

Jap Beetles Doomed!

The complete elimination of the turf-destroying Japanese beetle is now in sight, is the welcome news from the U. S. Experiment Station at Moorestown, N. J.

JAPANESE beetles first appeared in America at Riverton, New Jersey, in 1916. It is assumed that the grubs, or eggs, were brought into Riverton with plants imported from Japan for a local nursery. Along the Atlantic seaboard between Maine and North Carolina, extending westward to the Allegheny escarpment, approximately 25,000 square miles of territory is now heavily infested and 116,000 square miles are inside the quarantine lines of the U. S. Department of Agriculture.

B. R. Leach came forward with arsenate of lead as a specific in 1926. The beetle scourge struck the Merion golf courses in the Philadelphia District in 1927.

Beetles Cost Merion \$12,500

Since 1929, Merion has used for beetle control on its two courses 30 tons of arsenate of lead, at a prime cost of \$6,000. To dilute the arsenate for application by fertilizer drill, 500 tons of sand have been used at an initial cost of \$1,500. Unloading and handling through concrete mixer in preparation for spreading, together with the expense of application, has cost Merion approximately \$5,000. The total cost over the ten-year period has amounted to \$12,500, an average yearly cost of \$1,250. The number of acres treated was 66.

Depending upon weather conditions, the beetle appears annually during the latter

part of June or in early July. It deposits its eggs in the soil over a period of 8 weeks. Each female lays an average of 60 eggs. The eggs hatch in about 8 days into larva. The larva when full grown is about $\frac{5}{8}$ in. long, resembling more than anything else an undersized cut worm.

Grubs Feed on Grass Roots

A complete beetle infestation will show an average of 27 or 28 grubs per sq. ft. The maximum will run as high as 40 per sq. ft. The grubs feed on the organic matter of the grass roots. An infestation running greater than 15 per sq. ft. will strip the turf completely off a fairway if the grubs are left unimpeded between the time they hatch and the time they burrow into the ground for their dormant period throughout the winter.

With the approach of warm weather in spring the larva comes toward the surface of the ground and once more starts feeding on the grass roots. About the middle of June the grub ceases feeding. It then goes into a transitional stage and develops into the pupa. The pupa changes rapidly into an adult beetle and thus the cycle is complete.

Some five or six years ago a field man came into the office of the Bureau of Entomology of the U. S. Department of Agriculture at Moorestown, New Jersey. He held in his hand a dozen or more dead

Here's a tip found very practical by Jim Haynes, supt., Denver CC. On course bridges and wooden steps where spikes often slip or catch, nail down old industrial belting. It wears well and provides safe footing.

Japanese grubs which had turned white. The live grubs are a slate color with a black tip at the tail.

Since no white grubs, either dead or alive, had ever before been observed, one of the entomologists then studying the Japanese Beetle problem under the direction of the chief entomologist of the Moorestown Station, became interested in the field man's find.

Death From Disease Probed

After examination the idea was conceived that these white grubs had died of disease, probably caused by a bacteriological infection. With that thought in mind, some of the plasma of the dead grubs was injected into healthy grubs. The latter immediately became diseased, turned to a milky white color and died.

From these dead germs a culture was made and smeared on several microscopic slides. These slides were put away for three years. At the end of that time a drop of water was put on each slide. The solution thus obtained was injected into healthy grubs. As before, the healthy grubs paled and died, proving conclusively that the bacterial organism had not degenerated or in any way lost its virulence.

Looking toward a practical method of propagating the disease, the Moorestown entomologists next took a single dead grub, ground it up and put the mulch into a pint of water. With this pint of water they sprayed 10 sq. ft. of sterile ground and into the sprayed soil introduced a number of healthy grubs. A few days thereafter the healthy grubs once more turned milky white and died. Not at that time having isolated the definite organism, its effect thereafter was referred to simply as the "Milky White" disease.

Next 1 qt. of inoculated soil was scattered over 100 sq. ft. of virgin soil. Into this soil healthy grubs were once more introduced. Within two weeks the healthy grubs became diseased and within three weeks 90% of them were dead. Thus the second step was established. The soil itself, once infected, could be used to disseminate the disease, and the greater the number of grubs, the more virulent the disease. Then, too, it was also discovered that the bacteria not only attacked the Jap grub, but in a like fashion also

diseased and destroyed the Asiatic grub, the so-called May grub, and the June grub as well.

It was about this time, while working out a control program for chinch bugs with the pathologists and bacteriologists of Pennsylvania State College, that Joe Valentine, greenkeeper at Merion, got wind of the experiment in progress at Moorestown. He promptly told the story to his chief, Arnold Gerstell. The latter's reaction was immediate. "Joe," he said, "go get those bugs. We need them."

As the Moorestown experiment was pushed along it was found that two tons of infected soil would effectively inoculate one acre of virgin soil. Not content, however, those in charge of the experiment began searching for a natural carrier. To this end they fed infected grubs to a flock of chickens. Afterward, the droppings from the hen house were scattered on grub-infested soil. Ten days later the grubs again became infected, turned white and died; but the chickens, scorning to feed on the adult beetle, suffered no damage whatever in gobbling the larva.

Proceeding further, a number of wild birds, held under controlled conditions, were fed with infected grubs. The birds, like the chickens, proved a natural carrier, and also like the hens, suffered no ill effect.

Must Propagate Bacteria Artificially

And so after 5 years of intensive research, it appears that a natural means of completely eliminating the Japanese beetle now is in sight. But, exercising rigorously the meticulous restraint for which scientists are noted, the Moorestown station is not yet prepared to make any announcement as to the discovery. There is still work to be done before a scientific presentation of the case is in order. The diseased organism has been isolated, but as yet the bacteriologists at Moorestown have not accomplished artificial propagation of the bacteria, spore by spore.

It is probable that a formal announcement would have been made early this year had it not been for the fact that the Moorestown budget for 1939 was cut by nearly 50%. In consequence, the final stage of the research has not been completed. The bacillus is still unnamed. Nevertheless, practical application of the discovery is already under way.

Valentine got his "bugs," with the result that Merion established a disease bed

on its East Course April 27th last, but both Gerstell and Valentine were careful to keep their own counsel. What they foresee in the near future is a saving of more than \$1,000 per year on upkeep. As

a matter of mature precaution, however, they took no chances on letting the good news leak out at least until after their budget for 1939 had been approved and passed by Merion's Board.

\$1,000,000 Course for Cleveland

By J. Noble Richards

Commissioner of Recreation, City of Cleveland

"A golf course that has everything," accurately describes the million-dollar, 36-hole public golf course under construction on the outskirts of Cleveland, as a part of the city's development of a greater recreational system. In the last few years, with the help of WPA labor, Cleveland has made remarkable strides in the expansion of its park and recreational facilities. New playgrounds have been built, lighted ball diamonds opened to the public, a winter sports center started, many new tennis courts made available and the scope of the recreation program greatly enlarged. The new golf course is a part of this program and will serve the public of the south and west sides of the city.

For over 20 years a 36-hole course known as Highland Park has been operated for the public on Cleveland's east side, but the constantly increasing number of golfers and the inavailability of

this links to the populace of the south and west sides made it imperative to construct golfing facilities near these sections of the city. In 1938, there were 95,000 paid admissions at Highland Park. Every weekend last summer thousands of Clevelanders swarmed the links and play was slow and difficult because of the crowds.

It was this condition and the need for a course near the other sections of the city that prompted the department of parks and public property, of which recreation is a division, to obtain a Federal appropriation for the new course. An ideal location for the links was found on property already owned by the city near Brecksville, about 18 miles southwest of Cleveland's public square. About 325 acres of rolling, partly wooded land had been partly used as an emergency nursery, but in recent years it had been abandoned. Although neglected the land could not be better suited for a golf links.