

in a form toxic to grass roots has been suggested as a cause of some of this type of injury. Sulphur or other chemicals accumulating in soil have been observed to produce injuries practically indistinguishable from that produced by copper. In all such cases it is usually found that the roots of the grass are shallow and not vigorous, and yet the grass may respond to fertilization and otherwise appear practically normal during certain seasons most favorable for growth. On extremely acid soils this same type of injury may be due to the excessive use of certain fertilizers and fungicides which, although they may cause no harm at the time of application, may nevertheless produce such a highly concentrated solution in the soil at certain times that it may cause injury to turf. These and other explanations are

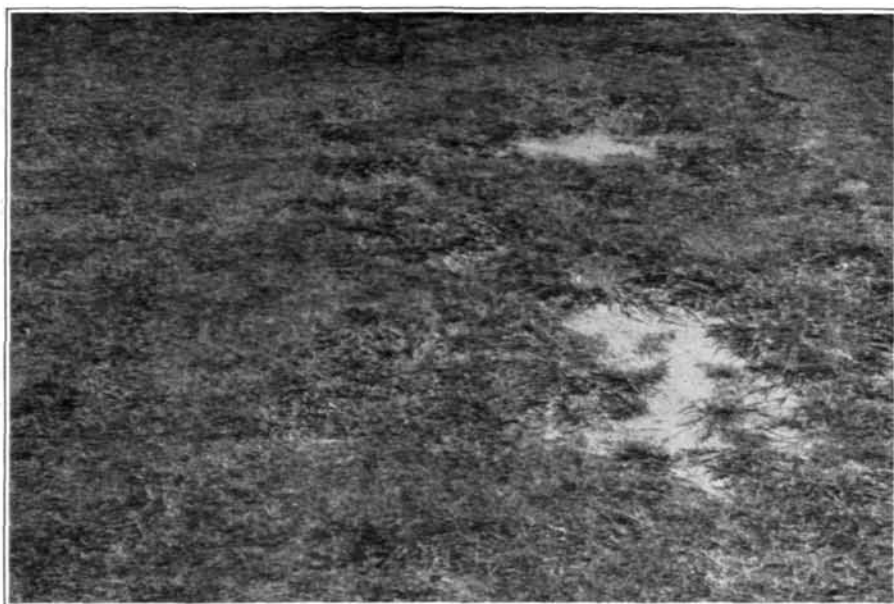


Fig. 9.—Bent turf which had repeatedly turned brown during the summer due apparently to some unfavorable soil condition. It was evident that the damage was not the result of brown-patch. In the summer of 1926 the left half was limed, and the turf immediately began to recover and remained healthy throughout the season of 1927. The turf on the half not limed, however, continued unthrifty and was badly scarred. Photographed July 15, 1927.

by no means confirmed as yet, and until the cause is fully determined no positive remedy can be prescribed. The following observations, however, will at least serve to throw some light on this problem which has baffled men interested in turf culture for years.

EFFECT OF LIME ON SCALD

Some old established turf of Rhode Island bent at the Arlington turf garden had repeatedly turned brown during the summer months. It was apparent that this turf was not suffering from brown-patch or other fungous diseases. The soil in these plots was very acid, and in the late summer of 1926 half of each plot was treated with lime at the rate of 50 pounds to 1,000 square feet. The limed area immediately showed improvement and its turf remained healthy throughout the following summer. The portion receiving no lime, however, continued to be unthrifty, and the old scars did not entirely heal before it again turned brown, in the summer of 1927 (see figure 9). Other

plots treated with lime and with sulphuric acid before planting in 1926 produced results which were in favor of the lime as compared with the plot receiving sulphuric acid or even the check plot which received neither lime nor acid.

In the early summer of 1927 some turf which showed symptoms of scald was treated with hydrated lime (calcium hydroxide), and an adjacent strip was treated with caustic soda (sodium hydroxide).

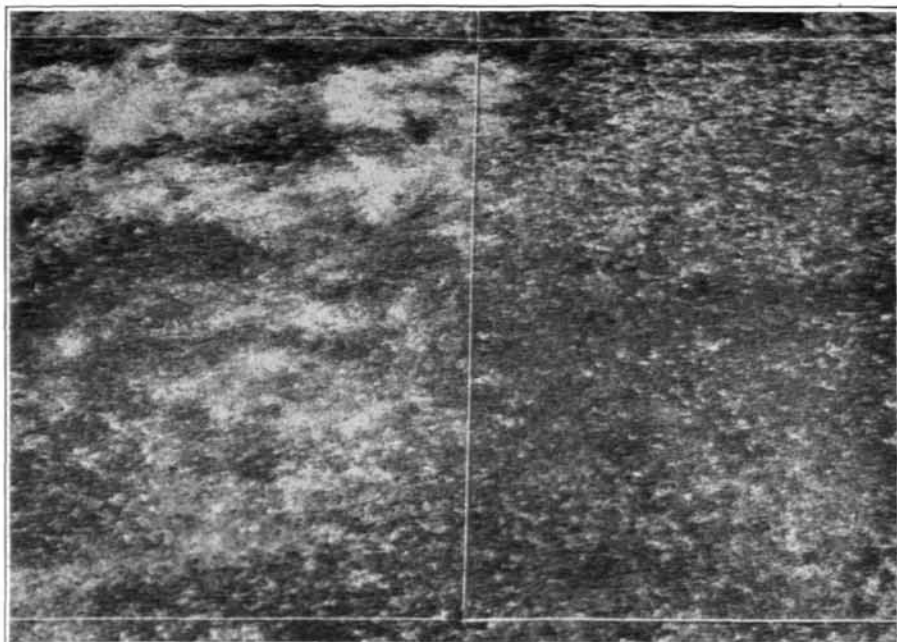


Fig. 10.—Two plots of Metropolitan creeping bent showing the influence of soil acidity on scald. The soil in the plot at the left was treated with oxalic acid in September, 1926, just before the stolons were planted. The plot at the right received lime at the same time. Both plots since planting were treated alike. The large irregular blotches of browned turf, or scald, on the plot at the left and the absence of this type of injury on the limed plot indicate that soil acidity has some influence on this particular type of turf disorder. Incidentally, the abundance of small brown-patch in the plot at the right shows that liming alone will not solve the brown-patch problem.

Within a few days the turf which had been treated with either of these chemicals showed a decided improvement over the untreated turf beside it, indicating that the neutralization of the soil acidity by these chemicals was beneficial to this bent turf. The results of this test were pointed out to the greenkeepers during their convention at Arlington in August, 1927.

In an attempt to study the effect on brown-patch of soil with a decidedly acid reaction as compared with a slightly acid and a nearly neutral soil, a series of six plots was prepared for planting in September, 1926. A heavy application of lime was incorporated into the soil of two plots. Into the soil of two other plots was worked a heavy application of oxalic acid, which was used to make the soil acid without leaving any possible harmful residue. The two remaining plots received no chemicals. One set of these three differently prepared plots was planted to Metropolitan and the other three to Washington creeping bent stolons. When scald was so prevalent at Arlington during the summer of 1928 these plots showed interesting differences. In the limed plots of this series scald did not develop except at the very borders, where apparently the lime was counter-

acted by the acid. In the two plots receiving neither lime nor acid there was some scald, but by far the worst damage was done in the plots receiving the acid. Two of these plots are illustrated in figure 10.

In other plots where lime was used on turf badly scarred with both brown-patch and scald there was a relatively quick recovery in the limed plots as compared with those where lime was not used. However, where the injury was due to previous use of Bordeaux mixture resulting in an accumulation of copper in the soil, the use of lime failed to bring about recovery of the turf. There are no doubt other poisons to be found in some soils which will not be remedied by lime. In such cases the only remedy so far found to be effective is to remove the poisoned soil and replace with fresh earth.

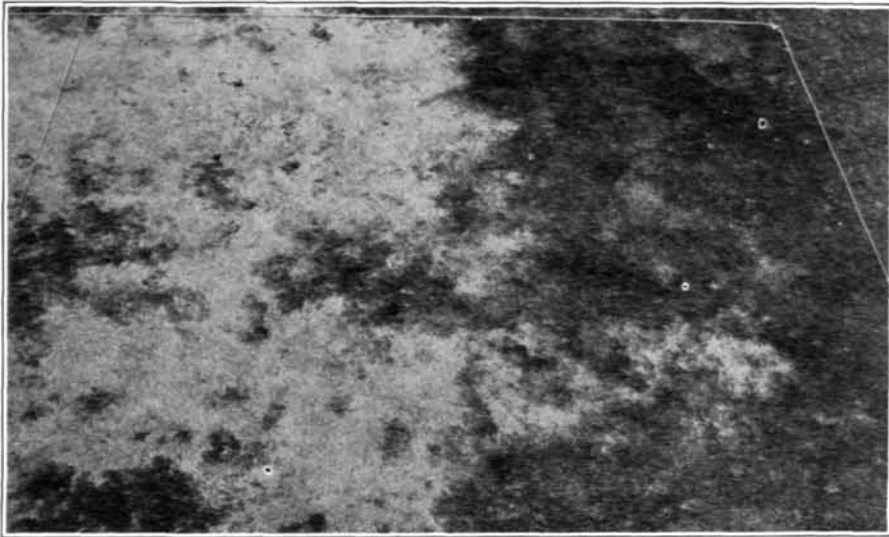


Fig. 11.—Cottonseed meal plot in the fertilizer series on Washington creeping bent. The large irregular blotches of browned turn on the left are the type of injury that was common throughout the East and Middle West during the summer of 1928. The right half of the plot was treated with corrosive sublimate and calomel. This treatment greatly reduced the amount of injury even though it did not completely control it. Photographed August 13, 1928.

FERTILIZERS AFFECTING SCALD

Another though similar type of scald is that shown in figure 11. This type produces the same irregular patches of dead turf, but the symptoms are somewhat different and the causes are probably not the same. At the present time, however, there is not sufficient knowledge of either type to warrant any distinctive names. In this latter type the injured grass has more the appearance of having been burned by a recent excessive application of some chemical such as sulphate of ammonia or corrosive sublimate. These symptoms are so similar that several cases have been experienced where the greenkeeper or green committee members have been inclined to blame the injury on some malicious individual who was suspected of having thrown chemicals upon the turf when none had been used by the club staff for perhaps three or four weeks. In the fertilizer series at Arlington this injury was most serious in the plots where the more slowly available fertilizers were used. In the spring of 1928 there seemed to be little response to some of these fertilizers even though the turf appeared to need food. Apparently the process of decomposition of the fer-