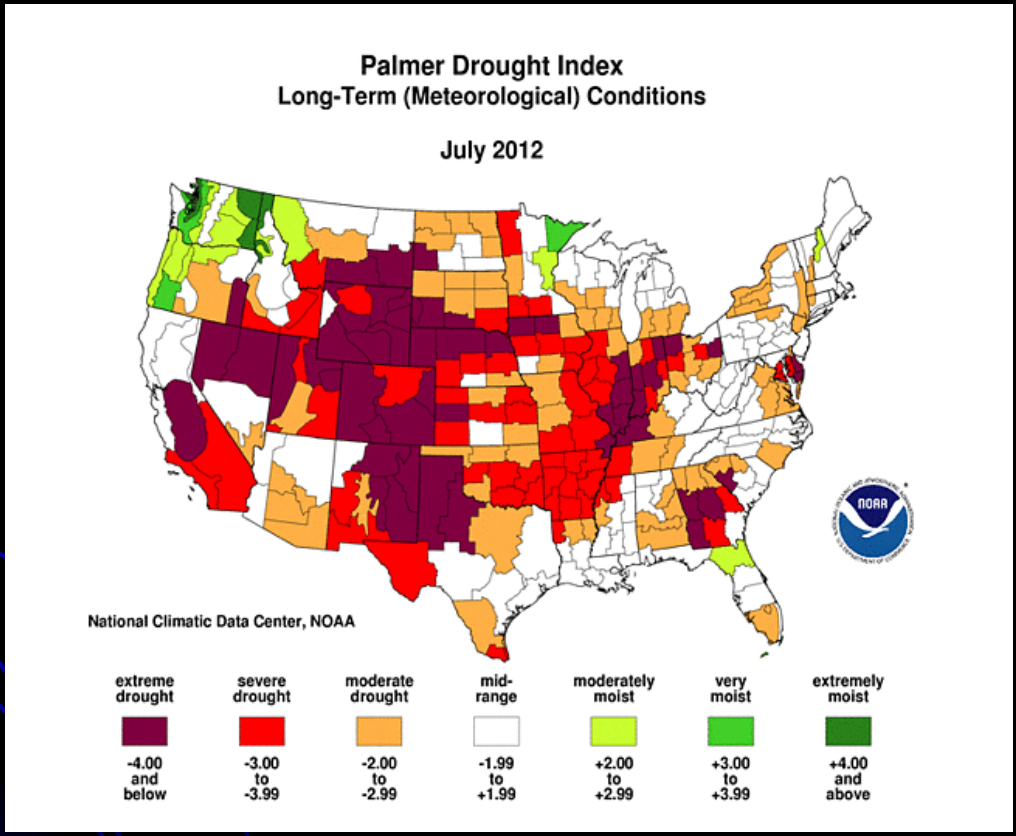
Planting guidelines for use prior to a dry summer

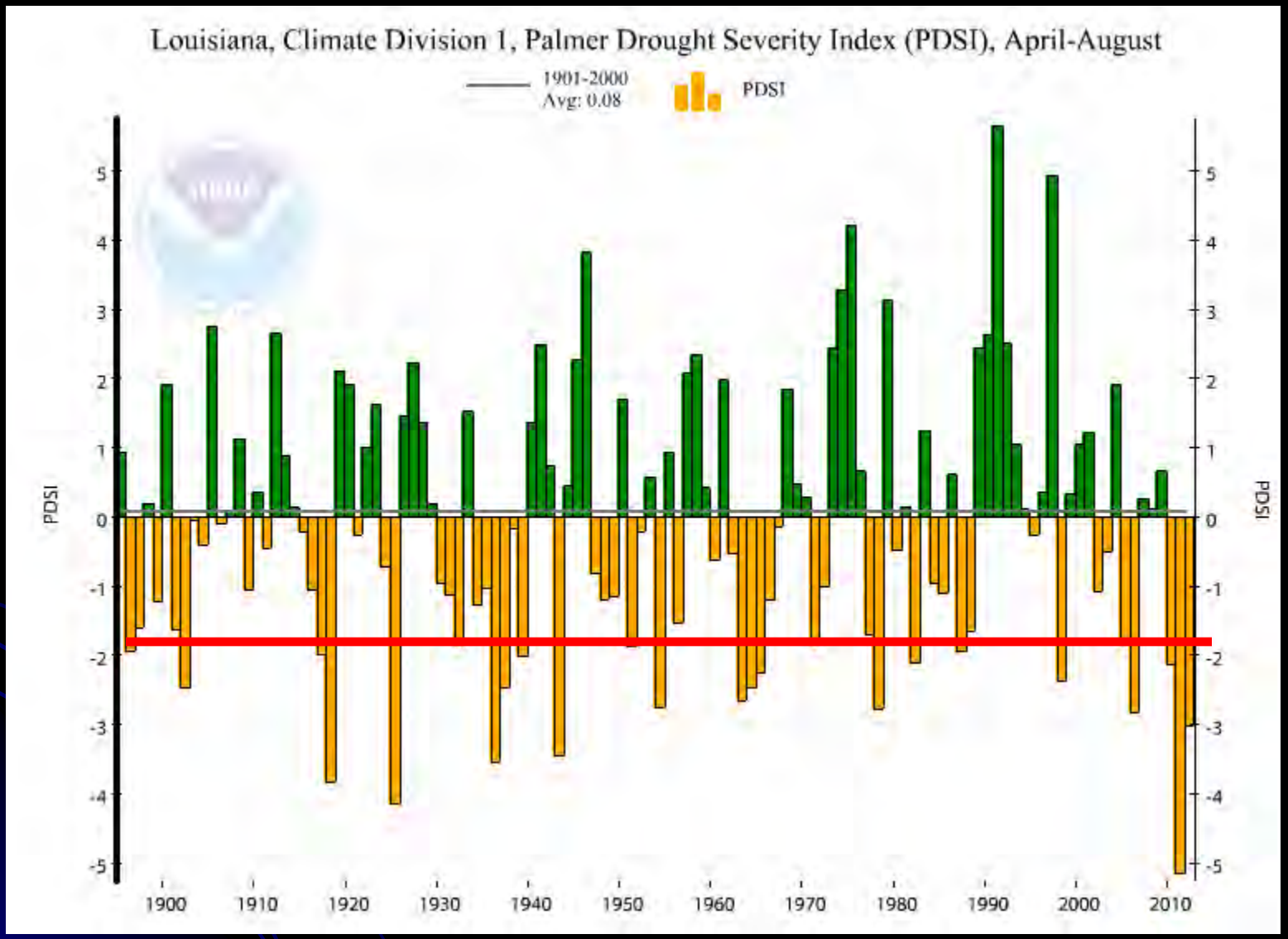
David B. South

AUBURN

FORESTRY AND WILDLIFE SCIENCES

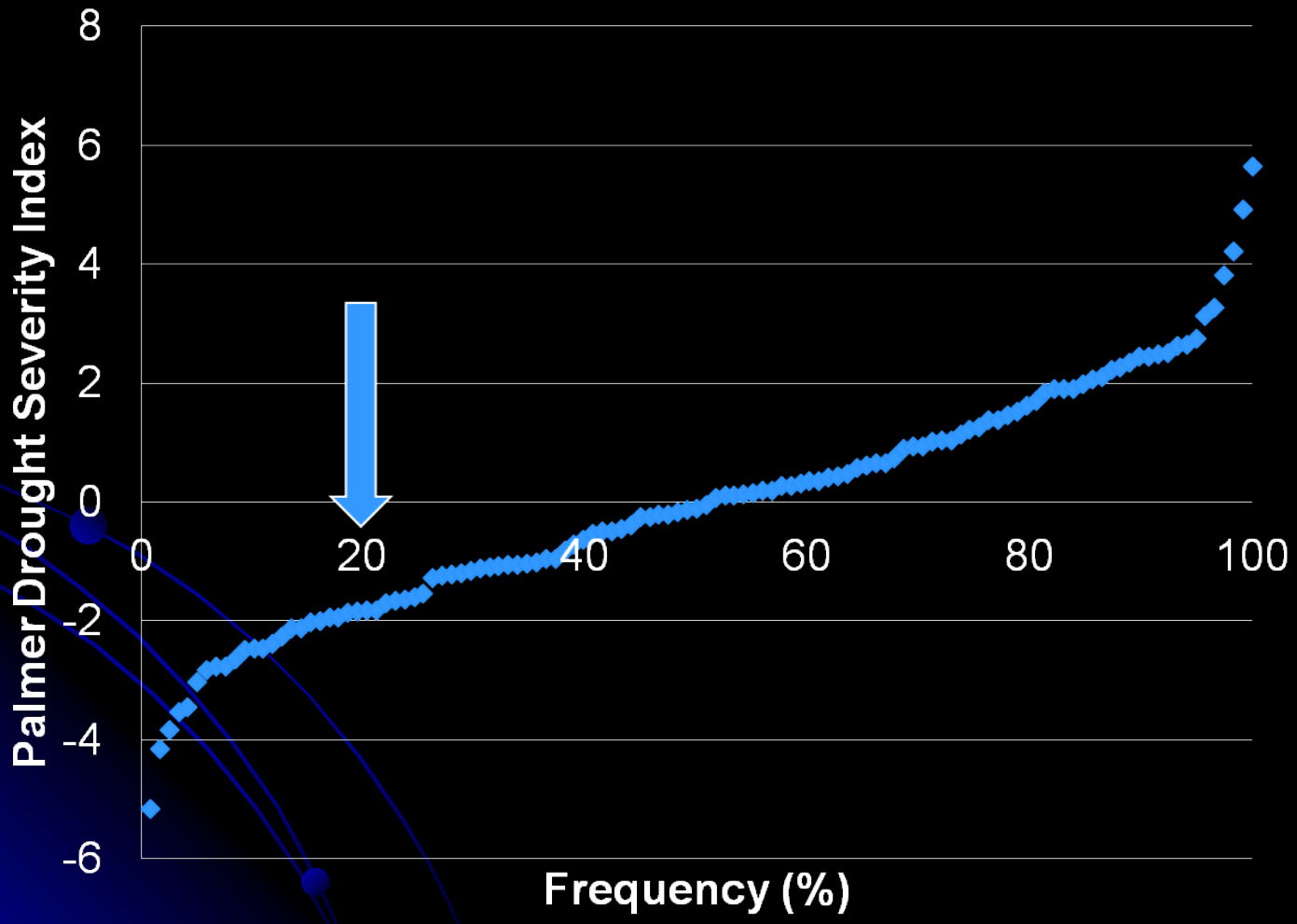
How often do we get a dry summer?



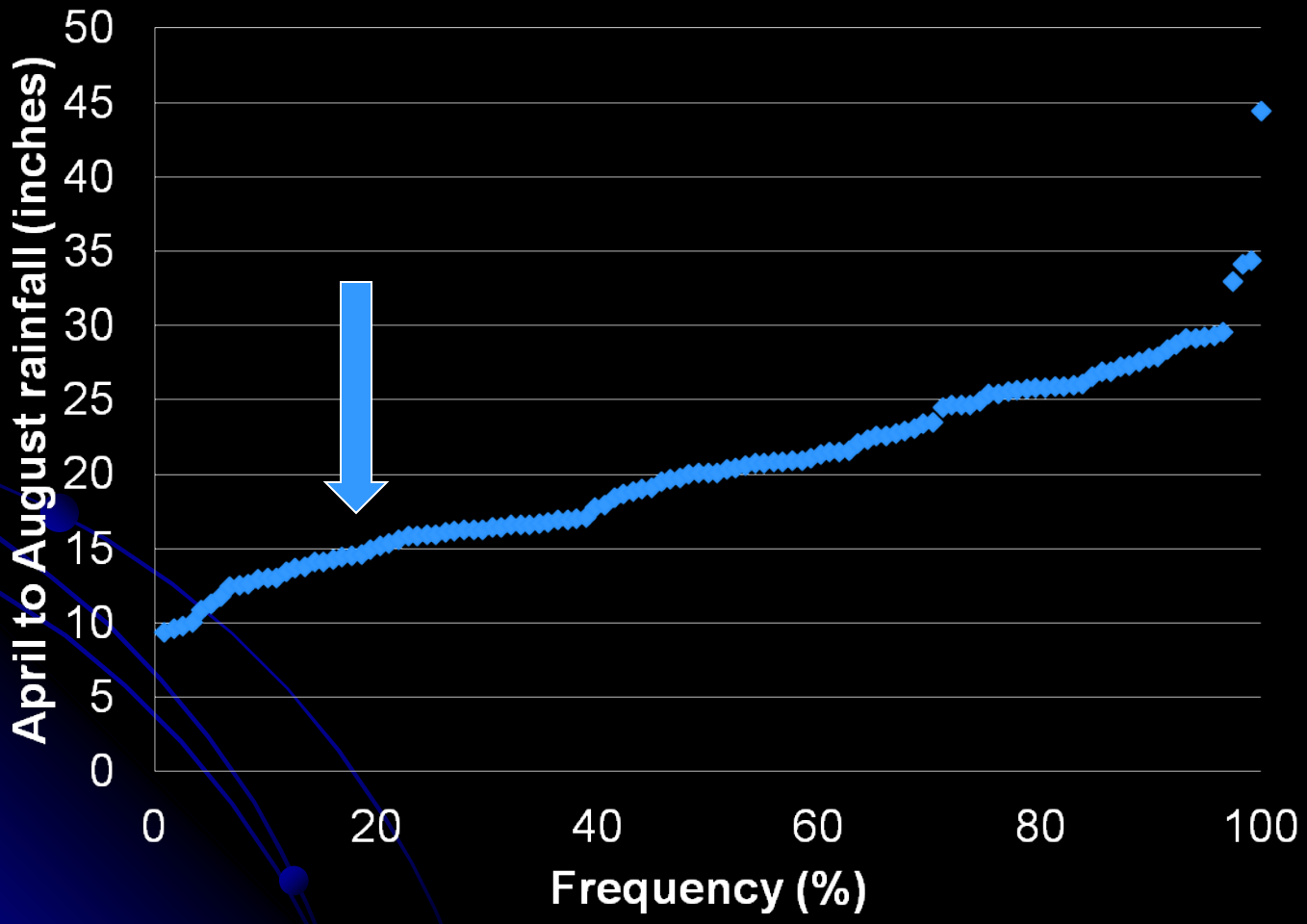

Louisiana, Climate Division 1, Palmer Drought Severity Index (PDSI), April-August
1901-2000
Avg: 0.08
PDSI
PDSI
PDSI
5
4
3
2
1
0
-1
-2
-3
-4
-5
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010

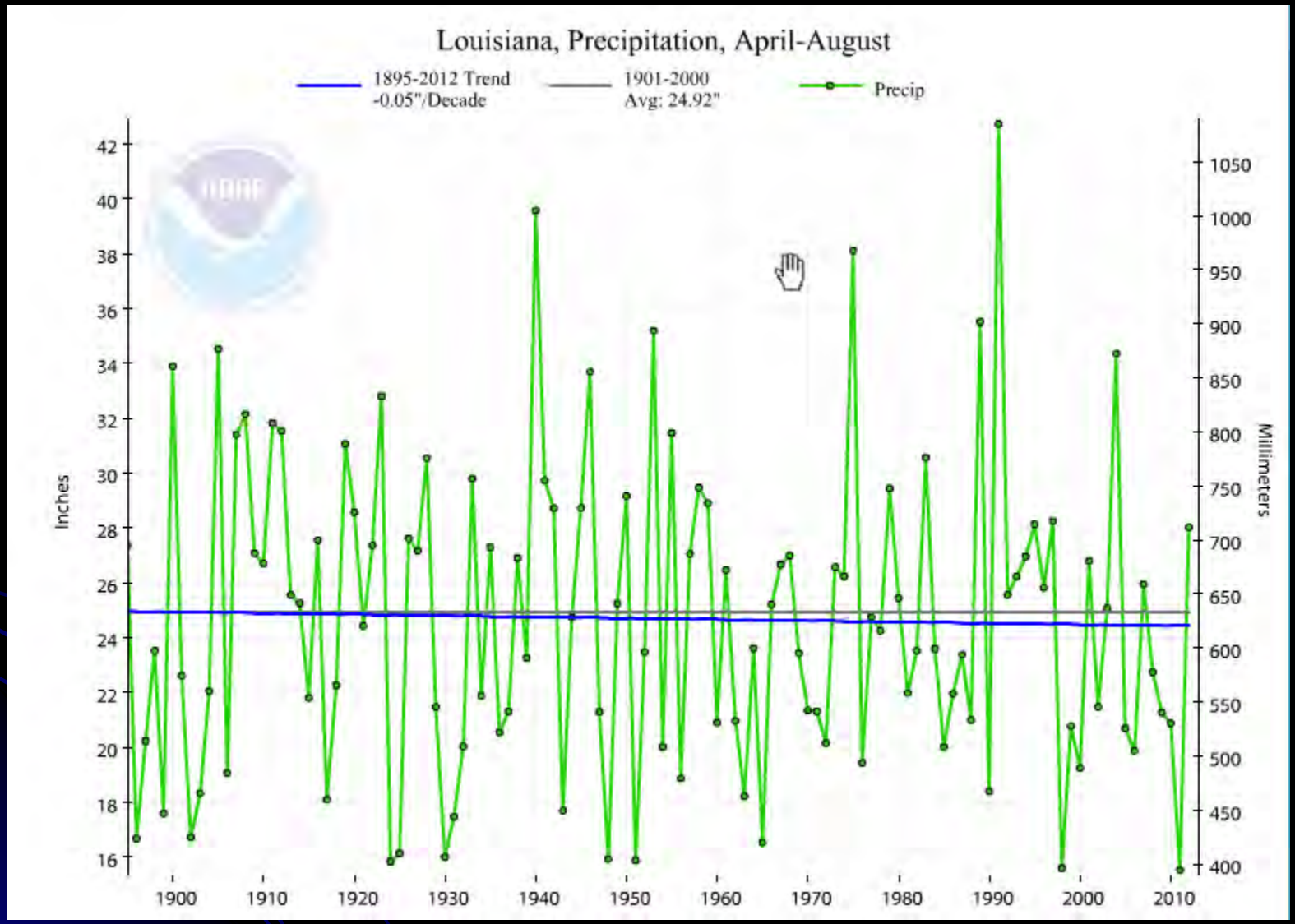
1 out of 5 years had a PDSI < -1.8

LA climate division 1

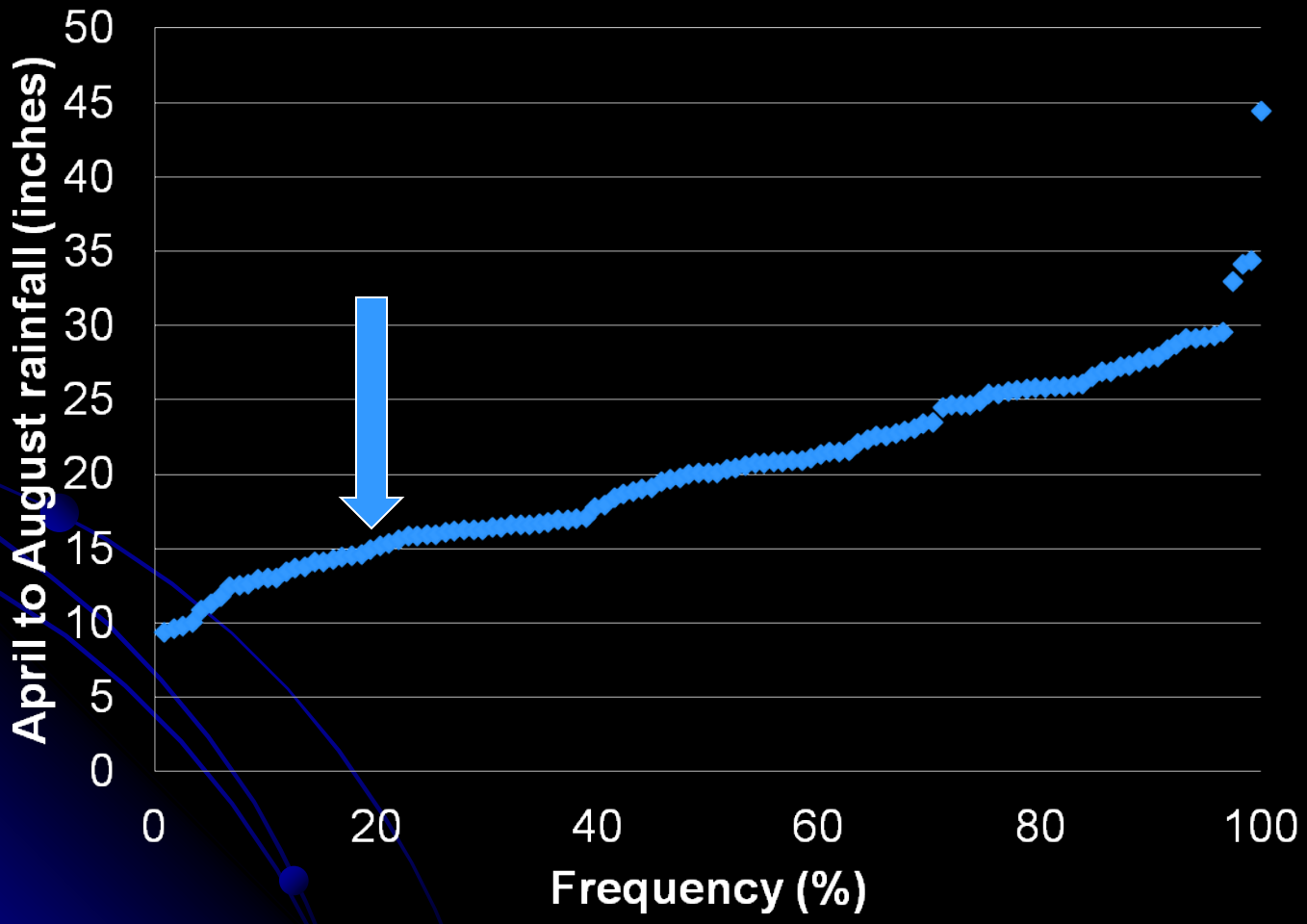


In LA, 1 out of 5 years has <20” of AA-rain (April-August)

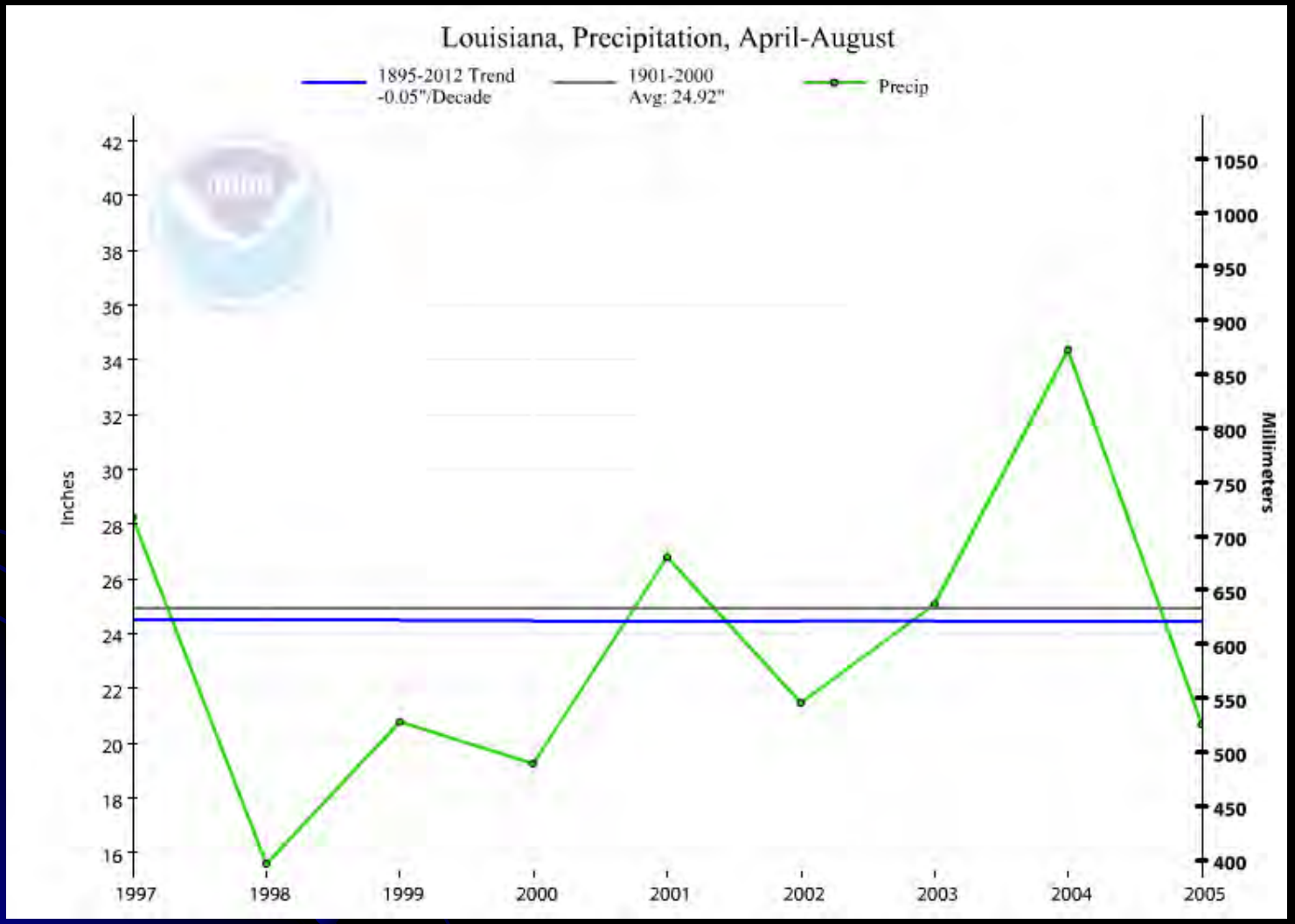



Louisiana, Precipitation, April-August
1895-2012 Trend
-0.05"/Decade
1901-2000
Avg: 24.92"
Precip
Inches
Millimeters
42
40
38
36
34
32
30
28
26
24
22
20
18
16
1050
1000
950
900
850
800
750
700
650
600
550
500
450
400
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010

In NW LA, 1 out of 5 years has <15” of AA-rain (April-August)



What is the relationship between AA-rainfall and seedling survival in Louisiana?



STATE OF LOUISIANA
DEPARTMENT OF AGRICULTURE AND FORESTRY
OFFICE OF FORESTRY
PINE PLANTATION SURVIVAL REPORT - 1998

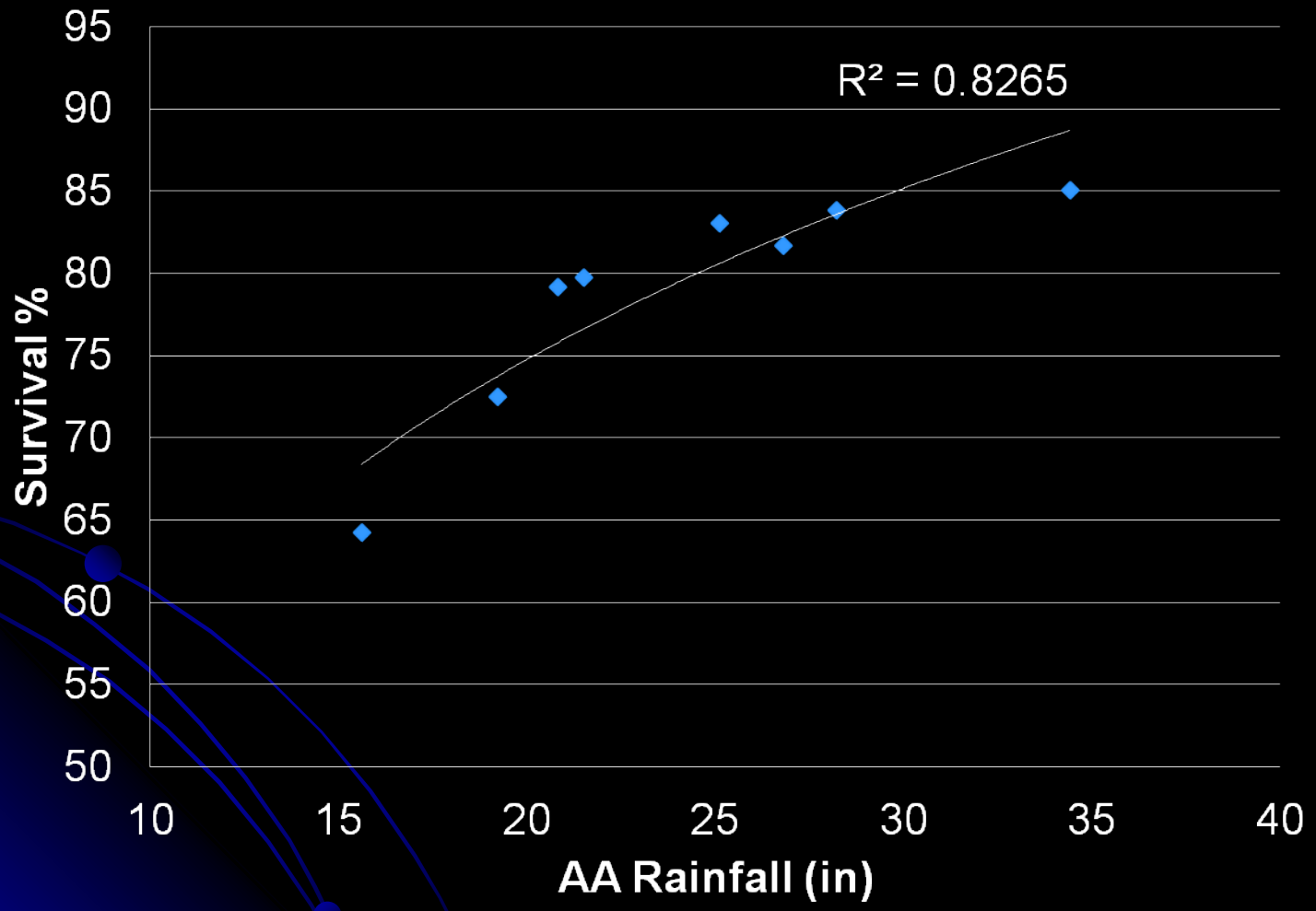
The pine plantation survival data exhibited below represents plantings established during the 1997-98 season (December 1997 - March 1998). Figures represent field inventories taken after the first growing season. The sampled acreage accounts for approximately 80% of the total estimated acreage regenerated in the State last year.

Private, nonindustrial forest (PNIF) landowners acreage sampled represents federal cost-share program plantings monitored by the Louisiana Office of Forestry. Figures for forest industry and the U. S. Forest Service were supplied by the respective owners.

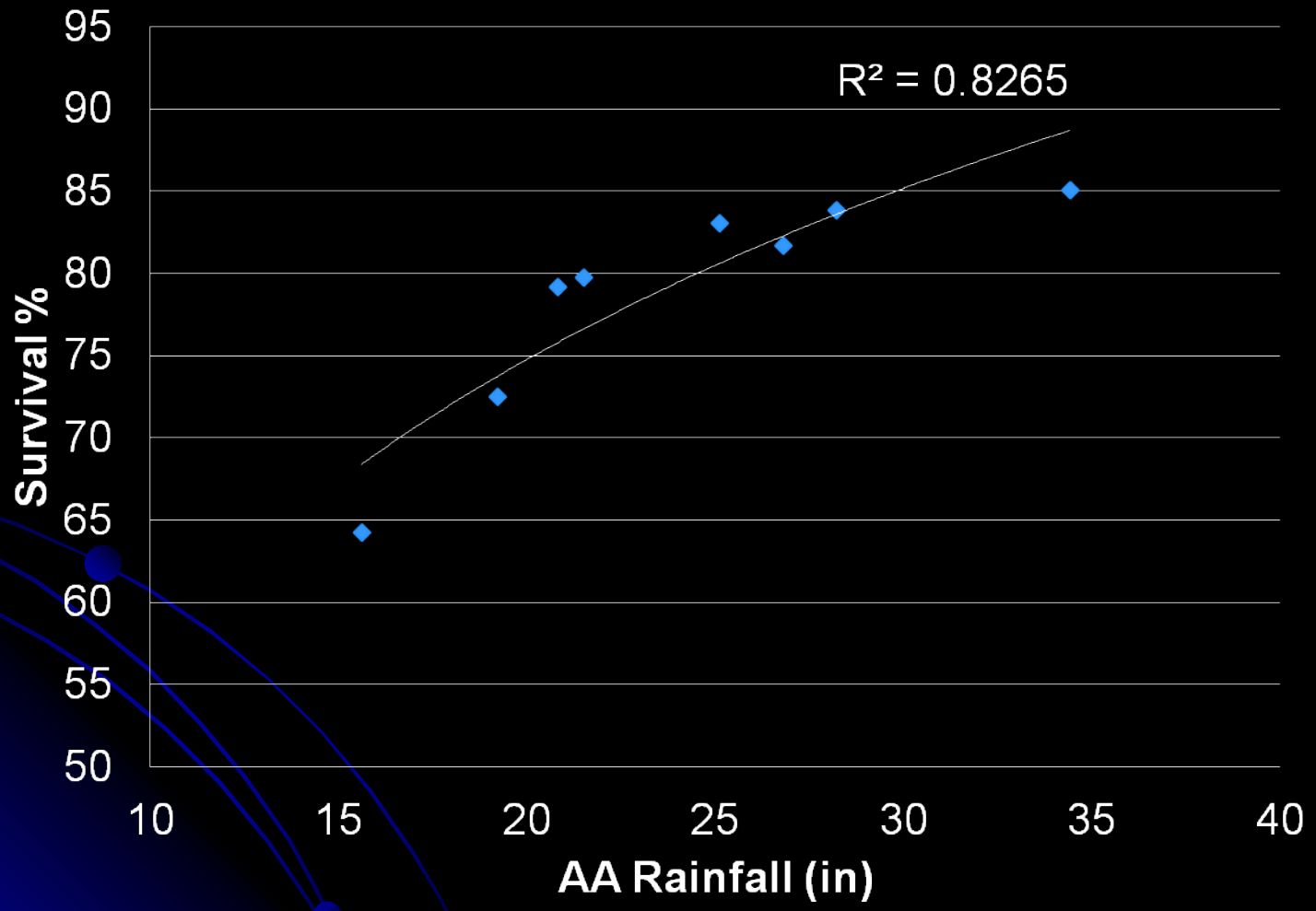
The 100,458 acres planted were identifiable as to the method of planting. Survival based on a weighted average were as follows:

8 years of survival data (1997-2004)

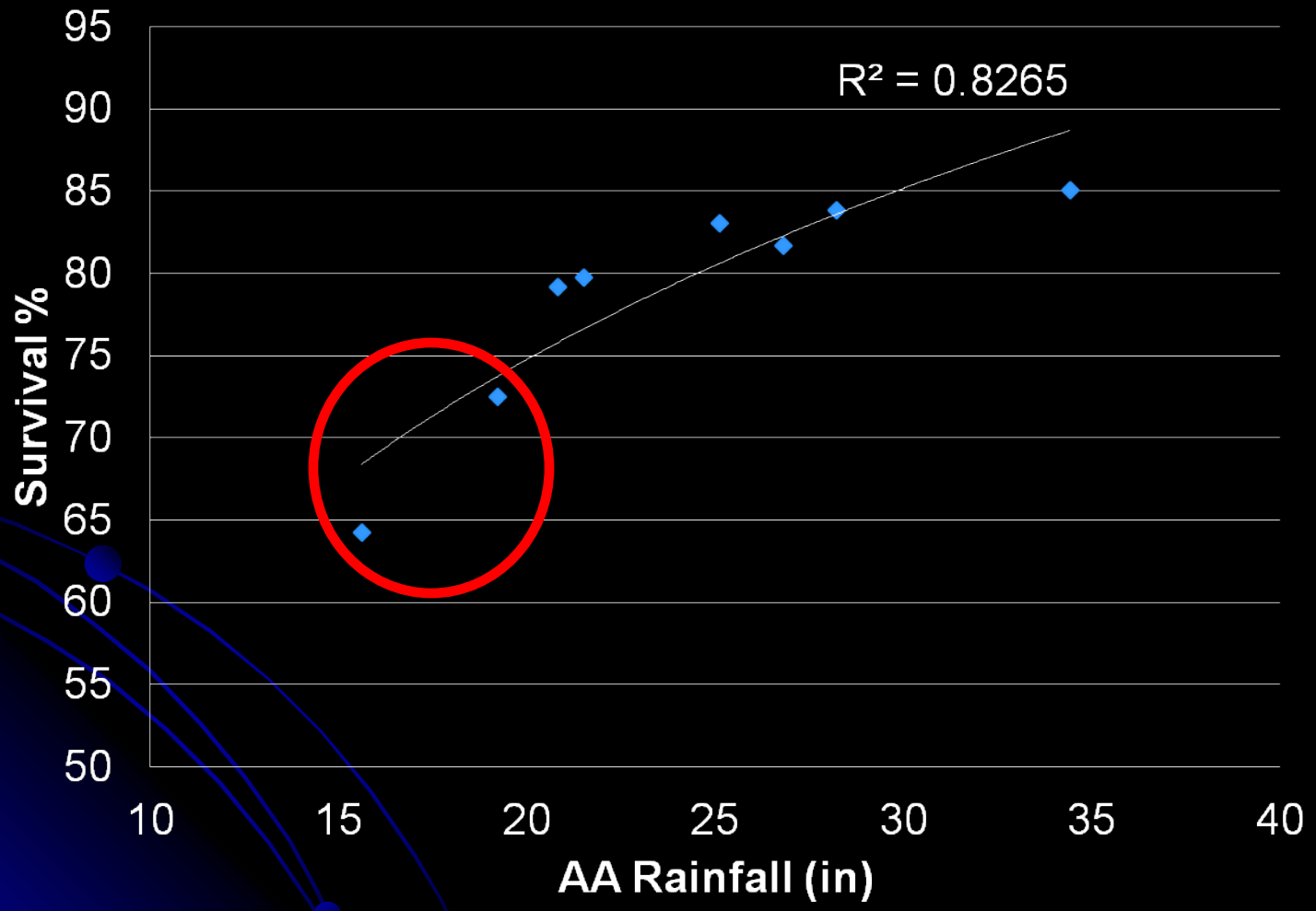
Adequate rain can increase bareroot loblolly pine survival by 20 points



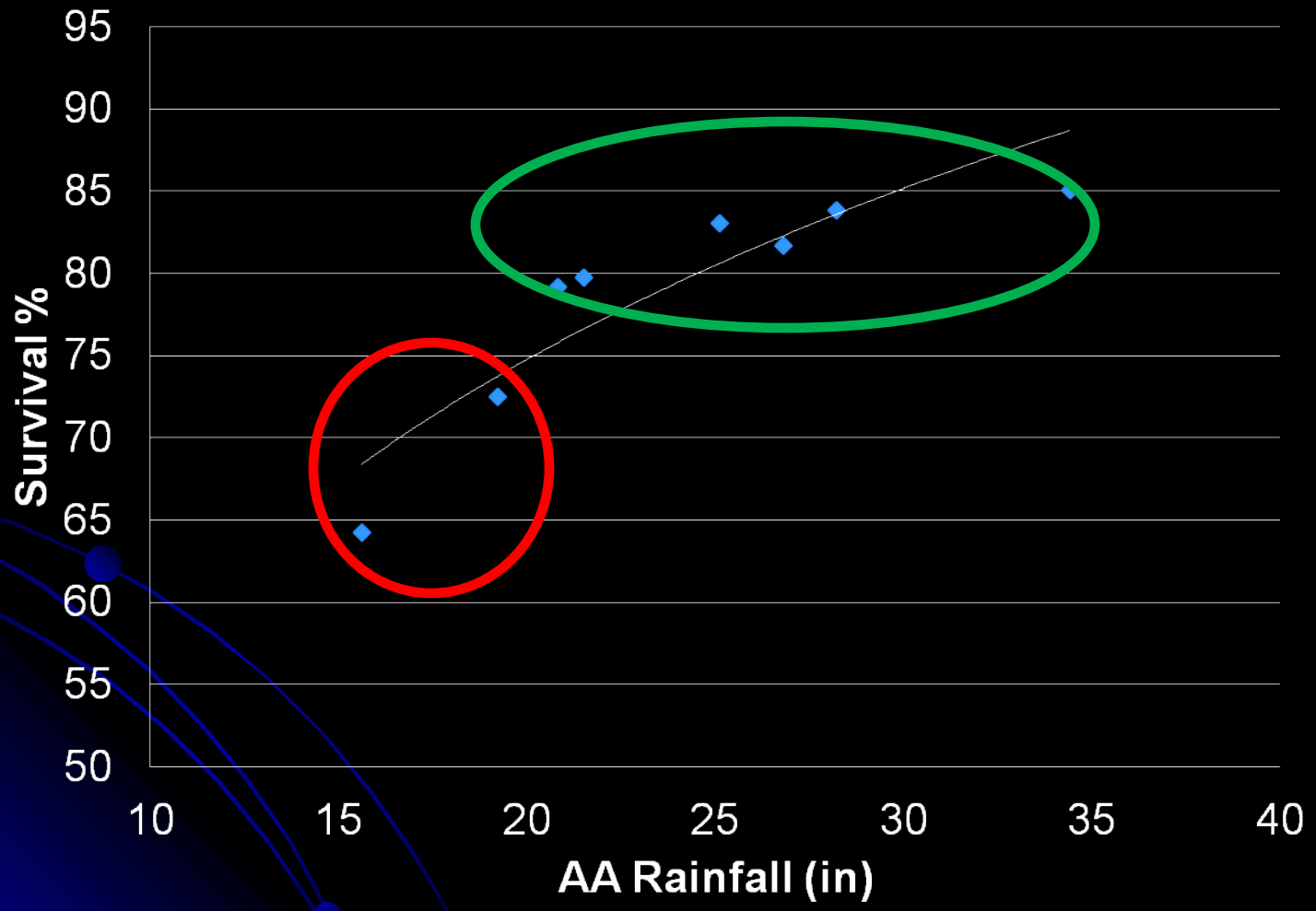
About 2 points increase / inch of rainfall (for 15 inch to 25 inch range)



1 out of 4 years had < 20” AA-rain (1997-2004)



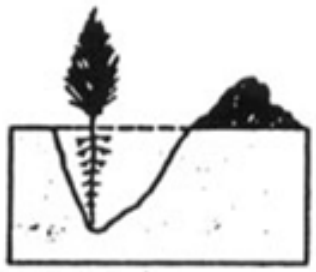
Most tree planting recommendations are for years with adequate AA-rainfall

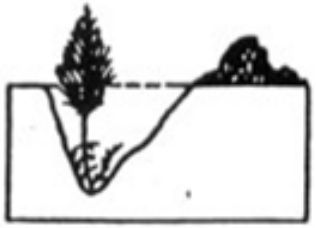


Two schools of thought

Keep taproot straight **Plant deep (which bends roots)**

Foresters have had a long-running debate about how deeply seedlings should be planted and the importance of keeping tap roots straight. Some foresters contend that a seedling's root collar should be planted no more than an inch or two below the soil surface, while others contend that the root collar should be planted four to six inches below. Some foresters contend that a bent tap root is a death sentence for a seedling, while others contend that a bent tap root is of no consequence if the seedling is planted deeply enough to keep the roots moist. Recent research tends to support the latter view.





Jon E. Barry, Ph.D.
Assistant Professor - Forestry

Two schools of thought

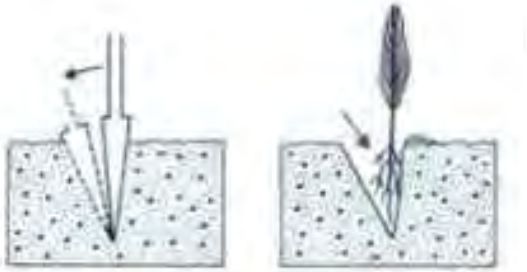
Plant deep (which bends roots)

- Machine plant (when possible)
- Do not prune roots
- Make deep planting hole (10-12 inches deep for bareroot stock)
- Place roots at bottom of hole
- Root-collar should be 5 to 6 inches below soil surface (except on wet soils)
- Don’t use “pull-up” method

Keep taproot straight

- Plant root collar at groundline or 0.5” below groundline
- Penalize tree planters if roots in a 12” hole are bent at the bottom
- Prune roots to match hole
- Same method for all soils
- Hope for a normal summer

Some tree planting recommendations
Say planting seedlings 2” deep is “too deep”
(even when no roots are bent)



1. Use a planting bar to create a hole for the seedling by inserting the bar into the soil and pushing in one direction to create hole.

2. Insert seedling to proper depth (see Figure 2 below for proper planting depth).

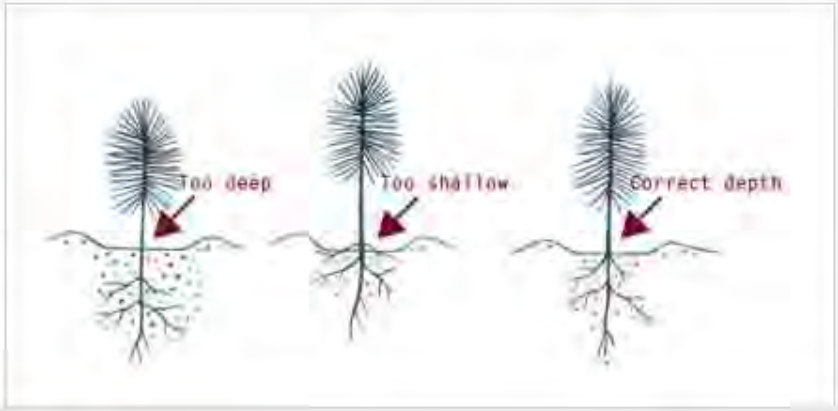
4. Push the planting bar away from the plant.

5. Push soil towards the planting hole by pushing the planting bar back and forth.

Planting Bare Root Tree Seedlings

By Vanessa Richins Myers, About.com Guide

Plant the Tree Seedling at the Correct Depth



Make sure you are planting your tree seedlings at the correct depth to ensure a good start.

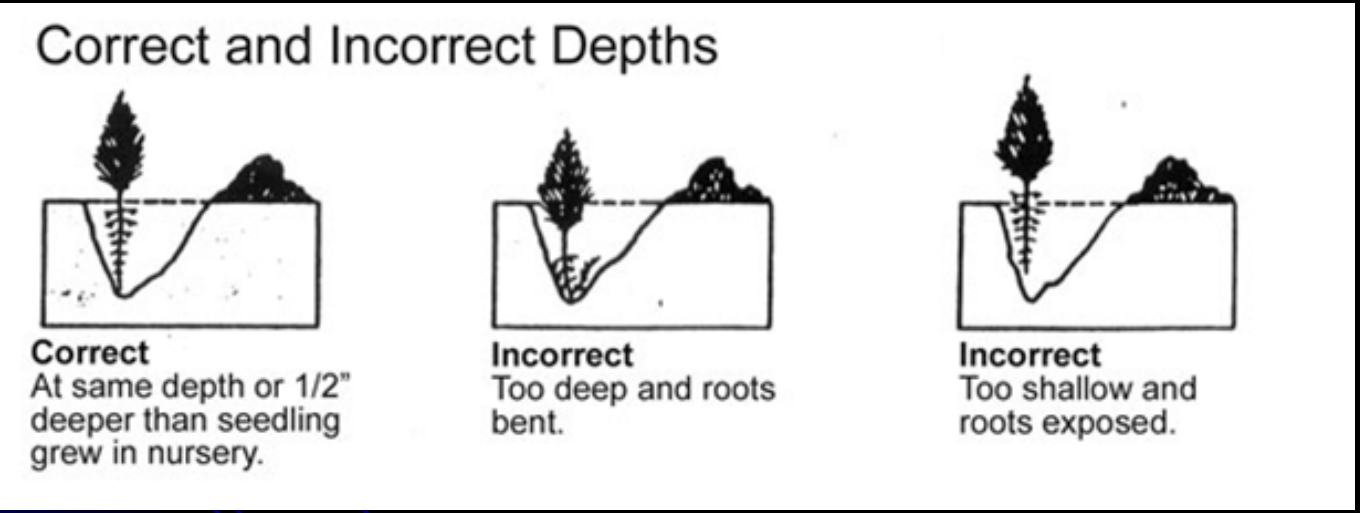
Photo : US Forest Service

Make sure you plant your bare root tree seedling at the correct depth.

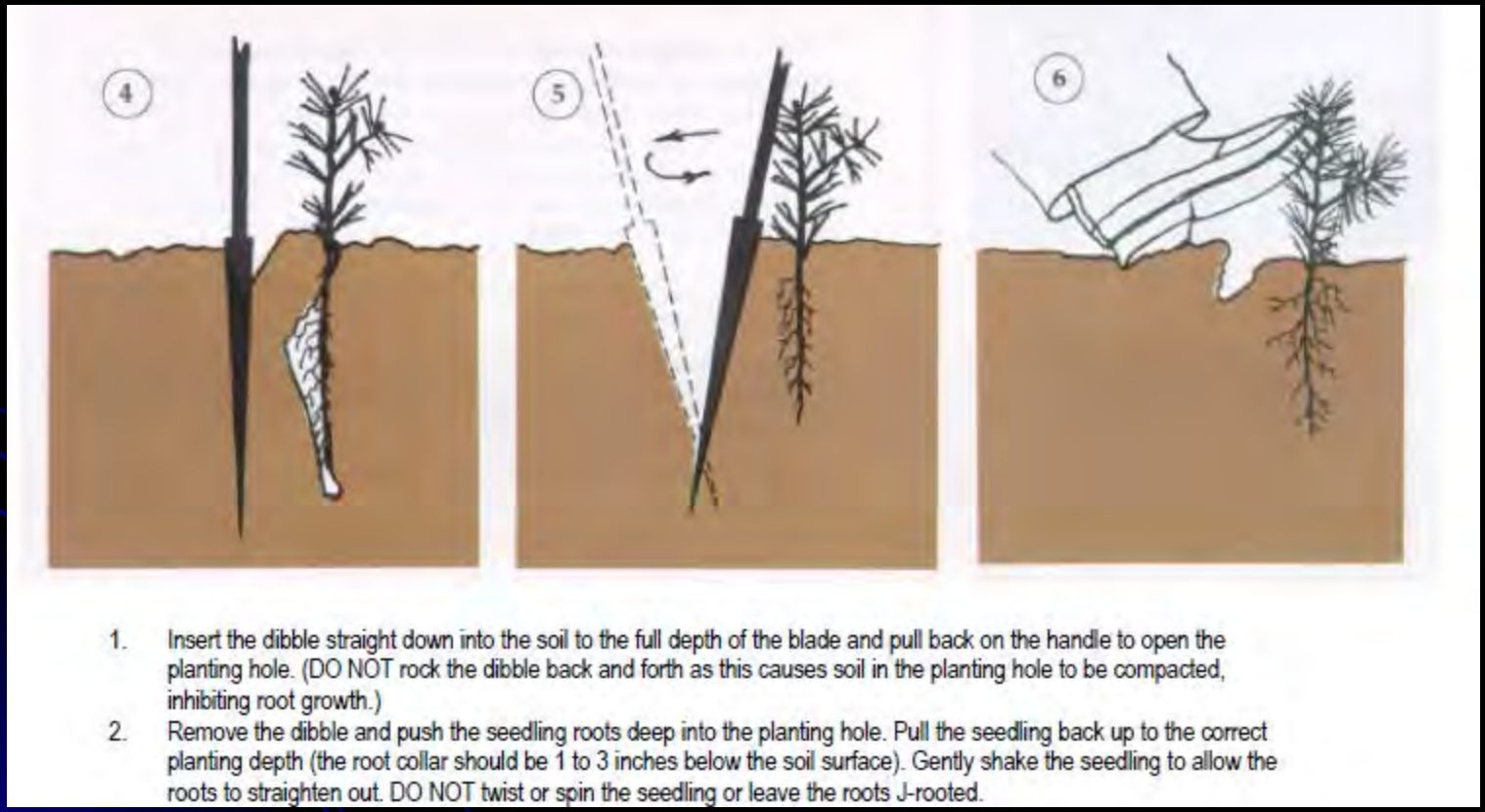
If you plant it too deep, the roots may not get enough oxygen and the tree will be more exposed to potential diseases from the soil.

Some tree planting recommendations say planting seedlings 2” to 6” deep with bent roots is incorrect

Plant seedlings so that the soil line is up to ½ inches above the root collar. Planting too deep or too shallow will greatly reduce survival.



Some guides say seedlings should be planted 1” to 3” deep but taproots should be straight (no 1” J-root or 1” L-root)



1. Insert the dibble straight down into the soil to the full depth of the blade and pull back on the handle to open the planting hole. (DO NOT rock the dibble back and forth as this causes soil in the planting hole to be compacted, inhibiting root growth.)
2. Remove the dibble and push the seedling roots deep into the planting hole. Pull the seedling back up to the correct planting depth (the root collar should be 1 to 3 inches below the soil surface). Gently shake the seedling to allow the roots to straighten out. DO NOT twist or spin the seedling or leave the roots J-rooted.

Broadleaf trees need large vigorous root systems to survive. They can be pruned to 8 to 10 inches long with at least 4-inch long lateral roots. Needleleaf trees can be pruned to 5 to 8 inches long, but never remove more than 50 percent of the lateral roots.

Some guides say to prune roots to 5” to 8” before planting

Figure 14. Root prune only when necessary by making a single clean cut, removing as little of the root system as necessary.

Broadleaf trees need large vigorous root systems to survive. They can be pruned to 8 to 10 inches long with at least 4-inch long lateral roots. Needleleaf trees can be pruned to 5 to 8 inches long, but never remove more than 50 percent of the lateral roots.

Some guides say to prune roots to 5” to 8” before planting

Figure 14. Root prune only when necessary by making a single clean cut, removing as little of the root system as necessary.

Ok to prune 5 laterals back to 3? (remove 40%?)

Some guides say the taproot can be pruned to 5.5” for “proper” planting

This makes planting easier and can reduce survival for late planted stock

Hand planters (paid by the tree) will likely say root pruning is necessary to keep taproot straight

Root Pruning

Do:

- ☺ Prune only if required for proper planting.
- ☺ Always ask a forester for advice before root pruning. ***(Root pruning is usually unnecessary.)***
- ☺ Assign one properly trained person to do the root pruning and supervise them.
- ☺ Protect seedlings from the elements during root pruning.
- ☺ Cut roots with sharp knife or machete.

Don’t:

- ☹ Cut roots shorter than 5” for pine, 6” for hardwood.
- ☹ Root prune routinely.
- ☹ Break or twist roots off by hand.
- ☹ Allow roots to dry out.
- ☹ Empty the whole seedling box when sorting.

One guide says to seedlings can be planted in a 6” to 8” deep hole.

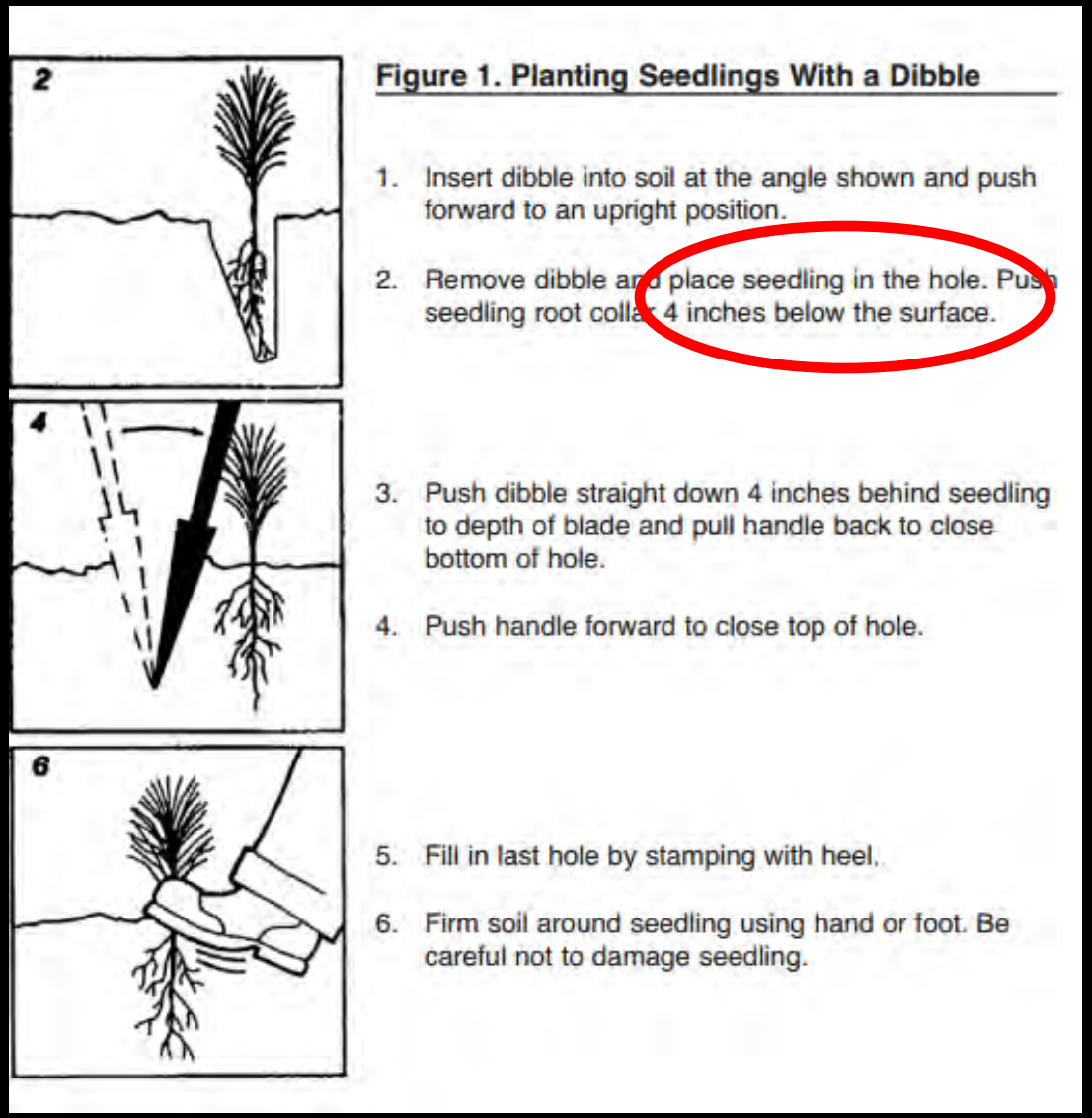
- Hand planters love guides that allow holes only 6” deep!!!

Improper planting techniques

Landowners need to be aware of several causes of seedling mortality. In many cases, the reason for seedling mortality is due to misplanting. Bareroot seedlings have about a 6-8 inch taproot, and subsequently, need a 6-8 inch deep planting hole.

A few guides say to plant seedlings 4” to 5” deep

This means 1” or 2” of the taproot is bent when the taproot is 8” long and the hole is 11” deep and the RC is 5” deep



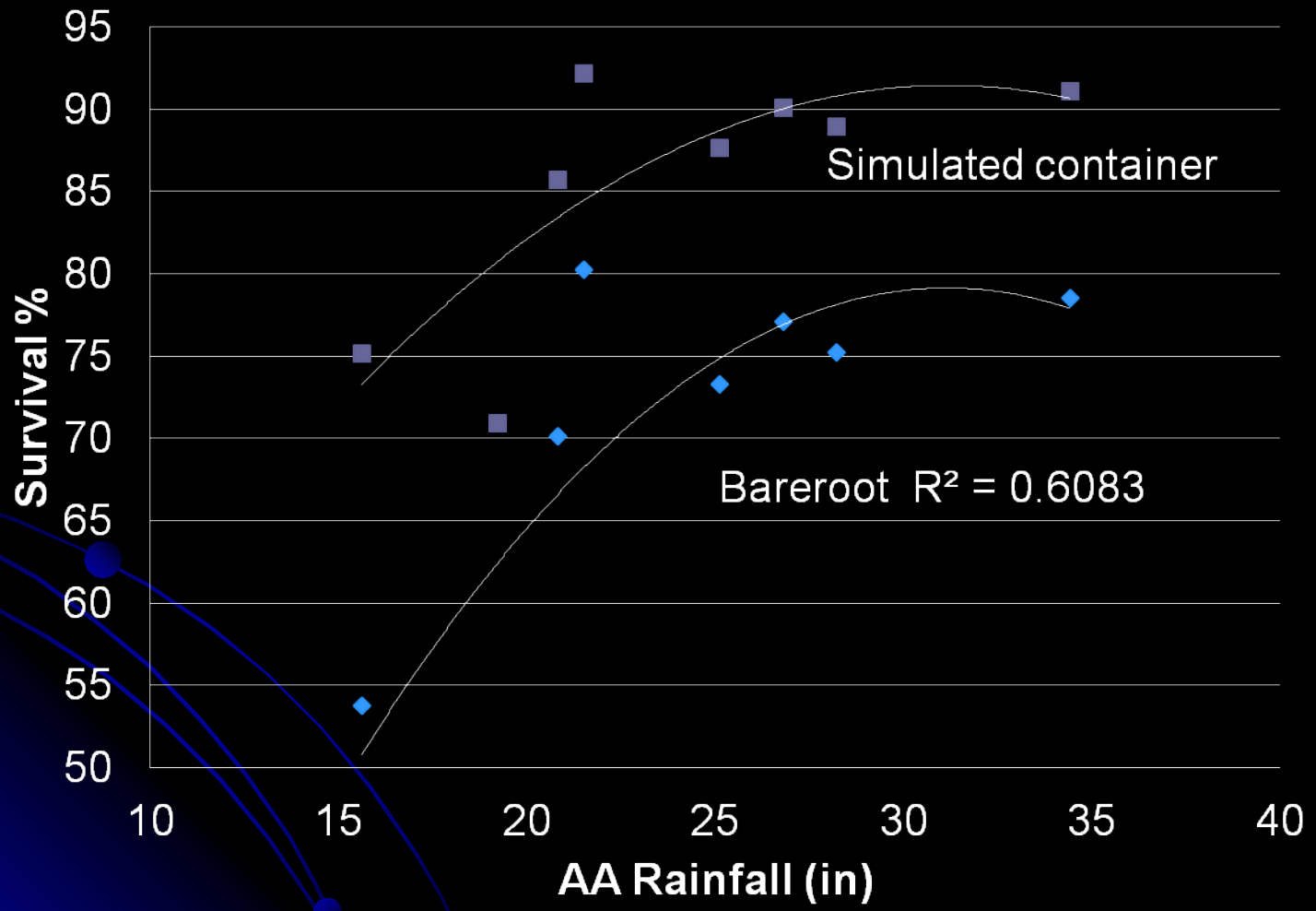
Example of root collar 4” deep

Ways to increase survival before a 15” AA-rainfall summer

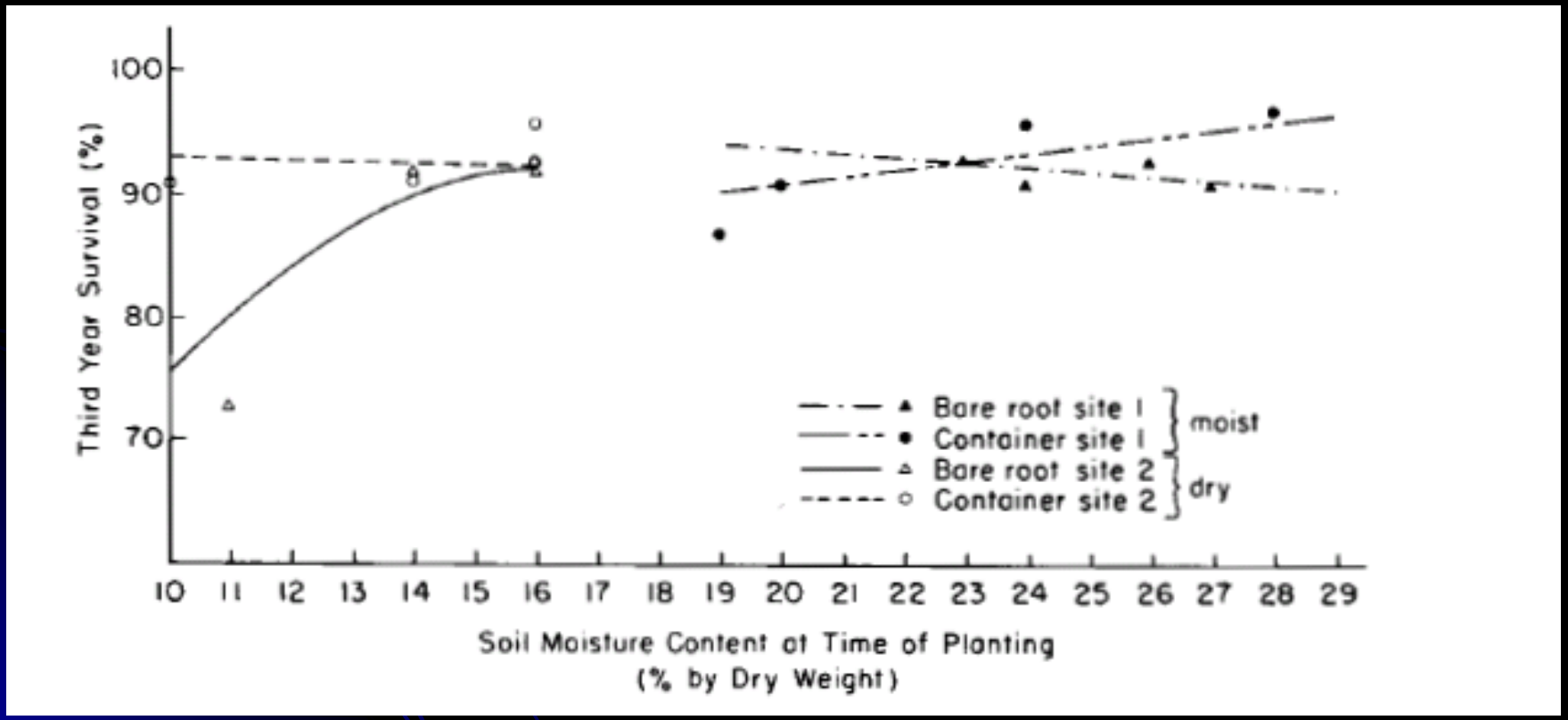
- Use container-grown stock, plant in October or November, and plant the root-collar 3” below the groundline*

*not longleaf pine and not on sites with high water table

Container stock might increase longleaf pine survival by 10 to >20 points



When soil is dry, container stock increased loblolly pine survival by 18 points in AL (from 73% to 91%)



South and Barnett 1986

Ways to increase survival of bareroot stock before a 15” AA-rainfall summer

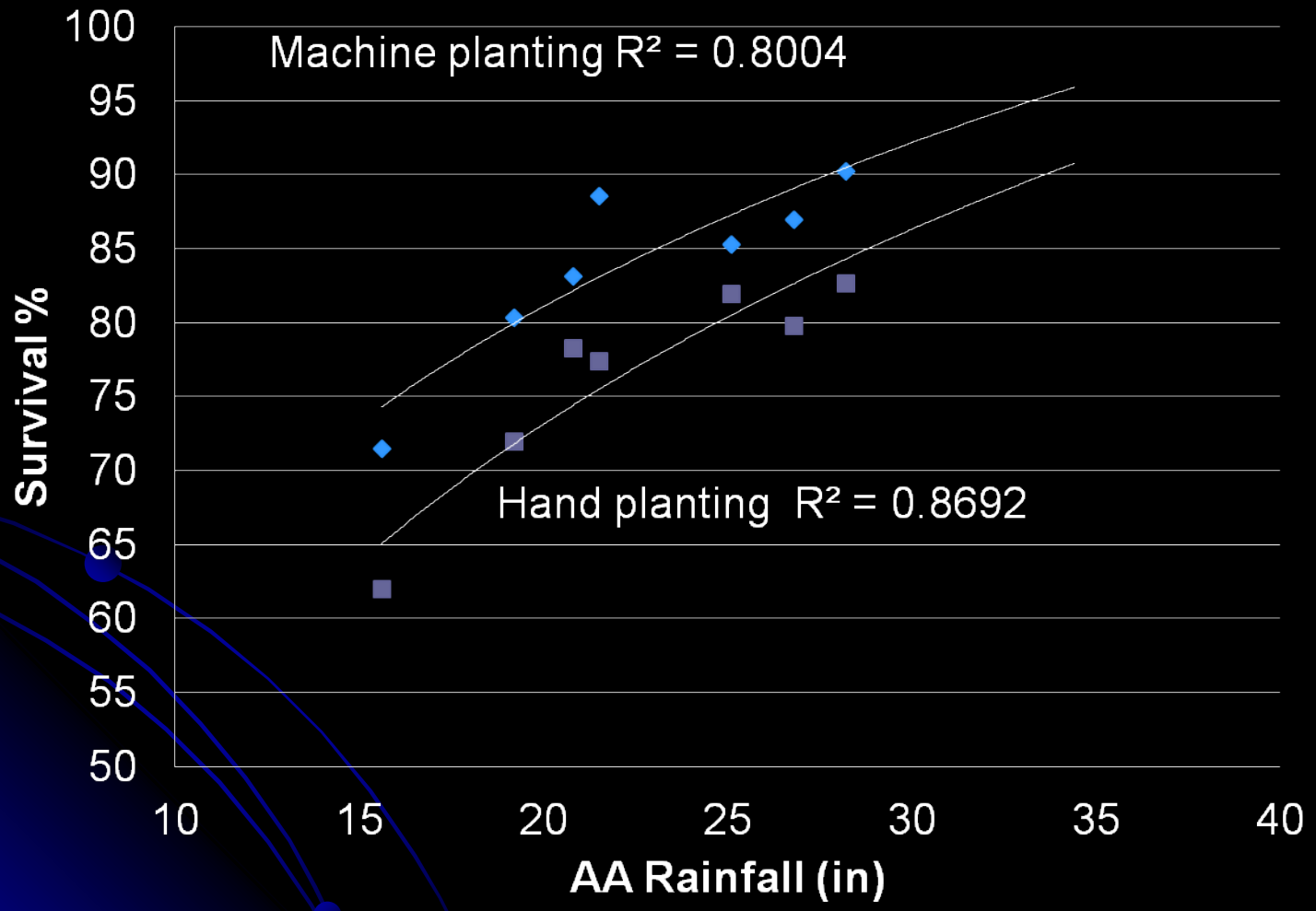
- Machine plant

(when possible) and “hot-plant”

5-7 mm RCD

seedlings in Nov and early Dec

Machine planting can increase survival by 5 to 12 points



In Louisiana, about 42% of the stands were machine planted (2003-04 season)

STATE OF LOUISIANA
DEPARTMENT OF AGRICULTURE AND FORESTRY
OFFICE OF FORESTRY
PINE PLANTATION SURVIVAL REPORT - 2004

The pine plantation survival data in the tables below represents plantings established during the 2003-2004 season (December 2003 - March 2004). Figures represent field inventories taken after the first growing season.

Private, non-industrial forest (PNIF) landowners acreage sampled represents federal and state cost-share program plantings monitored by the Louisiana Office of Forestry. Figures for forest industry and the U. S. Forest Service were supplied by the respective owners.

The 89110 acres planted were identifiable as to the method of planting. Survival based on a weighted average was as follows:

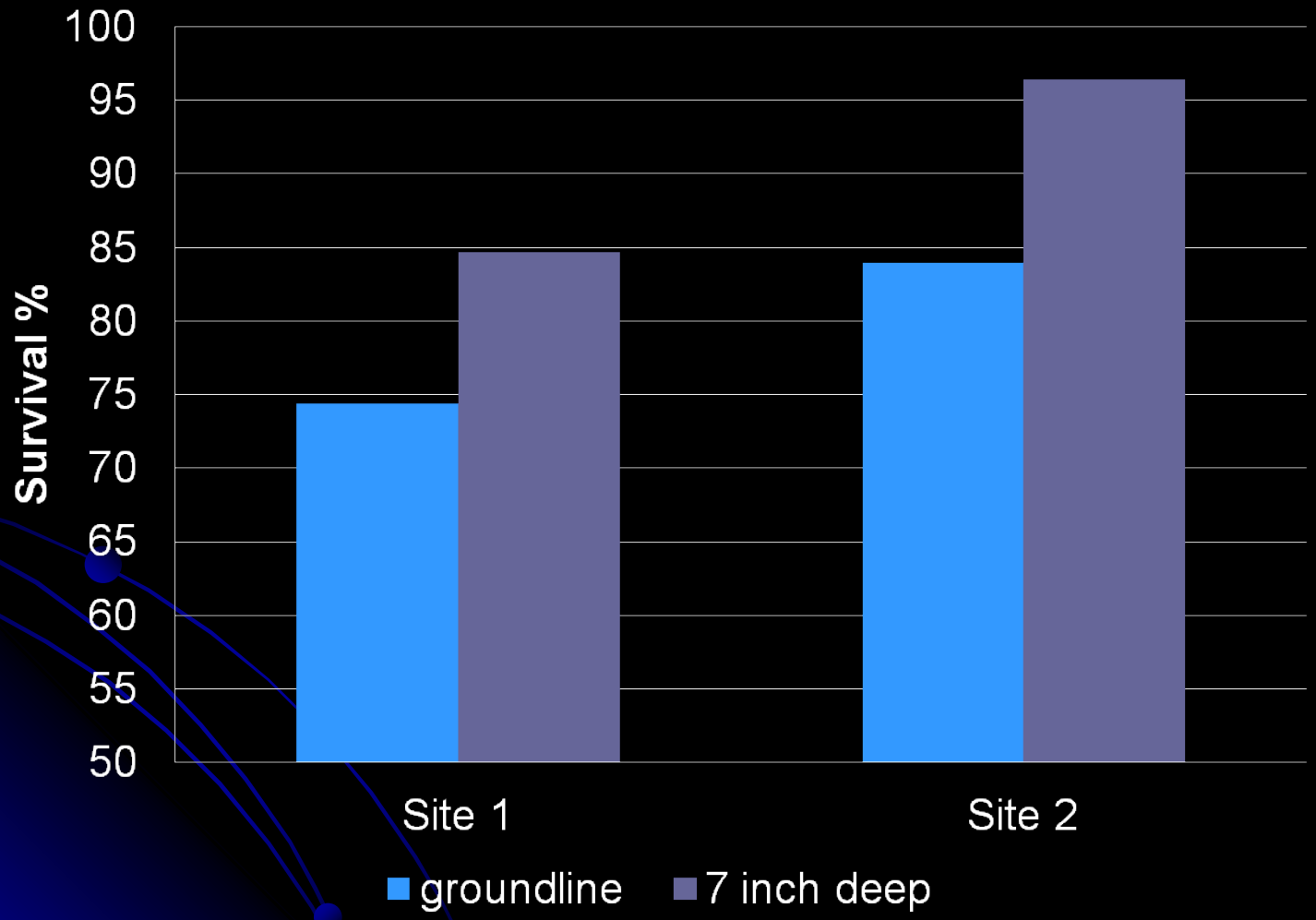
Hand (51,314) = 80.4% Machine (37,796) = 84.9%

Statewide survival for the 2002-2003 planting season averaged 82.9%

Ways to increase survival of hand-planted, bareroot stock before a 15” AA-rainfall summer

- Make sure planters make a deep hole (10-12”) and plant root-collar 5”-6”deep on well drained soils

Planting seedlings 7” deep can Increase survival by 10 to 12 points

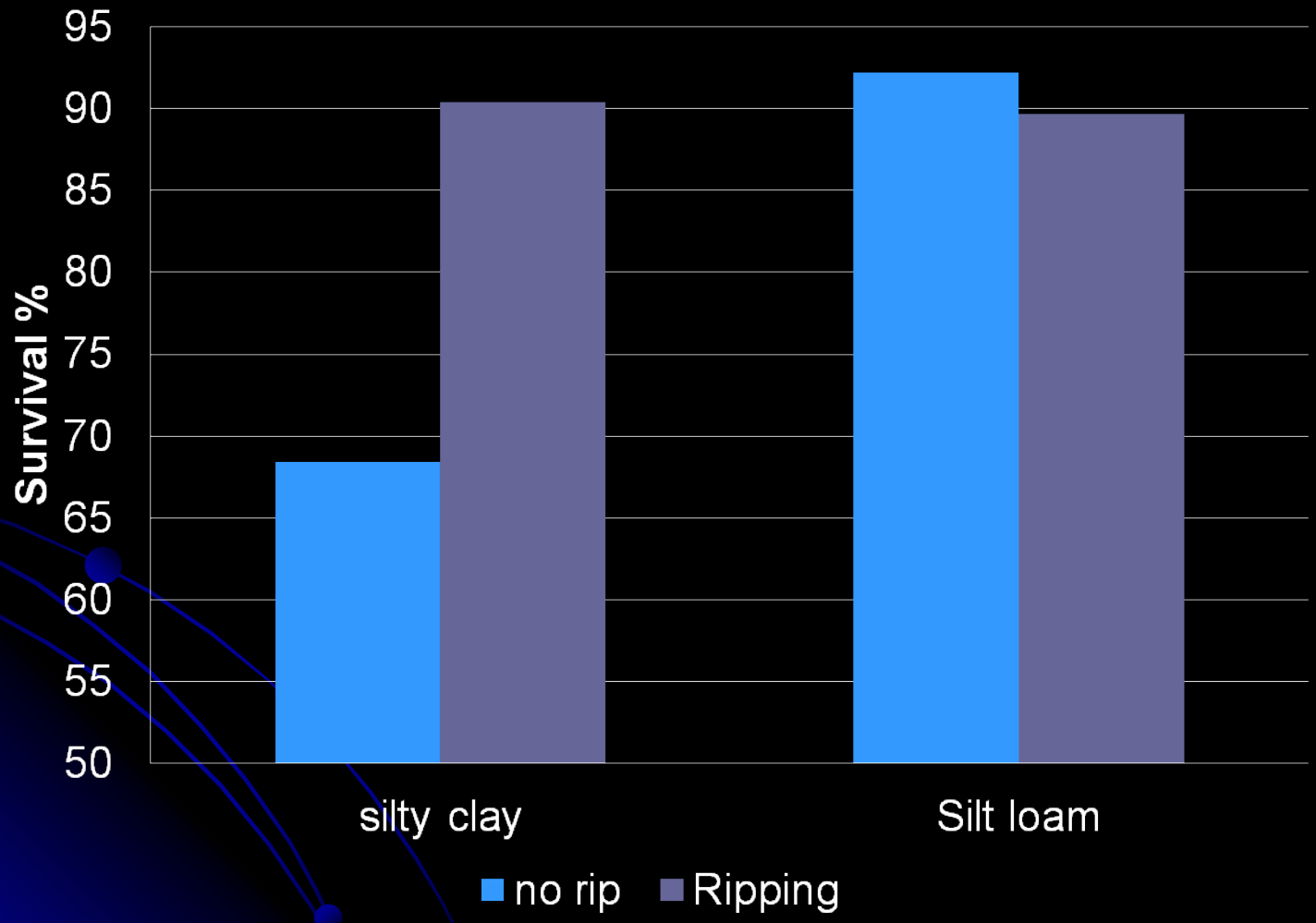


SCHULER 2007 - note 17.3” AArain for 2006 for AR planted in Jan

Ways to increase survival of hand-planted, bareroot stock before a 15” AA-rainfall summer

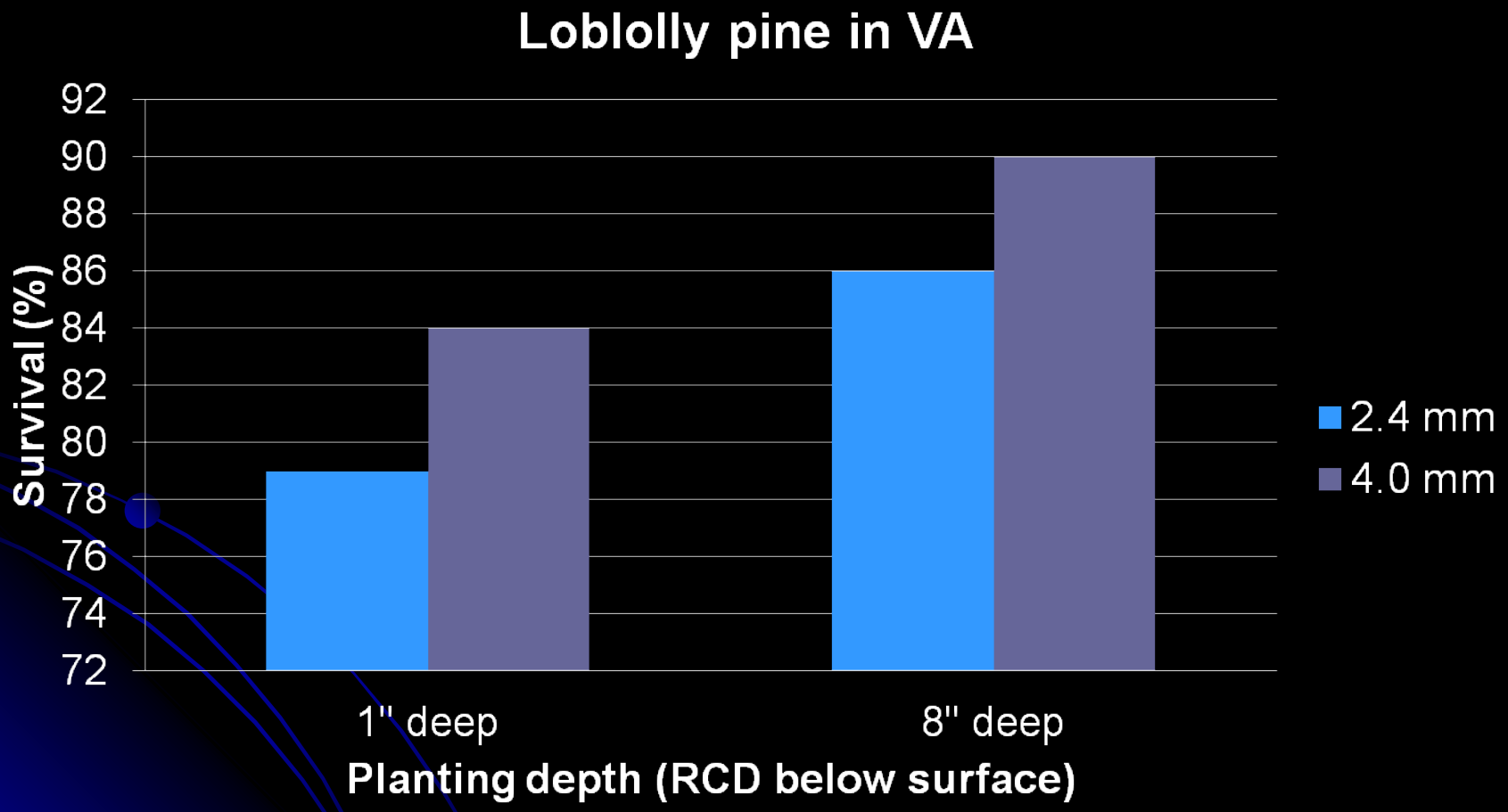
- When tree planters say they can’t make a deep hole (10-12”), rip the soil well ahead of planting

Ripping to 16” can increase survival by 0 to 22 points



SCHULER 2007 - note 17.3” AArain for 2006 for AR Planted in Jan

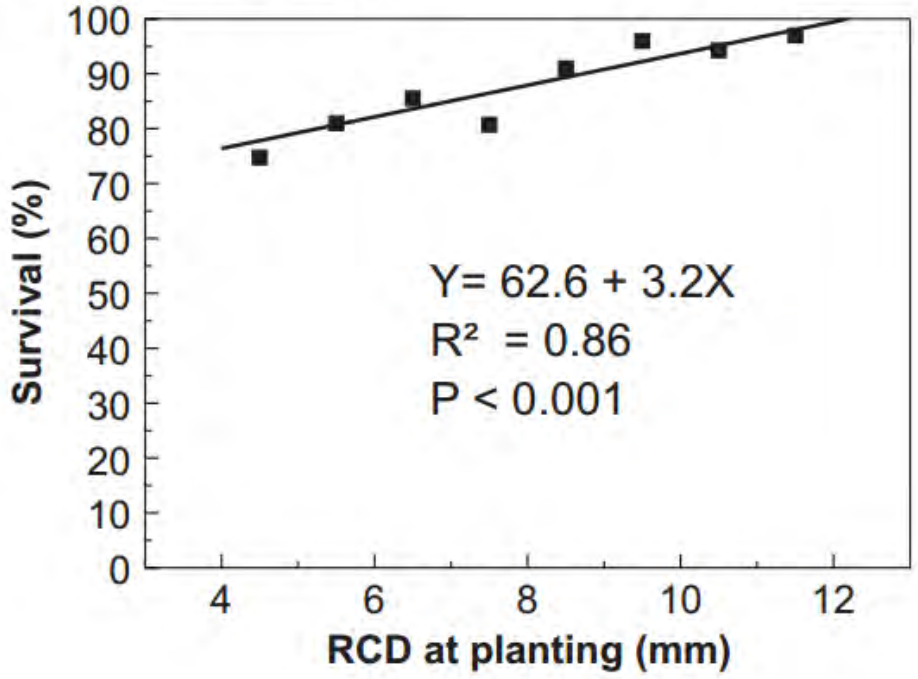
Planting 4 mm loblolly seedlings 8” deep can Increase survival by 11points (vs 2.4 mm RCD at normal depth)



Dierauf 1984; 17” AA-rainfall 1980

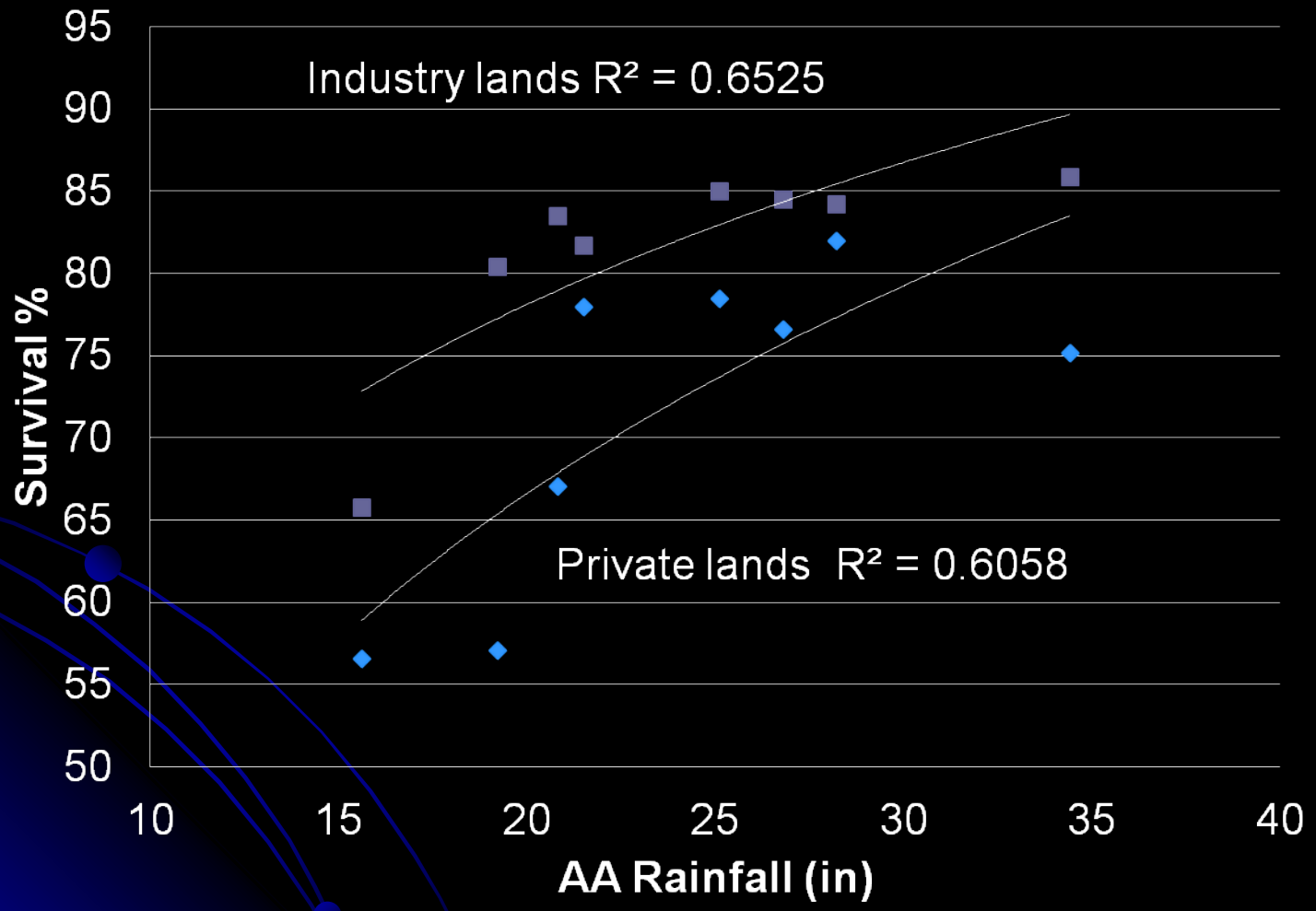
Planting 7-mm RCD seedlings may increase survival by 9 points (vs 4 mm)

Fig. 1. Relationship between first-year survival of *Pinus elliottii* seedlings (planted on a flatwoods site in Georgia) and initial root-collar diameter (RCD).



South and Mitchell 1999 Note: 21” AArain for 1992

Industry planting can increase survival by 10 points…. Why?



Industry planting can increase survival by 10 points…. Why?

Industry relies on:

Machine planting or ripping
Deeper holes and deep planting
No root pruning
Reliable planting crews
Better weed control
Earlier planting dates (contract crews work on large acreage first)

Industry planting can increase survival by 10 points…. Why?

Another answer… industry can plant seedlings deeper cause they do not have to follow Cost-Share guidelines.

(ie. Cost-share inspectors may reject payments due to bent roots)

Question

How do you determine
by October, that AA-rainfall next year will be less than 20”?

- Answer…. you can’t .
  In some regions, the probability might be 20%.

Summary

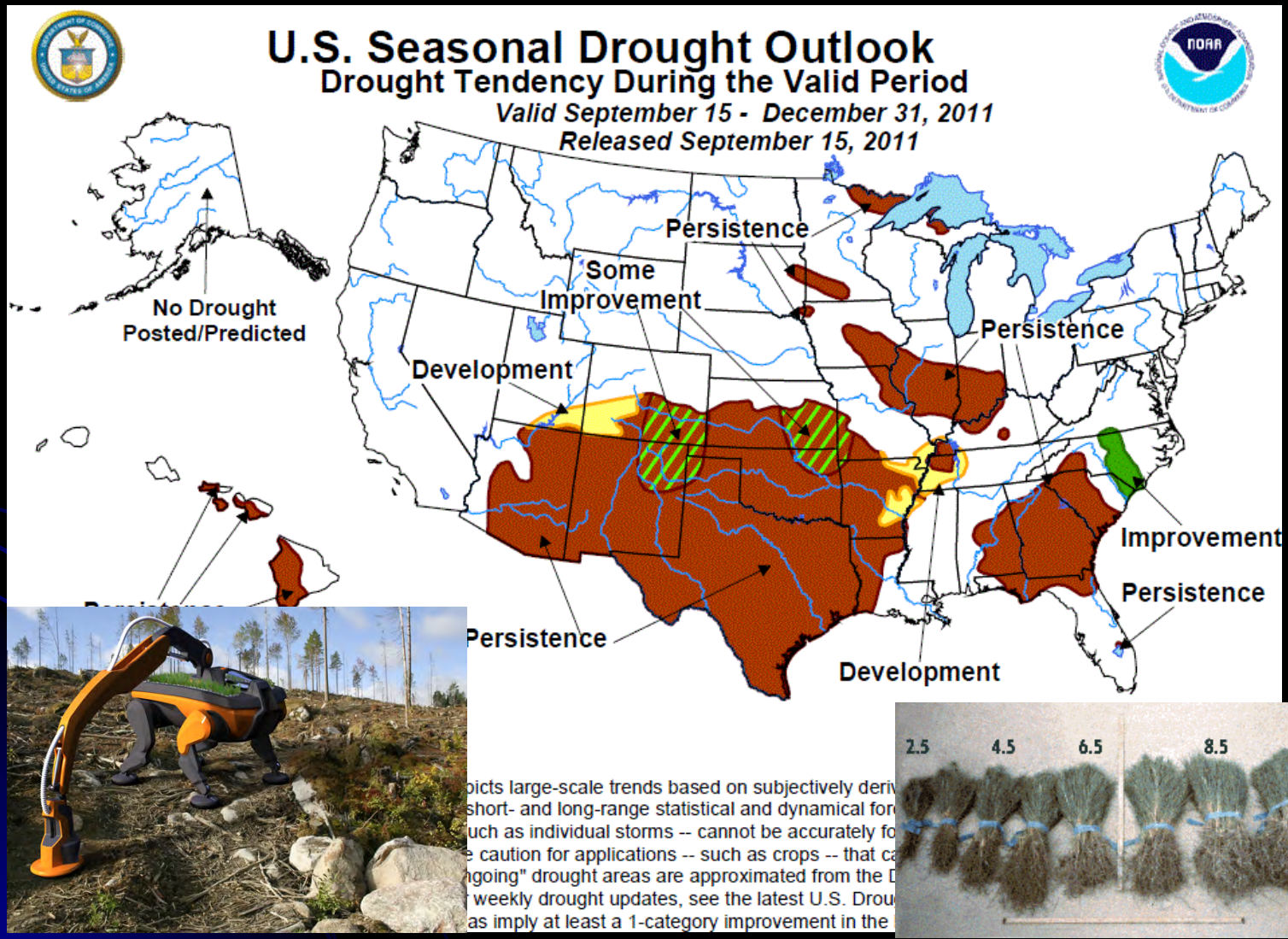
To obtain good survival of pines (with stems) during a summer with <20” of AA-rainfall on well drained sites;

(1) Make a deep hole and hot-plant large-diameter bareroot seedlings with RC

5” to 6” deep in the soil before mid-December (no root pruning).
or

(2) Plant container-grown stock in Oct or Nov with the root-collar 3” deep.

QUESTIONS?


U.S. Seasonal Drought Outlook
Drought Tendency During the Valid Period
Valid September 15 - December 31, 2011
Released September 15, 2011
NOAA
No Drought
Posted/Predicted
Persistence
Some
Improvement
Development
Persistence
Improvement
Persistence
Persistence
Development
2.5
4.5
6.5
8.5
10.5