fig. 1). Juice vesicles in the bruised areas usually have a gray tinge compared with unbruised tissue, and BEC-affected fruit develop off flavors. BEC is visible within 24 hours after bruising (often much earlier) and can affect up to 90% of the fruit in some loads. Decay, in particular mold, often develops in areas with BEC symptoms. BEC has also been referred as "wet bottoms," "stylar-end clearing," "water bottom," "waterlog," and "wet wick."

Factors involved in BEC development.

Fruit characteristics: Seedless grapefruit (e.g. 'Ruby Red' or 'Marsh') are most affected by BEC. The disorder is similar in appearance to "stylar end breakdown" or "juice spot" of 'Tahiti' limes. Grapefruit grown along Florida's east coast (Indian River region) are more prone to BEC development than fruit grown in the State's central regions. BEC develops most often in late-season fruit. Depending on the year, greater susceptibility to BEC may begin to appear in January and increase rapidly throughout the remainder of the harvest season. During this time, incidence in fruit

from the same grove may increase about 4 fold. Sensitive fruit often exhibit an open core with little spongy tissue and juice vesicles that protrude into the cavity. The fragile vesicle membranes rupture easily and leak juice into the core. The juice eventually runs into the peel at the blossom end of the fruit creating a wet spot. Small fruit may be twice as likely to develop BEC than large fruit. Thicker-skinned fruit develop less BEC than thin-skinned fruit under the same conditions. The severity of BEC varies widely from year to year and from grove to grove.

Rough Handling: BEC does not occur while fruit are still attached to the tree and does not develop on fruit handled very gently (receiving no drops or appreciable surface impacts). **Rough handling is the primary cause of fruit BEC.** Though fruit handling during harvest (e.g. from dumping fruit into bins) may cause BEC, most BEC develops as a result of rough handling in the packinghouse. Dumping operations are most likely to produce impacts that cause BEC, but other steps in the packing operation (e.g. presizer, sizing, and bagging/packing) can also contribute to BEC. Efforts should be taken to minimize drop heights and other impacts throughout the packing operation. For example, reducing fruit drop heights from 2 feet to 1 foot can reduce the development of BEC by more than half. Refer to Miller et al. (2001) for more information on reducing fruit damage in citrus packinghouses (<http://edis.ifas.ufl.edu/AE184>).

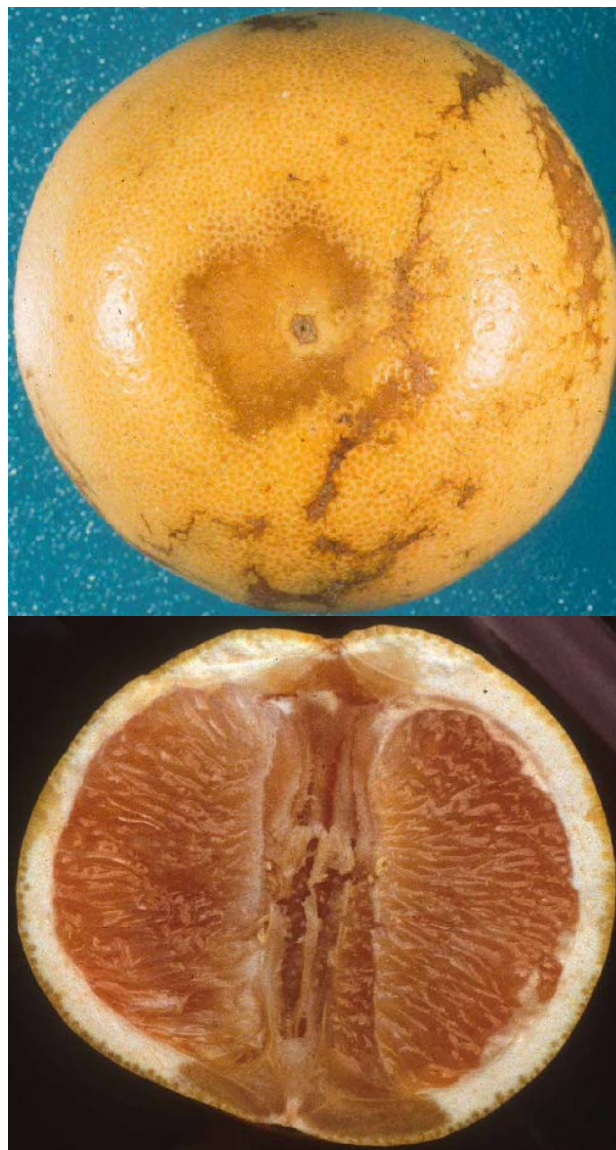


Fig. 1. Symptoms of grapefruit Blossom-end Clearing.

Temperature & RH: Although damage from rough handling is necessary to cause BEC, other postharvest factors also influence its development. Incidence of BEC greatly increases with higher fruit temperatures; doubling the fruit temperature can more than double the likelihood of BEC development. Thus, harvesting fruit earlier in the morning when fruit temperatures are cooler will reduce the incidence of BEC. Even if fruit were exposed to high temperatures in the grove prior to harvest, cooling the fruit (e.g. even to 70°F) will dramatically reduce the likelihood of developing BEC during packing operations. Such cooling is especially important later in the season when fruit are most likely to develop BEC. Holding fruit at low humidities prior to packing increases fruit susceptibility to BEC compared to holding it at high humidities. For example, fruit held for 2 days at

40% RH before packing developed about twice as much BEC as fruit held for 2 days at 95% RH at the same temperature. It is thought that cultural practices also influence fruit susceptibility to BEC, but there is no data at present.

Recommendations to reduce BEC.

1. Carefully handle grapefruit during all harvesting and packing operations.
2. Groves with a history of BEC should be harvested no later than early March.
3. Harvest fruit earlier in the morning when fruit temperatures are lower. Be cautious, however, that fruit are not so turgid that oil spotting (oleocellosis) results.
4. Allow susceptible fruit harvested under warm conditions to cool overnight (e.g. to 70°F or below) before packing.
5. Always hold fruit under high relative humidities.

Selected Literature.

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- Miller, W.M., W.F. Wardowski, and W. Grierson. 2001. Packingline machinery for Florida citrus packinghouses. Fla. Agr. Exp. Sta. Bull. 239. On-line at: <http://edis.ifas.ufl.edu/AE184>

Managing Packinghouse Employee Safety

Mark A. Wade, Indian River REC, Ft. Pierce

Enhancing workplace safety can increase the emotional well-being and morale of packinghouse employees while also reducing the costs associated with employee accidents and illnesses. The costs of sick leave, disability payments, workers' compensation, and replacement employees far exceed the costs of maintaining a safe working environment. For this reason, employee safety and health programs, including protection from physical hazards, unhealthy conditions, and acts of other personnel, should be an important element in the management of the packinghouse environment.

Consider that over 75 million working days are lost each year in the United States due to job-related injuries. Granted, this figure doesn't exclusively represent the 1.2 million hired workers on the Nation's farms and ranches (62,000 in Florida according to the October 6-12, 2002 farm labor figures), but if we assume an average wage rate of \$8.00 per hour, paid leave alone represents \$4.8 billion in additional costs to business. Add to this figure the costs of medical expenses and perhaps increased payments for disability, insurance and temporary employees and the amount is staggering. And this is per year! It is obvious then that efforts must be undertaken to minimize injuries and illnesses and maximize occupational safety. To help achieve this end, Congress passed an act creating the Occupational Safety and Health Administration (OSHA) in 1970.

In general, the OSHA act extends to all employers and their employees, and is meant to assure every working man and woman in the Nation safe and healthful working conditions. This includes the establishment and enforcement of mandatory safety regulations by OSHA. OSHA standards fall into four major categories: general industry, maritime, construction and agriculture. These standards address power sources, machinery and equipment, material, processing, first aid, protective clothing and administrative requirements such as record keeping. Published in the Federal Register (http://www.access.gpo.gov/su_docs/aces/aces140.html), these guidelines are widely accessible to employers and provide a good foundation for a standard occupational safety plan. While OSHA does conduct site inspections and has the power to issue citations and penalties (some involving very large sums of money), it is essentially the packinghouse or employer's responsibility to develop an employee safety program and ensure that all managers know and enforce these standards throughout the organization.

Are there actions that packinghouses can take to reduce the potential for accidents and illnesses on the job and improve employee morale and productivity? Sure there are. To improve your occupational safety programs consider the following actions:

- Take advantage of OSHA's free on-site consultation service. This service provides qualified consultants to help employers identify hazardous conditions that may exist in the workplace and to recommend corrective measures. Findings cannot be used to initiate OSHA inspections or provide the basis of formal citations.
- Participate in one of OSHA's Voluntary Protection Programs. These programs are designed to encourage employers to extend worker safety programs beyond the minimum standards required by OSHA.
- Develop a written occupational safety and employee wellness plan. This document should include a listing of any and all hazards that exist on the job (in accordance with employee right-to-know laws that exist in many states). It should address hazardous materials handling (including the location of Material Safety Data Sheets), protective clothing and equipment requirements, safe equipment usage practices, and first aid information. The policy should also cover employer expectations that all employees follow all safety standards and clearly state actions for failure to comply. Each employee should receive a copy of the plan and acknowledge, in writing, their receipt and understanding of the information contained in the plan. This acknowledgement should then be added to the employee's personnel file.
- Provide all materials, including safety materials, in the appropriate language if you employ non-English speaking workers, or individuals for whom English is a second language.
- Embrace and develop a culture of workplace safety. Appoint an employee/management safety committee to address occupational safety issues and policies.

- Involve everyone in the safety process. It is important to motivate managers and supervisors to be aware of safety considerations, but don't overlook the importance of peer-pressure in maintaining a safe environment.
- Reward teams for maintaining safe working conditions. Conduct contests and encourage teams to create safety-based posters, displays, banners and pamphlets.
- Make occupational safety and employee wellness a high-profile priority. Leave no doubt that safety is a top priority. And back this commitment up with incentives, discipline and enforcement.
- Make safety awareness part of your overall Total Quality Management principles and philosophy. Remember, safety impacts all other operational divisions: production, regulatory, distribution, human resource management and fiscal.
- Conduct frequent training programs. Most suppliers would be happy to provide training on their equipment free of charge. OSHA, the Department of Labor and local universities can also be sources of training.
- Provide needed safety equipment to employees free of charge. Make sure the equipment fits and is appropriate for the task at hand. If possible, purchase "stylish" protective hats, eyewear, etc. Most cases of employees not wearing required protective gear are directly related to a lack of fit, comfort or appearance. If you save \$1.00 per pair on protective eyewear by buying the "cheap stuff", but employees won't wear them, have you really saved anything?
- Maintain all equipment in proper working condition. This includes routine inspection and maintenance, and the use of all guards and safety features. Removal of guards on conveyor belts, power tools, etc. cannot be tolerated.
- Utilize good manufacturing practices. Make sure all employees are adequately trained and are operating equipment properly.
- Communicate with employees the importance of workplace safety and the cost of injuries and accidents. Putting these expenses in dollar terms (and the potential impact on bonuses and raises) can be very meaningful. Employees are more likely to buy into the safety plan once they fully understand its importance.
- Immediately report, investigate and document any accidents or illnesses that occur at the workplace.
- Maintain a current inventory of all hazardous materials. Consult with your local fire department for storage and documentation guidelines.
- Maintain indoor air quality free from smoke, chemical vapors, etc.

- Utilize good ergonomic practices with respect to lighting, noise levels, chairs, desks, computer monitors and general facility design. Back and repetition injuries represent a major source of job related injuries.
- Maintain a drug and alcohol free workplace.
- Deal with workplace violence proactively and immediately. This represents the second major cause of death in the workplace behind motor vehicle accidents and cannot be tolerated.
- Consider developing a company wellness program that emphasizes overall employee health. This can include nutritional, exercise, drug and alcohol, and stress management programs.

Today, most packinghouses must actively seek opportunities to reduce costs and increase profits by any means possible. Providing healthy employees with a safe working environment is the best way to reduce the costs associated with employee accidents and illnesses, increase productivity, and improve employee morale. To learn more, check out the OSHA website at www.OSHA.gov.

Citrus Postharvest Researchers in Florida

Following is a list of researchers working to assist Florida's fresh-market citrus industry. The researchers listed below represent diverse areas of expertise from the University of Florida IFAS (UF IFAS), the Florida Department of Citrus (FDOC), and the United States Department of Agriculture, Agricultural Research Service (USDA, ARS). The entire list (with mailing addresses) can also be found at the UF postharvest website (<http://postharvest.ifas.ufl.edu>).

Elizabeth Baldwin

Specialty: Postharvest Physiology, Flavor & Aroma Quality.

Location: USDA, ARS, Winter Haven

E-mail: ebaldwin@citrus.usda.gov

Tel: (863) 293-4133

Fax: (863) 299-8678

Galen Brown

Specialty: Agricultural Engineering, Mechanical Harvesting and Handling.

Location: FDOC, Citrus REC - Lake Alfred

E-mail: gbrown@citrus.state.fl.us

Tel: (863) 295-5922

Fax: (863) 295-5920

Jackie Burns

Specialty: Postharvest Physiology, Biotechnology, Fruit Abscission.

Location: UF IFAS, Citrus REC - Lake Alfred

E-mail: jkburns@mail.ifas.ufl.edu

Tel: (863) 956-1151 ext 285

Fax: (863) 956-4631

Huating Dou

Specialty: Postharvest Technology and Physiology, Maintaining Fresh Fruit Quality, Peel Disorders.

Location: FDOC, Citrus REC - Lake Alfred

E-mail: hdou@citrus.state.fl.us

Tel: (863) 295 5940

Fax: (863) 295 5920

Ed Etxeberria

Specialty: Postharvest Physiology,
Biotechnology, Membrane
Transport.

Location: UF IFAS, Citrus REC - Lake
Alfred

E-mail: eje@lal.ufl.edu

Tel: (863) 956-1151 ext 238

Fax: (863) 956-4631

Robert Hagenmaier

Specialty: Fruit Coatings (e.g. waxes).

Location: USDA, ARS, Winter Haven

E-mail: hagenmaier@citrus.usda.gov

Tel: (863) 293-4133

Fax: (863) 299-8678

Mohamed Ismail

Specialty: Regulation Management,
Fresh Cut Products, Quarantine
Treatment, Growth Regulators.

Location: FDOC, Citrus REC - Lake
Alfred

E-mail: mismail@citrus.state.fl.us

Tel: (863) 295-5949

Fax: (863) 295-5920

Greg McCollum

Specialty: Physiological and
Pathological Disorders of Citrus.

Location: USDA, ARS, USHRL, Ft.
Pierce

E-mail: gmccollum@ushrl.ars.usda.gov

Tel: (772) 462-5836

Fax: (772) 462-5986

Bill Miller

Specialty: Agricultural Engineering,
Packinghouse Machinery & Control
Systems, Cooling.

Location: UF IFAS, Citrus REC - Lake
Alfred

E-mail: wmmiller@mail.ifas.ufl.edu

Tel: (863) 956-1151

Fax: (863) 956-4631

Mark Ritenour

Specialty: Postharvest Handling,
Internal & Peel Disorders.

Location: UF IFAS, Indian River REC –
Ft. Pierce.

E-mail: mritenour@ifas.ufl.edu

Tel: (772) 468-3922

Fax: (772) 468-5668

Mike Talbot

Specialty: Agricultural Engineering,
Cooling, Packaging.

Location: UF IFAS, Gainesville

E-mail: mtt@agen.ufl.edu

Tel: (352) 392-1864, ext. 205

Fax: (352) 392-4092

Jiuxu (John) Zhang

Specialty: Postharvest Decay Control
Through Chemical & Biological
Means.

Location: FDOC, Citrus REC - Lake
Alfred

E-mail: Jzhang@citrus.state.fl.us

Tel: (863) 295-5938

Fax: (863) 295-5920