A SUMMARY OF EVIDENCE REGARDING NEMATODE PATHOGENICITY TO PLANTS

A Key to Literature Serving as a Basis for Discussion of the Pathogenicity of Selected Groups of Nematodes

prepared by

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INTRODUCTION

W. B. Mountain (1960) points out the two principal difficulties encountered in literal application of Koch's postulates to nematode disease of plants. First, plant parasitic nematodes have not, as yet, been cultured on artificial media. Second, these nematodes do not normally conduct their activities in a sterile medium. It is difficult to extrapolate results obtained under sterile conditions to the complex field situation.

It is possible to overcome the first difficulty by culturing a plant parasitic nematode *monoxenically* (Dougherty, 1959) in plant tissue cultures (e.g. Krusberg, 1961). The second difficulty has not been overcome.

In the absence of a completely satisfactory stepwise series of tests, such as Koch's postulates, for proof of nematode pathogenicity, nematologists make observations and conduct experiments to judge association with disease, include experimental treatments which will test involvement in disease, and conduct still other kinds of experiments to determine the role of a particular nematode species in disease. All these diverse kinds of experiments contribute to knowledge of nematode pathogenicity.

Evidence concerning nematode association with disease ranges from the diseased plant habitat sometimes mentioned in a taxonomic description to results of carefully designed field and glasshouse experiments. Judgment of the degree to which association with disease is established by any paper is left to the student.

Establishing association with disease does not prove involvement in disease. This is proven when it is shown that removal of nematodes, and nothing else, from experimental inoculum, prevents disease (Christie, Brooks and Perry, 1952; Lownsbery and Thomason, 1958).

Proof of involvement does not contribute knowledge of the role of a nematode species in disease. Gnotobiotic (Dougherty, 1959) cultures are required for this purpose. Probable roles can sometimes be deduced with less precise experiments. Much of the literature cited under "Role in disease" in the following pages describes probable, not certainly proven, roles.

Literature Cited

Christie, J. R., A. N. Brooks and V. G. Perry, 1952. Phytopathology 42: 173-176 (see pp. 175-176).

Dougherty, E. C., 1959. Ann. N. Y. Acad. Sci. 77:27-54.

Krusberg, L. R., 1961. Nematologica 6:181-200

Lownsbery, B. F. and I. J. Thomason, 1958. Proc. Am. Soc. Hort. Sci. 74: 730-746 (see pp. 736-738).

Mountain, W. B., 1960. pp. 419-425 in Sasser, J. N. and W. R. Jenkins (Eds.) Nematology. Univ. N. C. Press. 480 pp.

EVIDENCE REGARDING NEMATODE PATHOGENICITY TO CROP PLANTS

Nematode species	Associated with disease		Involved in disease	Role in disease
	In the field	In experimental microplots, greenhouse, or laboratory		
tylenchus brachyurus	Godfrey, 1929. Phytopathology 19:611-630 (pineapple, cowpea, soybean. tomato). Steiner, 1948. p. 48 in Dykstra, 1948. U.S.D.A. Circular No. 764. 64 pp. (potato). Boyle, 1950. Pl. Dis. Reptr. 34:61-62 (peanut). Clayton & McMurtrey, 1950. U.S.D.A. Farmers' Bull. No. 2023. 69 pp. (tobacco). Graham, 1951. S. C. Agric. Exp. Stn. Bull. 390. 25 pp. (tobacco). Good, Boyle & Hammons, 1958. Phytopathology 48: 530-535 (peanut). Boock, 1959. Bragantia 18: 327-335 (Helminth. Abstr. 28:79; medicinal potato).	Graham, 1951. S. C. Agric. Exp. Stn. Bull. 390, 25 pp. (tobacco). Good & Blue, 1954. Proc. Soil Sci. Soc. Fla. 14:159-166 (Ladino clover). Young & Ruehle, 1955. Pl. Dis. Reptr. 39:815-817 (avocado; neg. evidence). Minton, Smith & Cairns, 1964. Phytopathology 54:624-625 (cotton).		Godfrey, 1929. Phytopathology 19:611-630 (histological). Graham, 1951. S. C. Agric. Exp. Stn. Bull. 390. 25 pp. (histological). Graham, 1958. Phytopathology 48:343 (does not increase severity of Phytophthora black shank of tobacco).
	Jensen et al. 1959. Pl. Dis. Reptr. 43:253-260 (sugar cane). Monteiro, 1963. Revta Agric., S Paulo 38: 177-187; see also Helminth Abstr. 36:229-230 (corn).	Stokes, 1967. Nematologica 13:153 (Okinawa peach, positive; Lovell peach, negative). Ross et al, 1967. Phytopathology 57:423-424 (soybeans). Southards, 1966. Diss. Abstr. 26:4164-4165 (tobacco)		Stokes, 1967. Nematologica 13:150 (Okinawa peach; histological).