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POULTRY LITTER OR MANURES FOR NITROGEN SOURCES AND ROOT-KNOT CONTROL ON HORTICULTURAL CROPS

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by

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ABSTRACT

Poultry litter and manures were evaluated for root-knot control and as a nitrogen (N) source for squash. Field plots containing a natural infestation of *Meloidogyne incognita* race 3 were amended with fertilizer, or poultry waste (litter, high-rise manure, belt manure or chain manure) in the fall of 1993 and in the summer of 1994. Nitrogen application rates were based on supplying 90 kg of plant available N/ha. Application of N was based on 80 percent of the ammoniacal nitrogen (NH_4-N and NH_3-N) and 60 percent of the organic N as available to the crop over the course of the growing season. Soil amendments were incorporated by a power driven rotary hoe and covered with a white polyethylene mulch.

Litter and manure provided sufficient total plant available soil nitrogen (NH_4-N and NO_3-N) to support growth comparable to mineral fertilizers (Trial 1 and 2). Root galling, caused by *Meloidogyne incognita*, in litter amended plots (1993) was significantly lower than in chain manure amended plots. Nitrogen assimilation by squash plants was equal to or exceeded estimated N applications in litter or manure treatments.

Poultry waste (litter, high-rise manure, chain

manure), urea or calcium nitrate were evaluated for control of several life stages of *Meloidogyne incognita* in a greenhouse study. Application of N was based on crop requirements as described previously. Root-knot nematode life stages included: eggs, second-stage juveniles (J2's), egg masses and root-knot nematode infected root pieces containing all developmental stages. Litter, manure or fertilizers were added individually to soil in pots containing various *M. incognita* life-cycle stages and incubated for 14 days. One tomato seedling (*Lycopersicon esculuntum cv* Rugters) was planted into each pot.

Suppression of root galling by poultry waste was affected by *M. incognita* life stage. Litter, high-rise or chain manure-amended soils had lower levels of root galling than urea amended soils when pots were inoculated with root pieces ($P \leq 0.05$). No differences in root galling was observed between soil amendments when pots were inoculated with egg masses or J2's ($P \leq 0.05$). Production of eggs or egg masses by *M. incognita* inoculated plants was not altered by any soil N amendment. Soil nitrate (NO_3-N) and ammonium (NH_4) levels 60 days after planting were < 1 mg/kg soil indicating that plant demand for N was not exceeded by the organic amendments.

Ammonia (NH_3) volatilization can cause significant loss of N from surface applied organic amendments. Urea, poultry litter and manures (high-rise, belt and chain) were surface applied to soil in sealed plastic chambers (180 kg of N/ha) and the amount of volatilized NH_3 determined. Over a 14 day period 67.6%, 32.9%, 40.3%, 62.6%, and 50.1% of the total N from urea, litter, high-rise, belt and chain amendments, respectively, was volatilized.

Application of organic amendments (poultry waste) can significantly alter soil pH. Soil pH increased rapidly over a 36 h period, when amended with poultry manures and litter (180 kg N/ha). High-rise manure amended soils had a higher soil pH than all other organic amendments during the study ($P \leq 0.05$).

Poultry litter and manures (high-rise, belt and chain) were added to soil (180 and 360 kg N/ha) and pH was recorded over a 1115 h period. Soil pH rose from 5.63 to 8.29 units when manures were added to soil at a rate of 360 kg of N/ha. All treatments at 180 kg of N/ha and litter and belt at 360 kg of N/ha were lower in soil pH than nonamended control after 947 hours.

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