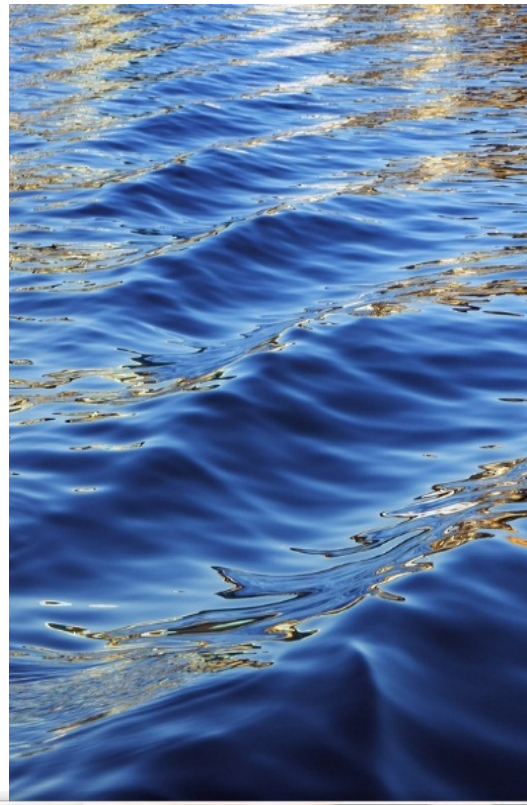
Growing Markets for Compost-Based Products

MRC Conference
May 18, 2017

Cary Oshins
Associate Director, USCC



Nature's Way to Grow!

US Composting Council®

Compost Uses

- Landscaping and home horticulture
- Turf management
- Commercial horticulture
- Agriculture
- Stormwater management and green building applications
- Environmental remediation

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1. Home Horticulture

- Uses
  - Planting beds and home gardens
  - Mulches
  - Backfill mix
- Sold through
  - Retail—bagged products
  - Resellers—nurseries, garden centers
  - Intermediaries—landscapers, contractors

Compost Application Rates

- Planting Beds
  - 3 to 6 cubic yards per 1,000 sq. ft., depending on native soil characteristics (pH, org. matter, texture)
  - Incorporate 6” – 8” with rototiller
- Backfill Mixes
  - 25% - 33% mix of compost and excavated fill
- Mulches
  - 2” – 3” layer around plants and shrubs

From: Field Guide to Compost Use

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Planting Bed Establishment

Step 1 – Evenly apply compost in a 1-2” layer (3-6 CY per 1000 ft^2)

- Use less with salt-sensitive species (e.g. geraniums)
- Watch compost pH levels if using acidic soil – loving plants (e.g. azaleas)

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- Step 2 – Apply compost evenly over bed, using rakes or shovels

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- Step 3 – Rototill compost into planting bed to a depth of 6-8”
- Add pH adjustments (if needed)
  - Raise pH – use lime*
  - Lower pH – use sulfur

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Step 4 – Transplant or seed into the amended soil and press firmly into place

Step 5 – Water

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Compost as Backfill Component

Step 1 – Dig a planting hole slightly shallower than the root ball and 2-4 times its width

- “Rough up” the sides of the hole to encourage root penetration

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- Step 2 – Blend compost with excavated soil
  - Target is 25-33% compost in blended soil
- Step 3 – Apply amended soil around rootball
  - Tamp down to remove air pockets

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Step 4 – Construct a soil berm to help capture and hold water

- Water thoroughly after planting
- Irrigate with 1” water per week until plant is established
- Mulch to conserve water

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Mulch volcanoes are not good for trees!

Landscape Mulch

- Mulch-applied to surface
  - Moisture conservation, weed control, aesthetics
- Composted yard trimmings, Ground wood (often dyed), Coarser-textured composts
- Application rate 2” – 3” layer (6-9 cubic yards/1000 square feet)

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Dan Herms OSU Case study: effects of mulch on soil microbes, nutrient cycling, and plant health.

Recycled organic wastes:

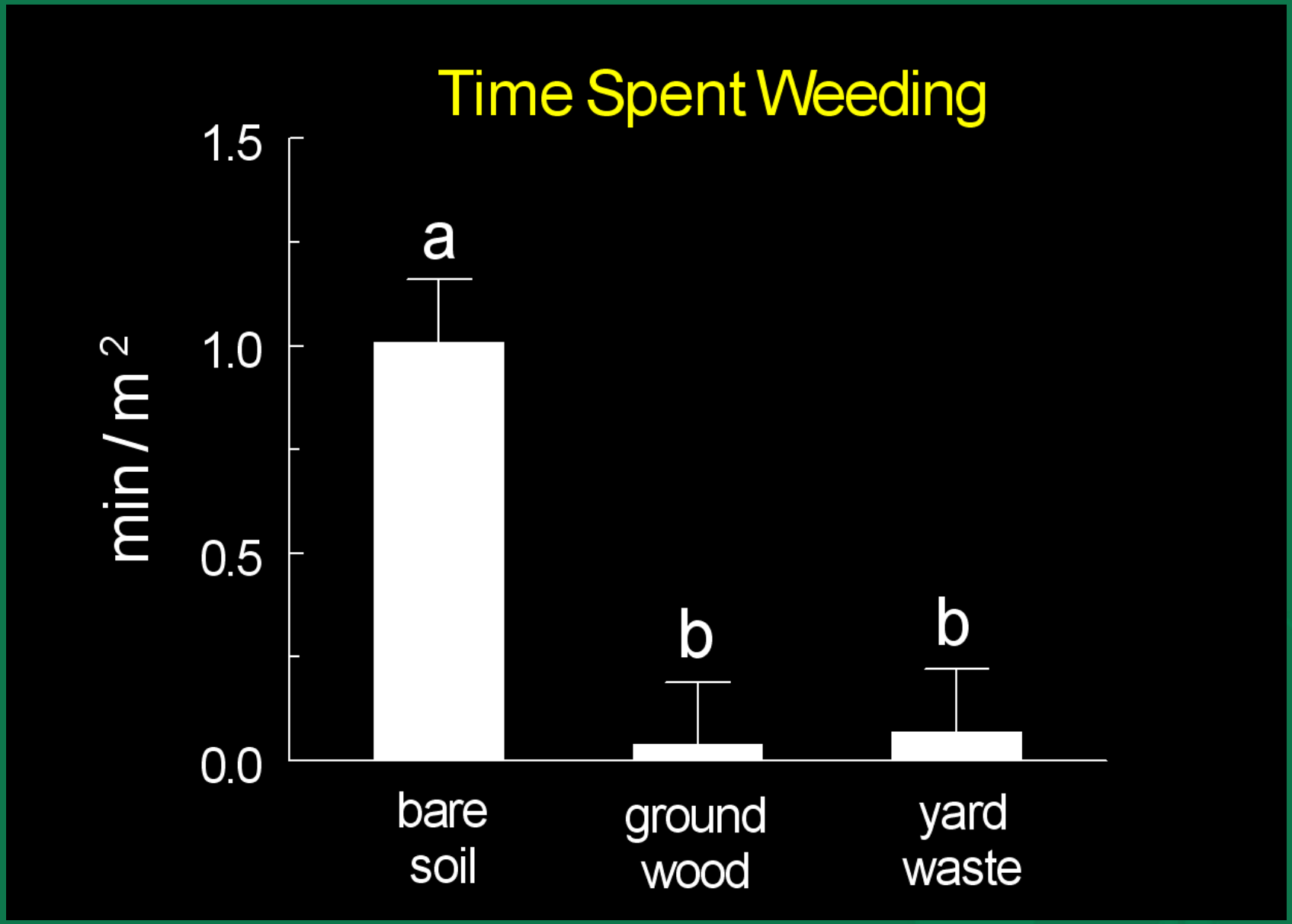
- Composted yard waste (C:N = 17:1)
- Ground pallets (C:N = 125:1)
- Bare soil control

For full report, contact Dan Herms, The Ohio State University, Wooster, Ohio, herms.2@osu.edu

Recycled organic waste as mulch

Composted mulch

Ground wood pallets


Time Spent Weeding
1.5
1.0
0.5
0.0
min / m 2
a
b
b
bare soil
ground wood
yard waste

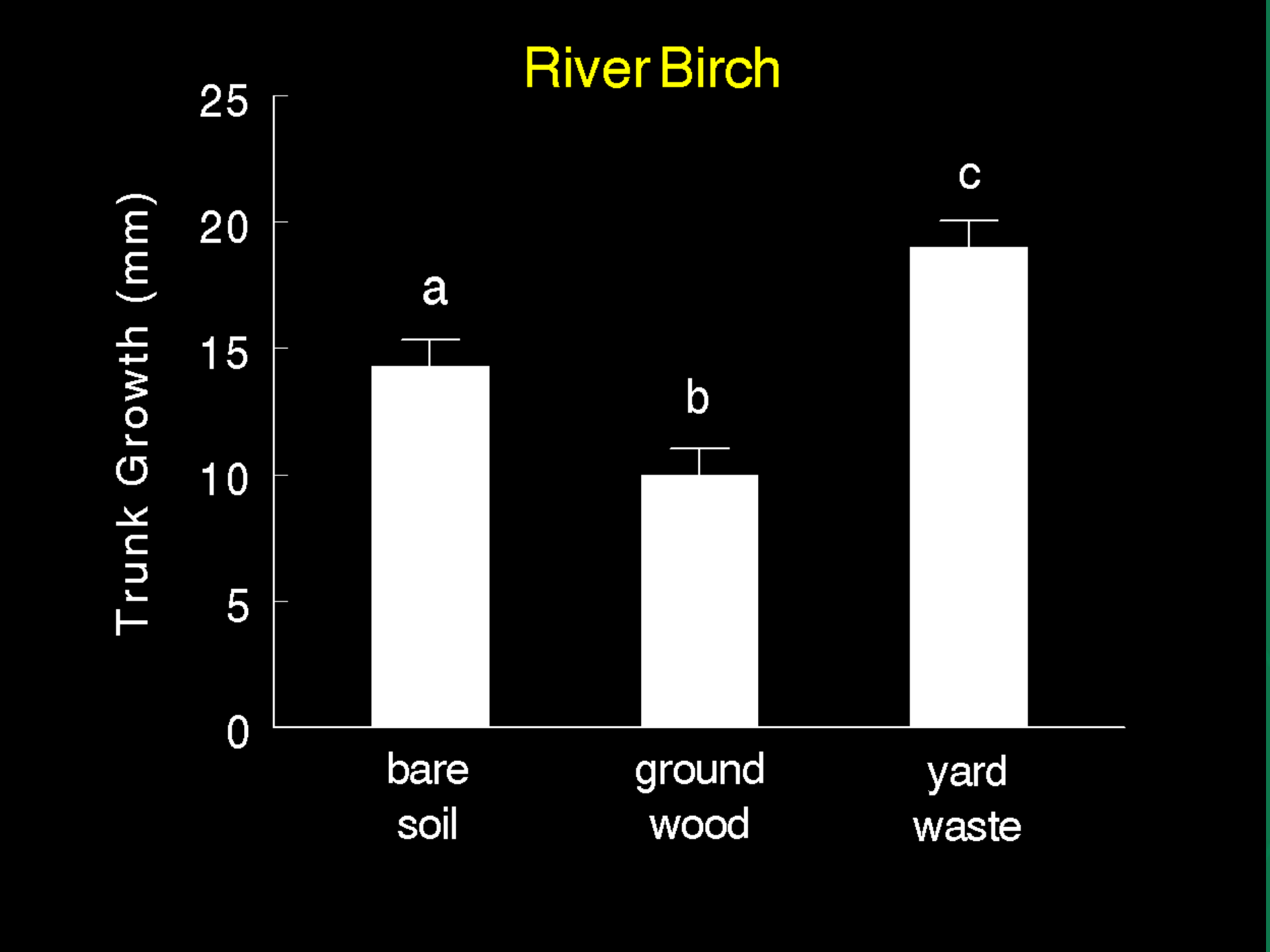
Rhododendron Flowers

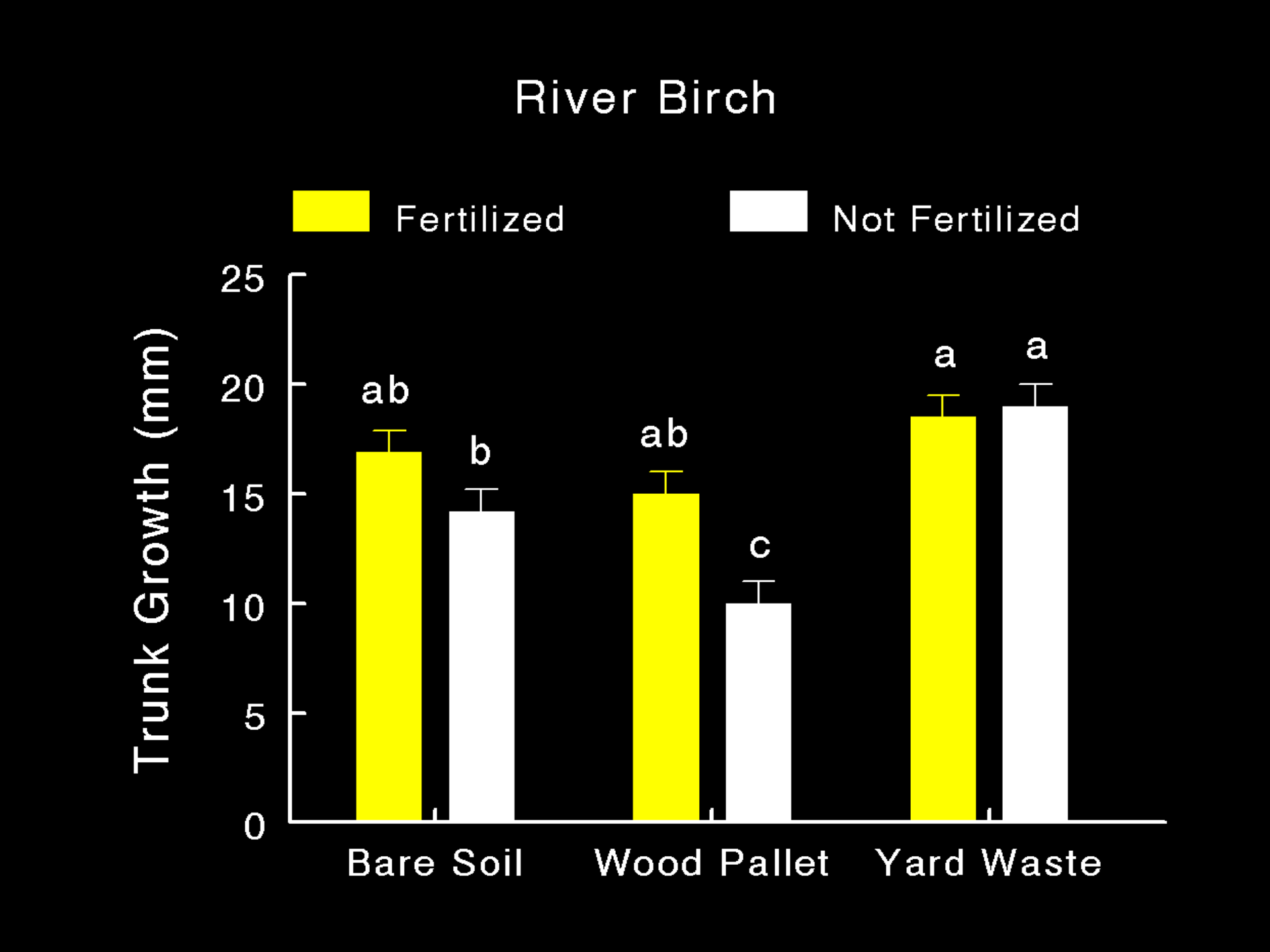
flowers / plant

60
40
20
0

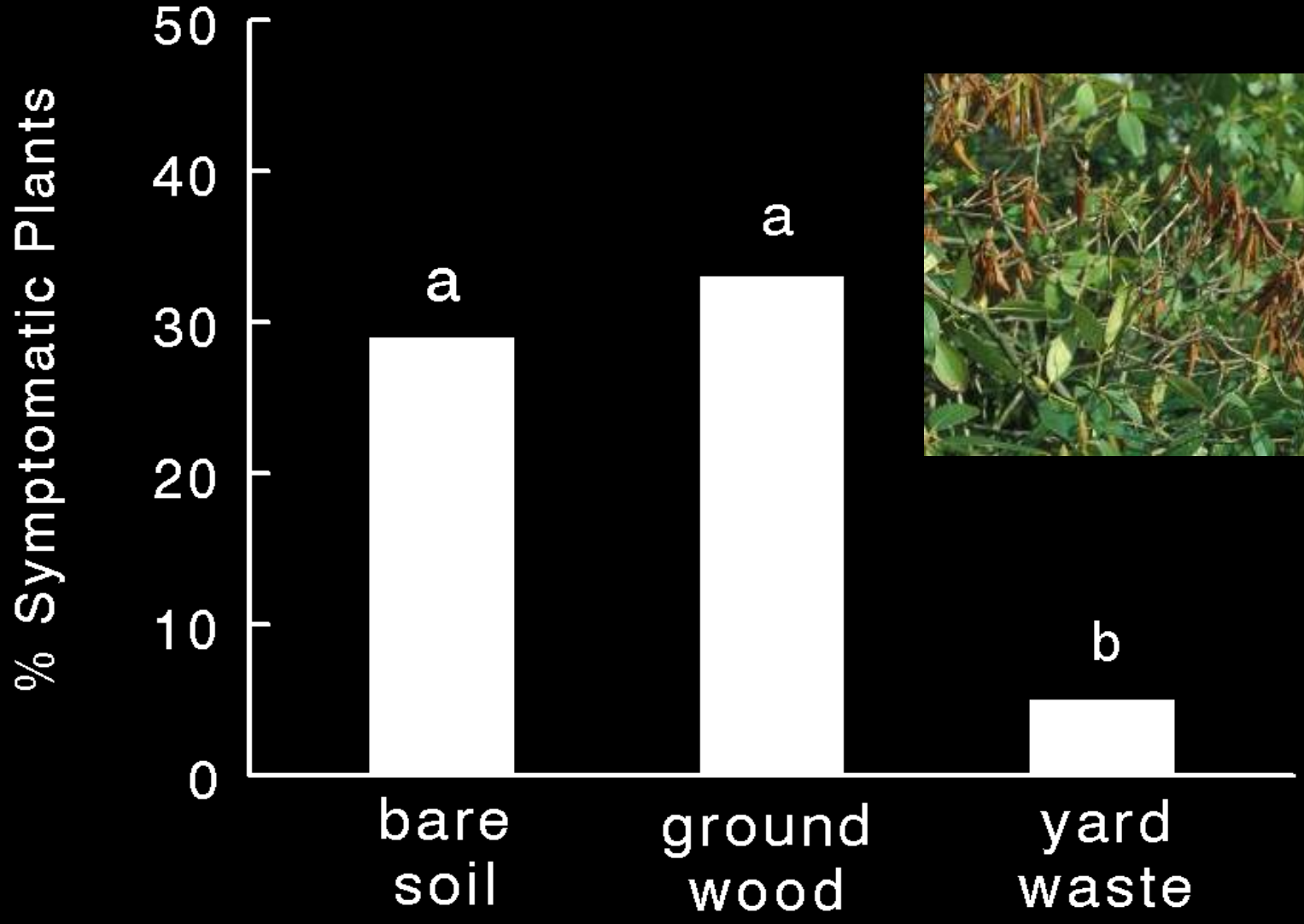
a
a
b

bare soil
ground wood
yard waste


River Birch
Trunk Growth (mm)
25
20
15
10
5
0
a
b
c
bare soil
ground wood
yard waste


River Birch
Fertilized
Not Fertilized
Trunk Growth (mm)
25
20
15
10
5
0
ab
b
ab
c
a
a
Bare Soil
Wood Pallet
Yard Waste

Incidence of Phytophthora Root Rot



Compost for Turf Establishment and Maintenance

Potential customers

- Housing builders and their subcontractors
- Playing field managers
  - Schools, clubs, leagues, associations
- Golf Courses
- Industrial parks
- Government entities: Municipalities, parks depts.

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Turf Establishment

Step 1

- Spread/blade compost to 1-2”
  - 3 – 6 CY/1000 ft^2
  - 134 – 268 CY/Acre
- No specialized equipment needed
- Spread other amendments (lime, fertilizer) based on soil tests

PS: Ron Alexander

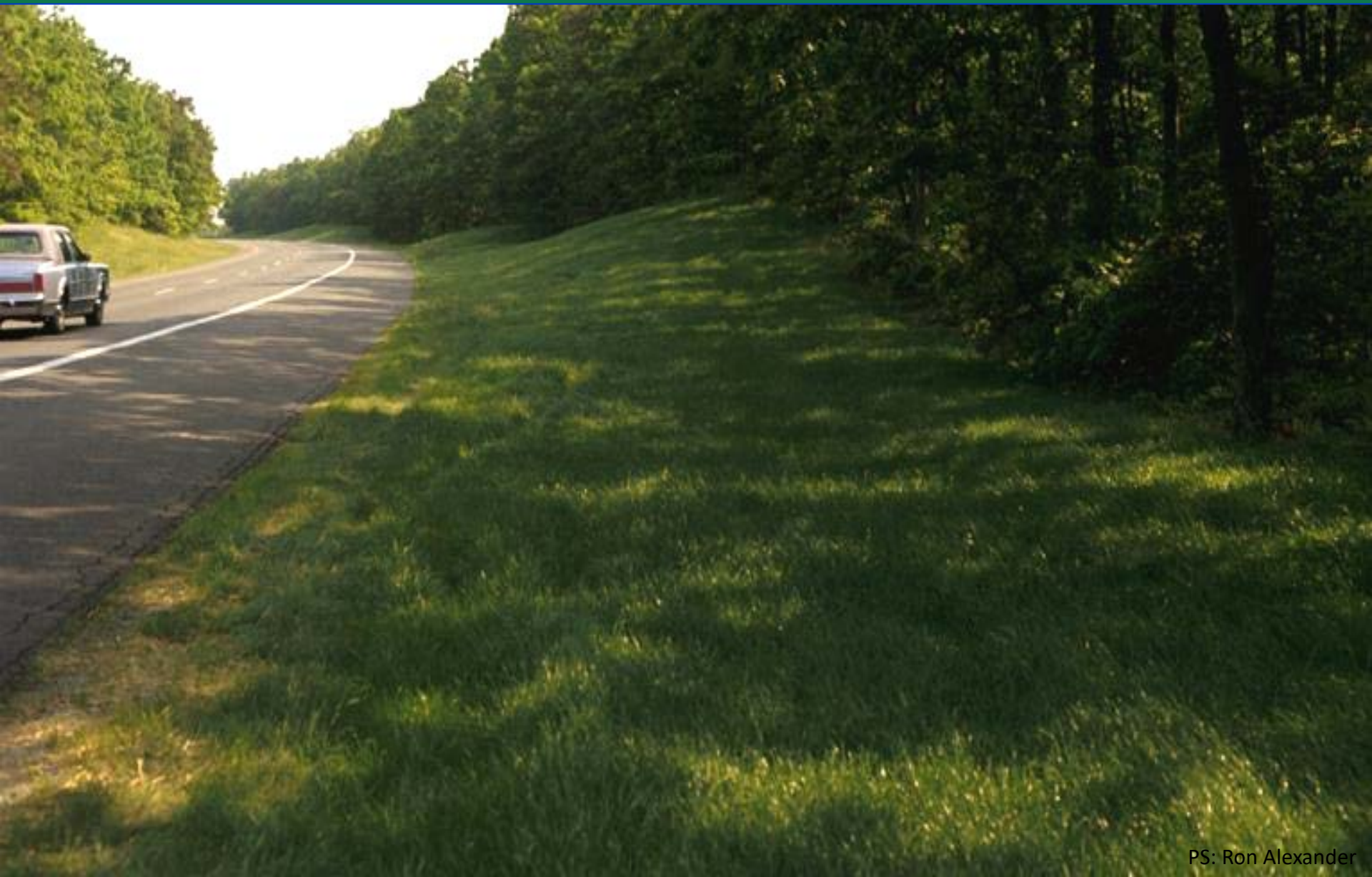
Step 2: Incorporate

Step 3 and 4: rake and apply seed normally


PS: Ron Alexander


PS: Ron Alexander

Step 5: watch grass grow!



PS: Ron Alexander

Topdressing Turf with Compost

- Annual application along with aeration
  - Cool season grasses – apply in Fall
  - Warm season grasses – apply in Spring
- Spread with specialized spreading equipment *(examples)*
- Compost requirements
  - Screened to 3/8” or less
  - Moisture <45%
  - May be amended with sand for flowability

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TURFCO
METER-MATIC II TOP DRESSER


DAKOTA
TURF TENDER
440


MILLCREEK TURF
50
KUBOTA

Manufactured Topsoils

- Approx. 30-50% compost (by volume) mixed with soil (rate depends on soil and compost characteristics)
- Mixing can be done with screen
  - Alternate loads into screen hopper
  - Run first mix back through screen again
- Markets: construction companies, DOTs

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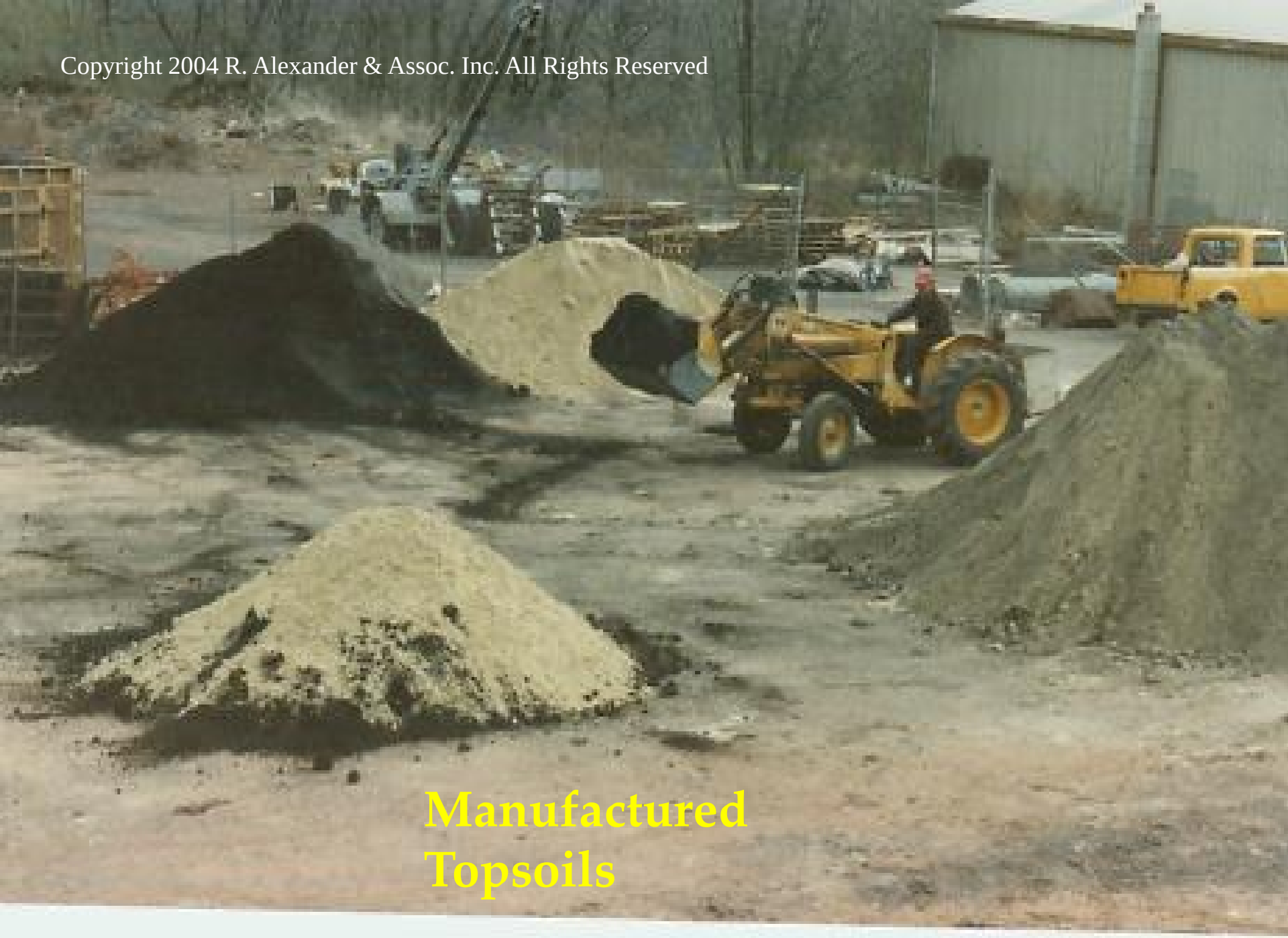

Manufactured Topsoils

Compost use in commercial horticulture

- Potting soils
- Greenhouses
- Planting beds
- Field nurseries

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Purposes of Container Mix

- Serve as reservoir of plant nutrients
- Hold water to be plant-available
- Provide adequate porosity for the exchange of gases
- Provide anchorage and support for the plant

Compost Use in Container Mixes

- Substitute for some or all of peat
- Beware of shrinkage, high bulk density, high salts
- Must be weed free
- Usually requires supplemental fertilizer
- Can contribute to root-rot suppression
- Use demos and trials

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Compost Use in Greenhouse Culture

- Very high value crops
  - Can spend more on inputs
  - Higher risk
  - Greatest compost failures!
- Key to selling to greenhouses:

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consistency, consistency, consistency,
consistency, consistency, consistency,
consistency, consistency, consistency,
consistency, consistency, consistency,
consistency, consistency, consistency,
consistency, consistency, consistency,
consistency, consistency, consistency,
consistency, consistency, consistency

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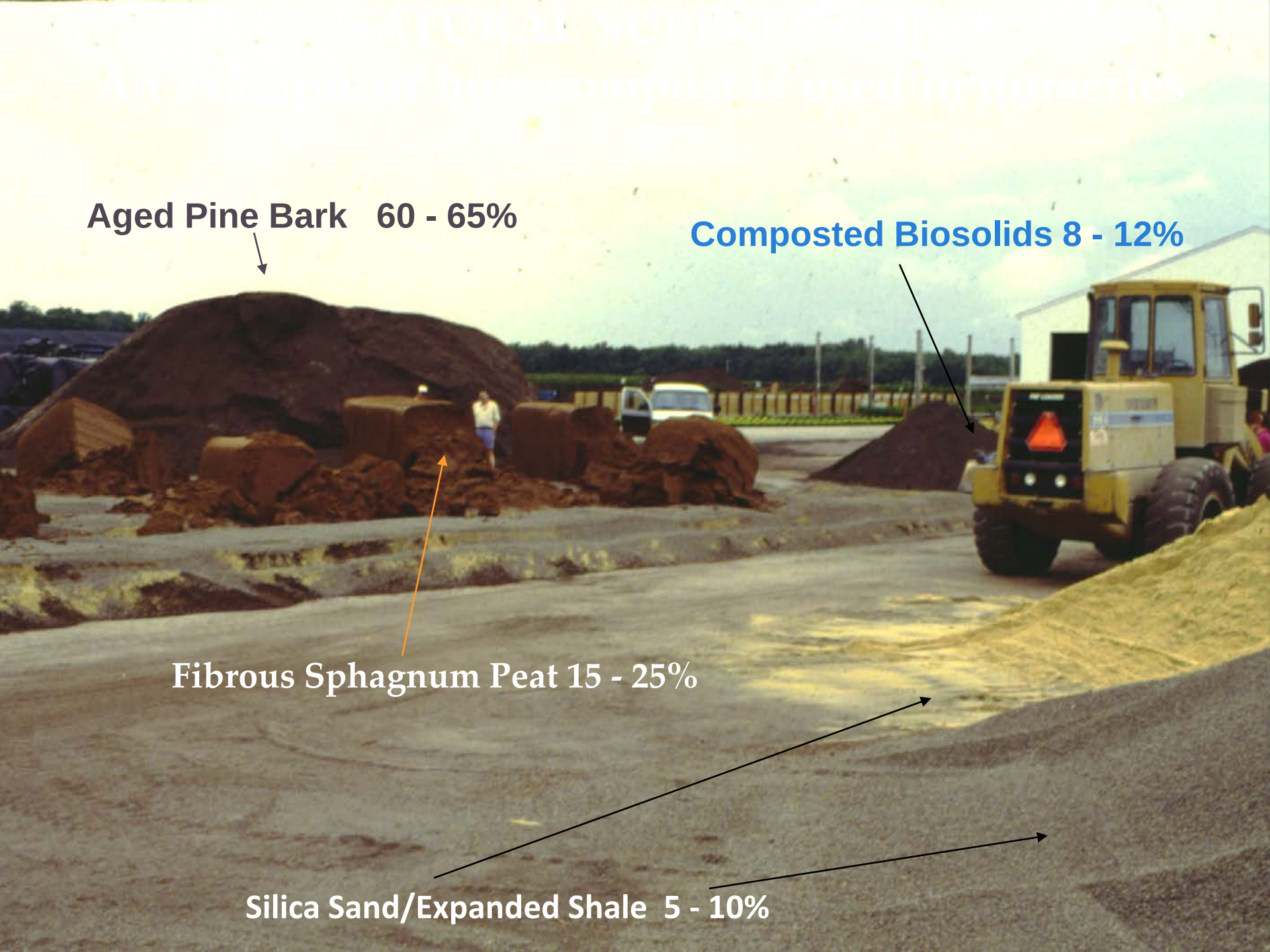
This Phytophthora root rot bioassay helped prove that natural suppression in compost mixes is effective

Spring et al., 1980, Phytopathology 70:1209-1212

NATURAL SUPPRESSIVENESS

An example of how compost is used in nurseries



Compost Use In Commercial Horticulture

- Applications
  - Whole fields
  - Raised beds, liner beds allow band application
  - Can permit continuous culture
  - May reduce years to harvest or increase caliper size

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Field Nurseries and Liner Beds

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Field Nurseries and Liner Beds

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Compost Use in Agriculture

- Difficult to generalize due to differences among CROPS, SOILS AND COMPOSTS
- Each grower will decide if benefits (moisture management, fertility, disease suppression, etc) are worth costs (material + delivery + spreading)
- Special case #1: organic farming
- Special case #2: fresh produce

Challenges Using Compost as a Nutrient Source

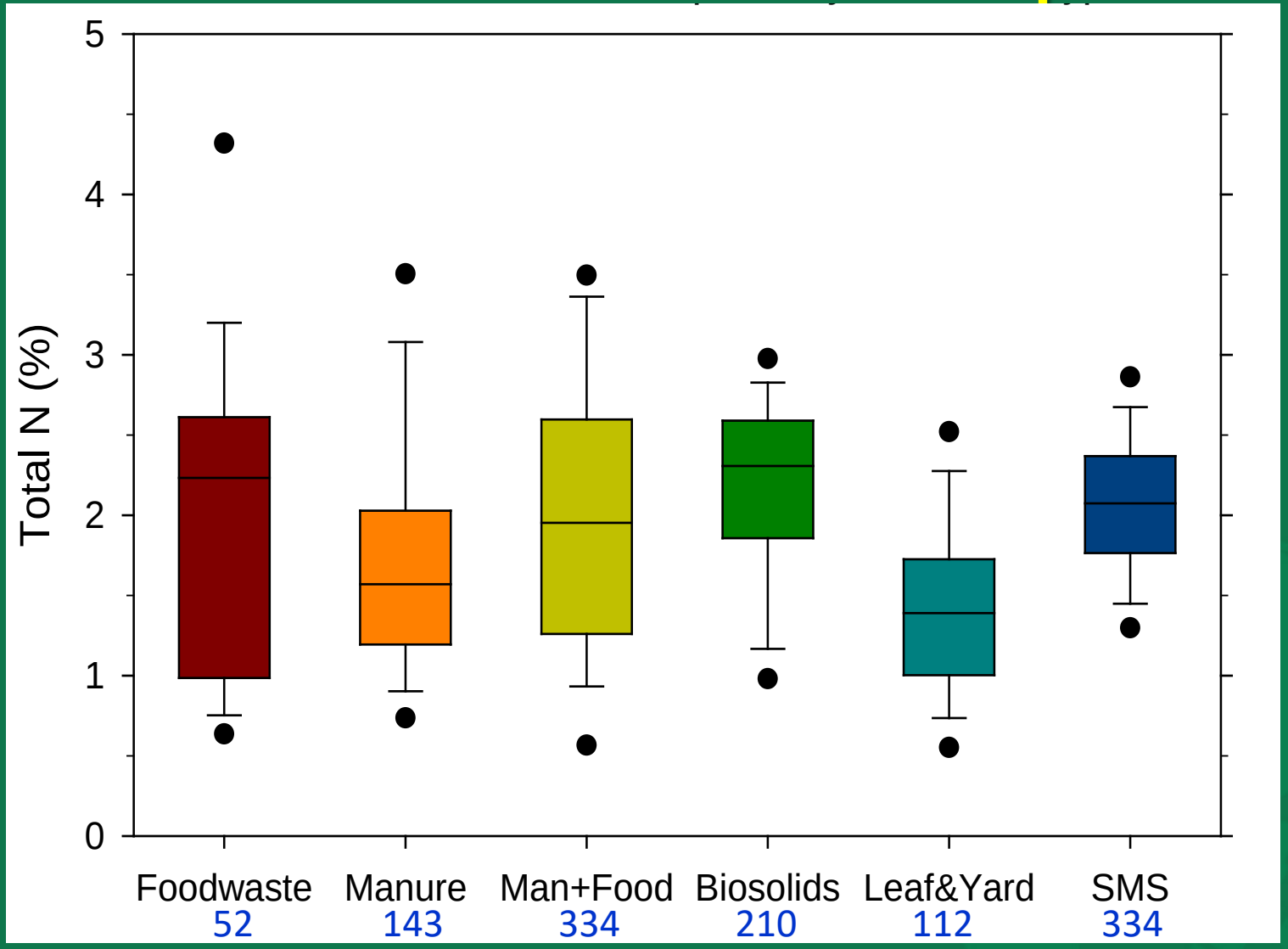
1. Composts slowly mineralize organic nutrients converting them to plant available forms.
2. Nutrient availability is often unpredictable – especially nitrogen
3. Composition of organic sources is highly variable and nutrient ratios do not match crop needs.

What is really in 20 tons of fresh compost?

Quantities in 20 tons of three manure composts produced at the same farm.

Parameter	Compost 1	Compost 2	Compost 3
OM (tons)	8.1	5.2	12.6
Tot. Nit. (lb)	510	415	842
P_2O_5 (lb)	200	88	146
K_2O (lb)	385	150	300
C/N	18	14	17

Total N content of Composts



Composts analyzed at Penn State Univ. Ag Analytical Services Laboratory

Compost Use in Organic Agriculture

- Compost must be “approved for use on certified organic farm”
- Approval is done by either farm certifier (e.g., PCO or NOFA) or OMRI (“OMRI Listed’)
- Standards for approval set by USDA National Organics Program (NOP)
- CDFA approval required in CA

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NOP Standards-Materials

- Allowed feedstocks
  - Plant and animal materials (and their ash)
  - "Natural" non-agricultural materials (e.g., yard debris, food residuals?)
  - Mined substances of low and high solubility
  - Synthetic materials accepted by the OMRI - few
- Prohibited feedstocks
  - Biosolids, including ash, grit and screenings from sewage sludge
  - Any synthetic materials not on “national list”
  - Manufactured compostables

NOP Standards-Process

- 2002 addendum—guidance document to allow greater flexibility
  - Achieve 55°C for more than 3 days
  - Mixed or managed to ensure all of mixture achieves 55°C
- Vermicompost approved
  - Aerobic, moisture and time minimums

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Compost Use on Fresh Produce

- FSMA—Food Safety Modernization Act
- Biological Soil Amendments of Animal Origin
  - Manures, non-fecal animal byproducts including animal mortalities, table scraps
- Requires valid pathogen control process
  - Compost meets PFRP standards
    - >131F
    - 3 days in ASP
    - 15 days in turned system
- Must include “adequate curing”
- MSU Extension Factsheet available

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Compost Use in Stormwater Management & Green Buildings

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Stormwater Management

- Required by Clean Water Act & NPDES
  - National Pollutant Discharge Elimination System
- During construction
  - Erosion and Sediment (E&S) Control
  - Shorter term and higher risk
- Post construction
  - Long term
- Use of approved BMPs “Best Management Practices”

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Compost-Based E & S BMPs

- Compost Berm and Sock: Pollutant removal
- Compost Blanket: Pollution prevention
- AASHTO Specifications MP-9 and 10
- Need coarse particle size to allow flow, resist movement
  - Composted mulch or screened “middles”
  - 30-60% (by wt) passing ¼” screen

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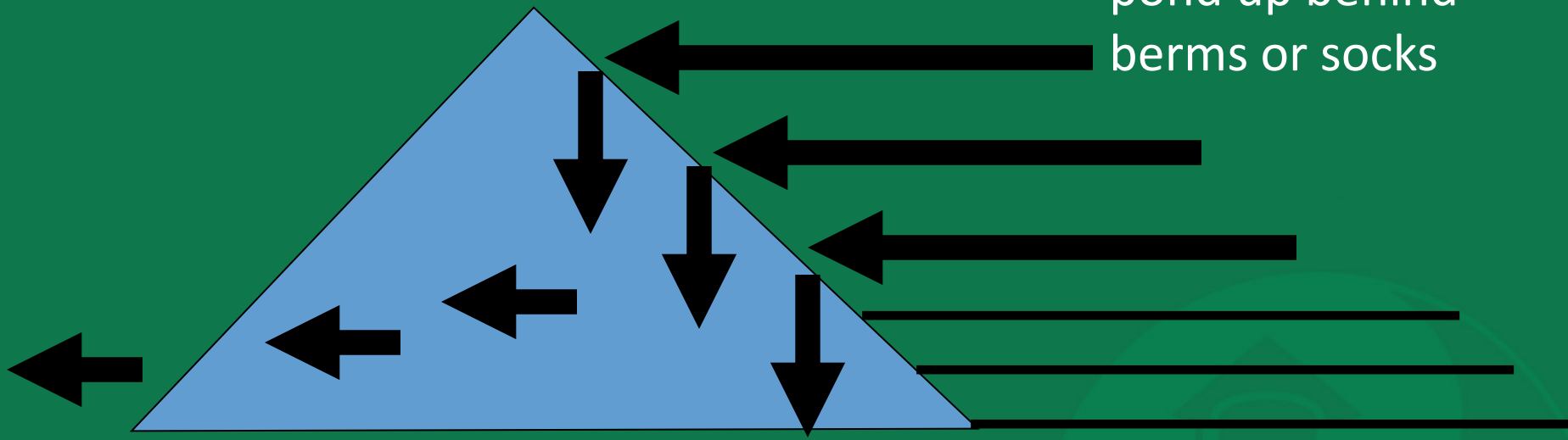
Failures Are Easy to See Anywhere


The Solution?
A 3-Dimensional Matrix

Berms are *'Geometrically Superior'*



High flow rates pond up behind berms or socks

Berms are three-dimensional filters

Sediment fills up behind berm

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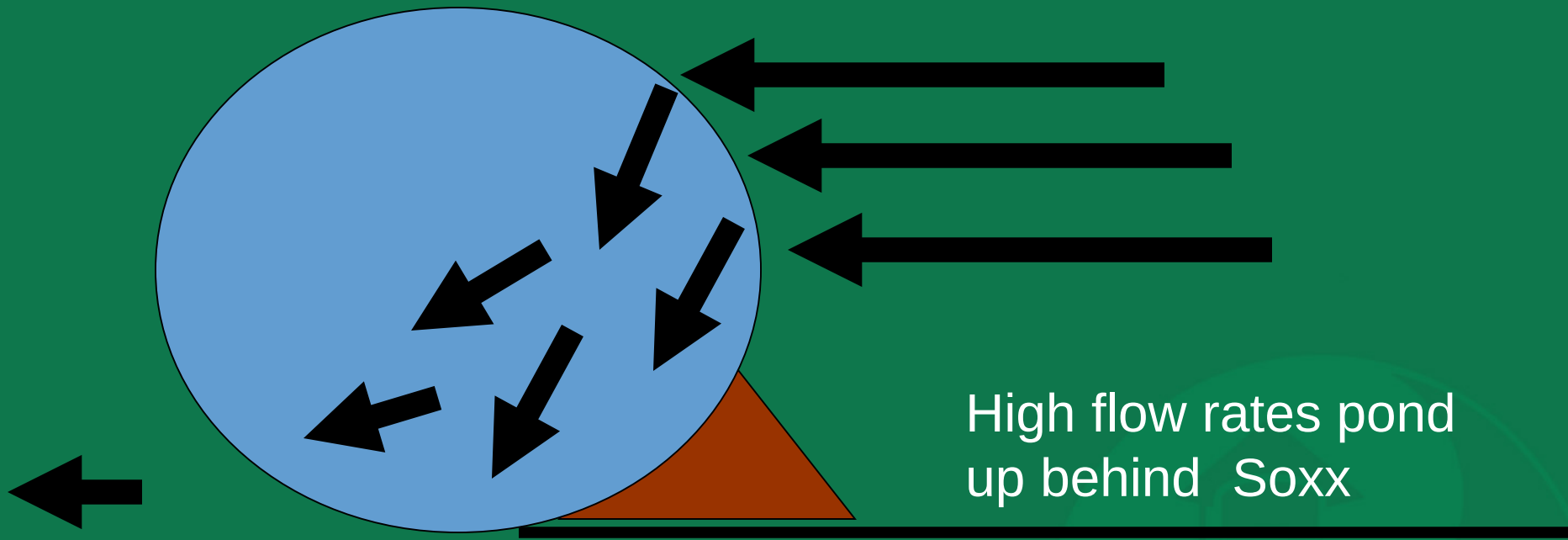
09/06/2006

FilterSoxx Don’t Fall Over & Can Be Used in Direct Flows



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How Compost Blankets Work

Slopes with soil

- Some soil is round
- Rolls downhill
- Speed/mass displaces other soil particles
- Rills are formed
- Speed increases due to channeling of water
- Channels are formed
- Gully erosion

Slopes with compost

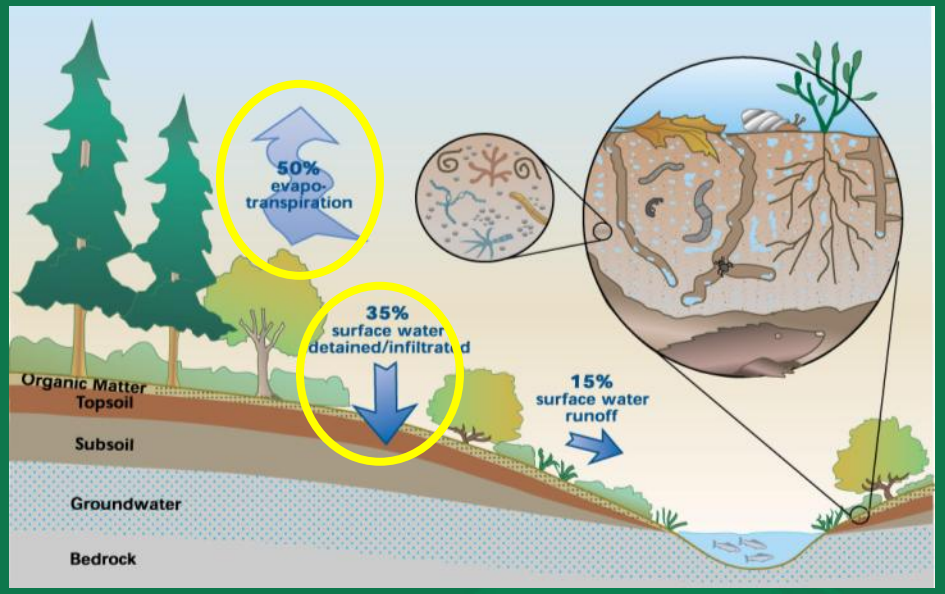
- Compost is flat, flexible and meshlike
- ‘Knits’ together on slopes
- Softer, does not roll
- Similar to a ‘wet deck of cards’ on the slope
- Porous enough to allow water to pass through slowly

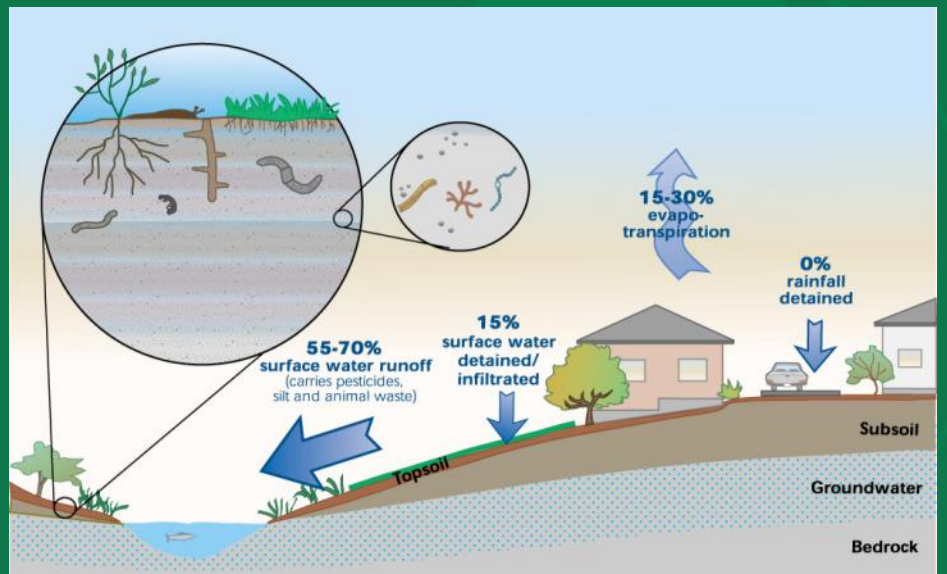

River Valley
BE
PREPARED
TO STOP


06.16.2004

Compost-based Stormwater BMPs

- Stormwater management evolving
  - Decline in ecosystem functions
  - From simply managing quantity (retention basins) to quality AND quantity
- Mimicking nature: focus on infiltration and evapotranspiration





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Compost-Based Stormwater BMPs

- Bioretention
- Bioinfiltration
- Soil Quality and depth
- Vegetated roofs
- Slope and streambank protection

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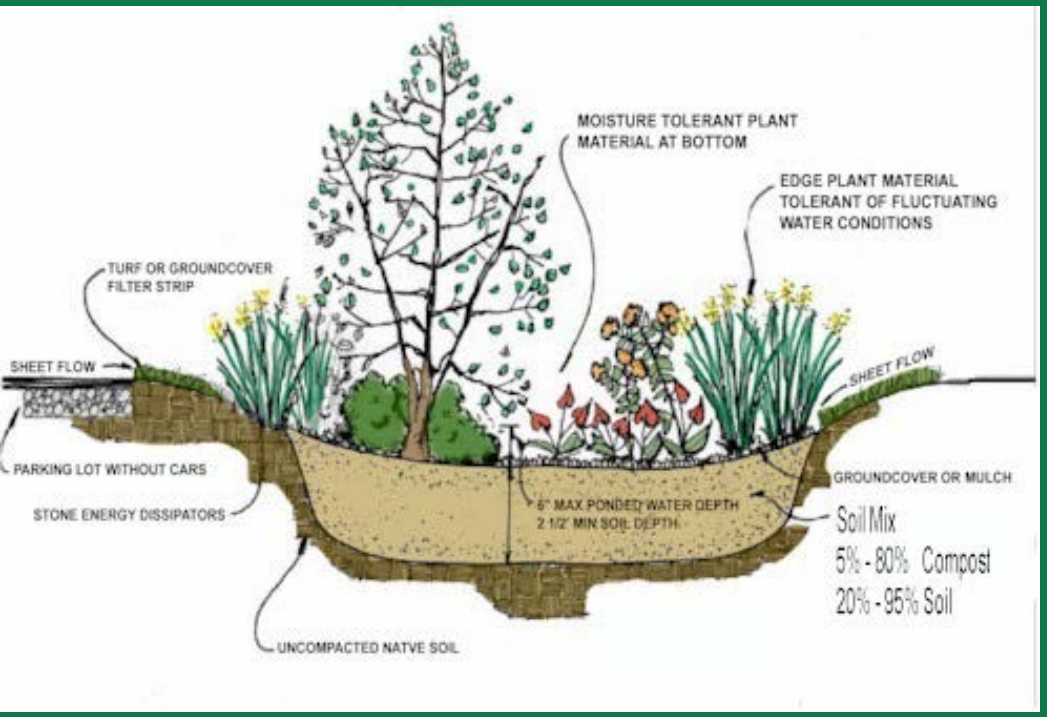
Bioretention/Bioinfiltration/Rain Garden



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Bio-based BMPs

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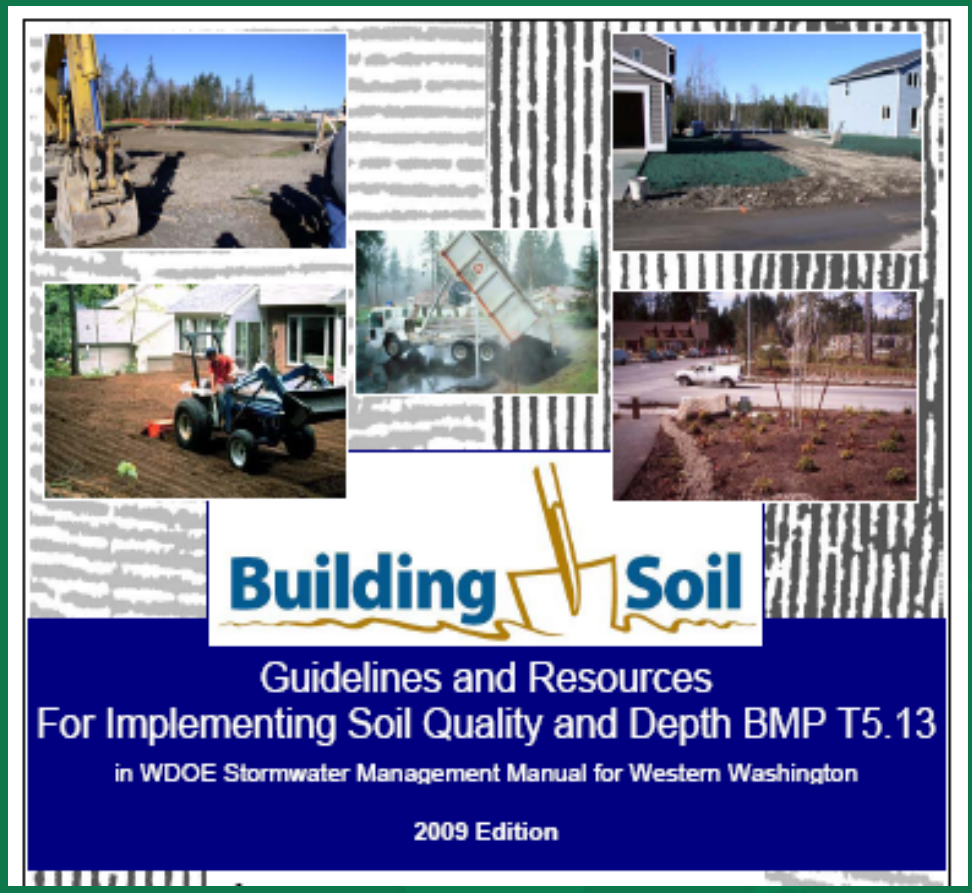
Soil Quality and Depth BMP

- Soils for Salmon outgrowth (WA)
- New construction required to meet minimum OM%
  - 5% turf
  - 10% planting beds



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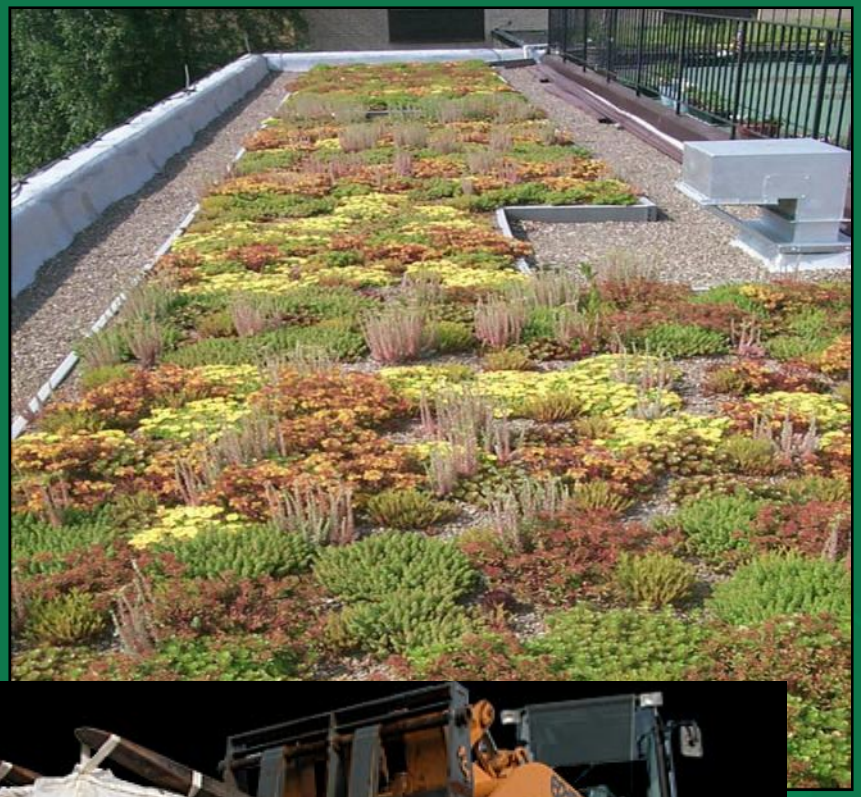
Vegetated Roofs

- "Green" roofs
- Part of LID and LEED
- Low volume, high value market
  - Planting media 10-20% compost



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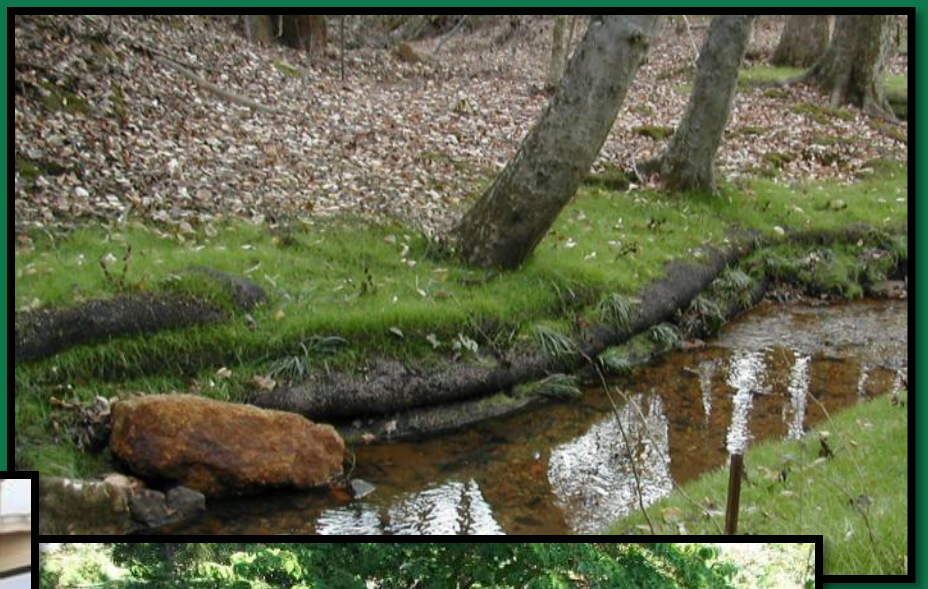
More compost-based landscape practices

- Streambank protection
- “Soft” planters
- Living walls



Environmental applications

- Remediating contaminated soils
  - Explosives, heavy metals (eg, lead in urban soils), organic and petroleum products
- Mineland and forestland reclamation
- VOC and odor treatment
  - Landfill methane
- Wetland and habitat rehabilitation

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Before you market—TEST!

- Use and approved lab
  - Follows TMECC, participates in CAP
- Check for Persistent Herbicides
  - Esp. if you handle horse or dairy manure
  - 3 USCC factsheets
- Consider joining Seal of Testing Assurance
  - Many DOT, other specs require STA
  - Certifiedcompost.com

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Thanks!

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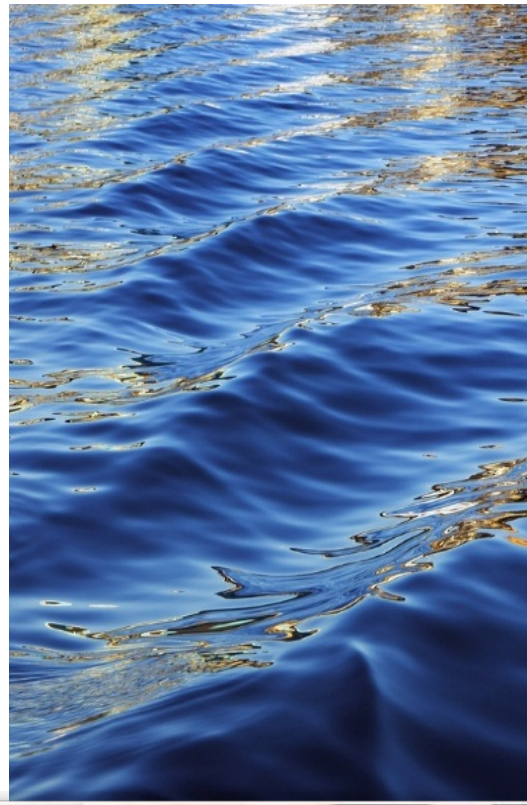

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SAVE THE DATE FOR
COMPOST 2018
Game On! Building Sustainable Communities
January 22-25 | Westin Peachtree | Atlanta, GA
✓ Tradeshow with over 100 exhibitors
✓ Workshops and technical sessions
✓ Equipment Demonstrations
✓ Networking, receptions and fun!
http://compostconference.com/