CONTROL OF NEMATODE AND WEED POPULATIONS BY PRE-PLANT SOIL FLOODING?

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A considerable portion of vegetable crops in Florida are grown in high water table soils that must be drained for crop production. Experiments are underway to assess the efficacy of soil water-logging for the control of root-knot nematode (*Meloidogyne arenaria*) and purple nutsedge (*Cyperus rotundus* L.) populations. The major questions being addressed in this study regarding the effectiveness of flooding for nutsedge control is 1) how water-logging affects sprouting of the nutsedge tuber, and 2) once the nutsedge is established, what becomes of it once it is flooded. The tubers may remain in dormant but viable stage after which they can proliferate when appropriate conditions occur or may die because of low soil redox potentials and consequent soil environment created after water-logging. With regards to nematodes, being aerobic organisms, these may be killed simply by asphyxiation. Nematodes may also be killed by H_2S and C_2H_4 produced under anaerobic soil conditions, and the presence of accumulated fatty acids (butyric, propionic) that result from microbial fermentation reactions. Additionally changes in soil ecology can occur which limit root-knot reproduction or stimulate predation by beneficial soil organisms.

The objectives of this experiment are to examine which combination of soil management and flooding treatment reduces soil root-knot nematode and purple nutsedge populations and to characterize soil redox potentials associated with the treatments. The current experiment is established using re-packed soil in 568 L stock watering tanks (1.5 m long x 0.6 m wide x 0.6 m deep). Purple nutsedge tubers were planted and grown until June 1996. Soils were inoculated with root-knot nematodes and eggplant was grown to provide host for nematode colonization and soil infestation. Prior to establishment of flooding treatment nutsedge density, nematode populations, and eggplant galling were evaluated. Soil management treatments included amending with compost mulch, applying a clear plastic with bubble wrap for soil solarization, and leaving soil fallow or planting with rice (cv. Lamont). Plots were rototilled and a combination of 14 flooding and soil management treatments were imposed (Fig. 1) on 25 July 1996 in randomized complete block design with 4 replications. Soil redox potentials, pH, and temperature were monitored during experiment. After conclusion of treatments nutsedge density and nematode populations will be evaluated and tomatoes will be grown and used as a bioassay.

Figure 1. Flow diagram of soil management and flooding treatments to control root-knot nematode and purple nutsedge populations.