UTILIZING LAKE WEEDS AS A SOIL AMENDMENT IN SOD PRODUCTION

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During the summer of 1994 significant amounts of lake weed growth occurred in Lake St. Clair became aesthetically unsightly and interfered with recreational uses. Some local municipalities attempted to physically remove some of the weed growth, but the question arose as to what could be done with this material. One obvious solution was to use as a soil amendment. While the area surrounding Lake St. Clair is developing rapidly there are still many farms in the area that could consider utilizing the composted weed material. Some of the farms have sand ridges left by receding waters after glaciers departed the region which have limiting water and nutrient holding capacity. The M.S.U. Extension Service in St. Clair Co. contacted the Marvin Debuck Sod Farm, Macomb, MI about potential interest in using the weed material as a soil amendment. Mr. Debuck agreed to cooperate in establishing a study on a sandy ridge on his farm.

Soil samples were obtained from each plot for the study in August, 1995. Soil test results varied slightly from plot to plot with pH of about 5.9; phosphorus was generally high and potassium was generally low. The soil was a loamy sand with a cation exchange capacity of 7.5 me./100 gm. Recommendations were about 30 lbs./acre of phosphate; 150 of potash; and about 1 ton lime per acre to bring the pH to 6.5. About 500 lbs. 6-12-36 and 1 ton limestone were applied per acre and disked in.

In late August the treatments outlined in Table 1 were applied to the site. The Lake Weeds were fresh and not composted; The Finished Compost was a locally available composted yard waste. Rates of application were adjusted to a dry weight basis. These materials were disked into the plots. Plot size was approximately 8 feet by 20 feet with a 15 foot border on the ends of the plots and 1-2 foot border on the sides to prevent movement into adjacent plots. There were 4 replications with a randomized complete block design.

Table 1. **Treatments Applied in Lake Weed Soil Amendment Study. August, 1995. Marvin Debuck Sod Farm, Macomb**

Treatment designation	Material	Rate of application dry weight, tons per acre
Check	None	—
LW1	Lake weeds	43
LW2	Lake weeds	72
LW3	Lake weeds	90
FC1	Compost	180
FC2	Compost	380

On September 16 a blend of Kentucky bluegrasses (29% Victa, 29% Abbey, 20% Bristol, and 20% Coventry) was seeded on the plots. In mid-October urea was applied at the rate or 25 lbs. nitrogen per acre.

Winter conditions arrived early in 1995 and cool, cloudy weather in early spring, 1996 slowed rate of establishment of the Kentucky bluegrass. The percent turf cover was estimated visually on May 8 and on June 20 (Table 2). It is clear that there was increased germination and rate of establishment occurred as a result of amending this sandy soil. In early May the higher rates of lake weeds enhanced germination more than other amendment treatments. By mid-June all amended plots had about the same cover. One application of urea was made on June 20 at the rate of 40 lbs. nitrogen per acre on the Finished Compost (FC) and check plots while the low rate of lake weeds (LW1) received 20 lbs. nitrogen per acre. By September 2 several treatments were again showing signs of a shortage of nitrogen, having lower turf density ratings than when higher rates of lake weeds

had been applied.

Another evidence of limiting nitrogen and lower turf density was the rating for relative rate of turf growth on May 8. The higher ratings for most amended treatments had greater growth rates. In addition, the lake weed treatments resulted in adequate density and establishment rate so there were fewer broadleaf weeds than other treatments on June 20, and again with crabgrass encroachment on September 2.

Table 2. Effect of Lake Weed Soil Amendment on Turfgrass Sod.

Treatment	Percent cover		Turf density	Relative growth	Weeds	Crabgrass
	May 8	June 20	Sept 2	May 8	June 20	Sept 2
Check	10	64 c	4.7 d	3.7 d	5.5 d	7.25 d
LW1	46	81 b	7.1 bc	5.7 c	2.5 b	2.0 ab
LW2	61	83 b	8.4 ab	6.7 b	2.25 b	1.4a
LW3	69	88a	9.0 a	7.7 a	1.37 a	1.0 a
FC1	29	80b	5.6 cd	6.2 bc	5.0 d	4.25 c
FC2	35	84 ab	6.0 cd	6.7 b	3.5 c	3.25 bc
Probability		.00	.00	.00	.00	.00
lsd		4.3	1.62	.79	.63	1.27

Clippings were harvested on several dates in 1996 (Table 3). In all cases amending the sand with lake weeds resulted in significantly greater growth of grass than the untreated check, even for the lowest rate of lake weed application. Results with the finished compost were statistically less consistent, but on all dates the check plots had the lowest clipping weights.

Table 3. Effect of Lake Weed Soil Amendment on Turfgrass Clipping Weights.

	Dry clipping weights per plot, grams				
Treatment	July 3	July 19	Aug 6	Sept 21	Oct 26
Check	24 c	55 c	35 b	55 c	24 e
LW1	110 b	131 ab	131 a	117 ab	62 bc
LW2	204 a	171 a	112 a	147 a	70 b
LW3	231 a	162 a	141 a	149 a	87 a
FC1	54 bc	93 bc	62 b	114 ab	51 cd
FC2	106 b	112 b	55 b	100 bc	41 d
Probability	.00	.00	.00	.01	.00
lsd	76.2	44.2	34.7	45.8	14.5

The clippings were analyzed for nitrogen content on several dates (Table 4) utilizing Near Infrared Analysis (NIR), a commonly used technique for analyzing protein content in forage crops. As was evident from the clipping weight data, lake weed amendments increase nitrogen content. Only on July 19 were the data inconsistent.

Table 4. Effect of Lake Weed Soil Amendment on Nitrogen Content of Clippings.
Nitrogen determined by Near Infrared Analysis.

	Nitrogen content in clippings, %					
Treatment	June 20	July 3	July 19	Aug 6	Sept 21	Oct 6
Check	2.7 c	2.5 b	4.3	3.7 d	3.0 b	2.8 c
LW1	3.7 a	3.5 a	4.2	4.2 b	3.8 a	3.7 b
LW2	3.7 a	3.7 a	4.1	4.5 a	4.0 a	3.9 a
LW3	3.5 a	3.7 a	4.3	4.6 a	4.0 a	4.3 a
FC1	2.9 bc	2.6 b	4.2	4.0 c	3.8 a	3.7 b
FC2	3.4 ab	2.8 b	4.0	4.1 c	3.8 a	3.9 ab
Probability	.00	.00	.08	.00	.00	.00
lsd @ .05	.53	.35	N.S.	.15	.41	.44

One measure of turfgrass sod development is a visual estimate of turfgrass quality. This rating is based on a combination of turfgrass color, density, and uniformity. Data in Table 5 verify the improvement in turf quality by amending this sand with lake weeds. As the season progressed differences among treatments was reduced as tended to occur with other evaluations.

Table 5. Effect of Lake Weed Soil Amendment on Turfgrass Quality Ratings.
9.0=ideal; 6.0=acceptable; 1.0=dead grass

	Turfgrass quality rating			
Treatment	June 20	July 3	Sept 21	Nov 16
Check	2.2 f	2.5 d	3.7 c	4.5 d
LW1	6.1 c	7.0 b	7.5 a	6.5 bc
LW2	7.7 b	7.9 ab	7.5 a	7.0 ab
LW3	8.4 a	8.4 a	7.7 a	7.2 a
FC1	4.6 e	4.4 c	6.5 b	6.6 bc
FC2	5.4 d	4.5 c	6.2 b	6.2 c
Probability	.00	.00	.00	.00
lsd @ .05	.52	1.22	.92	.56

Amending soils with both lake weeds and composted yard waste influenced several soil tests. Both lake weeds and compost increased phosphorus soil tests. Potassium was increased slightly by lake weeds, but there was a significant increase with the composted material. Both calcium and magnesium were increase somewhat by lake weeds, while much larger increases occurred with the compost. It is interesting to note that although calcium, magnesium and potassium were greatly increased by amending the soil with yard waste compost, there was no effect on pH.

Table 6. Effect of Lake Weed Soil Amendment on Soil Tests, July 3, 1996.

		Pounds per acre			
Treatment	pH	Phosphorus	Potassium	Calcium	Magnesium
Check	6.0	183 d	198 c	952 e	155 d
LW1	6.0	215 cd	250 c	1786 d	155 d
LW2	5.9	275 ab	279 c	2275 cd	200 cd
LW3	5.9	295 a	284 c	2525 c	213 c
FC1	6.0	245 bc	573 b	3350 b	377 b
FC2	6.0	260 b	841 a	4214 a	481 a
Probability	.59	.00	.00	.00	.00
lsd @ .05	N.S.	34	136	569	51

In conclusion, there is definite benefit in amending sandy soils with lake weeds. In this study, the rate of sod establishment was significantly enhanced, particularly at the higher rates of application. Turf density was improved such that there was less opportunity for weed encroachment. Nitrogen contained in the lake weeds was adequate to provide for nitrogen needs of the sod throughout the growing season when applied at the two higher rates of application. Higher rates of nitrogen fertilizer on the check and compost-treated plots may have reduced the differential in rate of establishment. However, it is likely that the lake weeds increased the water holding capacity of this sandy soil. This could enhance the rate of germination, encouraging more rapid development of turf density.

One concern with the higher rates of lake weed applications could be an excessive amount of nitrogen may be available to the grass. Studies conducted years ago confirmed that high nitrogen rates encourage topgrowth at the expense of root growth, resulting in weak sod. Lower nitrogen rates caused the turf to have a lighter green color, but with a much stronger sod. The nitrogen supplying capacity of lake weed sources is currently being evaluated. Measurements of root weights is also being determined.

A disadvantage with the use of lake weeds is the amount of debris that came with the waste. When the weeds were harvested there were also various pieces of plastic materials as well as smaller metal, leather, and other items. While smaller pieces would not impact on sod harvesting, larger pieces would need to be removed from the field.

Utilization of yard waste composted material also provide some benefit over the untreated check treatments, but differences were smaller than with lake weed amendments. The yard waste compost used in this study seemed to have a somewhat negative effect on germination. In places where the concentration of compost was high the germination rate was poor. More complete mixing of the compost into the soil may have alleviated this situation. In an attempt to prevent moving specific amendments from the designated plot area, the number of passes with a disk was limited. Additional disking may have mixed the compost more thoroughly with the soil.