Welcome to the webinar!

- The webinar will start at the top of the hour.
- To type in a question, use the question box on your control panel. We will read the questions aloud after the c. 45 minute presentation.
- The webinar is being recorded and you can find all recordings as well as upcoming NAPB webinars at http://www.extension.org/pages/60426

extension

PBGworks
Home of the Plant Breeding and Genomics Community of Practice

National Association of Plant Breeders
NAPB
Improving Plants to Improve Lives

From Depression Era Mules to the Moon and Back

Johnie N. Jenkins

Johnie N. Jenkins

From Depression Era Mules to the Moon and Back

Johnie N. Jenkins

Aerial View of ARS Complex on Mississippi State Campus

2014 Personnel & Budget

22 Scientists

46 Administrative/Technicians

Budget $8,506,000

White Gold

Spring 1961 ARS Boll Weevil Laboratory Under Construction

Boll Weevil the Key Pest in Cotton Insect Control

Mission of ARS

at

Mississippi State in 1961

Develop the Technology to Eradicate Boll Weevil.

Boll Weevil Life Stages and Weevil Feeding on Cotton Boll.

Early attempts to control boll weevil with machine to knock Weevils off plants and into a metal container

Duster using Calcium arsenate to control boll weevil

Applying dust (Ca arsenate) for boll weevil control

Application of dust insecticide with multiple row machine

Boll weevil genetics: Left wild type, Center F1 slate, Right ebony

Boll weevil Pheromone Trap a component of eradication

Boll Weevil
NOW ERADICATED !!!

Cotton bollworm/tobacco budworm complex

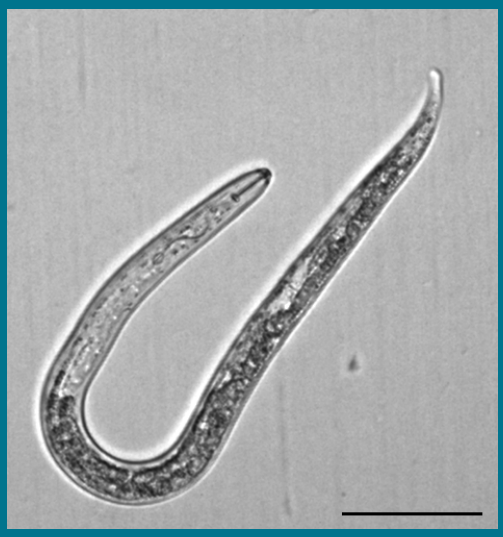
The world's first field plots of Bt transgenic cotton were grown by ARS in Mississippi in cooperation with Industry

Transgenic Bt Cotton in Mississippi

Non-transgenic cotton plot in Mississippi

Johnie N. Jenkins showing contrast of non-transgenic and transgenic Bt cotton

Boll Worms CONTROLLED !!!



Nematodes achieve status as major pest of cotton
ARS in Mississippi conduct research for plant resistance
And DNA markers for resistance genes

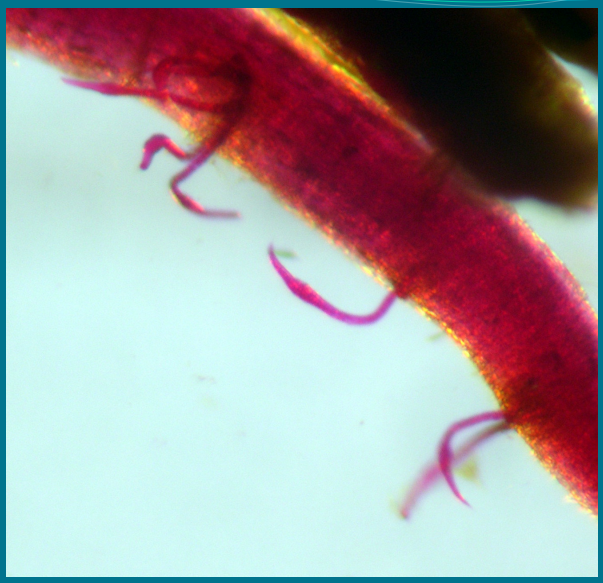
Cotton roots showing root-knot nematode

Cotton roots with root-knot nematode

2010 We published Two markers for RKN

2012 We proved that MAS worked for RKN

First Resistant Varieties Commercially Available in 2014



Reniform nematode major pest of cotton

Reniform nematode egg masses on cotton root
Stained with trypan blue 0.25%

2012 ARS in MS Made a Germplasm Release of 3 Reniform Nematode Resistant Genes and Markers From GB713

Diversity in wild cotton; green, white, brown lint

Wild Species of cotton in greenhouse in MS

Wild photoperiodic cotton plant in winter nursery in Mexico

F2 population in Mississippi from cross of wild G. hirsutum with cultivar. Notice most plants do not flower; however a few have some early bolls.

It is a long way from a useful gene in wild cotton to cultivars

White Gold

From Depression Era Mules
to the
Moon and Back

My Lifetime Journey
with Cotton

Animal Power used until late 1930's

Early tractor

Early Pickup truck

DNA Double Helix 1953
"The secret of life"
For decades the Eagle was the local pub for scientists from the nearby Cavendish Laboratory.
It was here on February 28th 1953 that Francis Crick and James Watson first announced their discovery of how DNA carries genetic information.
Unveiled by James Watson
25th April 2003

THE
EAGLE
The most famous pub in Cambridge
DELICIOUS HOME COOKED FOOD
AVAILABLE ALL DAY EVERY DAY
Traditional Courtyard
LICENSED HOURS 11am - 11pm DAILY
12pm - 10.30pm SUNDAY
USE OF COURTYARD NOT PERMITTED AFTER 10.30pm
NO PARKING

Modern Tractor with GPS Guidance System

1937 MS Cotton Crop

3,449,000 Acres
640 acres per sq mile
5,389 square miles of cotton
A block of cotton73.41 miles by 73.41 miles
If 40 acres per family/sharecropper farm=16 farms per sq mile
86,225 farms of 40 acres each
Production =2.692 million bales

2004 MS Cotton Crop

1,120,000 Acres
640 acres per sq mile
1,750 square miles of cotton
A block of cotton 41.8 miles by 41.8 miles
If 5,000 acres per family farm
224 family farms

Production 1937= 3.449 M acres=2.692 M bales
Production 2004 = 1.120 M acres =2.346 M bales

Breaking Ground

Early breaking plows and cultivators

1937 MS Cotton Crop

3,449,000 Acres

12” turning Plow requires 8.3 miles of walking and plowing to turn 1 acre.

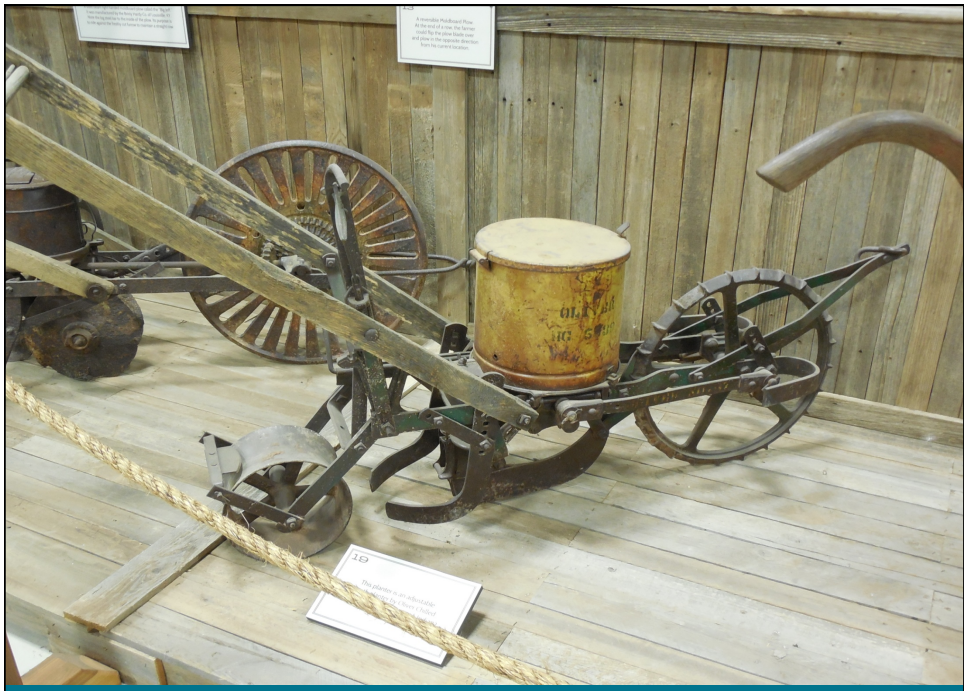
3.449 M acres x 8.3 = 28,626,711 miles.

Equal to 1,145 times around the earth at equator

With 100,000 men plowing = 286 miles per man

Planting of Cotton

One Row Planter



One Row Planter

Planting the 1937 MS crop of
3,449,000 Acres Required
Walking 8,553,520 Miles
342 times around the earth

Major Invention: Two Row Planter. Operator Now Rides Planter Instead of Walking

Modern 12 Row Planter. Some Growers have 32 Row Planters

1962 Research Plot Cotton Planter. Seed placed on Belt by Hand

2014 6 Row Research Planter, Computer Controlled Variable Seed Spacing Vacuum Planter

2013 Veris Machine. Records GPS Coordinates and Soil EC, pH, and Soil Organic Matter in one Pass

Cultivation of Cotton

Cultivating Cotton. Required 2 Trips. Once Down Each Side of Row

Cultivating Cotton One Row at a Time

A Common Cultivating Scene in the 1930's

1937 MS Cotton Crop 3,449,000 Acres

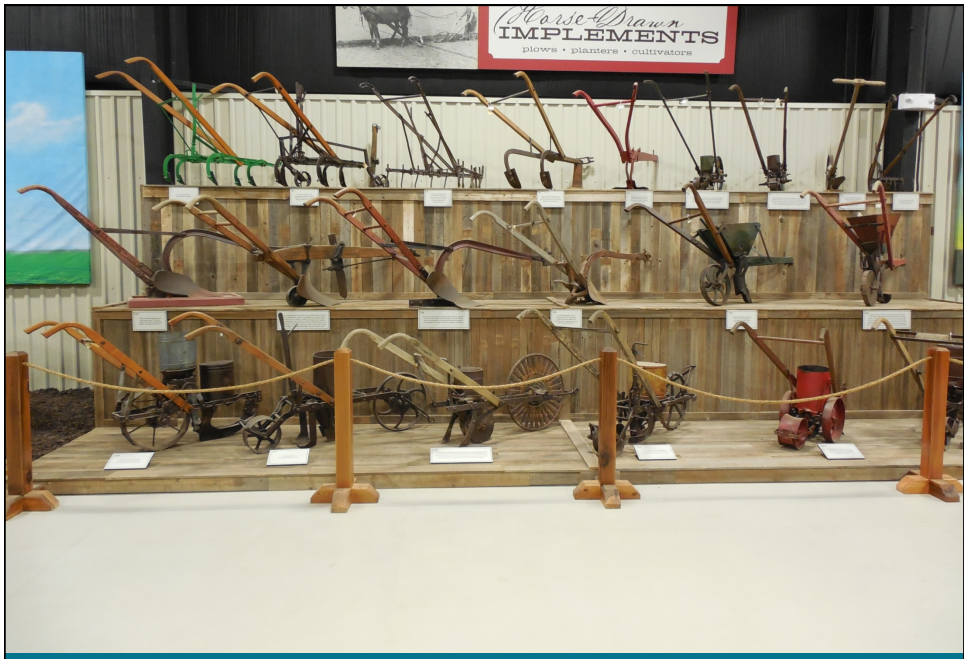
Cultivation once down each side of row a plowman walks 5 miles to plow one acre.

A plowman plows 4 acres per day & walks 20 miles.

17,245,000 miles walked to cultivate one time.

Equal to 690 times around the earth.

862,250 man days to cultivate one time.



Early One Row Plows, Planters, and Fertilizer Distributors

Major Invention. Cultivator that Cultivates Both Sides of Row

12 Row Cultivator

Growing Cotton

Modern Center Pivot Irrigation System

Modern Land Formed Poly Pipe Irrigation System

Insect Control in Cotton

The Boll Weevil Dominated Insect Control Before Eradication
Requiring Insecticide Sprays every 3-5 Days

Early Insecticide Dust Applications for Boll Weevil

Early(about 1930) Application of Dust Insecticides by Airplane
Delta Airlines was Formed by Early Ag Pilots

Applications of Dust Insecticide in Early Days of Aerial Application

Liquid Insecticides Applicators in Early 1960's

Closed Cab Insecticide Applicator

Modern Aerial Application of Insecticides or Herbicides

Modern Aerial Applicator

Aerial Biwing Applicator

Harvesting Cotton

Cotton Picking by Hand was Long Hours and Tired Backs

Common Cotton Picking Scene before 1945 Involved Entire Family

Early Cotton Picker mounted on a tractor

Early one row picker mounted on a tractor

Two row picker a major

Modern 4 row pickers

Recent Module Builder 6 Row Pickers

Round wrapped John Deere Picker Module

Farm Headquarters with Approximately $100,000 of Cotton in Modules

1937 – 2.692 million bales produced*
No mechanical pickers –
How many people did it take to harvest 2.692 million bales….
Assumption:
Takes about 5 Olympic Gold Medal Cotton Pickers to pick a bale of lint in a day (300 pounds seedcotton/man) ..
So – 5 X 2.692M = 13,466,000 man-days…..just to pick it

1937 - Produced 2,692,000 bales (state record still stands)
from 3,449,000 acres – av. Yield was 377 lbs. lint/ac
Today – one of these can pick over 100 + BALES per day
It takes about FIVE "SUPER STAR" hand pickers to pick ONE BALE per day.
If each cotton-picker preformed at "SUPER STAR" levels – It required over 13,000,000 man days just to pick the 1937 crop off the stalk.
Modern 6 Row Module Building Picker Cost More than $500,000 Each

Ginning Cotton

Early Jerky Gin for naked seed cotton grown in Asia

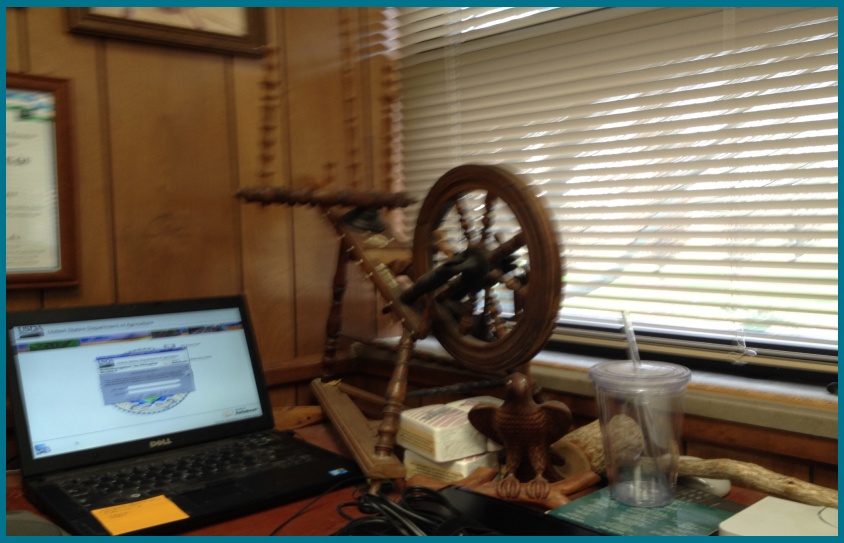
Hand Cranked Gin Similar to Eli Whitney's Gin in America 1793

Typical Gin from about 1930 to early 1950. Belt Driven

Modern High Speed Gin. All Electric

Modern Computer Controlled High Speed Gin

Spinning Cotton



Hand Spinning Wheel for Cotton, Wool or Flax
Spinning Jenny was Invented 1764 Patented 1770

Starkville Mills Inc. Many Mills Operated in MS.
This mill was built in 1901 and closed in 1962.
Stonewall Mill build in 1868 and was last mill in MS
to close in 2002. In 1901 Mississippi State University
had a textile school complete with spinning mill..

Starkville Mills in 2014 being Renovated into the Mill Convention Center

Starkville Mills

1901 City authorized $125,000 to build

Closed in 1962

Spun yarn and wove into cloth.

Starkville Chambray in 8 colors was produced at one time and shipped around world for fine cloth.

Life Also Advances

1962 shortly after I came to the ARS Boll Weevil Lab

Johnie N. Jenkins and a group of graduate students in Arch Monument in St. Louis where we had visited Monsanto and their biotechnology program

Time waits for No Man. Cotton Breeders Tour in 2011

Our Current Research

Developing Breeding Pop Useful For next 50 Years

CSL	3 Tetraploid Species
RMUP	11 Diverse Cultivars
RMBUP	CSB
RMPAP	Exotic Cottons

Our Current Research

Developing Breeding Pop Useful For next 50 Years

555 RIL from RMUP Map Fiber & Yield

180 RIL RMBUP for Map Traits

Assoc Map NCVT with 50 years of Data

RNAi to Modify Phytochrome Production

White Gold has been Good to Me

- Find all upcoming and archived webinars at http://www.extension.org/pages/60426
- Find the recording for this webinar at http://www.extension.org/pages/72707
- Have a question about plant breeding? Use the eXtension Ask an Expert service at https://ask.extension.org/groups/1714/ask
- Thank you for coming!