

Pre-Harvest, Harvest, Transport, Trash, Processing and Grading

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Advances in Pistachio Production Short Course

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Harvest Preparation

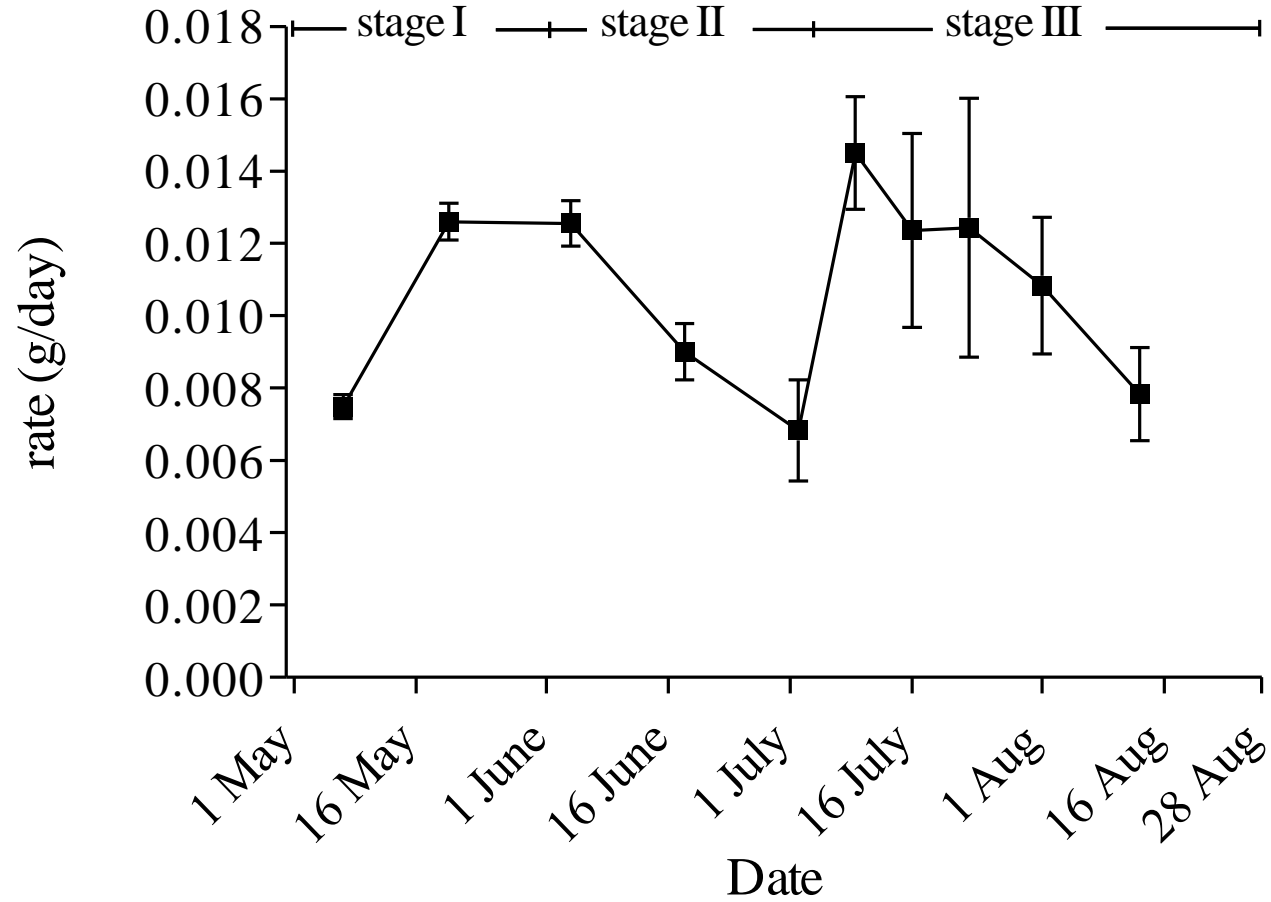
1. Irrigation
2. Navel Orangeworm (*Amyelois transitella*)
3. Determining when to harvest

1. Irrigation

- Shell splitting is particularly sensitive to water deficits
- Prevent water deficits July through harvest
 - maintain adequate soil moisture to maximize shell splitting; while keeping rows dry for harvesters



Nut dry weight accumulation



Data from: T.M. Spann

2. Navel Orangeworm



Prevent NOW infestation of early splits

- 3rd generation of NOW coincides with early splits (early- to mid-August)
- In early splits: shells split before the hulls dehisce, and the hull also splits, exposing the kernel
- Infestation of even 1% nuts can result in Aflatoxin levels above max. allowable

2. Navel Orangeworm

- During the **last two weeks of July**: monitor for early splits.
- Consider making a treatment if there are >2 early split nuts per 100 nuts, and if navel orangeworm eggs are consistently found.
- Choose the pesticide with the greatest IPM value
- Beware of Preharvest Interval (PHI) and plan your harvest accordingly
- www.ipm.ucdavis.edu

3. Determining when to harvest

- Hulls turns from green to ivory to rose pink blush
- Shell turns from translucent to opaque
- Lack or color change usually indicates a blank/aborted nut
- Fat and sugar content: **Increase**
- Kernel moisture, respiration rate, total protein content: **Decrease**



Determining when to harvest...

- Hull separates cleanly from shell
- Formation of abscission layer
 - – Nuts separate from rachis with a gentle shake
- Optimal harvest time: 2-3 weeks around full maturity period
- Ethephon, a compound that hastens maturity and reduces variability in maturity in many crops: **Is ineffective in pistachios!** (Crane et al., 1981)

Harvesting: basic principle

- Nuts removed by shaking or knocking
- Harvested either on a catch-frame or on tarps
- Nuts considered fragile (high moisture content, open shells)
 - So contamination can occur if they touch the ground
 - Aflatoxin: produced by a fungi, *Aspergillus spp.*

Harvesting Young Trees (6 years or younger)

- Spread tarps 5 feet beyond canopy
- Knock trunk with padded mallet or pole near clusters
- Remove large debris and dump tarps into bins
- Bins hold ~1000 lb









Photo: TM Spann

Harvesting Mature Trees

- Two separate, self-propelled units
 - One unit contains a shaker head to clamp on tree trunk and shake
 - The other joins the shaker unit to form a continuous collection surface
 - Once shaken off, nuts are conveyed over a belt to the bins, blowing off debris on the way via separator fan/blower



Photo: TM Spann



Photo by: G. Thurner, CSU Fresno



Photo by: G. Thurner, CSU Fresno



Photo from: American Pistachio Growers

Photo from: www.settonfarms.com



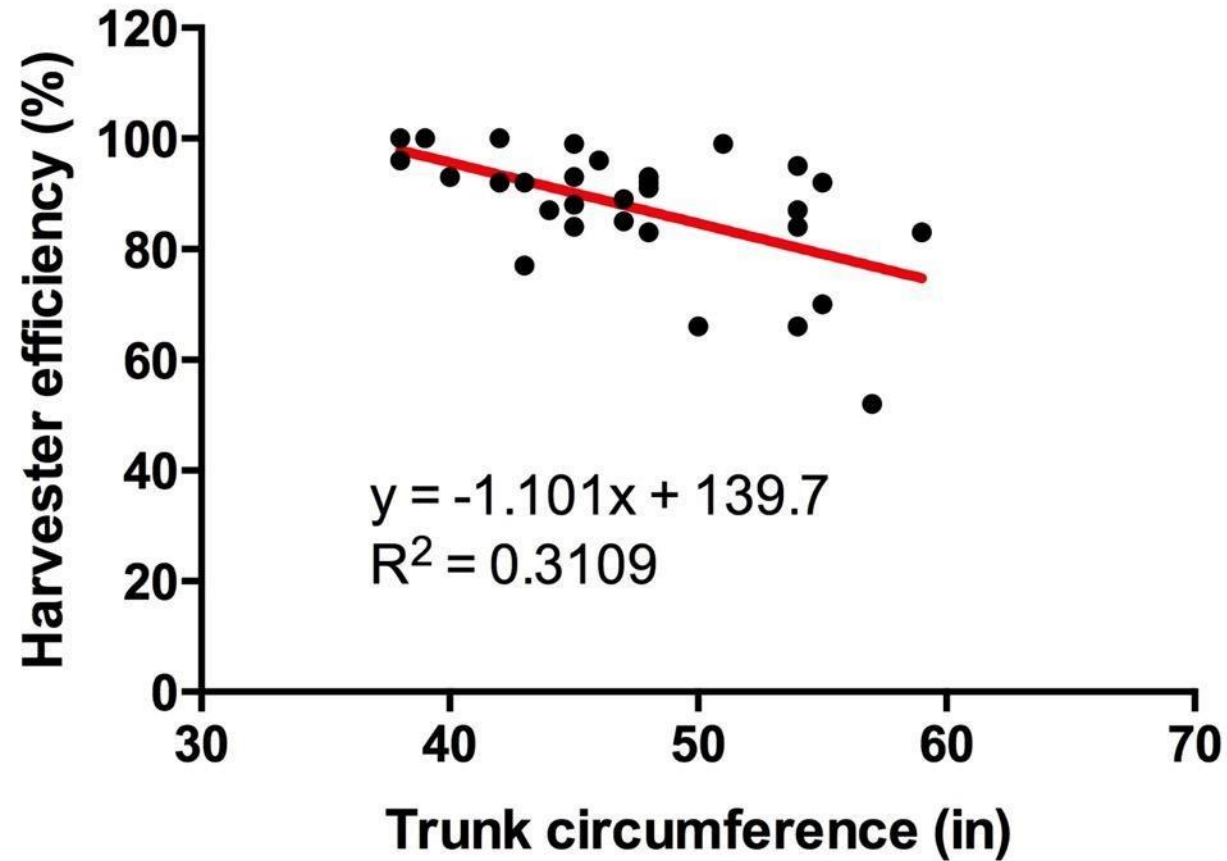
Harvest efficiency

- Harvest Efficiency is a function of:
 - Tree age
 - Trunk circumference
 - Canopy dimensions





Harvester Efficiency





Transport

- Shell staining increases during postharvest transport and storage (particularly if hull damage occurred at harvest)
 - \uparrow temp + \uparrow storage time = \uparrow staining
 - Temp in trailers can increase up to 1.1° F/hr
 - Good quality, intact hulls can be held up to 48 hrs
 - Poor quality, damaged/tattered hulls, show damage after:
 - 8 hrs @ 104° F; 24 hrs @ 86° F; 40 hrs @ 77° F

Tips for transport

- Keep the bins in shade
- Bulk trailers: greater potential for **↑** in nut temp. (Esp. in front-bottom)
- If transported in bins, at least 5% of vertical surface should be vented
- Trailer at highway speed **➡** Air Ventilation
- If delay is 2 days or longer:
 - Storage at 32°F; Airflow- 0.1 cu ft/min/lb and <70% RH



Processing procedures

Pistachios delivered in tared flatbed or bulk trailer are weighed and tagged for delivery fresh weight



Temperature within the load is measured



Nuts dumped and conveyed over an air leg to remove debris



20-pound (9-kilogram) unhulled sample is separated for separate processing and grading



Hulls are removed from nuts with an abrasive peeler

Blank nuts are separated by float tank and separately dried and stored



Filled split and non-split nuts are dried to 12 - 13% moisture in a high temperature dryer



Transferred to grain bins for final drying (to 4-6% moisture



Stored at ambient temperature with forced air flow



Splits separated from non-splits by needle picking drum



Non-splits are shelled or split mechanically



Split nuts sorted by electronic color reflectance sorter

Split nuts are hand graded to remove defects,
debris



Split nuts are salted



Split nuts are roasted



Split nuts are packaged and stored or shipped



Gross weight; nuts are dumped

Conveyed over an air leg to remove debris



20 lb sample



Photo: Gurreet Brar

Grading



Library and USDA
inspection samples

USDA Inspection

- Percent by weight
- Split inshell
 - Stain, insects, defects
- Split shelling
 - Insects, defects
- Closed shell
 - Blanks, insects, defects



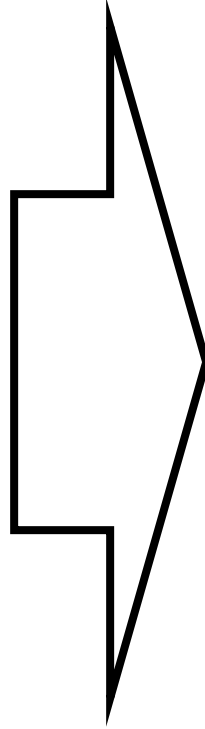
Grading

- Grading trays
- 19 categories
- Sample run through mesh first



Grower Resources

- UC Davis Fruit & Nut Research & Information Center
 - Fruitsandnuts.ucdavis.edu
- UC Davis Postharvest Technology Center
 - Postharvest.ucdavis.edu
- UCCE Mechanical Harvesting of Pistachios
 - Ucanr.edu/sites/mechpistachio



Thanks