TRIECA 2016 CONFERENCE

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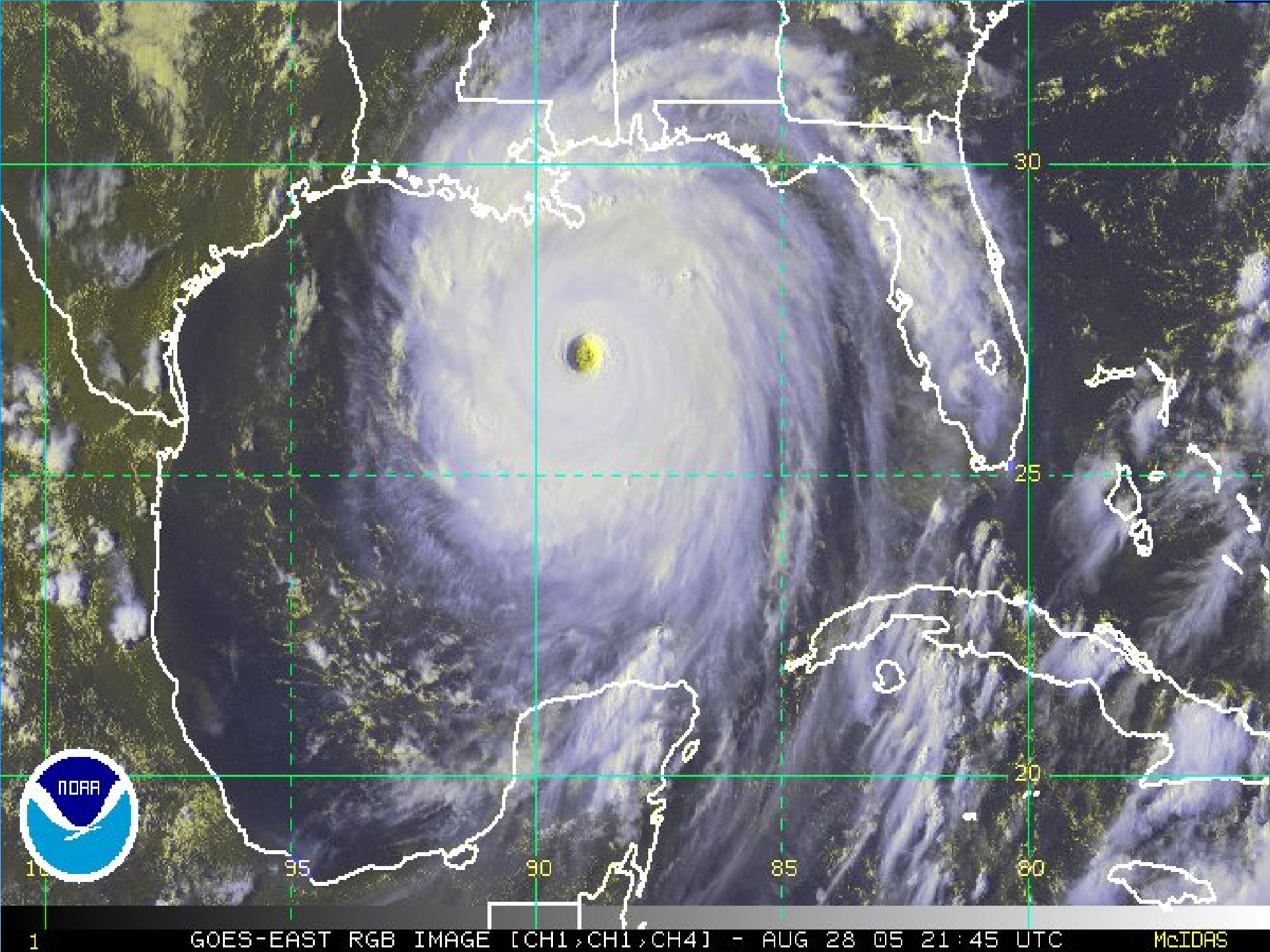
HOSTS

How Vegetation is Strengthening Levees in New Orleans

Jeffrey Beasley
LSU Agricultural Center


Denver Post, 2016


30
25
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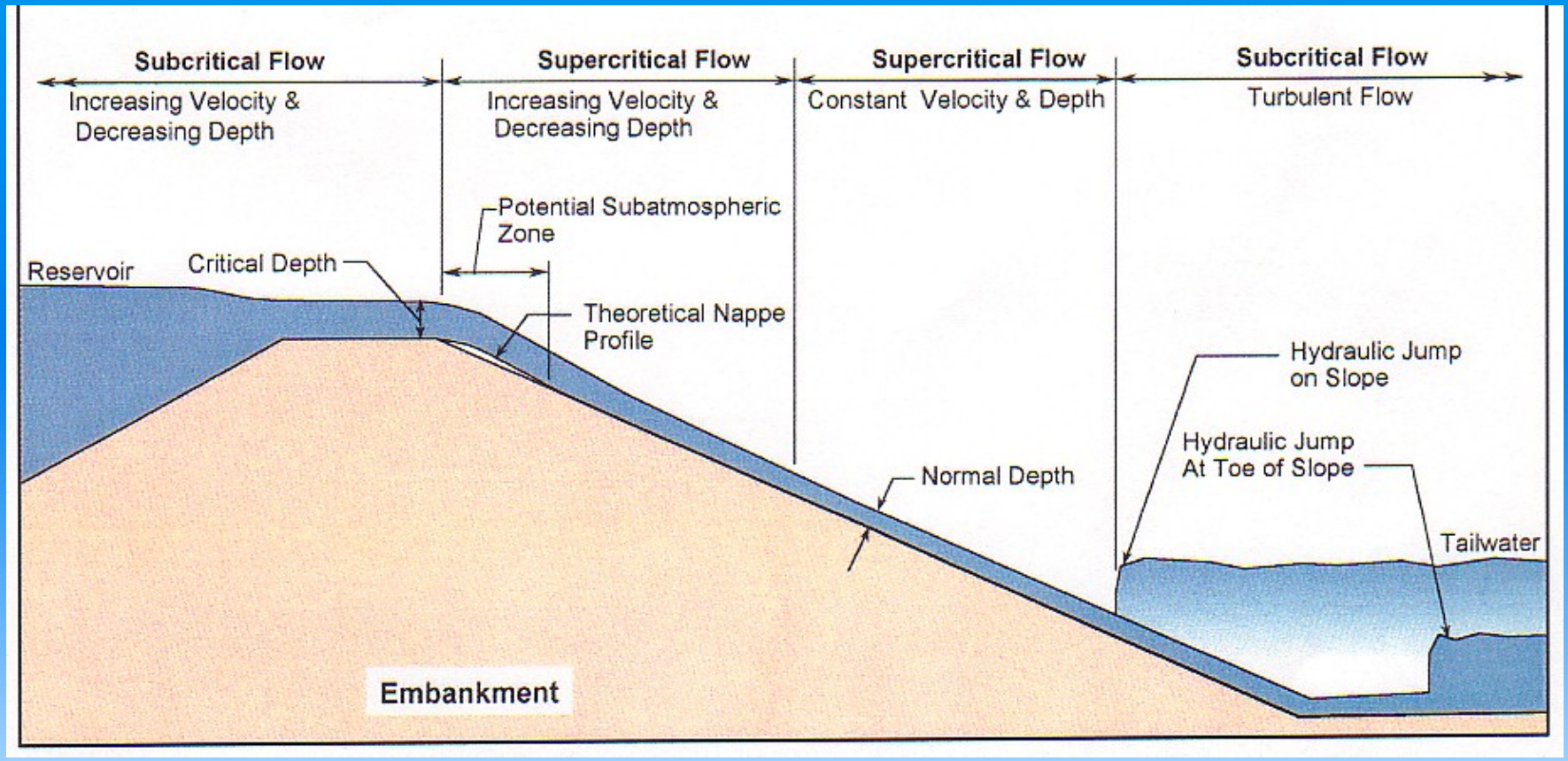
1
GOES-EAST RGB IMAGE [CH1,CH1,CH4] - AUG 28 05 21:45 UTC
McIDAS


AP


LAKE PONTCHARTRAIN
BONNET CARRE SPILLWAY
SITE 1
SITE 2
SITE 3
SITE 4
SITE 5
SITE 6
SITE 7
SITE 8
SITE 9
SITE 10
KENNER
Metairie
NEW ORLEANS
HARAHAN
WESTWEGO
GRETNA
Harvey
Marrero
Avondale
Bridge City
Waggaman
Ama
Destrehan
St. Rose
Almedia
River Ridge
Norco
Good Hope
New Sarpy
Ormond Estates
Backtown
Lakeview
Gentilly
New Orleans East
Old Metairie
Old Jefferson
Elmwood
Hollygrove
Mid-City
Treme
Faubourg Bywater
Marigny
Lower 9th Ward
Arabi
Chalmette
Meraux
Violet
Poydras
St. Bernard
Toca
Kenilwork
Verret
Caernarvon
Belle Chasse
Timberlane
Woodmere
Estelle
Terrytown
English Turn
Broadmoor
Carrollton
Uptown
Algiers
Algiers Point
Central Business District
Central City
Lower Garden District
Garden District
Irish Channel
MISSISSIPPI RIVER
HARVEY CANAL
GIWW/MRGO
MRGO
CHEF MENTEUR PASS
LAKE BORGNE
LAKE CATAOUATCHE
LAKE SALVADOR
LAKE LERY
LAKEFRONT AIRPORT
LOUIS ARMSTRONG NEW ORLEANS INTERNATIONAL AIRPORT
NEW ORLEANS NAS/JRB
LESS THAN 2 YEARS OLD
GREATER THAN 10 YEARS OLD
0 1 2
Miles


CAT

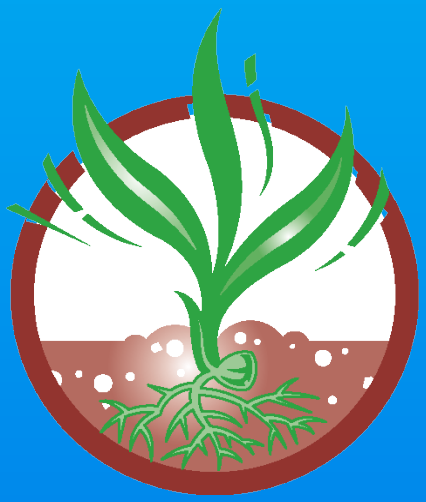
Wave Overtopping

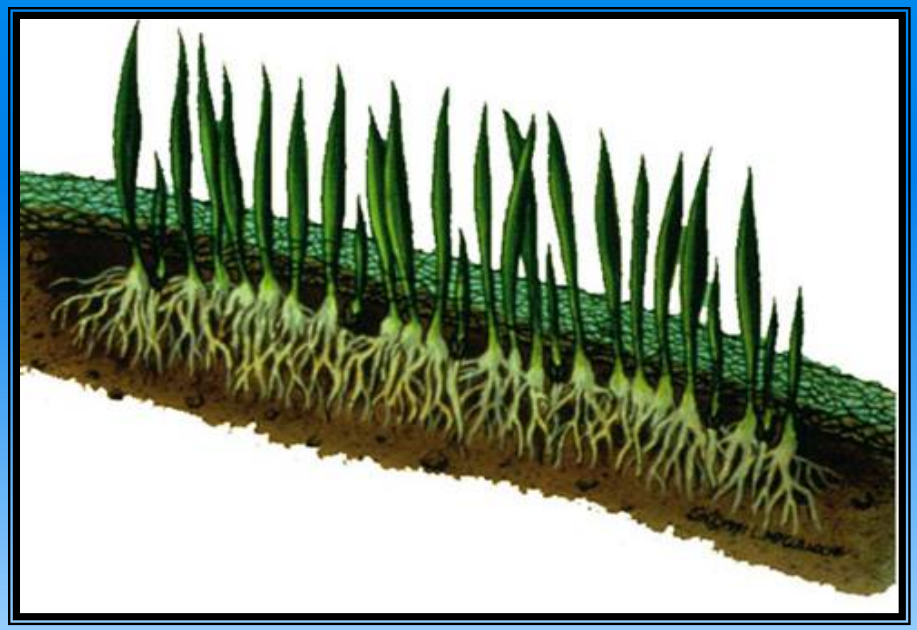


THE SCIENCE

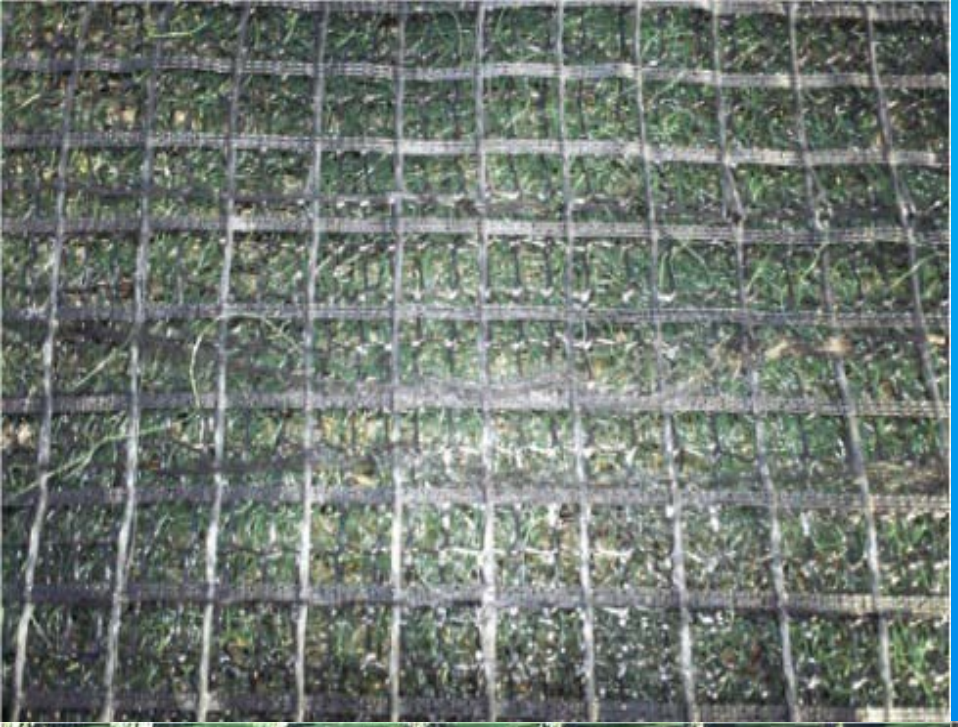
Turf Reinforcement Mat Concept

- Improve the ability of vegetation to resist the hydrodynamic forces of flowing water





Examples of HPTRMs



The Problem...

"The performance of reinforced grass is determined by a complex interaction of the constituent elements. At present these physical processes, and the engineering properties of geotextiles and grass, cannot be fully described in quantitative terms."

Hewlett, et al. (1987)

Un-Vegetated

Typical ranges

Velocity

5 – 15 fps

Shear

1 – 5 psf

Vegetated

Typical ranges

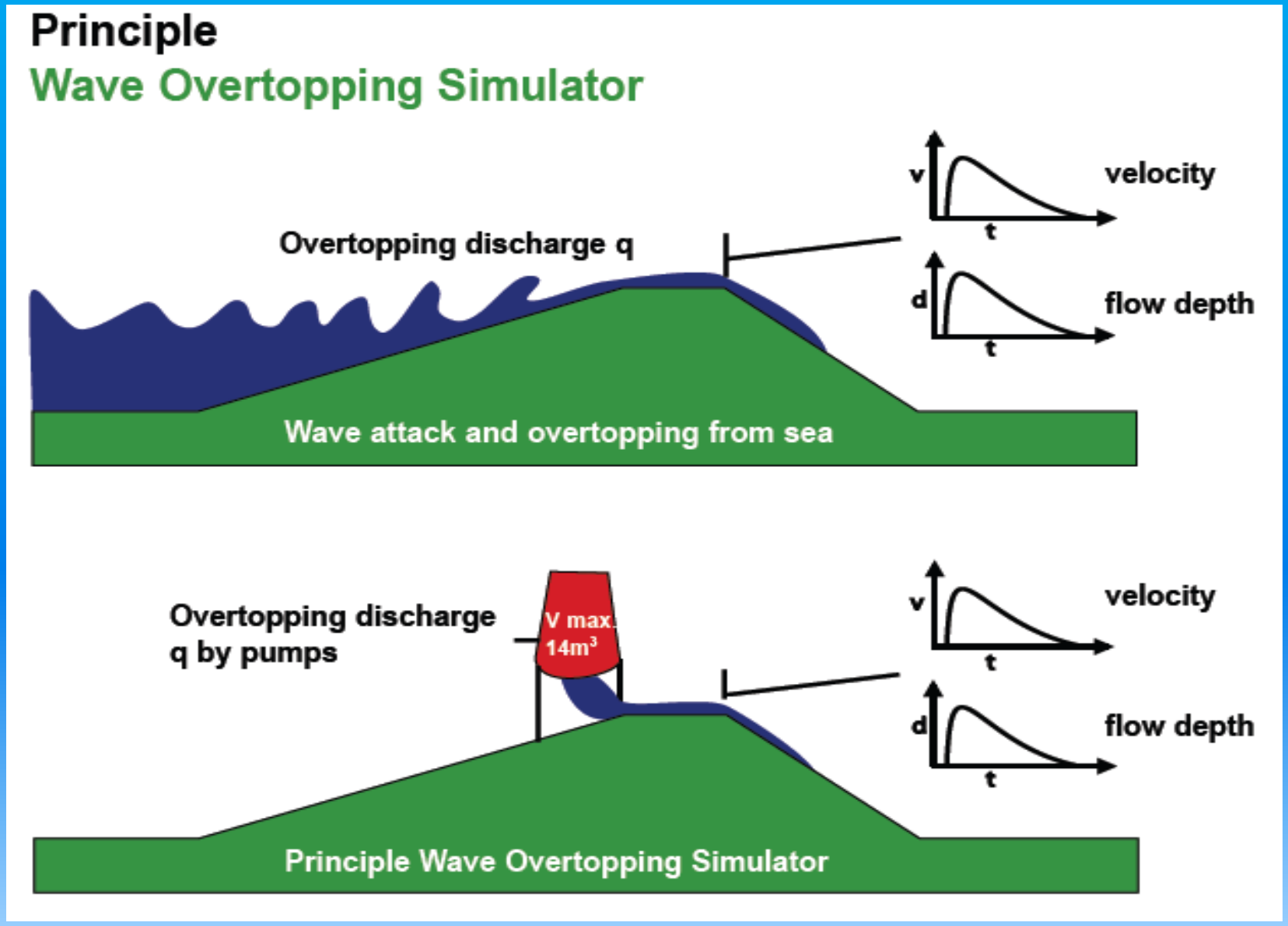
Velocity

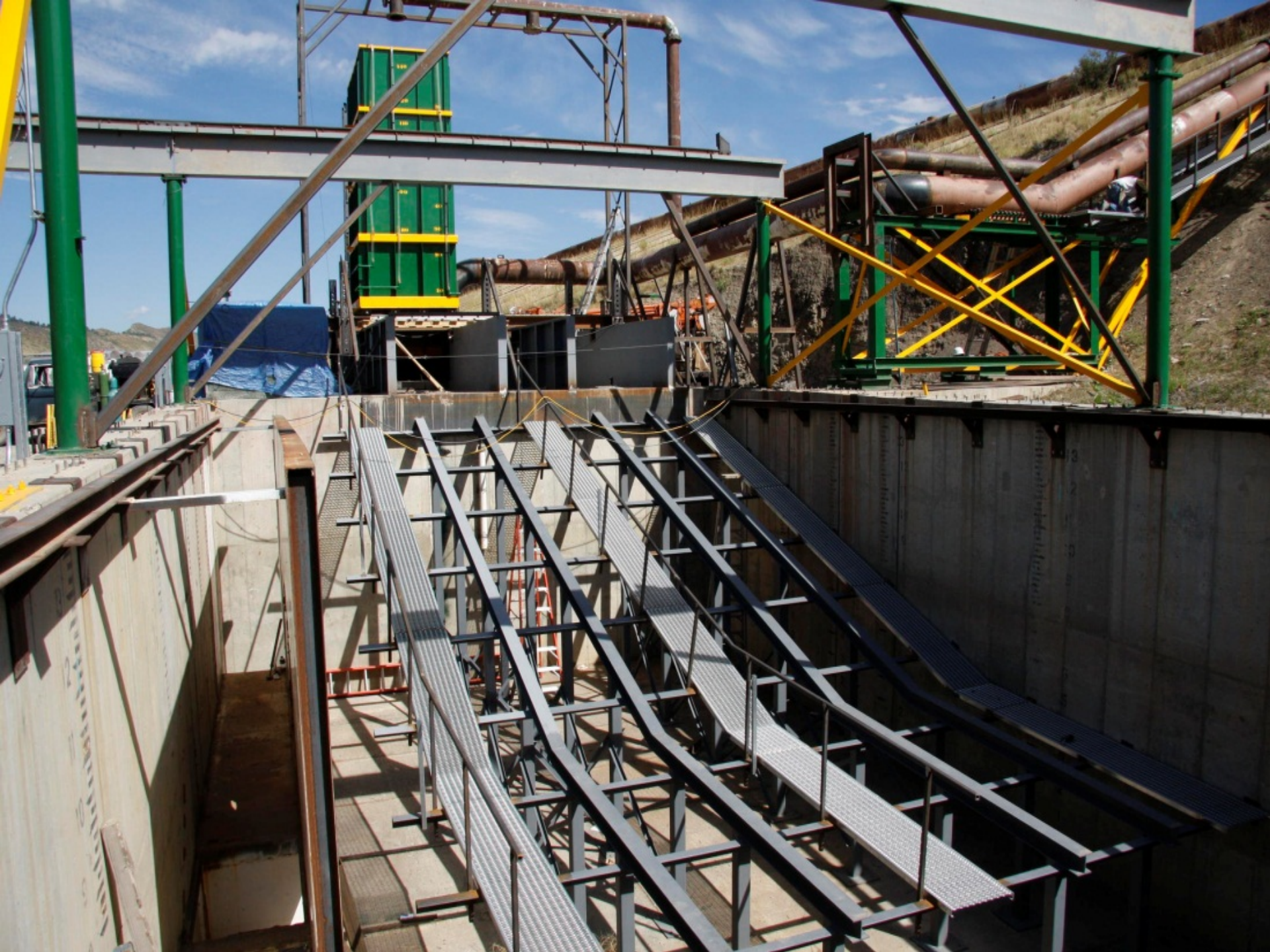
15 – 30 fps

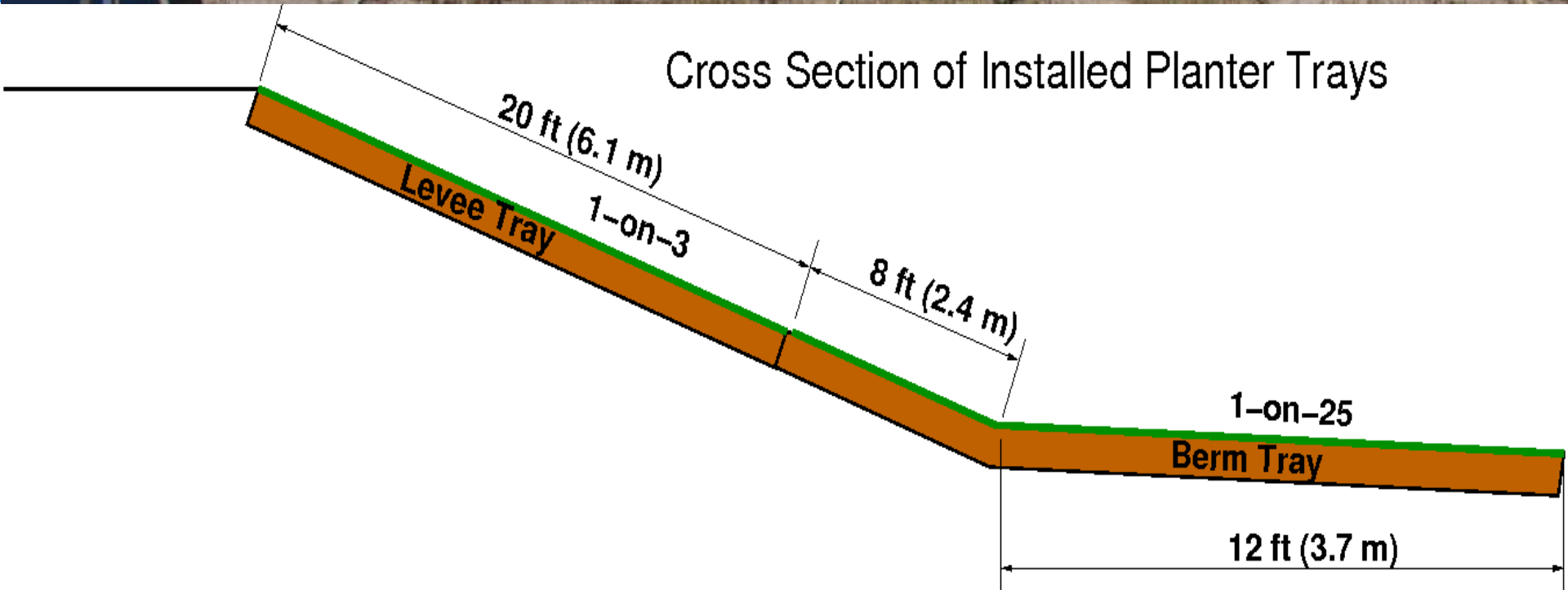
Shear

10 – 20+ psf

How to Test?


Principle
Wave Overtopping Simulator
v
velocity
t
Overtopping discharge q
d
flow depth
t
Wave attack and overtopping from sea
Overtopping discharge
q by pumps
V max
14m³
v
velocity
t
d
flow depth
t
Principle Wave Overtopping Simulator

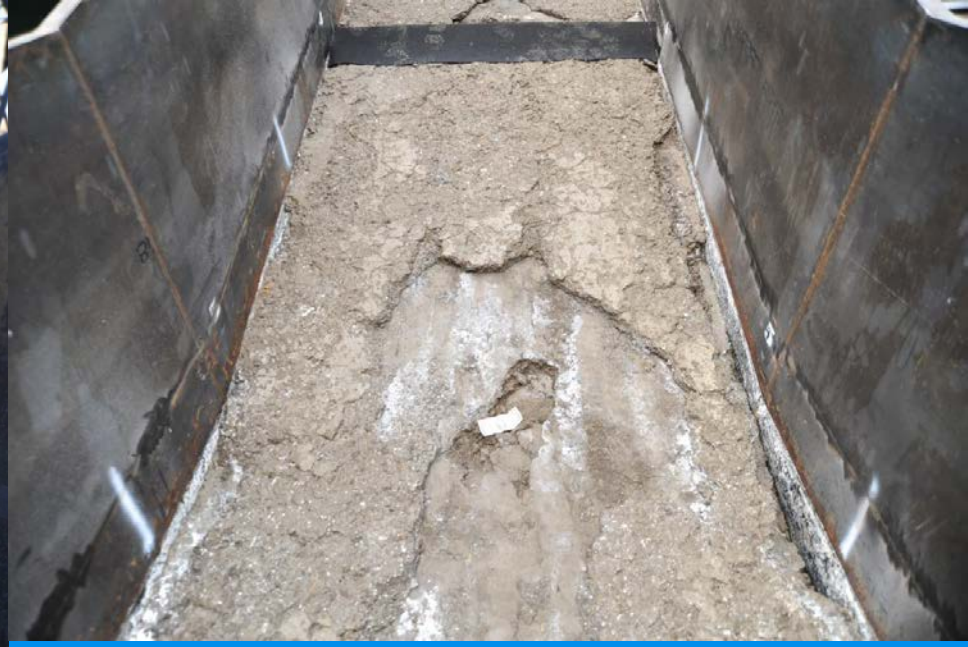



Cross Section of Installed Planter Trays
20 ft (6.1 m)
1–on–3
Levee Tray
8 ft (2.4 m)
1–on–25
Berm Tray
12 ft (3.7 m)


HONDA

Largest Wave Discharge


Total failure after 20 min at 0.2 cfs per ft



Lime Stabilized

After 20 min

Bermuda Grass Slope

After 12 hrs of testing

No damage after 4.0 cfs per ft

Grass Slope Resiliency Tests

Bermudagrass with HPTRM

Before

No damage after
4.0 cfs per ft

Before

After 1st hour at 2.5 cfs per ft

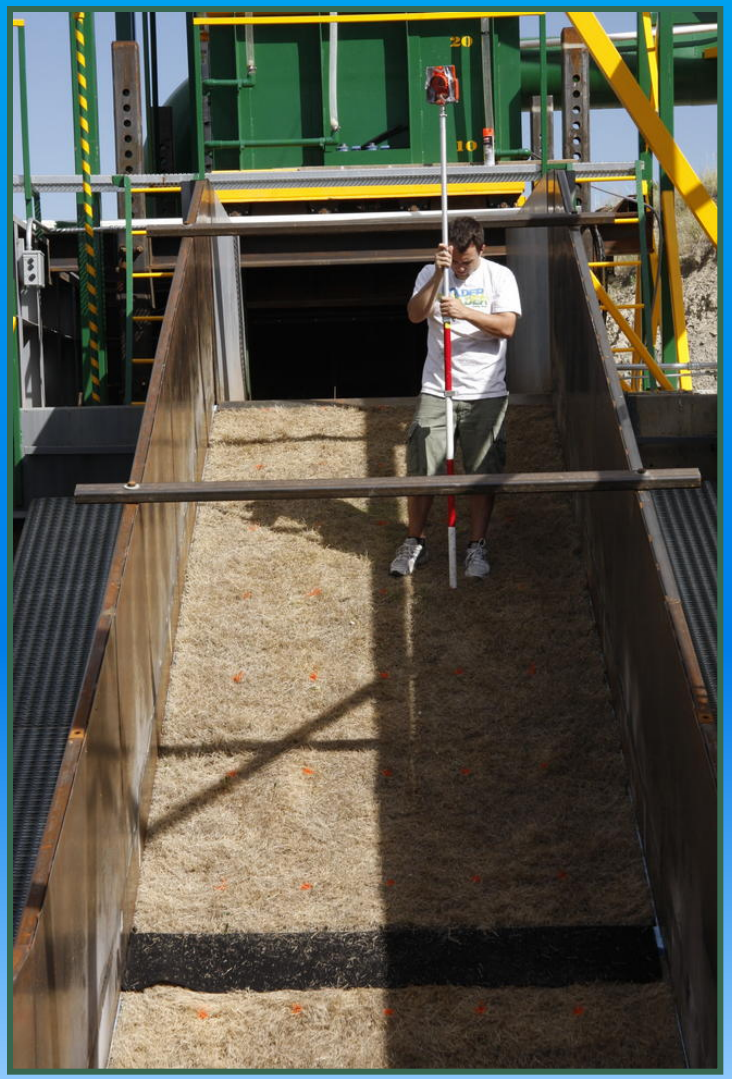
At end of 3rd hour

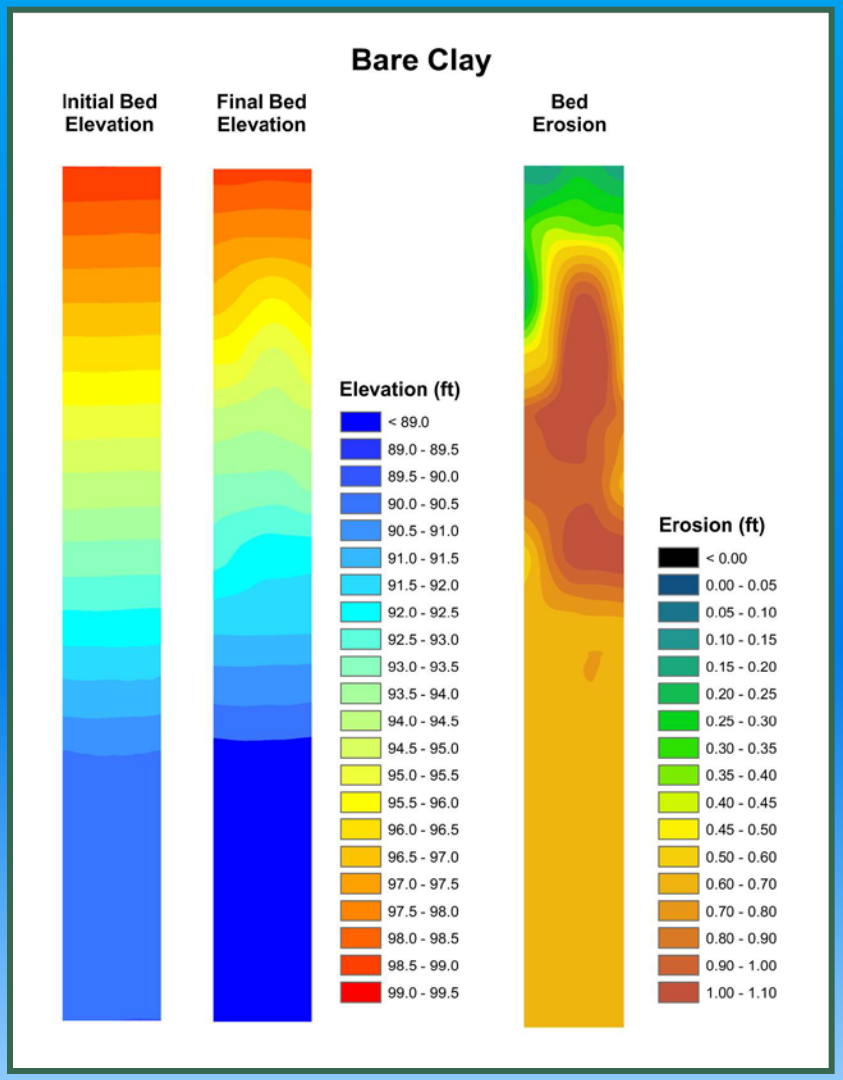
Before

After 3rd test at 4.0 cfs per ft

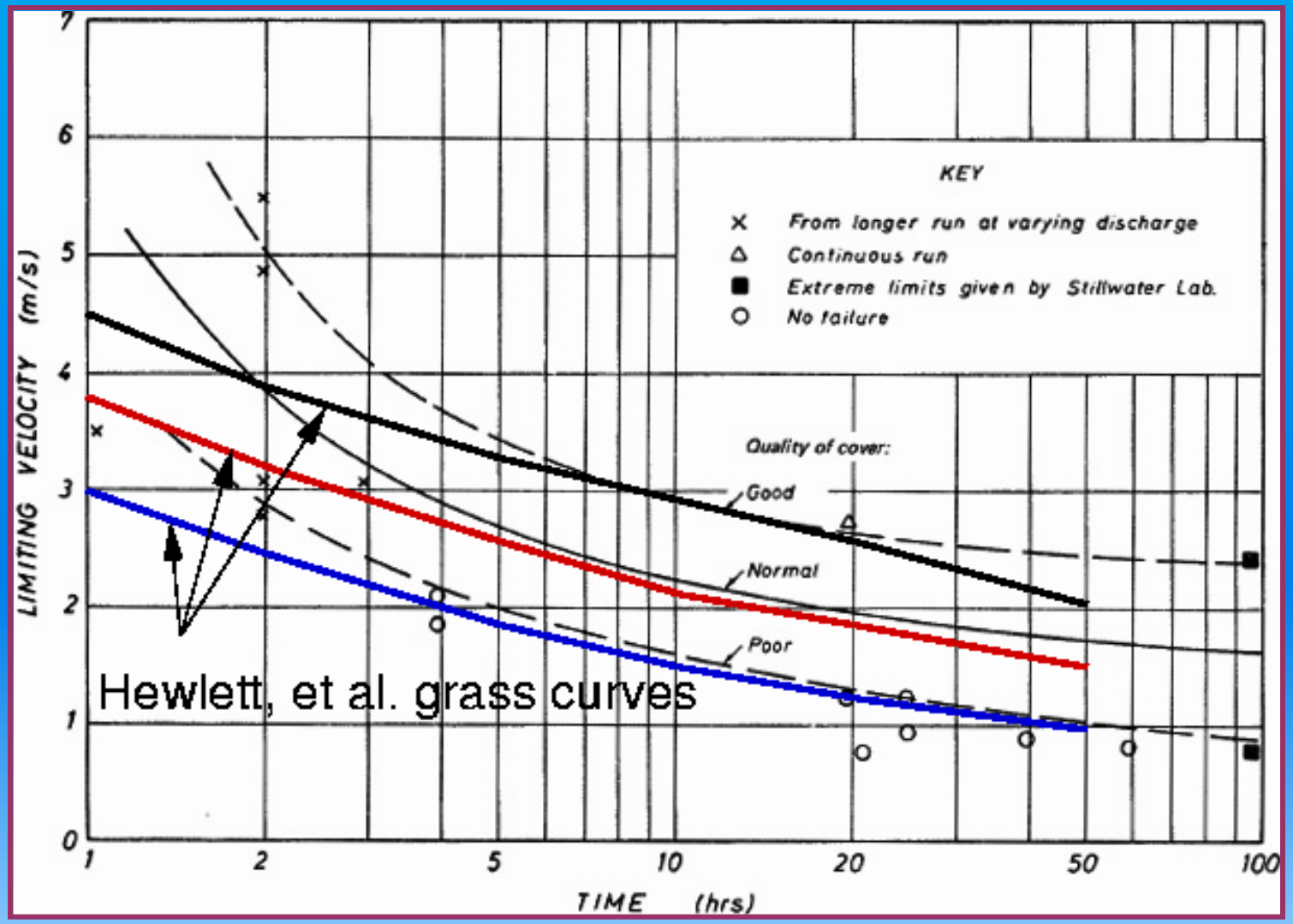
Dormant Grass + HPTRM

Erosion Quantification





Hewlett, et al. Curves



Grass Quality

Good Grass:

"Good grass cover is assumed to be dense, tightly-knit turf established for at least two growing seasons."

Average Grass:

?? No description given ??

Poor Grass:

"Poor grass cover consist of uneven tussocky grass growth with bare ground exposed or a significant proportion of non-grass weed species. Newly sown grass is likely to have poor cover for much of the first season."

Hewlett, et al. (1987)

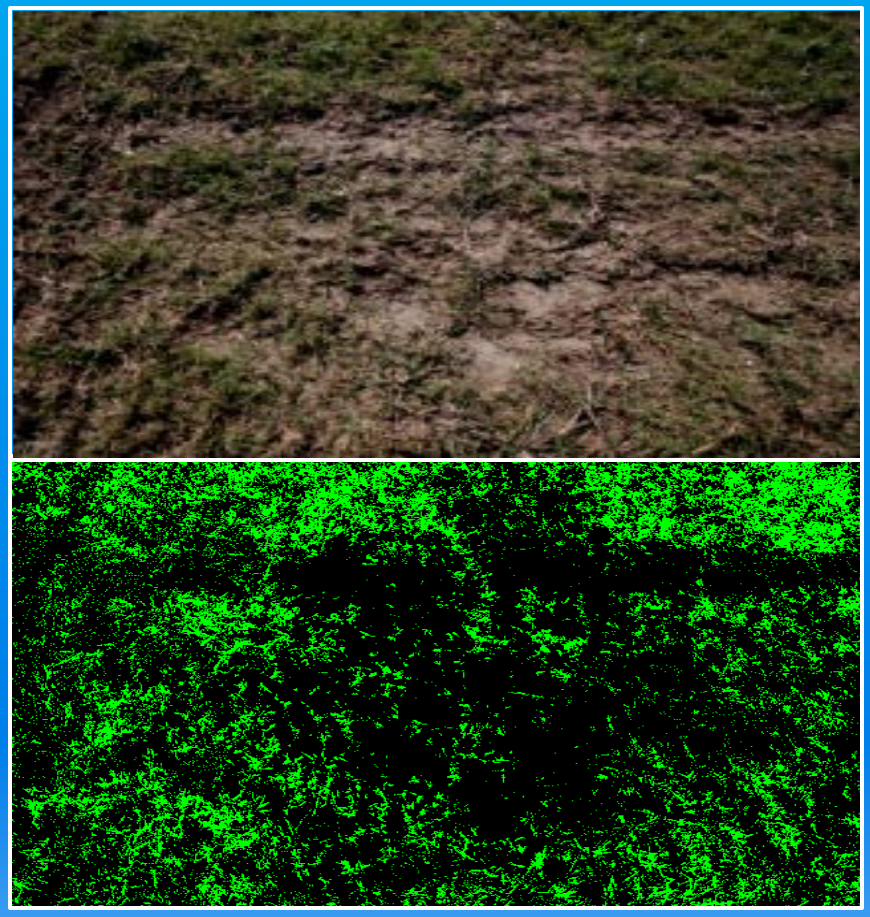
Why vegetation?

- Fast establishment
- Perennial and self-repairable groundcover
- Creates a permeable barrier to delay and reduce surface runoff
- Reduces sediment loading
- Aesthetics
- Economical

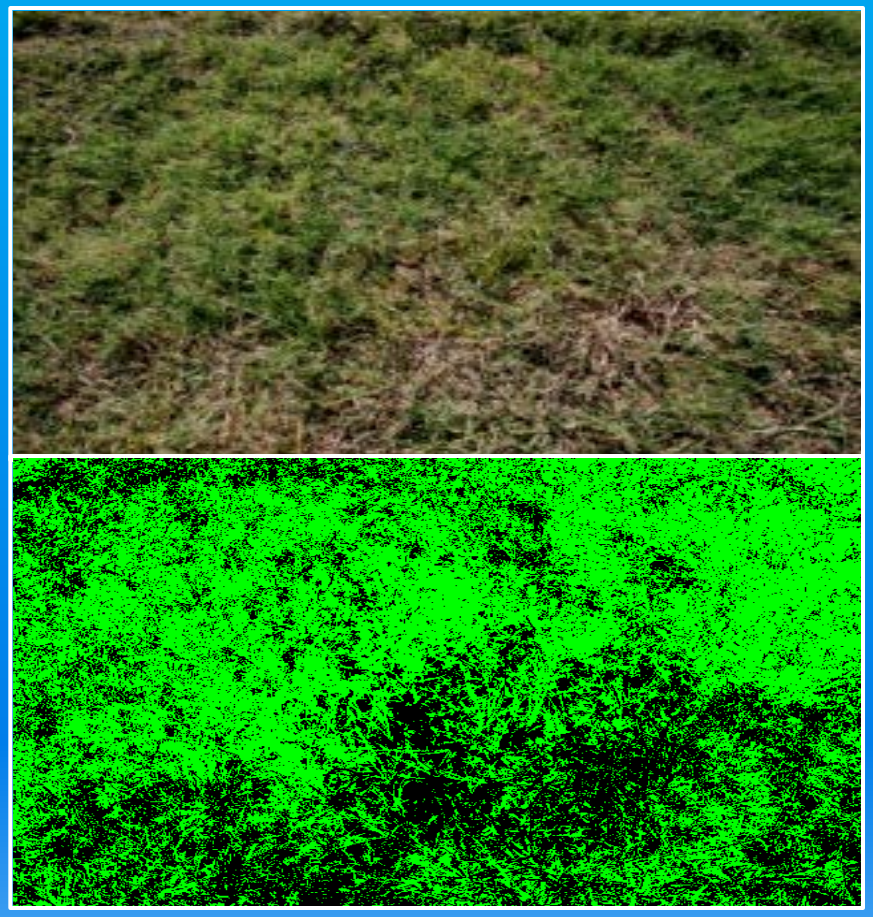
How Does One Quantify Vegetative Coverage?

Past

New



21 %

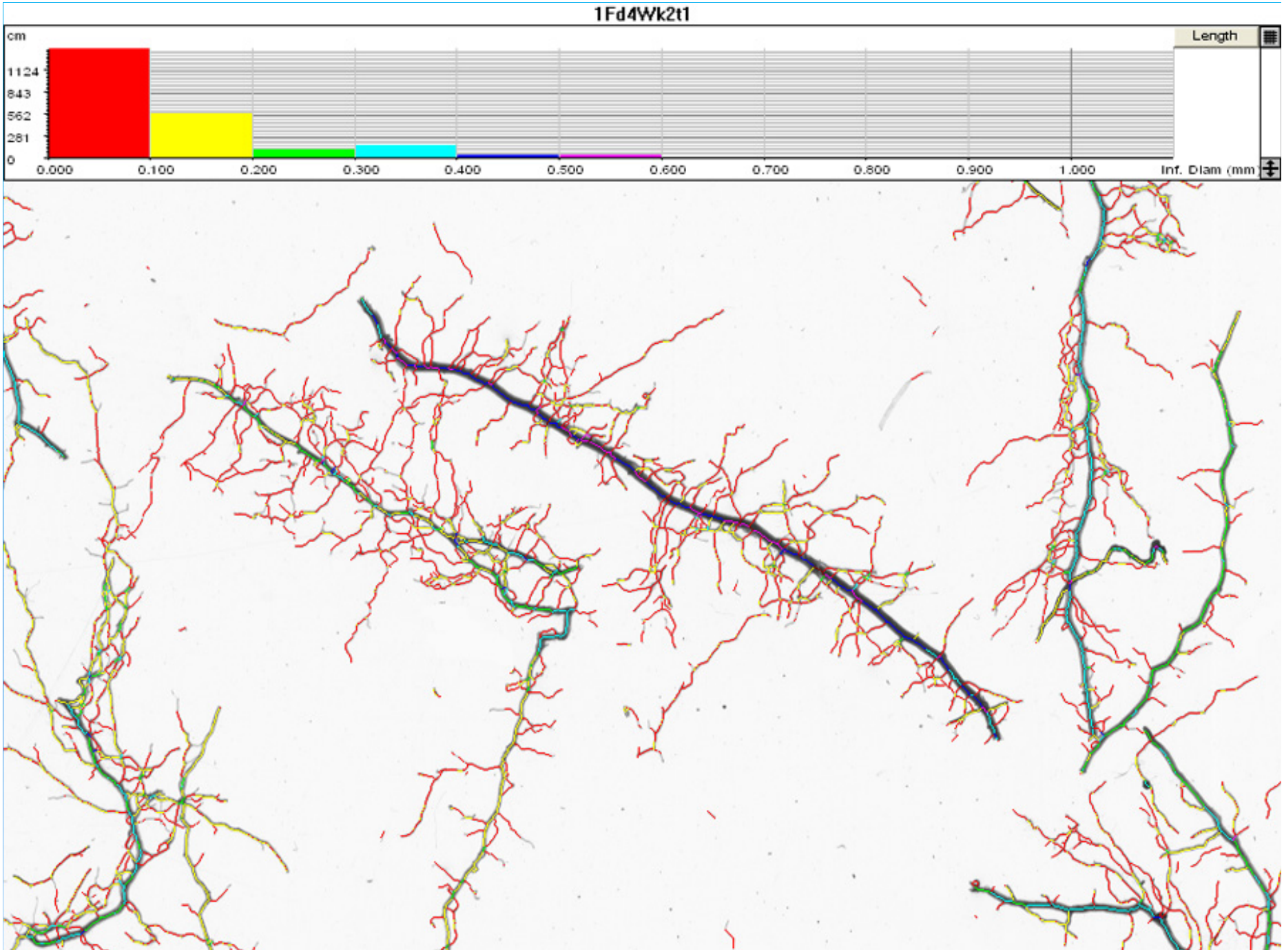


60 %


BUT… WHAT IS BELOW?

Root Harvesting

ROOT ANALYSIS


1Fd4Wk2t1
cm
1124
843
562
281
0
Length
0.000
0.100
0.200
0.300
0.400
0.500
0.600
0.700
0.800
0.900
1.000
Inf. Diam (mm)

Initial Study

Grass Species

- Bermudagrass
- Bahiagrass

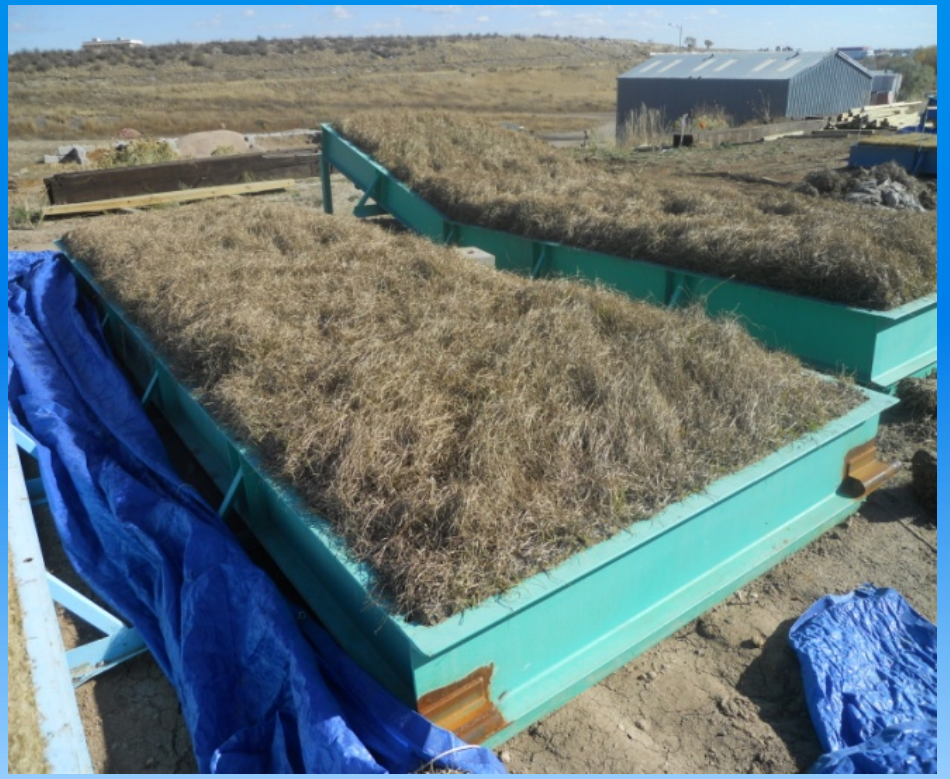
Survived >4 CFS

Root Parameters	
Root length	6575 cm
Surface Area	759 cm^2
Avg Root Diam	0.35 mm
Root Volume	7.24 cm^3

Same Trays Post Winter Stress

- Reduced Grass Performance
- HPTRM increased Performance

Root Parameters		
Root length	3072 cm	-53%
Surface Area	244 cm^2	-67%
Avg Root Diam	0.24mm	-31%
Root Volume	3.57 cm^3	-51%



Field Sampling Comparison

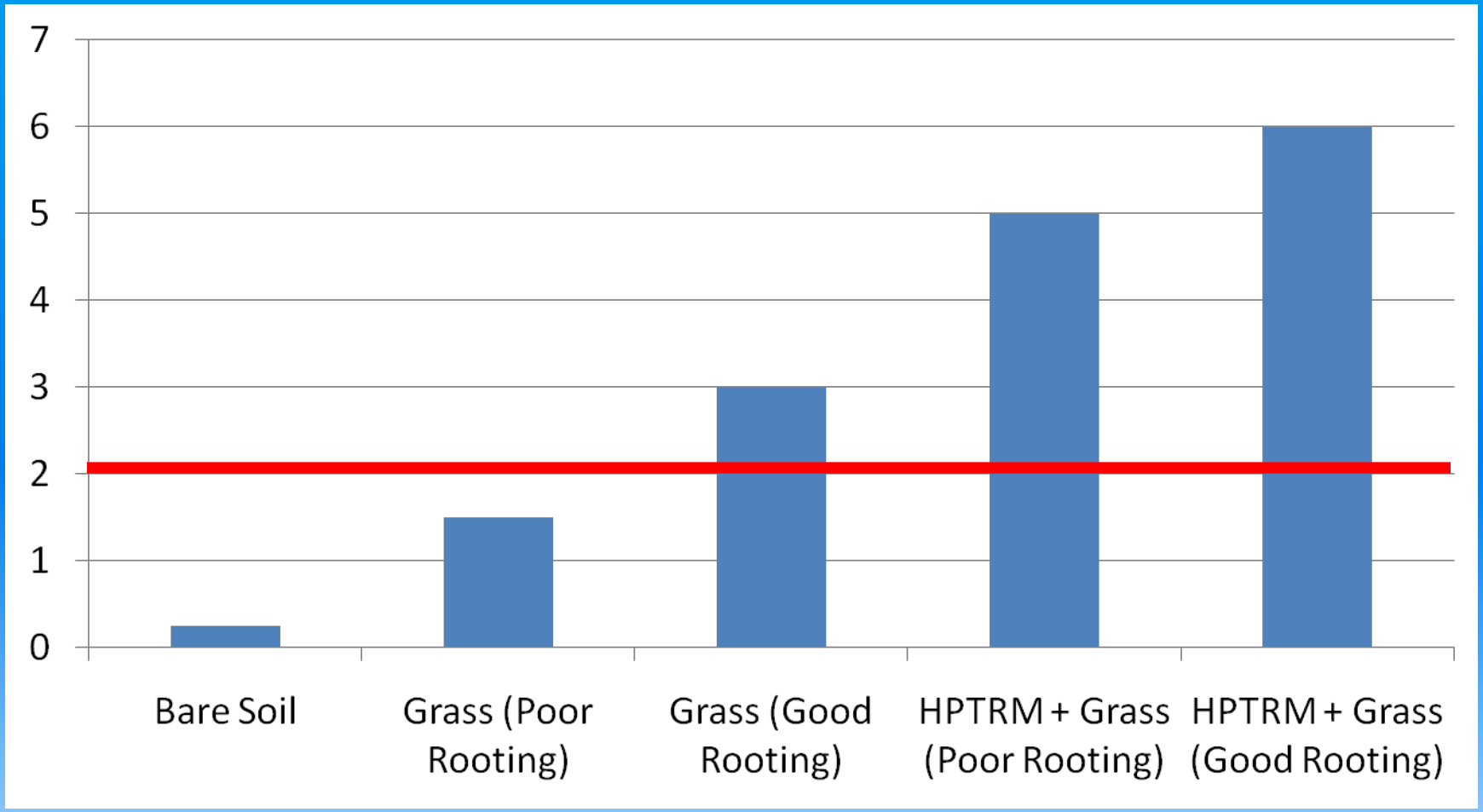
- Vegetation Age
  - Rooting
  - Performance

Root Parameters	
Root length	3772 cm
Surface Area	412 cm^2
Avg Root Diam	0.33mm
Root Volume	3.63 cm^3
Example of field core	

HOW IS THIS INFORMATION USEFUL?


LAKE PONTCHARTRAIN
BONNET CARRE SPILLWAY
SITE 1
SITE 2
SITE 3
SITE 4
SITE 5
SITE 6
SITE 7
SITE 8
SITE 9
SITE 10
KENNER
Metairie
NEW ORLEANS
HARAHAN
WESTWEGO
GRETNA
Harvey
Marrero
Avondale
Bridge City
Waggaman
Ama
Destrehan
St. Rose
Almedia
River Ridge
Norco
Good Hope
New Sarpy
Ormond Estates
Backtown
Lakeview
Gentilly
New Orleans East
Old Metairie
Old Jefferson
Elmwood
Hollygrove
Mid-City
Treme
Faubourg Bywater
Marigny
Lower 9th Ward
Arabi
Chalmette
Meraux
Violet
Poydras
St. Bernard
Toca
Kenilwork
Verret
Caernarvon
Belle Chasse
Timberlane
Woodmere
Estelle
Terrytown
English Turn
Broadmoor
Carrollton
Uptown
Algiers
Algiers Point
Central Business District
Central City
Lower Garden District
Garden District
Irish Channel
MISSISSIPPI RIVER
HARVEY CANAL
GIWW/MRGO
MRGO
CHEF MENTEUR PASS
LAKE BORGNE
LAKE CATAOUATCHE
LAKE SALVADOR
LAKE LERY
LAKEFRONT AIRPORT
LOUIS ARMSTRONG NEW ORLEANS INTERNATIONAL AIRPORT
NEW ORLEANS NAS/JRB
LESS THAN 2 YEARS OLD
GREATER THAN 10 YEARS OLD
0 1 2
Miles

Example of An Advanced Simple Decision Model




DOTD

What is happening today…

The Challenge

- ~130 km with HPTRM
- 4.2 million m² bermudagrass sod
- Irrigation for at least 60 days
- Fertility and pest management

TPI

Turfgrass Producers International

E-Newsletter

IN THIS ISSUE

We wanted to get this issue of the E-Newsletter out as soon as possible to make our readers aware of an enormous opportunity being proposed by the U.S. Army Corp of Engineers. They are reaching out to turfgrass producers in and around the New Orleans area to supply 4.5 million square yards of select turfgrass sod. A meeting is scheduled on September 18th and all interested parties are invited to attend.

We also wanted to recognize several TPI members including Randy Tischer of Green Velvet Sod Farms for his support to helps kids; extend congratulations to Ben Copeland Sr. of Patten Seed Company for being honored in the Georgia Ag Hall of Fame, and to Tuckahoe Turf Farms in Hammonton, NJ for providing the natural grass used to cover at artificial field at Michigan Stadium.

—Jim Novak

Find us on: facebook

TPI

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East Dundee, IL 60118
Tel: 847/649-5555
Tel: 800/405-8873
Fax: 847/649-5678
Email:
Info@TurfGrassSod.org
Website:
www.TurfGrassSod.org
Comments & Submissions:
Jnovak@TurfGrassSod.org

Volume 7 Issue 7 *September 2014*

Opportunity Knocks

U.S. Army Corp of Engineers may need 4.5 million square yards of turfgrass sod for the greater New Orleans area

By: Jim Novak

When hurricane Katrina struck in August of 2005 it demonstrated the need for a comprehensive risk reduction system for the greater New Orleans area. Following Katrina, the U.S. Congress authorized and funded the construction of the 100-year level risk reduction system, known as the Hurricane and Storm Damage Risk Reduction System (HSDRRS).

The HSDRRS includes five parishes (Orleans, Jefferson, St. Bernard, St. Charles, and Plaquemines) and consists of 350 miles of levees and floodwalls; 73 non-Federal pumping stations; 3 canal closure structures with pumps; and 4 gated outlets.

For turfgrass producers who are growers of Tifway 419 bermuda grass, or licensed growers of Celebration bermuda grass, and who have the ability to serve the greater New Orleans area, the U.S. Army Corps of Engineers wants to reach out to you to address a major project scheduled to begin in early 2015.

The U.S. Army Corps of Engineers, New Orleans District (MVN) will host a **Sod Industry Day** to provide an overview of the Armoring projects for the HSDRRS.

They are seeking industry information from producers on the availability of approximately 4.5 million square yards of turfgrass sod (Tifway 419 and Celebration). Construction is scheduled to begin in early 2015.

All interested TPI members who view this as an opportunity are encouraged to attend the event to gain further insight into this tremendous undertaking.

SOD INDUSTRY DAY

Thursday, September 18, 2014
MVN, District Assembly Room
7400 Leake Avenue
New Orleans, LA 70118
RSVP to
[redacted]

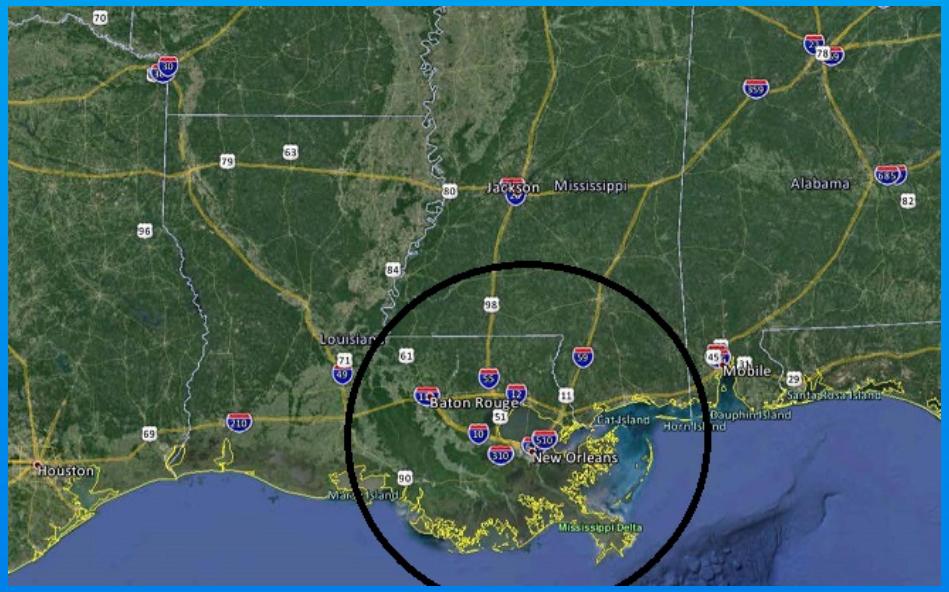
For more information contact:
Korey Clement
korey.clement@usace.army.mil
(504) 862-2609

For those unable to attend please call the following for more information
USA Toll-Free: 888-675-2535
Access Code: 9035935
Security Code: 1234

SOD SOURCES

Location

Perishable product
36 hour time limit
Weight limits



Weather Forecasts

Harvest scheduling/delays
Recommend close coordination with multiple growers

SOD SOURCES

Sandy Soils

Clay Soils

SOD INSTALLATION

Weather

Installation delays
Impacts to on-site sod storage time
Close coordination with grower for deliveries

Irrigation

Fully operational prior to installation

Installation

Per spec and TPI GSS (2006)
Demo project rate: 2 man crew – 8,000 ft^2 in 10 hrs
Laid sod must be pulled tight against adjacent strip
Must be damp when rolling
Edge blending/smoothing

IRRIGATION

<u>Effectively & Adequately</u>

Per spec rates

- *Day of installation soak sod thoroughly*
- *Period 2: 2 x 15,000 gal/acre/day split application (morning and afternoon)*
- *Period 3: 2 x 7500 gal/acre/day split application (morning and afternoon) for 60 days*

Monitor:

- Irrigation and Distribution Uniformity Test (IDUT) per spec (*at 1 per 5,000 linear feet of sod, etc.*)
  - Rainfall with gauges
  - Irrigation rates with gauges
- Out of spray range areas
  - Inadequate system layout
  - Strong winds
  - Natural precipitation must be taken into account

Must irrigate with clean water for at least 60 days

POST INSTALLATION - PESTS

- INSECTS
  - Fast response required
  - Collect specimen & photographs
- DISEASE
  - Collect specimen
  - Refer to LSU AgCenter Plant Diagnostic Center
  - www.lsuagcenter.com
- WEEDS
  - Seldom an issue in mature, dense sod

POST INSTALLATION PESTS AT WBV 14i

POST INSTALLATION – ACCEPTANCE

- Watering periods performed
- Mowing performed
- Coverage
  - 95% coverage
  - Total all brown areas ≤ 5% of total acreage
  - No brown/dead areas > 2 ft^2
- Sod Test Requirements
  - 2 samples/5,000 linear ft
  - root length > 3,772 cm
  - root volume > 3.63 cm^3
  - root weight > 13.9 gm

GRASS BASICS

Which species?

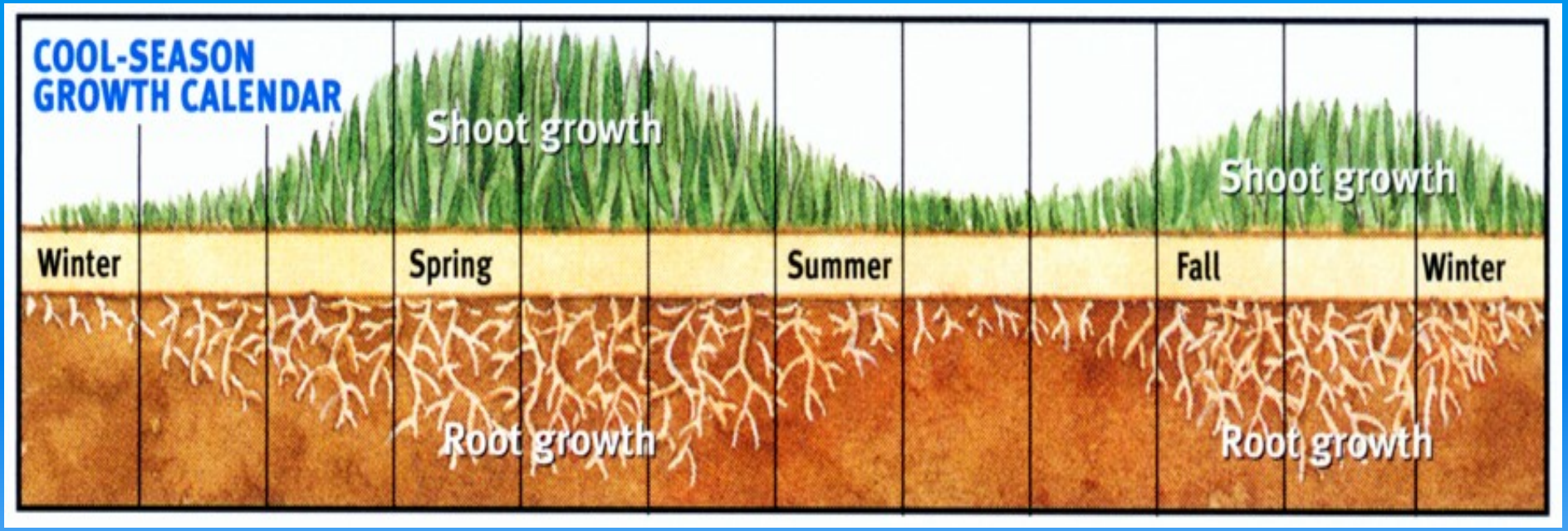
Table 7-1. Cool-season turfgrass resistance to freezing stress.

Turf	Genus	Cultivars	Crown moist.†	Ranking‡	LT_{50}§
		no.	%		°C
Rough bluegrass	*Poa*	--	72	Excellent	--
Creeping bentgrass	*Agrostis*	3	54–61	Excellent	−35
Bromegrass	*Bromus*	2	--	--	−30
Kentucky bluegrass	*Poa*	7	73–78	Good	−21 to −30
Canada bluegrass	*Poa*	--	--	Good	--
Colonial bentgrass	*Agrostis*	--	--	Good	--
Redtop	*Agrostis*	--	--	Good	--
Annual bluegrass	*Poa*	--	80	Medium	--
Creeping red fescue	*Festuca*	2	78	Medium	−24
Tall fescue	*Festuca*	--	74–77	Medium	--
Alkaligrass	*Puccinellia*	2	--	--	−21 to −27
Hard fescue	*Festuca*	1	--	--	−21
Perennial ryegrass	*Lolium*	11	79–81	Poor	−5 to −15
Annual ryegrass	*Lolium*	--	80	Very poor	--

† From Beard (1966). Crown Moisture in December in Michigan.
‡ From Beard (1973).
§ After Gusta et al. (1980).

Beard, J. B. and J. M. DiPaola. Physiological Effects of Temperature Stress. ASA Mongraph. P. 231-267

How Cool-Season Grasses Grow



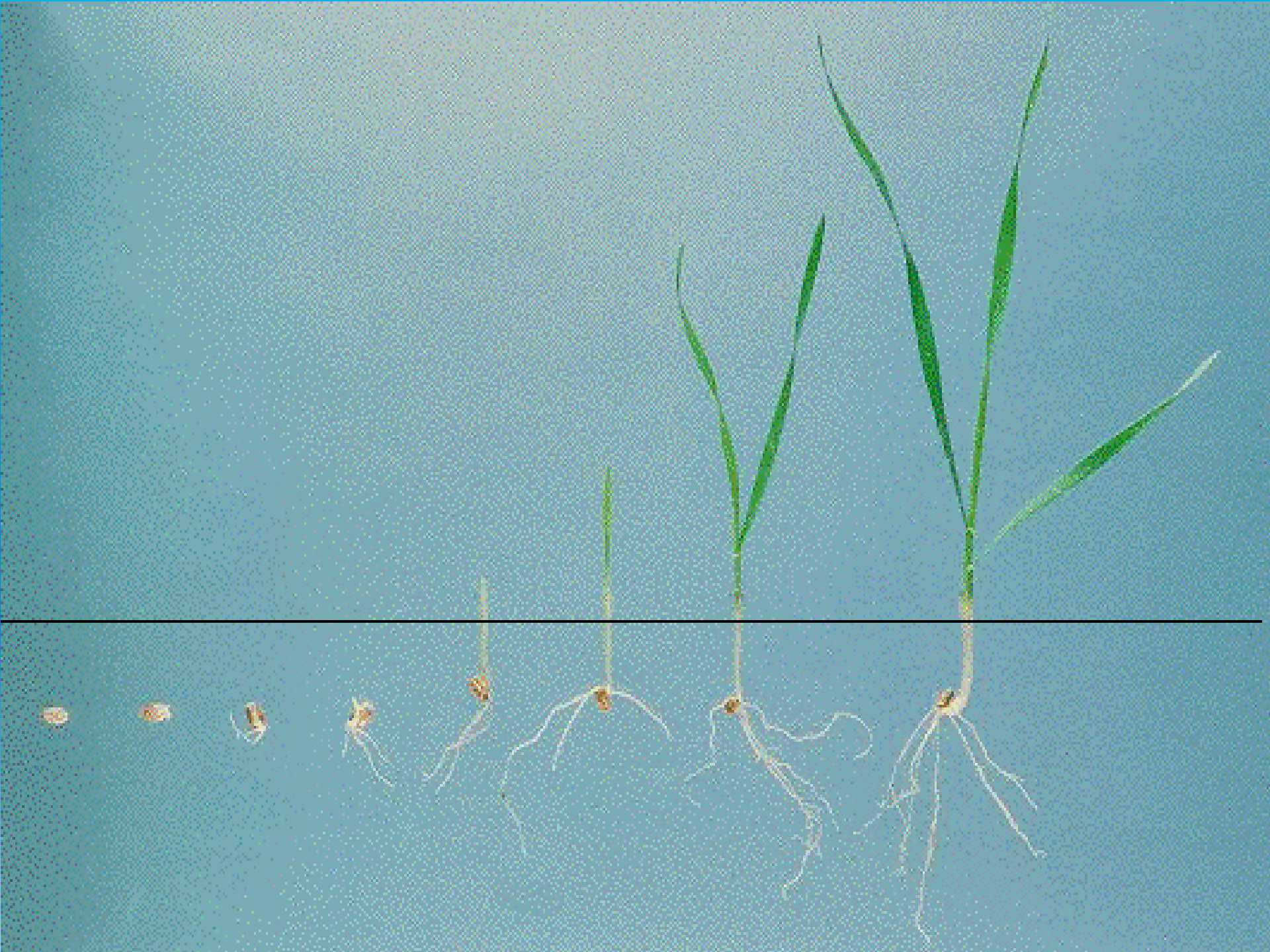
Sod or seed?

Vegetative varieties exhibit:

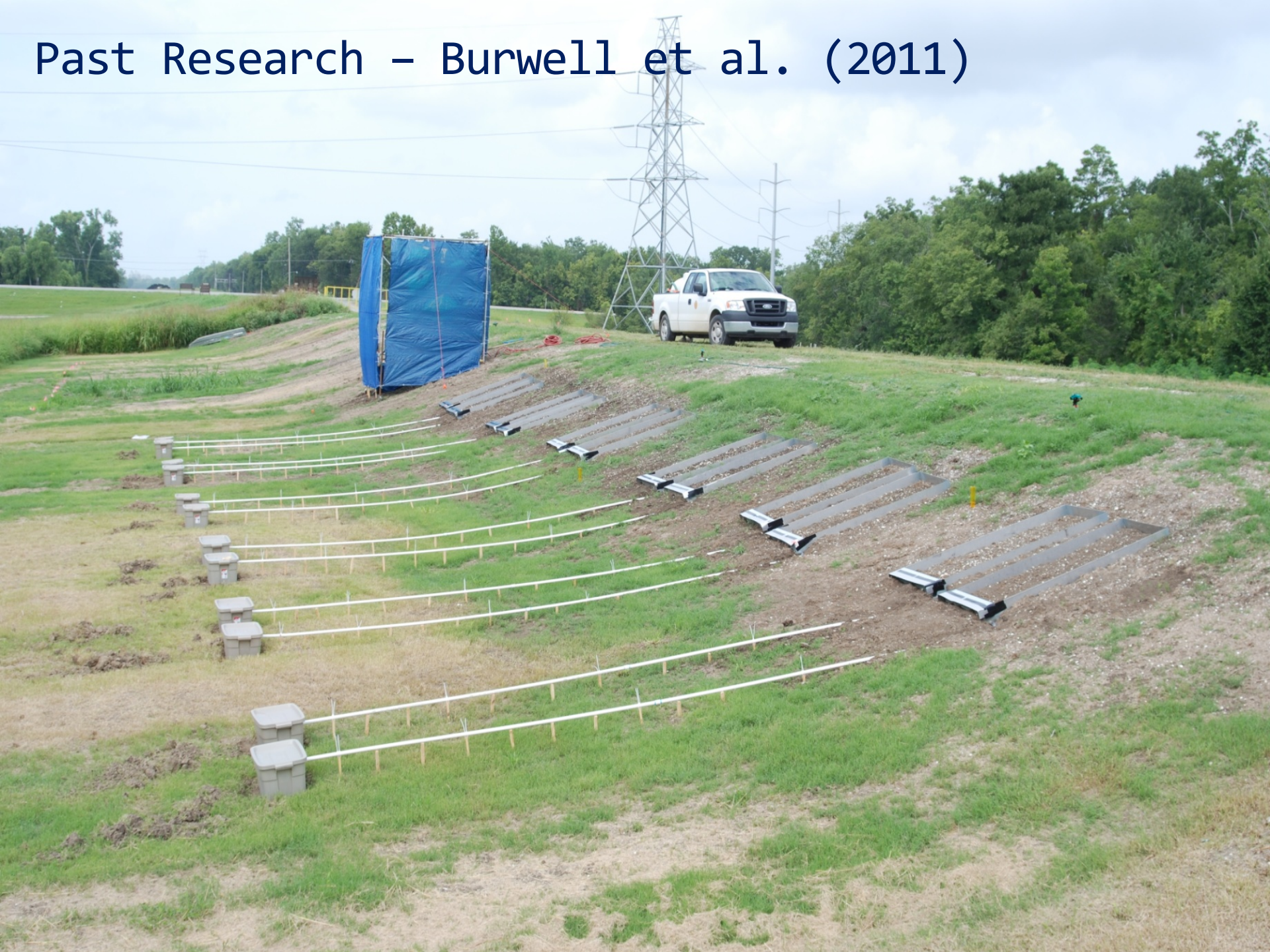
- Higher quality
- Faster to establish
- Increased window for establishment
- Higher initial expense

Seeded varieties often exhibit:

- Slower to establish
- Shorter window for extablishment
- Slower to increase environmental tolerances
- Know your mulches
- Less expensive



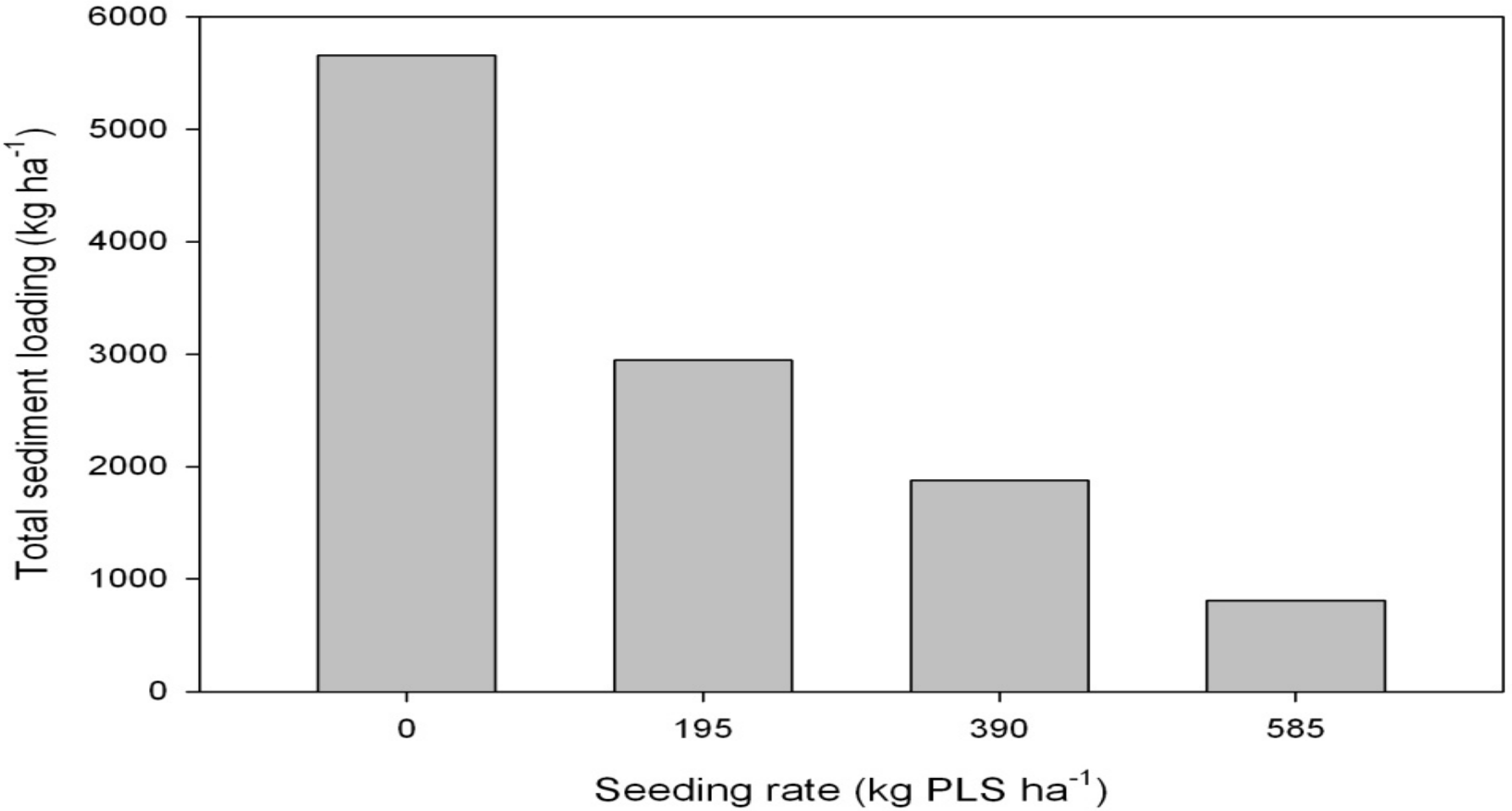
Past Research – Burwell et al. (2011)



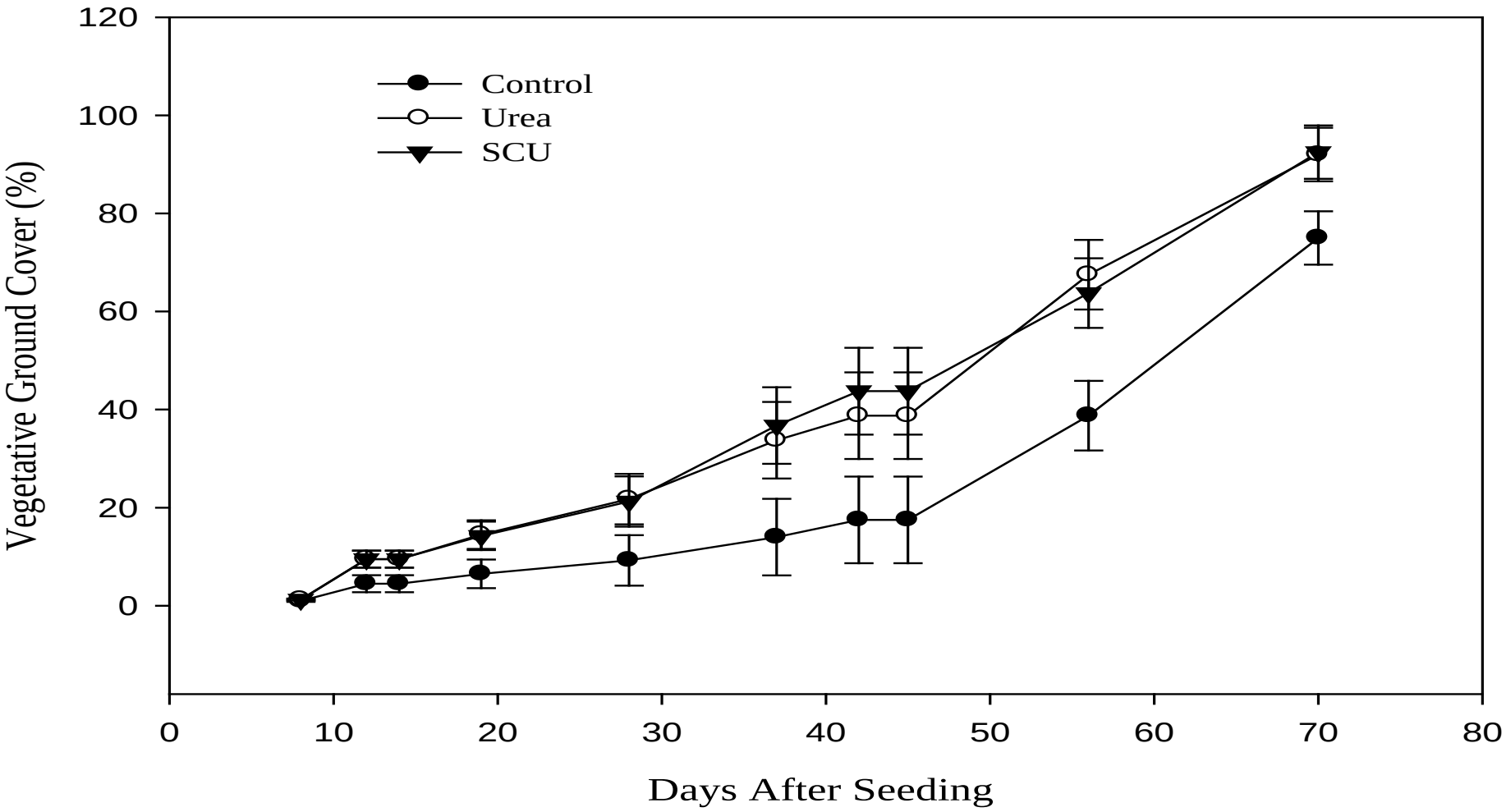
Simple Changes

- Establishment method
- Increase seeding rates
- Soil test
- Properly fertilize
- Proper mulches

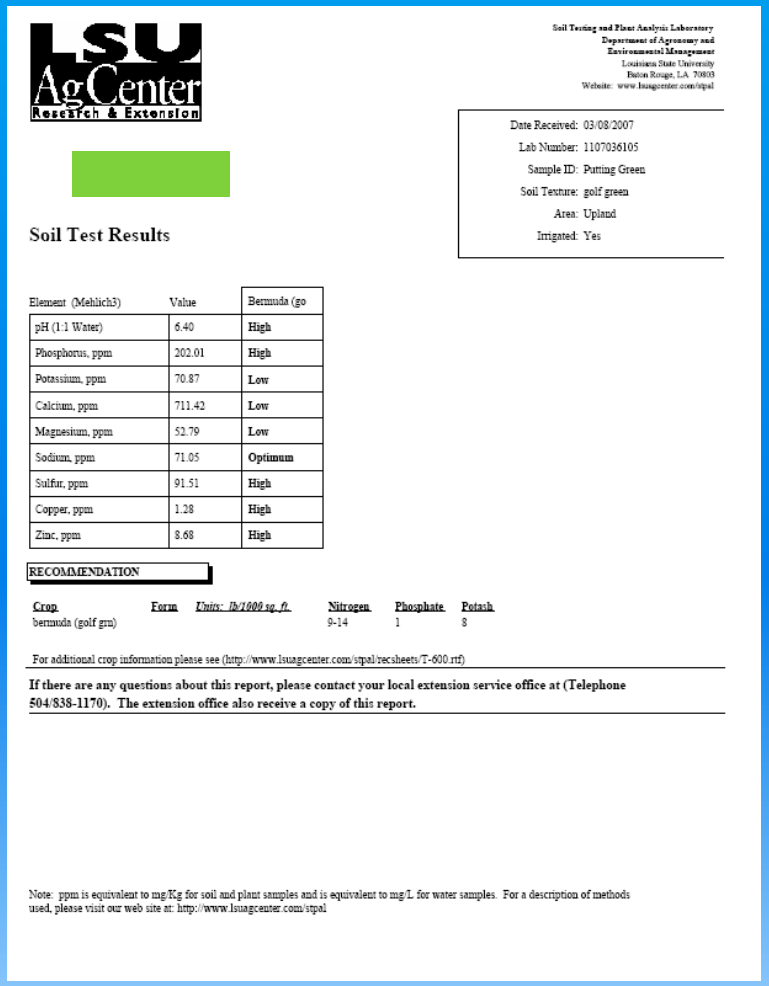
Increase seeding rate reduces sediment loading



What about fertility?



Why take soil and water tests



LSU AgCenter Research & Extension

Soil Testing and Plant Analysis Laboratory
Department of Agronomy and Environmental Management
Louisiana State University
Baton Rouge, LA 70803
Website: www.lsuagcenter.com/stpal

Date Received: 03/08/2007
Lab Number: 1107036105
Sample ID: Putting Green
Soil Texture: golf green
Area: Upland
Irrigated: Yes

Soil Test Results

Element (Mehlich3)	Value	Bermuda (go
pH (1:1 Water)	6.40	High
Phosphorus, ppm	202.01	High
Potassium, ppm	70.87	Low
Calcium, ppm	711.42	Low
Magnesium, ppm	52.79	Low
Sodium, ppm	71.05	Optimum
Sulfur, ppm	91.51	High
Copper, ppm	1.28	High
Zinc, ppm	8.68	High

RECOMMENDATION

Crop	Form	Units: lb/1000 sq. ft.	Nitrogen	Phosphate	Potash
bermuda (golf grn)			9-14	1	8

For additional crop information please see (http://www.lsuagcenter.com/stpal/recsheets/T-600.rtf)

If there are any questions about this report, please contact your local extension service office at (Telephone 504/838-1170). The extension office also receive a copy of this report.

Note: ppm is equivalent to mg/Kg for soil and plant samples and is equivalent to mg/L for water samples. For a description of methods used, please visit our web site at: http://www.lsuagcenter.com/stpal

- Tests Performed at LSU Agcenter Soil Lab
- Soil samples - $7
- Storm tests - $5
- pH, Fertility, Salt conc.

1. How to manage your soil
2. Is the water source acceptable

Questions or Comments