L592-48

575 (PS 1)

INFLUENCE OF POULTRY LITTER ON TOMATO YIELD, NUTRITION, AND SOIL CHEMISTRY

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Composted poultry litter (PL) containing 2.98% N was hand-applied on individual plots in a RCB design with 3 replications. Rates (0, 8.2, and 16.3 $Mg \cdot ha^{-1}$) were based on N content of the PL and requirement for maximum tomato production. Comparisons were made with a fertilizer blend (FB) containing 558 $kg \cdot ha^{-1}$ of 14.1N-5.7P-9.2K applied in split application. 'Summer Flavor 5000' tomato plants were hand-planted 46 cm apart in rows spaced 3 m apart. Plant volume and average fruit weight were not influenced by any treatment. A 5920 $kg \cdot ha^{-1}$ yield increase was noted when PL rate was increased from 0 to 8.2 $Mg \cdot ha^{-1}$. Total yield was further increased 2757 $kg \cdot ha^{-1}$ by doubling the PL rate. Yields due to FB were lower but not significantly when compared to PL rates. This decrease in yield could possibly be attributed to FB lowering soil pH to borderline levels for production (5.7) while litter rates had little effect on pH. No differences in leaf P and K were measured. Both rates of PL decreased leaf Ca but increased Mg as rate increased. There was no difference in leaf N, P, K, Ca, or Mg when zero PL and FB were compared. FB increased soil NO_3-N in the 0- to 30-cm depth zone more than the PL treatments. When comparing the highest PL rate to the lowest, there was almost a one and one-half time increase in residual soil K at the 0- to 15-cm soil depth. PL increased soluble salts only in the 0- to 15-cm soil depth, however, levels were low.

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UTILIZING POULTRY LITTER AS A FERTILIZER: SWEET CORN YIELD, MINERAL NUTRITION, AND SOIL CHEMISTRY

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Composted poultry litter (PL) containing 2.98% N was hand-applied to plots in a split-plot design with 3 replications. Application frequency (total, split) was the major plot and rate (0, 10.9, 21.7, and 43.6 $Mg \cdot ha^{-1}$) was the sub-plot. Rate was based on total N content of the PL and N requirement for maximum sweet corn production. Comparisons were made with a fertilizer blend (FB) containing 23.8N-4.3P-4.1K at a total rate of 564 $kg \cdot ha^{-1}$ in split applications. Leaf area and average ear weight of sweet corn ('Merit') were not affected by frequency or rate. Increasing PL rate from 10.9 $Mg \cdot ha^{-1}$ to 21.2 $Mg \cdot ha^{-1}$ increased yield by 3128 $kg \cdot ha^{-1}$. An increase to 43.6 $Mg \cdot ha^{-1}$ decreased yield which was probably due to an observed reduction in plant stand. When comparing FB with 10.9 $Mg \cdot ha^{-1}$ PL, the yields were equal. Plant P and K concentrations were increased linearly by PL rate. There were no differences in % N or $mg \cdot kg^{-1}$ Ca and Mg. The highest soil NO_3-N concentrations in the 15- to 30-cm depth range were produced by 43.6 $Mg \cdot ha^{-1}$ PL (15 $mg \cdot kg^{-1}$) and FB (35 $mg \cdot kg^{-1}$). Only the high litter rate increased soil NO_3-N below 30 cm. As PL rate increased, there was a corresponding increase in soil P. There was a linear increase in soil K from 60 to 200 $mg \cdot kg^{-1}$ as rate increased. A linear decrease in pH was noted when PL rate increased. Soil EC was almost 2 times higher in the 43.6 $Mg \cdot ha^{-1}$ PL plots than the next highest rate (275 vs. 150 $umhos \cdot cm^{-1}$).

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CILANTRO AND DILL RESPONSE TO NITROGEN FERTILIZER RATES

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Two separate experiments were conducted during 1992 to determine optimum rate of nitrogen fertilizer for cilantro (Coriandrum sativum L.) and dill (Antheum graveolens L.) production in Virginia. Three varieties of cilantro and two varieties of dill were used. The experiments were planted on July 28 and August 26 with three nitrogen rates (100, 200, and 300 kg/ha) and fresh weights (30cm row length from each plot) were recorded periodically during the vegetative growth. Generally, the nitrogen did not affect the yield indicating that soil nitrogen plus 100 kg of applied nitrogen per hectare was adequate for optimum growth of both cilantro and dill. At 45 days after planting (DAP), C1410 had the highest fresh yield of 1.8 kg/m whereas at 66 DAP the highest yielding variety was 18135 in both plantings (7.1 and 3.1 kg/m, respectively for first and second plantings). The differences between dill varieties were non-significant except with the second planting where Bouquet significantly outyielded Dukat at 70 DAP. The analyses to determine effects of varieties, nitrogen rates, and plant age on chemical properties of cilantro and dill is continuing and will be presented.

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C_3 AND C_4 PLANT RESPONSES TO PHOSPHORUS-LIMITING ENVIRONMENTS

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The anatomical and biochemical characteristics of C_4 plants may make them more efficient than C_3 plants in nutrient deficient environments. A greenhouse pot study was conducted in the summer of 1992 to compare the responses of six C_3, four C_4 and two C_3-C_4 intermediate species to three levels of phosphorus nutrition: adequate, deficient, and severely deficient. Severely deficient P nutrition reduced shoot weight by 74% and 85% on average in the C_3 and C_4 species, respectively. C_3 plants appear to be more efficient than the C_4 in producing shoot biomass under stressful P conditions and two genera having C_3, C_4 and C_3-C_4 intermediate species exhibited a trend in the order of C_4(least efficient) C_3-C_4 intermediate, C_3(most efficient). P nutrition was more significant than species or plant type in determining both the concentration of P in plant tissues and the carbon dioxide exchange rate (CER). A more detailed study is underway to compare biomass partitioning and P allocation schemes of these C_3 and C_4 and C_3-C_4 intermediate type plants.

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COMPARISON OF THREE BONEMEAL PRODUCTS ON GROWTH OF 'PILGRIM' TOMATO

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Three commercially available bone meal products, meat and bone meal, steamed bone meal, and bone chips were compared with Ca $(H_2PO_4) \cdot H_2O$ for their effectiveness in phosphorous availability. These products were added to a soil media (20 soil: 40 peat: 40 perlite by volume) at rates to give 0, 50, 100, 200, and 400 mg $P \cdot kg^{-1}$. Products effectiveness was evaluated by growth and P uptake of 'Pilgrim' tomato (Lycoperisicon esculatum Mill.). Difference in plant dry weights among the products were significant at $P \leq 0.02$, with the greatest difference occurring between the control & the bone meal products. Differences were also evident among the products with respect to shoot P content (mg $P \cdot shoot^{-1}$). A significant interaction between product & rate was observed for foliar P concentration, but not shoot P content reflecting a growth dilution effect. Therefore, the three bone meal products were equally effective in providing P for optimum tomato growth.

580 (PS 2)

LIGHT INTENSITY AND DROUGHT AS PREDISPOSITION FACTORS FOR DOGWOOD ANTHRACNOSE

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Environmental factors regulating spread of dogwood anthracnose remain largely unstudied, so we conducted a two-year experiment to determine if light intensity or drought can affect this disease. After leaf emergence in 1990, two-year-old potted dogwood trees (*Cornus florida* L.) were placed outdoors in shade huts giving light treatments of 100%, 50%, 10% or 2% ambient light. One year later, trees were removed from huts to inoculate them (artificially or naturally) with *Discula destructiva* Redlin sp. Nov. After inoculation, trees were returned to their former light treatments and some of the trees were subjected to drought. Disease progression, quantified as increasing percentage of leaves with lesions, was unaffected by inoculation procedure. Light did affect the disease; by the end of the experiment, disease percentages in well-watered trees were 30% at 10% light, 15% at 2% light and below 5% at 100% and at 50% light. Drought increased disease progression on all shaded trees, ultimately 8x at 50% light, 1.4x at 10% light and 2x at 2% light.