Products to Assist in Turfgrass Irrigation: Tools or Snake Oils?

Annual Spring Turfgrass Management Seminar
University of Arizona Maricopa Agricultural Center and
U.S. Arid-Land Agricultural Research Center
Wednesday, April 11, 2007

Bernd Leinauer

Extension Plant Sciences Department,

New Mexico State University, Las Cruces, NM

Outline

1) Introduction
2) Subsurface Irrigation
   - Drip Irrigation
   - Sub Irrigation
3) Soil Sensing
   - Moisture
   - Salinity
4) Water Conditioning
5) Summary

Water Management

1. Availability
2. Quality
3. Distribution

Justification

- ✓ “Emerging Technology” (GCM, January, 2005)
- ✓ Exempt from water restrictions (El Paso, Drought Emergency Response Plan, Stage 2)
- ✓ Potential for water savings and efficient irrigation

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Sprinkler Problems


1-21-12

Project

1) 21 grasses
2) 2 irrigation systems

3) 3 salinity levels
    a) Potable
    b) Blend
    c) Saline

Objectives

1. Study salinity effects on winter survival and determine if Las Cruces (zone 8a) has a sufficient growing season to establish cool and warm-season turf with saline water through sprinkler or sub-surface irrigation
2. Investigate if precipitation from monsoon season is sufficient to leach rootzone in drip irrigated grasses
3. Study long-term effects of water quality and irrigation type on turf performance
4. Study long term effects of saline irrigation water on soil chemistry

Water Quality

- **Saline**
  - **EC = 3.1-5.0 dS/m**
  - **SAR = 10.5**
  - **TDS = 2050 - 3220**
- **Potable**
  - **EC = 0.6-1.2**
  - **SAR = 1.61**
  - **TDS = 413 - 750**
- **Blend**
  - **EC = 1.7-3.0 dS/m**
  - **SAR = 6.1**
  - **TDS = 1200 - 3220**

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Grasses

Cool Season

- Hybrid Texas bluegrass
  - Thermal Blue
  - SRX2TK95
- Tall Fescue
  - Southeast
  - Tar Heel II
- Perennial Ryegrass
  - Brightstar SLT
  - Catalina
- Alkaligrass
  - Salty
  - Fults
- Fine Fescue
  - Dawson

Warm Season

- Bermudagrass
  - ‘Sahara’
  - ‘Princess’
  - ‘Riviera’
  - ‘Transcontinental’
- Zoysiagrass
  - ‘De Anza’
  - ‘Companion’
- Buffalograss
  - ‘UC Verde’
  - ‘SWI2000’
- Saltgrass
  - ‘DT16’
  - ‘A138’
- Seashore paspalum
  - ‘Seaspray’
  - ‘Seadwarf’

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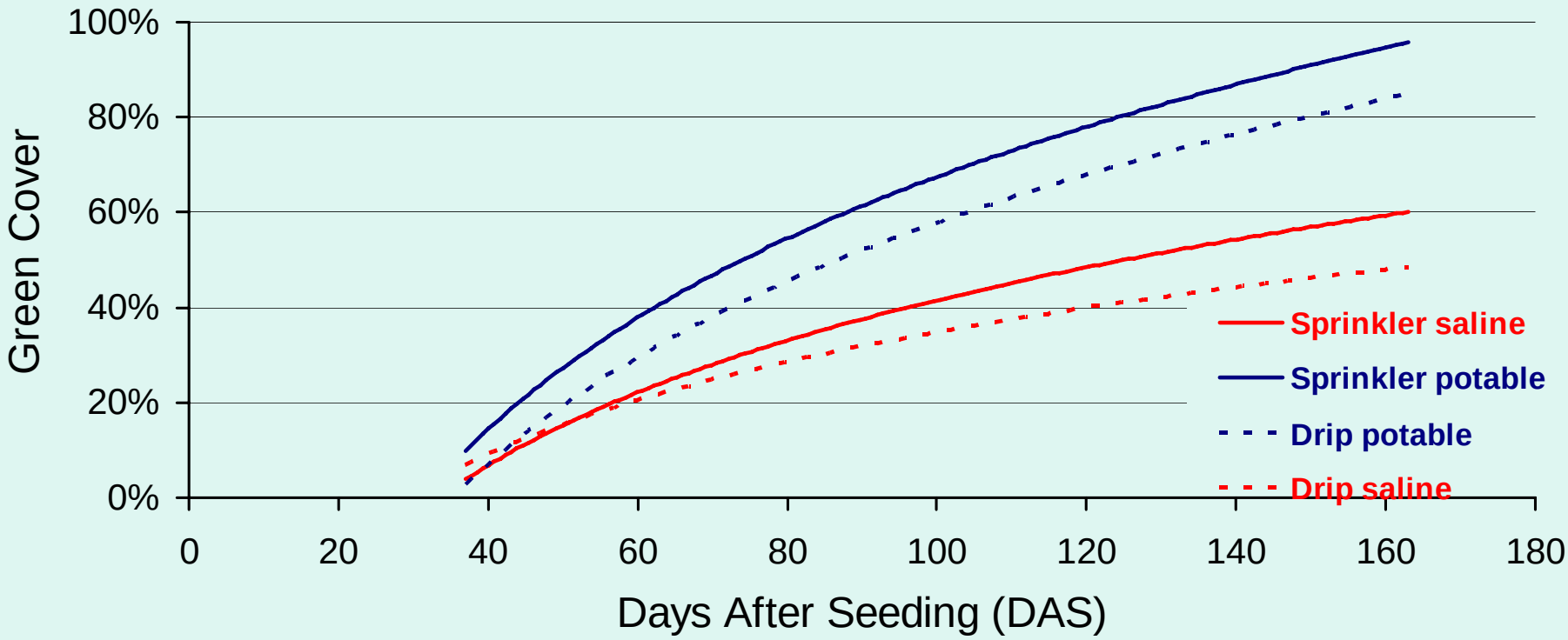
Results - Establishment

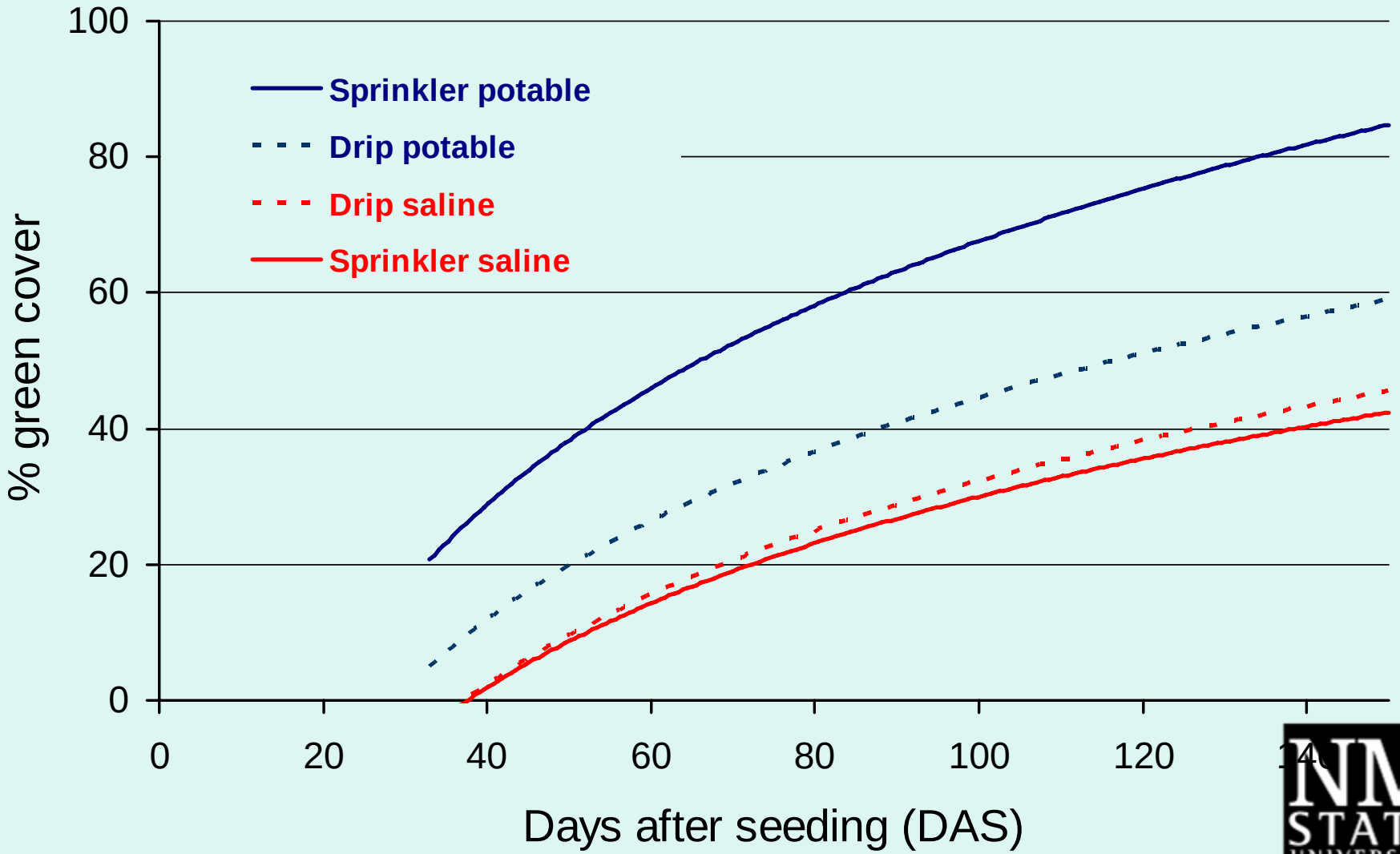
Subsurface

Sprinkler

Establishment Cool Season Grasses



Establishment Warm Season Grasses

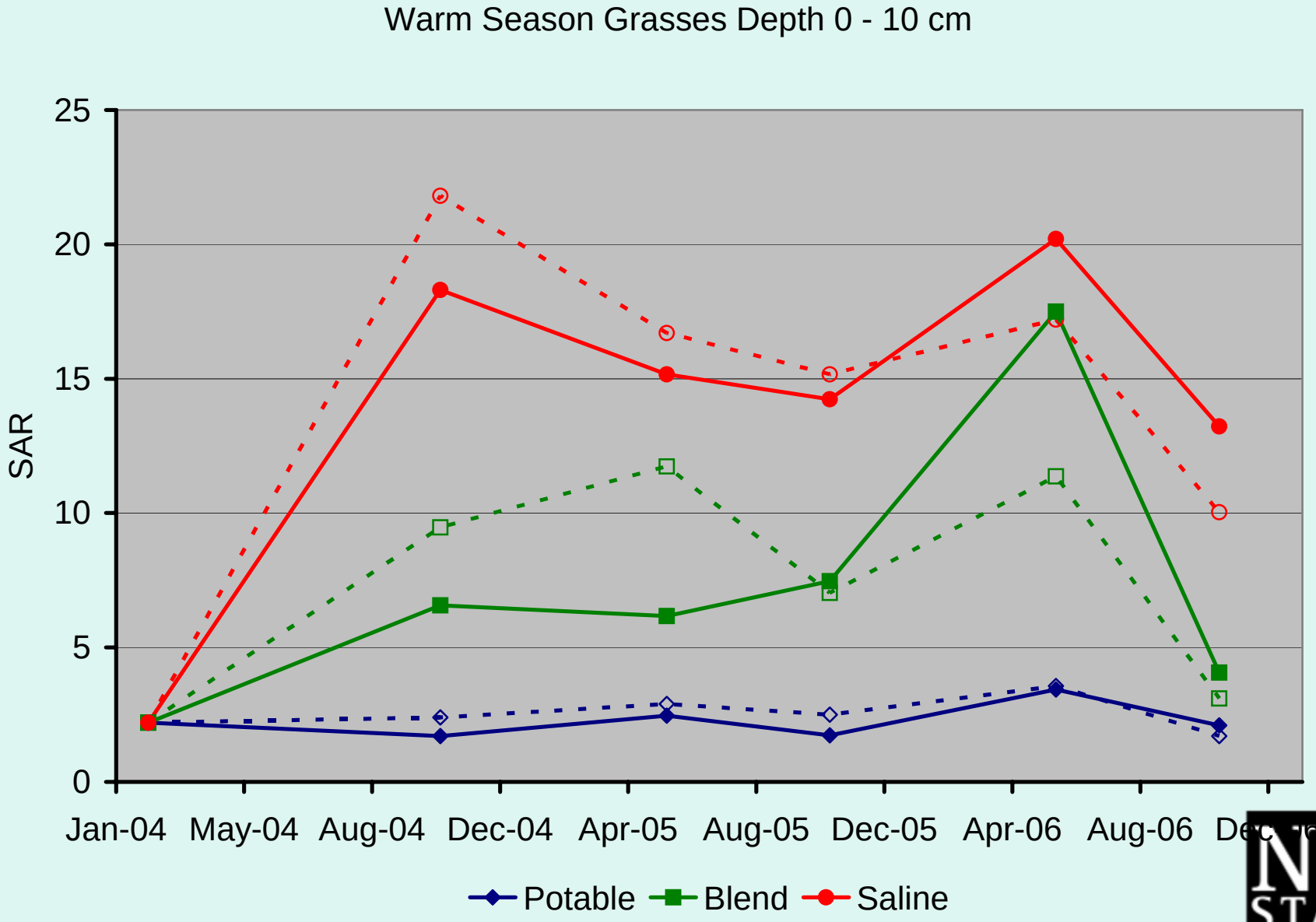


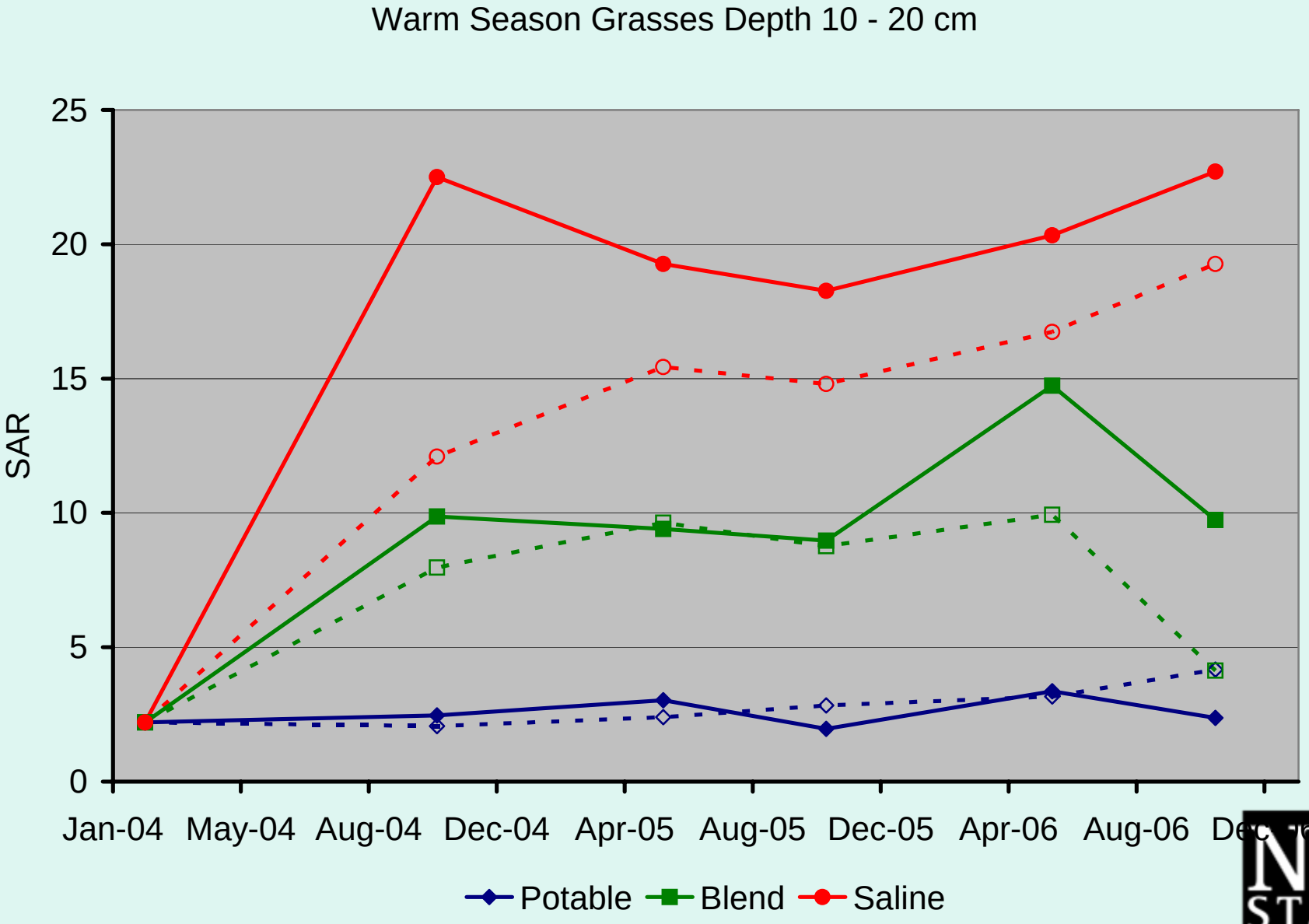
Establishment with saline water 150 DAS

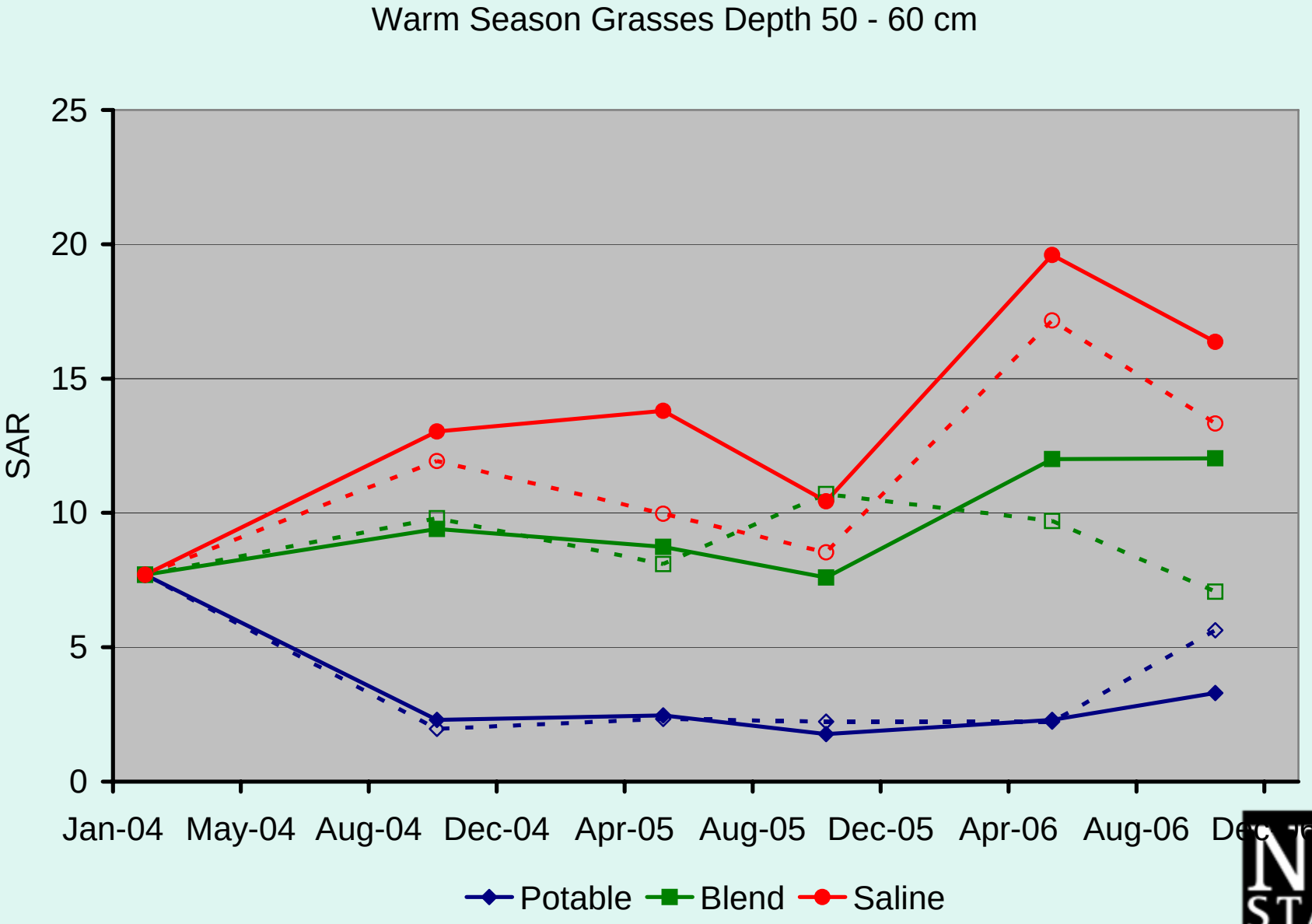
Princess Bermudagrass

Seaspray Seashore paspalum

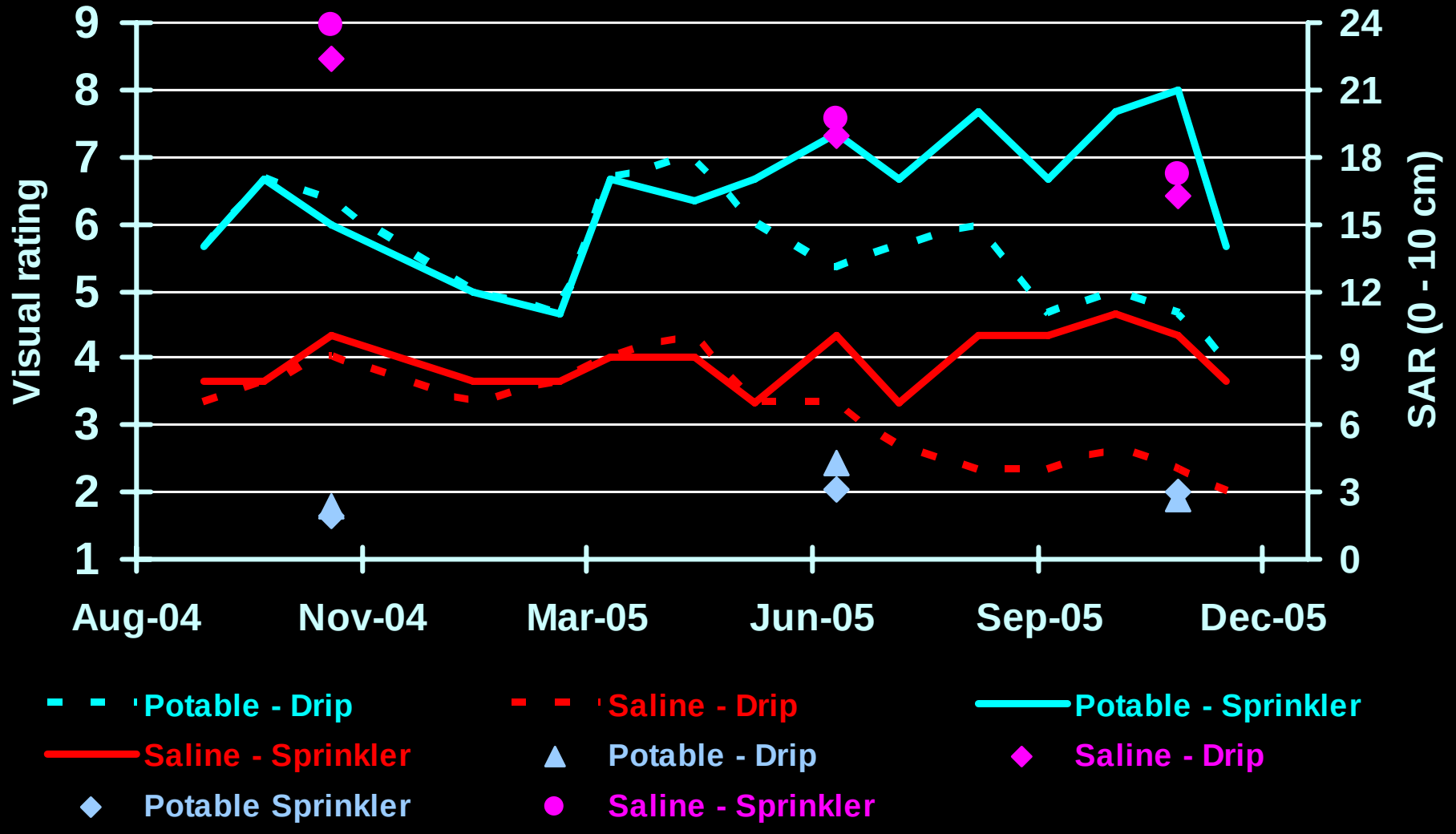
SWI2000 Buffalograss


Warm Season Grasses Depth 0 - 10 cm
SAR
25
20
15
10
5
0
Jan-04
May-04
Aug-04
Dec-04
Apr-05
Aug-05
Dec-05
Apr-06
Aug-06
Potable
Blend
Saline

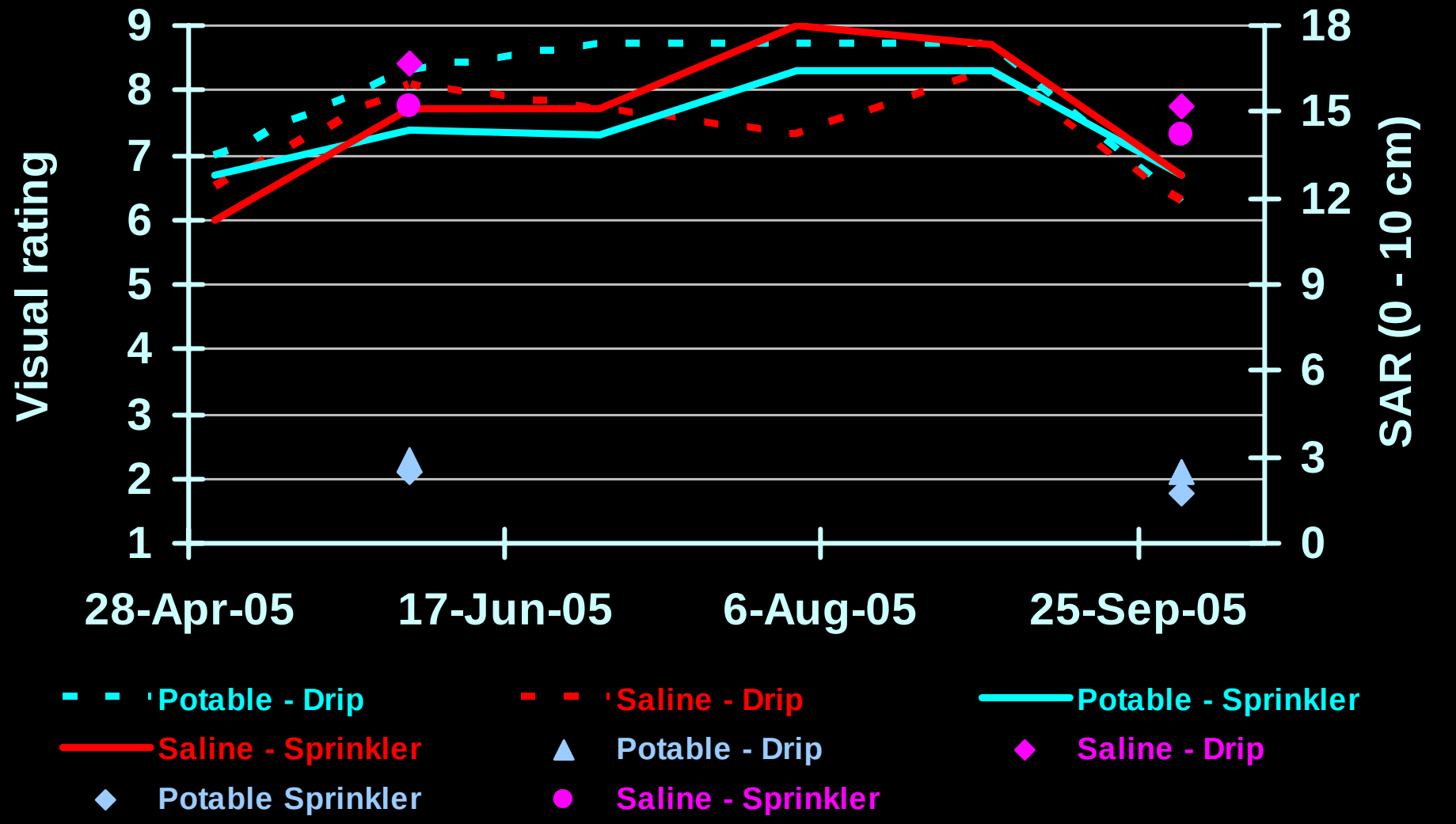

Warm Season Grasses Depth 10 - 20 cm
SAR
25
20
15
10
5
0
Jan-04
May-04
Aug-04
Dec-04
Apr-05
Aug-05
Dec-05
Apr-06
Aug-06
Potable
Blend
Saline


Warm Season Grasses Depth 50 - 60 cm
SAR
25
20
15
10
5
0
Jan-04
May-04
Aug-04
Dec-04
Apr-05
Aug-05
Dec-05
Apr-06
Aug-06
Potable
Blend
Saline

Quality – Perennial ryegrass cv. Brightstar SLT



Quality – Seashore paspalum cv. Seaspray

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USGA Research Green

Objective

To investigate the effects of greens type, irrigation type, and root zone material on turfgrass establishment, turfgrass quality, and irrigation water use on a creeping bentgrass stand

Research area: 4000 m^2
43,000 ft^2

Plot size: 17 m x 17 m
55 ft x 55 ft

Evaporative Control System (ECS)


USGA Drip
ECS


2006 10 2


SEP 13 2006

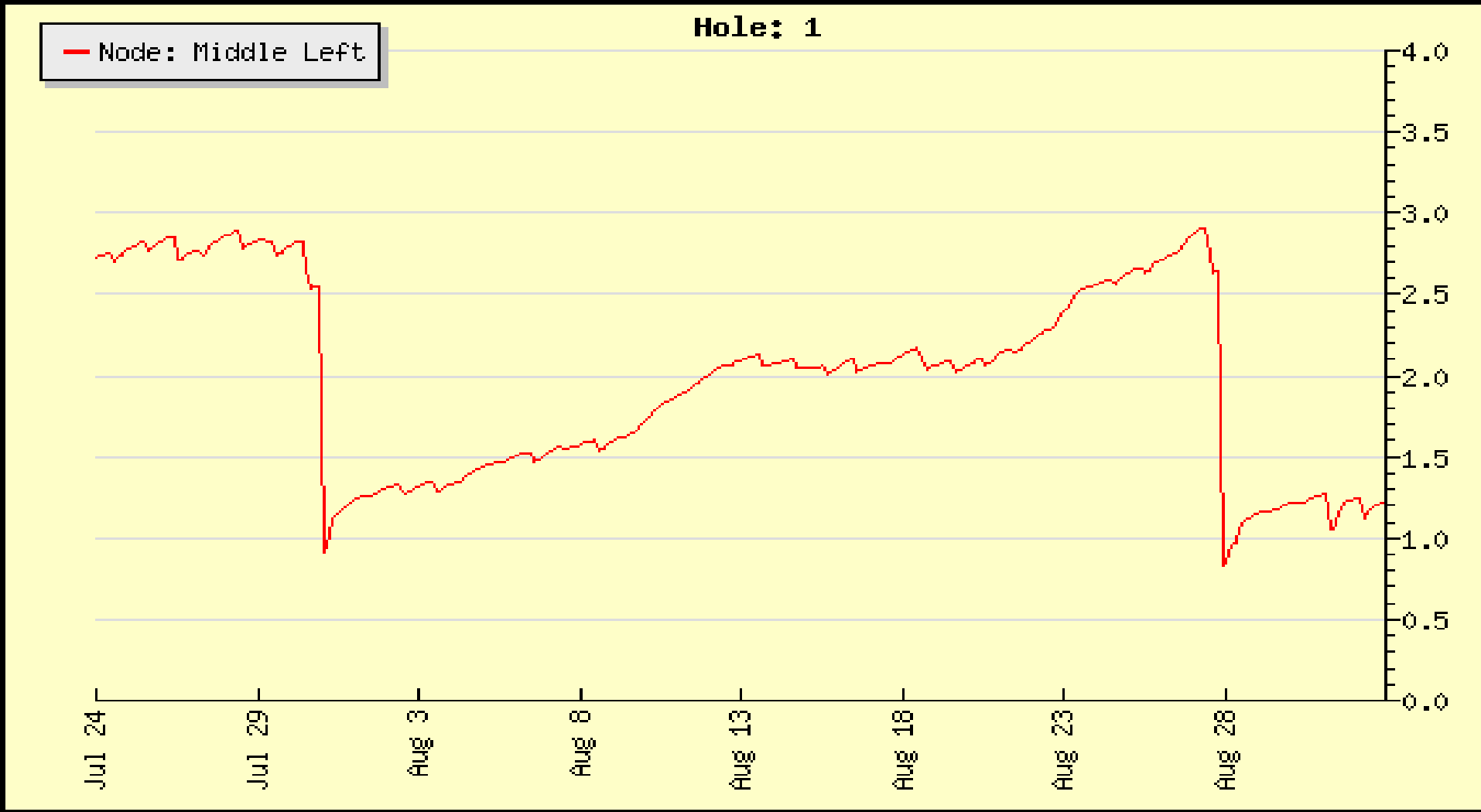

2006 10 2

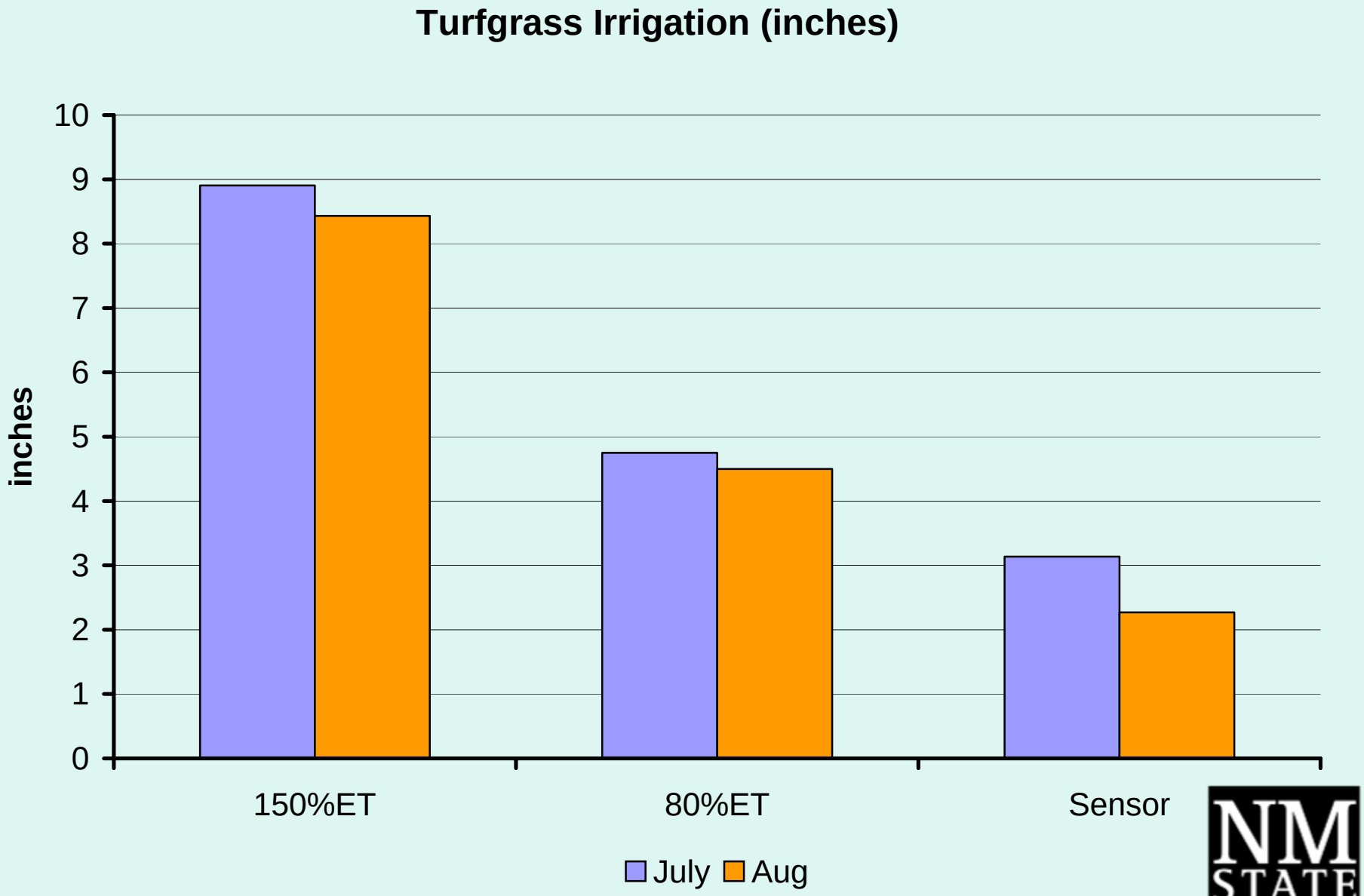
Soil Moisture – Soil Salinity Measurements

- Temperature:
  $r^2 = 1$
- Moisture:
  $r^2 > 0.94$
- Moisture readings not affected up to 4 dS/m

Wireless Sensor Technology

Salt Monitoring:




Turfgrass Irrigation (inches)
inches
10
9
8
7
6
5
4
3
2
1
0
150%ET
80%ET
Sensor
July
Aug

Water Conditioning Study

Experimental design

- Split plot design
- Water as whole block
- Treatments as sub-block
- Completely randomized, 3 reps
- 20’ X 20’ plot size

- Physical Water Conditioners for turf
  - Manufacturers claim that the devices:
    - Improve water penetration
    - Reduce establishment time
    - Improve turf quality
    - Reduce irrigation
  - Minimal data to support these claims
    - One small study in turfgrass
      - Concluded that the devices were not effective
        - » Gazaway D. 2003

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Magnawet

Zeta Core

Freflo

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Research Objectives

Do water conditioners

- Effect turf quality?
  - Visual rating
  - Tissue analysis
- Effect Turf Stress?
  - NDVI
- Effect soil quality?
  - Soil tests
- Effect irrigation requirements
  - Run time data

Acknowledgements

NEW MEXICO STATE UNIVERSITY

The Agriculture Program
THE TEXAS A&M UNIVERSITY SYSTEM

RIO GRANDE INITIATIVE

EFFICIENT IRRIGATION THROUGH RESEARCH & EDUCATION

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