

Nut Crops - Section Review

Like the small fruits, nut crops are a group of botanically unrelated crops. They are grouped together because the fruit type is a nut (generally), and harvesting, post-harvest processing, nutritional value and marketing characteristics are relatively similar. We focused on four major temperate-zone nuts, pecan, walnut, almond, and pistachio, and ended up with two tropicals - cashew and macadamia. The latter serve as a transition to the next section on tropical fruits.

While it is difficult to generalize about such a diverse set of crops, pay attention to the harvest and post-harvest processing (hulling, drying, roasting, etc.), and look at the nutritional value in comparison with that for fresh fruits. Notice the lack of vitamins C and A, but much higher values for minerals, B-vitamins, protein, and fat. Since nuts contain the seeds of the plant, it is not surprising that they are packed with nutrition.

Some important points to remember about nut crops:

- Nuts are often wind pollinated, unlike many of the species we have considered thus far. The trees generally produce a lot of pollen, often in specialized male inflorescences, to ensure that the female flowers will be fertilized. While possible, we would not want parthenocarpic fruit set in nut crops, since the seeds are the edible products.
- The terms monoecious and dioecious are useful in this section, as pecans and walnuts are all monoecious, and the pistachio is dioecious. Take a look at these definitions in the glossary. Also look at “protandrous” and “protogynous” under “heterodichogamy”, and think about the implications for orchard design and pollinizer placement.
- Walnut and pecan are closely related, both members of the Juglandaceae. While they are not cross- or graft-compatible, there are several aspects of their botany that are similar. One of the main differences, responsible for much higher yields in walnuts than pecans, is the propensity to bear nuts from lateral buds on 1-yr-old wood in walnut, not just terminal buds. This one feature makes a big difference in the yields per acre and orchard design between pecan and walnut.
- Nut crops often undergo a process known as alternate bearing, or irregular bearing. In other words, yield is high one year then low the next. Reasons for this revolve around two main theories: a hormonal theory and a carbohydrate depletion theory. The hormonal theory states that hormones in the developing nuts diffuse back into the stems and inhibit flower bud formation for next year’s crop. The carbohydrate theory states that carbohydrate reserves are exhausted in high crop years, such that none are left to allow flower bud formation for the next year. In “off” years, either the lack of hormone inhibitors or the surplus of

carbohydrates available allow for great flower bud set and a big crop the following year. In pistachio, it works a bit different, where flower buds are set for next year's crop in "on" years, but fall off during the maturation of the current season's crop. Regardless of the mechanism, this creates a hardship on the grower, since yields, and therefore prices, fluctuate drastically from year to year. Some progress has been made with "thinning" nutlets in an "on" year in pecan, which has the effect of smoothing out the variation in yield over time.

- The pecan is the most important native orchard species in North America. Other than some chestnuts, none of the other nut crops are native.
- Notice the lower yields per acre of nut crops compared to fresh fruits, due to the fact that nuts are dried to about 5-10% water content before sale, while fresh fruits are sold at about 90% water content. For example, 1-2 tons per acre would be a good yield for nuts, but yields of 10-20 tons/acre are typical in tree fruits. Despite lower yields, profits in nuts can be quite high since the price per lb is often over \$1, while the price per lb of fresh fruits is generally 10-30 cents/lb.
- Nuts are generally harvested by shake-and-catch methods, where the trunk is gripped by a mechanical arm, and shaken for a few seconds to dislodge the nuts. Nuts are then swept from the ground or caught in "catch frames" and funneled into storage bins. Few fresh fruits could be harvested this way since they would be bruised or cut as they fell, rendering them unmarketable. Harvesting costs are substantially lower (per lb) in nuts, despite a high initial investment in a mechanical harvester.
- Pecans and walnuts are the largest orchard species grown, and it is common to find planting densities of only 10-40 trees/acre, as opposed to 100 to several hundred plants/acre in tree and small fruits.
- In pistachio, almond, and macadamia, the fruit starts out as a drupe, but is marketed as a nut; review the definitions and structures of drupes and nuts and try to figure out what makes this possible.