ECONOMIC FEASIBILITY OF ALTERNATIVES DEVELOPED BY THE PACIFIC AREA-WIDE PEST MANAGEMENT PROGRAM

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Ultimately, the goal of the PAW-MBA program is to identify feasible alternatives to methyl bromide and promote adoption by growers. A feasibility analysis requires an economic component to test whether or not adoption of the alternative makes good business sense. Consequently, for each of the crop projects: almonds, walnuts, grapes, sweet potato, and cut flowers, an economic analysis will be conducted to compare the associated costs and the value of the yield responses to each of the alternatives. In so doing, the tradeoffs among alternatives from a business perspective will be illuminated. The background sections for each of the commodity based projects give specific information concerning the particular problems faced by that commodity.

Baseline cost and returns study have been developed for each of the commodities under consideration including almonds, walnuts, grapes, cut flowers (protea), and sweetpotatoes (Freeman, et al. 2008, Grant, et al. 2007, Ingels, et al. 2008, Lobo, et al., 2007, McGourty, et al. 2008, Stoddard, et al. 2007, and Verdegaal, et al 2008). Each of these studies includes detailed farming operations and associated inputs (equipment, labor, and materials) as well as expected yields and gross income. Analyses for almonds, peaches and grapes have been completed for previous years of the research project.

Almonds. The trees were planted in Madera in 2003 on a 22 by 14 foot spacing. The strip treatments were applied to 8.3 feet per row, accounting for 38 percent of the orchard floor. The application costs are based on local custom operator charges for both the fumigation and the tarp setup. The application costs for the different fumigants vary because of different equipment requirements. The tarp charge includes installation and materials.

The cumulative yield responses for the third through seventh years of the orchard (2006 – 2010) are shown in Figure 1. Overall, Telone C35 shows the highest yields followed by Chloropicrin, Telone II and Methyl Bromide. Strip fumigation showed higher yields for Chloropicrin but not for Telone II, Telone C35, or Methyl Bromide. Tarping the strip treatments increased yields slightly for Telone II and Methyl Bromide but not for Chloropicrin.

The costs for each of the control treatments, methyl bromide, and alternative materials and rates with and without tarps have been calculated for the first four years of the study (Table 1). The study considers broadcast and strip treatments of several alternative fumigants and then considers strip treatments with tarps. Obviously, the costs pre orchard acre are always lower for the strip treatments than the 100 per cent broadcast treatments and the strip with tarp is higher than the strip without tarp. Telone II is the lowest cost material followed by Telone C35, Chloropicrin and then Methyl Bromide.

Dividing the cost per acre by the yield increase per acre for the fumigation treatment gives the cost per pound of yield increase for each of the treatments. The results show that the range of cost per pound of increase range from $.27 (Telone II, strip) to $2.79 (Methyl Bromide broadcast) (Table 2). In all cases the strip treatments were more economically efficient than the broadcast treatments and the strip treatments without tarp were more efficient than the strip with tarp treatments. The ranking from most efficient to least efficient by fumigant is the same for the strip, strip plus tarp, and broadcast treatments with Telone II the most efficient and Methyl Bromide the least efficient for each category of treatments. For all of the fumigants strip was the most efficient followed by strip plus tarp and then broadcast with the exception of Telone II where the strip plus tarp was least efficient.

Peaches

Pre-plant treatments for peaches were made in the summer of 2008 with planting in February 2008 in Parlier, CA. The yields and tree circumferences were measured in July 2009, and 2010 the second and third leaf. Treatments varied with respect to fumigant materials, the percent of the area treated, and whether or not sudangrass was planted prior to treatments. The materials used were Methyl Bromide 98% plus Chloropicrin 2%, Telone C 35, Inline, and Chloropicrin. The percent of area treated include strip treatment over 42 percent of the orchard (Methyl Bromide and Telone C35), spot treatment on 8 percent of the floor through the drip system (Inline), and spot treatment on 15 percent of the floor (Telone and Chloropicrin). Each of the treatments were split with and without sudangrass. The sudangrass was planted in July 2008 and incorporated in September at a rate of 100 pounds. The cost per acre for seed was $150, irrigating the grass $50, and discing in the grass $14 for a total of $214 per acre. The total cost of treatment ranged from a low of $279 per acre for the spot treatment of Chloropicrin to a high of $1,101 per acre for the Methyl Bromine plus Chloropicrin and sudangrass (Table 3).

The yields for the third leaf showed Telone C35 to be the most effective treatment followed by Methyl Bromide, Chloropicrin, and Inline (Table 4). Sudangrass increased fruit production for Telone and Chloropicrin but not the other two fumigants. Telone was the only fumigant with both strip and spot treatments. The strip treatments outperformed the spot treatments with and without the sudangrass. The sizes of the peaches varied by treatment and are reflected in different values per box. Larger peaches receive a higher price per box. The value per box ranged from a high of $13.58 for the Methyl Bromide with sudangrass to a low of $10.23 per box for the Chloropicrin spot treatment (Table 4). Interestingly, the sudangrass increased the fruit quality for all of the fumigants except Telone that was the only fumigant showing an increase in yield from sudangrass. Subtracting the harvest costs and treatment costs from the income, the net returns are highest for the Telone C 35 strip followed by Telone C35 strip with sudan and then methyl bromide strip with Sudan. Chloropicrin spot showed the lowest net income despite having the second lowest costs per acre and a higher yield than Inline due to having the lowest quality ($ per box).

Third leaf data is too early to speculate on the long term impact of treatments on yield and tree growth. Commercial orchards do not achieve a marketable yield until the third leaf and full production by the sixth leaf. Another important caveat is that spot treatment of fumigants is not commercially available and the true cost of application is unknown. For this study we used the same application cost for spot treatment as strip treatment.

Table 1. Cost per Acre of Altnernative Fumigant and Tarp Treatments

		Percent			$ / Planted Acre			
	Rate	Area		Fumigant	Fumigant	Tarp	App.	Total
Fumigant	lbs/acre	Treated	System	$/lb.	$/acre	$/acre	$/acre	$/acre
Control								0
Control			tarped			658		658
MB 98%,CP 2%	400	100%	untarped	8.55	1,420		135	3,555
MB 98%, CP 2%	400	38%	untarped	8.55	1,300		135	1,435
MB 98%, CP 2%	400	38%	tarped	8.55	1,300	197	590	2,086
Telone II	340	100%	untarped	1.86	632		80	712
Telone II,	340	38%	untarped	1.86	240		80	320
Telone II,	340	38%	tarped	1.86	240	197	590	1,027
Telone C35	535	100%	untarped	3.50	1,873		80	1,953
Telone C35	535	38%	untarped	3.50	712		80	792
CP	400	100%	untarped	4.80	1,920		80	2,000
CP	400	38%	untarped	4.80	730		80	810
CP	400	38%	tarped	4.80	730	197	590	1,516

Table 2. Cost per Pound of Yield Increase by Treatment

Fumigant	Strip	Strip + tarp	Broadcast
Methyl Bromide	1.65	1.94	2.79
Telone II	0.27	0.79	0.28
Telone C35	0.35	NA	0.66
Chloropicrin	0.34	0.88	1.19

Table 3. Costs of alternative preplant treatments for peaches, Parlier, CA

Treatment	Fumigant	Application	Sudan	Total
Control	0	0	0	0
Control + Sudan	0	0	214	214
MB strip	1,436	135	0	1571
MB strip + Sudan	1,436	135	214	1785
Telone C35 strip	776	80	0	856
Telone C 35 strip + Sudan	776	80	214	1070
Telone C 35 spot	277	80	0	357
Telone C 35 spot + Sudan	277	80	214	571
Inline spot	151	100	0	251
Inline spot + Sudan	151	100	214	465
Chloropicrin spot	288	80	0	368
Chloropicrin spot + Sudan	288	80	214	582

Table 4. Yields, value, and net income from alternative preplant treatments for peaches

Treatment	Boxes per Acre	$/Box	Income/Acre Minus Harvest	Income/Acre Minus Harvest & Treatment
Control	246	$12.98	$1,472	$1,472
Control + Sudan	524	12.22	2,735	2,521
MB strip	1,085	13.02	6,528	4,957
MB strip + Sudan	1,072	13.58	7,054	5,269
Telone C35 strip	1,258	13.5	8,180	7,324
Telone C 35 strip + Sudan	1,397	12.38	7,520	6,450
Telone C 35 spot	794	13.15	4,886	4,529
Telone C 35 spot + Sudan	945	11.98	4,706	4,135
Inline spot	762	12.19	3,956	3,706
Inline spot + Sudan	715	11.96	3,541	3,077
Chloropicrin spot	896	10.23	2,897	2,529
Chloropicrin spot + Sudan	975	11.22	4,113	3,531

Figure 1. Almond yield response, cummulative Yield 2006 -2010