

Title: Improving Lawn Quality Using IPM Techniques Without Pesticides

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Abstract: Pesticides are widely used in lawn care, but IPM methods can provide many of the same functions. Proper fertility, use of correct grass species, repetitive overseeding and core cultivation are offered as ways to improve turfgrass quality and possibly replace pesticide treatments for weeds and grubs. This project demonstrated how repetitive overseeding four times in the late summer/early autumn period can increase turfgrass density by up to 90%. While core aeration can be a valuable practice, under the conditions of heavy rainfall, plots seeded multiple times with perennial ryegrass performed better without aeration, while aeration was neither a benefit nor a detriment in tall fescue plots. While other studies have demonstrated that grub control is possible using a core aerator, three passes with a core aerator had no impact on grubs in this study.

Background and justification: Keeping urban and suburban soils covered with a dense stand of turfgrass is beneficial for many reasons, including minimizing soil erosion, preserving soil organic matter, boosting soil fauna populations, cooling the atmosphere and reducing weeds. To obtain these benefits, as well as for aesthetic reasons, American consumers have been persuaded to adopt a largely chemical-based approach to lawn care by the turfgrass industry (i.e., The Scotts Step Program). While such programs are easy to follow, they may not be environmentally benign. Additionally, the future of easily-available pesticides for the consumer market is questionable, due to increasing environmental concerns and government legislation. Turfgrass researchers and Extension educators have identified many IPM practices which can improve lawns and protect environmental quality without pesticides, including optimizing mowing height, improving fertility, repetitive overseeding with endophyte-containing, hardy grasses and core cultivation. Additionally, core cultivation has been shown to appreciably decrease white grub populations in turfgrass, although more research is needed to further quantify these results (B. McGraw, K. Trotta and J. Grant, "Assessment of Non-Chemical White Grub Control in Turf Through Mechanical and Injection Cultivation Methods," NYS IPM Program, 2012). While these IPM practices are not uncommon, they have not been widely adopted by property owners, especially those who have historically used a chemical approach. This project will demonstrate the use of repetitive overseeding, with and without core cultivation, to improve residential lawn density and quality.

Objectives:

1. Demonstrate various combinations of core cultivation, repetitive overseeding and grass species type on lawn turfgrass at two locations in the Capital District.
2. Produce a video and fact sheet describing the techniques used and results, and share it with volunteer, consumer and commercial audiences statewide.

Procedures:

1. Two properties with poor to average quality lawns (containing crabgrass and other weeds, bare spots, and/or white grub damage) were identified for this study. One was a private home in Castleton-on-Hudson, NY and the other was at the Schodack Island State Park, also in Castleton-on-Hudson. The property owners mowed the plots to a height of 3 inches with their own mowing equipment and left the clippings during the study. No supplemental irrigation was provided. Starter fertilizer (24-25-4 analysis) was applied according to the manufacturer's instructions after the plots were created.
2. Two seed mixes were used in this study. At the private home we used SS9000 Perennial Rye Blend (33.07% 'SR4650,' 32.89% 'Karma,' 32.37% 'Grand Slam GLD,' from SeedSuperStore.com). At Schodack Island State Park, we used SS1000 Tall Fescue Blend (33.42% '4th Millenium,' 33.20% 'Regenerate,' 32.82% 'Traverse 2,' from SeedSuperStore.com).
3. Starting in early August, a series of plots was created at both locations. Plot sizes were 3 feet wide and 25 feet long. We spread the perennial ryegrass seed at a rate of 3 pounds of seed per 1,000 square feet of lawn and the tall fescue at a rate of 4 pounds of seed per 1,000 square feet of lawn. The seven cultural regiments studied are described in Table 1 below.

Table 1: Seven Cultural Treatments

1. Seed three times (3x) in late August, early September and late September
2. Seed 4x in late August, early September, late September and early October)
3. Seed 5x in early August, late August, early September, late September and early October)
4. Core aerate and seed 3x in late August, early September and late September
5. Core aerate and seed 4x in late August, early September, late September and early October)
6. Core aerate and seed 5x in early August, late August, early September, late September and early October)
7. Check plot (no treatment)

4. The aerator we used was the Ryan Lawnaire 28. It has 3/4 inch diameter tines on 3.5 x 5 inch spacing, makes up to 12 holes per square foot and impacts 2.5% of the surface area in one pass. We made three passes on each test plot with the core aerator machine on each of the three, four or five dates we aerated. We spread the grass seed, using a Gandy drop spreader, after aerating.
5. Plots were evaluated for turfgrass density, weed populations and bare areas before the treatments are initiated in August, and one week after each treatment for a total of four evaluations in 2018. Plots were scouted for grubs in September.
6. An informational video describing repetitive overseeding, which includes this project as well as a similar study conducted in 2017, is currently being produced. This video will be housed on the CCE of Rensselaer County YouTube Channel (<https://www.youtube.com/user/ccerensselaer>). It will be made available to Master Gardener Coordinators statewide for volunteer and public audiences, and to professional audiences as well.

7. A fact sheet describing the project and detailing how aeration and repetitive overseeding can be used to improve lawns without pesticides has been written and will be housed in the CCE of Rensselaer County website.

Results and discussion:

Very rainy and warm weather during this study made the ground extremely wet. August had more than 0.75 of an inch of rainfall above average, and September precipitation was 2.3 inches above average. While October was closer to normal, there was precipitation on 21 of the 31 days, keeping the ground continuously soggy. Aerating wet soil causes more disturbance than aerating drier soil, so as a result, the aerated plots were “beat up” quite severely each time we used our machine. Weather details are in Table 2 below.

Table 2: Weather, Autumn 2018

	Rainfall (inches)	Departure from average inches)	Temperature departure from average (F)
August	4.2	+0.74	+5.0
September	5.6	+2.32	+5.3
October	3.8	+0.09	+1.0

The only change in our aeration schedule was for the Schodack Island plots, which were only seeded, not aerated, in October due to the extremely wet soil.

At the private home, the greatest cover of new perennial ryegrass developed in the plots seeded four times, with an increase of 90%. This is shown in Table 2 and Photo 1. Of the plots seeded and core aerated, the 4x plots also showed the greatest increase in turfgrass cover, at 66%. This is shown in Photo 3. Seeding combined with aerating provided smaller increases in cover than seeding alone under our conditions. Core aerating, therefore, decreased the overall success of repetitive overseeding. Seeding or seeding and aerating a fifth time didn't pay off in an increase in seedling cover and showed about the same results as plots given four treatments. There was no change in the check plots. Details are in Table 3 below.

Table 3: Percentage increase in perennial ryegrass cover for six repetitive overseeding treatments,

Treatment	% cover of perennial ryegrass by early November
1. Seed 3x	58
2. Seed 4x	90
3. Seed 5x	86
4. Core aerate and seed 3x	63
5. Core aerate and seed 4x	66
6. Core aerate and seed 5x	59



Photo 1: The seeded 4x plot on the left and the unseeded check plot on the right



Photo 2: The 4x core aerated and seeded plot on the left and the 4x seeded plot on the right. Photos taken in mid-October.

At Schodack Island State Park, the seeded only treatments provided approximately the same increase in new tall fescue seedlings, from 65 to 72% new turf cover, whether they were seeded three, four or five times (Table 4). The coring and seeding treatments also all provided approximately the same results, ranging from 62 to 70% increase in turf cover. Therefore, the core aerated and non-core aerated

treatments provided similar results. There was no change in check plots. It is likely that some seed rotted, or failed to germinate, due to the overly wet conditions at both locations.

Table 4: Percentage increase in tall fescue cover for six repetitive overseeding treatments,

Treatment	% cover of tall fescue by early November
1. Seed 3x	72
2. Seed 4x	65
3. Seed 5x	65
4. Core aerate and seed 3x	62
5. Core aerate and seed 4x	67
6. Core aerate and seed 5x	70

We scouted for white grubs on September 24. Two samples were taken in each of the six treatments. At the private home, five grubs were found in non-aerated plots and six grubs were found in aerated plots. All grubs were intact and healthy. It appears that three passes of the aerator were not enough to kill any grubs. While additional passes might impact the grubs, during this study it was found that more than three passes would do significant damage to the turfgrass. No grubs were found in the plots at Schodack Island State Park.

Just how repetitive overseeding can be used will depend on the conditions found at each lawn as well as the current weather. We have shown that both perennial ryegrass and tall fescue can be used to significantly increase turfgrass density (which will crowd out next year’s crabgrass) when overseeded multiple times in the late summer and autumn. Based on this and previous studies, we can make the following guidelines. We recommend making four applications of seed, spaced two to three weeks apart, during the late summer to autumn period when there is average rainfall. At a price of \$3.71 per pound and a seed rate of 3 pounds per 1,000 square feet, one application of perennial ryegrass on 1,000 square feet costs \$11.13. At a price of \$4.28 per pound and a seed rate of 4 pounds per 1,000 square feet, one application of tall fescue on 1,000 square feet would cost \$17.12. Increasing the number of seed applications when the weather conditions are dry and there is no irrigation available was shown to be effective in the 2017 study (see the Fact Sheet). Late August to early October works for repetitive overseeding in upstate New York, but the timing might need to be adjusted according to location. Core aerating is not needed unless the soil is heavily compacted. Perennial ryegrass will provide faster results than tall fescue. Lawns can continue to be mowed at a height of 2.5 to 3 inches during the overseeding period. Use of a starter fertilizer will also increase success if soil fertility is poor. Soil testing with the help of a local Cooperative Extension office will provide an accurate picture of soil fertility. We hope that this project and ones similar to it will help move property managers away from relying on pesticides toward more culturally-based solutions, when possible.

Project location: This project was conducted in Rensselaer County, NY. It is applicable to all New York counties as well as much of the USA.

Resources developed:

Fact Sheet: “Repetitive Overseeding Can Replace Herbicides To Conquer Crabgrass.”

Video: “Repetitive Overseeding: Spreading Seed to Reduce Lawn Weeds.”