Using Sewage Sludge as a Turfgrass Fertilizer

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Environmental concerns associated with traditional avenues of sludge disposal have spurred research exploring alternate methods of disposal. Like other organic wastes, sewage sludge contains organic material and essential plant nutrients such as nitrogen and phosphorus. Unlike other organic wastes, however, sewage sludge contains heavy metals such as boron, cadmium and zinc. When concentrated, heavy metals may be harmful to our health and environment.

The overall objective of this research is to evaluate the effect of pelletized sewage sludge on turfgrass growth, and quality, and to monitor the environment impact of nutrients and metals contained in sludge. In addition, sludge performance and impact is being compared to that of several commonly available fertilizers.

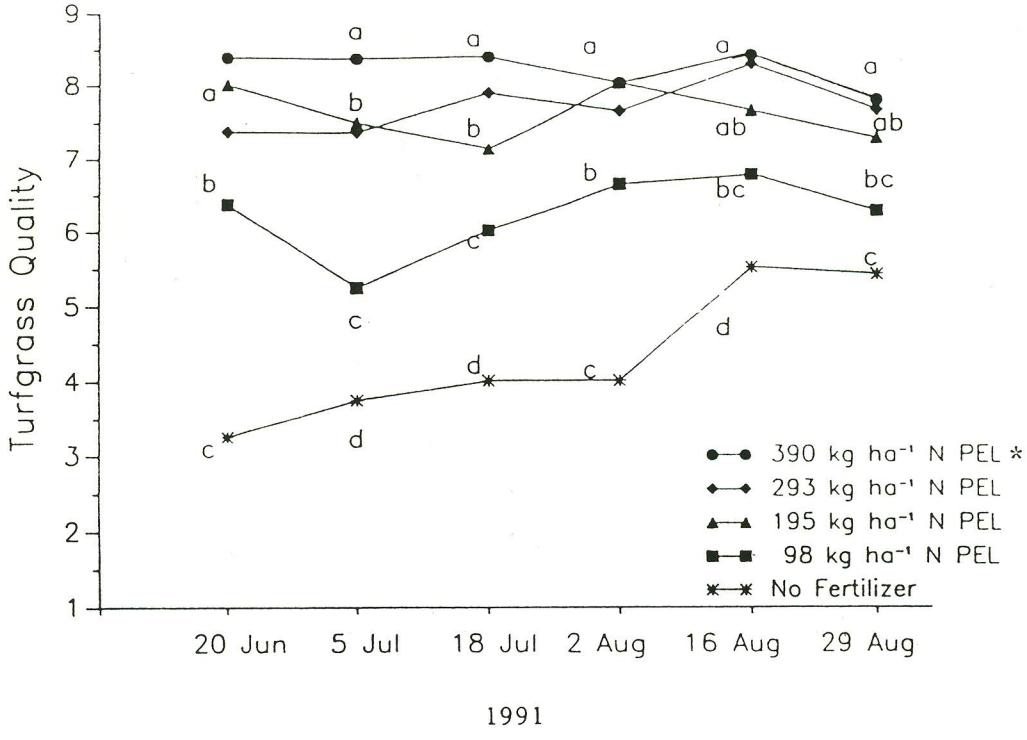
The sewage sludge used in this study has been processed into a material called pelletized sewage sludge. Pelletized sewage sludge is a dry pelletized material that resembles common turfgrass fertilizer. During the first year of research pelletized sewage sludge from Hagerstown, PA was analyzed and will continue to be analyzed this year.

Field studies were initiated on 6 June 1991 on a mixed stand of Perennial ryegrass 'Manhattan' and Kentucky bluegrass 'Baron' mown at 1 1/2 inches. Hagerstown pelletized sludge was compared to urea, 12-4-8, Ringer lawn restore, and Milorganite. Treatments were applied on 6 June and 29 August 1991, 23 April and 11 June 1992. The pelletized sludge was applied at 2, 4, 6, and 8 lbs. N/100 ft^2. Urea and 12-4-8 were applied at 1 lb. N/1000 ft^2. Ringer lawn restore and Milorganite were applied at 2 lbs. N/1000 ft^2. Turfgrass quality and clipping yield were noted every two weeks following each fertilizer application. Within each plot, a lysimeter was placed at a depth of 14 inches to allow sampling of the soil solution immediately below the root zone. The soil solution was monitored monthly to assess possible nitrate leaching caused by fertilizer applications.

Turfgrass Quality

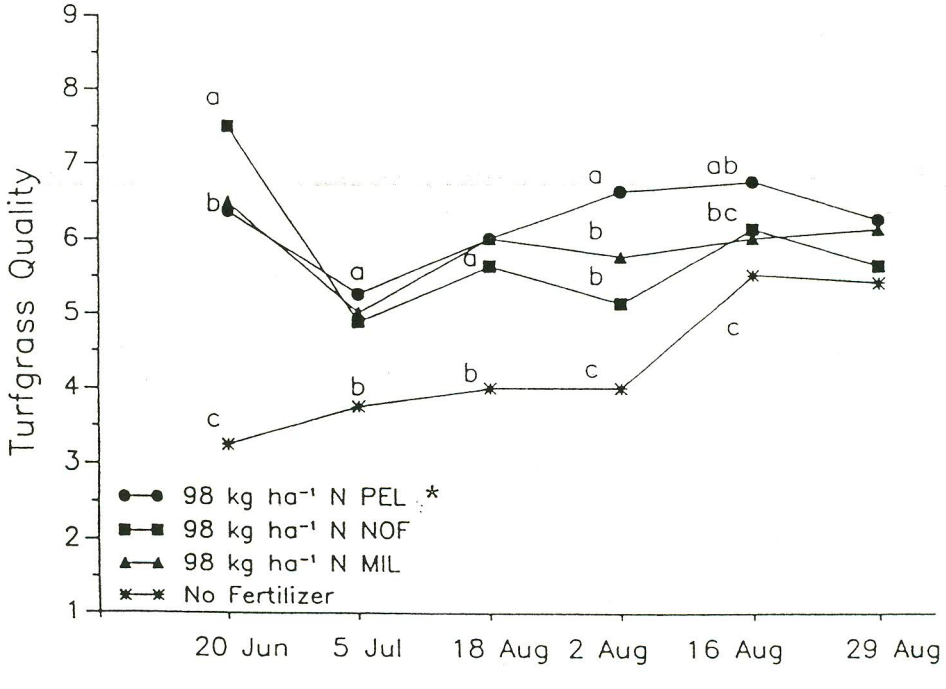
Turfgrass quality, measured on a scale of 1-9 with 1 = dead, brown turfgrass and 9 = dark green, dense turfgrass was monitored every other week from 6 June 1991 to 24 November 1991 and 21 March 1992 to the present. Applying Hagerstown sludge at rates as low as 2 lbs. N/1000 ft^2 provided acceptable to good turfgrass quality throughout the 1991 season. Sludge application rates of 6 and 8 lbs. N/1000 ft^2 seldom provided quality superior to the sludge 4 lbs. N/1000 ft^2 rate (Figure 1). Urea applied at 1 lb. N/1000 ft^2 produced higher quality turf than pelletized sludge during the initial month following 6 June 1991 application, however, all rates of sludge application resulted in quality equal to or better than urea for the remainder of the season. Turf treated with pelletized sludge performed similarly to that receiving comparable applications of Milorganite (Figure 2). Application of sludge at rates high as 8 lbs. N/1000 ft^2 produced no burning or foliar discoloration.

Figure 1.



1991

Figure 2.



1991

* 98, 195, 293 and 390 kg N/ha is equal to 2,4,6 and 8 lbs. N/1000 sq. ft.., respectively.

Figure 3.

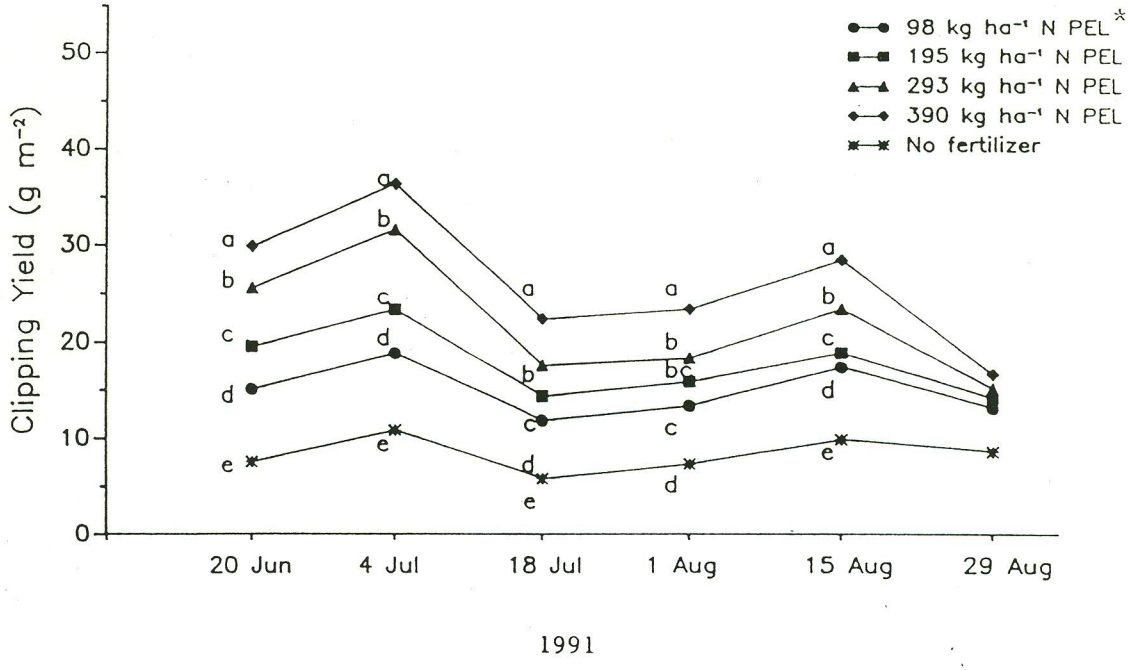
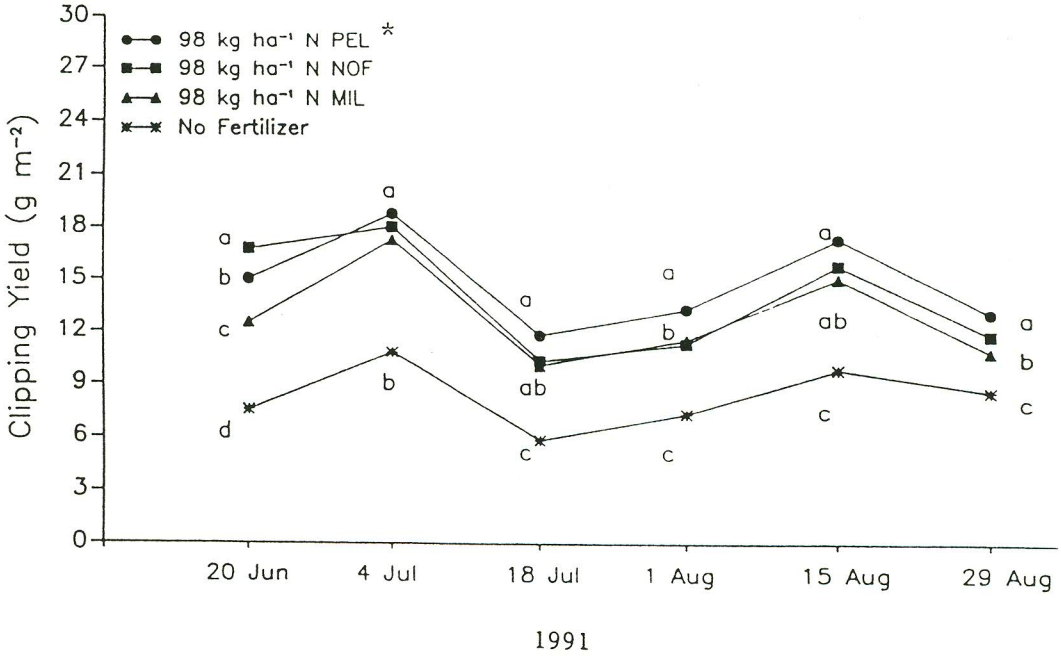


Figure 4.



* 98, 195, 293 and 390 kg N/ha is equal to 2,4,6 and 8 lbs. N/1000 sq. ft.., respectively.

Turfgrass quality was monitored for early spring green up from 21 March to 20 April 1992. Initially, a late season application of urea and 12-4-8 applied at 1 lb. N/1000 ft^2 did not provide quality superior to 2 lbs. N/1000 ft^2 pellet treatment applied on 29 August 1991. For the next month, however, urea produced quality superior to the 2 lbs. N/1000 ft^2 pellet treatment. Pellets applied at 2 lbs. N/1000 ft^2 did, however, provide similar quality compared to equivalent rates of Milorganite and Ringer lawn restore. Pellets applied at 4 lbs. N/1000 ft^2 provided quality similar to urea. All fertilizer applications provided quality superior to nonfertilized plots.

Growth Response

Clipping weight increased with increasing application rates of Hagerstown sludge during 1991 (Figure 3). Plots receiving sludge at 2 lbs. N/1000 ft^2 had similar clipping weights compared to plots receiving Ringer and Milorganite at 2 lb. N/1000 ft^2 (Figure 4) and urea at 1 lb. N/1000 ft^2.

Nitrate Leaching

Soil solution was sampled monthly, starting 7 July 1991 until 12 December and resumed again 3 April 1992. The Federal drinking water standard for nitrate is 10 ppm. Rarely was the soil solution greater than 1.0 ppm, even from an application of 8 lbs. N/1000 ft^2.

1992 Evaluations

Treatment application for 1992 commenced during April and will follow the same general scenario as last year. In addition to reapplication of the pelletized Hagerstown sludge, treatments utilizing Boston's sludge pellets will be Initiated.