Almond Variety Development *Project #Hort-1*

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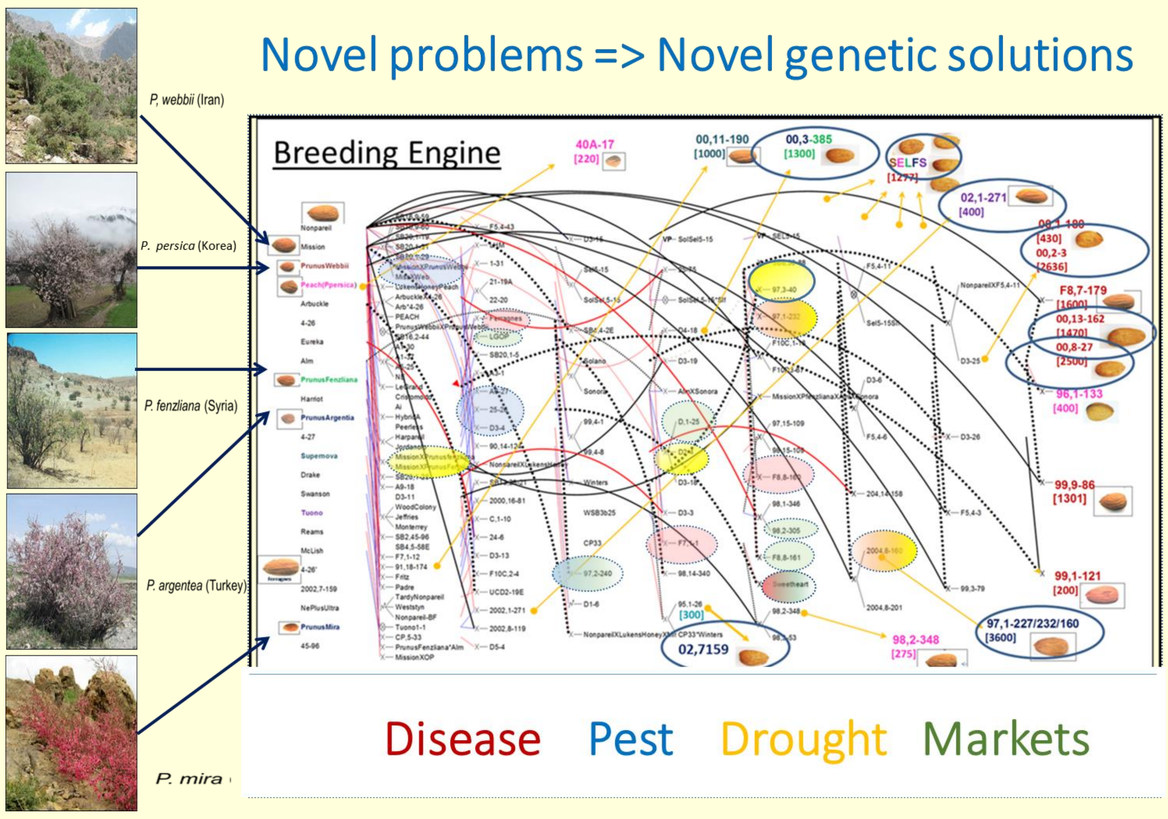
Field crosses using mesh bags to exclude bees and so control crossing parents.

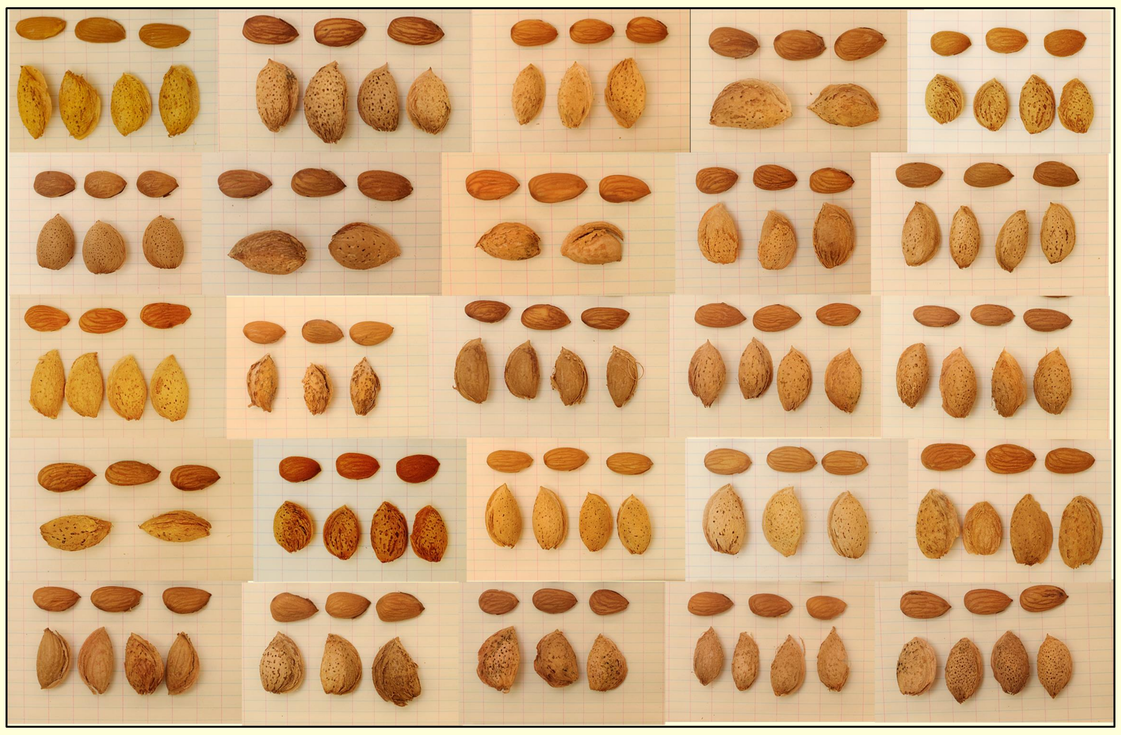
Introduction

The California almond industry is in a period of transformation driven by expanding Central Valley acreage, increasing environmental and market requirements, reductions in resources including water, agrochemicals, and natural pollinators, as well as the uncertainties of a changing climate. While almond is a diverse and highly adaptable species, commercial production in California is dependent almost entirely on the variety *Nonpareil* and a relatively few closely-related pollenizers, most of which have *Nonpareil* and *Mission* as direct parents. Thus, a long-term goal of the UCD almond breeding program has been the identification and incorporation of new and useful germplasm. Consequently, breeding opportunities have been greatly expanded through the incorporation of commercially useful germplasm from diverse European and Asian almond varieties as well as wild relatives including related peach and almond species. Genetic solutions to emerging production challenges are now becoming available from this improved germplasm and include regionally-adapted selections expressing high productivity, self-fruitfulness, and improved insect, disease and environmental stress resistance. A broadening of the breeding germplasm also offers opportunities to expand market demand by optimizing phytonutrients in new cultivars, such as the high heart-friendly oleic acid content in the *Sweetheart* variety, while minimizing potential health and marketing risks including aflatoxins, allergens and salmonella. The recently established Regional Variety Trials (RVT) includes a large number of UCD selections derived from these genetically diverse pedigrees (see below). This diversity has been managed to optimize capture of the greatest possible genetic contributions to kernel yield and quality as well as disease, pest and stress resistance in future California varieties.

Novel problems => Novel genetic solutions



Sample of 2019 breeding selections



Representation of UCD almond breeding lineages transferring self-incompatibility and other desirable traits from related species and land races. (Solid lines identify the seed parent; dotted lines identify the pollen parent). Because traits associated with wild species (thorniness, bitterness, etc.) are often undesirable for commercial production, the challenge is to select for desirable genes while simultaneously roguing-out undesirable traits. A concurrent challenge is to maintain a large genetic diversity to provide genetic options for current and emerging production challenges brought about by losses in agrochemicals, land and water quality, and changing climates. Circled items are advanced self-fruitful selections now in Regional Variety Trials (see below). Highlighted items identify germplasm recently utilized to improve disease, pest and drought resistance as well as market expansion.

Selection	Yield (kernel lbs./acre)	
Kester on Hansen	2630	a
UCD18-20	2121	b
UCD8-160	1992	b c
Supareil	1968	b c d
UCD7-159	1780	b c d e
Y117-91-03	1763	b c d e f
Y116-161-99	1739	b c d e f g
UCD8-201	1660	c d e f g h
UCD1-232	1646	c d e f g h
UCD1-271	1630	c d e f g h
Kester	1618	c d e f g h
Folsom	1573	c d e f g h
Self-fruitful P13.019	1558	d e f g h
Sweetheart	1554	e f g h
Booth	1498	e f g h i
Durango	1495	e f g h i
Aldrich	1480	e f g h i
Y117-86-03	1465	e f g h i
Sterling	1447	e f g h i
Bennett	1442	e f g h i
Nonpareil	1377	e f g h i j
Y121-42-99	1356	e f g h i j
UCD3-40	1341	e f g h i j
Winters	1341	e f g h i j
Jenette	1322	f g h i j
UCD1-16	1295	g h i j
Capitola	1284	h i j k
UCD8-27	1062	i j k
Eddie	964	j k
Self-fruitful P16-013	810	k

Yields for the 2019 Stanislaus County Regional Variety Trial (right) and kernel and nut samples (above) from the 2019 Chico RVT showing successful recovery of high yields as well as good quality despite a common origin from wild peach and/or almond species (required for recovery of self-fruitfulness). [See poster #97 for detailed summary of kernel characteristics at each RVT site.]