[Reprinted from PHYTOPATHOLOGY, March, 1935, Vol. XXV, No. 3, pp. 344–361.]

A LEAF SPOT OF BENT GRASSES CAUSED BY HELMINTHOSPORIUM ERYTHROSPILUM, N. SP.

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(Accepted for publication Sept. 12, 1934)

HISTOLOGICAL REVIEW, DISTRIBUTION, HOST RANGE, ECONOMIC IMPORTANCE

In a comparative account (1, p. 684) of various graminicolous members of the genus Helminthosporium that was published in 1923, reference was made to the occurrence on redtop, *Agrostis alba* L., and on thin grass, *A. perennans* (Walt.) Tuckerm., of 2 apparently undescribed species of Helminthosporium having larger conidia than *H. dematioideum* Bub. & Wrob., a form now and then also found on these grasses. The 2 fungi in question had been observed frequently on withered leaves of the bent grasses collected on Long Island near Brooklyn, N. Y., as well as in southwestern Connecticut between Stamford and Norwalk at different times late in June and during July in both 1920 and 1921. As in the absence of distinctive lesions the withering had much the appearance of drought injury, it was not possible then to attribute to either of the fungi any definitely disease-producing rôle.

Beginning with August, 1921, observations on redtop and other bent grasses were continued in the District of Columbia and adjacent portions of Maryland and Virginia. A withering of foliage resembling that previously seen in New York and Connecticut, was in evidence here also, and mostly, again, without any intervention of well-marked lesions. Microscopic examination of the dead leaves rather regularly revealed the presence of conidiophores and conidia of the one of the two larger species of Helminthosporium that had been by far the more abundant on redtop in the region surrounding New York City. During July, 1923, this species occurred on redtop in such definite relation to dull reddish grey foliar lesions that its causal connection with the injury became entirely obvious. In a brief abstract (3) based on observations then made the conidia were described as straight, cylindrical, olivaceous, 1- to 9-times septate, and germinating by the production of lateral and oblique germ tubes from intermediate as well as end segments. The details given were thus sufficient to place the fungus in the series of forms having their ascigerous stages in the genus Pyrenophora, especially as the antithesis between the two main series of graminicolous species of Helminthosporium with respect to both the conidial and the sexual stages was pointed out in another abstract (2) that appeared at the same time. Mention was made of the production of numerous small sclerotia in culture as a feature distinguishing the fungus from the parasite

causing leaf spot of oats; and the smaller dimensions of its conidia were cited as distinguishing it from *H. siccans* Drechsl., likewise a member of the Pyrenophora series.

Once the appearance of the more distinctive type of foliar injury due to the parasite was known, it was not difficult to recognize the pathological effects of the fungus on redtop in stands near Washington, D. C., nearly every season following 1923. When occasion offered opportunity for observation elsewhere, the same injury in association with the same fungus was found in various localities in the Middle West; as, for example, near East Lansing, Mich., in July, 1927; near La Fayette, Ind., in August, 1928; near Madison, Wis., in July, 1931; and near Columbus, Ohio, in July, 1933. Apparently the parasite is widely distributed wherever redtop is grown in the more humid States of our northern and middle latitudes, its prevalence and abundance here in any locality and season depending much on local weather conditions. All in all it seems certainly to be one of the most serious parasites affecting redtop, not any of which, to be sure, are especially devastating in their action. The economic loss accruing from it is perhaps not very considerable. Yet the possibility is hardly to be overlooked that damage to pasture and forage grasses brought about by leaf diseases may be greater than, in the absence of any good means of estimating injury of such origin, is now generally supposed.

Besides the agriculturally very valuable redtop, the fungus under discussion is known to attack also seaside bent, *Agrostis palustris* Huds., (formerly cited as *A. maritima* Lam.), and colonial bent, *A. tenuis* Sibth. Colonial bent was seen attacked only feebly, the strain of this grass growing at Arlington Experiment Farm, Rosslyn, Va., in 1928, showing only a few scattered lesions (Fig. 1, F–H) during the prolonged wet period in September of that year. The remarkably heavy infection that took place on seaside bent at that time was referred to in an earlier paper (4, pp. 129, 130, 132). Several of the strains of creeping bent, *A. palustris* Huds., (previously cited as *A. stolonifera* L.), widely used for turf on golf courses, bore lesions that appeared very probably referable to the Helminthosporium common on redtop, though the abundance of the zonate-eyespot fungus, similarly encouraged by the wet weather, precluded a wholly certain identification. Even greater difficulty attended the attempted identification of reddish lesions found on velvet bent, *A. canina* L., owing to the narrowness of the leaves taken together with the abundance of zonate-eyespot lesions in all stages of development.

SYMPTOMS AND PATHOLOGICAL EFFECTS

That the parasite has so long escaped observation in spite of its widespread distribution on an important economic plant, is undoubtedly to be

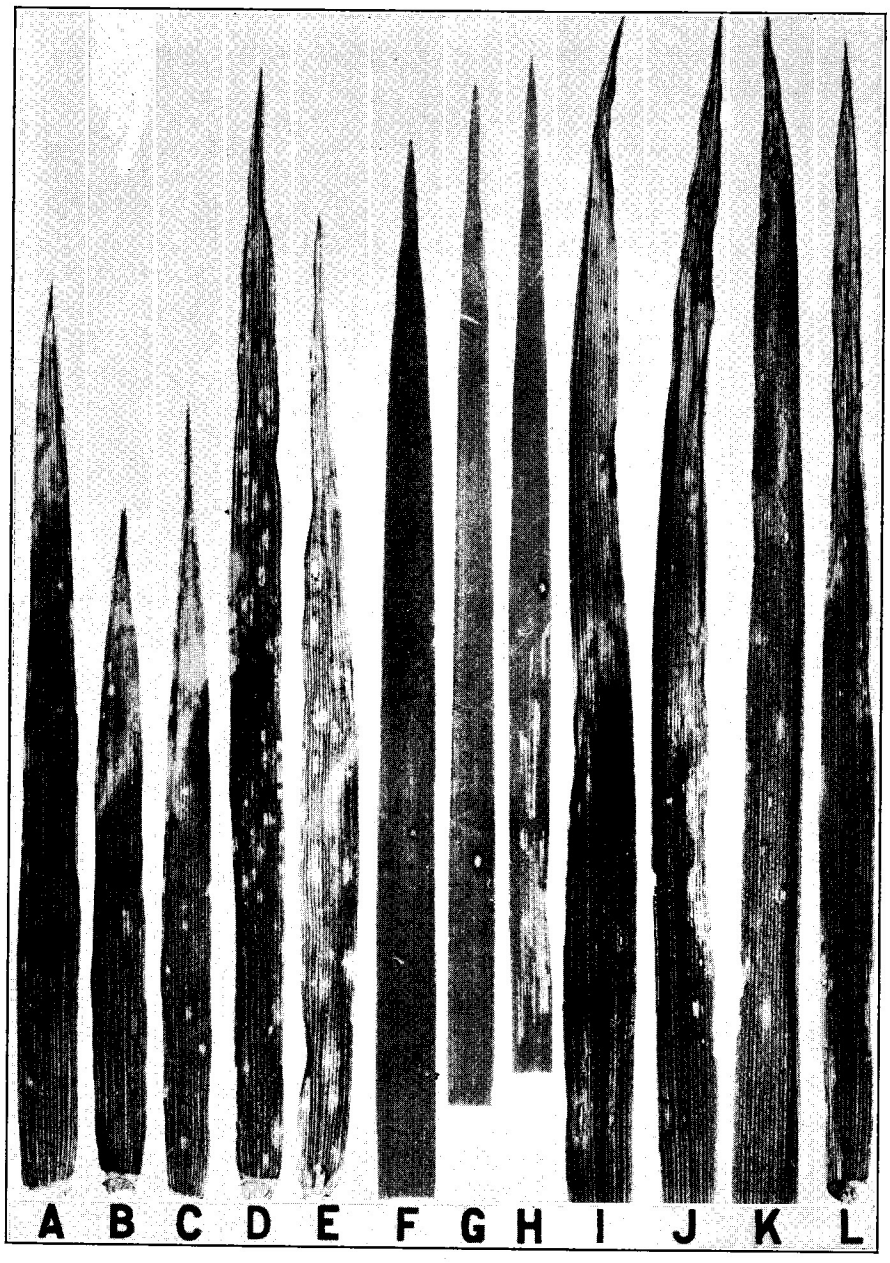

FIG. 1. A–E. Redtop leaves with lesions and general withering effects brought about by *Helminthosporium triseptatum;* photographed from material collected at Arlington Experiment Farm, Sept. 11, 1926. ×2. F–H. Leaves of colonial bent with single lesions due to invasion by *H. erythrospilum;* photographed from material collected at Arlington Experiment Farm, Sept. 26, 1928. ×2. I–L. Leaves of seaside bent collected at Arlington Experiment Farm, Sept. 28, 1928, showing definite lesions due to *H. erythrospilum* that had developed in rainy weather, and withering effects that soon appeared when drier conditions later intervened. ×2.

attributed in large part to the frequently deceptive appearance of the injury caused by it. In dry seasons and often even in moderately wet seasons the local discoloration associated with the inception and enlargement of separate invaded areas soon becomes obscured in the general withering of the leaf that follows apparently as a secondary effect of invasion. Consequently, affected redtop leaves frequently present a drought-stricken appearance, though the moisture available may be more than enough to keep healthy plants in full vegetative luxuriance.

During the 15 seasons in which my observations were continued, the essentially local character of the separate infections was never brought into relief more clearly than in the heavy attack of the fungus on seaside bent in September, 1928, to which reference has already been made. With the unusually moist and warm weather that came in the first 3 weeks of that month, infections multiplied on the luxuriant foliage, while at the same time the secondary withering effects were almost entirely avoided (Fig. 2, A–L). On most of the leaves were borne lesions from 5 to 25 in number, individually appearing often as straw-color spots, 0.5 to 0.8 mm. wide and 0.5 to 2.5 mm. long, surrounded by a reddish or brownish red border of variable width. Sometimes the straw-color center was very minute or entirely absent, and the spot then rather closely resembled the lesions that had become familiar on redtop under more ordinary weather conditions. Collections made during the prolonged intervals of precipitation showed a large proportion of the discolored spots surrounded individually by a water-soaked belt of variable width, representing undoubtedly an increment of newly occupied tissue. These zonal increments are illustrated fairly well in figure 2, D–L, showing affected leaves photographed immediately on collection after 16 hours of drizzling rain. The more extensive zonate lesions (Fig. 2, K, L) thus sometimes came to present a pattern somewhat suggestive of lesions caused by *Helminthosporium giganteum* on its more favorable hosts, among which, however, the strain of seaside bent in question is not to be reckoned. The differences between the simple eyespot lesions on this grass caused by *H. giganteum* and those due to the fungus under discussion have been previously set forth (4, p. 132), and become readily evident on a comparison of the pertinent illustrations of the earlier paper (4, Pl. 1, J–S) with those included in figure 2 of the present contribution. Rather curiously, the lesions produced by *H. giganteum* on seaside bent resemble those produced by the leaf-spot fungus on the same host (Fig. 2, A–L) much less than they resemble those produced by the latter parasite on the specifically different colonial bent (Fig. 1, F–H).

Weather conditions that permit the development of leafspot lesions as definite and numerous as those present on the leaves shown in figure 2,

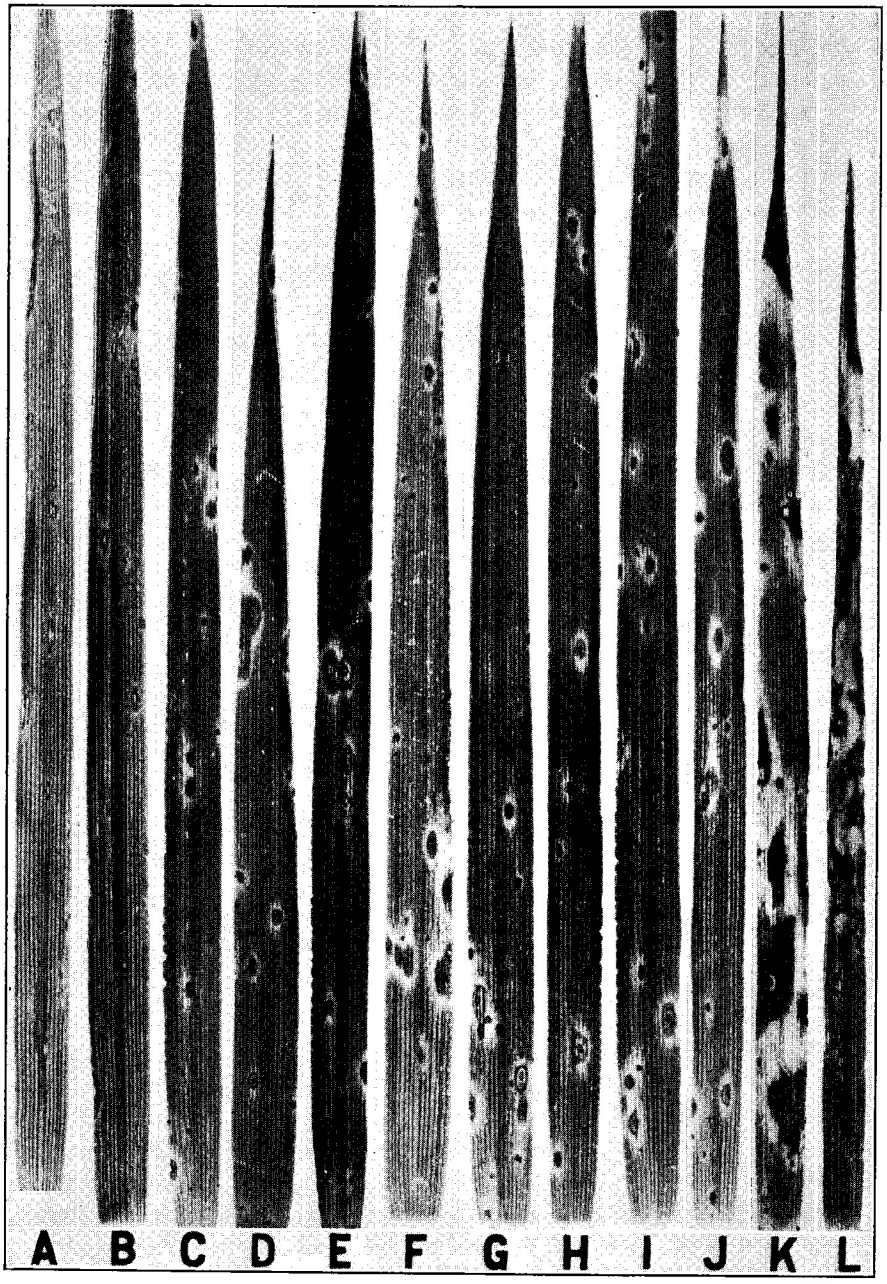

FIG. 2. A–L. Leaves of seaside bent arranged approximately in the order of increasing severity of attack by *Helminthosporium erythrospilum,* collected at Arlington Experiment Farm, Sept. 19, 1928, after 16 hours of misty rain. The light zones surrounding many of the spots represent water-soaked areas newly invaded by the fungus. Symptoms of withering are absent except in K, L. ×2.

are not wont to occur frequently, at least in the regions in which my observations were made. When such conditions come to an end, withering of the more seriously affected leaves soon intervenes; and with the consequent obliteration, in large part, of local discoloration, much of the distinctiveness of the earlier pathological picture is lost. Thus several days after the rains prevailing when the material shown in figure 2 was collected had come to an end, the diseased foliage in the same plot of seaside bent from which the collections were made showed the leafspot discoloration considerably faded, and the blades themselves in process of withering from tip toward base (Fig. 1, I–L).

COMPARISON WITH A REDTOP LEAF SPOT DUE TO HELMINTHOSPORIUM TRISEPTATUM

In the region surrounding New York City, as has been noted previously, *Helminthosporium dematioideum* was occasionally found during the season of 1920 on withered foliage of redtop and of thin grass. However, no well marked foliar lesions could at any time be connected with the presence of this fungus, even though it was encountered on redtop in small quantity from time to time in later seasons near the District of Columbia. Manifestly not much pathogenic activity is to be attributed to *H. dematioideum* as far as bent grasses are concerned. Indeed it would not be difficult to deny any injurious action on these grasses whatsoever, except for the fact that the foliage of sweet vernal grass, *Anthoxanthum odoratum* L., is almost equally free of local discoloration up to the time it begins to shrivel and put forth conidial apparatus of *H. dematioideum* in such quantity and with such regularity as to indicate a parasitic relationship.

In several of the last 14 seasons *Helmnthosporium triseptatum* Drechsl., a species first described (1, pp. 685–686) as occurring on velvet grass, *Holcus lanatus* L., has been found also on fading leaves of redtop as well as of timothy, *Phleum pratense* L., in Virginia and Maryland near Washington, D. C. In some especially favorable redtop material this fungus could be made out as the cause of rather minute foliar lesions consisting of a pale central area surrounded by a salmon-color zone (Fig. 1, A–E). Horsfall (5) found a fungus he identified provisionally as *H. triseptatum* to be the cause of a leafspot on redtop and on orchard grass, *Dactylis glomerata* L., in the State of New York. The lesions on redtop described by Horsfall would seem to have been somewhat darker than those caused by *H. triseptatum* on this grass in Virginia. In New York, moreover, the spots were described as becoming rapidly elongated longitudinally, forming streaks through which the death of the leaf is brought about; whereas, in Virginia, such death would seem to be introduced by general withering of the organ as a whole. These differences very probably find their explanation in the

rather considerable difference in environmental conditions obtaining between the two regions. Whatever the explanation may be, however, the individual lesions due to *H. triseptatum* in Virginia and Maryland, are usually distinguishable from those due to the fungus herein described, in their smaller dimensions and paler coloration. Of the two parasites, the former appears to be by far the less destructive one, at least as far as the bent grasses are concerned.

MORPHOLOGY OF THE CAUSAL FUNGUS ON THE NATURAL SUBSTRATA

The fungus responsible for the more serious, russet leaf spot is regularly to be found on the more extensive tracts of tissue killed by it (Fig. 3, A, a–c). Its conidiophores first generally appear in the centers of the larger discolored areas. Later they arise, somewhat more sparsely, from areas not included in the originally infected lesions. In either position they emerge from the host epidermis singly (Fig. 3, B, a–c, f) or in pairs (Fig. 3, B, d, e), rarely in larger groups. Emergence ordinarily takes place between epidermal cells; when stomata are utilized (Fig. 3, B, d, e) it is apparently more through accident than from physical constraint such as is evidently exerted by the structurally much sturdier epidermis of maize, *Zea mays* L., on the conidiophores of *H. turcicum* Pass. In dimensions, coloration, and septation, as in the presence of geniculate bends marking the points at which successive conidia were formed, the conidiophores of the present fungus show little to distinguish them from the homologous structures of congeneric parasites.

The cylindrical shape of the conidia (Fig. 3, C, a–z, aa–ad) and their indiscriminate mode of germination (Fig. 3, D, a–g) refers the fungus to the series of forms in Helminthosporium that have their ascigerous connections, wherever these are known, in the genus Pyrenophora—the series essentially corresponding, therefore, to the subgenus Cylindro-Helminthosporium of Nisikado (7, 8) and to the genus Drechslera of Ito (6). Though the conidia are by no means small in comparison with fungus spores generally, they are yet so much smaller than those of some of the larger members of the Pyrenophora series—*H. bromi* Died., *H. tritici-repentis* Died., and *H. teres* Sacc.—that the possibility of specific identity is convincingly excluded through the disparity in conidial size alone. Through their greater dimensions can be excluded from consideration also *H. tritici-vulgaris,* a species parasitic on wheat in Japan (7, 8), and *H. giganteum,* which, in view of its peculiarities in germination and in Hormodendron-like aerial proliferation, can only very doubtfully be considered a member of the series.

However, the differences in conidial dimensions are less pronounced when comparison is made with the less robust members of the Pyrenophora series. Among these members are to be reckoned, besides the barley-stripe

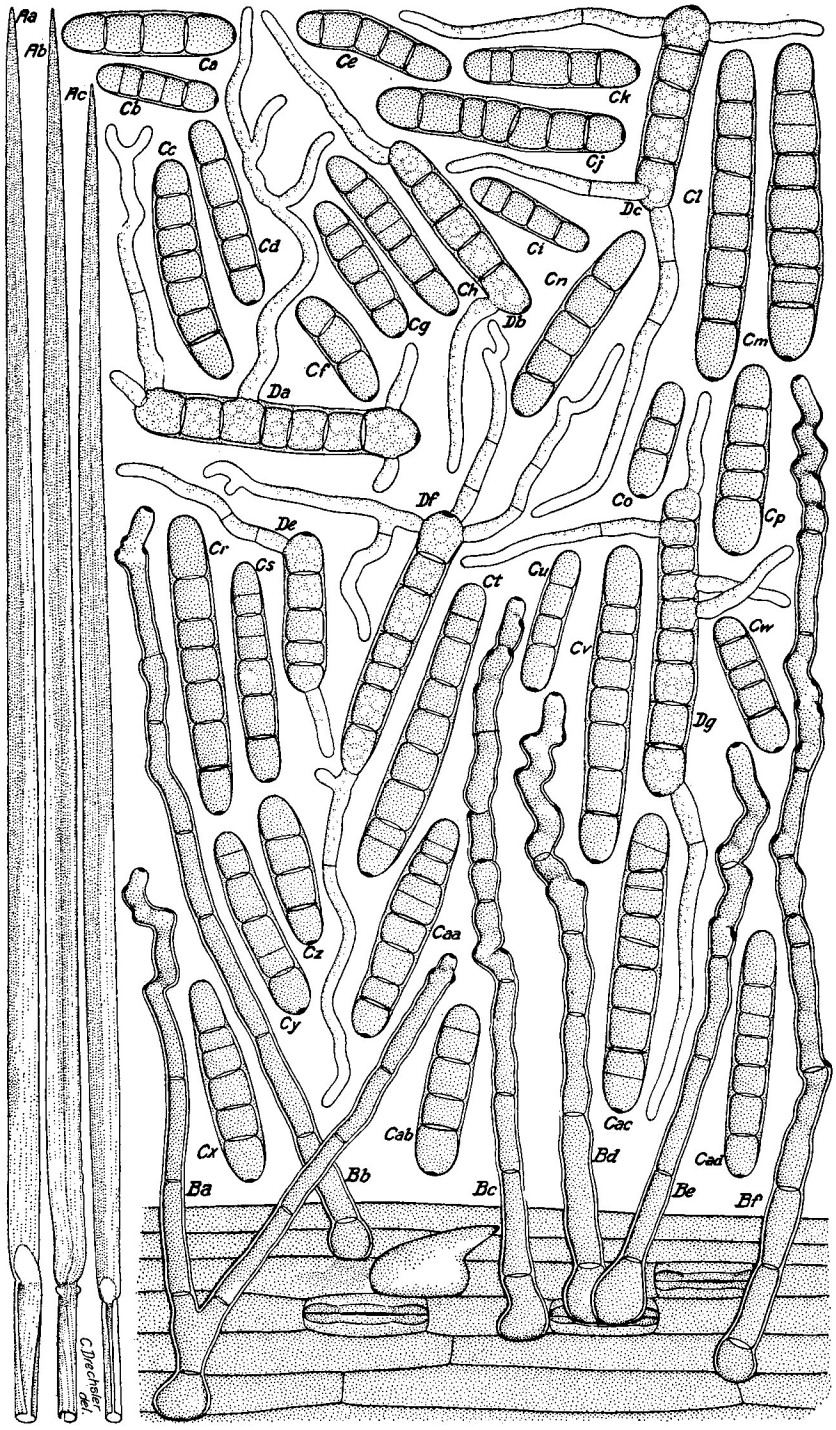

FIG. 3. *Helminthosporium erythrospilum* on redtop, drawn from material collected at Arlington Experiment Farm, July 16, 1923. A, a–c. Affected leaves of redtop, the more heavily stippled areas representing withered regions over parts of which conidiophores of the fungus are borne. ×1. B, a–f. Conidiophores emerging in various relationships to epidermal cells. ×500. C, a–z, aa–ad. Conidia from redtop leaves showing variations in size, shape, and septation. ×500. D, a–g. Conidia in early stages of germination. ×500.

TABLE 1.—*Lengths of 200 conidia produced by several species of Helminthosporium on their respective grass hosts in nature, distributed in classes with ranges of 10μ*

Fungus	21 to 30μ	31 to 40μ	41 to 50μ	51 to 60μ	61 to 70μ	71 to 80μ	81 to 90μ	91 to 100μ	101 to 110μ	111 to 120μ	121 to 130μ	131 to 140μ	141 to 150μ	151 to 160μ	161 to 170μ	Average length
H. erythrospilum (a)	2	15	29	29	48	40	24	12	1							64.3μ
H. erythrospilum (b)	1	16	18	43	42	48	23	9								65.2μ
H. dictyoides	2	14	20	23	24	29	38	30	13	4	2				1	74.5μ
H. siccans		4	13	19	20	49	41	26	16	5	3	3		1		80.1μ
H. gramineum		11	21	25	44	42	38	15	2	1		1				69.8μ
H. avenae		1	3	11	17	44	42	36	17	19	7	2	1			87.6μ

TABLE 2.—*Widths of 200 conidia produced by several species of Helminthosporium on their respective grass hosts in nature, distributed in classes with ranges of 1μ*

Fungus	8μ	9μ	10μ	11μ	12μ	13μ	14μ	15μ	16μ	17μ	18μ	19μ	20μ	21μ	22μ	24μ	Average width
H. erythrospilum (a)	2	15	15	40	68	35	20	5									11.8μ
H. erythrospilum (b)	3	4	6	16	45	64	35	21	6								12.8μ
H. dictyoides				1		3	21	38	58	49	26	3	1				16.1μ
H. siccans				1	1	4	7	22	39	66	41	15	4				16.8μ
H. gramineum	1			1	4	4	11	19	21	34	41	38	14	7	4	1	17.4μ
H. avenae					1	2	10	23	44	57	50	12	1				16.7μ

fungus, *Helminthosporium gramineum,* such parasites as *H. dictyoides* Drechsl., the cause of a fairly serious net blotch of meadow fescue, *Festuca elatior* L., and *H. siccans* Drechsl., the cause of a widespread leaf spot affecting perennial rye grass, *Lolium perenne* L., and Italian rye grass, *L. multiflorum* Lam. Like the bent grass parasite, *H. dictyoides* and *H. siccans* as well as *H. gramineum* produce conidial apparatus during June and the earlier weeks of July. Meadow fescue and the rye grasses are often found in fields intermingled with redtop, so that circumstances of local propinquity are present to encourage a supposition that the parasites on the grasses might belong to a single species. Yet, on closer examination, differences in conidial morphology become evident entailing separation of the parasites into species along lines corresponding to the generic separation of the host plants.

These differences are brought into relief in tables 1, 2 and 3, in which are shown the distribution in appropriate classes and the computed averages of measurements of the lengths and the diameters of 200 conidia taken from field material of the several members of the Pyrenophora series of most immediate concern, together with the corresponding distribution and averages of the numbers of septa in the conidia measured. The two separate sets of measurements of the bent-grass parasite are given under the binomial *Helminthosporium erythrospilum,* one set (*a*) being derived from spores taken from infected leaves of redtop collected near La Fayette, Ind., Aug. 25, 1928, the other set (*b*) from conidia taken from leaves of seaside bent collected at Arlington Experiment Farm, Sept. 19, 1928. The measurements of *H. dictyoides* were made on spores scraped from diseased leaves of meadow fescue gathered at Arlington Experiment Farm, June 7, 1934; and affected foliage of perennial rye grass gathered also at Arlington Experiment Farm, June 7, 1934, was used in making the measurements of *H. siccans.* Barley affected with stripe, originating from Virginia early

TABLE 3.—*Numbers of septa in 200 conidia produced by several species of Helminthosporium on their respective grass hosts in nature, distributed in classes*

Fungus	1	2	3	4	5	6	7	8	9	10	11	Average septation
H. erythrospilum (*a*)		7	17	40	24	71	27	11	2	1		5.4
H. erythrospilum (*b*)		6	19	37	40	50	25	19	3	1		5.4
H. dictyoides	5	23	20	61	41	35	10	3	1		1	4.4
H. siccans		13	13	50	64	35	14	6	4	1		4.9
H. gramineum	1	24	42	66	40	21	6					4.0
H. avenae	2	4	9	72	42	54	11	3	2		1	4.9

in June, 1934, was used in making the measurements of *H. gramineum*. Though *H. avenae* is hardly to be considered among the smaller members of the series, measurements of that species are included for comparison; they were made on conidia taken from leaves of oats, *Avena sativa* L., severely affected with leaf stripe collected at Arlington Experiment Farm, June 26, 1934.

The data given in tables 1–3 show in a somewhat quantitative manner relations that are readily perceptible when material of the several species are examined side by side. Though the conidia of the bent-grass parasite are appreciably shorter than those of *H. gramineum* and of *H. dictyoides,* the inferiority in length, especially in comparison to the stripe fungus, is not at all pronounced. On the other hand, the inferiority in width of conidium relative to any of the other four species is striking and undoubtedly significant, since this dimension is much less given to wide variation than is the length. Again, although the conidia of the bent-grass parasite are shorter than those of the other species represented in table 1–3, they are, nevertheless, on the whole more abundantly septate. As a result, the conidial segments are not only narrower than those of the other species but also shorter, and that in a measure more than proportional to the smaller length of the conidium.

From the accounts of Nisikado (7, 8) it is evident that the conidia of *Helminthosporium arundinis* Lév., a parasite causing leaf spot of *Arundo donax* L., approach those of the bent-grass fungus more closely in length, width, and frequency of septation, than do the conidia of either *H. dictyoides, H. siccans, H. gramineum* or *H. avenae.* With respect to shape, however, the correspondence would seem not especially close. The end cells in the conidia of *H. arundinis* are described as comparatively narrow; and this condition entails, as is apparent in Nisikado's figures, a more pronounced tapering of the spore in its apical and basal portions than is typical of the bent-grass parasite, whose conidia are as a rule abruptly rounded off at both ends. Moreover, the protruding position of the hilum set forth among the distinctive features of *H. arundinis* offers a marked contrast to the inclusion of the homologous scar within the basal contour of the conidium in the parasite on redtop and seaside bent.

Cultural Characters of the Parasite

The isolation of *Helminthosporium erythrospilum* offers no unusual difficulties. When vegetatively vigorous leaves with newly established lesions are available, the invaded portions of tissue may be excised, and after surface sterilization and repeated washing in sterile water, planted on some suitable medium like maize-meal agar. From most plantings thus made, mycelium of the parasite will grow out, free from contamination with

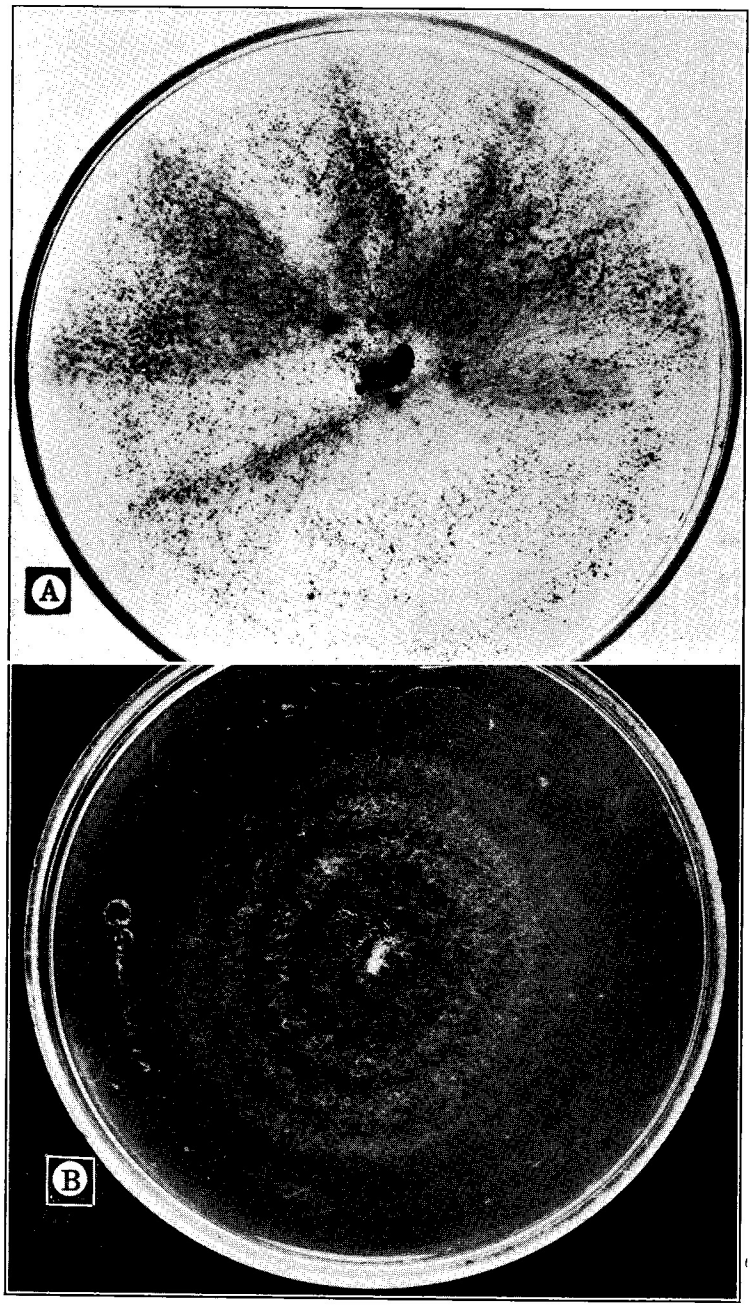

FIG. 4. Maizemeal-agar plate cultures of *Helminthosporium erythrospilum*. ×1. A. Culture incubated for 30 days at approximately 15° C., showing numerous submerged sclerotia. B. Culture after 6 days growth at a temperature of approximately 30° C., showing character of aerial mycelium.

other organisms. When withered leaves bearing conidial apparatus need to be used, plain agar dilution plates may advantageously be employed to make possible the removal of single germinating conidia to new cultures.

The fungus once isolated grows well on artificial media, showing a fairly rapid rate of linear extension. On maize-meal-agar plates at 30° C., it produces in several days a light grey or steel grey aerial mycelium (Fig. 4, B) rather strongly resembling that of *Helminthosporium siccans* (Fig. 5, B), though ordinarily somewhat less copious and often more given to zonation. Accordingly, like also the latter species, it is easily distinguished from *H. dictyoides,* which, in maize-meal-agar plate cultures, develops a more abundant, almost white, somewhat columnar or tufted mycelium (Fig. 5, A).

What is perhaps the most distinctive character of *Helminthosporium erythrospilum* on artificial media comes to light when cultures of it are kept at rather low temperatures (10 to 20° C.) for 2 weeks or longer. Numerous minute dark sclerotia scarcely exceeding 0.1 mm. in diameter make their appearance scattered through the substratum. A dense arrangement in the presence of abundant food materials (Fig. 4, A) yields to a more diffuse distribution in a less nourishing substratum (Fig. 6, B). Apparently, these sclerotia are of the same sort as the much larger but otherwise similar bodies that are produced in cultures of *H. bromi* and that evidently represent immature perithecia. Sclerotia much like those of *H. bromi,* and hence greatly exceeding those of the bent-grass parasite in size, are produced often on maize-meal-agar cultures of the Pyrenophora occurring fairly abundantly on old oat straw in Virginia, Maryland, and Delaware, during May and early June (Fig. 6, A).

The obvious disparity in size between the sclerotia of *Helminthosporium erythrospilum* and the sclerotia of the Pyrenophora on oats is of moment, especially as the two fungi, unlike most other members of the same natural series, sporulate fairly readily and fairly abundantly in pure culture. When, for example, maize-meal-agar plate cultures of the bent-grass parasite are kept for a period of 50 days at a temperature of approximately 18° C. and protected from evaporation, conidiophores (Fig. 7, A–F) abundantly laden with conidia (Fig. 7, A) are produced. In coloration, septation, and dimensions these conidia (Fig. 7, G, a–n) show little dissimilarity from those produced under natural conditions. Nor are the conidiophores essentially different from those produced in nature, though as might be expected from analogy with species of Helminthosporium referable to the Cochliobolus series, which in general sporulate very freely on artificial substrata, the prolonged conditions suitable for development permit these structures to attain greater length and to bear a proportionately larger number of conidia.

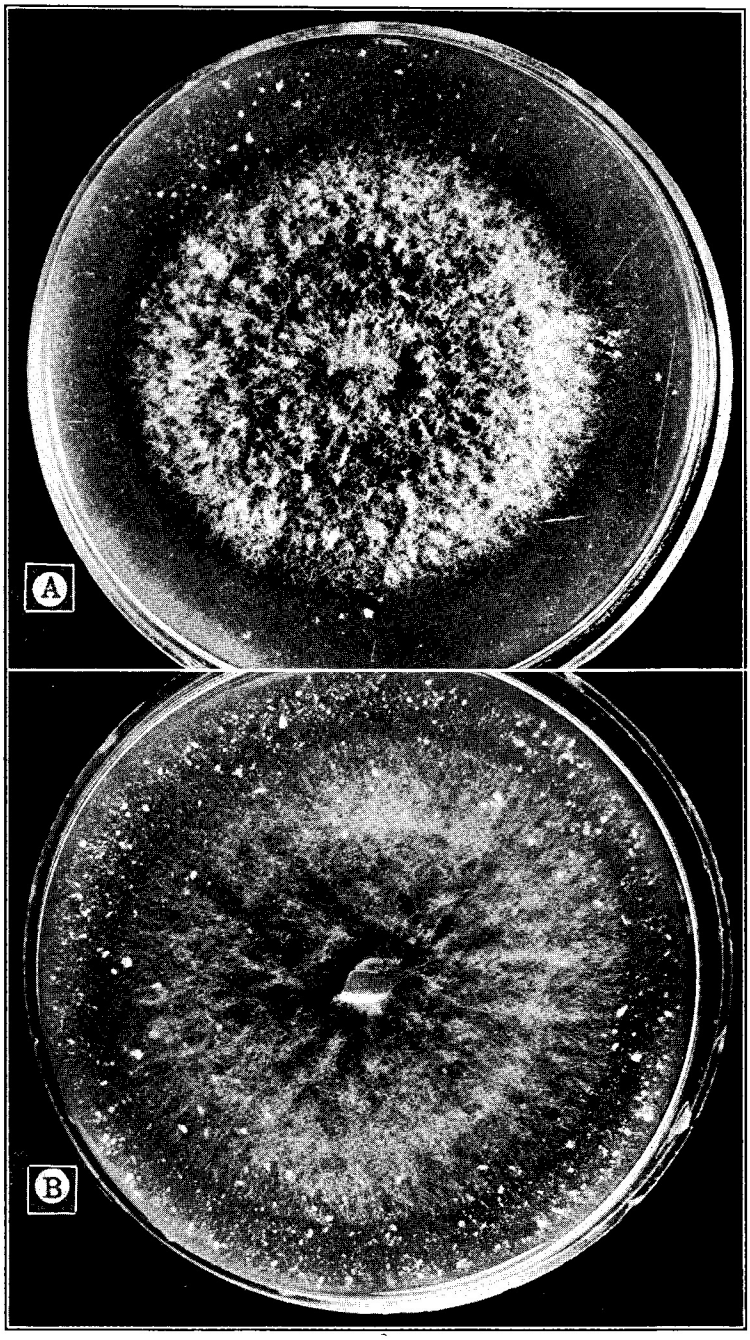

FIG. 5. Maizemeal-agar plate cultures of 2 species of Helminthosporium comparable to *H. erythrospilum* in conidial dimensions, showing appearance of aerial mycelia after 6 days' growth at a temperature of 30° C. ×1. A. *H. dictyoides.* B. *H. siccans.*

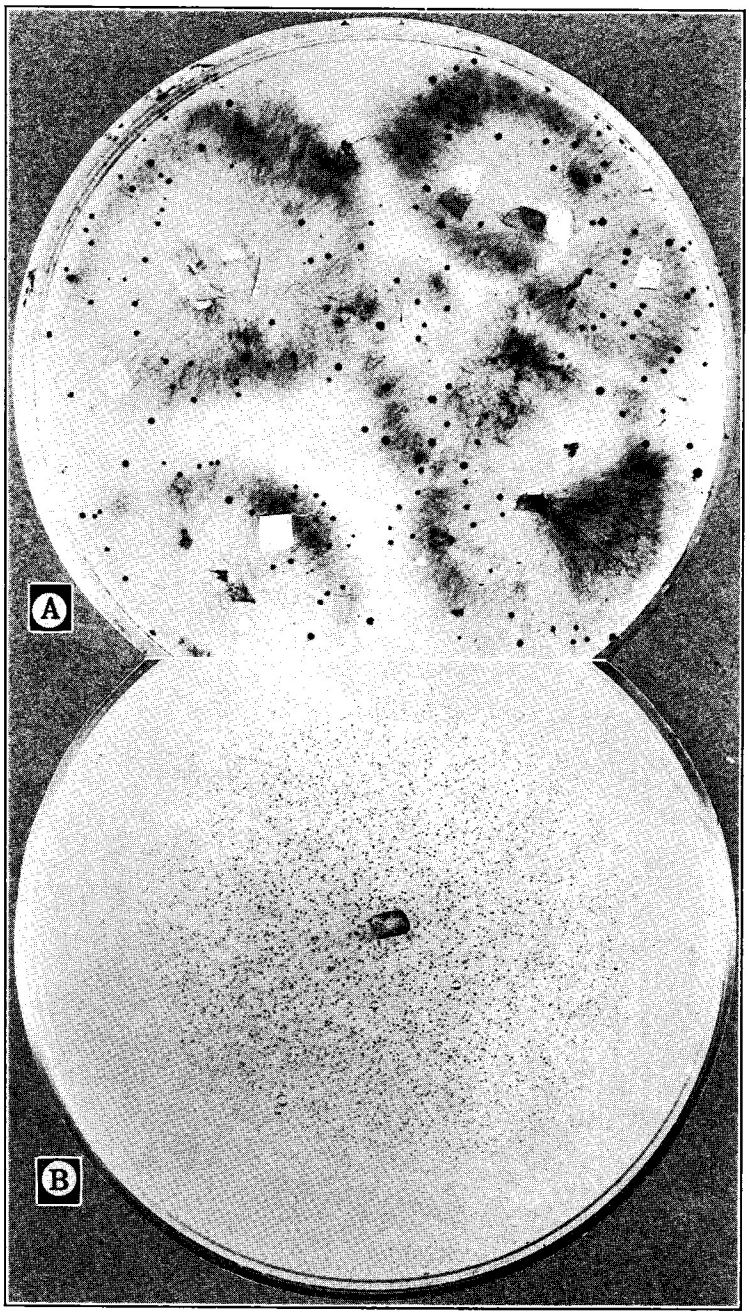

FIG. 6. A. Maizemeal-agar plate culture of the Pyrenophora sp. with ascospores having 5 transverse septa, that occurs abundantly on overwintered oat straw in Virginia, Maryland and Delaware; showing the relatively large sclerotia characteristic of the fungus. ×1. B. Maizemeal-decoction-agar plate culture of *Helminthosporium erythrospilum* after incubation for 30 days at a temperature of about 15° C.; the medium being poor in nutrients compared with that used in the culture shown in Fig. 4 A, has permitted the development of correspondingly fewer sclerotia. ×1.

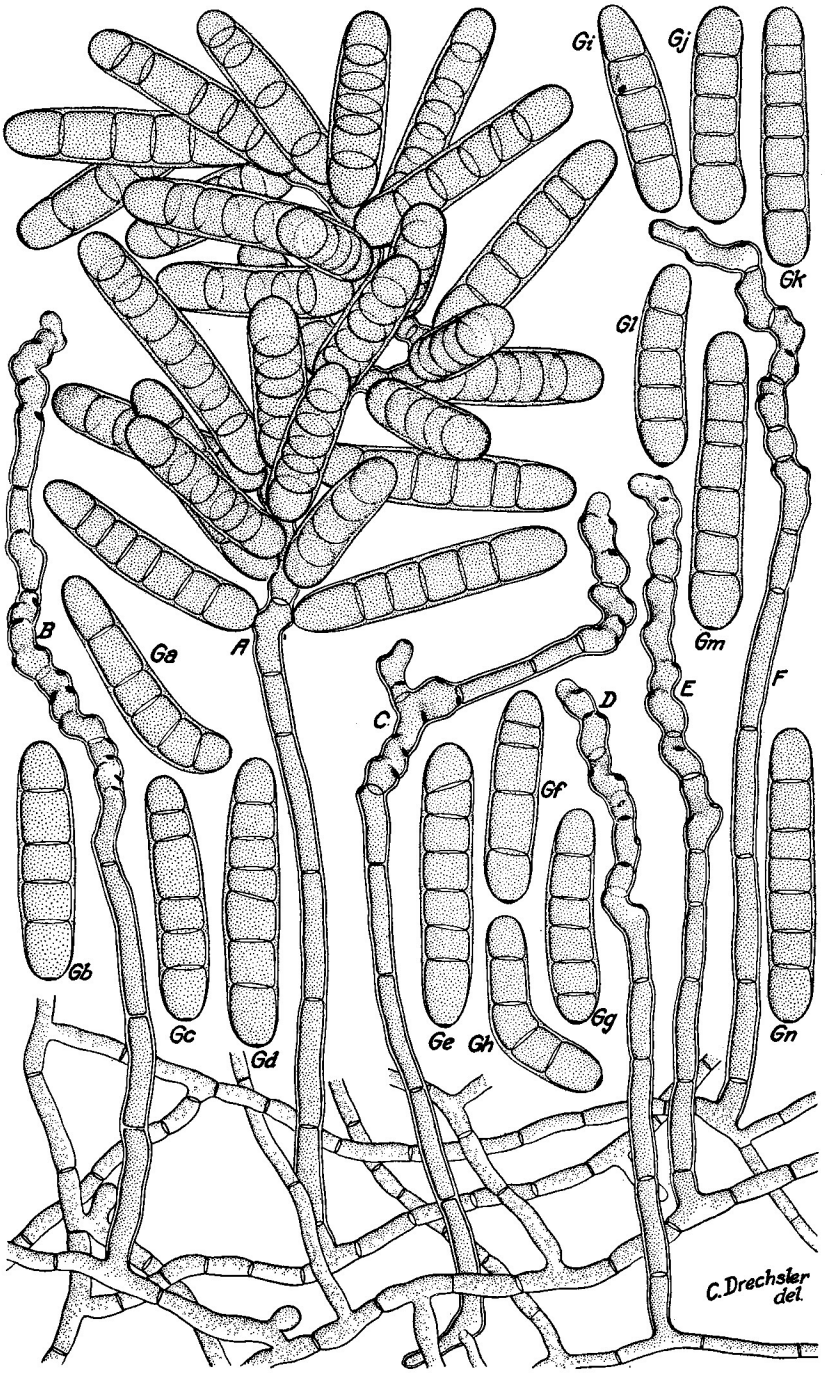

FIG. 7. *Helminthosporium erythospilum* in pure culture on a maizemeal-agar plate culture after incubation for 50 days at a temperature of approximately 18° C. ×500. A. Conidiophore with attached conidia. B–F. Denuded conidiophores. G, a–n. Conidia.

DESCRIPTION OF THE PARASITE AS A NEW SPECIES

As the parasite under consideration differs morphologically from all of the several congeneric forms assignable to the same series, it deserves description as a new species. The specific name, meaning "red spot," proposed for it is intended to be broadly descriptive of the coloration often present in leaf areas occupied by it, without, however, implying that such coloration constitutes an invariable diagnostic character of the fungus.

Helminthosporium erythrospilum, n. sp.

Sparsum; hyphis fertilibus erectis, fuligineis, simplicibus vel rarius furcatis, nodulosis, hinc illinc geniculatis, 75–275 μ longis, 6–9 μ crassis, 1–10 septatis; conidiis flavidis vel dilute olivaceis, typice rectis sed interdum nonnihil curvatis, cylindraceis, utrimque abrupte rotundatis, 2–10 septatis, ad septa non constrictis vel minute constrictis, saepius 25–105 × 8–16 μ, e cellulis pluribus germinantibus, hilo in membrana incluso.

Habitat in foliis vivis vel languidis Agrostidis albae, Agrostidis palustris et Agrostidis tenuis in Amer. bor.

Conidiophores erect, brown or fuliginous, simple or occasionally somewhat branched, emerging singly or less often in pairs or larger groups mostly from between epidermal cells but sometimes from stomata, measuring mostly 75 to 275 μ in length by 6 to 9 μ in diameter, producing the first conidium usually 75 to 125 μ from the base and later conidia at variable successive intervals marked by geniculations; containing 1 to 10 septa that delimit segments mostly 15 to 35 μ long.

Conidia when mature usually distinctly yellowish, sometimes even light olivaceous; typically straight, rarely somewhat curved, mostly nearly cylindrical, the ends rather abruptly rounded off, containing 2 to 10 septa that are usually not marked by constrictions, but at times may be associated with perceptible constrictions; measuring usually 25 to 105 μ (average 65 μ) in length by 8 to 16 μ (average 12.3 μ) in diameter; individually including the nonprotruding hilum within the basal contour; germinating rather indiscriminately from any or all cells, but usually more abundantly from the thin-walled basal and apical cells than from the intermediate cells.

Attacking leaves of redtop, *Agrostis alba,* and seaside bent, *A. palustris,* on which it produces reddish or yellowish red or russet brown spots with bleached centers, the local discoloration later becoming more or less obliterated with the withering of the individual leaves from tip toward base. Causing also localized lesions on the leaves of colonial bent, *A. tenuis.* In Connecticut, New York, District of Columbia, Maryland, Virginia, Ohio, Indiana, Michigan and Wisconsin.

SUMMARY

A leaf spot has been found to occur widely on redtop in some Eastern and Middle-Western States. Under wet conditions it gives rise to localized

lesions, these being marked individually by russet discoloration surrounding a relatively small, paler, central region. Local discoloration is less evident in dry weather, when infected leaves often wither in a manner suggestive of drought injury. The same disease occurs in severe form also on seaside bent. Lesions unaccompanied by withering effects have been observed on colonial bent.

Comparison is made between the disease and a much less injurious leaf spot attributable to *Helminthosporium triseptatum.*

The disease is caused by a species of Helminthosporium producing conidia typically straight cylindrical, rounded abruptly at both ends, distinctly yellowish in coloration, 25 to 105 μ long by 8 to 16 μ wide, germinating by the production of germ-tubes from any or all segments. The fungus is, therefore, referable to the series having ascigerous connections in Pyrenophora. It is described as a new species, *H. erythrospilum,* being distinguished from various other members of that series—*H. gramineum, H. dictyoides, H. siccans* and *H. avenae*—by the smaller diameter and closer septation of its conidia; from *H. arundinis* by its conidia being abruptly rounded at both ends, and by the position of the hilum within the contour of the basal segment. In pure culture on artificial media it often gives rise to submerged sclerotia that are more numerous and much smaller than those produced under similar conditions by *H. bromi;* or than those produced in pure culture by the Pyrenophora having ascospores with typically 5 transverse septa that occurs abundantly on overwintered oat straw in the Middle Atlantic States.

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