PREPLANT APPLICATION OF ALTERNATIVE FUMIGANTS BY IRRIGATION SYSTEMS

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The combination of MeBr/Chloropicrin has been highly effective in the control of weeds, nematodes, and soil fungal pathogens. Economical alternatives to MeBr as preplant fumigants are needed to avoid substantial damage to some crops in California, at least in the short term. Recent studies suggested that Telone ® (1,3-D)/Chloropicrin can be an effective replacement for MeBr in strawberry production. There is a need, however, to evaluate application methods that would increase the efficacy and reduce emission of potential alternative fumigants. Application of liquid fumigants (such as Chloropicrin, Telone, and Vapam® (MITC) alone or in combination) through irrigation systems is a promising alternative to MeBr fumigation.

Strawberry

Our main objective is to evaluate the efficacy and distribution of potential alternative fumigants to MeBr applied through drip irrigation systems. Variables that are being evaluated to increase the efficacy and reduce emissions include amount of water used to apply the fumigants; application of combinations of fumigants; initial soil water content and soil conditioning; drip tape spacing, discharge rate, and depth of placement; and surface sealing (plastic mulches or water). Two field tests are being conducted in Salinas and Watsonville, California, to compare the efficacy of Telone/Chloropicrin and Vapam applied through drip irrigation system to MeBr/Chloropicrin and Telone/Chloropicrin injection (Table 1). Strawberry yields were taken three times a week throughout the picking season (mid April to late August, 1997).

In the Watsonville plots, strawberry growth and yields showed that low rates of Vapam or Telone/chloropicrin when applied through the drip irrigation systems (treatments 4-10, Table 1) were not effective in controlling soil-borne disease (very high verticillium pressure) compared to MeBr/Chloropicrin or Telone/Chloropicrin injection (treatments 1 and 2). Most plants in treatments 4-10 died by July. Total marketable fruit yields from the untreated control (treatment 3) was 75 % less than treatment 1. Marketable yields from treatments 410 were 15 to 65 % less than treatment 1. In the Salinas plots, marketable yields from treatments 4- 10 were 3 to 25 % less than yields from treatment 1, and the efficacy of these treatments varied widely among the water management practices.

Perennial replant

Integrated pest management programs to replace MeBr fumigation for perennial crops are most likely to be a combination of nonchemical and chemical application practices. In addition to alternative fumigants, other promising alternative treatments include accelerated root kill with herbicides or deep tilling and fallow/rotation management. We are conducting a number of research trails on the efficacy of low rates of potential alternative fumigants in combination with other practices for replant of perennial crops. Fumigants were applied through surface drip (Telone), subsurface drip (Telone/Chloropicrin), and microspray (Vapam) irrigation systems. Results from these studies will not be available until 1998.

Table 1. Strawberry Research Experiments

Treatment[a]	Treatment Description[b]
1	MeBr/Chloropicrin (57/43) shank injection @ 325 lb/ac
2	Telone/Chloropicrin (TC35) sha injection @ 425 lb/ac
3	Untreated (control)
4	Telone C35 @ 18 gal/ac (190 lb/ac). in 15 mm net irrigation
5	Telone C35 @ 18 gal/ac (190 lb/ac) in 25 mm net irrigation
6	Telone C35 @ 30 gal/ac (320 lb/ac) in 15 mm net irrigation
7	Telone C35 @ 30 gal/ac (320 lb/ac) in 25 mm net irrigation
8	Vapam @ 60 gal/ac in 40 mm net irrigation
9	Vapam @ 100 gal/ac in 40 mm net irrigation
10	Vapam @ 60 gal/ac in 25 mm irrigation followed by Telone C35 @ 18 gal/ac in 15 mm irrigation

[a] For each treatment, plots are split to allow three different irrigation amounts. Treatments 6, 7 and 9 were applied at the recommended rates, and treatments 4, 5, 8, and 10 at 60% of the recommended rates.

[b] Telone C35 contains 58 % 1,3-D and 32 % Chloropicrin. Vapam contained 33 % MITC.