Effects of soil on pathogenicity of meliodogyne incognita on okra

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Abstract:

Tests were conducted both in the field and greenhouse to investigate effects of i. chicken and goat manure, sawdust (Cyprerssus governiana L.), kale leaves, bean stems, maize stalks and Nitrogen-Phosphorus-Potassium (20:10:10), (ii) time of incorporation of the organic materials into the soil and (iii) solar heating of soil using 0.07, 0.13 and 0.26 cm-thick polyethylene mulches on pathogenicity of Meloidogyne incorgnita (Kofoid and White) Chitwood on okra (Hibiscus esculentus L cv. pusa sawani). The organic materials and N-P-K (20:10:10) were incorporated into the soil 14 days before planting and at planting time, respectively, at the rate of 20 gms and 4 gms, respectively, per 15 cm diameter plastic pot containing unsterilized soil or per planting hole in tests designed to investigate effects of the materials on pathogenicity of M. incognita. An equal amount of organic material was incorporated into the soil 14, 28 and 42 days prior to inoculation in tests designed to investigate effects of time of incorporation of the organic materials on pathogenicity of M. incognita. Twenty one day old okra seedlings germinated in sterile sand and an inoculum level of 2500 + 50 M. incognita eggs and second stage juveniles (J-2) were used in all tests. A completely randomized block design with four and five replications per treatment was used in tests designed to investigate effects of solar heating of soils and organic materials, respectively, on pathogenicity of M. incognita. A split plot design with three replications per treatment was used in tests designed to investigate effects of time of incorporation of organic materials on pathogenicity of M. incognita. Plant heights and stem diameters were taken 21 days after inoculation and biweekly thereafter for 90 days. In addition, fresh fruit and dry shoot weights and number of fruits per plant were taken at harvesting time, 90 days after inoculation. A 0-4 gall rating scale, where 0 = no galls; 1 = 1-25%; 2 = 26-50%; 3 = 51 - 75% and 4 = 76 - 100% of root system galled was used to assess disease severity. Meloidogyne incognita counts were made 90 days after inoculation. Goat and chicken manure, kale leaves, sawdust and N-P-K suppressed pathogenic effects of M. incognita by up to 79.21%, 75.69%, 67.24%, 22.09% and 90.25%, respectively, as was revealed by the respective coefficients of determination (r^2) values of 0.7921, 0.7569, 0.6724, 0.2209 and 0.9025. The effects of maize stalks on pathogenicity of M. incognita varied from one test to another. The suppressive effects of goat manure, chicken manure, kale leaves and sawdust decreased by 24.31%, 20.13%, 20.57% and 98%, respectively, when the materials were incorporated into the soil 42 days prior to inoculation. The suppressive effects of maize stalks, however, increased by 1.97% when the material was incorporated into the soil 42 days prior to inoculation. Although bean stems incorporated into the soil 14 days prior to inoculation did not suppressed by up to 77.44% (r^2 = 0.7744) and 76% (r^2 = 0.76) when incorporated 28 and 42 days prior to inoculation, respectively. Solar heating of soils using 0.07cm and 0.13cm-thick transparent polyethylene mulches suppressed pathogenic effects of M. incognita by up to 100% (r^2 = 1.00) and 59.29% (r^2 = 0.5929), respectively. Besides poor plant growth, plants grown in soils mulched with the 0.26cm - thick polyethylene mulch supported low gall indices and numbers of M. incognita.