2)

SUSTAINING YIELDS IN HEDGEROW SYSTEMS

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The objective of this trial is to develop methods to train Nonpareil almonds into a hedgerow configuration and develop pruning and/or tree removal systems capable of sustaining high yields in hedgerows.

In 1979, a Nonpareil - Price (at a 1:1 ratio) almond block was planted 7′ x 22′ (270 trees/acre) at the Nickels Soil Laboratory in Arbuckle, California. The following four training treatments were used for this plot:

1) Temporary Hedge -- standard pruning for permanent trees, with temporary trees gradually whisked back and then removed after their 8th year (1986-87), leaving a 14′ x 22′ spacing.
2) Permanent Hedge -- trained to three scaffolds, standard pruned and maintained at 7′ x 22′.
3) Two Scaffold Hedge -- a 7′ x 22′ hedge trained with two primary limbs growing out into the row middles and standard pruned.
4) Unpruned Hedge -- a 7′ x 22′ hedge trained to three scaffolds and then essentially unpruned since.

While statistically there was no difference in production between treatments due to the variability in this orchard, the Temporary Hedge continued to numerically trail most treatments in production, as can be seen in the following table. Even though the permanent trees now appear to be filling-in quite well, it has taken longer than was expected on this class 2 soil, and perhaps tree removal after the 8th leaf was too early. In 1993 the Permanent Three Scaffold treatment was also low yielding.

Yields by hedgerow System for 1987-93 and Accumulative Yields Since Production Began in 1984.

	Kernel Pounds per Acre							
	Leaf/Year							
	9th	10th	11th	12th	13th	14th	15th	Accum.
Treatment	1987	1988	1989	1990	1991	1992	1993	1984-93
Two Scaffold	2720	1498	2746	3470	2992	2079	1943	21,687
Unpruned	2474	1626	2870	3072	3036	2471	1804	21,290
Permanent	2149	1932	2680	3333	2254	2268	1189	20,439
Temporary	1472	1308	2046	2450	2576	1739	1280	16,758

Accumulative yields through the 15th leaf showed the Temporary Hedge approximately 4,000 pounds behind the other three treatments. However, fruiting of the three close spaced hedgerows continues to

decline, especially in the lower canopy, presumably due to shading. While future yields for the Temporary Hedge may eventually catch-up with the other treatments, the accumulative loss may never be recovered.

3) ***Removing Temporary Trees in Double Planted Orchards***
(Connell, Micke, Yeager, Krueger)

The objective of this trial is to evaluate temporary tree removal by comparing three pruning treatments:

1. Maintaining a hedgerow indefinitely.
2. Gradual removal of temporary trees through thinning cuts.
3. Heavy whisking of temporary trees with chain saw cuts made from the ground.

Pruning in treatment 1 and on permanent trees in treatments 2 and 3 consists of removing crowded or crossing limbs by thinning out. Pruning temporary trees in treatment 2 consists of thinning out upper limbs when they crowd the permanent trees. Temporary trees in treatment 3 have chain saw cuts made from the ground to remove the tree center or whisk back the sides whenever branches compete with the permanent trees.

Pruning back temporary trees has been proceeding gradually since 1989 allowing the permanent trees to fill in. By gradually phasing out the temporary trees we hope to minimize crop loss when the trees are completely removed. Cumulative yields for 5 years from 1989 through 1993 show no statistically significant differences between the three treatments on either variety.

Treatment	5 years accum. yield lbs/tree	5 year average yield lbs/acre	%	Tot lbs/acre lost to tree removal over 5 years
Butte				
Maintaining hedgerow	94.5a	2647	100	0
Gradual thinning	86.8a	2431	92	1081
Chain saw whisking	86.3a	2416	91	1158
Mission				
Maintaining hedgerow	69.4a	1943	100	0
Gradual thinning	65.6a	1837	95	534
Chain saw whisking	60.1a	1680	87	1316

kernel pounds are calculated on a 140 tree per acre basis.

Although yield differences between treatments are not statistically significant at the 5% level, numerically, cumulative yields are lower as the severity of pruning increases. Chain saw pruning from the ground, although easier, resulted in the numerically lowest yield. So far, yields are numerically highest where we continue to maintain the hedgerow at a 14 foot spacing. Ultimately, this project will help us determine whether tree removal is the best approach to deal with crowding in double planted orchards.