EFFECTS OF BUDDING HEIGHT ON TREE GROWTH AND INCIDENCE OF BACTERIAL CANKER IN FRENCH PRUNE IN 1995

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Introduction

Prune trees are susceptible to bacterial canker (*Pseudomonas syringae* pv. *syringae*) and in the 1993-1995 years the incidence of the disease was particularly severe. The disease is associated with increased rainfall, poor drainage, temperature (i.e.. freezing events), and soilborne ring nematodes (*Criconemella xenoplax*). Field control of bacterial canker is marginally successful with localized fumigation with methyl bromide. The use of peach rootstock is also partially beneficial, but the use of that rootstock is not always desirable in the heavy and poorly drained soils in the Sacramento Valley where prune trees have often been planted. Cherry growers in the San Joaquin County region claim to use high budding on Mazzard and Mahaleb rootstocks to control bacterial canker (Ogawa and English, 1991). Additionally, recorded observations by prune growers in the Santa Clara Valley indicate that high budding French prune trees helped to reduce the incidence of gummosis. Based upon these and other observations we initiated trials in bacterial canker problem sites in the Sacramento Valley to determine if high budding (grafting) might help to reduce the incidence of bacterial canker under field conditions.

Trials were begun in the spring of 1993 with three experimental locations (1 Butte County, 2 Sutter County) and French prune trees (*Prunus domestica* L.) were randomly interplanted in existing orchards where many trees had died from what appeared to be bacterial canker. Each location was determined to be a problem site where the incidence of bacterial canker was high and growers had high numbers of trees die from bacterial canker disease. No preplant fumigation was performed and trees were planted by the growers' preferred methods.

Objectives

1. To determine if high budding helps to reduce the incidence of bacterial canker under field conditions.

2. To determine how budding height affect scion growth.

Summary High Budding 'French' on Myro 29C
1995 Planting

Fowler Nursery propagated Myro 29C cuttings in the Fall of 1992. Rootstocks were budded to 'Improved French' prune in the Fall of 1993, and the trees were dug in the winter of 1994 for planting in 1995.

At budding time all rootstock material were of similar size and approximately 100 trees of each treatment were budded:

1. Conventional low bud
2. Medium bud 20"
3. High bud 36"
4. Lovell peach low bud

Trees were planted in April 1995 at four locations in historical bacterial canker sites in Sutter, Butte, Glenn, and Tehama Counties.

Tree trunk cross-sectional area measured 6 months after planting gave the following per cent growth increase over the low bud Myro 29C budded to Improved French cultivar.

1995 Planting

Table 1. Percent growth increase over low budded French on Myro 29C trees.

Location	Lovell peach	Medium bud 20"	High bud 36"
Tehama	29	36	145
Glenn	22	1	53
Butte	28	36	60
Sutter	60	1	52

Table 2. Growth in 'French' prune on Myro 29C trees as affected by budding height.

	1995 Trunk cross-sectional area (TCSA cm^2)			
	Tehama	Glenn	Butte	Sutter
Lovell Peach	4.0 bc	3.9 bc	3.2 b	4.0 a
Low bud Myro 29C	3.1 c	3.2 c	2.5 c	2.5 b
Med. bud Myro 29C	4.2 b	3.4 bc	3.4 ab	2.7 b
High bud Myro 29C	7.6 a	4.9 a	4.0 a	3.8 a
Unbudded Myro 29C	3.1 c	4.2 ab	2.9 bc	4.0 a

Lovell peach had at least 22% increase in growth over low bud trees at three locations. A 60% increase occurred at the Sutter location, which is the sandiest location (68%). Myro 29C medium budded

trees grew approximately 10% more than Lovell peach at two locations, but less than 1% at the other two. Again, these two sites (Glenn, Sutter) were sandier, whereas peach flourishes in sandy conditions. the Myro 29C might have been restricted on moisture for good tree growth. The high budded trees grew 50% more than the low budded Myro 29C trees at three locations, but 145% more than the low budded at the Tehama site, which has an even-textured soil, and is the best tree growing location.

1993 Planting

Table 3. Percent growth increase 1994-95.

	Sutter	Butte
Lovell peach	39	71
Myro 29C low bud	66	51
Myro 29C unbudded-budded 1994	--	42
Myro 29C unbudded-budded 1995	53	78
Myro seedling	--	43

Table 4. Growth in 'French' prune trees as affected by budding height.

	1995 Trunk cross-sectional area (TCSA cm^2)	
	Butte	Sutter
Lovell Peach	14.4 bc	33.9 b
Low bud Myro 29C	8.6 c	23.6 b
Low bud Myro Seedling	12.7 bc	--
High bud Myro 29C (Budded 1994)	17.0 b	--
High bud Myro 29C (Budded 1995)	25.3 a	53.6 a

Table 5. Growth in 'French' prune trees as affected by budding timing interval after rootstock planting		
	1995 Trunk cross-sectional area (TCSA cm^2)	
Trees planted 1993	Butte	Sutter
Myro 29C budded 1992 (prior to planting out)	8.6 c	23.6 b
Myro 29C budded 1994	17.0 b	--
Myro 29C budded 1995	25.3 a	53.6 a

Tree growth based on TCSA (cm^2) shows that trees budded prior to field planting (nursery budded) are restricted in growth as compared to the same age rootstock where buds are placed into the unbudded rootstocks 2 or 3 years later. Tree growth on the unbudded trees would have been even greater if not for the severe pruning that was done to control the extensive vigor to shape these trees for field scaffold budding.

No tree loss occurred from bacterial canker in 1995, in either the 1993 or 1995 high budding plantings from any of the budding treatments. Bacterial canker losses from existing trees in these plantings was very evident to all planting locations in 1995.

The increased growth response from the high budding and delayed budding treatments could help to reduce the incidence of bacterial canker with plum rootstocks.

Experiments conducted by English and Devay showed that fumigation or fumigation plus back-hoeing increased tree growth and significantly reduced the severity of bacterial canker in years four through seven corresponding to the period of greatest susceptibility. Methyl bromide treatments historically have increased tree growth, and it may be that high budding increases vigor, thereby making it possible for those trees to elude bacterial canker decline.

Since the establishment of the budding height experiments on Myro 29C, high budded trees have grown at least 50% faster than the conventional low budded practice. Lovell peach low bud trees, although unsuited for most soils on which prunes were grown, grow at least 25% faster than Myro 29C low bud.

A strategy of placing a bud higher on the rootstock at the nursery might be a more suitable alternative than planting a rootstock and scaffold budding. Although the unbudded trees will grow faster, multi-budding into scaffolds would be more costly to the grower, and the same result might be achieved by placing a bud higher into the rootstock. One disadvantage from high budding is the increased rootstock suckering, although less of a problem than replanting in bacterial canker sites.

Soil samples were collected at each experimental site and analyzed by DANR Analytical Laboratory, UCDavis (Table 6).

Table 6. Soil analysis of experimental budding height sites.					
County	% Organic matter	% Sand	% Silt	% Clay	Soil type
Glenn	1.14	54	36	10	sandy loam
Tehama	1.14	42	48	10	loam
Butte	0.68	68	22	10	sandy loam
Sutter	1.21	38	46	16	loam

Table 7. Inventory of 1995 budding height test trees.

				Orchard/County				
Bud type	Budding height	Rootstock	Year Planted	Butte	Sutter	Glenn	Tehama	Total # trees
French	low	myrobalan 29C	1995	21	15	17	20	73
French	medium 20"	myrobalan 29C	1995	31	20	18	20	89
French	high 36"	myrobalan 29C (budded 1995)	1995	20	22	19	19	80
French	low	Lovell peach	1995	23	13	18	20	74
French	scaffold (9/95)	myrobalan 29C	1995	8	14	13	8	43
French	low	myrobalan seedling	1993	12				12
French	low	myrobalan 29C	1993	2	6			8
French	low	Lovell peach	1993	9	9			18
French	high 36"	myrobalan 29C (budded 1994)	1993	14				14
French	high 36"	myrobalan 29C (budded 1995)	1993	13	10			23

Data on tree growth and bacterial canker incidence in relation to each of these four high budding plot locations will continue in the coming years.

Literature cited

Ogawa, J.M. and H. English. 1991. Diseases of temperate zone tree fruit and nut crops. Univ. Calif., Div. Agric. Nat. Res., Oakland, CA, Publ. 3345. 461 pp.