# A Discussion of Five Portable Soil Drenching Devices, Three Biocide Injection Methods and Ten Biocide Agents Under Field Conditions

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A portable soil drenching device has been developed for delivery of any number of short-&dual, water soluble, biocidal materials for pre-plant soil treatment in order to eliminate pests and disease agents. The device includes a series of hoses, each having drip irrigation emitters in place thereon at 30-cm intervals. The hoses may be attached to the underside of a tarp, Each hose is sealed at one end and attached at the other end to a manifold delivery system. The hoses are deployed onto the field which is to bc treated, and the manifold is connected to a water supply and material mixing source. The selected materials arc mixed with the water and introduced into the hose and manifold system by one of three alternative methods (uniform delivery, wave delivery or stacking) resulting in drenching of the field for elimination of pests and/or disease agents. Alternative embodiments allow for connection to existing linear, wheel line, and center-pivot irrigation systems and for the use of low atomizing sprinklers instead of hoses.

The standard biocidcs that have now received greatest evaluation have been the MIT-liberators, including Vapam®, Soil Prep® or Metham Sodium@. Nine other biocides evaluated at least once in a field situation include: emulsified 1,3-dichloropropene, carbon bisulfide, Clorox®, chlorine dioxide, calcium hypochlorite plus urea, Acrolein, urea plus sucrose, Furfural and cold water extracts from the stubble of safflower, *Carthamus tinctorius*, marigold, *Tagetes tenuifolia* and Cahaba White Vetch, *Vicia sativa x Vicia cordata*.

Treatments with MIT-liberators have repeatedly given consistent performance when applied via the Portable Soil Drenching Device (PSDD). Soil must be properly prepared or have the capability of infiltrating 10 to 15 cm water in 6 to 8 hr, respectively. Control of plant-parasitic nematodes at 98 to 99.9% one year after treatment is possible within the surface 150 cm of soil at 1" to 30" C. At 360 kg ai/ha drenched to the 1 50-cm depth the MIT-liberators give 100% control of viable tree and vine roots *down* to 60-cm depth. At double that treatment rate 100% root kill is achievable to 120-cm depth. Soils containing viable roots smaller than pencil-sized do not pose a problem; however at the existing labeled rate of 360 kg ai/ha the MIT-liberators are only mediocre in performance in replant of orchards and vineyards. The increased growth response (IGR) following use of MIT-liberators has not always been as dramatic as it is after use of methyl bromide. Grapes, *Vitis vinifera*, can grow better after MIT than methyl bromide, however, walnuts, *Juglans niger* and peach, *Prunus persica*, may not, Efforts are undctway to drench IGR-promoting substances into the surface 30 cm of soil during treatments with MIT.

Nematode infested fields to be planted to annual-type crops or one-year nursery crops may be successfully treated by using 220 to 360 kg ai/ha in 10 cm water delivered to the surface 90 cm of soil profile. Products delivered to soil via PSDD become locked into the soil profile, thereby greatly reducing their volatilization when properly applied.

In terms of nematode kill in 150 cm of soil, the emulsified 1,3-D treatments can perform slightly better than treatments with MIT-liberators. Relative to the IGR response, there are indications that some materials are better promoters for certain crops but not others.