# EFFECTS OF VIF AND CHLOROPICRIN AND INLINE RATES ON SURVIVAL OF NEMATODES AND PATHOGENS IN SOIL

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Drip applications of chloropicrin (Pic) and Inline have become leading alternatives to methyl bromide:chloropicrin mixtures (MBP) for strawberry fruit production in California. There has been sustained interest in determining economically optimized rates for the alternative treatments and whether use of virtually impermeable film (VIF) instead of high density polyethylene (HDPE) mulch affects the optimization. Although effects of fumigation treatments and mulching systems on fruit yield in the season after treatment are major factors governing treatment optimization, long-term effects on soilborne pest and pathogen populations also may be important.

**Methods.** We examined survival of *Phytophthora cactorum*, *Verticillium dahliae, Pythium ultimum*, and the the citrus nematode after drip applications of Pic and Inline at different rates under VIF and HDPE mulches. Four experiments were conducted, all in fields used for commercial strawberry production in California. Pic and InLine were applied at 50, 100, 200, 300 and 400 lbs per acre in water through the drip irrigation system Sept. 16, 2002 and Aug. 27, 2003 at Oxnard, CA, and Oct. 1, 2002 and Sept. 24, 2003 at Watsonville, CA. The commercial standard, MBC was applied at 350 lb/A. HDPE and VIF tarps were applied to subplots within each replicate mainplot devoted to a fumigation treatment. Each treatment combination was replicated four times per experiment. During the week before fumigation mesh bags containing the pests and pathogens were buried at 6, 12, and 24 inches below the soil surface between dual drip lines in the plant beds. Approximately 4 weeks after treatment, the bags were retrieved. Survival of the nematodes and pathogens was determined in lab assays. Survival values were calculated as percentages, relative to survival in non-fumigated control plots.

**Results and Discussion.** For all fumigants, but especially for Pic and Inline, increasing soil depth increased pest and pathogen survival. Rates of 300 to 400 lb/A of Inline or Pic were required to approach the levels of control of the nematodes and pathogens resulting from fumigation with MBC. Overall, VIF significantly reduced survival of the test organisms compared to HDPE, but the effect was small. It is possible that VIF would have had a much greater impact on the test organisms within a few inches of the soil surface, as observed for weed seeds, but our assays could not assess effects at depths shallower than 6 inches. Inline was more effective than Pic for control of nematodes. Although lower rates of Pic and Inline may provide acceptable strawberry fruit yields at some sites, effective long-term management of soilborne nematode and pathogen populations my require 300 to 400 lb/A of these fumigants. Inline is preferred over Pic where plant parasitic nematodes are a risk.