



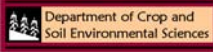
## Functional Landscapes

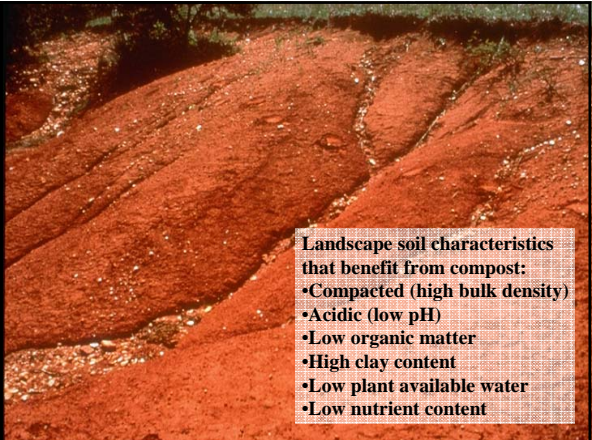
Greg Evanylo  
Professor of Soil Environmental Quality



Use of Compost

1. Soil amendment
2. Turf renovation
3. Mulch




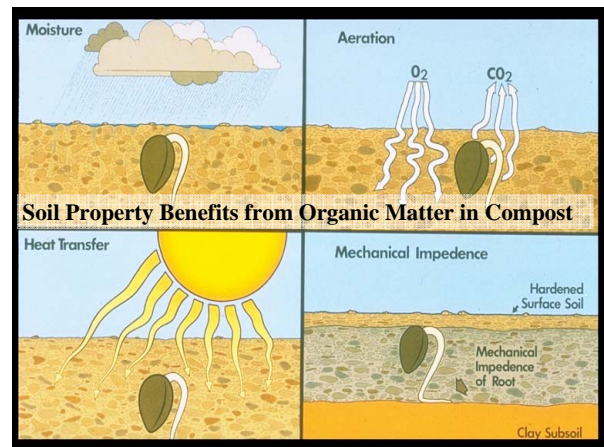
**Landscape soil characteristics that benefit from compost:**

- Compacted (high bulk density)
- Acidic (low pH)
- Low organic matter
- High clay content
- Low plant available water
- Low nutrient content

## Humus

- Dark Colored Organic Residue which Resists Further Decomposition





## Ramifications of Poor Soil Quality

Poor soil preparation




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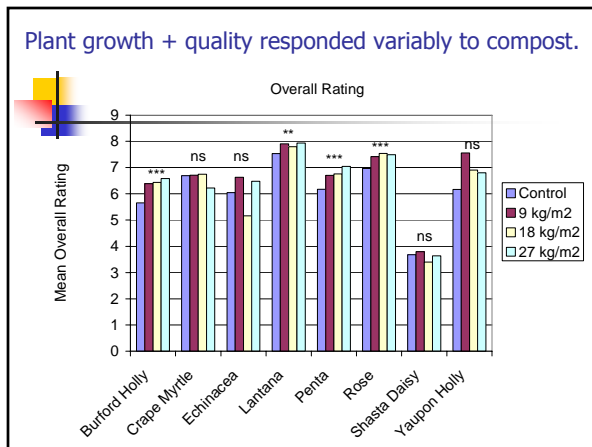
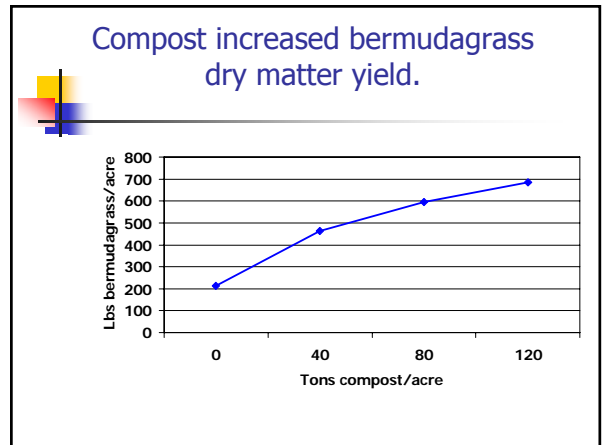
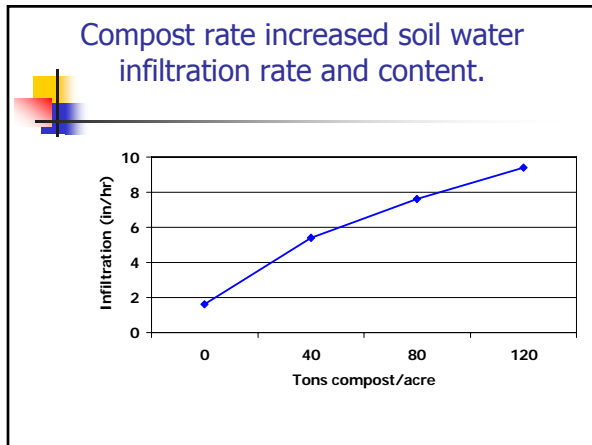
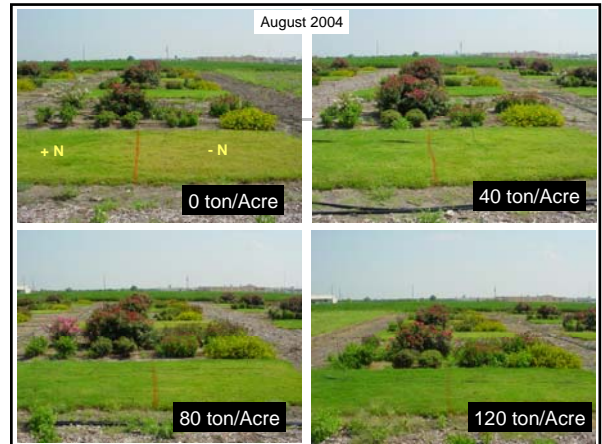
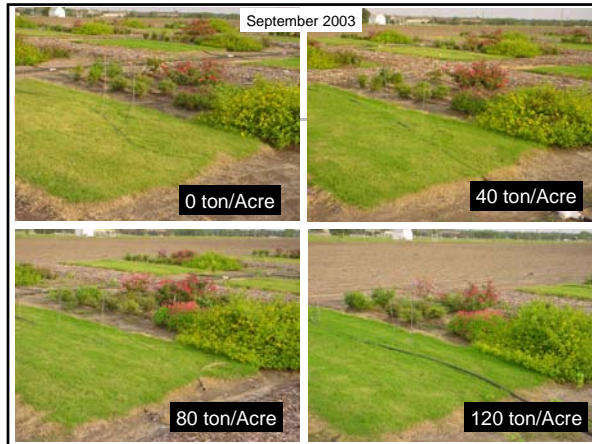
Poor turf establishment

## Dairy manure compost (DMC) for urban soil revegetation (Sloan et al., TAMU).



- Objective: To assess the effects of single application of 0, 40, 80, and 120 t/ac DMC on:
  - Establishment and growth of landscape plants
  - Soil chemical and physical properties

| Parameter | Mean |
|-----------|------|
| OM (%)    | 18.7 |
| N (%)     | 0.9  |
| P (%)     | 0.1  |
| K (%)     | 0.5  |

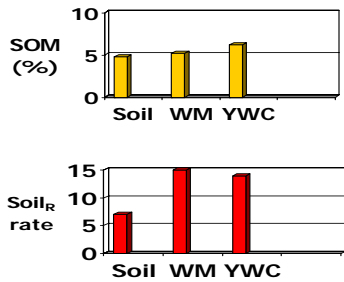


### Comparing composted yard trimmings and ground wooden pallets as mulches

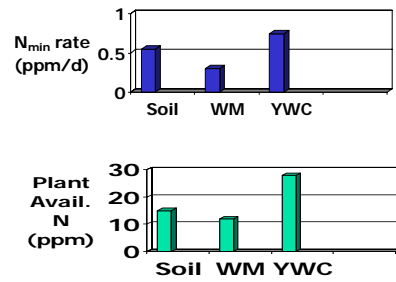
- Lloyd, Herms, Stinner, and Hoitink. 2002. BioCycle, Sep. 52-55, 69.
- Objective: To compare annual applications (@2-inch thickness) of surface-applied compost and wood mulch on soil microbial activity, nutrient cycling, and ornamental plant growth.

| Treatment  | C:N ratio |
|------------|-----------|
| Wood mulch | > 100:1   |
| Compost    | < 20:1    |

Yard waste compost (YWC) and wood mulch (WM) affects soil organic matter and microbial respiration.



Yard waste compost (YWC) and wood mulch (WM) affects soil N mineralization and plant available N.



### Compost Effects on Soil Properties (Shiralipour et al.)

| Parameter                | Rate (T/Ac) | Effect    |
|--------------------------|-------------|-----------|
| Organic matter           | 18-146      | 6-163% ↑  |
| Water holding capacity   | 7-146       | 5-143% ↑  |
| Cation exchange capacity | 57-228      | 31-94% ↑  |
| Bulk density             | 20-146      | 4-71% ↓   |
| pH                       | 20-146      | 0.8-1.4 ↑ |
| Nutrients                | 18-446      | 0-500% ↑  |

### 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
- Turfgrass topdressing

### Topdressing



- Compost can replace topsoil, peat, and wood fines in conjunction with aeration and re-seeding.
- Apply ¼-½ inch (0.75-1.5 cf/1000 sf) and rake
- Improves soil properties and provides nutrients

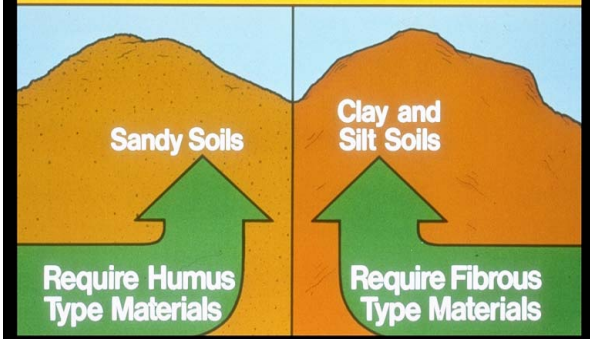
## Planting Bed Establishment



- Apply 1-2 inches (3-6 cf/1000 sf)
- Incorporate 6-8 inches (20-30% by volume)



## Selecting Physical Soil Amendments for Varying Soil Conditions



## Attributes of compost quality for soil amendment and mulch

| Parameter   | Amendment         | Mulch           |
|---|-------------------|-----------------|
| pH  | 5.5-8.0           | 5.5-9.0         |
| Electrical Conductivity (dS/m)                                    | ≤ 10              | ≤ 10            |
| Moisture content (%)  | 30-60             | 25-60           |
| OM content (%)  | 30-65             | > 30            |
| Particle size (% passing selected mesh)                           | 98% (3/4" screen) | 99% (3" screen) |
| Stability: CO <sub>2</sub> evolution (mg CO <sub>2</sub> /g OM/d) | < 8               | NA              |
| Maturity: seed emergence and seedling vigor (% of control)        | ≥ 80              | NA              |

## Compost vs. Other Materials

| Parameter | Compost | Manure | Peat | Topsoil |
|-----------|---------|--------|------|---------|
| Nutrients | M-H     | H      | vL   | L-M     |
| Sol Salts | L-H     | M-H    | vL   | L       |
| pH        | M       | M-H    | L-vL | L-M     |
| BD        | M       | H      | L    | H       |
| WHC       | M       | L-M    | H-vH | L       |
| OM        | M-H     | M-H    | H-vH | L       |

## Conclusions: Benefits of compost addition to urban soils

- Improves soil productivity properties
  - Physical (tilth)
  - Chemical
- Ameliorate soil toxicities
- Improves soil environmental quality
- Provides source of essential plant nutrients