EFFICATIOUS APPLICATION RATES OF PROPARGYL BROMIDE AND IODOMETHANE/CHLOROPICRIN FOR STRAWBERRY PRODUCTION

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Earlier research showed that applications of alternative fumigants (such as chloropicrin and 1,3-dichloropropene) with irrigation water through drip irrigation systems might be a more effective method than shank injection in raised-bed culture. Drip fumigation would also be economical and environmentally friendly, reduce worker exposure, and would reduce the amount of chemicals applied. The objective of this study was to determine the most efficacious application rate and method of iodomethane:chloropicrin mixture and propargyl bromide for strawberry production in California.

Methods

The research was initiated in October 2000 in two major commercial strawberry production areas in CA (Watsonville and Salinas). The soil was cultivated and beds (76 cm wide, 132 cm center-to-center) were formed (30 cm high) following standard cultural practices. Three rates of IM:Pic (50:50) mixture (224, 336, and 448 kg ha^{-1}, equivalent to 200, 300, and 400 lbs/ac) and three rates of PrBr (67, 134, and 201 kg ha^{-1}, equivalent to 60, 120, and 180 lbs/ac) were applied by drip fumigation or shank injection approximately four weeks before planting. Treatments were randomized in a complete block design with four replicates. Fumigants were shank injected at 25 to 30 cm depth with two chisels spaced 35 cm apart into soil beds that were immediately covered with standard polyethylene mulch (0.03 mm thickness). Fumigants were also applied through two drip tapes (placed 10 cm from the bed center) with emitters spaced 30 cm apart and emitter flow rate of 0.87 L hr^{-1} at 1 bar. Fumigants were injected throughout the irrigation period (50 mm water) into the drip irrigation system from a nitrogen-pressurized cylinder containing the fumigant. At least four weeks after fumigation, plant holes were cut in the plastic mulch at 30 cm spacing and strawberries were planted. The fruit was harvested once every week throughout the production season (early April to mid August) and graded into marketable and culls.

Results

Fruit yields were significantly greater in the chemical treatments than in the untreated plots. For most application rates, strawberry yields from drip fumigation were greater than yields from shank injection treatment (Figures 1 & 2). Plant growth in the shank-fumigated soil varied widely and a growth gradient was observed along some of the treated beds, possibly due to faulty fumigant flow controllers or due to poor distribution of fumigants in the soil. Our results indicate that a minimum of 300 lbs/ac of IM:Pic or 120 lbs/ac of PrBr is needed for strawberry production. Reduced yields in the PrBr treatments in the Salinas soil were attributed to phytotoxicity. Cool climate and soil type in Salinas may have delayed the dissipation/degradation of PrBr.

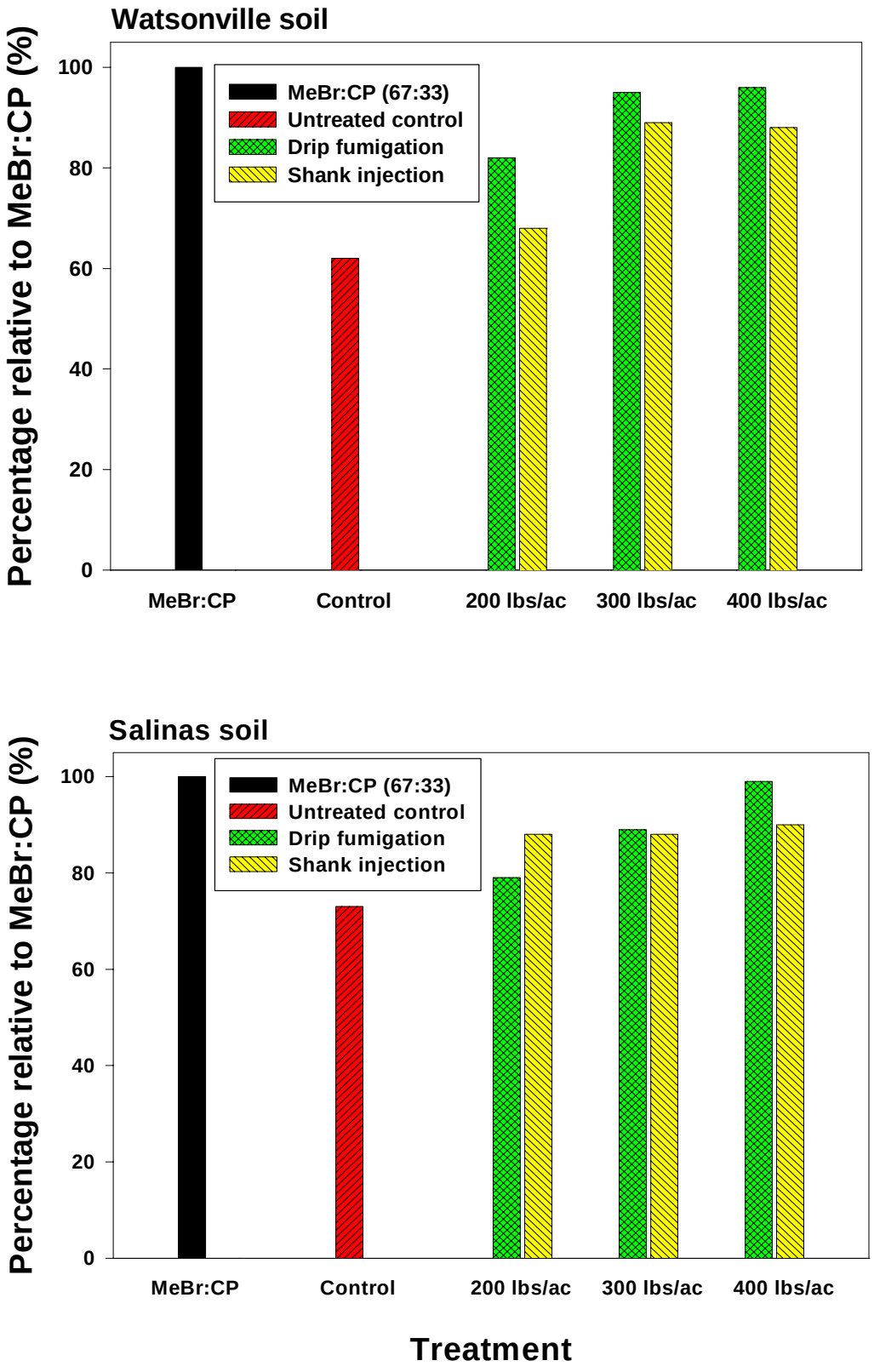

Figure 1. Total strawberry yield from shank injection and drip fumigation with iodomethane:chloropicrin relative to MeBr:CP

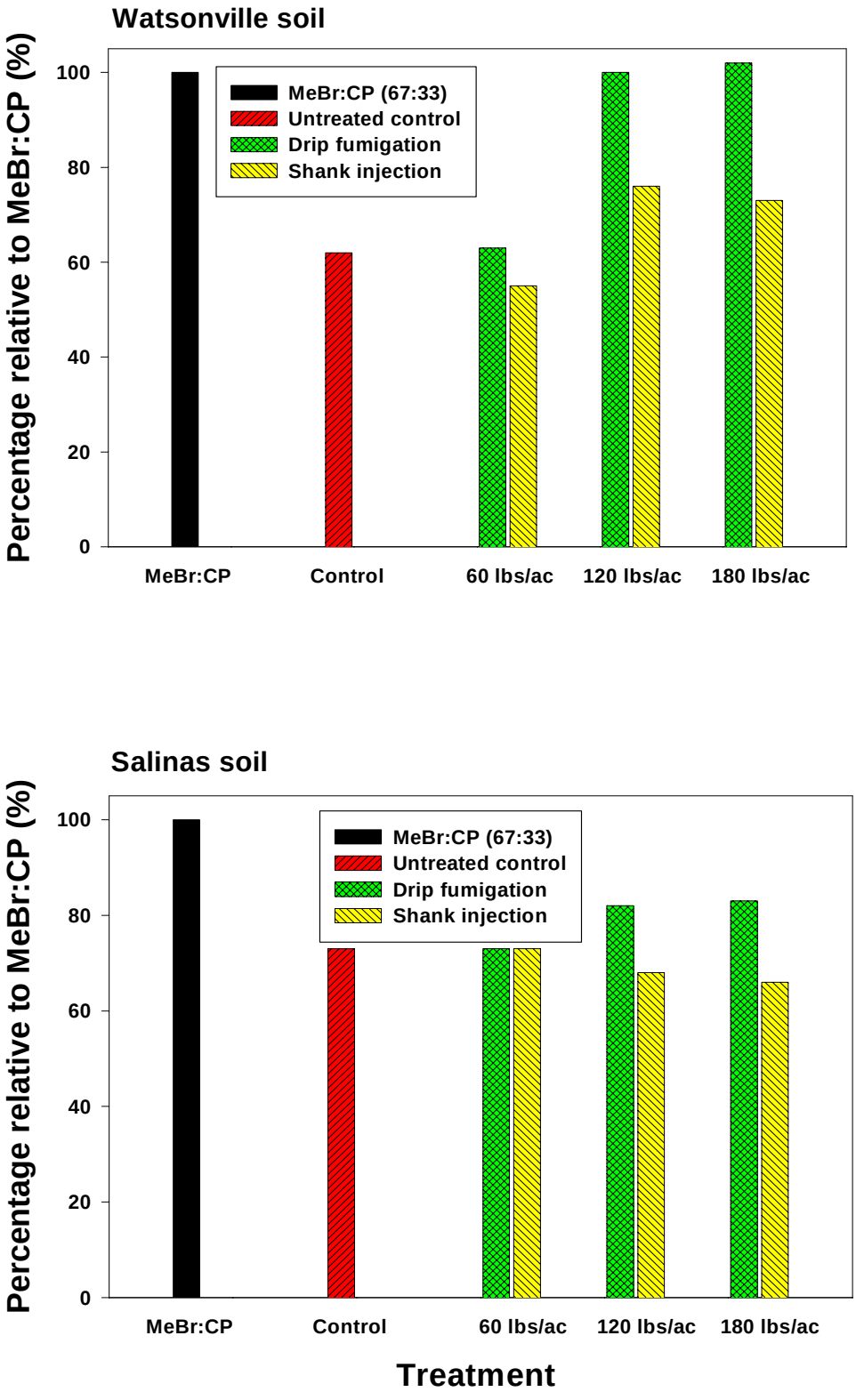

Figure 2. Total strawberry yield from shank injection and drip fumigation with propargyl bromide relative to MeBr:CP