LETHAL TEMPERATURE-TIME DOSAGES FOR *MELOIDOGYNE INCOGNITA* IN SOIL

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Constant temperature-time dosages were applied to soil infested with cotton root knot (*Meloidogyne incognita* = Mi). Nematodes in soil were extracted after heat treatment (E1). Experimental soil was then bioassayed using grape cuttings, and further extractions from soil (E2), and roots (E3), and a root galling (RG) assessment were done to confirm nematode mortality. Values for lethal dosages were determined for Mi using data from E1. LD_{95} values were 813, 281, and 32.4 min at 39, 42, and 46 °C, respectively. The E2, E3, and RG ratings showed longer time requirements to achieve LD_{100} than E1. Observed LD_{100} values for Mi in RG were <5, 15, 22, 1440, and 5040 min at 70, 60, 46, 42, and 39°C, respectively.

This study was conducted using 300 g aliquots of natural field soil. The rationale was that, although the presence of a confounding lag time to reach target temperatures was unavoidable, the study was conducted under natural conditions of the experimental soil, with all the physical, chemical, and biological interactions germane to the microenvironment allowed to impact during the entire trial process upon the results obtained. The goal was to provide users of soil solarization, and other heat-based methods of nematode control, with guidelines for treatment applications.

The LD_{95} information can be a valuable tool for those interested in solarizing open fields. On the other hand, the observed LD_{100} values represents important information for nursery plant production users of "double-tent" solarization, where control of 100% of nematodes is required (Calif. Dept. of Food and Agriculture, 2002).

The temperatures selected for this study are regularly observed in soil when solarization is applied in open fields, or in the "double-tent" technique for soil disinfestation in nursery soils. Temperatures even higher than 70°C have been achieved during summers in the San Joaquin Valley of California, using this technique (Stapleton *et al.,* 2002). It was not possible to determine the LD_{95} values for temperatures of 70 and 60°C. At both temperatures, the minimum heat exposure tested was five minutes, and this time-temperature combination was lethal for *M. incognita.*

Portions of this study not reported here confirm that lethal temperature-time data need to be collected for each nematode species, in order to be able to accurately predict efficacy of heat-based methods of nematode control.

REFERENCES

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