



Stakeholders evaluate the quality of a new peach variety and share their feedback with Tom Gradziel (center).

Processing Peach *Prunus persica* L.

Dependent on public breeders

About half of the 2 billion pounds of peaches produced annually in the U.S. are processing peaches grown almost entirely in California's Central Valley. The lower price paid for processing peaches requires a consistently higher production of marketable fruit for a variety to be commercially viable. Growers are understandably reluctant to aggressively plant new, largely unproven varieties.

Consequently, unlike with the relatively high-priced fresh-market peaches where new varieties meet changing consumer preferences,

processing-peach breeding has not been profitable in the private sector. It has therefore fallen on public breeders to develop varieties for this important and predominantly family-farm industry.

From its beginning in the early 1900s, the processing-peach industry in California has depended on varieties developed by public programs and on grower selections of seedling trees often derived from public varieties. **Carson**, **Carolyn**, and **Corona**, developed in the 1930s and 1940s by W.F. Wight of the USDA in collaboration

with G.L. Philps of what was then the UC Berkeley research farm at Davis, remain heavily planted today and have been used as parents in many recent varieties. Initial selection was for local adaptation, uniform fruit size, shape, and golden-yellow flesh color, as well as a continuous sequence of ripening periods to supply canneries throughout the summer.

Breeding of **Clingstone** peach varieties continued in the 1950s under L.D. Davis, whose program was notable for its incorporation of germplasm to improve fruit

flavor and canning quality, as well as its thoroughness and continued emphasis on high productivity. Three of his varieties, **Klampt**, **Tufts**, and **Andross**, were not released until after his retirement in 1964. All three remain commercially planted today.

Evaluation of Davis' breeding selections continued under Clarion Hesse (1970–1979), Andrew Kuniyuki (1979–1984), and Jim Beutel (1979–1987), resulting in the release in the mid-1980s of **Ross**, **Dr. Davis**, **Dee-Six**, and **Riegels**. Ross and Dr. Davis have become the industry standards for productivity and quality and remain the most heavily planted processing-peach varieties in California.

The importance of Ross to the industry was further enhanced with the release by Bill Tsuji, Ted DeJong, and Jim Doyle in 1990 of **Late Ross**, a late-maturing bud sport (a bud or shoot having a natural mutation) of Ross which extended its harvest season by one to two weeks.

In 1988, the program was continued and expanded under Tom Gradziel with funding from the California Clingstone Peach Marketing Board, California processors, and the UC Agricultural Experiment Station. Immediate objectives were to replace the historically important and extensively planted **Dixon**, **Andross**, **Halford**, and **Starn** varieties because of their deteriorating processing quality along with rapid development of varieties with improved pest resistance, ability to be mechanically harvested, and ease of orchard maintenance (to counter the dramatic losses in labor during this period).

In 1992, **Hesse** was released as a high case yield and high phytonutrient (pro-vitamin A) replacement for Starn. **Rizzi** was also released as a high case yield, mid-



season variety which could be held in cold storage up to eight weeks and still maintain good canning quality (to buffer the increasingly erratic raw product supplies to the

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Goodwin (2001) combines improved case yields — in particular, freedom from red pit staining and associated pit fragmentation — with improved disease resistance. **Lilleland** (2002) combines high fruit quality with freedom from red pit staining and associated pit fragmentation.

Sources of resistance to flower blight, fruit rot, leaf curl, mildew, and green peach aphid have been identified in closely related *Prunus* species, including wild peach species, wild almond species,

and cultivated almond. Progress towards mechanically harvestable varieties includes the identification in wild and domestic germplasm of sources of improved harvest and postharvest fruit integrity, single pass harvestability, and modified tree structure, size, and bearing habit. Modified tree structure and size is also being pursued by DeJong through various size-controlling rootstocks. Molecular markers for these traits are being pursued in collaboration with Carlos Crisosto.

Molecular-based research has transformed breeding program funding, with about half of current funds coming from competitive grants and the remainder from the Clingstone Peach Marketing Board, processors, and UC Agricultural Experiment Station funds. The California Clingstone Peach Marketing Board also supports a permanent endowment for the UC Davis peach breeding program.

Integration of advanced field- and lab-based technologies into applied variety breeding has made UC Davis an international center for peach genetic research with collaborations among scientists in the U.S., Europe, Canada, and Central and South America.