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A New Phase in the Control of Large Brown Patch

SUMMARY OF A SPEECH GIVEN AT FOURTH ANNUAL CONVENTION OF THE NATIONAL GREENKEEPERS ASSOCIATION AT LOUISVILLE, KENTUCKY

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IN ATTEMPTING to control the fungus disease known as large brown patch, we must recognize, or better still, accept certain facts that at present appear to be inevitable. These facts are set forth as follows:

1. The disease is caused by a fungus known as **rhizoctonia solani** (Kuhn).

2. This fungus attacks not only most grasses but many other kinds of plants, such as potato, cotton seedlings, vegetable seedlings and many other species.

3. The resting bodies or sclerotia are found in most cultivated soils.

4. The resting bodies are of corky texture, and resistant to the usual extremes of temperature remaining over winter in the soil or upon the grass leaves.

5. The fungus appears in three phases: (a) the resting stage; (b) what may be called the critical stage, or the stage in which the hyphoe or what may be termed feeding roots, have developed from the resting body, but have not begun to feed upon the plant; (c) the parasitic stage in which the fungus is living upon the plant.

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Because of the wide distribution of the fungus and because the resting bodies being corky, are difficult to destroy with fungicides, it has long appeared to me that the disease should be accepted and controlled rather than any attempt made to exterminate it; especially should the greenkeeper control rather than exterminate.

Fungicides are Helpful

SUCH a statement may sound out of order, for fungicides appear to destroy the fungus and therefore exterminate it. Fungicides are helpful in the control of the disease, and many of the resting bodies are destroyed when fungicides are applied. However, in the practical application of fungicides not all of the resting bodies are destroyed, and also there is a very large probability that resting bodies are transported on the shoes of golfers, in the top-dressing, and numerous other ways.

Control methods to be of general use must be simple and not costly, and it has been with such an idea in mind that I have been working with the large brown patch disease for the past five years.

The greenkeepers have furnished much valuable data with which to work by reporting their experiences with the disease. Their experiences when classified and the conditions noted were so uniform that they led me to believe that air temperature was a vital factor in the development of the fungus. Reporting temperature (usually soil temperature because most of the work has been done on potatoes) was of vital significance.

Five years of field observations with a recording thermometer were so uniform as to air temperature and the appearance of the brown patch disease, that I spent a few weeks at the Boyce Thompson Institute for Plant Research at Yonkers, N. Y., submitting my conclusions drawn from the field observations to laboratory tests. The laboratory results confirmed the field results, and while I would have liked to wait another year to still further confirm my ideas as to the control of the disease, enough pressure has been brought to bear to demand that I tell you in general about the conclusions as I have made them.

Summary of Field Observations

TWO phenomena must be given consideration, the growth of short "feeding roots" from the resting body which are entirely dependent upon the resting body and the development of these short "feeders" to active feeders that are parasitic upon the grass.

The optimum temperature range for the growth of the short feeders appears to be from 64°-68° F and the required duration within such range seems to be variable.

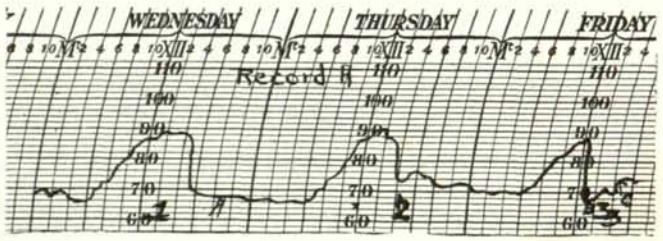
If the resting bodies are present, the short feeders will appear from 30 minutes to one hour after a sudden drop in air temperature to within the optimum temperature range. Virulent growth appears to require a rather rapid rise in air temperature fom 64°-68° F to 80°-85° F and parasitism commences about 73° and ceases at about 90° F.

If the air temperature falls below 62° F the short feeders are destroyed.

Moisture and humidity appear to have no influence over the development of the short feeders, but growth from the short non-parasitic stage is much more rapid on moist grass than on dry grass.

The typical thermograph records will illustrate better than I can tell you how the air temperature effects the development of this disease.

Development of Mycelia from Dormant Sclerotia. Representative Thermograph Readings Selected from Three Seasons' Records



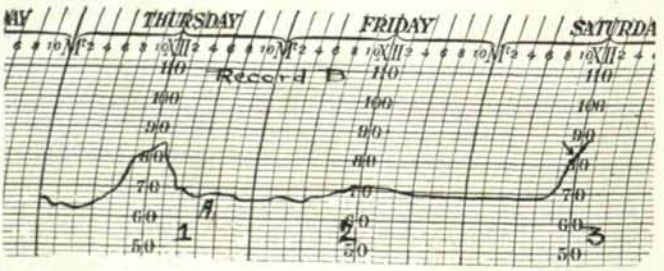
Record A

Under field conditions, if the optimum temperature was reached from a higher temperature, growth did not occur unless the change was very rapid.

1.—No growth of sclerotia was expected since abrupt drop in temperature failed to reach the optimum range (64°-68° F.) until four hours after the fall, indicated as A.

2.—No growth of sclerotia was expected since the optimum range was not reached.

3.—Very severe attack was expected and did occur since the sudden drop in air temperature was to the optimum range, indicated at B. Spread of mycelia began at 4:30 p. m. (73° F.), indicated at C. Immediate poling completely checked the mycelia already developed. On an unpoled plot the spread of mycelia was noted until the cool evening temperature was reached. (70°).



Record B

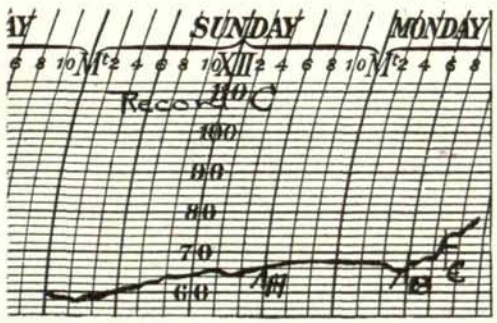
After short growth from the sclerotia the mycelia will remain inactive until environmental conditions favor their development, or they may be destroyed by attrition or excessive heat or cold.

1.—It is to be noted in the instance illustrated that on Thursday, growth of the sclerotia

should be expected at between 7 and 8 p. m. (A). The temperature was too low for rapid development of mycelia, but realizing that there were many sclerotia covered with very short mycelia, the green was not disturbed.

2.—On Friday no attack was noticeable to the ordinary observer because the mycelia had not developed sufficiently to be visible as cobweb-like masses.

3.—7, 8, 9, 10 and 11 a. m. observations found no apparent attack of the fungus. 11:45 a. m. observation found that the mycelia had developed so rapidly that the usual circular patches of diseased area were very noticeable.



Record C

The records also showed that if the optimum temperature range (64°-68° F.) is reached from a lower temperature, the air must remain from eight to ten hours at a nearly constant temperature within the optimum range to secure growth of sclerotia.

It is interesting to note that during the seasons 1928 and 1929 environmental conditions forecast the appearance of the disease on twelve and **only** twelve occasions at Amherst. Brown patch occurred on these twelve occasions and on the forecasted occasions only.

Practical Adaptation of Observation

ON THE test putting greens at the Massachusetts Agricultural College, no control methods were used to prevent the appearance of the disease, and when the disease was forecasted the greens were treated as follows:

One section was left untouched and the fungus permitted to develop as it wished. A second section was divided, one-half of which was heavily and thoroughly poled very soon after the optimum temperature range was reached, and at the same time the other half was treated with a fungicide. The third section was treated with a fungicide after the disease had appeared in its usual circular patches.

The results of the various treatments showed that poling during the critical stage is inexpensive and effective if thoroughly done. Fungicides if applied during the critical stage are comparatively inexpensive, effective in control, and seldom injurious to the turf.

Brown patch is not nocturnal but may appear any time when environmental conditions favor its development. It happens that a large per cent of the "right times" occur after mid-afternoon.

Practical Significance

IT IS possible to forecast the appearance of the fungus and therefore limit control measures to such occasions, thereby effecting a saving in cost.

It is practical to check effectively the development of the mycelia by poling or any such attrition and if the attrition is applied soon after the short feeders grow from the resting stage, control is as complete as when fungicides are applied and with less injury to the turf.

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