With rising costs, agriculturalists are continually seeking more efficient agronomic practices. Some deciduous tree fruit growers have cut costs by treating individual tree sites rather than fumigating the entire field before planting. These spot treatments may include such treatments as soil profile modification, fumigation, and fertilization—individually or in combination.

Although nematodes can be especially destructive to perennial crops during the early years of root development, and getting the plant off to the proper start is of primary importance, nematodes will return regardless of the extent of preplant fumigation. Do we need to go to the extra expense of fumigating every square foot of field surface? Utilizing recent advances in pesticide monitoring, we set out to determine the degree of nematode control achieved after using methyl bromide or 1,3-Dichloropropene (1,3-D) nematicides as spot treatments.

### Laboratory findings

Using our own data and the data from researchers at UC Davis, we determined that at temperatures higher than 15°C a 24 hour exposure of 20 μg per ml of methyl bromide in the soil water is sufficient to control second stage juveniles of root knot nematode. This nematoxic dosage level is referred to as lx.

Extrapolating from work at UC Riverside, 99.9 percent control of oak root fungus, *Armillaria mellea* (Vahl) Quel within infected citrus roots (3.5 cm in diameter) at temperatures above 15°C would require 5.1 times the nematoxic level.

With these toxicity levels in mind we set out to compare the effects of the two chemicals following spot treatments.

### Field experiments

On October 16, 1973 at the Kearney Horticultural Station, Parlier, California we treated the soil in a field that had been cleared of existing trees and prepared for replanting. Three treatments involved preplant soil preparation utilizing a tractor-mounted backhoe. Holes approximately 12 cubic meters in volume were dug at individual tree sites. Upon reaching the 165 cm (5½ foot) depth the backhoe operator used his digging bucket to cave in the soil from the side walls of the hole. At this time the hole had been filled to approximately 45 cm (18 inches).

For one of the treatments we applied one pint (0.60 kg) of Telone (42 percent cis-1,3-D and 36 percent trans-1,3-D) using a spraying device to spread the...
Selection of preplant fumigation

Michael V. McKenry

Application rates of methyl bromide, 1,3-Dichloropropene, and ethylene dibromide which have been used in California for 30 years as preplant soil fumigants, are well established. Field monitoring of these fumigants has revealed certain characteristics of each fumigant; those characteristics are greatly influenced by soil conditions. In order to show the relative importance of each of the soil factors we have developed a chart which reveals the quantity of chemical to apply for a given field situation.

This chart is based on pesticide monitoring data obtained from numerous field- and simulated field-fumigations. It is also based on laboratory data which indicate the dosage of each toxicant necessary to be lethal to specific pest populations. This chart may or may not correlate with current label recommendations and it should not be considered as a suggested usage by the University of California. It was designed to demonstrate the relative impact of various soil conditions on the delivery of fumigant throughout the soil profile. Hopefully, after studying this chart pest control applicators will better understand the value of exerting greater control over soil conditions at the time of application.

Field situations and pest problems vary. Most field soils are not of uniform measure or texture throughout the soil profile. This chart applies directly to those which are uniform and serves as a guide for treating less uniform soil profiles. The chart demonstrates the difficulty of satisfactorily controlling pests by fumigation of fine-textured soils which characteristically hold higher moisture.

The cost of planting site fumigations is 1/6 to 1/2 that of a commercial broadcast fumigation.

Additional experiments

Using similar application techniques, we then conducted experiments to determine the optimum placement depth for methyl bromide in non-backhoed, moist to dry, sandy loam soils. Comparative experiments at placements of 90, 45, and 15 cm, or at 15 cm with a tarp, revealed that 45 cm provided optimum fumigant movement. The presence of a tarp (3.6 m²) provided nematoxic dosages at all positions just beneath the tarp.

The soil subsidence problem is significant, aside from the loss of trees. Sub-sided areas should not be refilled with nematode infested soil. Extra soil should be placed on the surface of the backhoed area prior to the fumigation. Removing additional surface soil from the tree sites just before planting is a more practical approach than making soil additions at planting time.

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