STRAWBERRY PRODUCTION WITH METHYL BROMIDE ALTERNATIVES; A FARMER'S PERSEPECTIVE

Cecil Martinez*, Strawberry Farmer, Martinez Farms, Oxnard, CA
Steve Fennimore, Extension Specialist, U.C. Davis, Salinas, CA
Husein Ajwa, Water Management Lab, USDA-ARS, Fresno, CA

Many of the individual methyl bromide alternative fumigants reportedly provide less consistent yield and weed control than methyl bromide. To evaluate the yield and weed control efficacy of eight methyl bromide alternative treatments, a study was initiated on September 9, 1999 in Oxnard, CA. Treatments evaluated were methyl bromide + chloropicrin (250 lbs/A of 67:33) shank applied to the bed, chloropicrin at 600 lb/A shank applied to the bed, chloropicrin at 600 lb/A shank applied to the bed followed by drip-applied metam sodium (MS) at 50 gal/A, drip-applied chloropicrin EC at 24 gal/A, drip-applied chloropicrin EC at 24 gal/A followed by drip-applied MS at 50 gal/A, drip-applied Inline at 35 gal/A, drip-applied Inline at 35 gal/A followed by drip-applied MS at 50 gal/A, shank-applied Telone C35 at 350 lb/A and shank-applied Telone C35 at 350 lb/A followed by drip-applied MS at 50 gal/A. These treatments were applied as preplant soil fumigants under sealed tarps. Nonreplicated plot sizes ranged from 0.06 to 0.26 acres. Bareroot 'Camarosa' were transplanted 14 inches apart in four rows on each bed on October 11, 1999. Farmer standard strawberry IPM production practices were followed throughout the growing season. The effects of the preplant soil fumigation treatments are based on the timing and cumulative fresh market yield in crates per acre taken on 12/27/99, 1/5/00, 3/3/00 and 4/20/00. Additionally, the effects of the preplant soil fumigation treatments are based on a weed count by species, and weeding times taken on 12/2/99, 12/27/99, 1/26/00, 2/23/00, 3/30/00 and 5/22/00.

Chloropicrin + MS and chloropicrin alone yielded 85% and 90% of the standard methyl bromide + chloropicrin treatment respectively (Table 1). Telone C35 + MS and chloropicrin EC + MS yielded 100% and 102% of the standard methyl bromide + chloropicrin treatment respectively. Inline, Telone C35, chloropicrin EC and Inline + MS yielded 119%, 122%, 124% and 126% of the standard methyl bromide + chloropicrin treatment respectively. Chloropicrin EC and Inline containing treatments had higher early yields than the standard methyl bromide + chloropicrin treatment, and also higher early yields of shank-applied chloropicrin or Telone C35. The treatments containing 600 lb/A chloropicrin shank-applied resulted in the lowest yields, possibly due to injury from the very high rate of chloropicrin carryover.

Drip-applied chloropicrin EC at 24 gal/A provided better weed control, and reduced weeding costs compared to shank-applied chloropicrin at 600 lb/A (Table 2). Drip-applied Inline at 35 gal/A also provided better weed control and lower weeding costs than shank-applied Telone C35 at 350 lb/A. Weed control provided by drip-applied chloropicrin EC, Inline or shank-applied Telone C35 were not improved by a sequential application of drip-applied MS at 50 gal/A. However, shank-applied chloropicrin at 600 lb/A followed by drip-applied MS at 50 gal/A did result in improved weed control compared to shank-applied chloropicrin at 600 lb/A alone.

Although some of the methyl bromide alternatives tested here show promise, there are a number of issues that need to be addressed yet for methyl bromide alternatives to 'work'. These include:

Regulatory

Buffer zones – both Telone C35 and Inline require a 300' buffer zone. This alone effectively puts many strawberry farmers out of farming near urban areas.

Township caps - both Telone C35 and Inline face severe limits on the amount that can be used in a township.

Chloropicrin – currently the allowable amount of straight chloropicrin with which one can preplant soil fumigate varies from zero to that contained in the farmer's current standard preplant methyl bromide + chloropicrin treatment; the allowable amount one can use depends on the county one farms in in California.

Virtually Impermeable Films (VIF) – VIFs are getting better, but they are still not viable in terms of cost, quantity, quality and delivery. We can not farm well with zero cost-benefit, not enough, almost good enough and 'any time now'.

Efficacy

Some of the methyl bromide alternatives test on my farm faired well relative to methyl bromide. However, my farm does not have a high level of soil borne disease or weed pressure compared to other farms. What is needed is a consistent, reliable level of efficacy against pests across farming situations and areas. It will take a number of years under methyl bromide alternatives to really see how efficacious they are against soil borne pests, primarily weeds and soil borne fungal pests.

Cultural

The plant-back period of 4-6 weeks beyond that of the existing methyl bromide plant back requirement has far reaching implications. Under methyl bromide alternatives one has to start ground working earlier, which means the farmer will have to give up the end of his strawberry crop (and any profit he had hoped to make!). For those strawberry farmers that rotate with and follow vegetables, one rain event may prevent getting vegetables out and strawberries in, or strawberries out and vegetables in; in any event, it is possible someone could end up buying someone's crop and his way out of farming.

Time

We need time. We need time to learn how to modify the existing strawberry cropping system to use methyl bromide alternatives. Nursery fumigation, nursery location, cultivar, digging and planting dates, fruit field preplant soil fumigation material, application method, application rates, fertilizer rates and timing , etc. all need to be considered when switching away from methyl bromide, and there is very little time to redo decades of work before methyl bromide is no longer available.

Table 1. Yield in crates per acre at four picking dates during the 1999-2000 season.

Fumigant	Application method	Rate	Crates/A 12/27/99	Crates/A 1/5/00	Crates/A 3/3/00	Crates/A 4/20/00	Crates/A Total	Total Crates/A as % of MeBr/Pic
Methyl bromide + chloropicrin	Shank	250 lbs/A of 67:33	0.2	4.7	23.5	207.4	235.8	100.0%
Inline + MS	Drip/Drip	35 gal/A + 50 gal/A	2.7	23.5	46.3	225.8	298.3	126.5%
Chloropicrin EC	Drip	24 gal/A	1.2	12.5	37.0	242.0	292.7	124.1%
Telone C35	Shank	350 lbs/A	1.1	15.8	45.7	224.6	287.2	121.8%
Inline	Drip	35 gal/A	1.8	23.0	51.8	204.6	281.2	119.3%
Chloropicrin EC + MS	Drip/Drip	24 gal/A + 50 gal/A	1.6	13.3	44.0	181.5	240.4	102.0%
Telone C35 + MS	Shank/Drip	350 lbs/A + 50	0.5	8.1	51.2	176.0	235.8	100.0%
Chloropicrin	Shank	600 lbs/A	0.2	4.8	30.9	176.0	211.9	89.9%
Chloropicrin + MS	Shank/Drip	600 lbs/A + 50 gal/A	1.2	12.9	32.1	154.7	200.9	85.2%

Table 2. Number of little mallow per acre, total weeds per acre, and weeding costs per acre.

Fumigant	Application method	Rate	mallow (no./A)	Total weeds[a] (no./A)	Weeding cost[b] ($/A)
Methyl bromide + chloropicrin	Shank	250 lbs/A of 67:33	2,446	3,765	193
Chloropicrin	Shank	600 lbs/A	4,333	5,736	269
Chloropicrin + MS	Shank/Drip	600 lbs/A + 50 gal/A	2,940	4,141	202
Chloropicrin EC	Drip	24 gal/A	1,382	2,335	133
Chloropicrin EC + MS	Drip/Drip	24 gal/A + 50 gal/A	2,363	3,766	193
Inline	Drip	35 gal/A	2,073	3,318	174
Inline + MS	Drip/Drip	35 gal/A + 50 gal/A	4,024	5,602	268
Telone C35	Shank	350 lbs/A	4,740	5,984	299
Telone C35 + MS	Shank/Drip	350 lbs/A + 50	4,924	6,256	302

[a] Includes little mallow

[b] Weeds were assayed on 12/2/99, 12/27/99, 1/26/00, 2/23/00, 3/30/00 and 5/22/00, and therefore costs reported h only represent a portion of the total yearly weeding costs.