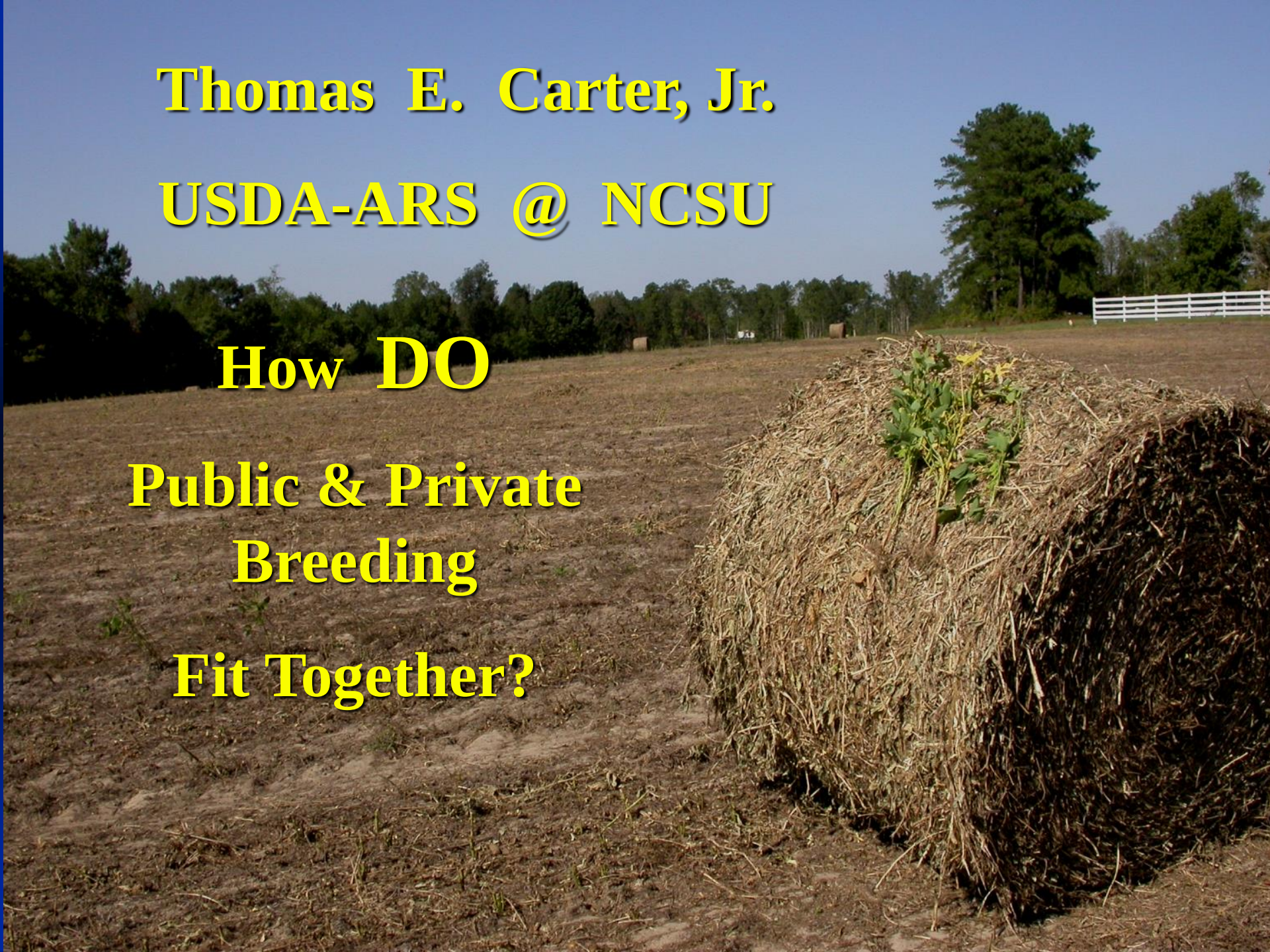

Thomas E. Carter, Jr.
USDA-ARS @ NCSU
How DO
Public & Private
Breeding
Fit Together?

First Came Public Breeding

The USDA Soy Breeding program started in 1943

On NCSU campus

1st in the South

Edgar Hartwig-

First Came Public Breeding

The USDA Soy Breeding program started in 1943

Then Charlie Brim

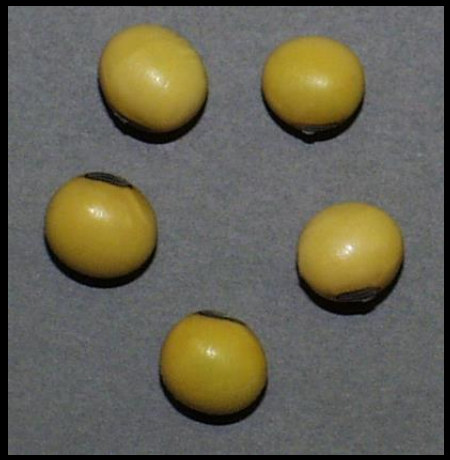
• Together they Released -

'Lee'

Soybean in 1953

Changed Soy from

to



- Successes -
  - **Set up 1st**

Winter Nursery in Soy-

Private Industry Winter Nursery in Puerto Rico

A $100-million Enterprise annually today

- Successes -

- **Released 1st Cyst Nematode Resistant Variety- Pickett**

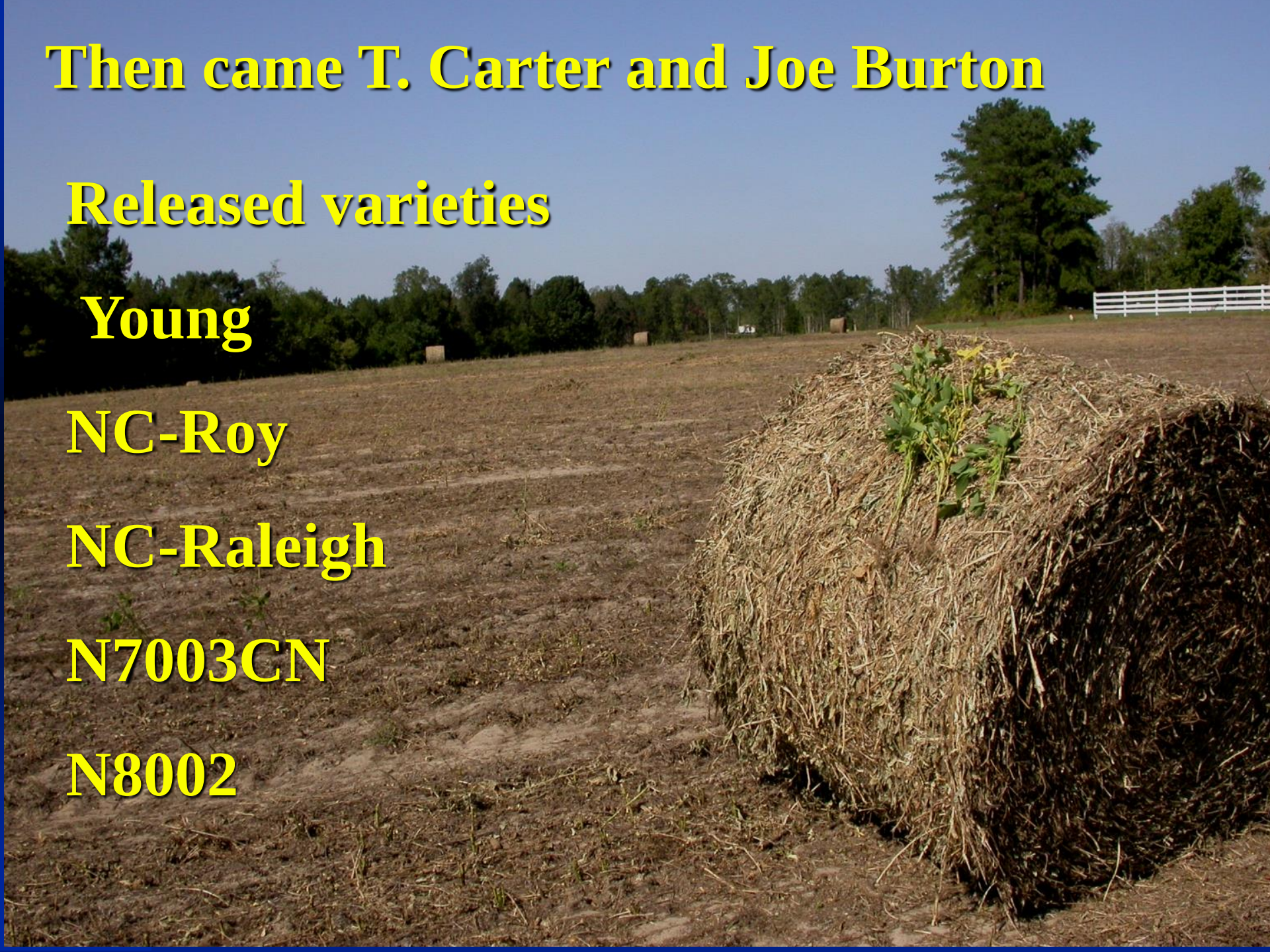
- **Developed Breeding Method that makes winter nursery work for Private Breeders**

SSD

GOOGLE scholar— ‘Single Seed Descent’

3370 papers !!

Soybean – 1730
Wheat - 1210
Maize - 1710
Peanut - 305
Sunflower - 196
Potato - 945
Alfalfa - 856
Tobacco - 1030
Sorghum - 354


Then came T. Carter and Joe Burton
Released varieties
Young
NC-Roy
NC-Raleigh
N7003CN
N8002


Big Change in 1995 - advent of Roundup Ready
Forced USDA to
Re-Think Mission
'Do WE need Public Breeding?'

Food For thought—

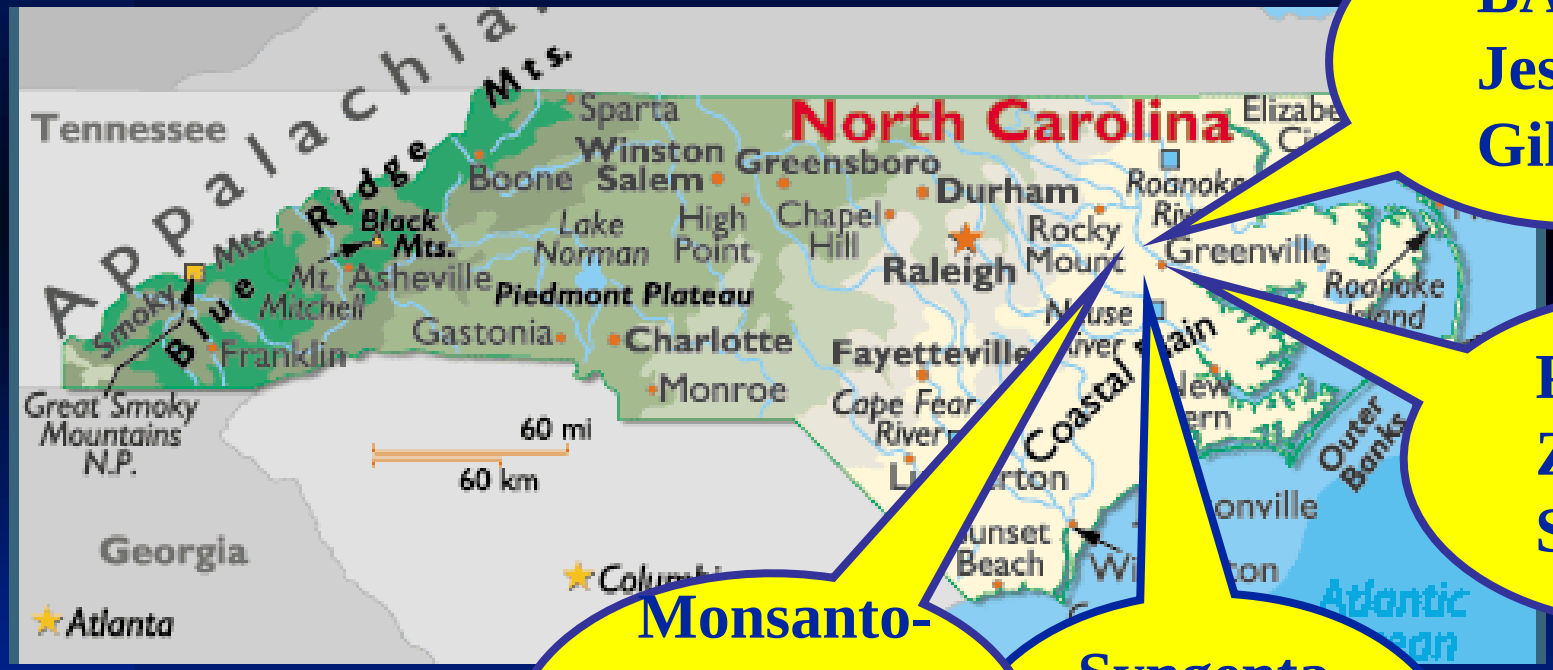
There is No University of Pioneer

Public Sector Trains Industry Staff

Four Private Soy Breeding Programs
In North Carolina

All Four are NCSU alums

We interact with these programs



BASF-
Jesse
Gilsinger

Pioneer-
Zach
Shearin

Monsanto-
Bayer
Dawn
Frazer

Syngenta-
Wesley
Hancock

More Food for Thought-

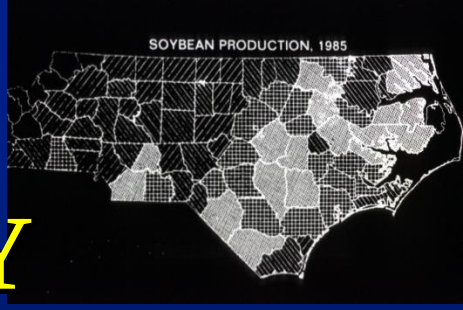
A Private Soy Breeding Program is like a Herd of Cows

How do you improve the Herd?

Where does New Stock Come from?

Public Breeding Provides Stock

USDA Soybean Unit on NCSU Campus TODAY



Over 20 people in our Unit

USDA Soybean Unit at NCSU

Tommy Carter & Rouf Mian - Soybean Breeders

Anna Locke - Plant Physiologist

Earl Taliercio - Molecular Geneticist

(Kent Burkey, plant physiologist)

Our Mission

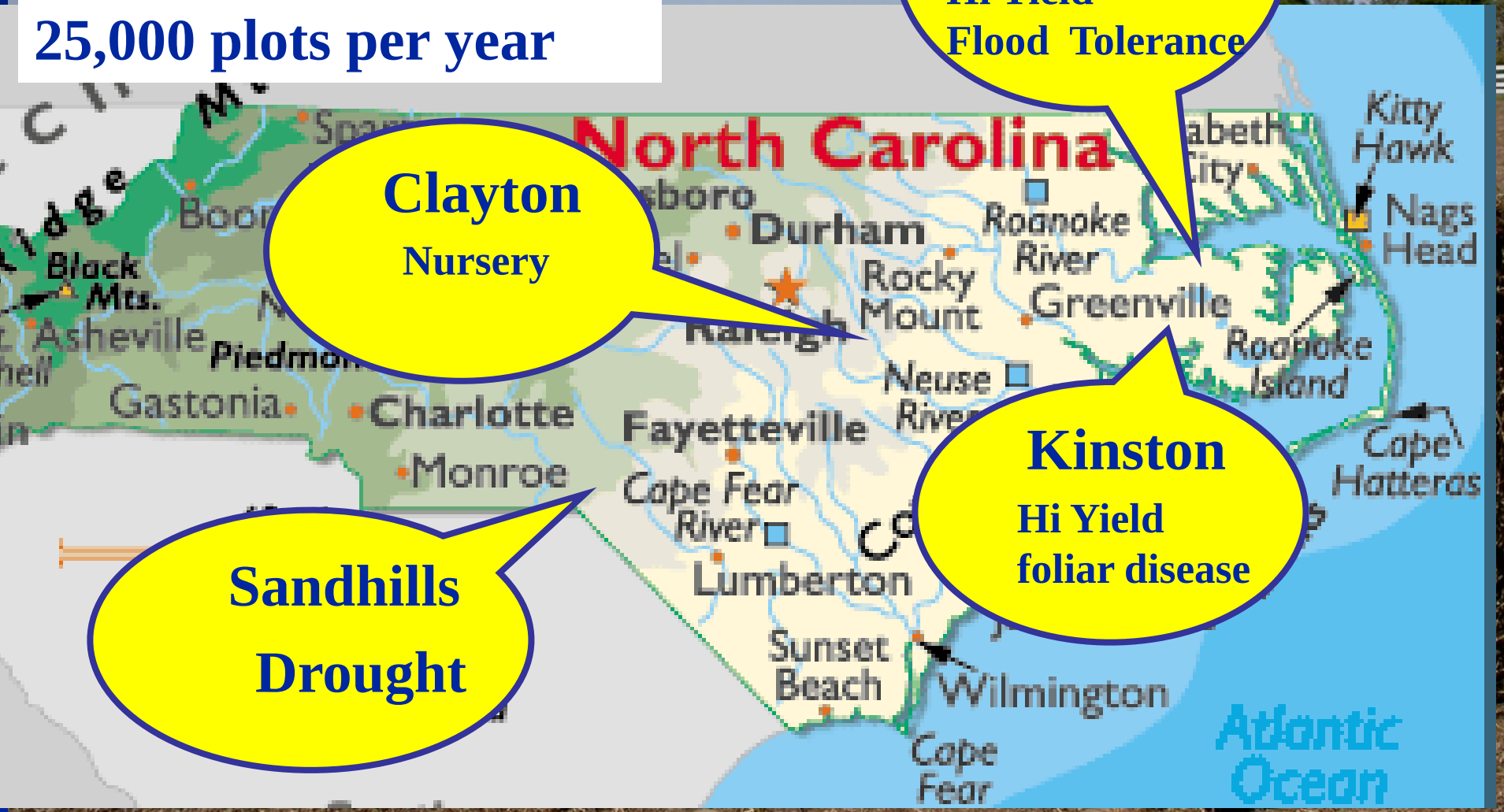
Make Soybean More Profitable in the South

- ✓ Drought, Heat and Flood Tolerance
- ✓Break the Yield Ceiling
- ✓Higher Protein in Seed (competition with S.A.)

- ✓Accomplish these Goals using Exotic Breeding Stock from Around the World-Wild & Domesticated

USDA Soybean Unit at NCSU

25,000 plots per year



Plymouth

Hi Yield
Flood Tolerance

Clayton

Nursery

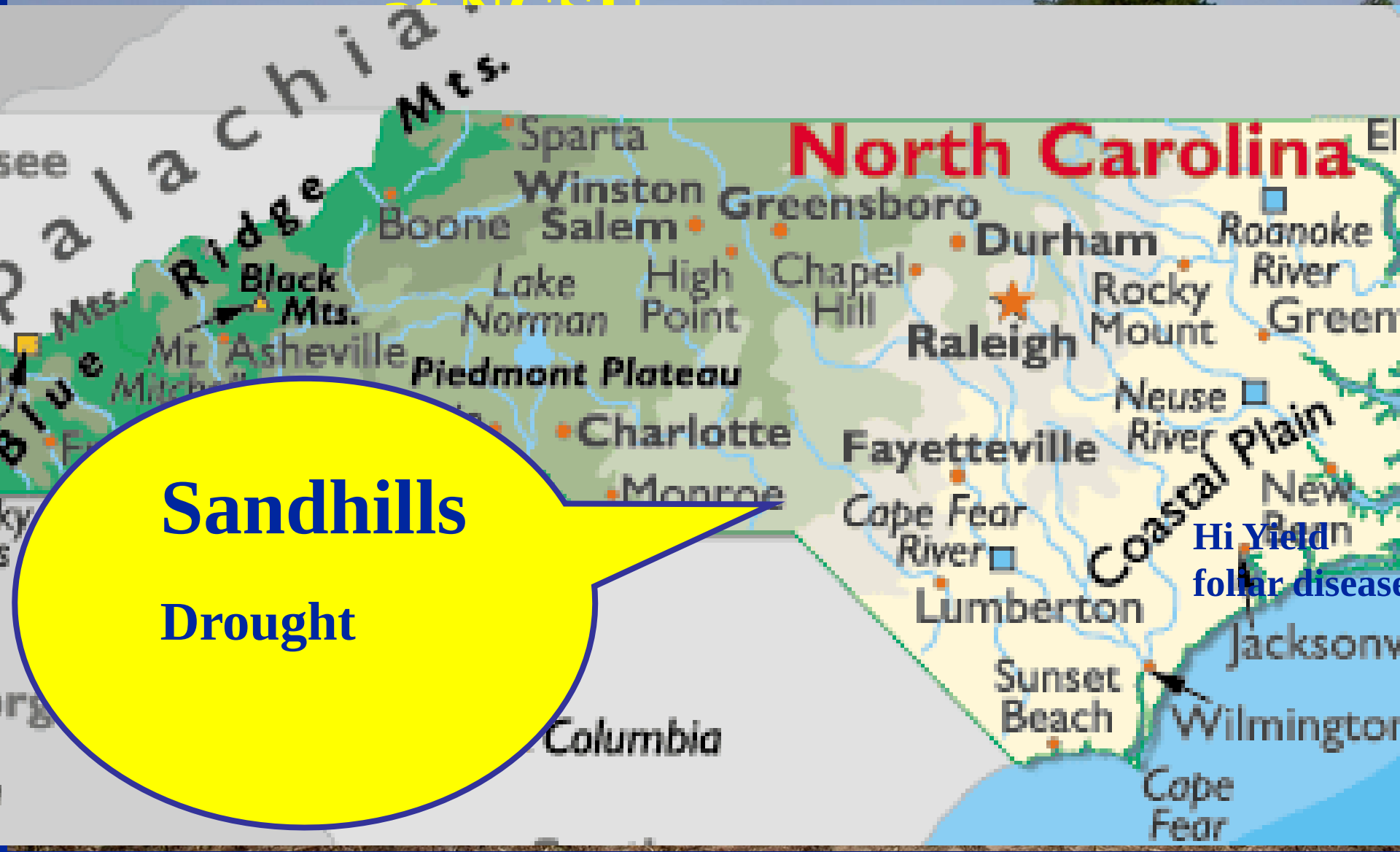
Kinston

Hi Yield
foliar disease

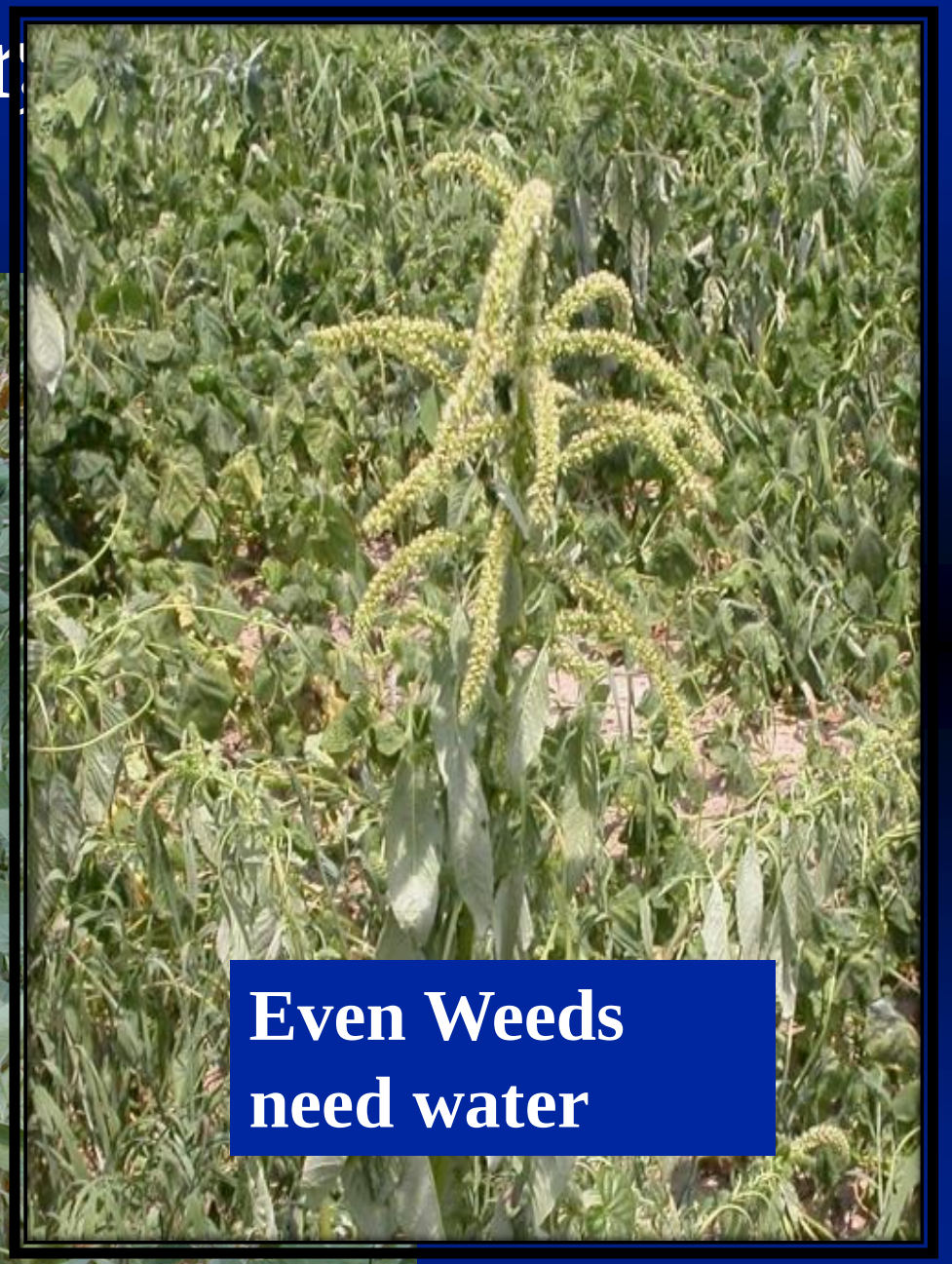
Sandhills

Drought

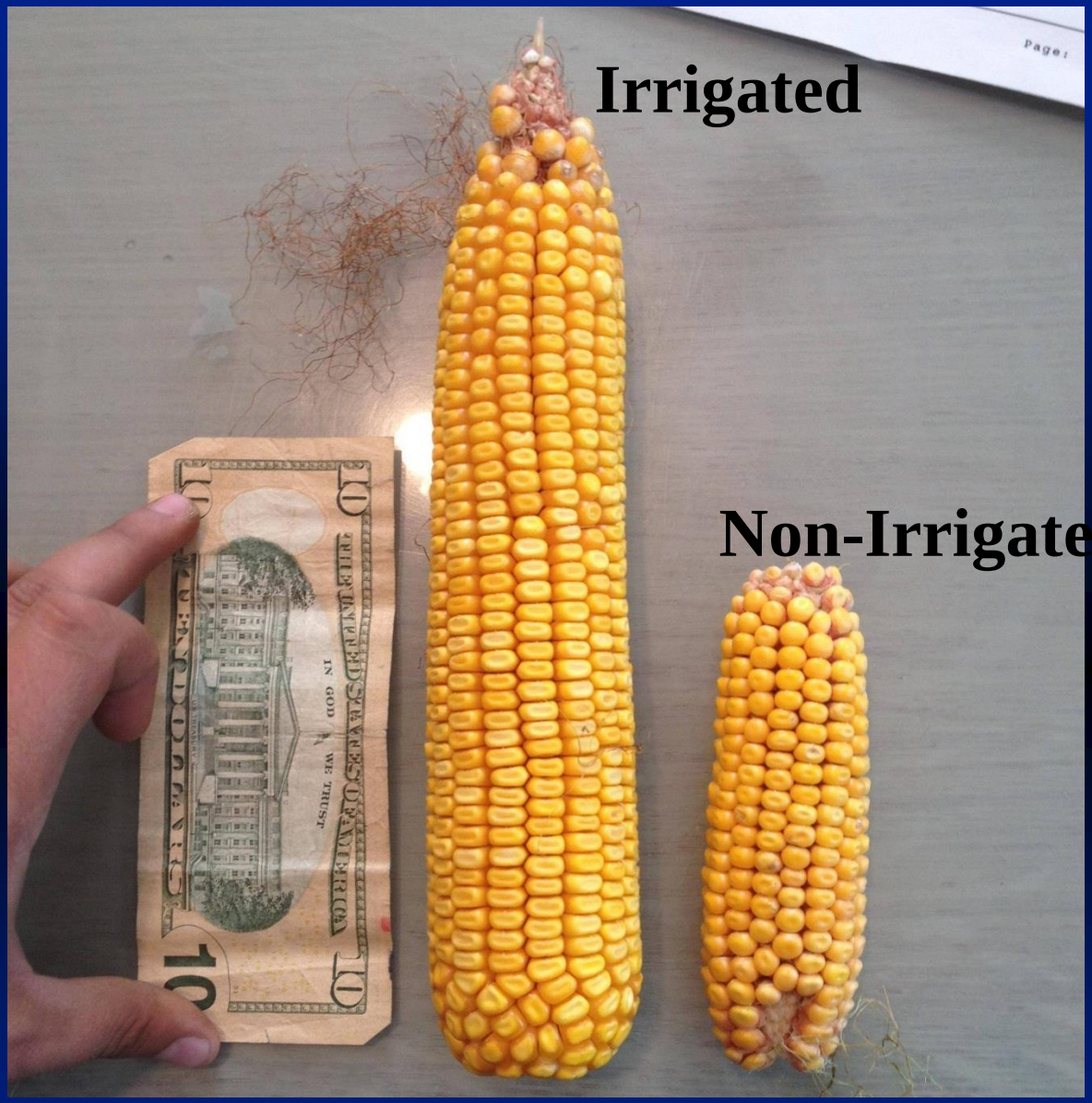
USDA Soybean Unit at NCSU



Plants need water; a lot of it.



Even Weeds need water

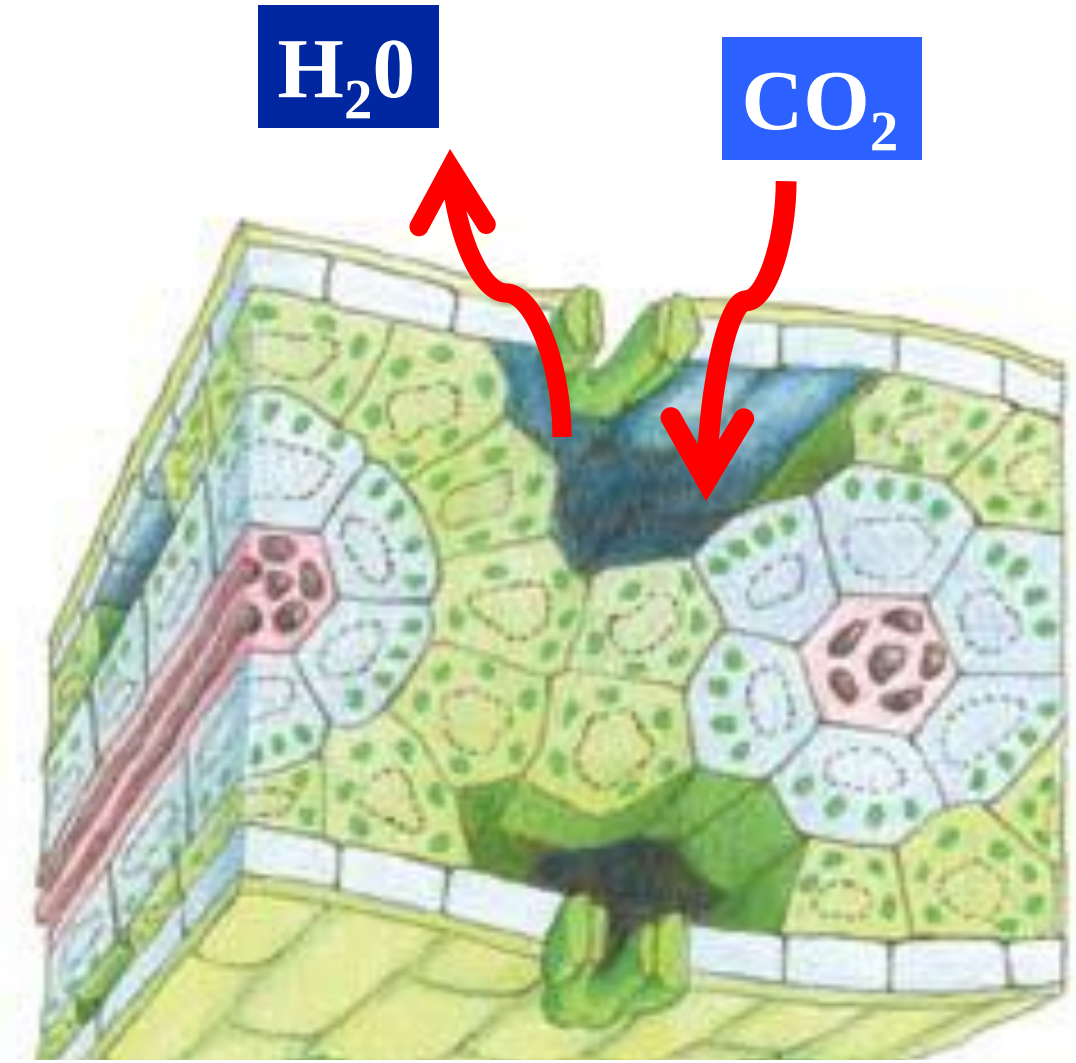


Comparison of irrigated and non-irrigated corn gr

Why is drought a problem for plants?

To Grow (trap carbon from the air)

Plants Must Lose Water



Leaf Cross Section

How many gallons of water does it take to grow an acre of crop like soybean?

It takes about

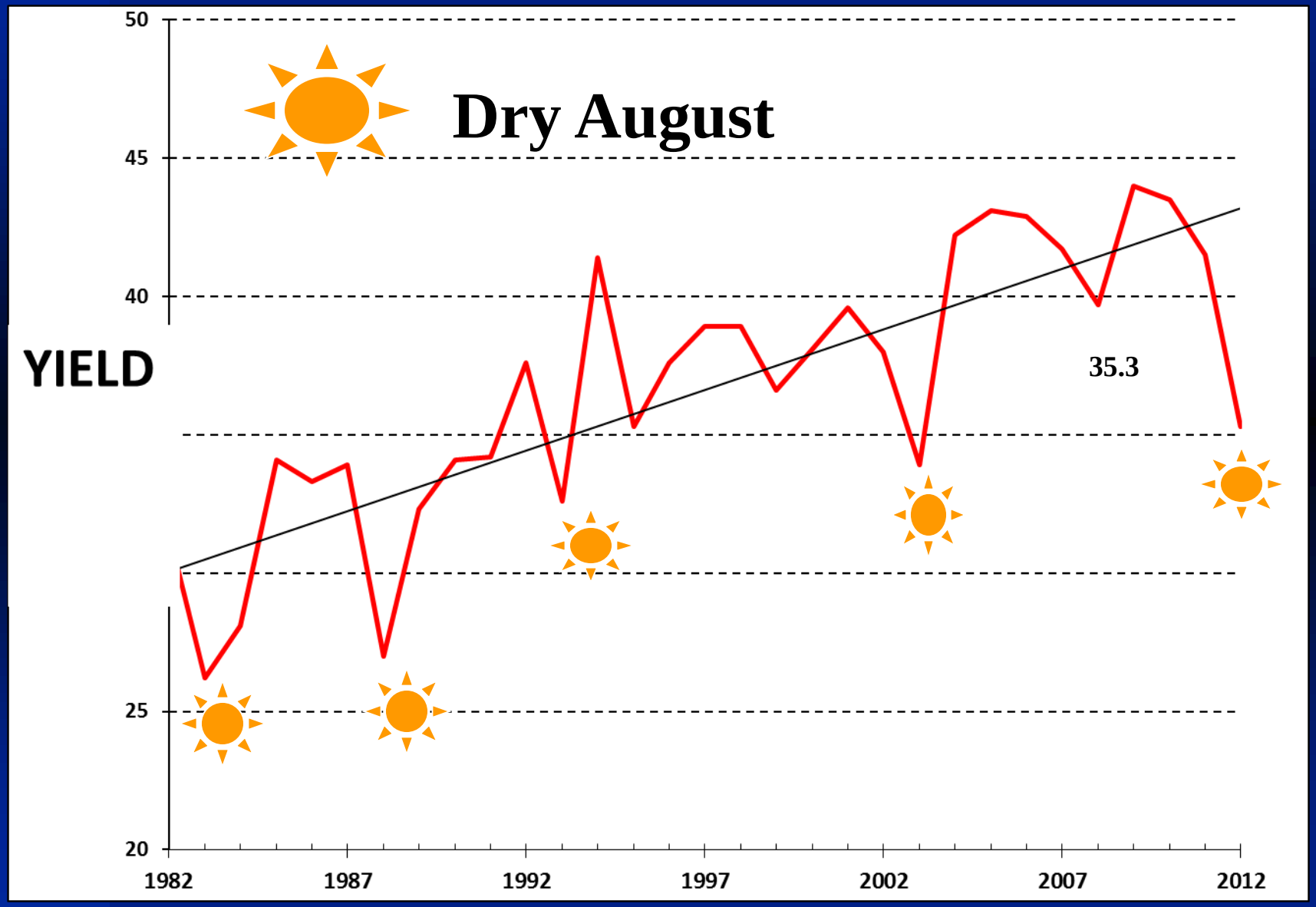
500,000 gallons.

This water tower holds about 300,000 gallons of water, Enough for 3/5 of an acre.

Bean Economics

Only about 15% of soybeans are irrigated

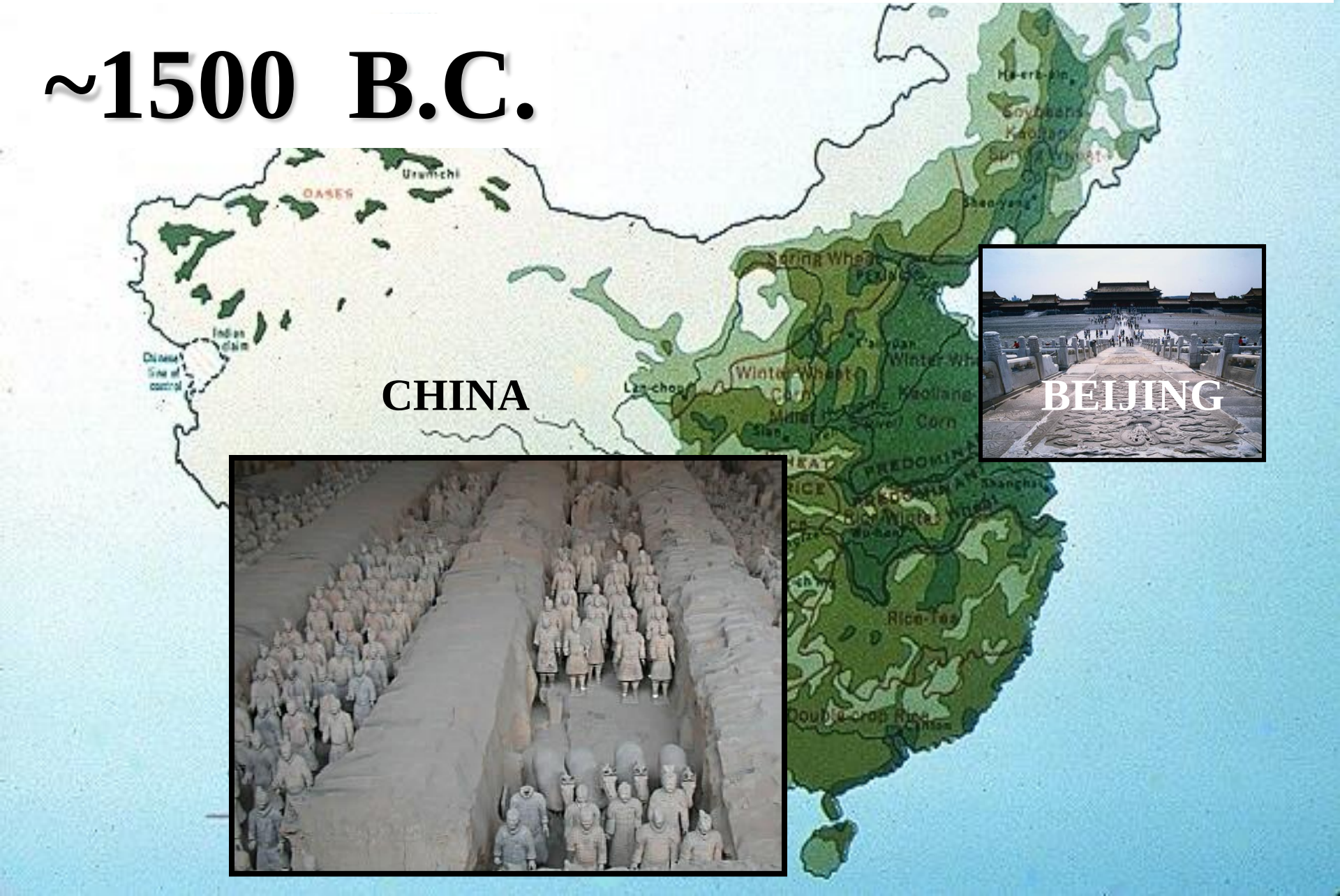
U.S. Soybean Yield – August Drought




How Do we Attack the
Drought Problem using
Breeding?

DOMESTICATION OF SOYBEAN

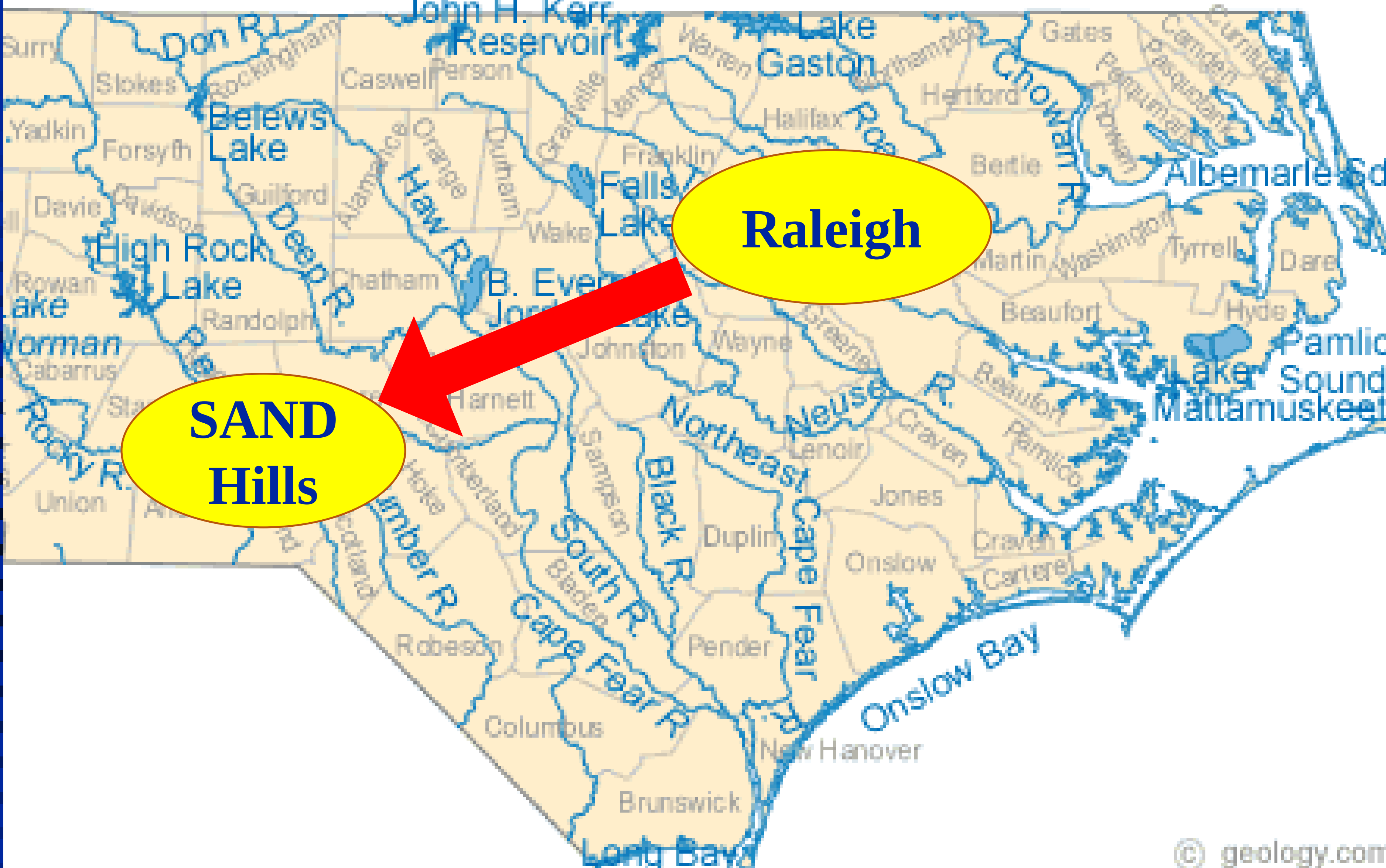
~1500 B.C.



3000 Years of On Farm Breeding

More than 20,000 Types of Soybean Developed by farmers - and Collected

By USDA


Raleigh
SAND
Hills
John H. Kerr Reservoir
Lake Gaston
Belews Lake
High Rock Lake
Falls Lake
B. Everett Jordan Lake
Albemarle Sd.
Pamlico Sound
Lake Mattamuskeet
Onslow Bay
Long Bay
Dan R.
Haw R.
Deep R.
Neuse R.
Northeast Cape Fear R.
Black R.
South R.
Cape Fear R.
Lumber R.
Chowan R.
Roanoke R.
Rocky R.
Surry
Stokes
Rockingham
Caswell
Person
Granville
Vance
Warren
Northampton
Gates
Hertford
Halifax
Bertie
Yadkin
Forsyth
Guilford
Alamance
Orange
Durham
Franklin
Davie
Wake
Rowan
Randolph
Chatham
Martin
Washington
Tyrrell
Dare
Beaufort
Hyde
Cabarrus
Harnett
Johnston
Wayne
Greene
Lenoir
Craven
Pamlico
Union
Jones
Duplin
Sampson
Onslow
Carteret
Cumberland
Hoke
Scotland
Bladen
Robeson
Pender
Columbus
New Hanover
Brunswick
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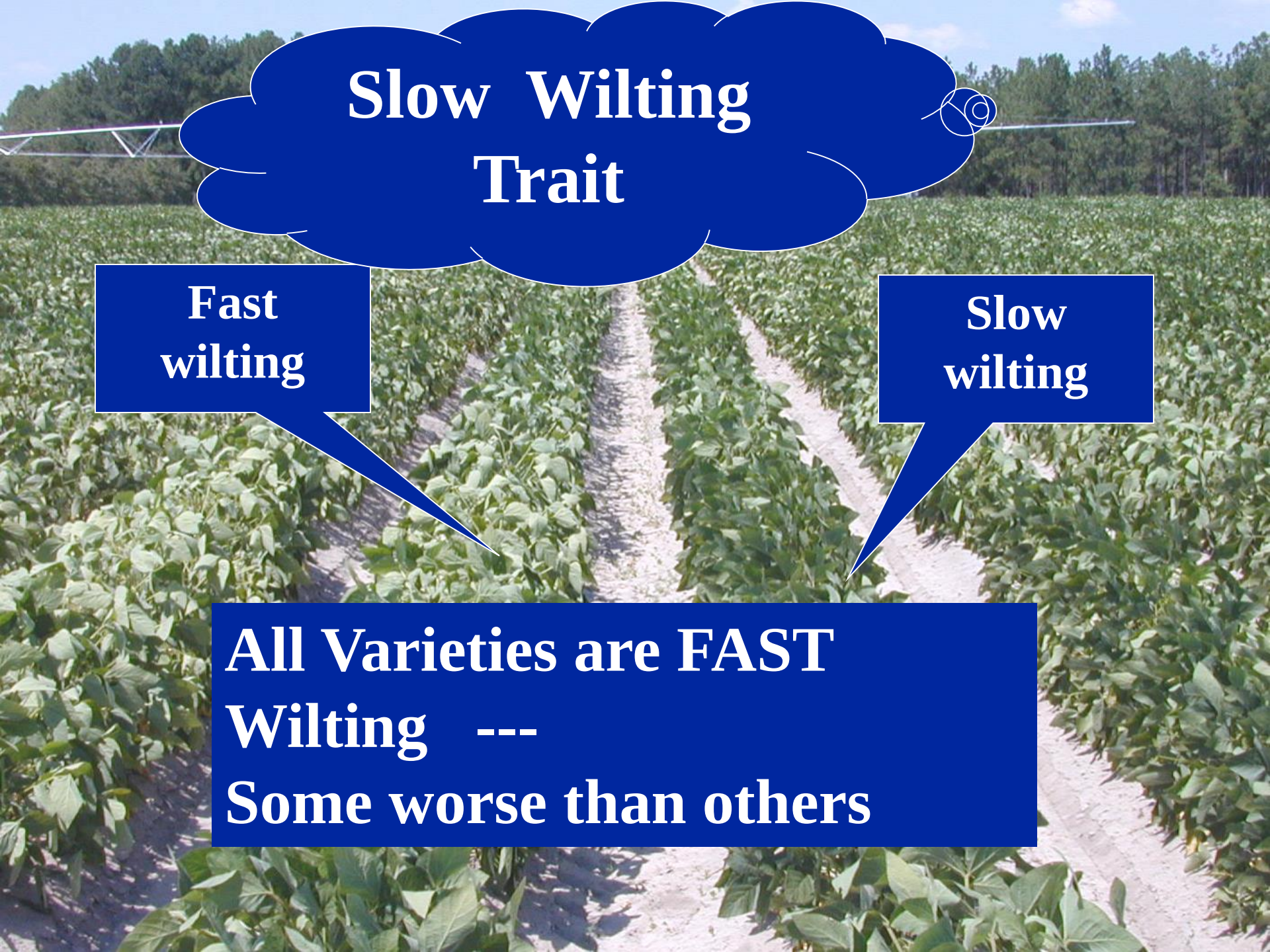
SANDHILLS Research Station, NC
USDA & N.C. State University


Slow Wilting Trait
Fast wilting
Slow wilting
All Varieties are FAST Wilting ---
Some worse than others

Screened 5,000 soybean types

Discovered 10 Slow wilting types

Spent 20 Years of R&D

Field Day in North Carolina

Proof of Concept

New USDA Drought Variety N8002