



COOPERATIVE EXTENSION ... UNIVERSITY OF CALIFORNIA

FRUIT and NUT NOTES



TEHAMA COUNTY

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History of the Walnut Breeding Program - *Walt Tulecke and Gale McGramaban*

Historical accounts of walnuts in California mention the hard-shelled walnuts brought in from South America by the Mission fathers in the 1770's. A hundred years later (1869), Joseph Sexton purchased a large sack of walnuts at the dock in San Francisco and planted a thousand trees at his ranch in Goleta, California. The origin of these nuts is uncertain, perhaps Chile or China. The selections from these trees gave rise to the Santa Barbara soft shells, such as Placentia. About the same time (1870), Felix Gillet, a nurseryman in Nevada City, California, was importing scion wood and nursery stock from France. He is credited with introducing the French cultivars Franquette, Mayette, and others to California. As a result of these introductions by Sexton and Gillet, walnut growers found superior open-pollinated seedlings that led to the cultivars Eureka, Pacentia, Concord, Payne, Hartley, and others.

All of the early walnut cultivars were obtained by selecting seedlings that occurred by chance, rather than from controlled crosses. However, some walnut breeding work was done by Luther Burbank between 1879 and 1885 which gave rise to Paradox, the hybrid from Northern California black walnut (*J. hindsii* and *J. regia*). He also crossed *J. hindsii* and the eastern black walnut (*J. nigra* L.) to get the Royal walnut. It was Paradox that was especially useful for rootstocks since it provided root vigor and some disease resistance.

The walnut breeding program of Serr and Forde began in 1948 when Serr was appointed Lecturer and Associate Pomologist in the Pomology Division of the college of Agriculture, University of California. Serr was 50 years old at the time and was Extension Specialist for deciduous fruits and nuts for the state of California.

In their summary of results after the first seven years of walnut breeding with selected lines, Serr and Forde came to the conclusion that certain characters were inherited in a more predictable manner and other characters were less reliable. Leafing dates of 14 to 21 days after Payne, a character of Franquette, and pistillate flowering on lateral buds, a character of Payne, could be obtained in a few selected progeny by crossing Franquette with Payne. If Payne was selfed then some progeny were dwarfed, giving short internodes, small nuts, and russeted hull, indicating a recessive gene(s) for this character.

Overall, by 1956 Serr and Forde had made 39 different crosses, pollinated 15,691 pistillate flowers in controlled pollinations, and derived a population of 833 seedling progeny to be evaluated and selected for desirable characters.

In 1956, Serr and Forde began using the best seedlings from their controlled crosses as parents, thus beginning a breeding program of recurrent mass selection. By 1972 almost all the crosses made were between selections. This resulted in a narrowing of the germplasm base and an increasing frequency of deleterious traits such as the short internode/russeted hull phenotype which had been first observed when Payne was selfed.

Also in 1956 they began getting requests for their selections. One of the first selections out for field trials was 49-49, later released as Vina. In 1957, they had requests from growers and farm advisors for scion wood from their collection. The number of requests per year increased until 1967 when 100 requests were received, each for one or more selections or cultivars. The popularity of their germplasm and selections for field trials was in part due to the fact that Serr and Forde reported annually on their evaluation of walnut cultivars in the trade journal, *Diamond Walnut News*, comparing the performance of old and new cultivars and promising selections.

After his retirement in 1965, Serr continued to work with Forde in evaluating their most promising selections. He recommended that 10 cultivars be named and released by the University. Serr named all of these cultivars except one (59-129), which was named after Serr by the Pomology Department after Serr's death in 1968. The other nine cultivars were Lompoc (52-48), Gustine (53-11), Vina (49-49), Amigo (56-226), Pioneer (51-170), Tehama (58-11), Pedro (53-113), Midland (49-47), and Chico (56-206). These cultivars were the culmination of 20 years of work with controlled crosses and represented the selection and evaluation of 1,734 walnut seedlings.

From 1965 to 1978 Forde continued the walnut breeding program and in 1978 released three new cultivars from crosses made in 1963 and 1965: Chandler (64-172), Howard (64-182), and Sunland (66-4). Chandler is now the most popular cultivar in California, making up about 70% of nursery sales. Another two cultivars, Cisco (66-178) and Tulare (67-11) from the Serr/Forde breeding program have been released recently.

Until his retirement Forde continued making between five and ten crosses per year, thus increasing the total number of crosses in the program to almost 200, and the number of progeny evaluated to 5,916.

The walnut breeding program has not stopped although there was a brief hiatus after Forde retired. In 1982, G McGranahan was hired by the US Department of Agriculture to breed for solutions to the blackline problem. In 1989, she joined the Dept. of Pomology and continued her activities of breeding walnuts and curating the Walnut Germplasm collection. The early years of her program were directed towards examining the inheritance of the hypersensitive response to the virus that causes the disease and beginning a backcross breeding program to develop hypersensitive cultivars, as well as introduction of germplasm so that the traditional cultivar improvement program could be continued. The new germplasm is now being used in the breeding program and over 1,000 seedlings from controlled crosses are ready to be evaluated.

Walnut Breeding Program Field Day

The walnut breeding program from past to present is available at UC Davis. Each year growers, nursery representatives, processors and farm advisors attend a full day meeting at UC Davis to evaluate new varieties and provide program input. In addition, a “Walnut Breeding Field Meeting” will be held August 8th from 9-11:30 at UC Davis. The goal is to familiarize farm advisors, interested growers and nursery representatives with the walnut breeding program and to get varieties out into grower field trials. *If you are interested in attending this meeting please give me a call at 527-3101 to be placed on the attendance list.*

Insect Update

Codling moth is currently at 880 DD (7/16/01) from the second biofix. Third flight activity should start 7/26/01 (about 7-10 days). The Day Degree accumulations will get you close to the biofix but your traps will verify the actual start of the third flight. Make sure traps are serviced and are in good condition so they will catch if moths are present.

In general, the third flight would NOT be treated if there is little or no evidence of canopy infestation. A treatment may be advisable if there is obvious canopy infestation. The way we rate canopy infestation is to quickly count walnuts for signs of Codling moth entry. If we find more than 3 infested nuts per 100 nuts counted (3 percent), a treatment should be considered.

This information is also available on our website: cetehama.ucdavis.edu or our weekly email insect updates. If you would like to get on the email list send a request to rpbuchner@ucdavis.edu.

Husk Fly

We caught our first Walnut Husk Flies (WHF) on 6/14/01 in a Dairyville orchard. The first female WHF with eggs occurred on July 2, 2001. Spray timing based upon egg presence has proven to be an excellent technique. The “Walnut Husk Fly” video available at our office is a fast easy way to learn about this pest. If you need help identifying female flies with eggs, give us a call and we will show you how its done.

Prune ESPS Observations

MITES: We have not seen much spider mite activity in the two test orchards that we monitor. Mites started to increase about the end of May. We measured moderate (17% leaves with mites) populations by mid June. Toward the end of June mites disappeared and have remained low to non-existent. In the 2 ESPS prune orchards, mite sprays were not necessary.

RUST: Rust has not been a problem either. As of July 18 we have seen no rust symptoms. Last year, we saw rust in both test orchards on 7/25 and 7/26. One orchard was treated and one was not. In the treated orchard we observed 6% defoliation at harvest and 1% defoliation in the untreated orchard. Based upon last years experience, rust symptoms in late July do not represent an economic problem. Late applications of sulphur are not a good option if you plan to fresh pick.

PTB: Both ESPS orchards were not dormant sprayed and PTB has not been a problem. Leaf curl plum aphid LCPA was present in one of the non-sprayed orchards but did not reach damaging levels and was not treated. LCPA left the orchard in early May.

BROWN ROT: Brown rot does not appear to be a problem disease in prunes this year. So far, we have seen no brown rotted fruit. We are currently using a newly developed freeze/thaw technique for predicting harvest brown rot using July green fruit samples. This technique is predicting little if any brown rot in the two ESPS test orchards.