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PYTHIUM ARRHENOMANES N. SP., A PARASITE CAUSING MAIZE ROOT ROT

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Maize rootlets collected in the vicinity of the District of Columbia at various times during several years have yielded an assortment of nearly a dozen different species of *Pythium*. While a number of the isolations represent forms of recognized pathogenicity to a wide variety of cultivated plants, their occurrence in connection with local yellowish or brownish discolorations could not, in the absence of evidence of more serious damage, be regarded as of any considerable pathological moment. More importance presumably attaches to a form submitted for identification by Helen Johann which, in an abstract by Johann, Holbert, and Dickson,[1] was set forth as being associated with root rots of dent corn in Wisconsin and Illinois.

Although the fungus in question, as the abstract states, would seem to resemble the form to which Carpenter[2] earlier attributed root rot of sugar cane in Hawaii, the resemblance is by no means complete. Against the similarities evident between the two species with respect to the lobulate structure of the zoösporangium, the approximate dimensions of the smooth oögonium and oöspore, and, judging from Carpenter's figures, even the crook-necked shape of the terminally borne antheridium, are opposed rather significant differences in the mycelial relationships of the antheridia and in the number of these bodies to each oögonium. In the account of the cane-root parasite reference is made to "several" antheridia surrounding the female organ, while the illustrations appear to represent from 1 to 5 or at most 6 such structures. In addition it is reported that "Antheridia are often from the same branch as the oögonium." Whereas, in the maize parasite from 15 to 20 antheridia have not infrequently been counted in relation to the upper and equatorial aspects of the oögonium, indicating a probability that the total number, including those concealed underneath, might well lie between 25 and 30. Furthermore, an androgynous condition has never been observed, the mycelial connection between male and female organs being evidently relatively remote as a rule.

[1] JOHANN, H., J. R. HOLBERT and J. G. DICKSON. A Pythium seedling blight and root rot of dent corn (Abst.). Phytopath. 16: 85. 1926.

[2] CARPENTER, C. W. Morphological studies of the Pythium-like fungi associated with root rot in Hawaii. Bul. Exp. Sta. Hawaiian Sugar Planters Assoc., Bot. Ser. 3: 59–65. 1921.

From *Pythium aphanidermatum* (Eds.) Fitz. the maize parasite differs so markedly that the possibility of specific identity is clearly out of question. In the former the almost invariably single antheridium is represented typically by a terminal, subterminal, or intercalary portion of hypha, delimited by 1 or 2 septa, together with a relatively massive orbicular, barrel-shaped or dome-shaped protuberant part making broad apical contact with the oögonium. In the latter the male organ is typically a crook-necked, expanded terminal or lateral structure making narrow contact with the oögonium and never set off from its supporting filament by more than a single cross-wall. It may be noted that inasmuch as in Carpenter's plates the second type of antheridium is illustrated, the conclusion seems unescapable that the identification of the cane parasite as *Pythium aphanidermatum* was quite erroneous.

While the maize root fungus under consideration apparently is not recognizable in any published descriptions based on material from the underground parts of sugar cane, it is not intended to assert at this time that the pathogen may not also occur there. A goodly proportion of several hundred cultures from affected sugar cane roots, obtained in part from greenhouse material collected at Arlington Experiment Farm, Rosslyn, Virginia, but mostly isolated in Louisiana by R. D. Rands from field material, exhibit general similarities to the maize parasite in mycelium and zoösporangial complexes. This is true also of many of the isolations from corn roots to which reference has been made. Final opinion concerning the probable relationship of such forms from the two hosts must await the development of the sexual stage, and that on a substratum permitting satisfactory microscopic study.

Isolations from diseased maize rootlets submitted by W. D. Valleau as typical of the root rot described from Kentucky by Valleau, Karraker, and Johnson[3] yielded a preponderance of the "Pythium-like fungus" represented in their illustrations. Its similarity in both sexual and asexual phases is strongly indicative of specific identity with the Wisconsin parasite, which latter may expediently serve as type of a new species for which the term *arrhenomanes*, suggestive of the extraordinary supply of male elements, is proposed.

Pythium arrhenomanes n. sp.

Mycelium intercellular and intracellular; in culture exhibiting moderately strong aerial development; composed of hyphae 2.0–5.5 μ in diameter. Zoösporangia lobulate, composed of inflated communicating elements up to

[3] VALLEAU, W. D., P. E. KARRAKER and E. M. JOHNSON. Corn root rot—a soil-borne disease. Jour. Agr. Res. 33: 453–476. 1926.

20 μ or more in diameter, often occurring in extensive compound complexes; evacuation tube usually 3 to 4 μ in diameter, variable in length (frequently 50–75 μ); zoöspores usually from 20 to 50 or more from a vesicle, 2-ciliated, motile, later rounding up as subspherical or ellipsoidal bodies with average diameter of approximately 12 μ, and germinating usually by a single germ tube 2.5 to 3.0 μ in diameter.

Oögonia (on carrot-cornmeal agar) subspherical, terminal or more rarely intercalary, measuring 24–35 μ (average 29.4 μ) in diameter, with a wall approximately 0.5 μ in thickness. Antheridia crook-necked, measuring usually 6–9 μ in diameter in the distal expanded portion, 12–25 μ in length along curved axis from apex to basal septum, the rounded apical end making narrow contact with oogonium about a short fertilization tube that measures approximately 3 μ in diameter, the proximal part more gradually tapering toward delimiting septum to diameter of supporting filament; numerous, from 15 to 20 often visible in relation to an oögonium, the total number then probably in excess of 25; borne terminally or more rarely laterally on branches arising from several (usually 4–8) hyphae, each of which contributes usually up to 4 antheridia, and all of which are distinct from hypha bearing oögonium. Oöspores (on carrot-cornmeal agar) subspherical, yellowish, sometimes completely filling oögonium, usually 22–33 μ (average 27.3 μ) in diameter, containing a reserve globule often 12–19 μ (average 15.4 μ) in diameter, and surrounded by a wall 1.2–2.0 μ (average 1.6 μ) in thickness.

Causing a decay of maize (*Zea mays* L.) roots in Wisconsin.

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