Project No.: 93-L20 - Field Evaluation of Almond Varieties & Rootstocks (cont. of Project 92-L19)

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Objectives:

1. Continue data collections and observations from selected varieties in the Butte and Delta RVTs since long-term performance of promising varieties has been indicated as being important by members of the almond industry. Data on susceptibility to pests, disease and other disorders will be collected as opportunities occur.
2. Three new RVTs will be planted in early 1993. Advise/assist grower cooperators for these trials on tree training and management decisions as needed. Observe and evaluate trees for pest and disease susceptibility and noninfectious bud failure symptoms. Collect bloom, harvest and nut data once bearing begins.
3. Make further cross-pollinations to identify the pollen compatibility of newer varieties.
4. Continue collection of yield, nut quality and tree size data from the rootstock evaluation plots in Fresno and Merced Counties. Continue obtaining compatibility and production information on varietal compatibility and/or interstem studies with Marianna 2624 plum in Colusa and Butte Counties.
5. Summarize and analyze data associated with this project and publish and otherwise disseminate this information as appropriate.

Results:

Older Regional Variety Trials. Production and nut quality data was again collected from many, but not all varieties in the older Regional Variety Trials (RVT's) at California State University at Chico and San Joaquin Delta College. Yields in 1993 from these plots were mostly exceptional to good; although, a few varieties had poor production.

In the California State University at Chico trial (planted in 1976), most of the varieties that were evaluated from the original planting yielded well with Sonora and Norman producing more than 3000 kernel pounds per acre (table 1). In addition, Carrion, Nonpareil, Fritz, Butte and Padre produced 2700 or more kernel pounds per acre; however, Price, which bore an excellent crop in 1992, came back in 1993 with only a little over 1000 pounds per acre. Sonora, which like Price has had a tendency to alternate bear, produced exceptional crops in both 1992 and 1993. Aldrich, Rosetta and Ruby were added to this plot in 1987. In 1993, Aldrich produced 1500 pounds per acre, while Rosetta and Ruby were both under 1000 kernel pounds per acre.

In the CSU, Chico planting Price produced over 30 percent double kernels in 1993, while Ne Plus Ultra had 22 percent and Mission 12 percent. All other varieties had below 10 percent double kernels. Damage from Navel Orangeworm (NOW) was low this year with Sonora having the highest damage at 8 percent. Price produced a lot of blank kernels in 1993. Ne Plus Ultra and Norman had about 20 percent shrivelled kernels and more than any of the other varieties evaluated.

At the San Joaquin Delta College RVT, Nonpareil was the highest producing variety from the original planting (1978) with 2600 kernel pounds per acre. Also yielding over 2000 pounds per acre were Monterey, Butte, Jordanolo, Livingston, Fritz, Sauret 1 and Mission (table 2). Le Grand had a very low yield and Thompson, Peerless, Sonora and Mono were all below 1500 kernel pounds per acre. After four heavy crops in a row, Sonora had a relatively light crop in 1993. Seven varieties were added to this planting in 1984. Of these, Valenta, Jeffries, Wood Colony, Dottie Won and Aldrich all produced more than 1600 pounds per acre, while Pearl had very low production.

At the Delta College trial a number of varieties produced a high percent of double kernels this year with Valenta the highest at 46 percent. In addition Dottie Won, Ne Plus Ultra and Price had 20 percent or more double kernels followed by Pearl at 16 percent and Aldrich, Le Grand, Livingston Monterey and Sauret 2 all with 10 to 12 percent. Most varieties had 2 percent if any NOW damage in 1993; however, Dottie Won had 8 percent damage. Sauret 2 had over 20 percent shrivelled kernels, the most of any variety in this planting.

New Regional Variety Trials. Three new RVT's were planted in 1993. These trials are located at California State University at Chico, San Joaquin Delta College near Manteca and Paramount Farming in Kern county, These plantings are nearly identical, and the same varieties are included in each trial with only a couple of exceptions. Varieties in these trials include Nonpareil and Mission as standards; Butte, Carmel, Fritz (except Chico), Monterey, Padre, Price and Sonora as "new standards"; seventeen test varieties (mostly newer ones) that have not been evaluated or not adequately evaluated in current RVT's; and six numbered selections.

Pollination. Studies on the cross-compatibility of a number of varieties, especially newer ones, were continued. Unfortunately weather conditions were not favorable when most crosses needed to be made and little was learned this year. Because of these conditions we were not able to clarify the cross-compatibility of Butte and Monterey. Crosses with this combination in the past have given questionable results. Thus, until their cross-compatibility can be clarify, including Butte and Monterey in the same planting without provision for pollination by additional cross-compatible varieties is not recommended.

Rootstock Plots. Four rootstocks (Bright's hybrid, Hansen hybrid, Nemaguard peach and Lovell peach) were compared during their eighth growing season in a test plot in western Fresno County. With Nonpareil, trees on the two hybrid rootstocks were significantly larger (based on trunk size) and out-produced those on the two peach rootstocks (table 3). With Fritz in 1993, trees on Nemaguard were significantly smaller than those on the other three rootstocks. While there were no significant differences in yield among trees on any of the four rootstocks with Fritz, those on Nemaguard tended to produce less.

Trees on six rootstocks growing in a sandy soil in Merced County were compared in 1993, their fifth growing seasons. The rootstocks compared were Nemaguard, Red-Leafed Nemaguard, Lovell and Halford peach and Bright's and Hansen peach-almond hybrids. With Nonpareil, because of variability, there was no significant differences between trees on any of the rootstocks in either yield or tree size (table 4). However, with Carmel, trees on Bright's hybrid significantly out-produced those on all other rootstocks, while trees on Hansen hybrid yielded more than those on Lovell. Trees on Bright's hybrid were also larger than those on the peach rootstocks, except Red-Leafed Nemaguard.

Thus, it appears that the scion variety and soil characteristics can make a difference and should be taken into consideration when comparing rootstocks for almond.

Table 1 1993 Yield Summary for the Almond Regional Variety Trial at California State University, Chico

Variety	No. of Nuts/Tree	Average Kernel Weight(g)	Kernel Pounds Per Tree	Acre
1976 Planting				
Early Blooming Varieties				
Sonora	12,980	1.54	44.0	3,519
Ne Plus Ultra	6,401	1.58	22.3	1,788
Mid Blooming Varieties				
Norman	19,221	0.97	40.9	3,275
Nonpareil	13,237	1.23	35.7	2,859
Fritz	15,004	1.07	35.5	2,837
Carmel	8,192	1.38	24.8	1,985
Price	4,854	1.26	13.5	1,076
Late Blooming Varieties				
Carrion	14,328	1.18	37.3	2,980
Butte	15,918	1.01	35.3	2,821
Padre	16,600	0.92	33.8	2,704
Mission	11,776	1.07	27.8	2,219
1987 Planting				
Aldrich	9,848	0.90	19.6	1,567
Rosetta	3,889	1.37	11.7	939
Ruby	3,733	1.16	9.5	763

Table 2 1993 Yield Summary for the Almond Regional Variety Trial at San Joaquin Delta College, Manteca

Variety	No. of Nuts/Tree	Average Kernel Weight(g)	Kernel Pounds Per Tree	Acre
1978 Planting				
Early Blooming Varieties				
Jordanolo	9,710	1.40	30.0	2,246
Ne Plus Ultra	7,566	1.45	24.2	1,813
Sonora	5,561	1.49	18.2	1,368
Peerless	6,488	1.27	18.2	1,364
Mid Blooming Varieties				
Nonpareil	13,784	1.16	35.2	2,637
Monterey	11,465	1.22	30.9	2,319
Fritz	14,129	0.92	28.6	2,144
Sauret 1	11,180	1.11	27.3	2,050
Price	11,440	1.01	25.4	1,903
Carmel	9,682	1.14	24.3	1,821
Sauret 2	8,633	1.15	21.8	1,639
Late Bloom Varieties				
Butte	17,161	0.81	30.5	2,290
Livingston	11,856	1.13	29.6	2,222
Mission	12,474	0.98	27.0	2,024
Ruby	11,304	1.06	26.3	1,972
Padre	11,779	0.98	25.4	1,909
Tokyo	9,588	1.01	21.4	1,607
Mono	7,692	1.13	19.1	1,430
Thompson	5,831	1.21	15.5	1,162
Le Grand	4,106	1.29	11.7	875
1984 Planting				
Valenta	11,373	0.97	24.4	1,828
Jeffries	9,071	1.21	24.1	1,807
Wood Colony	8,199	1.30	23.4	1,756
Dottie Won	9,991	1.06	23.3	1,749
Aldrich	10,770	0.93	22.1	1,659
Rosetta	6,175	1.46	19.8	1,489
Pearl	4,469	1.07	10.6	793

Table 3 1993 Yield and Tree Growth Data for Almond Rootstock Trial Planted in 1986, Harris Ranch, Coalinga, CA

	Nonpareil		Fritz	
Rootstock	Yield lbs./Ac.	Trunk x-area (cm^2)	Yield lbs./Ac.	Trunk x-area (cm^2)
Bright's Hybrid	2,212 a[1]	344 a	1,979 a	307 a
Hansen Hybrid	2,271 a	357 a	1,985 a	324 a
Nemaguard	1,858 b	269 b	1,759 a	253 b
Lovell	1,699 b	282 b	1,954 a	301 a

[1]Numbers within columns followed by the same letter are not significantly different at the 5% level.

Table 4 1993 Yield and Tree Growth Data for Almond Rootstock Trial Planted in 1989, Arnold Farms, Atwater, CA

	Nonpareil		Carmel	
Rootstock	Yield lbs./Ac.	Trunk Circ. (mm)	Yield lbs./Ac.	Trunk Circ. (mm)
Bright's Hybrid	1,475 a[1]	500 a	1979 a	499 a
Hansen Hybrid	1,454 a	489 a	1,468 b	469 ab
Nemaguard	1,610 a	491 a	1,448 bc	447 b
Halford	1,285 a	470 a	1,280 bc	448 b
Red-leaf Nemaguard	1,384 a	483 a	1,259 bc	462 ab
Lovell	1,234 a	460 a	1,183 c	438 b

[1]Numbers within columns followed by the same letter are not significantly different at the 5% level.