# STRAWBERRY YIELD PERFORMANCE IN RESPONSE TO TEN PREPLANT SOIL TREATMENTS

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**Performance of Camarosa strawberry plants in response to ten preplant soil treatments was assessed during the 1997-98 strawberry production season at the University of California South Coast Research and Extension Center, Irvine, California. Six preplant soil treatments were applied using bed fumigation equipment on September 1, 1997: 1) methyl bromide:chloropicrin (67:33) at 275 pounds/acre; 2) a 65:35 mixture ("Telone-C35") of Telone (1,3-dichloropropene):chloropicrin at 275 pounds/acre; 3) chloropicrin alone at 200 pounds/acre; 4) chloropicrin alone at 250 pounds/acre; 5) nonfumigation + compost (20 tons/acre of mature compost rototilled to a 6-inch depth just prior to forming the beds); and 6) nonfumigation (control). Compost was obtained from a commercial compost manufacturer, and was derived from a mixture of manure and municipal green waste. For all treatments, bed-shaping equipment formed 62" wide, 4-row planting beds, applied slow-release fertilizer (22-7-10) directly under each planting row (rate = 190 pounds N/acre), positioned two drip lines in each bed, and applied black polyethylene bed tarp.**

**On September 14, we injected metam sodium (Vapam HL, 42% a.i., Amvac Chemical Corp.) through the drip irrigation system in half of the beds in each of the two chloropicrin treatment plots, the Telone:C35 treatment plots, and the nonfumigation treatment plots. Vapam was applied at a rate of 70 gallons/acre during a 1.5-hour injection period using a flow-regulated injector/proportioner (Dosmatic, Inc.). Beds were pre-irrigated three days prior to application, and had a soil moisture content slightly below field capacity at the time of Vapam injection.**

**There were a total of ten soil treatments, and each treatment was applied to two beds in each of two replicate blocks: 1) methyl bromide:chloropicrin (67:33) at a rate of 275#/acre; 2) chloropicrin at a rate of 200#/acre; 3) chloropicrin at a rate of 200#/acre + Vapam HL applied through the drip irrigation system at a rate of 70 gallons/acre; 4) chloropicrin at a rate of 250#/acre; 5) chloropicrin at a rate of 250#/acre + Vapam HL applied through the drip irrigation system at a rate of 70 gallons/acre; 6) Telone:C35 (Telone:chloropicrin, 65:35) at a rate of 275#/acre; 7) Telone:C35 (Telone:chloropicrin, 65:35) at a rate of 275#/acre + Vapam HL applied through the drip irrigation system at a rate of 70 gallons/acre; 8) Vapam HL applied through the drip irrigation system at a rate of 70 gallons/acre; 9) nonfumigation + compost;**
**and 10) nonfumigation (control).**

**For all treatments, individual beds were divided into six, 40-plant plots. Camarosa runner plants, produced with methyl bromide:chloropicrin nursery soil fumigation, were dug from a Macdoel, California nursery on October 5 and established in all treatment plots on October 10, 1997. Plant**

**spacing was equivalent to 25,290 plants per acre. Fruit yield (total and marketable yields) and a 10-fruit weight were determined for individual plots for all treatments on a weekly or twice-weekly basis from Dec. 30, 1997 through April 18, 1998.**

**Preplant fumigation with methyl bromide:chloropicrin, chloropicrin + Vapam, and Telone:C35 + Vapam resulted in greatest total and marketable yields, and in general, greatest fruit weights (Table 1). For plants in the nonfumigation treatment, yields and fruit size were 47% and 72%, respectively, of those obtained with methyl bromide:chloropicrin. The use of compost resulted in yields that were 32% of the yields obtained with methyl bromide:chloropicrin. Although the benefits of compost in crop production are widely recognized, compost varies in quality, and can be a source of excess salts, plant pathogens, weeds, and phytotoxic compounds. Poor quality compost also may have a high carbon:nitrogen ratio. The compost used in this trial was mature compost with a low salt content (data not shown), and so it is unclear what factor(s) contributed to the poor yield of plants grown in the compost-amended plots.**

**The use of Vapam alone resulted in yields and fruit size that were intermediate between nonfumigation and methyl bromide:chloropicrin. Grower experience and scientific studies have demonstrated that strawberry yield responses to Vapam soil fumigation are variable, but generally better than nonfumigation. However, the results of this trial are at variance with the results of other trials conducted to test the efficacy of chloropicrin + Vapam. In eight separate trials (K.D. Larson and D.V. Shaw, unpublished data, 1993-1997) that compared the use of 300 pounds/acre of chloropicrin (flat-fume rate) and chloropicrin + drip-injected Vapam, we failed to observe consistent yield increases due to the use of Vapam. Nevertheless, the data presented in Table 1 demonstrate that Vapam, used in conjunction with chloropicrin or Telone:C35, can result in yield increases compared to the use of either material alone.**

**The future regulatory status of chloropicrin and Telone is uncertain, but the use of high rates (300 pounds/acre flat fume rate, 200 pounds/acre bed fume rate, or perhaps even less) of these materials may be problemmatic in California. However, even at high application rates, chloropicrin is not a reliable herbicide or nematicide, and its fungicidal activity is rate-dependent (K.D. Larson and D.V. Shaw, unpublished data, 1996; T. Gordon and K.D. Larson, unpublished data, 1996). Therefore, to obtain effective pest control, application of Vapam following the use of reduced rates of chloropicrin or Telone may be an important component of viable soil fumigation programs in the near future. Trials that assess the efficacy of Vapam in conjunction with various rates (100, 150 and 200 pounds/acre) of chloropicrin are currently in progress.**

**Table 1. Performance of Camarosa strawberry plants in response to ten preplant bed fumigation treatments, at the U.C. South Coast R.E.C., Irvine, 1997-98. Plants were dug from Macdoel, Calif. on 10/5, and planted in Irvine on 10/10/97. Yields reported are for the period Dec., 1997 to April 18, 1998.**

| soil treatment* | yield** crates/a | | mkt. yield crates/a | | grams/ fruit | |
|---|---|---|---|---|---|---|
| MB:CP (67:33) 225#/acre | 3566 | a*** | 2927 | a | 34.6 | a |
| CP 200#/acre | 3158 | bcd | 2503 | cd | 33.5 | ab |
| CP 200#/acre +Vapam 70 gal/acre | 3629 | a | 2803 | ab | 33.8 | a |
| CP 250#/acre | 3148 | bcd | 2476 | cd | 34.1 | a |
| CP 250#/acre +Vapam 70 gal/acre | 3492 | ab | 2745 | abc | 33.4 | ab |
| Telone:C35 275#/acre | 3126 | cd | 2529 | cd | 32.7 | ab |
| Telone:C35 275#/acre +Vapam 70 gal/acre | 3336 | abc | 2717 | abc | 33.0 | ab |
| Vapam 70 gal/acre | 2921 | d | 2394 | d | 31.1 | b |
| Nonfumigation | 1657 | e | 1377 | e | 24.9 | c |
| Nonfumigation+20 tons compost/acre | 1122 | f | 937 | f | 23.8 | c |

*** MB:CP (67:33) = a mixture of 67% methyl bromide and 33% chloropicrin; CP = chloropicrin; Telone:C35 = a mixture of 65% Telone and 35% chloropicrin; CP + Vapam = bed fumigation with chloropicrin followed by an application of Vapam through the drip system.**

**** one crate = 12 pounds of fruit**

*****different letters indicate significant differences (P < 0.05) between treatments within columns.**