

SOLARIZATION TO DISINFEST SOIL FOR CONTAINERIZED PLANTS IN THE INLAND VALLEYS OF CALIFORNIA

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Growers of containerized plants in the San Joaquin Valley (SJV) have several options for obtaining clean planting substrates. Many purchase "virgin" soil or organic media from off-site locations, while others use various methods of chemical soil disinfestation. Solarization was tested during the summer months of 1995 and 1996 for its potential to disinfest nursery soils of certain nematode and fungal pathogens which attack a variety of perennial crops in California.

In a preliminary experiment at Kearney (central SJV) in 1995, moist field soil naturally infested with the citrus nematode (Tylenchulus semipenetrans) and with the fungal pathogen Pythium ultimum was placed in black polyethylene (poly) planting sleeves (20 x 45 cm) and subjected to one of four treatments for a period of four weeks: (1) placed on a sheet of black poly in the field and exposed daily to open sun; (2) as #1, but also covered with a single layer of transparent poly film; (3) as #1, but also covered with two layers of transparent poly separated by wire hoops; or (4) maintained in an incubator at 4 C. Soil temperatures in the center of the bags reached 48, 69, and 72 C in treatments 1, 2, and 3, respectively. Numbers of T. semipenetrans and P. ultimum were reduced by 89-99% in sealed but untented bags, and the organisms were undetectable after treatment in either single- or double-tented bags.

Two subsequent experiments were conducted at a cooler site near Oakdale (northern SJV) during 1996, using soil mounds (914 cm x 914 cm x 23 cm) infested with the lesion nematode Pratylenchus vulnus and placed on black poly sheets. Two solarization methods were used - single tent, and double tent, using clear plastic film in both cases. Each experiment was mulched for a period of two weeks during July-August 1996. The control treatment consisted of mounds of soil not covered by plastic. Typical maximum temperatures at the bottom center of the soil mounds were 44 C in the single tent, 68 C in the double tent, and 36 C in the noncovered control. In both experiments, each of the solarization treatments reduced P. vulnus to undetectable levels by the end of the two-week treatment period. Soil from the mounds was then placed in black poly planting bags to conduct bioassays for production of nematode-free plants.

Eradication of the test pathogens in these experiments indicated that solarization may be used commercially in nursery operations in the SJV and other desert areas in California; further tests are underway.