

Does Lime Control Japanese Beetle Grubs in Turf?

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SOME GOLF COURSE superintendents in the Northeast and Midwest have claimed recently that applications of limestone reduced Japanese beetle grub populations on their golf courses. The reports we have seen of the reduction of grub populations with lime applications apparently involved large areas of turf, all uniformly treated with lime and no untreated areas for comparison. Since insecticide costs are rising steadily and homeowners are always looking for materials that have insecticidal activity but are safe for people to handle, we decided to

conduct some tests to see whether applications of limestone would reduce grub populations in eastern Massachusetts.

Two small test areas were set out in the summer. In each area we marked out a series of 10-foot plots, four plots wide and five plots long. Ten pounds of finely ground dolomitic limestone was applied to each plot (roughly a 2 ton per acre rate) on one of four dates (each plot received lime only once) or, in one plot per row, applied no limestone at all. Thus, there were four application dates and a no-limestone check to compare.

Each application or check was repeated 4 times. In both of these tests, grub populations in all lime-treated plots were not significantly different from populations in the untreated check.

In the following spring, we set up two tests similar to the earlier ones. Five applications were made, at one-week intervals, beginning on April 20. We used ground dolomitic limestone at 10 pounds per plot *or* hydrated lime at ½-pound per plot. Each application, or check, was replicated five times. Dolomitic limestone was applied by hand, using jars with perforated tops

Figure 1. Applying dolomitic limestone with a hand shaker.



Figure 2.
Counting grubs in a
one square-foot sample.



(Fig. 1). Hydrated lime was applied with watering cans, using 18 gallons of water per plot (equivalent to 180 gallons per 1,000 square feet), to reduce the chance of burning the grass chemically. In late June a count was made of the grubs in one square foot cut from the center of each plot (Fig. 2). Table 1 summarizes the results from one of these tests. In both of the spring tests, the grub population in the untreated plots was not significantly different from the population in any of the lime treated plots. So, while there was a range of grub population, this range was the result of random distribution and not the result of application of lime.

ANOTHER SERIES of lime trials was conducted in the late summer, this time repeating the trial in three locations and applying lime on six dates at one-week intervals, beginning on July 15. Dolomitic limestone was used at 10 pounds per plot, but this time we applied hydrated lime at one pound per plot, again applying with 18 gallons of water per plot. Again each treatment or check was replicated five times. At no time was any burning or weakening of turf observed in the limed or check areas. In late September another count was made of the number of grubs in one square foot taken from the center of each plot. Table 2 summarizes the results from one of these tests. None of the treatments or the check in any of the three summer tests was significantly different from any other treatment. Again, while there was a range of grub populations in the test area, this range was a result of random distribution, not a result of lime applications.

In the past 18 months we have conducted seven trials in which unlimed turf was compared with turf on which lime was applied on a range of dates. In all seven of these tests there was no statistically significant difference in grub populations between unlimed plots and any of the limed plots, regardless

TABLE 1
Lime Trials — Spring
Weston Country Club, Weston, Massachusetts

Formulation	Rate (Lbs./1,000 Sq. Ft.)	Date Applied	Ave. Grubs Per Sq. Ft.*
Hydrated	5	4 May	9.6 A
Dolomitic	100	11 May	5.4 AB
Dolomitic	100	4 May	4.2 AB
Hydrated	5	18 May	2.6 AB
Check	0	—	2.6 AB
Dolomitic	100	18 May	1.0 B
Hydrated	5	27 April	0.8 B
Dolomitic	100	20 April	0.4 B
Hydrated	5	11 May	0.4 B
Dolomitic	100	27 April	0.0 B

* Numbers followed by the same letter are not significantly different at the 95 percent level (Duncans Multiple Range Test).

TABLE 2
Lime Trials — Summer
The International Golf Club, Bolton, Massachusetts

Formulation	Rate (Lbs./1,000 Sq. Ft.)	Date Applied	Ave. Grubs Per Sq. Ft.*
Hydrated	10	17 August	18.6
Hydrated	10	27 July	18.4
Dolomitic	100	3 August	16.2
Hydrated	10	15 July	15.2
Dolomitic	100	10 August	12.0
Dolomitic	100	17 August	12.0
Check	0	—	12.0
Hydrated	10	3 August	11.2
Dolomitic	100	27 July	9.6
Hydrated	10	10 August	9.4
Dolomitic	100	21 July	8.8
Hydrated	10	21 July	5.6
Dolomitic	100	15 July	4.8

* None of the treatments was significantly different from any of the others at the 95 percent level (Duncans Multiple Range Test).

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of the kind of lime or the treatment date. It appears, therefore, that the application of lime alone does not provide a satisfactory means of controlling Japanese beetle grubs in eastern Massachusetts.

Earlier laboratory studies, conducted in 1979, indicated that soil pHs from 5.5 to 7.3 (roughly comparable to the range preferred by most turfgrasses) did not affect grub survival. The pHs of the soils in our trials were only changed a few tenths of a unit during the course of the trial, and it generally remained in the 6's. Thus, the insecticidal effect of lime claimed by various turf managers does not appear to be pH related.

During the late-summer applications of lime to trials areas, we observed Japanese beetle adults flying around the area. These beetles often would approach turf that had just been treated with dolomitic limestone or hydrated lime and would change flight patterns so as to land in an area that had not been treated that day. These beetles probably were avoiding the residue of the dolomitic limestone, which may provide a temporary physical or chemical barrier to the beetle, or were avoiding the wet surfaces, where hydrated lime had just been applied. Within a day or two after lime was applied, however, there usually was no apparent difference in any of the plots, because rain, dew, or irrigation had washed in any residue. This one- or two-day period during which egg-laying beetles may have avoided the treated plots was not significant compared to the six-week long period during which egg-laying beetles were active in the area.

FROM THE TESTS it appears that single applications of lime do not affect grub populations in eastern Massachusetts. In fact, lime applications were, in some tests, just as likely to have more grubs than the check as they were likely to have fewer grubs. Further tests will be conducted comparing different rates of hydrated lime and dolomitic limestone, perhaps involving multiple applications on some plots. However, at this time it appears that the logistics of applying the rates of lime (and, in some cases, water) being considered would be prohibitive for the golf course superintendent.



BLACKHAWK

Country Club

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November 4, 1983

Mr. William H. Bengeyfield, Director
United States Golf Association
19461 Sierra Luna Drive
Irvine, California 92715

Dear Mr. Bengeyfield:

This autumn is the one when I'm setting my procrastination aside and writing this letter, a letter I've intended to write for many years. I suspect my ambition to finally get this in the mail has been inspired to a great extent by a very difficult season in 1983. The recollections of it are still vivid in my memory as is the sense that survival was made a great deal easier by the good advice of our Green Section Agronomist. My hope is that other Golf Course Superintendents have been more dutiful in corresponding with you than I — I know scores of them share my thoughts.

There is no better way of expressing my feelings than extending to you and the USGA Green Section Staff a simple but sincere "thank you." The influence of the USGA on golf courses and their management across the world, wherever the game is played, is well founded and appreciated in a very general way. But to me, talking to the Green Section Agronomist face to face on one's own golf course is the only way to really understand what a positive and constructive impact the Association has. It is always a distinct privilege to have Stan Zontek visit our Club, both for me and for Club officials. It has often struck me that somehow a meeting that is so productive and intense shouldn't be as enjoyable as it is, but we all look forward, weeks in advance, to Stan's visit. That is to his credit, no doubt. But in the larger view, the USGA itself deserves a lion's share of the recognition given — for initiating the program years ago, for encouraging participation on the part of member golf courses, and for hiring premier agronomists like Stan Zontek. A tip of my hat to you!

These words of gratitude are a long time in coming. But I do want you to know that many of us have worked hard over the years in repaying the debt we feel to the USGA by sharing our good experiences from the Green Section Visit with our colleagues and peers. I firmly believe that we are your best salesmen. It is the least we can do.

So again, please accept these heartfelt thanks for a job well done.

Sincerely,

Monroe S. Miller
Golf Course Superintendent