SOLARIZATION AS AN ALTERNATIVE TO METHYL BROMIDE IN FLORIDA FLORICULTURE

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Soil solarization is a promising alternative to methyl bromide (MB) that can offer a number of advantages over MB and other soil fumigants. Solarization uses an abundant natural energy source for pest management, avoids addition of chemical products to soils, has lower impact on beneficial soil organisms (Wang et al., 2006), and in one case was superior to MB when *Pythium* was introduced after the treatment period (Saha at al., 2005). Solarization has been used effectively for managing soilborne diseases and nematodes in ornamental crops such as impatiens and vinca (McGovern et al., 2002). More recently, it performed as well as MB and other chemical fumigants, particularly in early season suppression of weeds (McSorley et al., 2004).

During 2005-06, a small-scale demonstration strip with solarization was set up on a commercial site in Hobe sound, FL. The solarized area was 10 ft wide x 100 ft long and covered with 1-mil clear plastic from 12 Aug. to 19 Sept. 2005. The remainder of the site was fumigated with 450 lbs/A of MB:chloropicrin (98:2). Delphinium was planted in the site in late November. Weed data were collected from the plant beds in January, and then plots were hand weeded. Therefore subsequent data on weed populations were collected from unweeded row middles. Results (Table 1) illustrate the advantages and disadvantages of solarization relative to MB. Solarization was more effective than MB in suppressing white clover (*Trifolium repens*), a winter weed that may be temperature-sensitive. However, solarization was not as effective as MB in suppressing other weeds, particularly on the April sampling date.

These data show potential for using solarization against a winter weed, but also illustrate the major disadvantage of the method. Because the heat from solarization does not penetrate the soil as deeply as MB, there is resurgence of pests later in the season (note April data, Table 1). Solarization is effective for several months, but there are concerns about its efficacy at 5-8 months after the solarization event. This has been known since the time of the earliest test of solarization in Florida, when the method performed well compared to fumigants in the first crop but was ineffective in a double crop (Overman and Jones, 1986). There are other disadvantages of solarization as well. The use of plastic raises concerns about recycling. In situations where opaque plastic is to be used on plant beds, an extra use of (clear) plastic is needed. This is not an issue with many cut flower growers who do not use plastic on their plant beds. They use plastic only as a tarp for fumigation, so one plastic use is just replaced by another. Finding an easily available source of durable plastic is a more important limitation for these growers. Solarization can be conducted on flat ground or on raised beds, but if applied to beds, weeds may sometimes encroach on the bed shoulders. This problem can be minimized by arranging beds in a N-S rather than an E-W direction (McGovern et al., 2004).

To address some of these limitations, future work with solarization will focus on several areas:

- Performance of solarization vs MB standard for effects on weeds, nematodes, soilborne diseases, and crop performance.
- Identification and field testing of plastic films that are available to growers.
- Integration of solarization with use of other nonchemical practices to improve pest management over a longer time period. These include use of biorational fungicide vs soilborne fungi, *Pasteuria* vs nematodes, and rhizobacteria vs fungi and nematodes.

The last point is particularly critical since new research is needed to address the most serious limitation of solarization, i.e., consistency in extending the benefits of pest management beyond a 4-5 month time period.

References

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Table 1. Effects of solarization and methyl bromide treatments on weed populations, Hobe Sound, FL.

	Weeds per plot	
	Solarization	Methyl bromide
18 January 2006:[a]		
White clover	14.0	27.2 *[b]
Other weeds[c]	7.0	0 *
13 April 2006:[d]		
White clover	3.8	16.5 **
Other weeds[c]	27.0	0.2 **

[a]Weeds per m^2 within plant bed.
[b]Data are means of 4 samples. *, ** indicate significant differences between methyl bromide and solarization at $P<0.10$ and $P<0.01$, respectively.
[c]Other weeds were primarily purslane (*Portulaca* spp.) and spurge (*Euphorbia* spp.), with a few plants of pigweed (*Amaranthus* spp.) and grass.
[d]Weeds per 18 ft of row middle between beds.