INTEGRATED PEST MANAGEMENT FOR SOILBORNE PESTS OF TOMATO

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The effects of cultural practices, chemical fumigants, organic amendments, and host resistance on survival of soilborne pests of tomato was examined in northern Florida. Cultural practices consisted of soil solarization using three different types of plastic film: clear, low density polyethylene (Polyon Barkai, Israel); a photo-selective, low density polyethylene (AEP Industries, New Jersey); and a clear, gas impermeable film consisting of low density polyethylene coextruded with nylon (LMG Smith Bros. England). Soil solarization treatments were applied broadcast or on 1 m wide, raised beds over a 32-49 day-period. Chemical fumigants consisted of a 67:33 mixture of methyl bromide:chloropicrin applied at 175, 350, and 400 lbs/A (196,392, and 448 kg/Ha) and metam-sodium applied at 50 and 100 gal/A (468 and 935 l/A). Cabbage residue incorporated into the soil at the rate of 17.8 t/A (40 mt/Ha) fresh weight was used as an organic amendment. Tomato cultivars included Solar Set and Neptune. Neptune is an open pollinated, bacterial wilt tolerant cultivar. Treatments were applied individually and in various combinations to determine if synergistic interactions occurred.

Maximum soil temperatures recorded at a depth of 5, 15, and 25 cm were 43.8, 38.9, and 36.5 C in bare soil and 49.5, 46, and 41.5 C in solarized soil. Soil solarization reduced ($P < 0.05$) populations of *Phytophthora* capsici, *P. nicotianae, Pseudomonas solanacearum, Fusarium oxysporum f.sp. radicis-lycopersici* and *F.o. lycopersici* down to a depth of 25, 25, 15, 5, and 5 cm, respectively. Fumigation with methyl bromide:chloropicrin reduced ($P < 0.05$) populations of *P. capsici, P. nicotianae, F.o. radicis-lycopersici,* and *F.o. lycopersici* to a depth of 35 cm. The effect of methyl bromide:chloropicrin on *P. solanacearum* was highly variable. Additional reductions in populations of *P. solanacearum* were achieved when soil solarization was combined with methyl bromide:chloropicrin. Reductions in mixed populations of yellow and purple nutsedge (*Cyperus esculentus* and C. *rotundus)* by soil solarization were significant ($P < 0.05$) and greater than those achieved by fumigation with metam-sodium or methyl bromide:chloropicrin.

Soil solarization reduced ($P < 0.05$) populations of the plant parasitic nematodes *Paratrichodorus minor, Rotylenchulus reniformis,* and *Criconemella* spp. 85 days after transplanting on the cultivar Solar Set. Reductions of *P. minor* and *Criconemella* spp. were similar to those achieved by fumigation with the high rate of methyl bromide:chloropicrin. Reduced populations *($P < 0.10$)* of *R. reniformis were* observed on the cultivar Neptune.

Neither soil solarization or fumigation with methyl bromide:chloropicrin provided season long control of bacterial wilt. When soil solarization treatments were combined with fumigation, the incidence of bacterial wilt at harvest was reduced from 36% in control plots to 6%. Similar reductions in bacterial wilt were achieved using the cultivar Neptune without any additional soil treatments.

Results from three years of field evaluations indicate that reductions in selected soilborne pest populations similar to those achieved by methyl bromide can be achieved through the combination of various disease management tactics. It is emphasized that the success of an integrated approach is dependent upon the target pest organism, cropping cycle and economic constraints and must be evaluated on an individual farm basis.