

Sun Helps Geraniums Poison Japanese Beetles

An insect poison that seems to need the aid of the sun to develop its best effects has been observed in connection with the campaign against the Japanese beetle. It has been known for some time that geraniol, an oil which occurs in geraniums and some other plants, is very effective in attracting the beetles, and this bait or attractant has been used to concentrate beetles on a single tree where they can be killed by a poison.

It has also been known that the beetles feed on geraniums, and that such feeding is often followed by paralysis or death. Articles suggesting that geraniums could be used for controlling beetles have frequently appeared in newspapers in the districts infested by the pest.

The effects of geraniums on the Japanese beetle have been studied by Charles H. Ballou, of the Bureau of Entomology. He found that the insects are drawn to the plant and eat it, both flowers and foliage. Many of the beetles are paralyzed and fall beneath the geranium plants. In the ordinary course of events some of the beetles recover and others die. But in making observations of the effect of geranium poisoning, Mr. Ballou observed that if beetles fed on geraniums in the sun many more were paralyzed than when they fed on geraniums in the shade. He also found that the flowers of the geranium were somewhat more poisonous than the foliage of the plant, although either would cause the death of a considerable proportion of the beetles feeding. One of the most interesting facts discovered was that 24 hours after death by geranium poisoning the entire digestive system of the beetle was destroyed.

Because of the poisonous effect of geraniums on the beetles Mr. Ballou suggests that a thorough study of the chemical nature of the plant might lead to the discovery of a new and better poison than any used for control of the beetles at present.

Zonate Eye-Spot Disease of Turf Grass

By Arnold S. Dahl

In the summer of 1928 a leaf-spot disease was common on certain strains of bent grass. The disease probably occurred in all of the northern states east of the Mississippi River. It was observed at Minneapolis, Kansas City, Chicago, Detroit, De Kalb (Ill.), La Fayette (Ind.), London (Ohio), the Metropolitan district (N. Y.), Philadelphia, Cumberland (Md.), Washington, and Richmond, where it caused more or less injury, in some cases severely thinning the grass on the putting greens and reducing the vigor of the plants in nursery rows. At Cumberland it was reported that several putting greens had large areas severely damaged by this disease. At the Country Club of Virginia, Richmond, some of the greens observed were completely defoliated. This was also the case with some of the plots at the Arlington Turf Garden.

The disease is caused by the fungus *Helminthosporium giganteum*. This fungus is related to those which cause net-blotch, spot-blotch, and stripe disease of many of the cereal crops. Many other species of *Helminthosporium* cause diseases of a variety of plants, including

all of the common turf grasses. Each species, however, has a more or less restricted range of hosts. As an example, the one causing the stripe disease of cereals is not serious on bents, neither is the one described on bluegrass in the September, 1925, issue of the Bulletin a serious pest of the bent grasses.

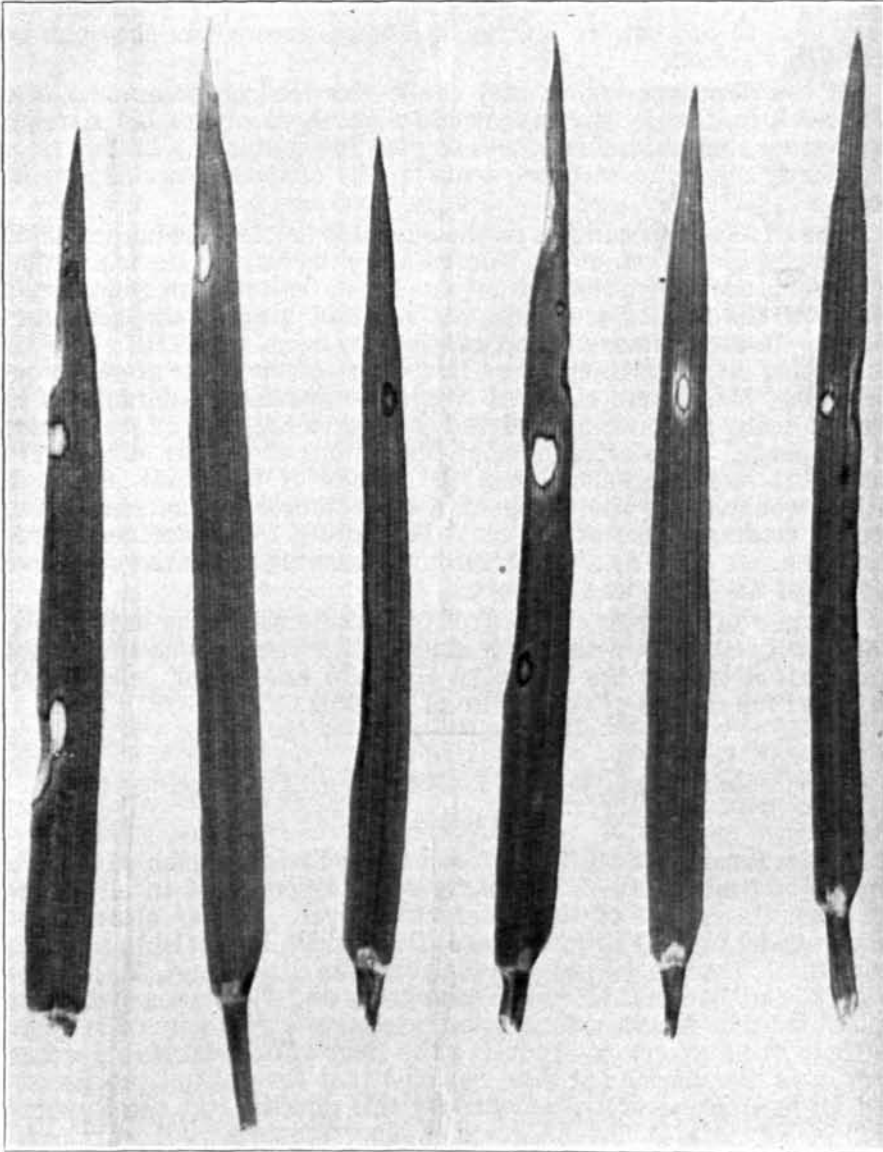


Fig. 1.—Leaves of Virginia creeping bent (about twice natural size), showing early stages of the zonate eye-spot disease. The eye-like spots with bleached centers and distinct dark rings are characteristic of the disease. On some of these spots light-colored zones are also evident just outside the dark rings. The later stages of the disease are shown in Fig. 2.

The zonate eye-spot disease appears first as a small, dark, brown speck, which in a short time may spread to a diameter of $1/16$ to $1/8$

inch. The center of the speck then bleaches, leaving a straw-colored spot surrounded by a brown ring (Fig. 1). When a droplet of water occurs on this spot the filaments of the fungus grow out into the water and attack the surrounding healthy areas of the leaf which are covered by water. The spread of the fungus is limited to the portion

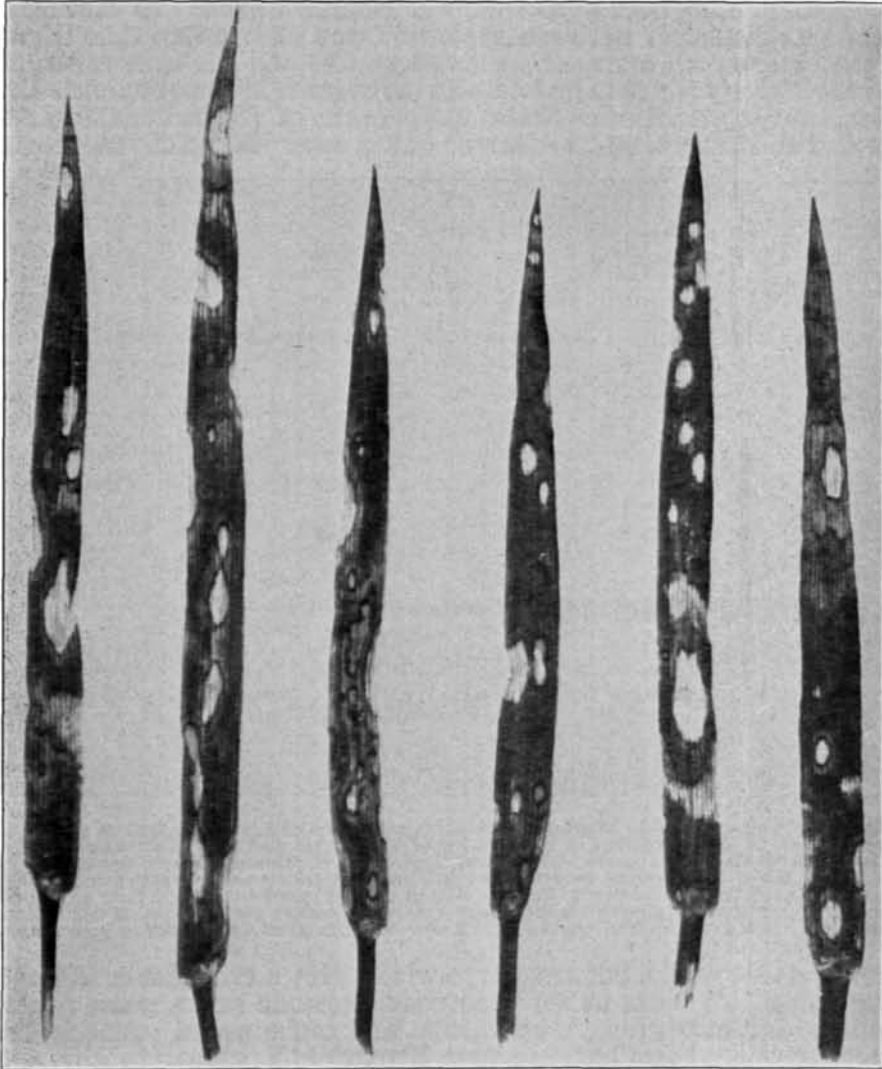


Fig. 2.—Advanced stages of the zonate eye spot disease on leaves of Virginia creeping bent (about twice natural size). It will be seen from the photograph that the disease has spread out in zones around the original eye-spots, leaving large discolored blotches, which in time dry out. Leaves as generally affected as those shown in the photograph usually soon wither and die, resulting in a thin and badly discolored turf, as shown in Fig. 3.

of the leaf covered by the droplet. Repeated periodic spreading of the disease into new zones gives rise to the zonate appearance of the older spots (Fig. 2). When conditions are favorable for the disease, the lesions may spread across the leaf, and the entire portion above

the spot will be killed. If many of these large spots occur, especially near the base of the leaves, whole patches of turf may be entirely defoliated in a comparatively short time. In such cases symptoms of this disease are frequently confused with those of large brown-patch. On narrow-leaved grasses, such as velvet bent, even a small spot soon spreads across the blade and the leaf withers and dies.

Helminthosporium giganteum was described in 1911 as causing a leaf-spot disease of Bermuda grass in Texas. Since that time it has been observed on a large number of grasses and has been regarded as the limiting factor in growing Bermuda grass in some sections. Dr. Drechsler, of the United States Department of Agriculture, has reported this fungus on 23 different host plants. Many of these were

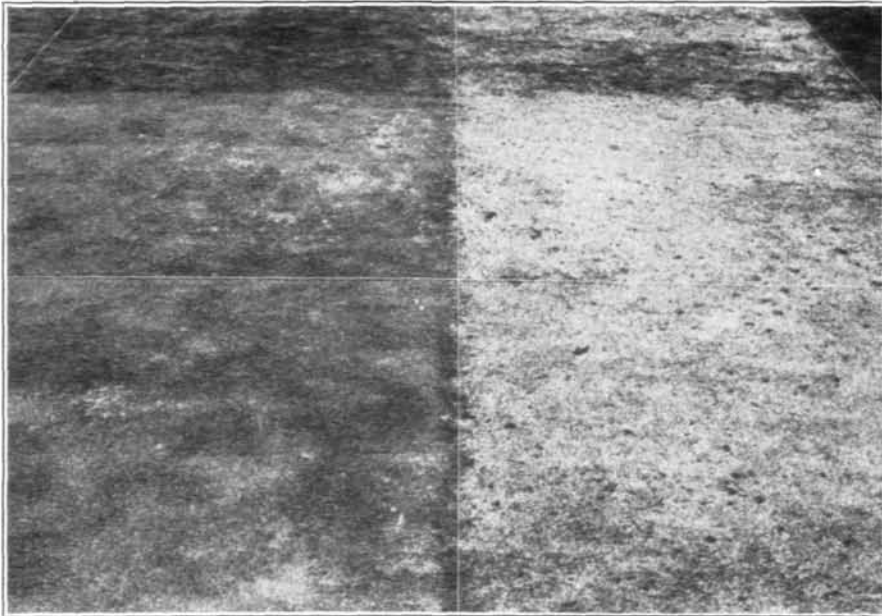


Fig. 3.—An illustration of the difference in resistance of two strains of creeping bent to the zonate eye-spot disease. The three plots on the right are of Virginia creeping bent, whereas those on the left are of the Washington strain. The general discoloration of the Virginia bent was due chiefly to a severe attack of the eye-spot disease. Some discoloration is evident on the Washington bent, but this was due chiefly to brown-patch. The two plots in the background were cut at lawn or fairway length, whereas the four plots in the foreground were cut at putting green length. It will be seen that the Virginia bent was less injured by the disease when the grass was allowed to grow longer.

unimportant weeds, but some were widely grown crop plants. Among the susceptible hosts he reported were Bermuda grass, goose grass, wild rye, brome grass, couch grass, and snake grass. Among the more resistant hosts he listed were Kentucky bluegrass, timothy, and finger grass. It has been observed that some strains of creeping bent are very susceptible while others are very resistant.

The disease spreads by the dissemination of the spores of the fungus, probably through the agency of spattering water, clippings, mowing equipment, and other mechanical means. Since the spores are very large they probably are not carried far by the wind. When a spore falls on a leaf, provided conditions are favorable for its development, it germinates and sends out filaments which enter the leaf. These filaments, or mycelium, penetrate the cells of the leaf and live

upon their contents. These affected cells soon die, the leaf becoming first brown and later bleaching to a straw color. After the cells are dead the fungus sends filaments out from the surface of the leaf, and on these a new crop of spores is borne. The spores are never very numerous, only a few being borne on each spot. They are short-lived and soon die if they do not find a favorable place for germination and growth. Thus the spread of the disease is closely dependent on climatic conditions. Two conditions favorable for germination of the spores and spread of this fungus are high temperature and plenty of moisture; this again often leads to confusion with large brown-patch, since these climatic conditions also favor the brown-patch fungus. The disease is most serious during warm wet seasons, but when once established it may continue to cause much damage even during the cooler periods of late summer or early fall. The daily watering customary on most putting greens encourages the fungus and probably accounts for its damage on putting green turf. The disease, unlike brown-patch, is not definitely limited to certain patches on a green, but wherever it occurs as a serious problem it is usually found that nearly every blade of grass on the green has a few spots. Later, as the disease becomes more severe, patches may be seen where no green leaves remain, and on the rest of the green the turf may be very thin.

There is a wide difference in the resistance of various strains of bent grass. The Virginia strain of creeping bent is the most susceptible of any that have come under our observation. This strain is widely grown throughout the territory where the disease was common in the summer of 1928. At Richmond, Cumberland, Minneapolis, and Arlington it was the Virginia strain that suffered the greatest injury. At Richmond this strain has been reported to die out every summer and it is probable that eye-spot disease has been an important contributing factor to this condition. The Washington and Metropolitan strains of creeping bent appear to be very resistant, only a few spots having been observed on the Metropolitan during the season and none on the Washington. The difference in resistance between the Virginia and Washington strains may be seen in figure 3. Among the various strains of velvet bent being tested at the Arlington Turf Garden there were also observed decided differences in resistance to attacks by this fungus. It was also noted that the more closely cut turf was more severely damaged than that where the mower was set higher.

It is probable that the best way to control this disease is to plant resistant strains of grass. In regions where the disease appears year after year it would be especially important to grow a resistant strain. In preliminary tests the ordinary treatments with fungicides appeared to be unsuccessful in controlling this disease. Efforts will, however, be continued to find some way in which fungicides may be used with success.

Freshly painted flag poles brighten a whole course. A good color combination for a flag pole is alternate strips of black and white. This combination helps much in showing off the flag pole, especially if a black strip is at the bottom of the pole and a white strip at the top. Poles should be repainted at least once a month, and flags renewed as often.