Research Update on Compost BMPs used for ES&P Control

Dan Noble, Executive Director

ASSOCIATION OF COMPOST PRODUCERS

"We Build Healthy Soil"

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Research Ecologist and Director R&D

FILTREXX®

THE CERTIFIED STANDARD IN EROSION CONTROL

OUTLINE

- How & Why it works
- Research: Compost ECBs
- Research: Compost Filter Socks/Berms

W&H PACIFIC

METRO
PEOPLE PLACES • OPEN SPACES

TCEQ

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

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THE OHIO STATE UNIVERSITY
OARDC

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The University of Georgia

CONNECTICUT DEPARTMENT OF TRANSPORTATION

TxDOT

Woods End Research Laboratory, Inc.
AMERICA'S LEADER IN COMPOST QUALITY ANALYSIS

Iowa Department of Transportation

USDA ars

University of Connecticut

Colorado State University
Knowledge to Go Places

CAL POLY

IOWA STATE UNIVERSITY

Texas A&M UNIVERSITY

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EARTH ENVIRONMENTAL PARTNERS
CHANGING THE WAY THE WORLD GROWS

REXIUS
EROSION CONTROL SYSTEMS

THE UNIVERSITY OF TEXAS AT AUSTIN

MAINEDOT
Maine Department of Transportation

FILTREXX
THE CERTIFIED STANDARD IN EROSION CONTROL

Erosion Control - 'Prevention'

VS

Sediment Control – 'Treatment'

Filter Media = Sediment Control

Designed for Optimum Filtration & Hydraulic-flow

Growing Media = Erosion Control

Designed for Optimum Water Absorption & Plant Growth

Specs/Certification is Key!

Training

Certification

Specifications

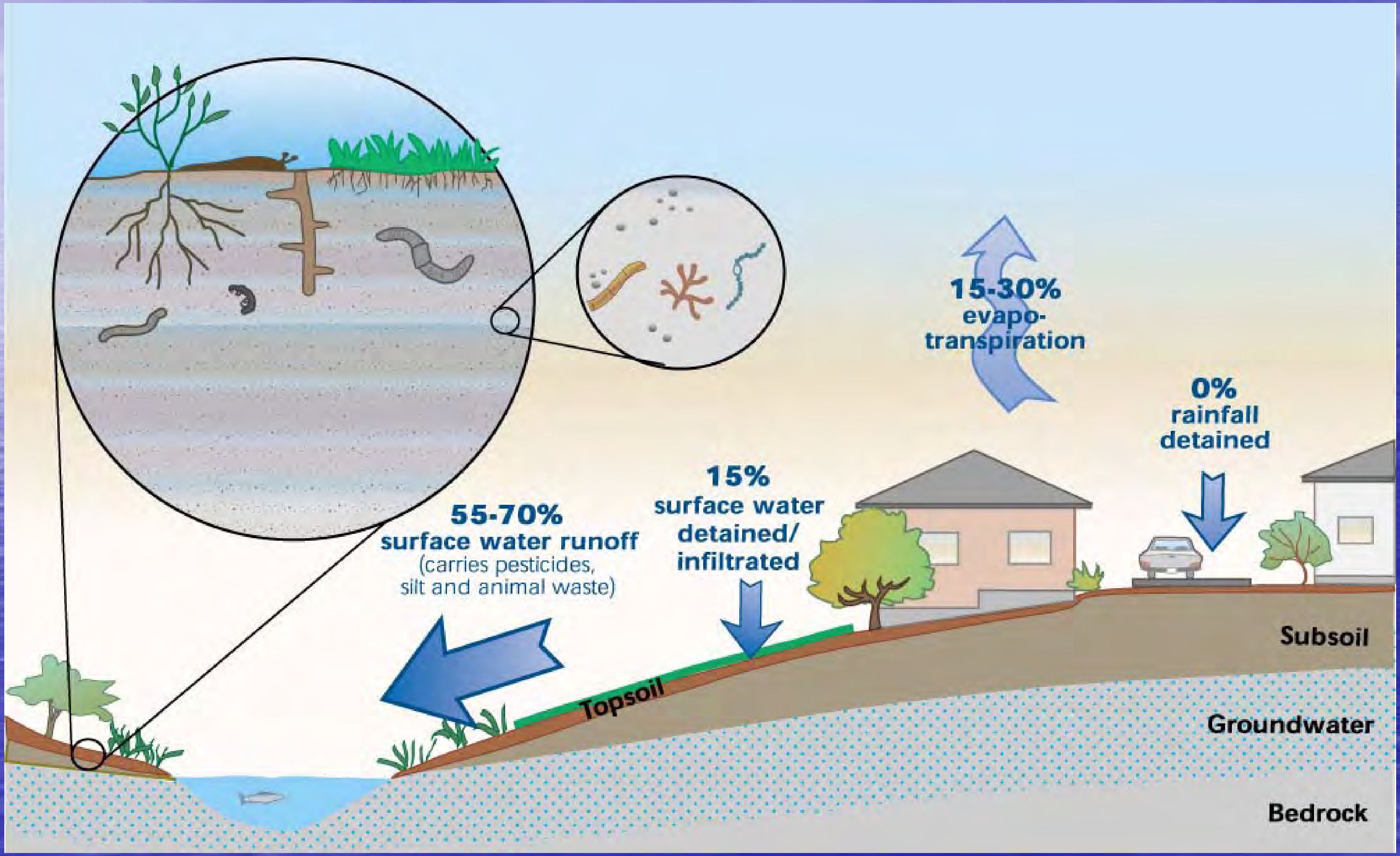
Performance Testing

Certification

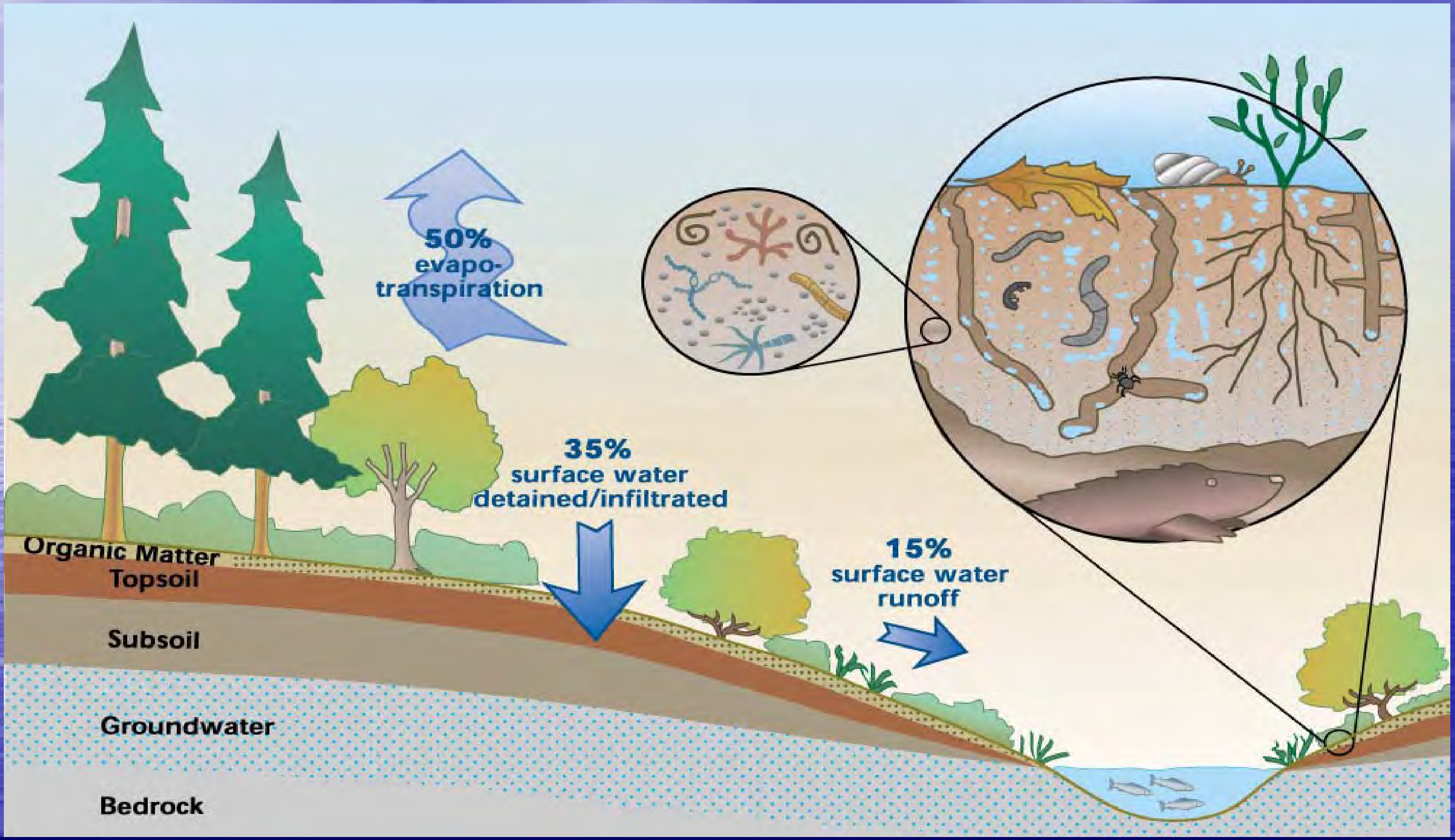
PART I - Erosion Control

'Soil Erosion Prevention'

Urban Environment
Storm Water 101



Native Soil Environment
Storm Water 201



Low Impact Development (LID) approach – new hydrologic pattern mimics predevelopment patterns

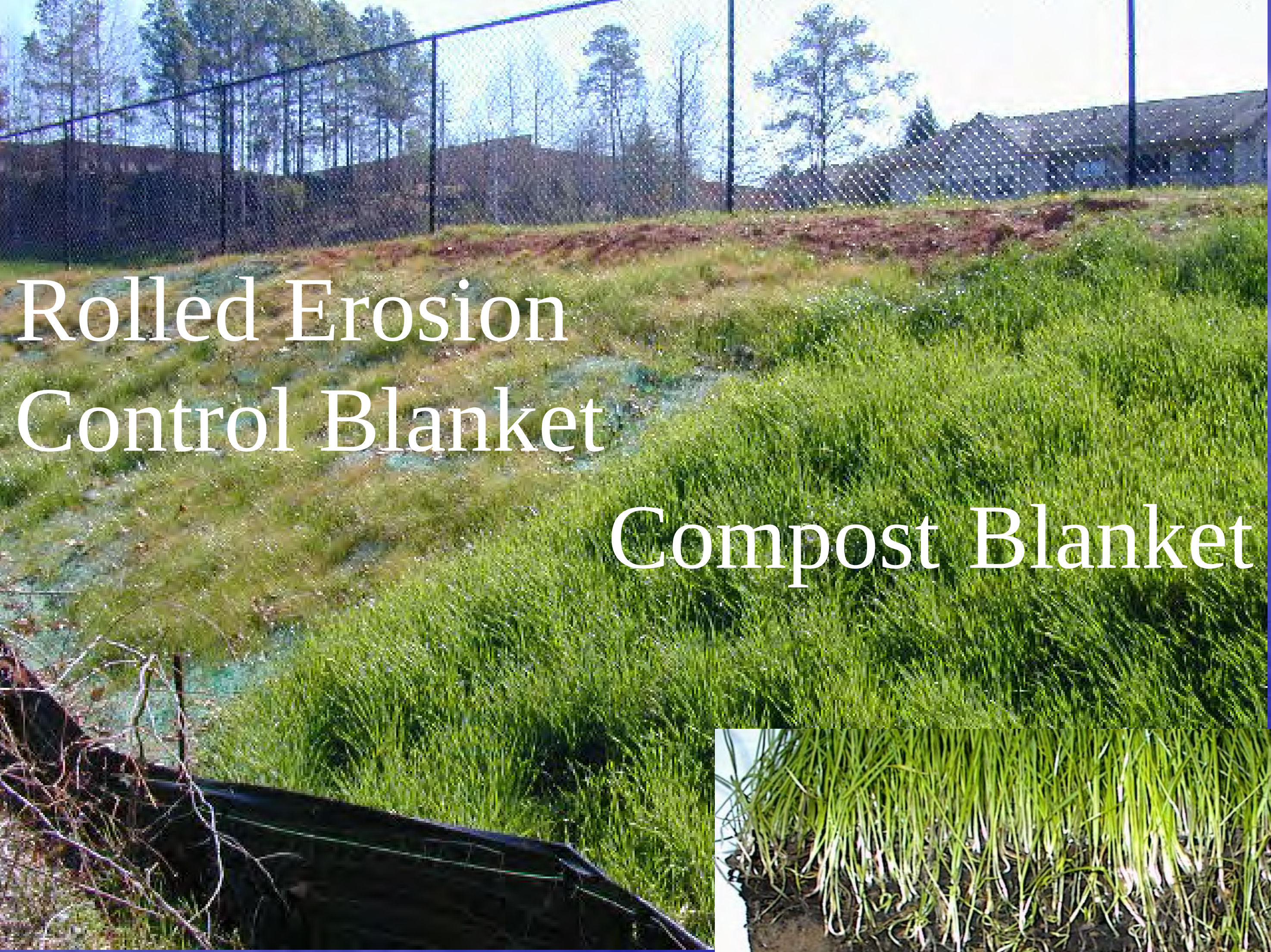
EC/Slope Stabilization uses Growing Media

Compost _Storm Water_ Blanket?

Designed to:

1) Dissipate energy of rain impact;
2) Hold, infiltrate & evaporate water
3) Slow down/disperse energy of sheet flow;
4) Provide for optimum vegetation growth


Compost Blanket
Hydroseeding
Demo Project in Atlanta
after 3” storm event



CECBs Fill Low
Points in Soil Surface

Journal of Soil and Water Conservation, Nov/Dec 2005

Evaluation of Storm Water from Compost and Conventional Erosion Control Practices in Construction Activities

Britt Faucette[1&2], C. Jordan[2], M. Risse[1], M. Cabrera[2], D. Coleman[2]
Dept. of Biological & Agricultural Engineering[1],
Institute of Ecology[2],
The University of Georgia, Athens, GA

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The University of Georgia

Objective

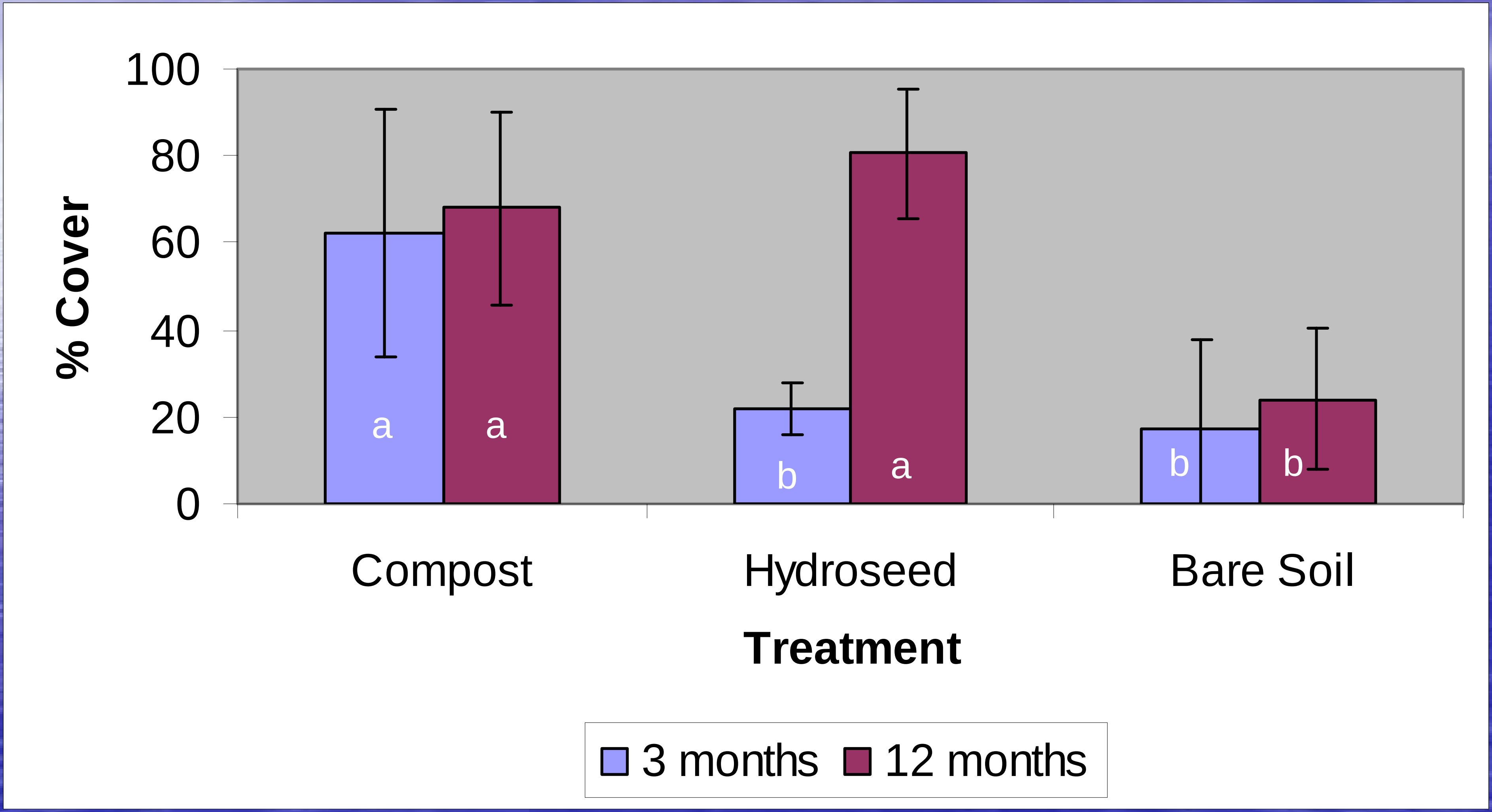
Evaluate the short and long term effects of compost compared to silt fence and hydroseed on storm runoff, soil erosion, nutrient loss, vegetative growth characteristics and soil quality.

The University of Georgia

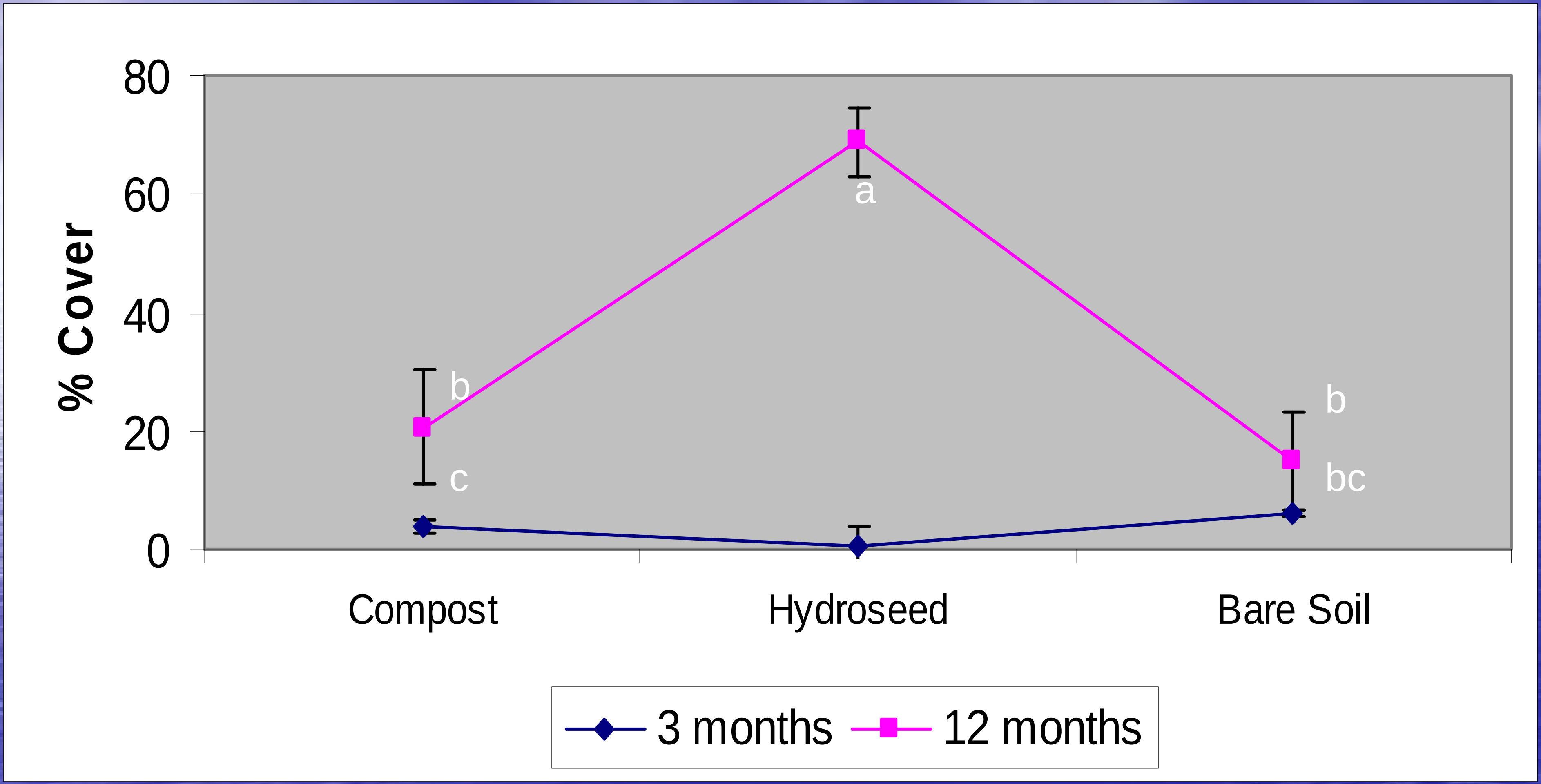
Experimental Design

- Blankets (1.5 in) & Filter Berms (1' x 2')
- Hydroseed applied by local professional
- DOT certified Class A silt fence
- Seeded w/ bermuda grass @ 20 lbs/ac (GDOT spec)
- 10% slope (cleared & graded)
- Plot size = 3' wide x 16' long
- Rainfall simulation = 3.1 in/hr for 1 hr = 50-yr/1-hr return for Athens, GA – worst case scenario
- 3 Storms = immediately after treatment application, 3 months, 12 months
- Soil sampling = day 1, 6 months, 18 months
- No supplemental irrigation

Vegetation Cover

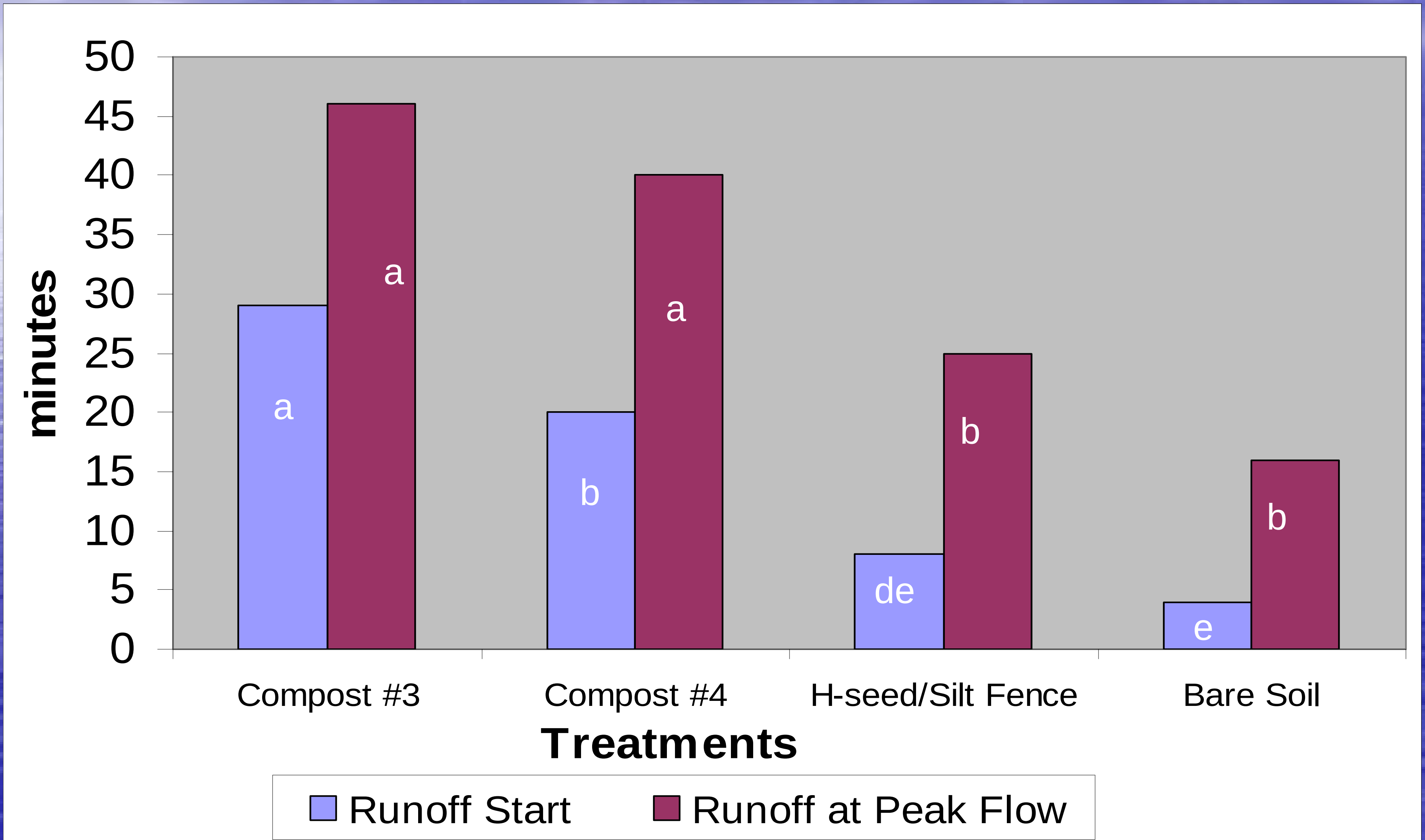


Invasive Weed Cover

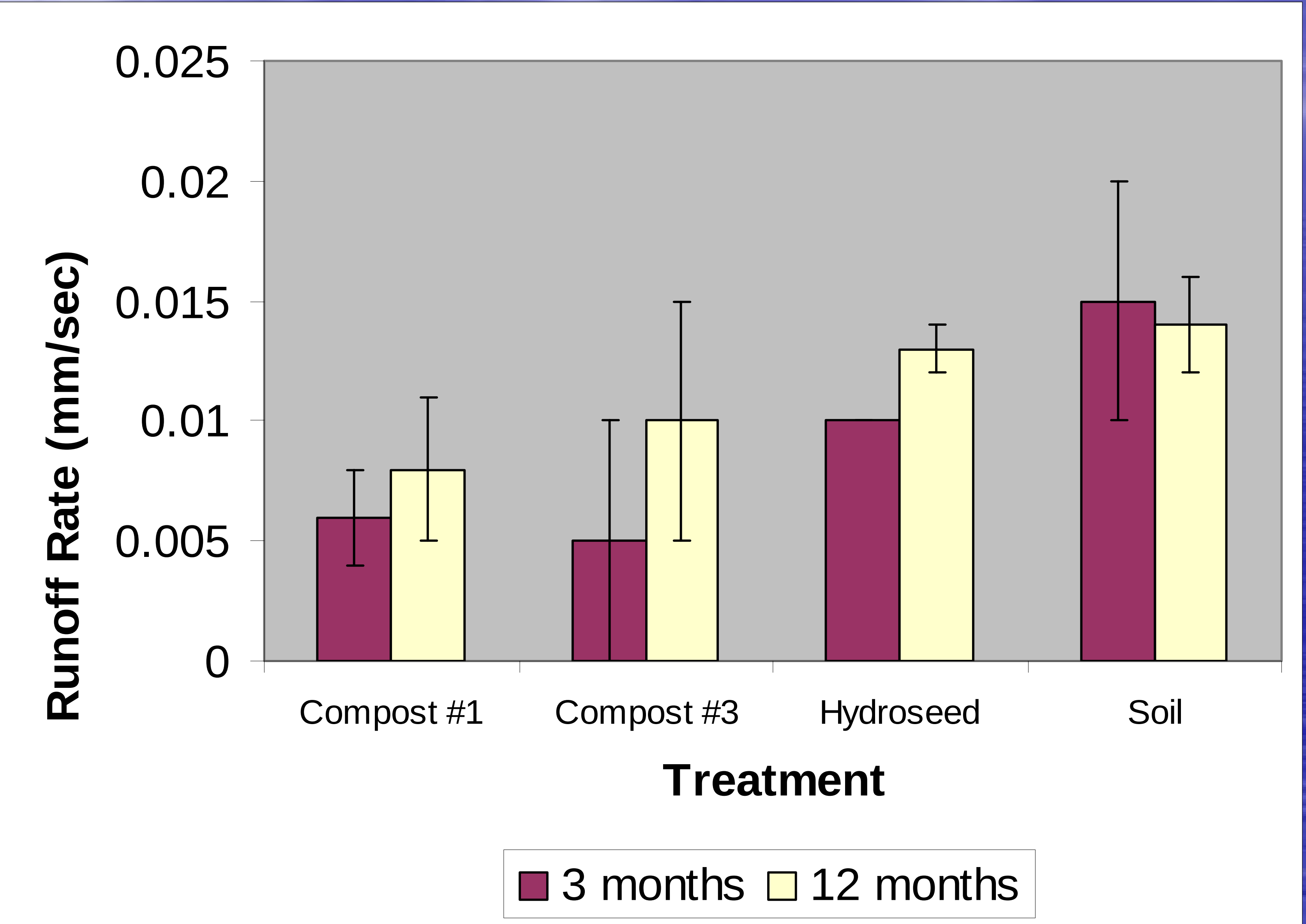


*Weed Cover & Biomass positively correlated (r>0.85) to high <u>inorganic</u> N

Average Elapsed Time to Runoff Start & Peak Flow



Runoff Rate @ Peak Flow



Summary: Storm Runoff

Compost ECB vs Hydroseed

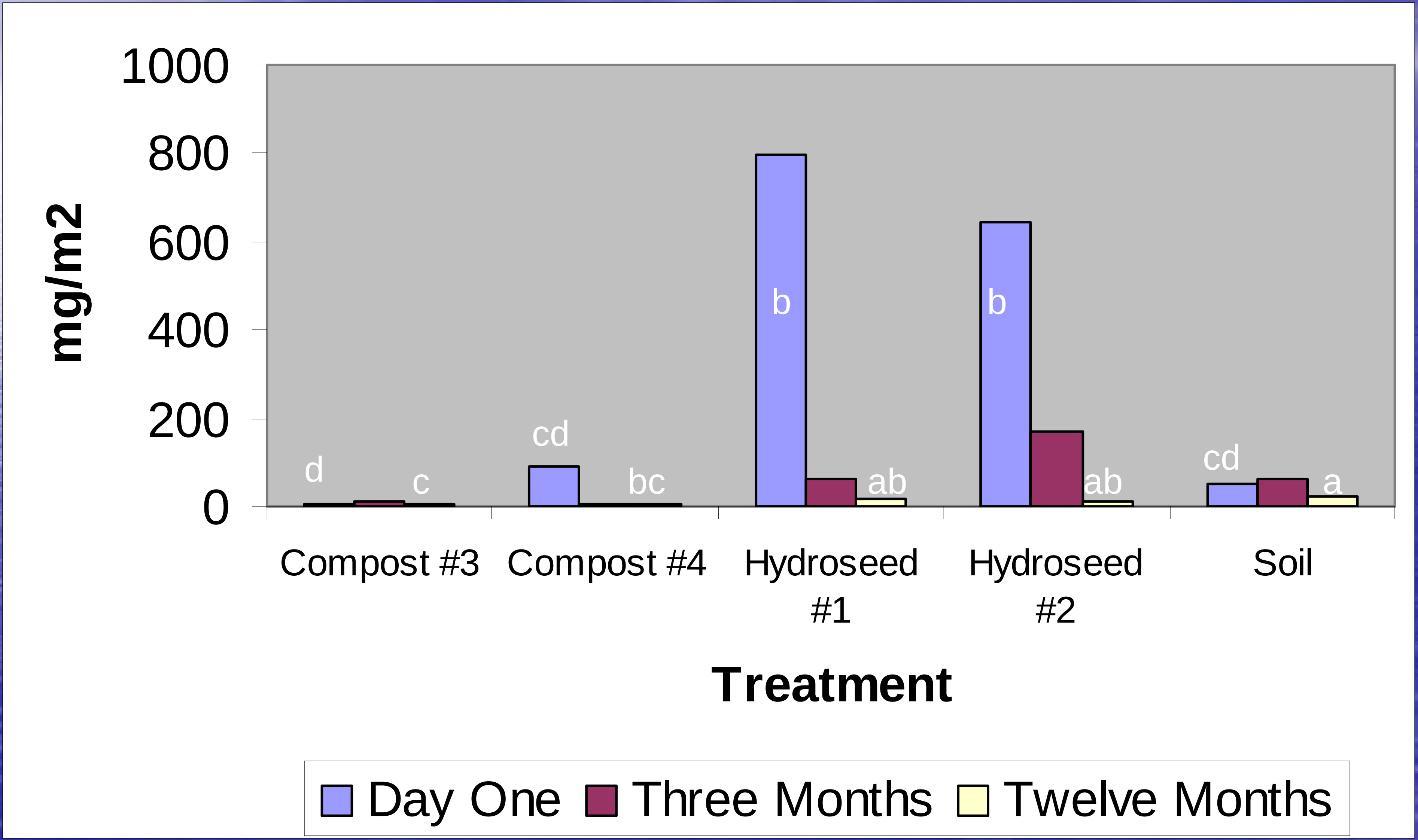
1. Some compost ECBs produced *NO* runoff
2. No runoff = little/no erosion (from transport)
3. Greater time until start of runoff = no runoff for small & medium storm events
4. Less runoff = smaller storm water management ponds/design areas = $$$$$

Summary: Total Solids Loss

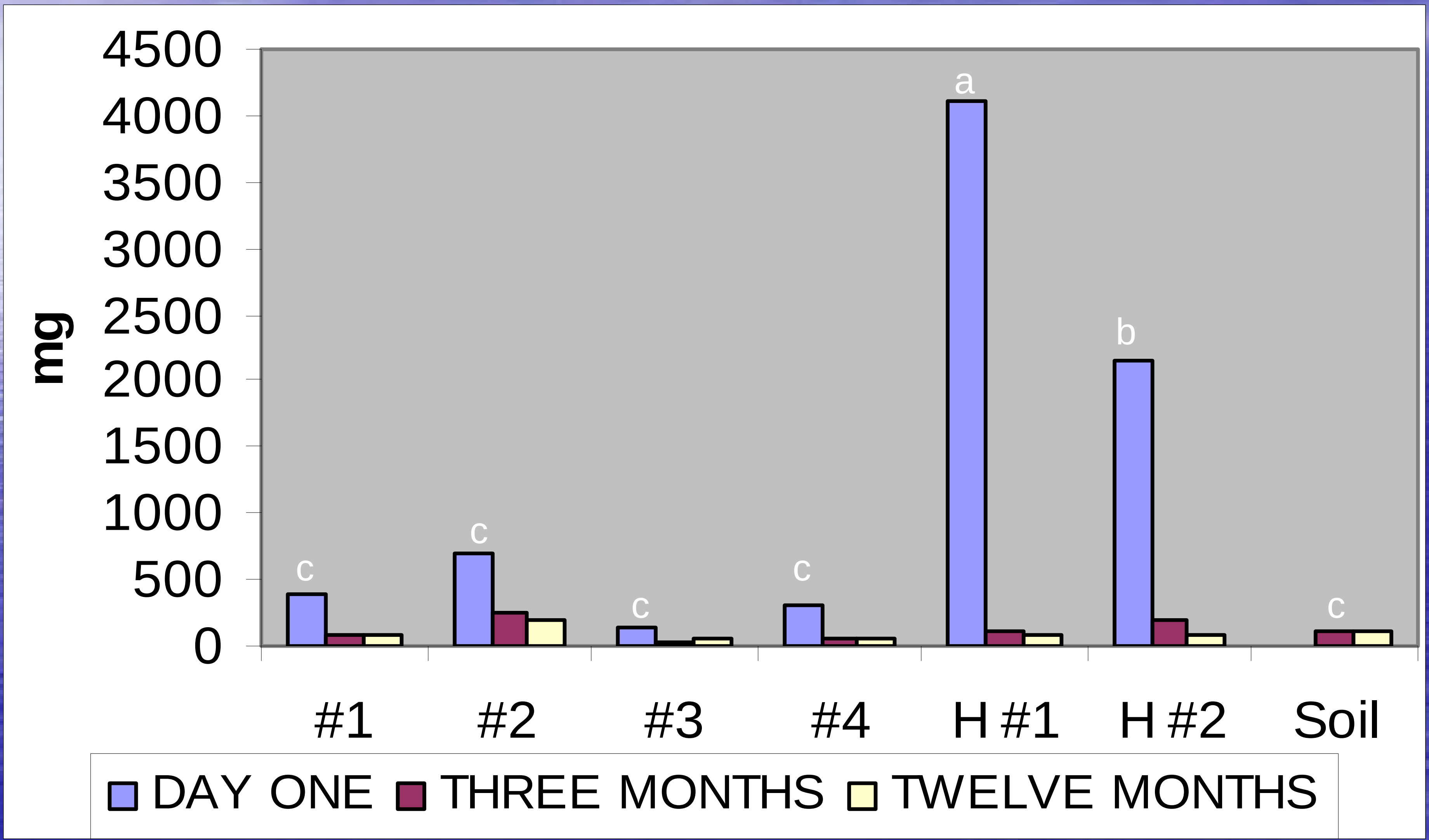
Hydroseed/silt fence vs Compost system for 3 storm events

- ✓Day 1 = **308 & 136 g/m^2**
- ✓3 mo = **220 & 13 g/m^2**
- ✓1 yr = **15 & 14 g/m^2**

Nitrate-N Load



Diss. Reactive P Load



Compost Blanket Particle Size & Straw Mulch w/ PAM Affects on Water Quality, Water Quantity & C Factors

Britt Faucette[1], Jason Governo[2], Carl Jordan[2], B. Lockaby[3], H. Carino[3], R. Governo[3]

2 The University of Georgia

3

1 FILTREXX® THE CERTIFIED STANDARD IN EROSION CONTROL

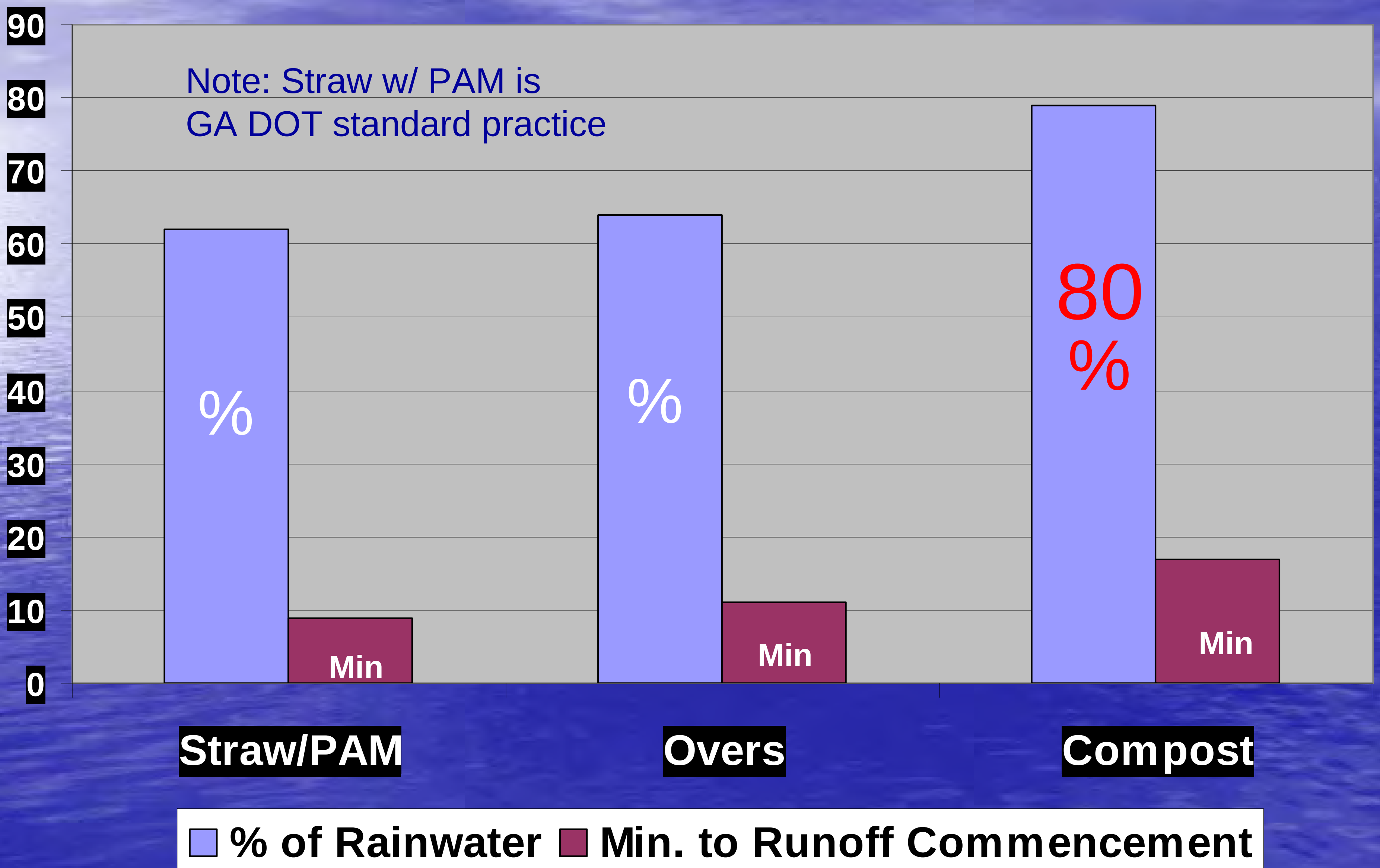
Funding assistance USDA

Objectives:

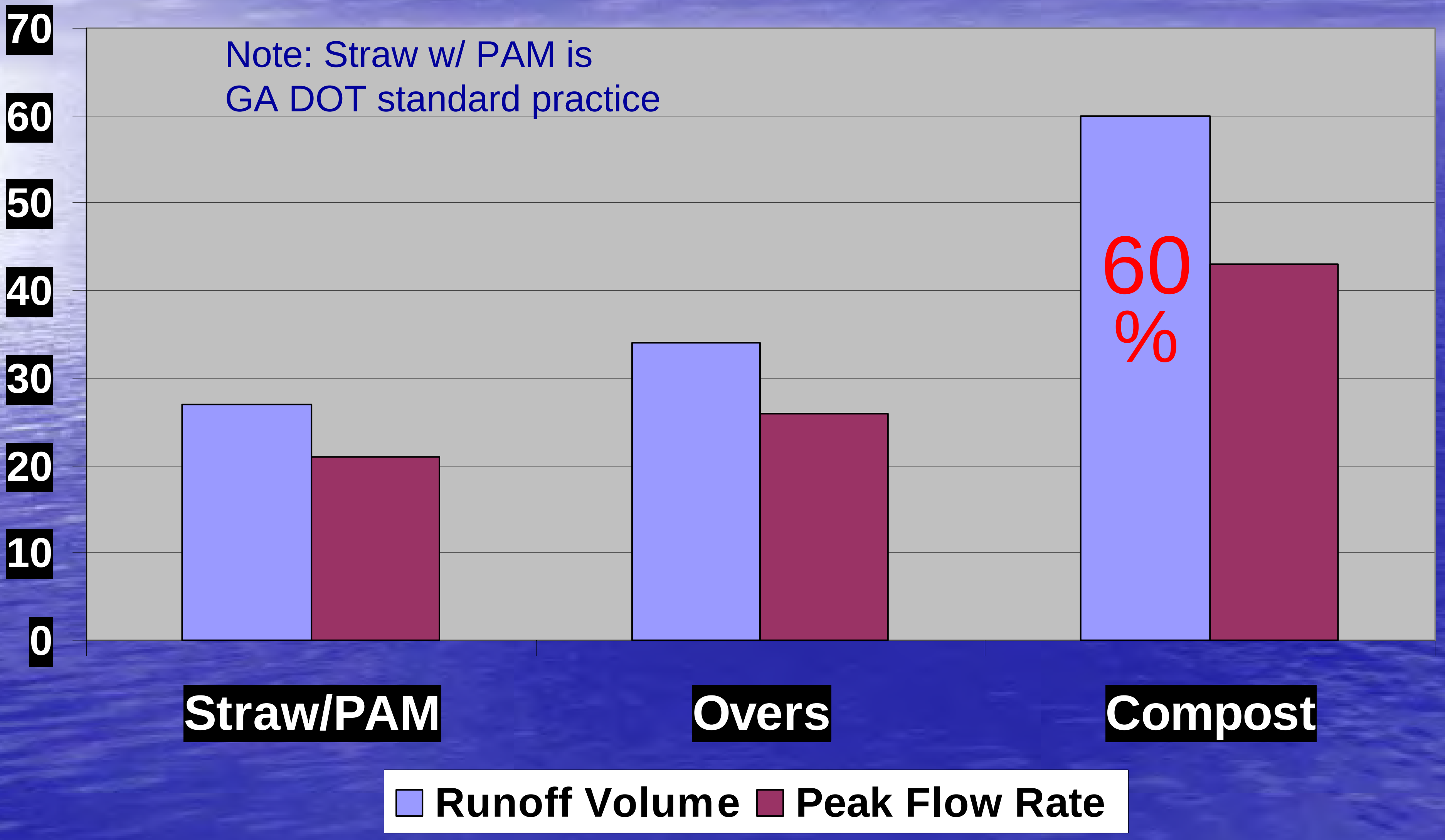
- Evaluate affect of compost particle size on performance of Compost ECBs
- Compare performance of Compost ECBs to Straw Mulch w/PAM (conventional BMP)
- Evaluate performance of flocculants added to Compost ECBs for sediment reduction
- Determine RUSLE Cover (C) Factors for all treatments

✓ Increased Rainfall Intensity/Duration to **4 in/hr**

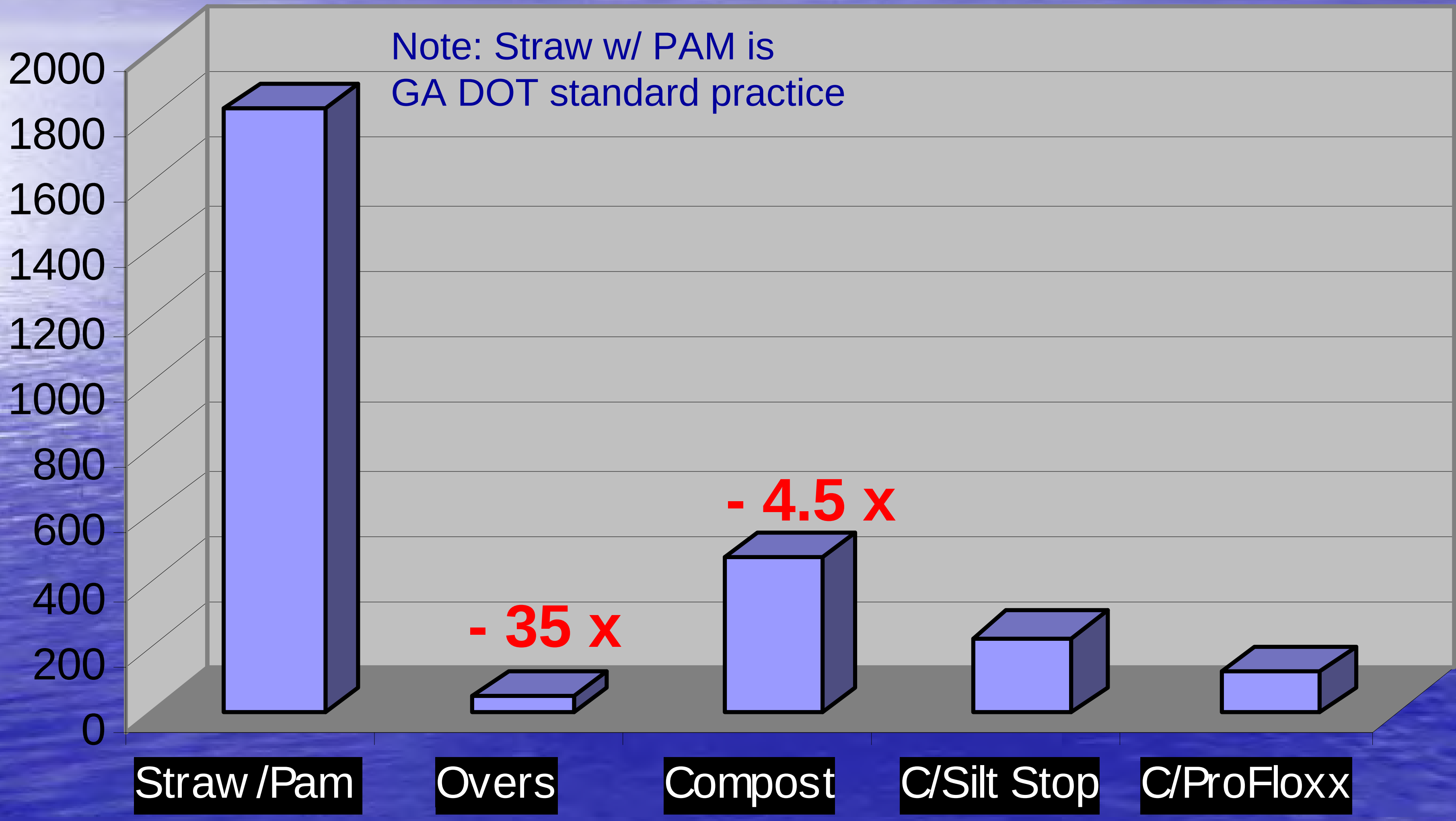
Rainwater Absorption



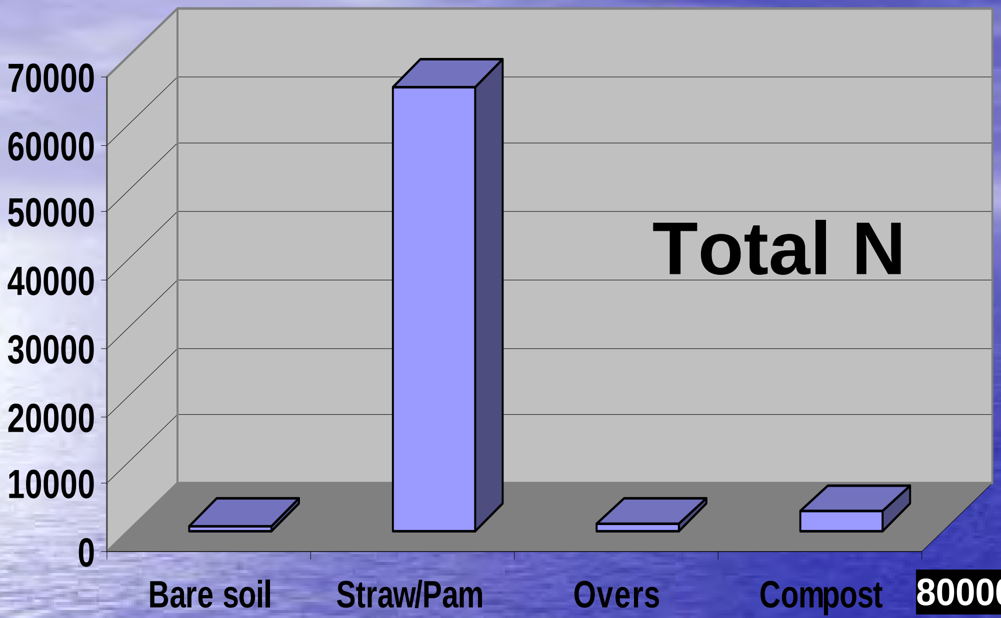
% Reduction of Storm Water Runoff

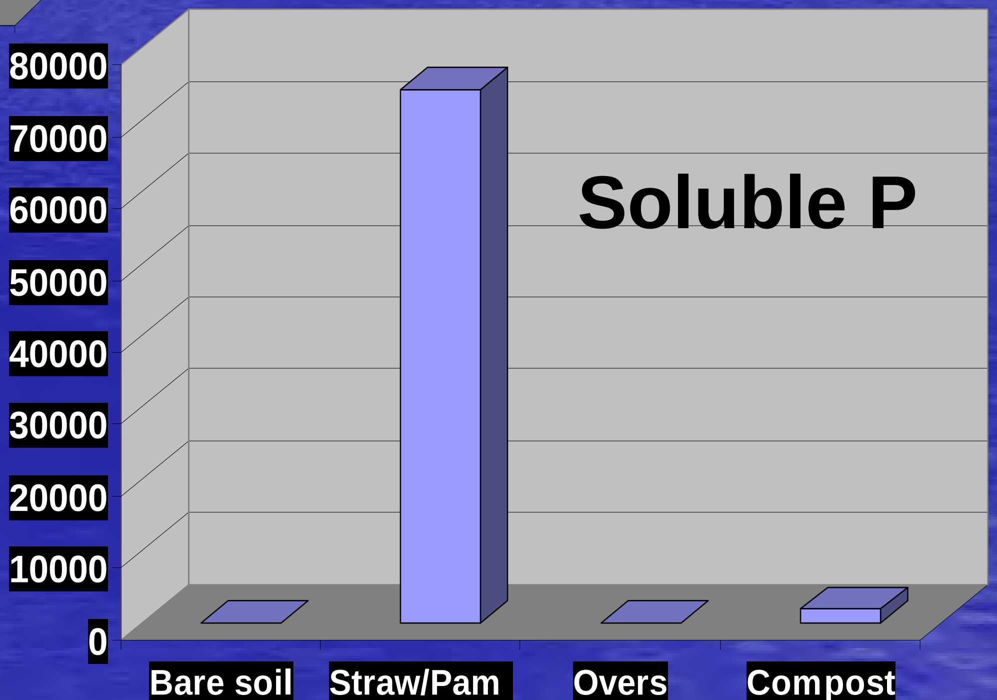


Turbidity (NTU) during Storm #1



Nutrient Loads (mg) for Storm #1





PART II - Sediment Control

‘Storm Water Treatment’

Filtration Devices use Filter Media

What's in that Sock?
3-Way Filtration

- Physical
  - Traps sediment in matrix of varying pore spaces and sizes
- Chemical
  - Binds and adsorbs nutrients/hydrocarbons in storm runoff
- Biological
  - Degrades various compounds with bacteria and fungi

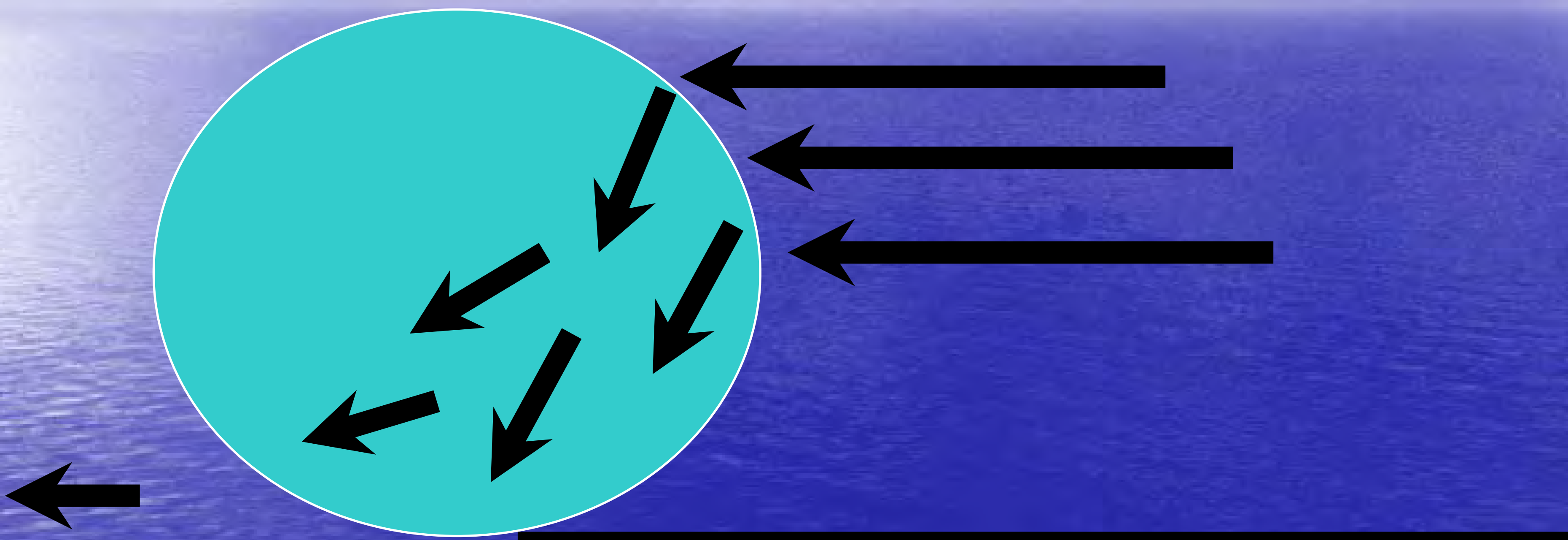
Silt Fence Is a Single Membrane and Functions as Mini *Sediment Detention Pond*

- Designed to pond water
- Suspended solids smaller than filter fabric pores
- Only functions once clogging begins

US EPA/NPDES

- Clay removal = 0-20%
- Silt removal = 50-80%
- Sand removal = 90%

Filter Socks Act as a 3 Dimensional *Filter*

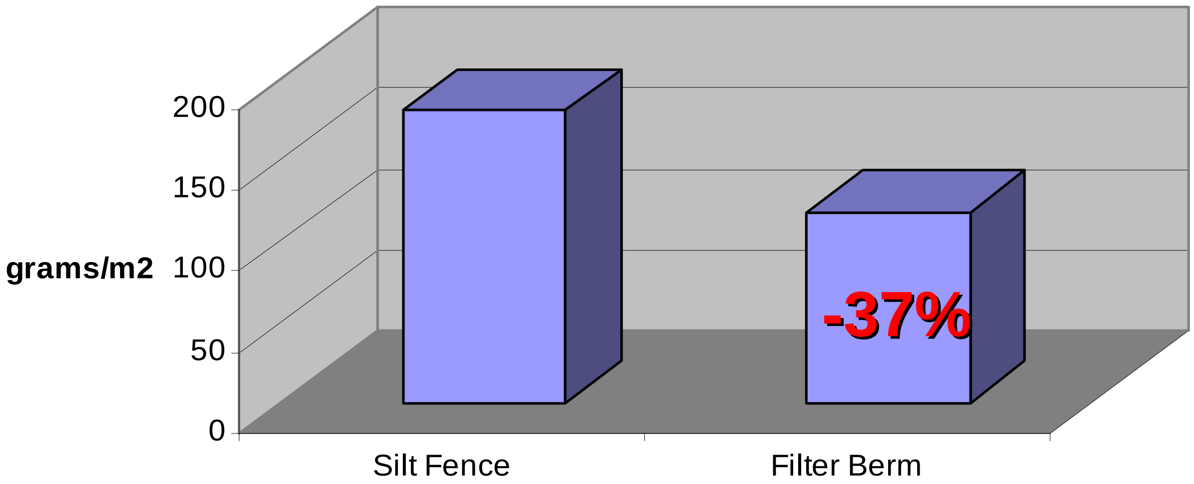


- Designed to flow water faster
- Mix of particle sizes (<u>SPECS!</u>) = micro & macro pores
- Humus = adsorption of soluble pollutants (+ charged)

Silt Fence vs Filter Berm

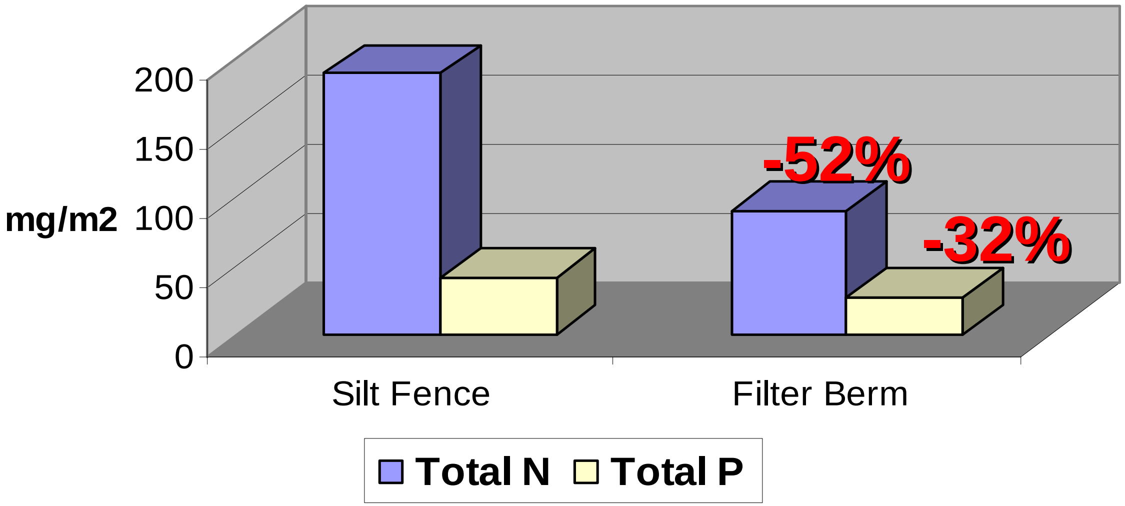
Journal of Soil & Water Conservation (Faucette et al., 2005)

Mean Total Solids Load for 3 Storm Events



- ✓All Plots used Hydromulching

Nutrient Loads for 2nd Storm Event



The University of Georgia

International Erosion Control Association – Annual Conference Proceedings, 2006; 2nd Interagency Conference on Research in Watersheds Proceedings, 2006

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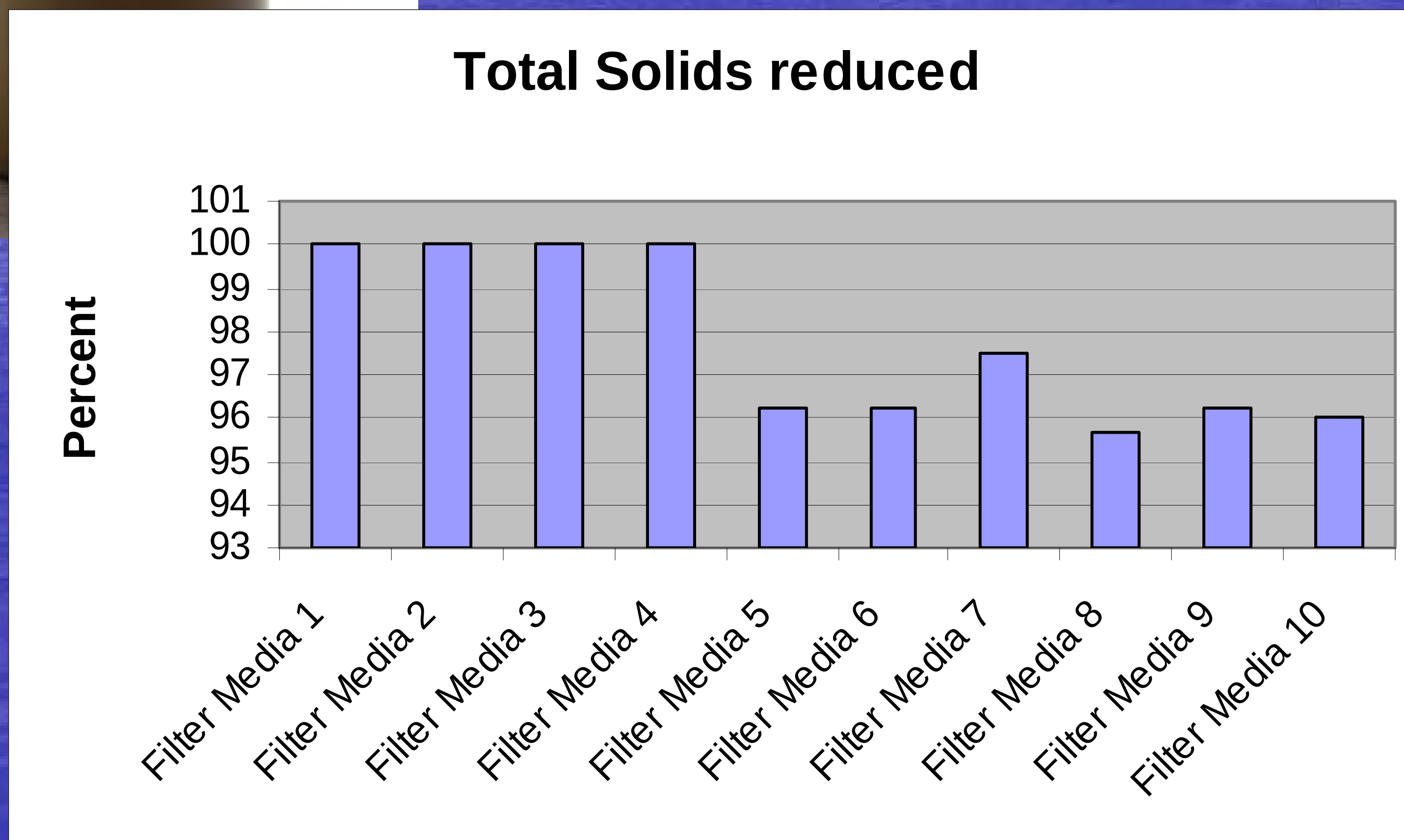

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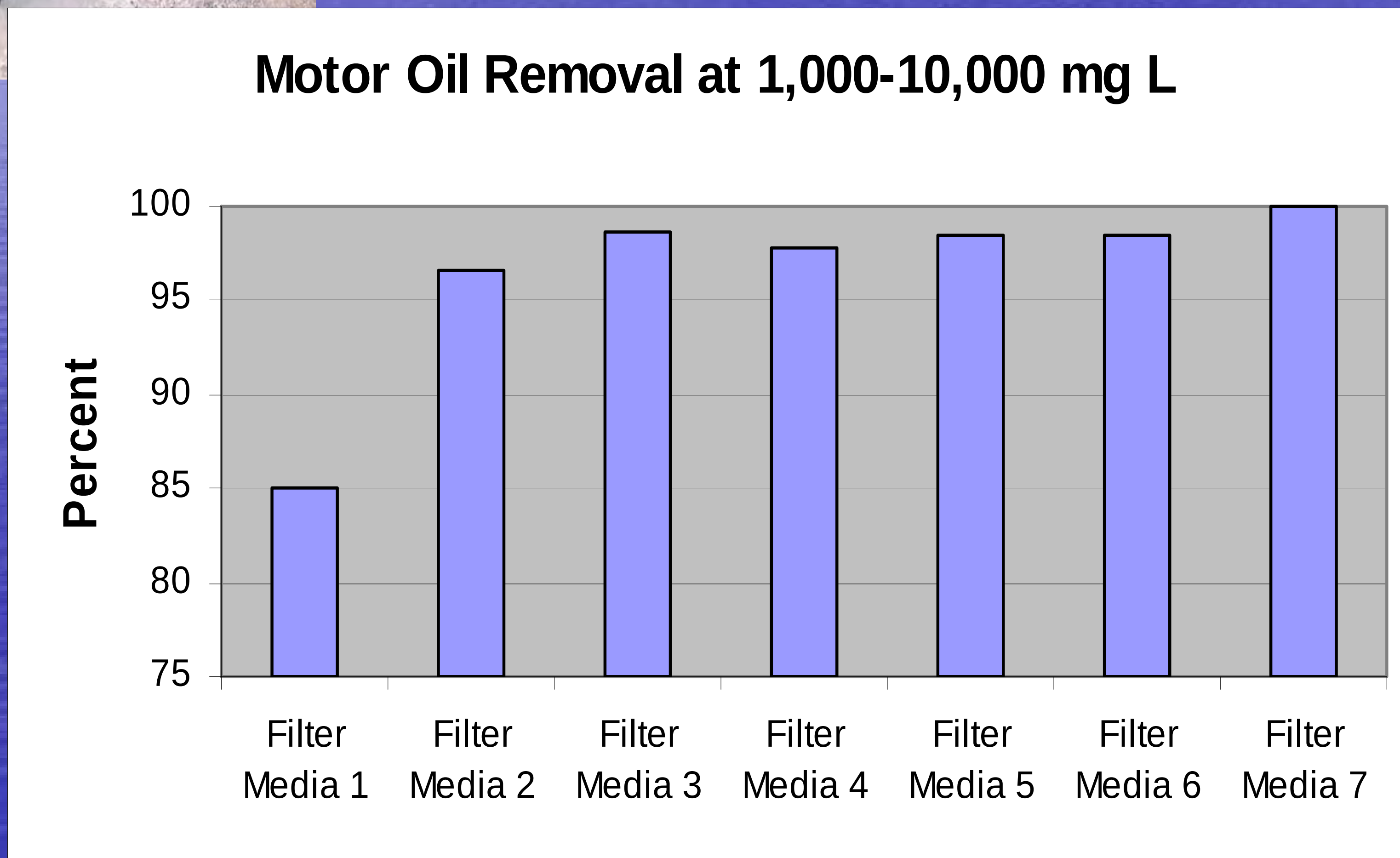
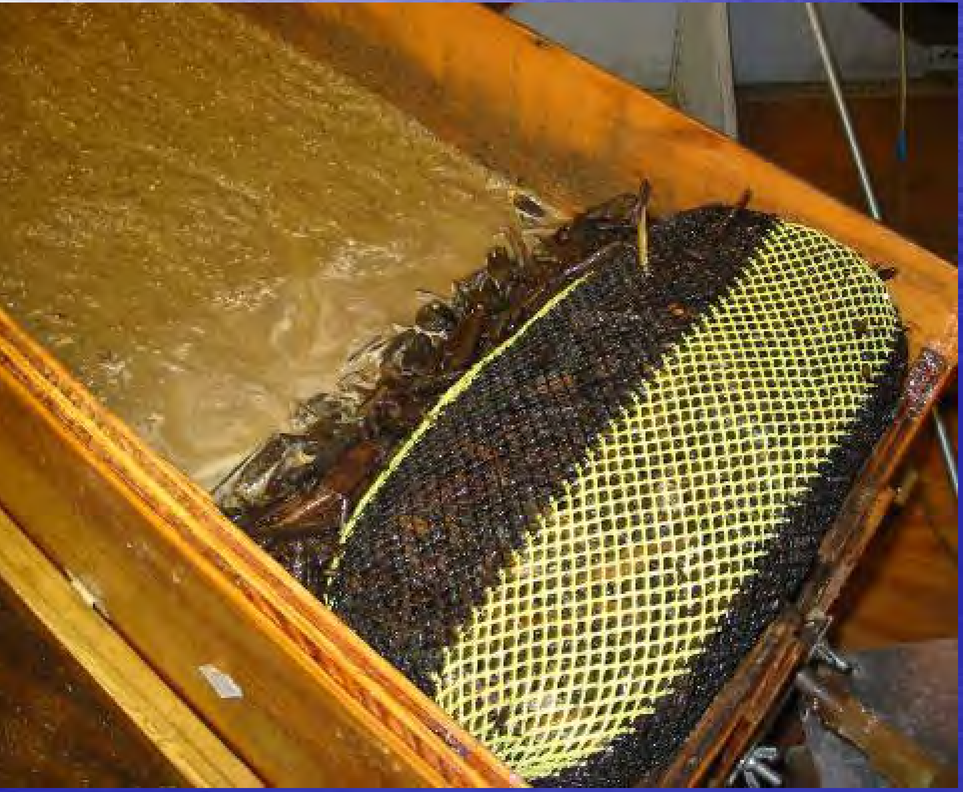


International Meeting Paper, 2006

American Society of Agricultural and Biological Engineers

Sediment and Nutrient Removal from Storm Runoff with Compost Filter Socks and Silt Fence

A. Sadeghi, B. Faucette, K. Sefton



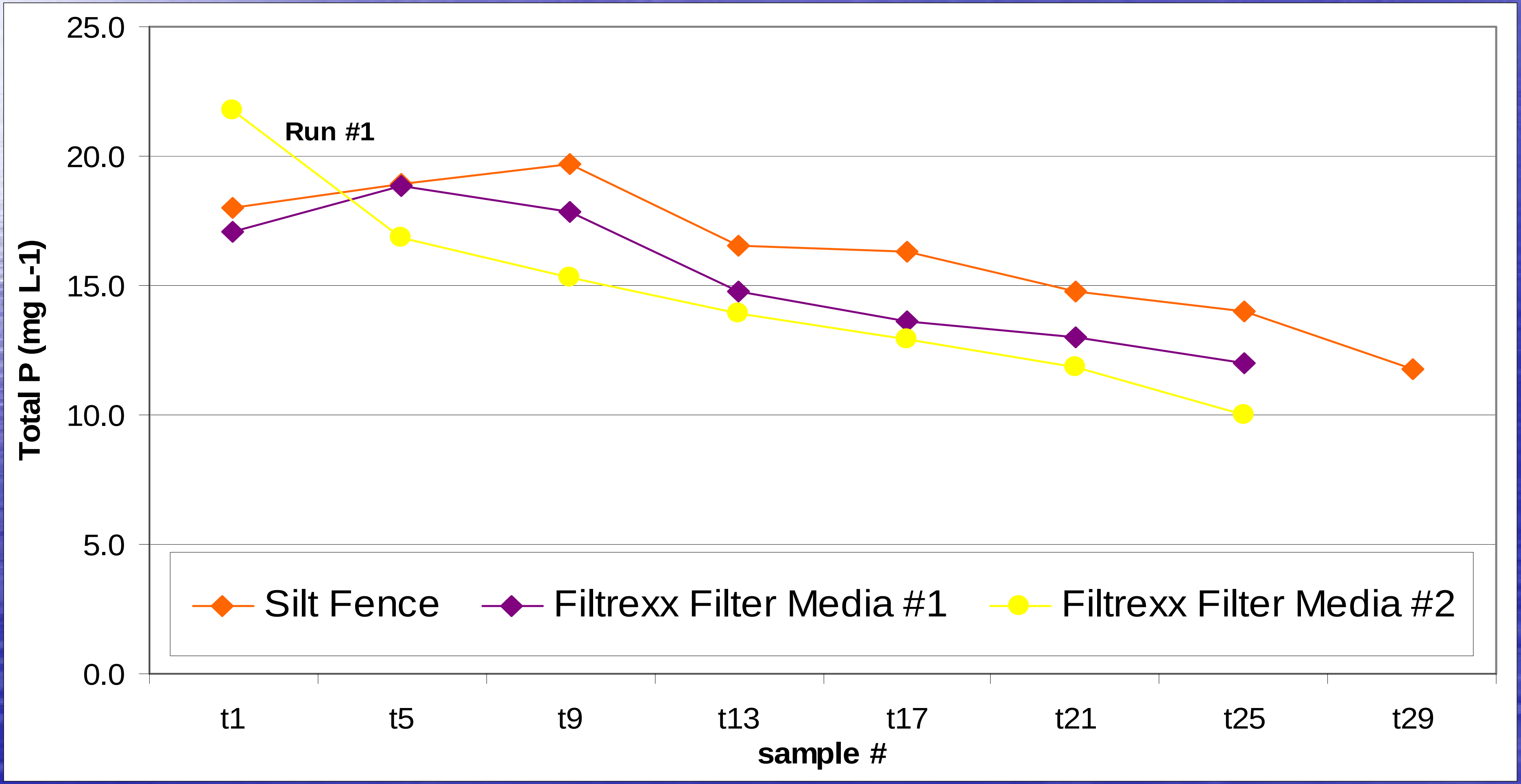
Sediment Summary

% Reduction of TSS & Turbidity of Silt Fence, Filter Soxx, Filter Soxx + Floc

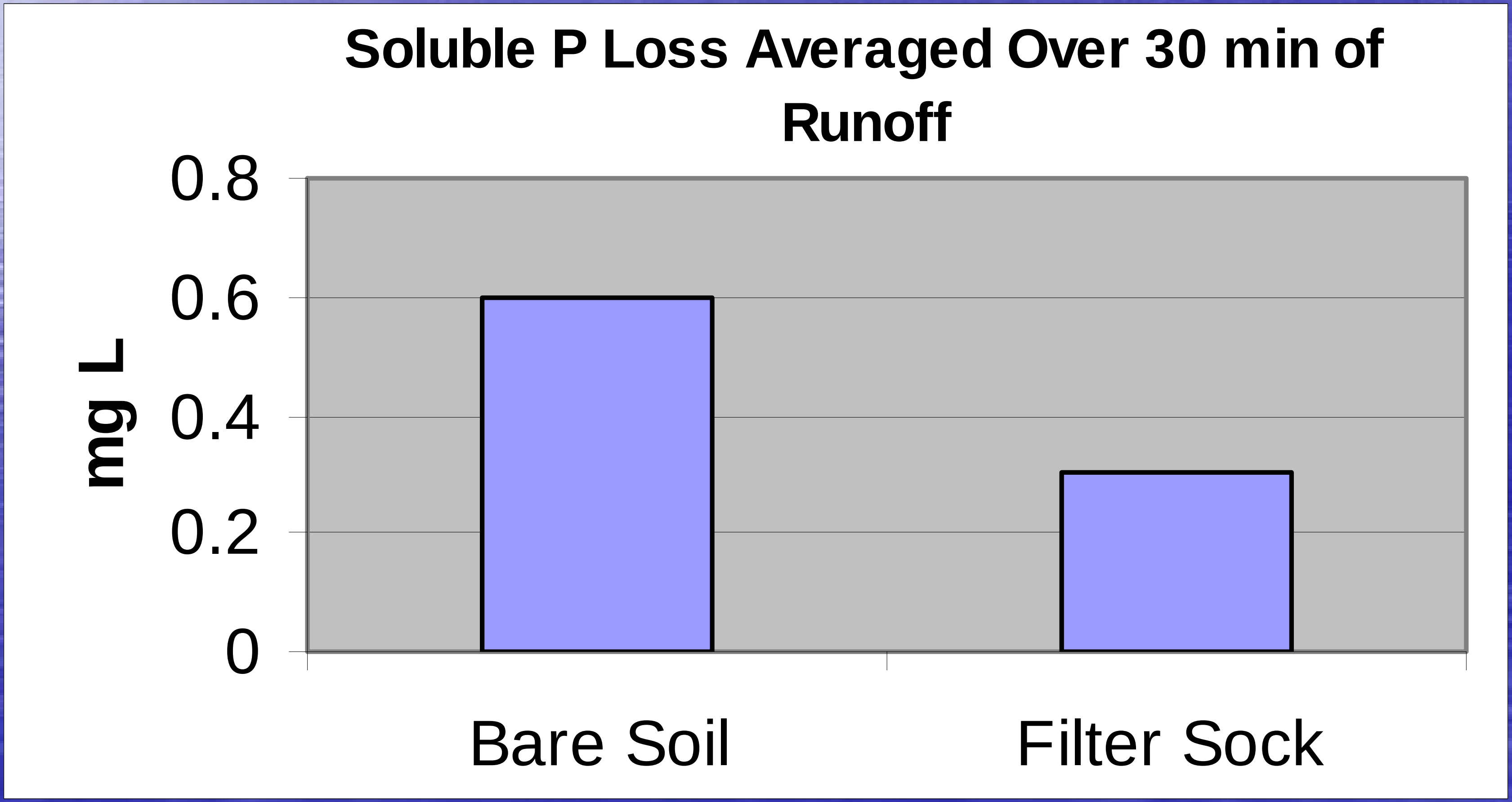
Treatment	TSS	Turbidity
Silt Fence	67	52
Filter Soxx	78	63
Filter Soxx + Silt Stop	97	98
Filter Soxx + BioFloxx	97	94

*** Total Solids removal efficiency for Filter Soxx = 90%**

Total Phosphorus



SOLUBLE P

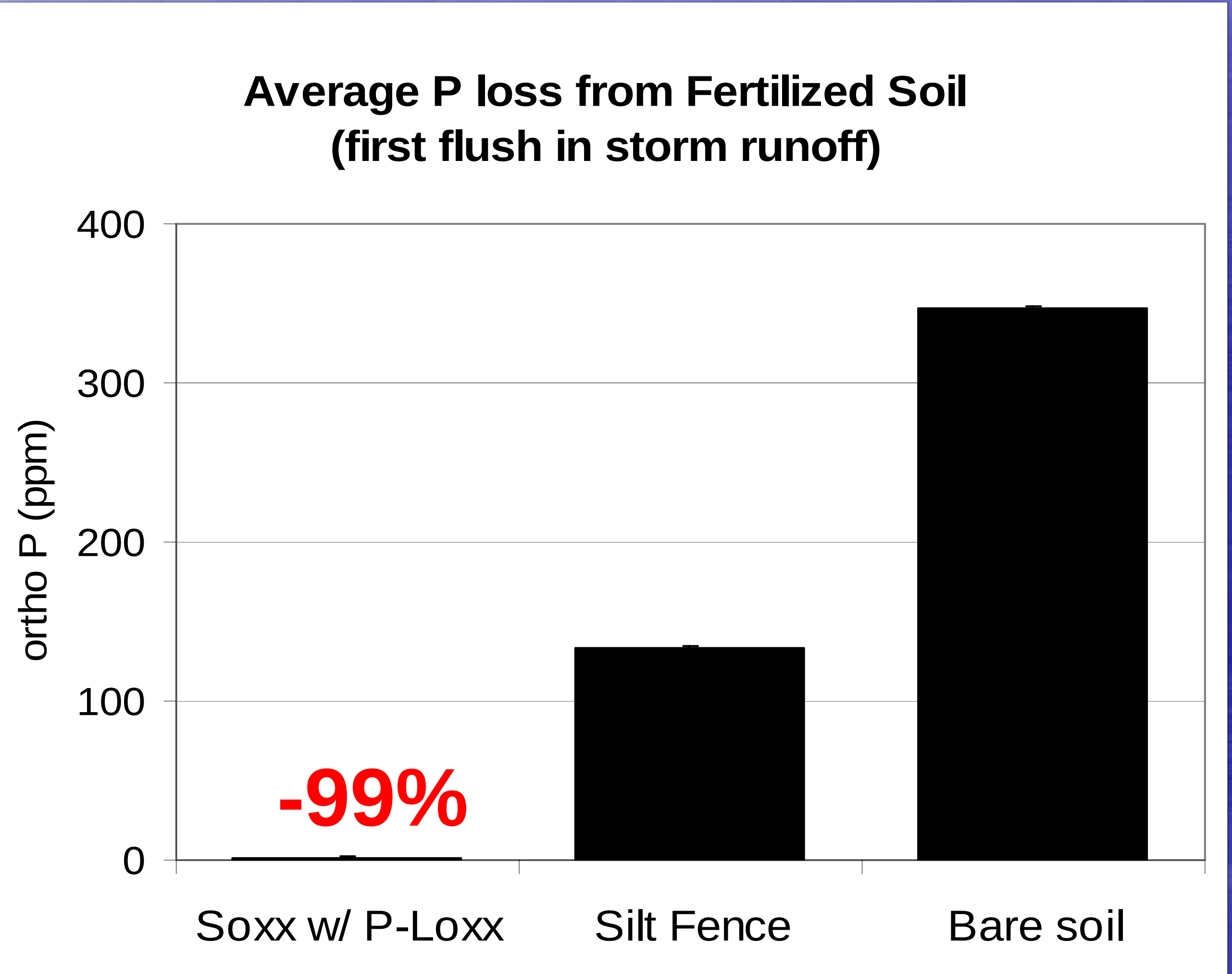


Soluble P Loss Averaged Over 30 min of Runoff
mg L
0.8
0.6
0.4
0.2
0
Bare Soil
Filter Sock

Soluble P

Filter Soxx + P-Loxx = 99% reduction

NPK 25-27-5 Fertilizer Applied at 150 lbs/ac



International Meeting Paper, 2006

American Society of Agricultural and Biological Engineers

Flow-Through Rate & Design Capacity of Compost Socks & Silt Fence in Sediment Control Applications

H. Keener, B. Faucette, M. Klingman

- Design capacity prediction tool for Filter Soxx™ vs Silt Fence
- MS Excel™ based program
- Engineers, L.A.'s, E&SC/SWPPP Designers
- Inputs = storm intensity or total rainfall, storm duration, area of watershed, potential runoff reduction, slope length & degree, length of filter, ht/diameter of filter
- Outputs = Y/N failure, time to failure

Results: Design Capacity

- Avg flow rates were **<u>50%</u>** greater for filter socks
- Ponding height as much as **<u>75%</u>** greater for silt fence

- 8” Filter Soxx™ = 24” silt fence;
  12” Filter Soxx™ > 36” silt fence

SO WHAT?

1. Higher flow rate capacity = greater drainage area;
2. Greater drainage area = **<u>less BMP installation/inspection/maintenance</u>**
3. <u>Less cost to contractor and/or inspectors</u>

*Based on 30 min. of flow with sediment concentration at 10,000 mg L^{-1}

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Research Ecologist,

National Director R&D/ Technical & Environmental Assistance

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