Fig 1

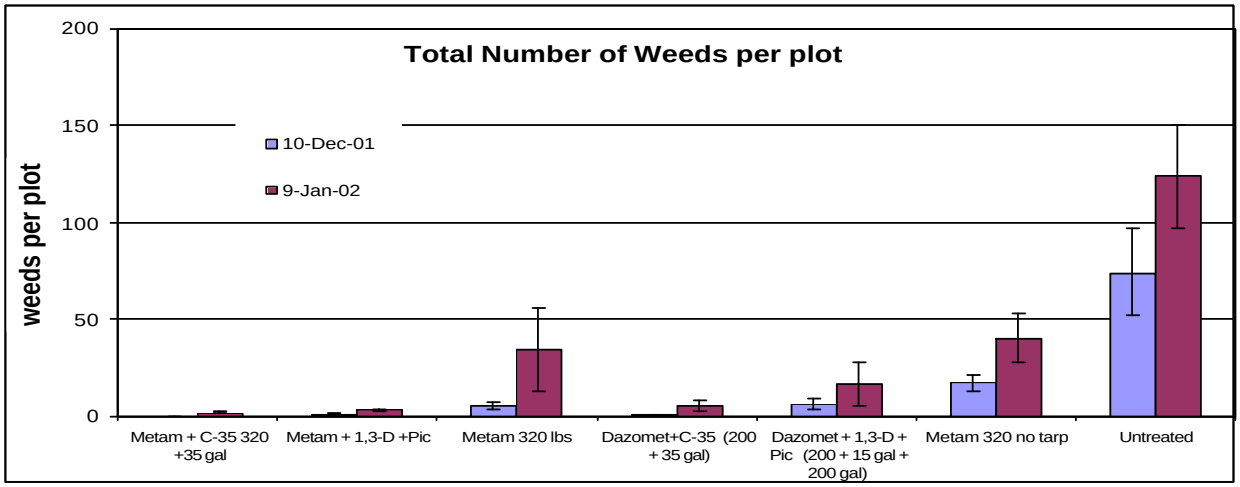


Fig 2

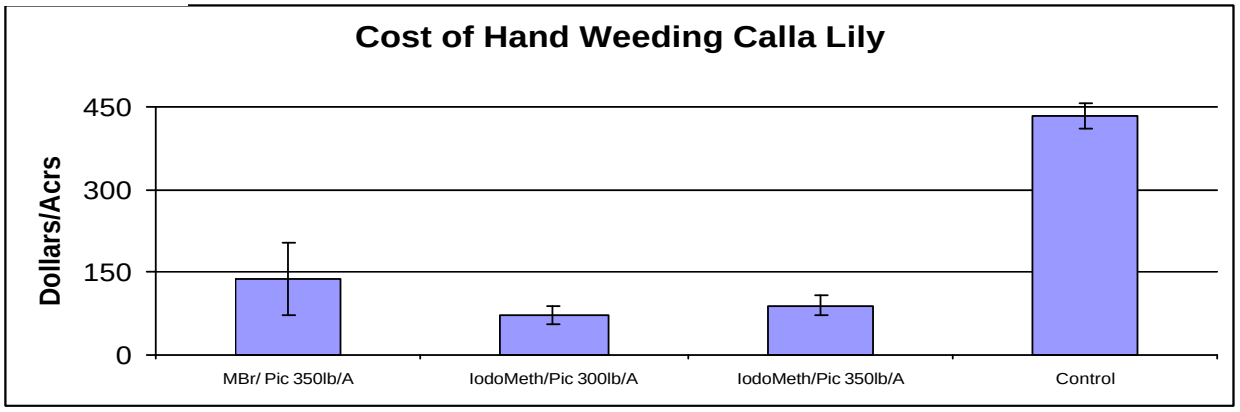
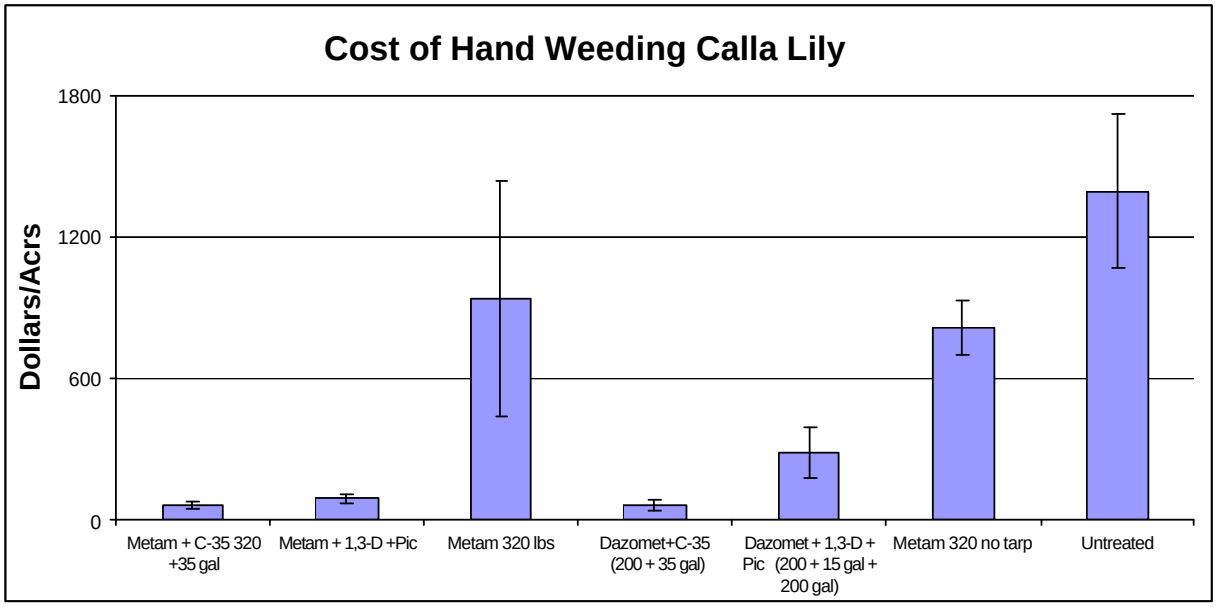


Fig 3



Alternatives to Methyl Bromide in Cut Flower Production in California

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Weeds and their control constitute a major segment of the field-grown flower pest management budget. In the absence of methyl bromide, and with few or no selective pre-emergence herbicides available, weed control costs, and the effort needed to control them will increase. With these changes the frequency and overall number of cultivations, both mechanical and by hand will likely increase. Several combinations of preplant pesticides are being evaluated in search of one or more, broad-spectrum control treatment that may be an effective alternative to methyl bromide.

Two sites were selected in major flower growing regions of California. The first site Año Nuevo Flower Gardens located just north of Monterey Bay is planted with several cut flower species with Calla Lily, Column Stock, and Delphinium being evaluated in this test. The second site, Glad-A-Way Gardens located east of Santa Maria on the Central Coast, is primarily a producer of Gladiolus corms and cut flowers. Weed control and phytotoxicity were evaluated at both sites. Two separate trials were initiated at each site. These trials were designated 'Wet' (moisture above 40% at 6 inches at Año Nuevo and 25% at Glad-A-Way) and 'Dry', below field capacity (moisture 10-20% at 6 inches at Año Nuevo and 16% at Glad-A-Way). Soil analysis for Año Nuevo showed pH 5.2, Organic matter 2.7%, Sand 20%, Silt 41%, and Clay 39% classified as a silty clay loam The soil at Glad-A-Way had a pH of 7.2, Organic matter 1.1%, Sand 47%, Silt 38%, and Clay 15% and is classified as a loam. Large plots were established with a length of 150 ft and width of 15 or 17 ft with 4 replications in a randomized complete block design. All treatments were applied by a commercial applicator (Tri-Cal Inc. Hollister CA) on August 27, 2001 at Glad-A-Way, and October 23, 2001 at Año Nuevo

'Dry' Treatments

1) methyl bromide/chloropicrin(50:50) mixture: 350 lb/A
2) iodomethane/chloropicrin(50:50) mixture: 300 lb/A
3) iodomethane/chloropicrin (50:50) mixture: 350 lb/A
4) Untreated Control: Tarped

All treatments were made with shanks to a depth of 18 inches and immediately tarped with 1.1 mil polyethylene tarp

'Wet' Treatments

1) metam sodium: 75 gal/A + Telone C-35(1,3-D 81% + chloropicrin 35%): 35gal/A
2) metam sodium: 75 gal/A + 1,3-D: 15 gal/A + chloropicrin: 200 lb/A
3) metam sodium: 75 gal/A
3) dazomet: 200 lb/A + Telone C35: 35 gal/A
4) dazomet : 200 lb/A + 1,3-D: 15 gal/A + chloropicrin: 200 lb/A
5) metam sodium: 75 gal/A (not tarped)
6) Untreated Control: Tarped

Metam was applied with a blade and incorporated to a depth of 8 inches and then power rolled. Subsequent 1, 3-D or chloropicrin applications were made using a second implement to a depth of 18 inches with shanks that also applied 1.1 mil polyethylene tarp.

Dazomet was applied using a Scotts drop spreader onto soil surface then incorporated to a depth of 8 inches by a power roller. Subsequent 1, 3-D or chloropicrin applications were made using a second implement to a depth of 18 inches with shanks that also applied1.1 mil polyethylene tarp.

Results

Año Nuevo

Weed control was excellent with methyl bromide/chloropicrin at 350 lb/A or with iodomethane/chloropicrin at 300 or 350 lb/A. Delphinium transplants were more vigorous when planted into methyl bromide/chloropicrin treated plots than in iodomethane /chloropicrin treatments. Plants in all treated areas were more vigorous than those in the control plots. Weed control in the metam+ C-35 or dazomet + C-35 treated plots was similar to methyl bromide and gave better weed control than metam alone or with tank mix combinations of 1,3-D and chloropicrin. Metam incorporated but untarped was not effective for weed control. Total weed and most individual weed species numbers were reduced by all treatments when compared to the untreated plots(Fig 1.)

Direct seeded Column stock appeared to be least affected by a dazomet + C-35 preplant treatment. Calla lily vigor was lowest in treatments with metam alone tarped, though number of shoots was not reduced significantly with any treatment. Vigor of Delphinium species did not appear affected by any preplant treatments. Time to hand weed plots was recorded and analyzed using grower supplied cost/hour of labor ($11.00). In the 'Dry' plots hand weeding costs were reduced by at least 75%, or $250 per acre in the Delphinium and 66% or nearly $300 per acre in the Calla Lily plots (Fig 2) when compared to the control. Weed pressure was much greater in the 'Wet' treatments and because of the multiple shoots of the Calla Lily plants hand weeding costs were $1391 per acre in the untreated plots (Fig 3). Metam alone, tarped or untarped, did not significantly reduce costs when compared to the control. All treatments with chloropicrin or 1,3-D greatly reduced this cost and were not significantly different from each other. The Delphinium transplant results mirrored those of the Calla plantings but, were substantially lower.

Glad-A-Way

Gladiolus bulbs were planted back into the iodomethane plots 9/4/01 (8 days after treatment and two days after the tarp was removed), 9/11/01, 9/18/01 and 9/25/01. When growth was evaluated no difference were found between dates of planting in the methyl bromide and iodomethane treatments. Visual differences were noted between treatments of several varieties gladiolus that were planted, though not replicated and therefore could not be analyzed. Within variety, S19-14 gladiolus growth was improved with any fumigation treatment. Iodomethane/chloropicrin increased growth of both S359 and HY gladiolus varieties over the control or methyl bromide/chloropicrin in this study.

In the 'Wet' experiment excellent weed control was apparent with all treatments compared to the control and gladiolus vigor was exceptional. Gladioli cormlets (volunteers) were an extensive weed in the 'Dry" experiment where all methyl bromide and iodomethane treatments reduced the number of cormlets per plot by more than 95 percent.