A REVIEW OF THE TAXONOMY AND NOMENCLATWRE OF SQME LOW-TEMPERATURE FORAGE PATHOGENS[1/]

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At the 1960 meeting of the Diseases of Forage Crops Sub-Committee of the Associate Committee on Plant Diseases it was suggested that a study be made of the taxonomy of low-temperature fungi attacking forage crops, with particular reference to the genera Typhula and Sclerotinia. This suggestion was forwarded by Dr, J.B. Lebeau, C. D.A. Research Station, Lethbridge, on behalf of a group of plant pathologists attending the 9th International Botanical Congress, Montreal, who were disturbed over the confusion created in the literature by the use of several specific epithets for fungi which were probably identical morphologically. A project on this topic was assigned to the Winnipeg laboratory for study. This report consists of a critical review of the literature which was made as the first step in the investigation.

SCLEROTINIA

Sclerotinia borealis Bub. & Vleug., in Vleugel, Svensk Bot. Tidskr. 11: 308. 1917.
Synonym - Sclerotinia graminearum Elen. ex Solkina, Pl. Prot., Leningr. 18: 100-108. 1939. (R.A.M. 18: 582).

The main point of confusion in naming low-temperature pathogens in this genus is the use of the name S. graminearum in Russia (26) and Japan (23) and S. borealis in the rest of the world (6, 11, 13, 17, 20) for what most people believe to be the same fungus, Jamalainen (11) reviewed the literature concerning the taxonomy and suggests the probable ,synonymy of the two species. Solkina in 1939 (19) compared specimens of S. graminearum with related species and, although she retained the—name S. graminearum for her Russian isolates, did indicate the similarity between them and S. borealis. The description given by Solkina for S. graminearum agrees sufficiently well with that given by Groves and Bowerman (7) for S. borealis that they can be considered to be the same species. Recently Sprague et al (20) compared specimens of S. borealis collected in the U.S.A. with the description of S. graminearurn an arrived at the same conclusion. As the name S. borealis has priority over S. graminearum it should be adopted as the correct name for the fungus,

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TYPHULA

Typhula incarnata Lasch ex Fr., Epicr., 585, 1838.
Synonyms: T. itoana Imai, Trans. Sapporo Nat. Hist. Soc. 11:39-44. 1929.
T. graminum auctt. non Karst. Volk, Zeitschr. f. Pfl. Krankh. 47: 339. 1937.

T. incarnata, according to Corner (2), has priority over T. itoana which is commonly used (1, 4, 12, 17, 18). In Japan and the U.S.A. the binomial T. incarnata has been accepted (20, 24). Isolates of this species have been misidentified as T. graminum Karst. (25) but Imai (10) showed that the two species were different. There seems to be no reason why T. incarnata cannot be accepted as the correct name of the species.

Typhula graminum Karst., Finl. Nat. o. Folk 37: 183. 1882.

The prevalence of this species on grasses is difficult to determine because of the confusion in the literature between it and T. incarnata. Reports of its occurrence without a description of the fungus leaves doubt as to the species actually encountered. Corner (2) believes that T. graminum is probably not uncommon but that it is very small and inconspicuous.

Typhula ishikariensis Imai, Trans. Sapporo Nat. Hist. Soc. 11:74. 1930.
Synonyms: T. idahoensis Remsberg, Mycologia 32: 89. 1940.
T. borealis Ekstrand, Medd. Växtskyddsanst., Stockh. 67. 125 pp. 1955.
T. hyperborea Ekstrand, Medd. Växtskyddsanst., Stockh. 67. 125 pp. 1955.

Imai described T. ishikariensis in Japan from specimens collected during October and November on rotting stalks or petioles of Trifolium pratense L. and rotting leaves and culms of wheat and grasses (9). It is not as widely distributed in Japan as T. incarnata (21) and was ignored until Tomiyama's work (21, 22, 23, 24) on the comparative pathogenicity of the two species. Neither Remsberg nor Corner mention this species in their monographs nor does Ekstrand refer to it in his papers. Remsberg described T. idahoensis in the U.S.A. in 1940 (15) three years after Ekstrand (3) in Sweden differentiated a species, T. borealis, from T. incarnata but did not publish a description of the fruit bodies of his fungus. Ekstrand has maintained that his isolates do not fit Remsberg's description of T. idahoensis and in 1955 (5) divided his original species into two species. T. borealis and T. hyperborea, on the basis of the length-width ratio of their basidiospores; they are indistinguishable otherwise. Some doubts as to the realiability of such a diagnostic character is suggested by Ekstrand's statement (5) that: "The length of the spores is very variable in different fruit bodies and in different collections. The relation between the length and width of the spores is very variable too, due to the variation in the length which is very great even in the spores of fruit bodies from the same collection". T. borealis has been identified by Ekstrand (6) on material collected in Sweden, Finland Canada, and Norway. Jamalainen (12) has since acknowledged that isolates

of Typhula occurring in Finland agree with the description of T. idahoensis and should be referred to that species. Corner (2) and Remsberg (16) consider that T. borealis is synonymous with T. idahoensis.

The description given by Imai (9) for T. ishikariensis agrees fairly well with those given by Remsberg (15) for T. idahoensis and Ekstrand (5) for T. borealis, considering the variability of the fungus. A comparison of the taxonomic features taken from descriptions of (A), T. idahoensis; (B), T. borealis; and (C), T. ishikariensis are tabulated Glow:

Sclerotia	-(A)	globose, flattened; chestnut-brown to blackish; 0.5-0.9 x 1-2 mm.
	(B)	rounded to subglobose; brown to black; up to 1.5 mm diam.
	(C)	globose, ellipsoid, often compressed; dark-brown to black; 0.5-1 mm.
Clavula	-(A)	cylindrical, elongate, fusiform; vinaceous-brown to leathery-brown; 4-7 mm long, 0.5-1.5 mm thick.
	(B)	clavate or cylindrical; white to brown-velvet; stipe and clavulavariablein length -together up to 30 mm.
	(C)	cylindrical, oblong-clavate, fusiform; white or whitish becoming light yellowish-brown when dried; 2-5 mm long, 0.5-1.0 mm thick.
Stipe	-(A)	distinct; bistre, umber, or dark-brown; 2.5 x 0.1-0.5 mm.
	(B)	distinct; lighter or darker grey-brown, darker towards sclerotium.
	(C)	distinctly marked off from clavula; brownish; 3-10 mm.
Basidia	-(A)	elongate, thicker at apex; 5.8-7.8 μ thick; 4-6-8 spored.
	(B)	4-spored
	(C)	cylindrical, clavate; 5.5 μ thick; 4-spored
Spores	-(A)	ovate-ellipsoid, apiculate; 8-14 x 3.8-7.8 μ, aver. 10.5 x 4.5 μ.
	(B)	ovate-oblong to ovate-subcylindric; 5.5-13.25 x 2.0-4.5 μ, aver. 8.9 x 3.2 μ. (T. hyperborea - 5.5-11 x 2.75-5.75 μ. aver. 8.4 x 4.3 μ)
	(C)	ellipsoid or oblong; 8-10 x 4 μ.
Hosts	-(A)	wheat, grasses, clover'?(14), not pathogenic to alfalfa (1).
	(B)	cereals, grasses, clover, alfalfa, rape, beets and many other kinds of plants from different families.
	(C)	cereals, clover, rape (24).

It is unfortunate that the structure of the sclerotia of T. ishikariensis and T. borealis has not been described because both Corner (2) and Remsberg (15) believe it to be of primary diagnostic importance in the taxonomy of the genus.

The descriptions of the four fungi (T. hyperborea is identical with T. borealis except for spore size) appear to be sufficiently similar to justify the belief that they are co-specific. As the name T. ishikariensis has priority the other names must be placed in synonomy.

Conclusion

The work involved in collected a sufficiently large number of specimens of Sclerotinia spp. and Typhula spp. from widely separated geographic areas for comparative study does not seem warranted on the basis of what is already known about them. However, some doubts may still exist as to the correctness of placing certain names in synonymy with T. ishikariensis. These will not be resolved until Japanese, American, and Swedish specimens are compared culturally, morphologically, and pathogenically by one investigator.

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