

2002 Season Fig Girdling Project Report

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A previous four year research project demonstrated trunk girdling of figs increased yield, the percentage of figs above standard size and higher net returns. The objective of this second experiment is to determine an easily field measurable biofix, or indicator, of when to girdle. This was to be the second year of a three year project but the results are consistent enough that the project can be terminated. This is a progress report on the 2002 year data and a final report will be submitted when Valley Fig completes their analysis of the DFA data.

Methods:

Twelve rows within a mature Black Mission fig orchard were grouped into 7 tree long sections of 5 trees each. These 7 different sections within each row were girdled at weekly intervals starting in mid May, 2001 and 2002: 5/17, 5/24, 6/1, 6/7, 6/15, 6/22 and an ungirdled control was maintained. Within these 5 tree sections, 1 tree was selected and 5 branches tagged. Weekly, the width of the centermost fruit on each branch was measured. The objective was to determine if fruit size could be used to determine when to girdle. All trees were harvested for yield data.

Results:

The effects of each weekly girdling on yield and fruit size grade are given in the three tables below.

**Table 1. Effect of Girdling on Black Mission Fig Yield
2001 and 2002**
Yield in Lbs/tree

Girdling Date	2001	2002
Control	88.2 c	32.8 b
5/17/02	123.5 a	44.0 a
5/24/02	117.9 ab	41.3 a
6/1/02	123.3 a	41.9 a
6/7/02	109.2 ab	43.4 a
6/15/02	111.9 ab	40.3 a
6/22/02	104.8 b	41.8 a

This table clearly demonstrates all dates had an equally significant effect on yield but that among the girdling dates, the earlier dates had the greater effects on yield. At 56 trees to the acre girdled trees would produced almost a ton more per acre in 2001 and slightly more than a half ton per acre in 2002:

$$(123.3 - 88.2 \text{ lbs/tree}) = (35.1 \text{ lbs more per tree}) \times (56 \text{ trees/acre}) = 1,965.5 \text{ lbs/acre}$$

$$(44.0 - 32.8 \text{ lbs/tree}) = 11.2 \text{ lbs more per tree} \times 56 \text{ trees/acre} = 672.2 \text{ lbs/acre}$$

**Table 2. Effect of Girdling on Black Mission Fig Size
2001
Percent of Figs in Each Size Grades**

Date	Std	Choice	X Choice	Fancy+XFancy+Jumbo	>Std
Control	33 a	47	18 c	2	67 b
5/17/02	21 b	48	27 abc	4	79 a
5/24/02	21 b	53	24 bc	2	79 a
6/1/02	16 b	47	33 a	4	84 a
6/7/02	18 b	49	29 ab	4	82 a
6/15/02	20 b	50	27 abc	3	80 a
6/22/02	19 b	51	27 abc	3	81 a
		NS		NS	

**Table 3. Effect of Girdling on Black Mission Fig Size
2003
Percent of Figs in Each Size Grades**

	Standard	Choice	X-Choice	Fancy	X-Fancy	Jumbo
Control	35.9a	44.4	17.9c	1.8	0.0	0.0
5/17/2002	19.5b	45.9	29.5a	5.0	0.1	0.0
5/24/2002	24.4b	46.7	24.2abc	4.4	0.2	0.0
6/1/2002	19.6b	42.9	30.2a	7.1	0.2	0.0
6/7/2002	20.3b	46.9	29.2a	3.6	0.0	0.0
6/15/2002	21.5b	49.9	25.7ab	2.7	0.2	0.0
6/22/2002	25.0b	49.7	21.4bc	3.7	0.1	0.0
	P=0.0001	NS	P=0.0073	NS	NS	NS

Tables 2 and 3 demonstrate the strongest effect of girdling is to significantly reduce the percentage of fruit in the standard size grade and increase the figs in all size grades above standard. However, all girdling dates proved equally effective as there were few significant differences among treatments in the grades above standard. The extra-choice size grade was the only exception.

**Table 4. Effect of Girdling on Total Marketable Crop
2002**

	Total Dry			Bird					Total	
	Yield	Floaters	Sinkers	Pecks	Broken	Sunburnt	ScaredDirt	Total Bad	Marketable	
5/17	44.0a	5.9a	38.1A	0.01	2.4bc	1.18ab	1.7	0.65	5.9bcd	34.2a
5/24	41.3a	4.7ab	36.6A	0.00	2.9ab	1.48a	2.0	2.54	7.1ab	29.5a
6/1	41.9a	4.4ab	37.4A	0.03	2.0bc	1.22ab	1.5	0.48	5.1cd	34.3a
6/7	43.4a	4.7ab	38.7a	0.00	2.3bc	1.69a	2.1	0.67	6.7abc	32.0a
6/15	40.3a	4.2b	36.0a	0.05	2.6abc	1.22ab	1.9	0.29	6.1abcd	30.0a
6/22	41.8a	3.5b	38.4a	0.02	3.6a	1.25a	2.2	0.56	7.7a	30.7a
Control	32.8b	1.9c	27.6b	0.02	1.8c	0.66b	1.9	0.23	4.5d	23.1b
	P=0.0089	P=0.0002	P=0.0296	NS	P=0.0276	P=0.0395	NS	NS	P=0.0095	P=0.0054

Figure 1 is the growth curve of a fig in mm. This figure demonstrates figs have a sigmoid growth curve, a fast growth stage followed by a slow growth stage followed by another fast growth stage. In the first stage cells are dividing, in the second little is happening, and in the third stage cells are increasing in size. Fruit size is result of cell number times cell size. It has generally been proven that cell size cannot be increased. Therefore, the only factor that could potentially increase fruit size is increasing fruit cell numbers. This is the logic behind fruit thinning; decreasing fruit number early during fruit growth so the remaining fruits compete more effectively for the tree's resources and have more cells per fruit. Then when the increased number of cells enlarge they produce a larger fruit. The growth curve here suggests the girdling is increasing the number of cells. This data suggests fig girdling should be done when second crop figs are 10 mm in or less in diameter. Figures 2 and 3 support this theory by demonstrating the most rapid growth rates are achieved with girdling before June 7th, when fig size is 10n mm or less in diameter. There are few significant differences between the control and girdled trees, or among girdled trees, in the rate of growth in mm/day.

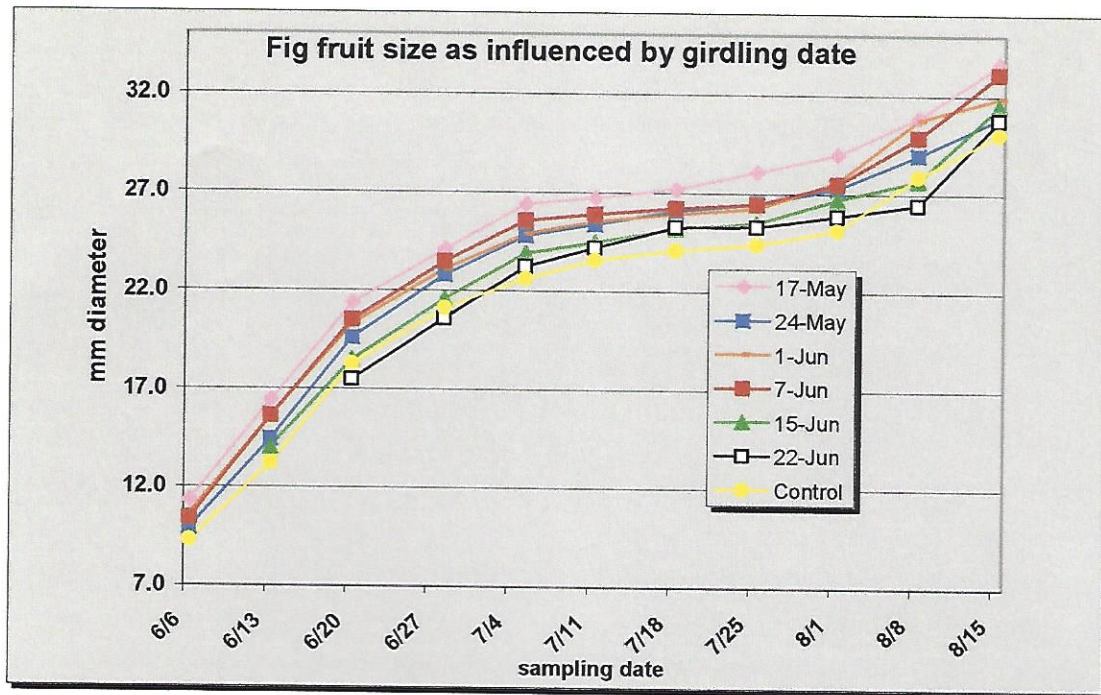


Figure 1. This is absolute size of fig fruit in mm on each date.

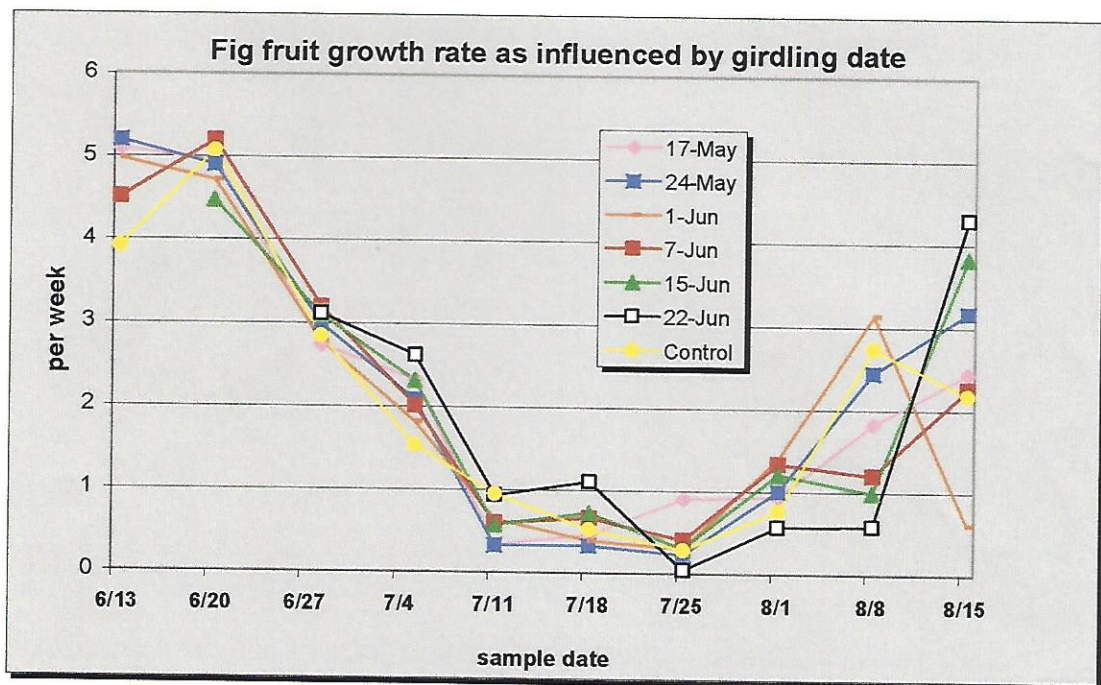


Figure 2. This is calculated as follows:

$$(\text{mm on later date} - \text{mm on earlier date}) = \text{mm growth/week.}$$

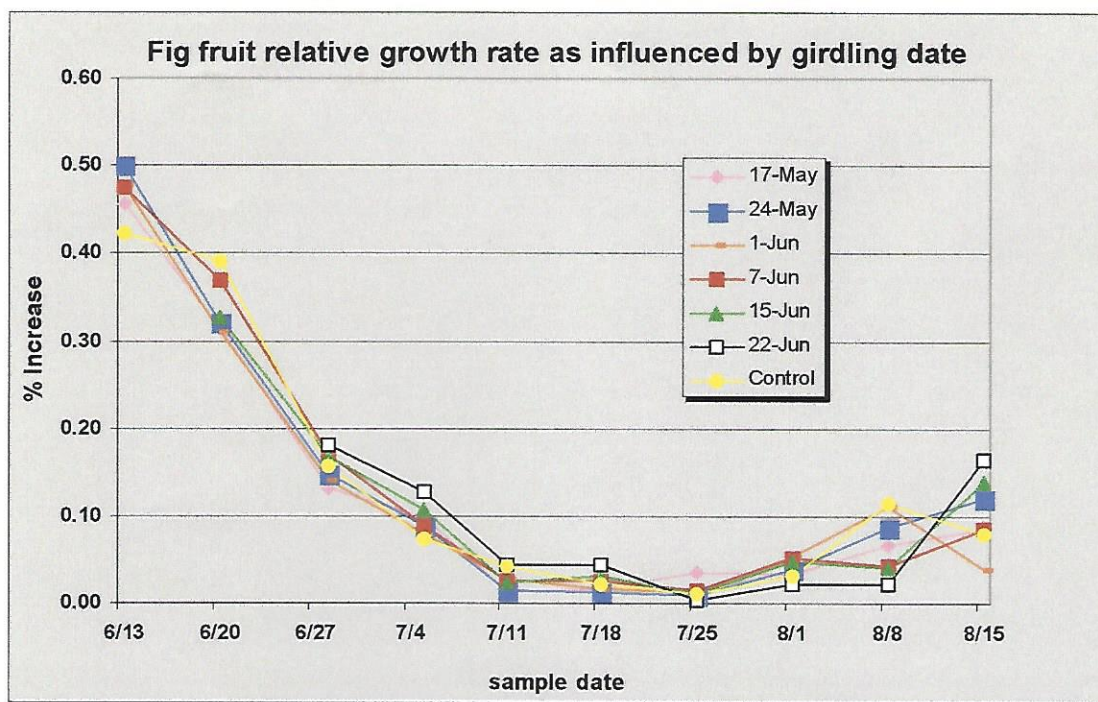


Figure 3. Each point is calculated as follows:

$$\left\{ \frac{\text{mm@ later date} - \text{mm @ earlier date}}{\text{mm @ earlier date}} \right\} = \% \text{ increase in growth from previous date}$$