GROWER FIELD DEMONSTATION TRIALING OF METHYL BROMIDE ALTERNATIVES IN FLORIDA STRAWBERRY

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Environmental problems with the soil fumigant methyl bromide, coupled with the continued reliance of growers on existing and internationally approved supplies, have led to the urgent need to implement alternative methods for managing soilborne nematodes, weeds, and disease problems into the farming practices of Florida fruit and vegetable growers. With the depletion of existing supplies and diminishing levels of approved levels within critical use exemptions (CUE) for methyl bromide, large scale grower field trials are needed to demonstrate the efficacy and economics of alternative methods of weed, nematode, and disease control. This USDA CSREES project was funded to demonstrate and improve the performance and consistency of chemical alternatives to methyl bromide. Efficacy of next-best chemical tactics were evaluated in large scale, grower field demonstration trials. Alternative chemicals evaluated include individual and or combined use of chloropicirin, 1, 3-dichloropropene, and methyl iodide with use of appropriate herbicide(s). Secondary objectives were to evaluate the feasibility of using high barrier (Pliant Blockade) or gas impermeable (VIF) mulch films to reduce emissions and soil fumigant field application rates and to compare crop yield and pest control efficacy of alternatives to that of methyl bromide.

Emission Reduction / VIF trials: These trials were part of a continuing effort to identify and evaluate alternatives to methyl bromide for sting nematode, *Belonolaimus longicaudatus*, management in Florida strawberry. Overall, fifteen emissions reduction studies evaluating alternating strips (replicated plots) of high barrier mulch film (Pliant Blockade) to reduce methyl bromide field application rates by 50 to 75% and to compare crop growth and pest control efficacy with treatments utilizing standard low density polyethylene (LDPE) film. In some trials, methyl bromide chloropicrin (67/33) fumigation rates were not reduced with the high barrier mulch to determine if nematode control inconsistencies in problematic fields could be resolved by increased rate and improved containment of methyl bromide. In general, Carolina geranium (*Geranium carolinianum)* and nutsedge control (*Cyperus esculentus* and *C. rotundus*) were the primary weeds observed in most trials. In general the results from these trials with high barrier Pliant Blockade mulch demonstrated to was possible to reduce the methyl bromide application rate by 50% without significant (P#0.01) loss in nutsedge control obtained with

methyl bromide applied at a full dose under LDPE (Table 1). However, nutsedge control and plant size (crown diameter) were significantly (P#0.01) reduced with the 75% reduced rate at FSGA compared to that of methyl bromide applied at full dose under LDPE. At none of the field demonstration sites were substantial differences in the incidence of dead or decline plants per 15 m row ever observed between half rates of methyl bromide chloropicrin (67/33) and Pliant Blockade, compared to standard use full rates with LDPE. At two sites (Favorite Farms, BDukes), the Pliant Blockade treatments without methyl bromide chloropicrin rate reduction provided significant improvement in overall plant size to that of standard LPDE mulch and a maximum, overall methyl bromide chloropicrin (67/33)fumigation rate.

Alternative Chemical Trials: Three grower field studies focused on a co-application approach of different fumigants, herbicides, and other alternative tactics to achieve pest control efficacy and crop growth response similar to that of methyl bromide. Among the sites, treatments included broadcast equivalent methyl bromide chloropicrin 67/33 (350 lb/a), Dimethyl Disulfide (DMDS) (79%) Chloropicrin (21%) (74 gpa), methyl iodide chloropicrin 50/50 (175 lb/a), and Telone C35 (17 gpa) plus Goal herbicide. Assessments of plant growth were made as appropriate during the course of the season to characterize differences in plant size, health, and vigor. Following chemical treatment, weed densities (i.e., nutsedge germination within 15 m of row) were monitored and recorded on a periodic basis to determine differences in weed control. An untreated control was not included for comparison in any trial. With the exception of DMDS, all treatments were arranged within their respective experimental areas as a completely randomized block design with 3 or 4 replications per treatment. Based on the overall results of the different farm demonstration trials, no significant differences in strawberry yield were observed between any of the different fumigant treatments (Figure 1,2,3). No significant (P#0.05) differences in numbers of dead, decline, or weed densities among treatments were observed season long

GENERAL SUMMARY:

- $ In these trials, a number of alternative fumigants produced yields which were higher or equivalent to that of methyl bromide chloropicrin.
- $ There are apparent limits to the extent to which methyl bromide use rates can be reduced without loss of pesticidal efficacy and crop growth performance.
- $ Based on results from the fifteen field scale demonstration trials conducted during the 2006 – 2007 season, many strawberry growers could be transitioned to the high barrier, more gas impermeable plastic, allowing them to reduce field application rates of methyl bromide by 50% without consequence

Table 1. Results of fifteen grower field demonstration trials evaluating alternating strips (replicated plots) of high barrier, gas impermeable mulch film (Pliant Blockade) to reduce methyl bromide chloropicrin (67/33) field application rates by 50 to 75% and to compare crop growth and pest control efficacy with treatments utilizing standard low density polyethylene (LDPE) film. In general, the grower standard fumigant application rate was between 320 to 350 lb per treated acre under LDPE were.

	Farm Location	Rate Reductions Evaluated	Overall Treatment Performance Compared to MeBr Grower standard
1	BDukes	0% , 50%	50% produced NSD; 0% significantly increased plant size
2	Ferris	50%	NSD
3	Favorite	0%, 50%	50% produced NSD; 0% significantly increased plant size
4	WBorder	50%	NSD
5	CGrooms	50%	NSD
6	RGriffin	0%, 50%	NSD
7	EMercer	50%	NSD
8	MSewell	50%	NSD
9	RBlanco	50%	NSD
10	JStickles	50%	NSD
11	RSapp	50%	NSD
12	RHutto	50%, 75%	NSD
13	RGoodson	0%	No visual differences observed
14	FSGA	50%, 75%	50% produced NSD, 75% resulted in significantly higher weed densities
15	JDukes	50%	NSD

NSD = No Significant Difference (P=0.05) detected with grower standard methyl bromide treatment

Figure 1. Cumulative monthly yields of marketable strawberry fruit, in response to three shank applied fumigant treatments under high barrier, gas impervious plastic mulch (Pliant Blockade). Floral City, FL., 2006-07

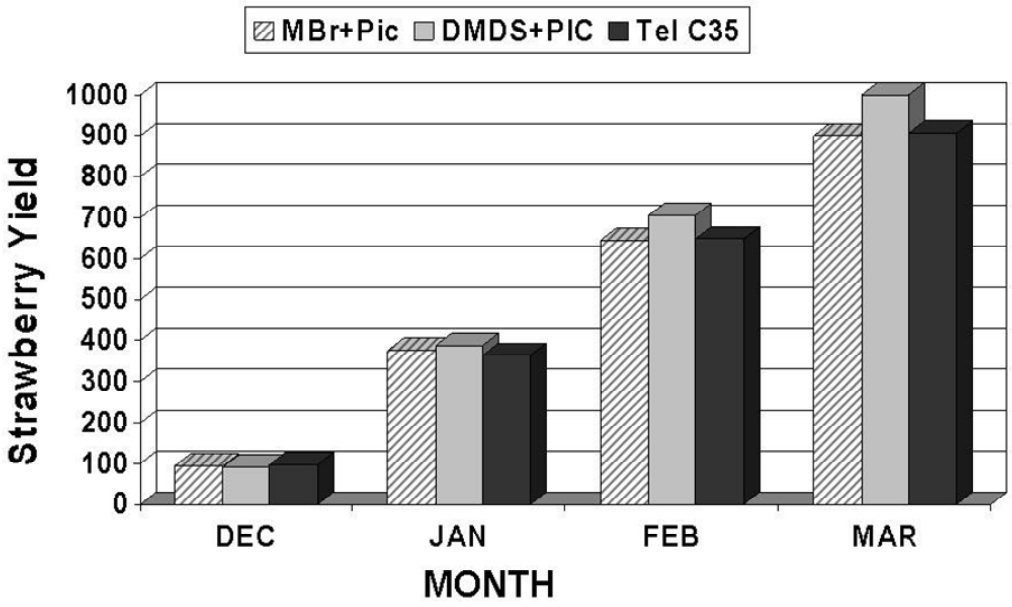

Figure 2. Cumulative monthly yields of marketable strawberry fruit (flats per acre), in response to three shank applied fumigant treatments under high barrier, more gas impervious plastic mulch (Pliant Blockade). FSGA, Dover FL., 2006-07

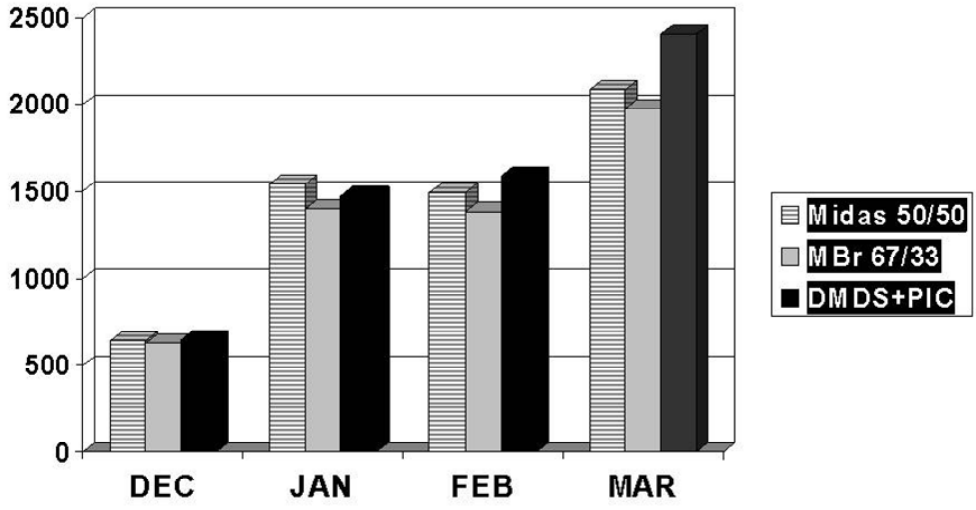

Figure 3. Total marketable yield of strawberry pounds fruit per acre, in response to various shank (2 or 4 chisels/bed) or drip applied (1 or 2 tapes/bed) fumigant treatments, under low density poly-ethylene (LDPE) or high barrier, more gas impervious plastic mulch (Pliant Blockade). Florida Pacific, Dover FL. 8, 2006-07