ECONOMIC FEASIBILITY OF NON-FUMIGANT SYSTEMS IN CA STRAWBERRY BUFFER ZONES

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EPA regulations require buffer zones for the use of methyl bromide and chloropicrin ranging from 25 feet to a half a mile depending on a number of factors including the size of the block, pounds of active ingredients applied, whether or not the application is tarped, the type of tarp, and the proximity to difficult to evacuate sites. Growers have several alternatives in managing these buffer zones including leaving them fallow, planting an alternative cash crop without fumigation, and non-fumigant management techniques including ASD and steam. We will analyze the economic feasibility of using ASD or steam in buffer zones for strawberry production in California. We estimate the minimum economically feasible buffer size for each of the two alternative soil treatments.

Monterey Bay Academy Trial. Field experiments were conducted in Watsonville during the 2010-2011 and 2011-2012 seasons. The experiment compares several non-fumigant soil treatments including mustard seed meal alone (1.5 tons), ASD with rice bran (9 tons), mustard seed meal (1.5 tons) and ASD with rice bran (7.5 tons), steam, and steam with mustard seed meal (1.5 tons). In addition, PicChlor 60 fumigation and an untreated control are included.

For each treatment the monthly marketable yields are determined from April through September from the field trial results. Monthly prices received by growers for fresh strawberries are based on USDA data. The total income for each treatment is calculated by multiplying the monthly yield by the monthly price to get the monthly income and then adding the monthly incomes. The costs of production are calculated for each treatment only for the costs that varied by treatment (Table 1). These included the cost of the carbon source, tarp, water, equipment, labor, fuel, and harvest. In other words, the costs that are identical by treatment such as planting costs and fertility costs are not included in the analysis.

The economic performances of two steam application techniques are evaluated: a stationary steam application and a mobile automatic steam application still in the prototype stage. We estimate the cost of a commercial applicator, 2-beds wide, to be $3,500 an acre. The prototype cost approximately $4,500 per acre. The stationary steam application costs are estimated at $10,207 per acre.

Therefore, the feasibility of steam is greatly increased with the development of the mobile unit. The economic analysis considers steam at the cost of the stationary unit and the projected cost of a commercial mobile unit.

The Pic-Clor 60 treatment showed the highest revenue and the highest net returns above harvest and treatment costs (Table 2). Steam with mustard showed the second highest revenues, almost $9,000 an acre higher than steam alone and more than offsetting the cost of the mustard seed meal. Mustard also increased the revenue of the ASD treatment. However, the increase in revenue did not offset the increased cost for ASD as it did for steam. ASD showed the second highest net revenue and ASD + mustard showed the third highest net revenue above treatment and harvest cost.

Watsonville and Salinas Trials. Analyzing data from field trials in the 2011-2012 growing season, we found that at both sites, Pic-Clor 60 resulted in higher net revenues than steam did using a cost of $4,500 per acre for steam. Experience from adoption of drip fumigation and totally impermeable tarps (TIF) suggests that there is potential for the net revenue from steam to increase as applicators learn how to use the new technology more efficiently. In the case of steam, learning would result in a shorter application time, decreasing costs. Researchers' repeated experience applying steam over multiple years of field trials has demonstrated that there is great potential for application time reduction.

Reflecting this reality regarding innovations, we incorporated expert opinion regarding the distribution of potential reductions in the application time into the analysis. Unsurprisingly, we found that when this standard learning effect was included the mean net revenue for steam at both sites increased. More important than the qualitative effect was that at the Watsonville site net revenues from steam exceeded those from Pic-Clor 60, and it became the preferred soil disinfestation treatment. In other words, steam has the potential to be an economically viable alternative to pre-plant soil fumigation in some cases given reductions in application time that can reasonably be expected to be achieved. Finally, steam is an energy-intensive technology. Its economic feasibility is dependent on the price of propane. We demonstrated that with a lower propane price, the difference of the expected net revenue of switching from Pic-Clor 60 to steam becomes positive for Watsonville and the magnitude of the difference of the expected net revenue at the Salinas site becomes smaller.

REFERENCES

Bolda, Mark, Laura Tourte, Karen Klonsky, and Richard DeMoura. 2010. Sample Costs to Produce Strawberries: Central Coast Region. University of California Cooperative Extension.

Table 1. Cost per Acre of Inputs

Material	Amount	Unit	$/unit	$/acre	Applied treatment
Pic-Clor 60				$1,200.00	Pic-Clor 60
Rice bran	9	Tons	$200.00	$1,800.00	ASD
Rice bran	7.5	Tons	$200.00	$1,500.00	ASD+MSM
Mustard seed meal (MSM)	1.5	Tons	$1,600.00	$2,400.00	ASD+MSM, Steam+MSM, MSM
Shipping for rice bran	9	Tons	$30.00	$270.00	ASD
Shipping for MSM	7.5	Tons	$30.00	$225.00	ASD+MSM
Shipping for MSM	1.5	Tons	$30.00	$45.00	ASD+MSM
Water	3	Acre-inch	$21.67	$65.01	ASD, ASD+MSM

Table 2. Income, Costs, and Net Returns Above Harvest Cost and Net Revenue Above Harvest and Treatment Costs per Acre for Monterey Bay Academy Trial 2012

Treatment	Treatment Costs	Harvest Cost	Total cost	Revenue	Revenue-harvest	Revenue-harvest-Treatment
Control		11,486	11,486	21,843	10,357	10,357
Mustard	2,430	17,282	19,712	32,859	15,577	13,147
Steam[1/]	3,500	16,851	20,351	32,240	15,389	11,889
Steam[2/]*	10,207	16,851	27,058	32,240	15,389	5,182
ASD	2,135	19,406	21,541	36,895	17,489	15,354
Steam+Mustard[1/]	5,930	21,815	27,745	41,377	19,562	13,632
Steam+Mustard[2/]	12,637	21,815	34,452	41,377	19,562	6,925
ASD + Mustard	4,220	21,616	25,836	40,833	19,216	14,996
Pic-Clor 60	1,200	23,974	25,174	45,374	21,400	20,200

1/ Steam cost is $3,500 per acre, the predicted cost of a commercial mobile applicator
2/ Steam cost is $10,207 per acre using a stationary applicator