

SOIL FUMIGATION FOR FREESIA PRODUCTION

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Hybrid freesia (*Freesia x hybrida* L.) is grown in field soil under shade on the coast of California for cut flower production. A variety of weed species can quickly overgrow the sparse canopy of the crop. The crop is susceptible to *Fusarium oxysporum* which causes a classical yellows disease. Pre-plant soil fumigation with methyl bromide/chloropicrin is commonly employed as a means of weed and disease control. The soils are usually fumigated with a 98/2 formulation using the hot gas method. Two experiments were established to evaluate alternative fumigants applied through drip irrigation tape for freesia production.

Trial 1: All Season's Flowers, Nipomo

A freesia flower trial was established at All Season's Flowers in Nipomo, CA on Oceano Sand (9 to 30 % slope; sand: 92%, silt: 5%, clay: 3%; o.m. 1.4%). The trial was conducted under shade cloth and the experimental design was a 6 X 6 Latin square. The plots were 457 cm long and 107 cm wide. The treatments were delivered in 5 irrigation tapes evenly spaced over the width of the bed. The tape was T-Tape model 506-04-1.0 which delivers 750 LPH/100 m @ 0.55 bar and has emitters on a 10 cm spacing. Each bed was covered with polyethylene sheeting before chemigation. The treatments were made 1 October 2003 in 5 cm of water. The trial consisted of 5 InLine (1, 3 dichloropropene, 60.8% + chloropicrin 33.3%) rates (251, 377, 502, 628, & 706 kg/ha) compared to the water control. The trial was planted with corms on 24 November 2003. All data were analyzed by the SAS software system (PROC GLM) and means were separated by Fisher's Protected LSD, as indicated by the error bars in the charts. *Pythium ultimum* populations were greatly reduced in all treatments compared to the control plots (Fig. 1). *Fusarium oxysporum* populations averaged 1210 CFU/g soil in the control plots and could not be detected in the any of the InLine treatments. Early season weed control was reasonably good with all treatments compared to the control plots (Fig. 2). Weeds were again counted in January. The most prevalent weed: mustard still had lower populations at this date compared to the control (Fig 3.); total weeds were also lower at this date for all treatments (Fig. 4). Final data for this trial were collected on April 6, 2004. On this date, all treatments had taller stems, better vigor and less weed cover compared to the control (Fig. 5-7). The incidence of *Fusarium* yellows was not significantly different for any treatments (Fig. 8).

Trial 2: Dramm & Echter, Encinitas

A freesia trial was established at Dramm & Echter Flowers at the Vulcan Avenue facility in Encinitas, CA on Marina Loamy Course Sand (2 to 9% slope; sand: 80%, silt 10%, clay 10%; o.m. 4.8%). The trial was conducted in a greenhouse

and the experimental design was a 5 X 5 Latin square. The plots were 610 cm long and 117 cm wide. The treatments were delivered in 4 irrigation tapes evenly spaced over the width of the bed. The tape was Toro model EA5080867-750 which delivers 508 LPH/100 m @ 0.69 bar and has emitters on a 20 cm spacing. Each bed was covered with polyethylene sheeting before chemigation. The treatments, made on 15 October 2004 in 3.8 cm of water, included 448 pounds per hector Midas (iodomethane 47.5% + chloropicrin 47.5%), 706 kg/ha InLine, 672 kg/ha (ai) Multiguard (furfural), and 672 kg/ha (ai) equal parts Multiguard and Vapam (metham sodium) and a non-treated control. The trial was planted with corns on 5 November 2004. All data were analyzed by the SAS software system (PROC GLM) and means were separated by Fishers protected LSD, as indicated by the error bars in the charts. On November 5th the two most prevalent weeds were chickweed and bitter-cress. Per plot average weed counts were lower in all treatments compared to the control (Figs. 9-10). Per plot average populations of *Pythium ultimum* were lower for all treatments compared to the control, and the Midas, InLine, and Multiguard plus Vapam treatments were also lower compared to the Multiguard alone treatment (Fig. 11). Populations of *Fusarium oxysporum* were not significantly different for any of the treatments (Fig 12). Final data were collected on February 24, 2004. On this date, average plant height was greater for all treatments compared to the control (Fig. 13). There was no significant difference in the incidence of *Fusarium* yellows among any of the treatments Fig. 14).

Conclusions

Populations of *P. ultimum* were reduced by all treatments in both trials. All rates of InLine reduced the populations equally. Multiguard alone reduced the populations to a lesser extent than Midas, InLine and Multiguard plus Vapam. Populations of *F. oxysporum* were not significantly reduced in the Encinitas trial. *F. oxysporum* populations in the treated plots from Nipomo could not be determined due to another soil fungus that interfered with the assay. In both trials the incidence of *Fusarium* yellows was not significantly reduced by any of the treatments. Initial weed populations were reduced with all treatments, but weeds continued to emerge throughout the growing season in all treatments. Both trials were conducted from late fall into the winter when weed pressure is lower. Weed control in the spring and summer may be more difficult as has been observed in subsequent trials now underway in the summer of 2004. Although methyl bromide/chloropicrin was not directly compared with the treatments in either trial, observation from adjacent plantings and conversations with the growers indicate that none of the treatments in these two trials performed as well as the standard treatment of methyl bromide/chloropicrin.



