

WEED POPULATIONS IN NURSERIES AS AFFECTED BY METHYL BROMIDE AND ALTERNATIVE FUMIGANTS

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Introduction:

Methyl bromide (MB) has been used for several decades as a broad-spectrum pre-plant soil fumigant for many crops, including perennial fruit and nut trees. Methyl bromide is not only an effective fumigant but it also provides long-term control of several weed species. The MB phaseout thus presents a critical challenge to US agriculture, and deciduous fruit and nut crops are among those most severely affected. Failure to control weeds with pre-plant fumigation results in high labor costs for weeding at nurseries where pre- and post-emergence herbicides cannot be used around the young, developing tree seedlings and cuttings. The objective of this study was to determine the effect of MB and alternative fumigants on weed seed survival, weed population dynamics, and hand weeding time in almond and walnut nurseries.

Materials and Methods:

Studies were conducted at four locations in California. Two studies were conducted in 2003/2004 and two in 2004/2005. The treatments common in all four locations were: non-fumigated control; MB:PIC standard, 400 lb/ac; Iodomethane (IM:PIC), 400 lb/ac, HDPE; Telone C35, 544 lb/ac, HDPE; and Telone C35, 544 lb/ac, VIF. An additional treatment (Telone II, 354 lb/ac, HDPE) was included at three locations and Inline, 544 lb/ac, HDPE was included at two locations. The experimental design was a randomized complete block with four replications. Plot sizes varied across locations and ranged from 80-90 feet long and 22-33 feet wide.

Fifty seeds of field bindweed (*Convolvulus arvensis*), common mallow (*Malva parviflora*), annual morningglory (*Ipomoea* spp.), Johnsongrass (*Sorghum halepense*), and common purslane (*Portulaca oleracea*) were bagged and buried 1 and 6 inches below the soil surface prior to fumigation. The seed bags were retrieved 3-4 weeks after fumigation and subjected to tetrazolium test in the lab. Herbicide treatments varied across locations and included preemergence application of Gallery (Isoxaben) and Prowl (Pendimethalin) at one location, preemergence application of Surflan (Oryzalin) plus postemergence application of Roundup (Glyphosate) at one location, and a single postemergence application of Roundup (Glyphosate) at two locations. All herbicide treatments were applied at

recommended labeled rates. The preemergence herbicides were sprinkler incorporated.

Weed emergence counts by species in one entire crop-row was made every 2-3 months. After the counts were made, the entire row was hand-weeded and time taken to hand weed the row was recorded. The interrow spaces were cultivated periodically. Therefore, no weed emergence counts were taken in the interrows. Data were subjected to ANOVA and means were separated by Fisher's LSD at a 0.05 level using the PROC GLM procedures of SAS.

Results:

All the fumigants including MB were generally weak in reducing the viability of the seeds of field bindweed and common mallow. However, the alternate fumigants were effective as MB in reducing seed viability of annual morningglory, Johnsongrass, and common purslane.

Weed monitoring several times during the growing season showed that weed emergence was greatly reduced under all the fumigant treatments compared to the non-fumigated control plot. None of the fumigants provided adequate control of hard-seeded weed species such as Spanish clover (*Lotus purshianus*), wild radish (*Raphanus raphanistrum*), and burr clover (*Medicago* spp.). Later in the season, wind disseminated species such as sowthistle (*Sonchus* sp.), fleabane (*Conyza* sp.), and common groundsel (*Senecio vulgaris*) were the prevalent weeds in all the plots. Subtle differences were seen in weed densities between the different fumigants depending on the location.

Hand weeding time in all the fumigated plots was generally lower than in the non-fumigated plots. The hand weeding time for plots treated with alternative fumigants was generally similar to that of the MB plots. However, some differences occurred between the fumigants across locations and time of the year.

Conclusion:

The alternate fumigants were effective as MB in providing weed control in the nursery plots. Efficacy of the fumigants was influenced by the dominant weed species present at each location. Additional management techniques will be required to control hard-seeded weed species and reduce hand weeding costs in these nurseries.

Acknowledgments:

The cooperation of Brights Nursery, Le Grand, CA; Burchell Nursery, Oakdale, CA; Dave Wilson's Nursery, Hickman, CA; and Sierra Gold Nursery, Yuba City, CA is highly appreciated. Funding for this project was provided by the USDA-CSREES Methyl Bromide Alternative Grants.