

Organic Sources of Nutrients and Soil Conditioners for Turfgrass and Landscapes

DCR Nutrient Management Training
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Manure & Biosolids as Nutrient Sources



Odor, disease and moisture may limit urban use.



Heat drying and pelletization/granulation creates Class A product.

Composition of Typical Pelletized Biosolids

Property	Value	Property	Value
Solids (%)	93	pH	7.12
TKN (%)	5.51	EC (mmhos/cm)	3.62
NH ₄ -N (%)	0.26	WSN (%)	0.56
Organic N (%)	5.25	WIN (%)	4.95
P (%)	2.32	Fe (%)	2.86
K (%)	0.17	SO ₄ -S (%)	1.68
TOC (%)	40	Cu (ppm)	262
C:N	7.3	Zn (ppm)	1830

Properties of Common Turfgrass N Sources (Mugaas, UMn)

Fertilizer source	N content (%)	Low temp response	Leaching potential	Residual effects
$(\text{NH}_4)_2 \text{SO}_4$	21	Rapid	High	Short
Urea	46	Rapid	Moderate	Short
Sulfur-coated urea	14-38	Moderate	Low	Moderate
Isobutylidene diurea	30-31	Moderate	Mod Low	Moderate
Biosolids	5-6	Very low	Very low	Long
Manure	3-10	Very low	Very low	Long

Compost: Product of aerobic, thermophilic microbial decomposition



High OM, Class A product



Important Compost Properties

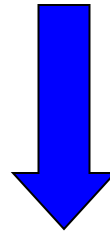
Variable	Preferred Range
pH	6.0-7.5
Electrical Conductivity (mmhos/cm)	1.0-4.0
Organic matter (%)	>50
Water holding capacity (%)	>100
Moisture content (%)	35-45

Important Compost Properties

Variable	Common values and guidelines
Nutrients	N = 0.5-2.5%; C:N = 12:1-20:1 P = 0.2-2.0% K = 0.3-1.5%
Trace elements	Must meet U.S. EPA Part 503 Regulations
Stability	Stable to highly stable
Growth screening	Must pass seed germination & plant growth assays

Plant Available N (PAN) Forms

Urea N mineralized to NH_4/NH_3	Organic N mineralized during year 1	Stable organic N mineralized during year 2
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Source	% Available N		
Pellets	100	35-50	0-5
Compost	100	5-15	0-8

Compost Use for Turfgrass



- Turfgrass establishment
 - Apply 1-2 inches (3-6 cy/1000 sf or 135-270 cy/acre)
 - Incorporate 5-7 inches (20-30% by vol)
 - Establish vegetation by seeding, sprigging or sodding

Compost Use for Turfgrass Establishment on Disturbed Soils



- Lynchburg, VA
- SOM: ~1%
- STP: 3 ppm (low)

Property	Value
pH	7.9
C:N	18:1
Tot Org C (%)	30
Tot N (%)	1.7
P (%)	1.0



Applying and Incorporating Compost

1



Compost

2



Aerovate

3



Seed, roll

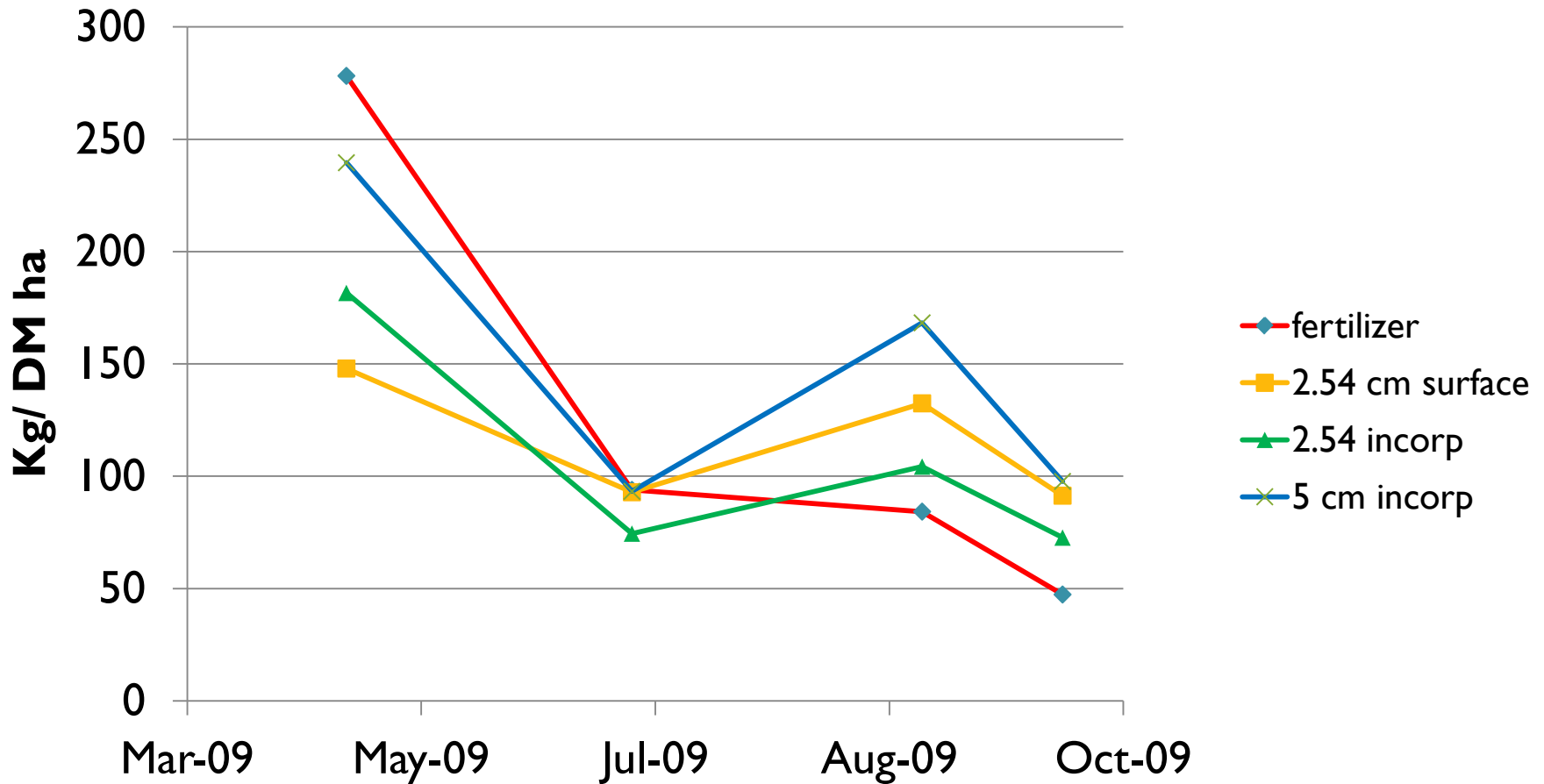


3/28/2009

Compost Application Estimator

Thickness	Cu yds/1000 ft ²	Cu yds/acre
1/4 inch	0.75	34
1 inch	3.0	134
2 inch	6.0	269

Treatment Effects on Turf biomass



Standard fertility treatment
based on soil test, rep 3

2" compost, incorporated ,
Rep 3

1" compost, incorporated ,
Rep 3

July 5, 2011

Soil properties after 2 years (Jul 2011)

	Soil Test Extractable				
Treatment	P	K	TN	TOC	bulk density
	ppm		% soil	% soil	g/cc
Fertilizer	16 c	145 b	0.08b	1.22b	1.25 b
1 in. compost, incorporated	22 b	172a	0.15 a	2.82a	1.24 ab
2 in. compost, incorporated	26 a	202 a	0.17 a	3.20a	1.18 a

Turf Topdressing

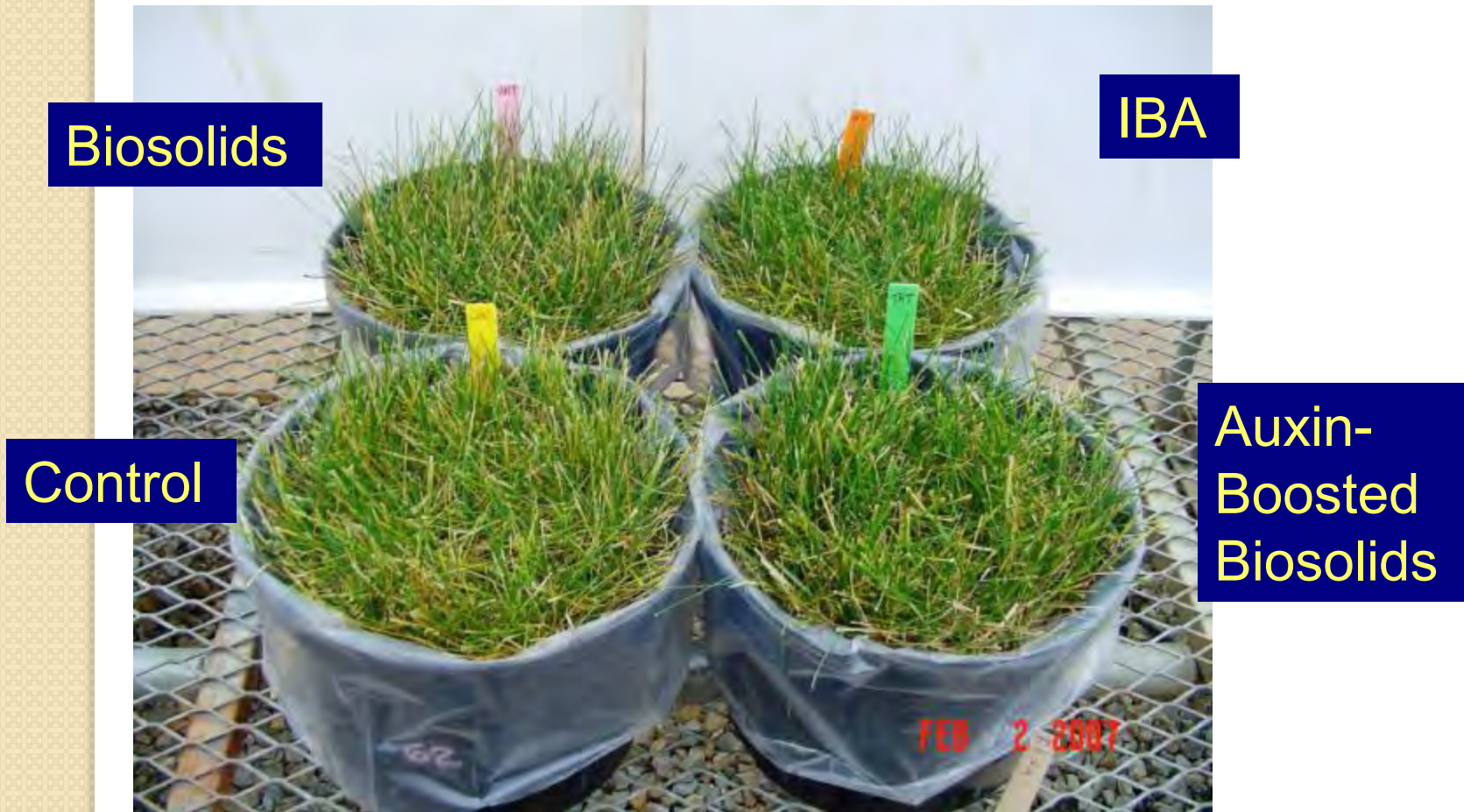
Apply ¼ inch in conjunction with aeration and reseeding.

Promotes seed germination & improves soil properties.



Effects of biosolids on leaf and soil biostimulants associated with drought resistance in tall fescue

E. Ervin, X. Zhang, G. Evanylo, and K. Haering



Root Growth Under Drought Stress

Control



Biosolids

Auxin-boosted biosolids

Biological Suppression of Turfgrass Diseases with Topdressed Compost

Treatment	Brown patch	Red thread	Pythium root rot
	% plot area diseased		
Untreated	72	47	38
Leaf compost	44*	53	---
Turkey litter compost	18*	10*	18*
Fungicide std	8*	---	22

* Significantly different than untreated control.



Bio-retention Pond

Erosion Control

Apply compost at rate of 270-540 cu yds/acre (2-4 inch layer).

Apply compost 3 ft over the top of slope to prevent rill formation.



Control - Untreated



Treated - 2" Compost



Compost in filter socks reduces runoff and protects stormwater quality



FLOW THROUGH RATE:	16 GALLONS PER MINUTE
LEACH TEST:	NPK: NONE
CHEMICAL REMOVAL:	TOTAL N: 29% REDUCTION
	TOTAL P: 14% REDUCTION
	TOTAL K: 14% REDUCTION
MOTOR OIL TEST:	98.5% REDUCTION (ABSORPTION)
TURBIDITY:	27% REDUCTION
LARGE SOLIDS REMOVAL:	100% REDUCTION
SUSPENDED SOLIDS REMOVED:	52% REDUCTION
SUSPENDED SOLIDS W/ FLOCULANT:	96% REDUCTION

NOTE: THIS PRIVATE TESTING AND CERTIFICATION PROGRAM IS CURRENTLY IN PROGRESS.

MORE TESTING IS AVAILABLE ON A QUARTERLY BASIS VIA EITHER YOUR

LOCAL INSTALLER OR OUR HEADQUARTERS AT

FILTREXX INTERNATIONAL, LLC

Organic Amendments and Water Quality

- Slow release N → reduce water impairment
- N:P imbalance → excessive soil P
- Improved soil quality (e.g. aggregate stability, water-holding capacity)
 - Increased soil infiltration, reduced runoff
 - Increased biomass production & nutrient use

Composting References

- Evanylo et al. 2003. The Virginia Yard-Waste Management Manual. 2nd Ed. VCE 452-055.
<http://pubs.ext.vt.edu/452/452-055/452-055.pdf>
- Stoffella, P.J. and B.A. Kahn. 2001. Compost utilization in horticultural cropping systems. Lewis Publishers, Boca Raton, FL.
- Field Guide to Compost Use. 1996. U.S. Composting Council.
<http://www.compostingcouncil.org>