STATUS OF THE MILKY DISEASES OF JAPANESE BEETLE LARVAE

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This article is a summary of a discussion given on September 16, 1940, at Arlington Turf Meeting sponsored by the United States Golf Association Green Section and the Greenkeeping Superintendents Association at the Arlington Experiment Farm, Arlington, Virginia.

Early work at the Moorestown, New Jersey, laboratory indicated that diseases of the Japanese beetle were playing a part in the reduction of this pest. It was not until 1933, however, that the organisms responsible for certain of these diseases were discovered, and not until 1935 was the use of these newly described species of bacteria attempted for control under field conditions.

Diseases of the Japanese beetle can be grouped into four major classes, namely, bacterial, nematode, fungus, and protozoan. The bacterial group may again be divided into the "white group" and the "black group." The white group seems at present to be of most importance, and thus it is with this group that we are primarily interested.

At least two diseases of the white group, known as type A and type B milky diseases, have shown promise for utilization in larval control. Two heretofore undescribed species of spore-forming bacteria, which develop in the blood of living larvae, are responsible for these diseases. The spores of these bacteria are microscopic in size and cause the blood to become turbid and of a milky-white color; hence the name "milky diseases."

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Repeated tests have shown the spores, not only to resist extended periods of drying, but also to be equally resistant to periods of exceedingly wet conditions. The spores have been held in soil with no grubs present for approximately 4 years. This ability of the organism to withstand such adverse conditions of moisture and temperature indicates its usefulness under field conditions.

Experimental field plots were started in 1935 in areas in which preliminary surveys indicated little, if any, disease present. At the present time over 256 experimental field plots have been established under a variety of conditions of dosage, interval of application, temperature, moisture, and soil type. They are located at different points in the states of Virginia, Maryland, Delaware, Pennsylvania, New Jersey, New York, and Connecticut, and in the District of Columbia. In certain of these plots larval reductions of over 90 percent have been obtained within a single season. In the earlier treated plots attempts to reestablish a grub population in the soil have failed owing to the high incidence of the disease organism which has developed; in other words, when the soil once becomes highly infectious it is impossible for larvae to survive therein long enough to mature.

In addition to the research work under way, a program of colonization of the type A disease has been undertaken by the United States Department of Agriculture and several cooperating State agencies. Programs of disease distribution are under way in New Jersey, Maryland, New York, and Connecticut. It is planned to expand the colonization program as rapidly as possible.

Numerous examples of natural occurrence and build-up of the disease have been followed closely, and two such instances may well be mentioned at this time. Early in the fall of 1939

at the Veterans' Administration Hospital and Facility, Perry Point, Md., an average larval population exceeding 38 per square foot was found. Under ordinary circumstances in the absence of milky disease, severe injury to the turf would be expected under these conditions. An examination of the turf

Inoculation of a 1-acre area of turf on the Mall in Washington with the causal organism of the Milky Disease of Japanese beetle larvae. The dust which was being applied here by the spot-colonization method consisted of talc containing a specified quantity of spores of the bacteria which produce the disease. The apparatus released 2 grams of the dust mixture at each spot and the spots in this test were placed every 10 feet. The estimation is that when grubs are present in the soil it will take 1 year for the disease to spread uniformly over the entire treated area from these spots placed at 10-foot intervals.

area showed that approximately 4 percent of all larvae present were infected with milky disease, and that some reduction in the grub population had already been caused by the disease. A survey over the entire area in June, 1940, showed that only six larvae per square foot remained and 67 percent of these were diseased. Thus, a reduction of 94.7 percent in the larval population occurred between September, 1939, and June, 1940, owing to the activity of the milky disease organism.

Surveys conducted at the Battle Hill Golf Course, Springfield, New Jersey, showed conditions paralleling those found at Perry Point, for during the same period a reduction of 94.5 percent was recorded.

The situation in the District of Columbia is interesting and somewhat typical of other areas of comparable infestation. The beetle has been established there for a number of years and the infestation in several sections of Washington is now quite general. There is evidence, however, that the milky disease is also established to a limited extent through natural occurrence. In the spring of 1936, among several larvae collected in the Benning's Road section, one was found to be definitely infected with milky disease. In larval collections made in June, 1940, from several parks in the southeast and southwest portions of the District, larvae infected with type A milky disease were found. Since the disease occurrence appears to be limited and of low degree of incidence, a number of plots have been recently treated in order to hasten the development of disease in Washington and adjacent areas in Virginia.

All but one percent of the world's supply of Jute, the material used in making burlap bags, comes from India. England has, therefore, been able to commandeer the supply for use as sandbags to be used in protecting the structures in London from air raids. With increased difficulty in obtaining burlap bags for fertilizers, cotton and paper bags can be substituted, although they are not as suitable under some conditions as are those made of burlap. It has been suggested that the use of cotton bags would help, in a modest way, to reduce our cotton surplus.