

Walnut Harvest, Hulling and Dehydration in California: Video Notes
by e-Afghan Ag Team

1) Field conditions before harvest

Prior to harvest, it is very important for the orchard floor to be weed-free and dry so the harvest machinery can work properly. Wheel divots made in wet soil can make it difficult to sweep walnuts into windrows. Also, heavy machinery can compact wet soil which is not good for root growth and drainage. Dense weeds that grow around trees can interfere with the shakers. Weeds in the middle of rows interfere with the sweepers and harvesters and can contaminate the nuts. Certain weeds and cover crops can also attract insects (ants, mites) and rodents (gophers, voles) that also interfere with crop production.

2) Ripening

In California, walnut harvest generally begins in late August and can last until mid-November. The difference in harvest times is due to climate and varietal differences. Harvest should begin when both the kernel and hull are mature. Packing material around the kernel that has just turned brown indicates kernel maturity; cracking and separation of the hull around the shell indicates hull maturity. In areas where day temperatures are moderate and nights are cool with high humidity, the time between kernel and hull maturity is very short. In areas where day and night temperatures are warm with low humidity, the hull may mature 3 weeks after the kernel matures. Delays in harvest increases the incidence of insect (navel orange worm) and mold (*Penicillium*, *Aspergillus*, *Alternaria*, and *Rhizopus*) damage and decreases the percentage of light-colored kernels.

Walnut varieties differ with respect to kernel size, maturity, hull split, and ability to produce light-colored kernels. Serr, Lompoc, and Sunland varieties produce large kernels; Chico variety produces small kernels. Ashley, Payne, Chico and Serr are early-maturing varieties; Hartley, Franquette, and Mayette are later-maturing varieties. The hulls of Ashley and Hartley varieties expose the nut like the petals of a flower; the hulls of Chico and Eureka varieties merely loosen their contact with the shell. Chandler, Serr, and Hartley varieties have kernels that are consistently light in color; Eureka and Vina varieties tend to have darker kernels.

3) Shaking, sweeping and pickup

Walnuts are removed from trees by mechanical shakers that shake the nuts to the ground. About 12 trees can be shaken every minute with this machine. Each wheel on the shaker has sweepers in front of them to ensure nuts are not run over. If shaking equipment is properly maintained, the shaking does not hurt the bark or graph of the tree (Note: California English walnut varieties are generally propagated on black walnut or Paradox rootstocks for better anchorage, disease and nematode resistance, ability to take up nutrients, tolerance to adverse soil conditions, or high production). The fallen walnuts are then swept into windrow, sucked up by mechanical harvesters, and taken to processing plants where they are cleaned, sorted, and dried before being packed in-shell or cracked to be sold as kernels.

When the nuts are ripe, 99% of the nuts can be shaken from the tree. Unharvested nuts that remain on the tree are called “mummies”. “Mummy” nuts shelter overwintering navel orangeworms [*myelois transitella* (Walker)] which is one of the most devastating pests of walnuts grown in California. Once “mummy” nuts are removed from the trees, shredding to destroy the protective shell ensures maximum navel orangeworm mortality.

7) Hulling

In the video, many of the nuts going through the huller had very few green hulls. This is not common, usually half of the nuts still have hulls attached. In the year the video was taken there was a lot of rain. This allowed for higher humidity in the orchard canopy and earlier hull split.

Walnuts are washed in a salt bath before entering the huller to completely separate any rocks mixed in with the walnuts. Rocks can damage the huller. The wash tank is called a “rock tank”.

When sorting through hulled walnuts, all walnuts with hulls still attached or have black stains on the shell are removed, ground up, and composted. Black stains on walnut shells can be caused by insects or mold when the nuts sit too long between harvests and hulling/drying.

8) Dehydration

Drying is necessary to remove excess moisture from the kernel and the shell. Dehydration results in a product of stable weight, prevents further deterioration, molding or darkening of the kernels, and allows prolonged storage. Adequately dried walnuts should not contain more than 8 percent moisture. Walnuts are stored until needed for cracking.

For drying, air temperature should not exceed 43 degrees Celsius. At higher temperatures, oil in the kernel becomes rancid making the kernel inedible. Rancidity from overheating occurs within a few weeks to several months in storage.