ECONOMIC PERFORMANCE OF ALTERNATIVE PREPLANT FUMIGATION TREATMENTS FOR ALMONDS

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Economic analyses were prepared for alternative preplant fumigation treatments comparing costs and the value of yield response to performance of methyl bromide. The costs of materials, tarp, and application were obtained from local suppliers. All other production costs were equivalent across treatments and so were not included in the analysis. The values calculated were the costs per acre for the preplant treatment, the cumulative yield increase above the control treatment yield, and the cost per pound of increased yield attributable to the fumigation. The cost per pound of increase is calculated by dividing the cost of the fumigation treatment by the cumulative yield increase over the control treatment. The cumulative yield increase over the control is the sum of the differences in yield between the alternative treatment and the control for each year of the experiment thus far. The treatment with the lowest cost per pound of increase is the most economically efficient treatment. The treatment with the highest cumulative yield is not necessarily the most economically efficient because the cost of achieving the yield increase (the cost of fumigation) may be too great compared to the cost of the other treatments.

The cumulative yields for each treatment are re-calculated every year to add the additional annual yield response information. Therefore, the cost per pound of increase will decrease every year as another year of yield data is added. In other words, the cumulative number of pounds of increased yield will increase every year as another year of results is added to the cumulative yield response but the one-time cost of the fumigation remains unchanged. Thus, the numerator stays unchanged while the denominator increases resulting in a decreasing value for the cost per pound of increase from one year to the next. This means that the relative efficiency of the treatments is the key result, not the absolute values of the cost per pound numbers.

Firebaugh, Madera County Almond Trial

Almond trees were planted in 2003. Yields were measured thus far in 2006 through 2009, the third through 6th leaf. Measurements will continue to be taken annually. The fumigant alternatives were chloropicrin, methyl bromide, methyl bromide 98% plus chloropicrin 2%, telone C35, telone II, and 50/50 methyl bromide plus iodomethane. The treatments were split into full floor, strip (38% of the floor), and strip with tarp.

For each material, the highest cumulative four year yields were achieved by the full floor treatments except for chloropicrin where the strip treatment showed the highest yield. For telone II and methyl bromide plus chloropicrin, the tarp increased yields slightly. (There was no strip plus tarp treatment for telone C35.)

As mentioned above, the cost of materials, tarp, and application were acquired from local input suppliers and applicators. Obviously, the strip treatments reduced the material and application cost to 38% of the full floor treatments making this the lowest cost treatment for each material. The VIF tarp added $350 per acre for material and installation. Not surprisingly, the three highest cost treatments were the full floor treatments; methyl bromide plus chloropicrin ($2,200 per acre), chloropicrin ($2,000 per acre), and telone C35 ($1,800 per acre). However, the substantially lower cost of the telone II material resulted in the full floor treatment showing a lower cost than the strip treatments for the other three materials (Table 1).

Looking at the cost per pound of yield increase over the control, chloropicrin and telone C35 strip treatment showed the lowest cost at $ .36 per pound. Despite being the lowest cost material, telone II strip showed a cost of $ .38 per pound due to demonstrating the poorest yield increase from treatment. Methyl bromide plus chloropicrin strip treatment cost $1.09 per pound of increase and the full floor treatment cost $1.96 per pound. All of the materials showed a significantly higher cost per pound of increase for the full floor treatments compared to the strip treatments except for telone II where the broadcast treatment showed a cost of $ .37 per pound compared to $ .38 per pound for the strip treatment. This results from the low cost of telone II and the substantially better yield performance of the full floor treatment compared to the strip treatment.

It should be emphasized, that as more years of results are added the cost per pound of yield increase will go down because the numerator (cost per acre) will remain unchanged and the denominator (cumulative yield increase) will go up every year with the additional year of data. Consequently, the cost per pound of increase will go down each year for each treatment. However, the relative cost efficiencies will still depend on the relative costs and the relative yield performance. Therefore, the current ranking will only change if the ranking of yield performance changes in the remaining years of the experiment.

Table 1. Almond preplant fumigation alternatives, costs and cumulative yields 2006 – 2009

	Strip + tarp	Strip	Broadcast
	Yield (pounds per acre cumulative 2006 - 2009)		
Chloropicrin	8,874	**9,176**	8,541
Telone C 35		8,947	***9,560***
Telone II	7,851	7,701	**8,736**
Methyl Bromide 98% + Chloropicrin 2%	7,844	7,838	**8,196**
Control	6,970	**7,073**	**7,073**
	Yield increase due to fumigation (pounds per acre 2006 – 2009)		
Chloropicrin	1801	**2,103**	1,468
Telone C 35		1,874	***2,487***
Telone II	778	628	**1,663**
Methyl Bromide 98% + Chloropicrin 2%	771	765	**1,125**
	Cost per acre of alternative fumigation treatments		
Chloropicrin	1,120	**760**	2,000
Telone C 35		**684**	1,800
Telone II	589	***236***	620
Methyl Bromide 98% + Chloropicrin 2%	1,178	**836**	2,200
	Cost per pound of yield increase		
Chloropicrin	.61	***.36***	1.36
Telone C 35		***.36***	.72
Telone II	.76	**.38**	.37
Methyl Bromide 98% + Chloropicrin 2%	1.53	**1.09**	1.96

1/ Bold indicates best performance for each material. Italics indicates best performance overall.