

STING NEMATODES, DEVASTATING PARASITES OF FLORIDA CROPS
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HISTORY: BELONOLAIMUS GRACILIS, STEINER, 1949, WAS FIRST DESCRIBED FROM SLASH AND LONGLEAF PINE NURSERIES AT OCALA, FLORIDA, IN 1949.

REGULATORY STATUS: STING NEMATODES ARE PROHIBITED ENTRY INTO CALIFORNIA AND ARIZONA AND ALLOWED WITH TOLERANCE IN TURF SHIPPED TO GEORGIA.

ECONOMIC IMPORTANCE: STING NEMATODES ARE SOME OF THE MOST DEVASTATING PARASITES IN THE SOUTH. TURF, FOREST TREES, CITRUS AND MANY FORAGE AND VEGETABLE CROPS SUCH AS BEANS, CARROTS, CORN, AND POTATOES SUFFER HEAVY LOSSES EACH YEAR DUE TO THIS PEST. BEAN AND CORN (FIG. 1A & 1B) PLANTINGS HAVE BEEN NEARLY ELIMINATED BY THIS PEST. SOME ROWS PLANTED TO BEANS LOSE EVERY SEEDLING. GRAPE CUTTINGS PLACED IN INFESTED SOIL MAY SUFFER UP TO 90% MORTALITY.

TAXONOMIC STATUS: ONLY 2 SPECIES OF STING NEMATODE ARE CONSIDERED IN THIS REPORT, B. GRACILIS AND B. LONGICAUDATUS, RAU, 1958, (FIG. 1c) BOTH OF WHICH HAVE SIMILAR HABITS, HOST AND GEOGRAPHIC RANGES. B. GRACILIS HAS A MORPHOLOGICAL PECULIARITY THAT HAS RARELY BEEN SEEN AFTER ITS INITIAL DESCRIPTION. A NUMBER OF NUTRITIONAL AND AT LEAST 2 MORPHOLOGICAL BIOTYPES OF B. LONGICAUDATUS OCCUR BETWEEN NORTH CAROLINA AND GEORGIA STING NEMATODE POPULATIONS.

GEOGRAPHIC DISTRIBUTION: STING NEMATODES HAVE BEEN REPORTED FROM ALABAMA, ARKANSAS, CONNECTICUT, FLORIDA, GEORGIA, KANSAS, LOUISIANA, NORTH CAROLINA, NEW JERSEY, SOUTH CAROLINA, TEXAS, AND VIRGINIA.

HOST LIST: THE MOST RECENT HOST LIST PUBLISHED (2) INCLUDED 53 HOSTS. IN THIS COMPILATION 116 HOSTS ARE LISTED: ACER RUBRUM, AGROSTIS PALUSTRIS, ALBIZIA JULIBRISSIN, AMARYLLIS SP., AMBROSIA ARTEMISIFOLIA, APIOS AMERICANA, APIUM GRAVEOLENS, ARACHIS HYPOGAEA, ARECASTRUM ROMANZOFFIANUM, AVENA SATIVA, BETA VULGARIS, BIDENS BIPINNATA, BOUGAINVILLEA SP., BRASSICA OLERACEA, B. RAPA, CAMELLIA JAPONICA, CAPSICUM FRUTESCENS, CARYA ILLINOENSIS, CASUARINA EQUISETIFOLIA, CELTIS LAEVIGATA, CHAMAECYPARIS THYOIDES, CHRYSANTHEMUM SP., CITRUS AURANTIUM, C. LIMON, C. MITIS, C. PARADISI, C. RETICULATA, C. SINENSIS, COCOS NUCIFERA, CORNUS FLORIDA, CUCUMIS MELO, C. SATIVUS, CUCURBITA PEPO, CYNODON DACTYLON, CYPERUS ROTUNDUS, DACTYLOCTENIUM AEGYPTIACUM, DAUCUS CAROTA, DELONIX REGIA, DESMODIUM TORTUOSUM, DIGITARIA SANGUINALIS, EREMOCHLOA OPHIUROIDES, FESTUCA ARUNDINACEA, FRAGARIA VIRGINIANA, FRAXINUS PROFUNDA, GLYCINE MAX, GOSSYPIUM HIRSUTUM, HELIANTHUS ANNUUS, HEMARTHRIA ALTISSIMA, HEMEROCALLIS SP., HORDEUM VULGARE, ILEX CRENATA 'HELLERI', I. CRENATA 'LATIFOLIA', I. OPACA, IPOMOEA BATATIS, I. PURPUREA, JUNIPERUS CHINENSIS 'PFITZERIANA', J. VIRGINIANA, LACTUCA SATIVA, LESPEDEZA SP., LIATRIS SPICATA, LIQUIDAMBAR STYRACIFLUA, LOLIUM MULTIFLORUM, LUPINUS LUTEUS, LYCOPERSICON ESCULENTUM, MAGNOLIA VIRGINIANA, MALUS SYLVESTRIS, MELILOTUS ALBA, MUSA SP., NEPHROLEPIS EXALTATA, OXALIS SP., PANICUM XALAPENSE, PASPALUM DILATUM, PENNISETUM GLAUCUM, P. TYPHOIDEUM, PHASEOLUS VULGARIS, PHILODENDRON OBTUSUM, P. OXYCARDIUM, PINUS CLAUUSA, P. ELLIOTTII, P. GLABRA, P. PALUSTRIS, P. TAEDA, PISUM SATIVUM, PLATANUS OCCIDENTALIS, POLYSTICHUM ADIANTIFORME, PRUNUS PERSICA, PYRUS COMMUNIS, QUERCUS NIGRA, ROSA FORTUNEANA, RUMEX CRISPUS, SABAL PALMETTO, SACCHARUM OFFICINARUM, SECALE CEREALE, SESBANIA GRANDIFLORA, S. MACROCARPA, SOLANUM MELONGENA, S. TUBEROSUM, SORGHUM HALEPENSE, S. VULGARE VAR. SUDANENSE, SPOROBOLUS VIRGINICUS, STENOTAPHRUM SECUNDATUM, STIZOLOBIUM DEERINGIANUM, TARAXACUM OFFICINALE, TRADESCANTIA FLUMINENSIS, TRICHOSTEMA DICHOTOMUM, TRIFOLIUM INCARNATUM, T. PRATENSE, T. REPENS, TRITICUM AESTIVUM, ULMUS FLORIDANA, U. PARVIFOLIA, UNIOLA PANICULATA, VACCINIUM ASHEI, V. CORYMBOSUM, VICIA VILLOSA, VIGNA SINENSIS, VITIS ROTUNDIFOLIA, ZEА MAYS, AND ZOISIA JAPONICA.

RESISTANT OR NON-HOSTS: THE FOLLOWING PLANTS SHOULD BE CONSIDERED IN CROP ROTATION PROGRAMS: ALLIUM CEPA, A. VINEALE, ASPARAGUS OFFICINALIS, CAMELLIA SASANQUA, CENCHRUS PAUCIFLORUS, CHENOPODIUM ALBUM, C. AMBROSIODES, CHLORIS GAYANA, CITRULLUS LANATUS, CROTALARIA MUCRONATA, C. SPECTABILIS, DATURA STRAMONIUM, DIGITARIA DECUMBENS, D. GAZENSIS, D. PROCUMBENS, ERIGERON CANADENSIS, GLADIOLUS HORTULANUS, HIBISCUS ESCULENTUS, ILEX CRENATA 'CONVEXA', INDIGOFERA HIRSUTA, LIRIODENDRON TULIPIFERA, NICOTIANA TABACUM, PASPALUM NOTATUM, PHYTOLACCA AMERICANA, PLANTAGO LANCEOLATA, TAGETES MINUTA, XANTHIUM PENNSYLVANICUM.

SYMPTOMS: ABOVEGROUND SYMPTOMS FOR MOST HOSTS INCLUDE STUNTING, UNTHRIFTINESS AND CHLOROSIS. SEEDLINGS ARE KILLED ON HIGHLY INFESTED SITES LEAVING LARGE GAPS OF MISSING PLANTS IN ROWS OR SCATTERED PATCHES OF UNHEALTHY PLANTS. STRAWBERRY LEAVES HAVE NECROTIC EDGES. AFFECTED CORN TASSELS OUT WHEN LESS THAN 1 FOOT HIGH. ROOTS ARE DECAYED, SPARSE, AND COARSE WITH A STUBBY APPEARANCE. INFESTED ROOT TIPS BECOME NECROTIC (FIG. 1D). PEANUTS HAVE NECROTIC SPOTS ON THE HULL AND PEG. GRAPE CUTTINGS FAIL TO DEVELOP SHOOTS OR BEAR SHOOTS WITH NECROTIC MARGINS AND COARSE ROOTS WITH SWOLLEN TIPS IN STING NEMATODE-INFESTED SOIL.

HOST-PARASITE RELATIONSHIP: STING NEMATODES ARE ECTOPARASITES WITH LONG STYLETS THAT PENETRATE THE ROOT DEEPLY. SHORTLY AFTER FEEDING, THE ATTACK SITE AREA TURNS YELLOW; IN A FEW DAYS THE ROOT TIP SWELLS SLIGHTLY AND SOME ASYMMETRIC ROOT RECURVING OCCURS; LESIONS FORM AND CAVITIES APPEAR IN THE ROOT LINED WITH LESIONED CELLS.

COMPLEX: STING NEMATODES AND *FUSARIUM* SP. SEVERELY DAMAGED WILT RESISTANT COTTON THAT FAILED TO WILT WHEN INOCULATED WITH *FUSARIUM* ALONE. *PYTHIUM APHANIDERMATUM* IN CONCERT WITH STING AND ROOT-KNOT NEMATODE DAMAGED MUMS AT AN EARLIER STAGE OF GROWTH AND MORE SEVERELY THAN ANY OF THE 3 PESTS ALONE. STING NEMATODE ALSO REDUCED THE NUMBER OF NITROGEN-FIXING BACTERIAL GALLS IN SOYBEAN.

SEASON: STING NEMATODES ARE MOST ABUNDANT IN APRIL AND MAY IN NORTH FLORIDA, AND FROM JUNE THROUGH SEPTEMBER IN GEORGIA.

TEMPERATURE AND MOISTURE: OPTIMUM SOIL TEMPERATURE FOR STING NEMATODE DEVELOPMENT RANGES FROM 25-32 C; REPRODUCTION IS SHARPLY CURTAILED AT 35 C. OPTIMUM SOIL MOISTURE IS ABOUT 7%.

HABITAT: STING NEMATODES PREFER THE TOP 30 CM OF SANDY SOILS (84-94% SAND), AND ARE RARELY FOUND IN SILT, MUCK OR CLAY SOILS.

CONTROL: STING NEMATODES ARE RELATIVELY EASY TO CONTROL WITH NEMATOCIDES. CONTROL OF THIS PEST HAS BEEN VERY BENEFICIAL. CABBAGE FIELDS TREATED WITH DDB AT 25 GAL/A PRODUCES A YIELD OF 742 CRATES/ACRE WHILE UNTREATED LAND YIELDED 357 CRATES/ACRE. DBCP (95%) AT 9 GAL/A PREPLANT TREATMENT PRODUCED 1566 POUNDS OF COTTON PER ACRE WHILE UNTREATED LAND PRODUCED 727 POUNDS OF COTTON PER ACRE.

REFERENCES:

1. CHRISTIE, J.R. 1959. PLANT NEMATODES THEIR BIONOMICS AND CONTROL. FLA. AGR. EXPT. STA. 256 P.
2. ORTON WILLIAMS, K.J. 1974. *BELONOLAIMUS LONGICAUDATUS*. C. I. H. DESCRIPTIONS OF PLANT-PARASITIC NEMATODES, SET. 3, No. 40, 4 P.
3. STANDIFER, M.S. 1959. THE PATHOLOGIC HISTOLOGY OF BEAN ROOTS INJURED BY STING NEMATODE. PLANT DIS. REPTR. 43:933-986.

FIG. 1A BEAN PLANTS.

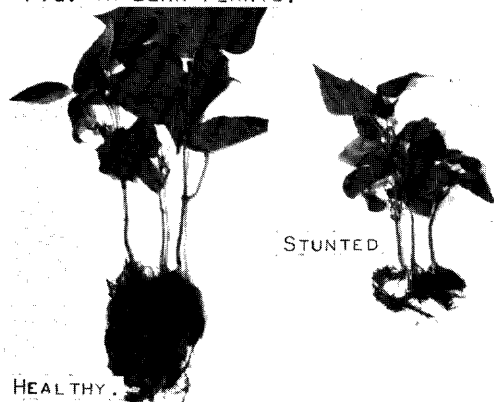


FIG. 1B CORN



FIG. 1C STING NEMATODE,



FIG. 1D BEAN ROOT TIPS.

