SAVING THE OZARK CHINQUAPINS

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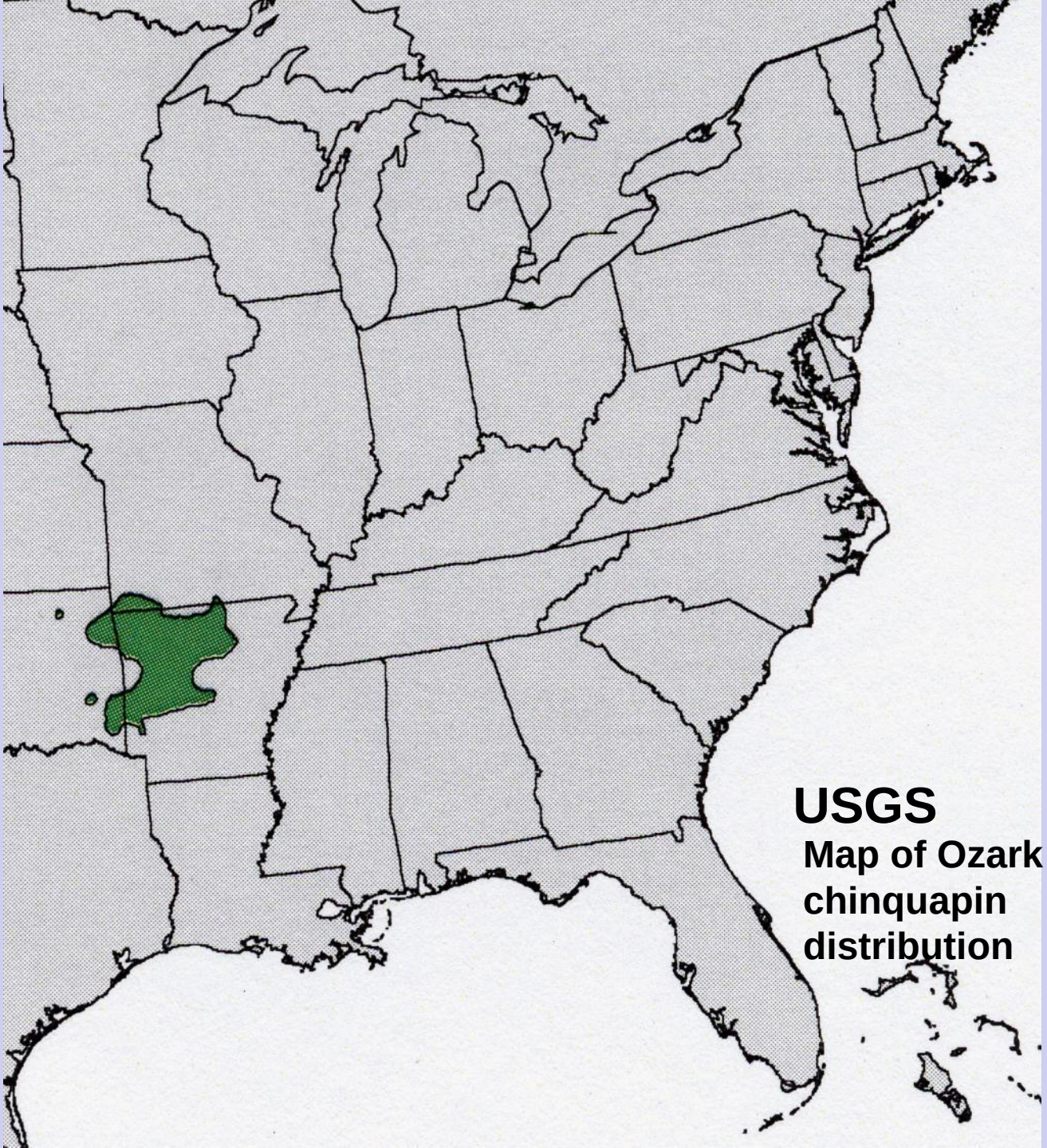
chestnut bur three nuts/bur

chinquapin burs one nut/bur

American chestnuts and chinquapins are still found in the woods, but you can't assume that a tree is really a pure species of one of these.

Planted in NW Arkansas in the past

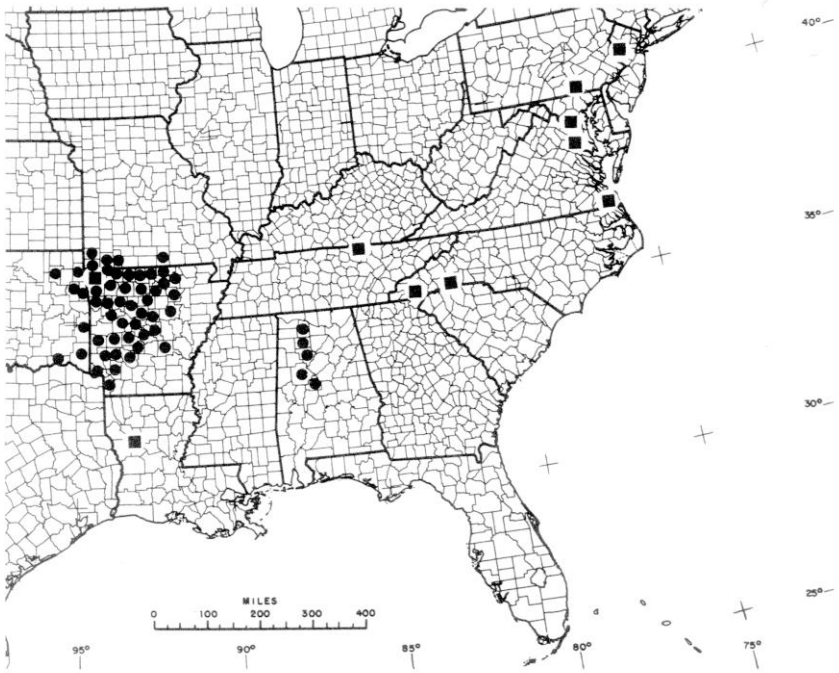
- **Springdale (J. R. Cooper): 1915, 1916, 1931, 1932**
  78 Chinese and 100 Japanese
- **Jasper, Koen Forest (U.S. Forest Service): 1953**
  100 Chinese
- **Hot Springs (Ouichita National Forest): 1952**
  122 Chinese and 30 chinquapin hybrids
- **Mena (U.S. Forest Service): 1953**
  100 hybrids
- **Omaha (V. R. Jones): 1931**
  35 Chinese
- **Russellville (U.S. Forest Service): 1938, 1939**
  998 Chinese and "several" chinquapin hybrids



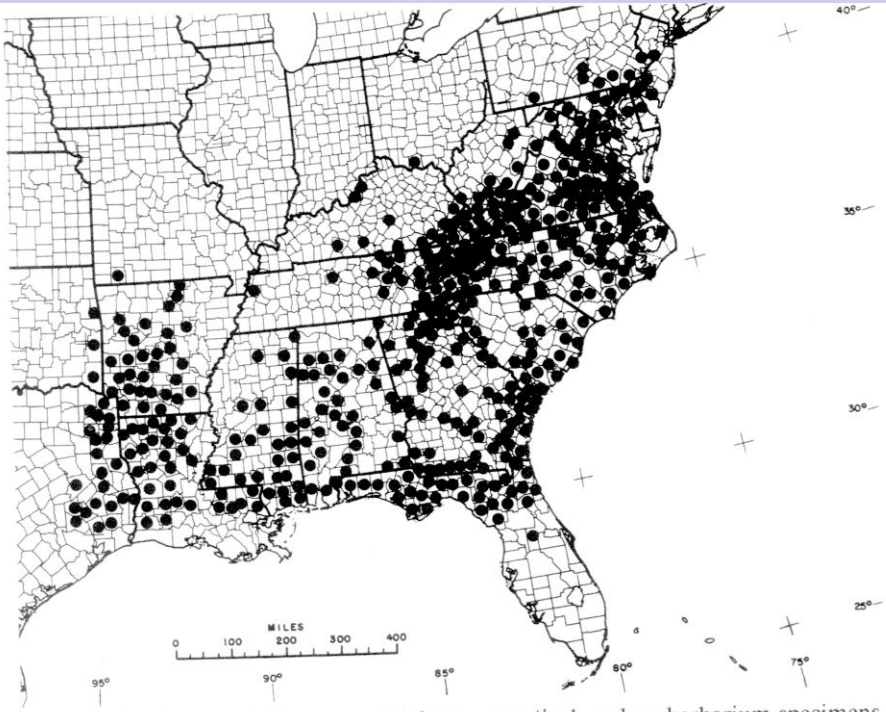
USGS

Map of Ozark chinquapin distribution

The Ozark Plateau is separated from the ranges of other chestnut in the US by geography



MAP 2. Distribution of *Castanea pumila* var. *ozarkensis* (dots) and *C.* ×*neglecta* (squares), based on herbarium specimens.



MAP 1. Distribution of *Castanea pumila* var. *pumila*, based on herbarium specimens.

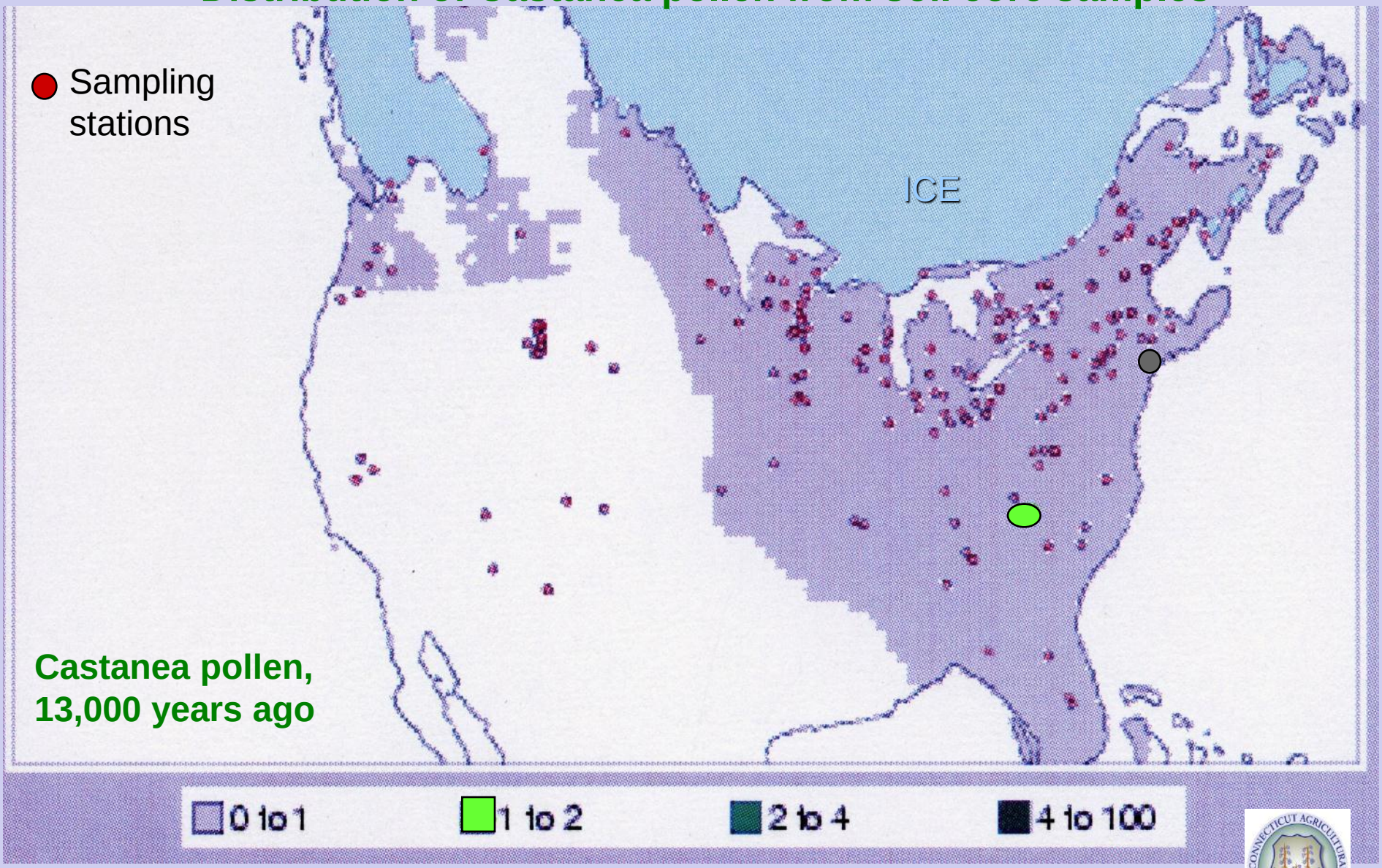
Ozark **Allegheny**

Maps by George P. Johnson, Arkansas Tech University.
He decided that all the chinquapins were the same species, and just different varieties. I don't agree with him.

Ozark chinquapins are trees

Allegheny chinquapins are bushes

Distribution of Castanea pollen from soil core samples



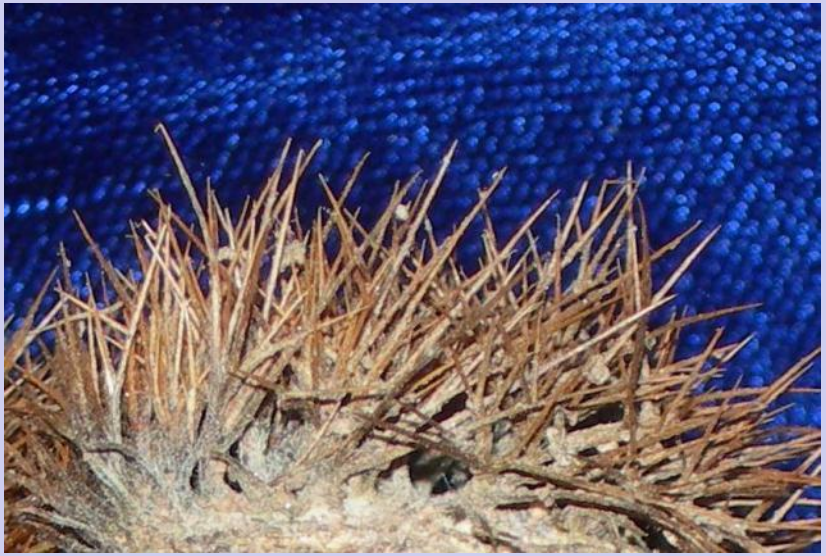
Geological Sciences at Brown University ,
Tom Web, Phil Leduc, Jack Williams, Paige Newby, Bryan Shuman

American chestnut fruits on the tips of the branches, and the branches don’t usually grow beyond the burs

Allegheny chinquapin fruits on spurs off to the side of the branches and the branches keep growing.


Burs on spurs
Ozark chinquapin from Arkansas
07.07.2009
THE CONNECTICUT AGRICULTURAL EXPERIMENT STATION


Ozark chinquapin
from Oklahoma
Burs on spurs
07.20.2007



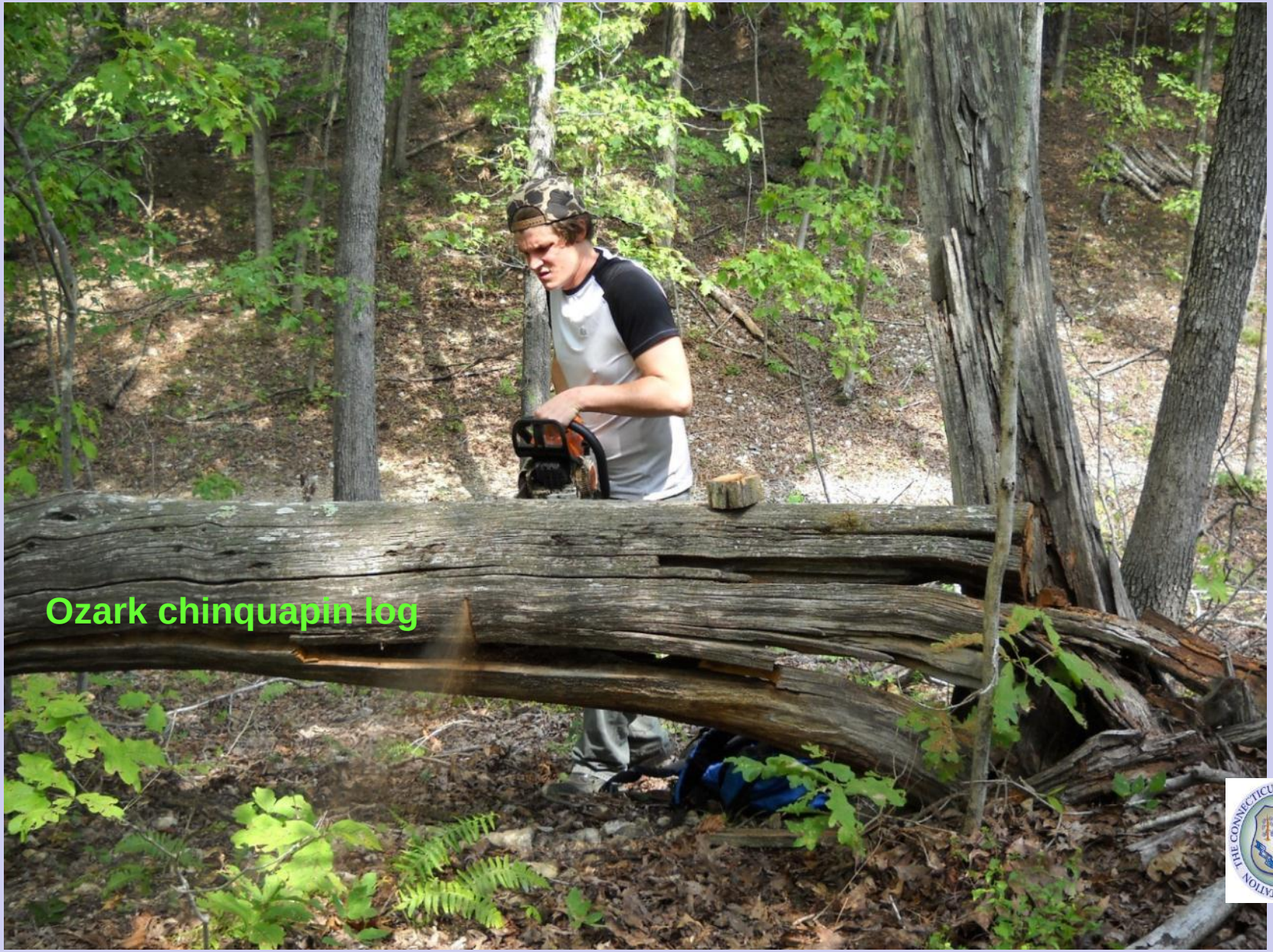
western Ozarkensis

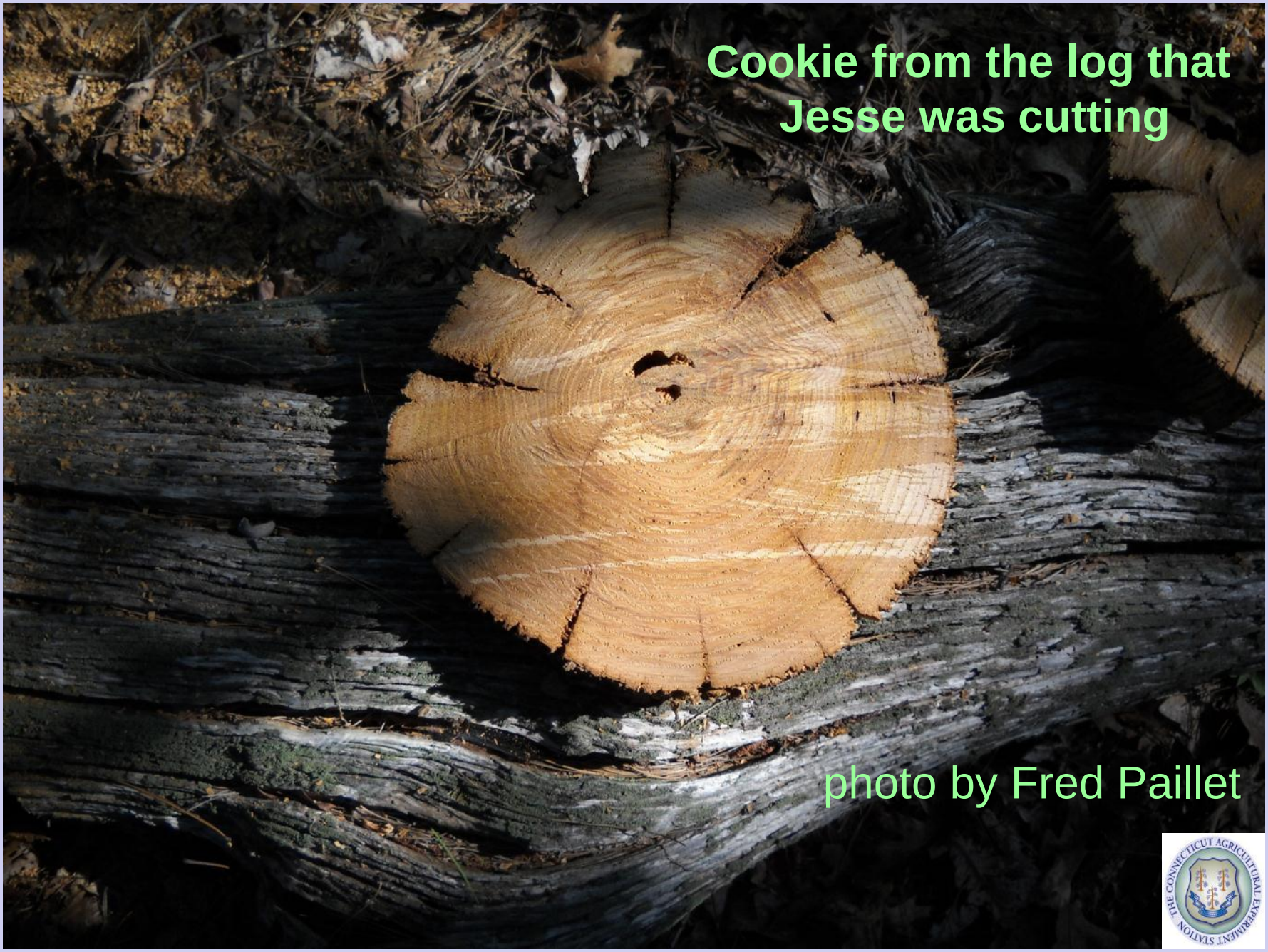
eastern Ozarkensis

Some people have used spine shape to tell species apart, but that doesn't seem to be useful here.

pumila

Jesse Edmunson photographed by Fred Paillet




Cookie from the log that Jesse was cutting
photo by Fred Paillet
THE CONNECTICUT AGRICULTURAL EXPERIMENT STATION

DNA tests will help!

Dr. Jeanne Romero-Severson
University of Notre Dame
Indiana
Will be able to develop markers to tell the species and hybrids apart.

Threats to Survival

First Threat

Ink Disease caused by *Phytophthora cinnamomi*

Infects roots and base of trunk

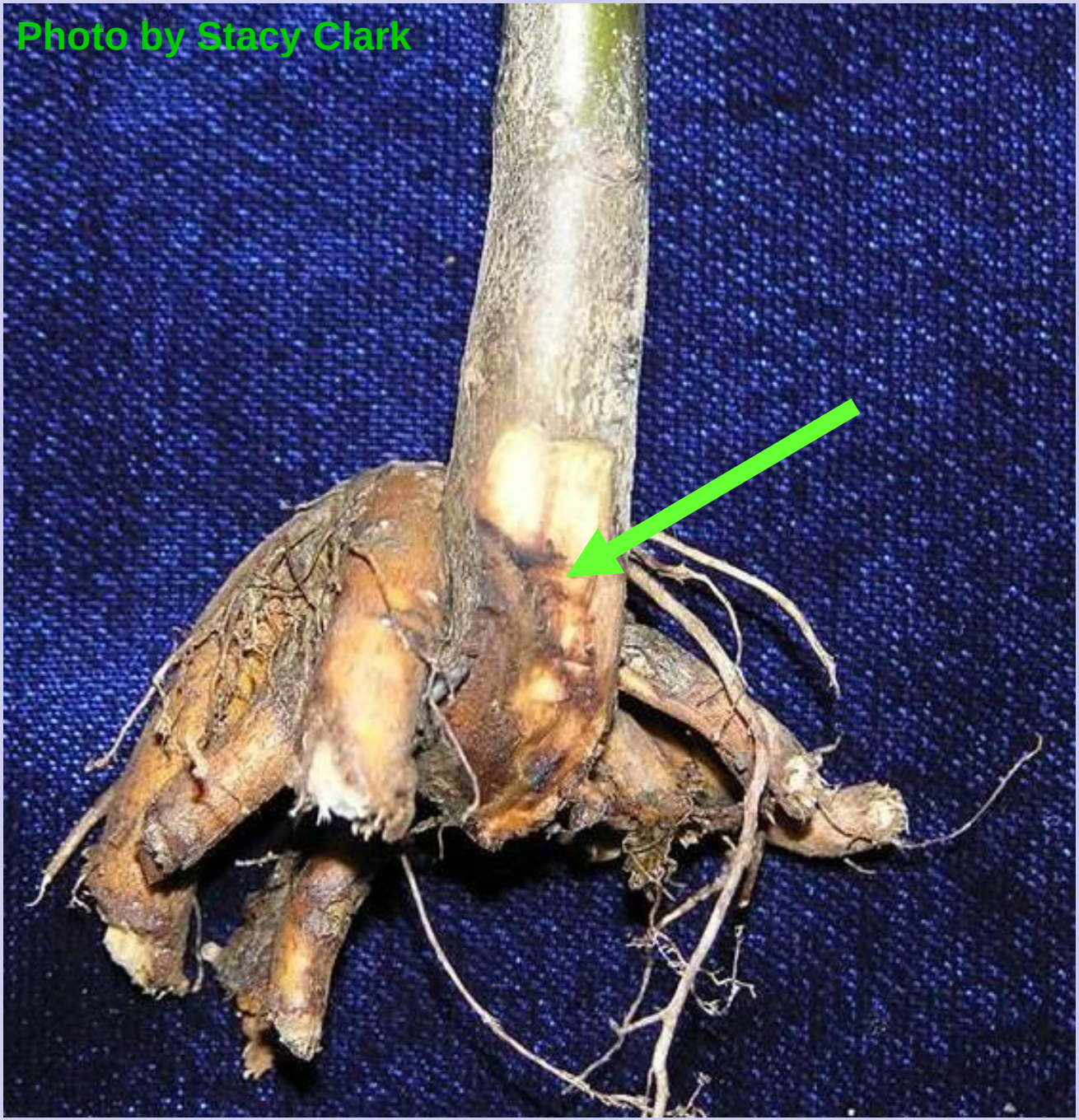
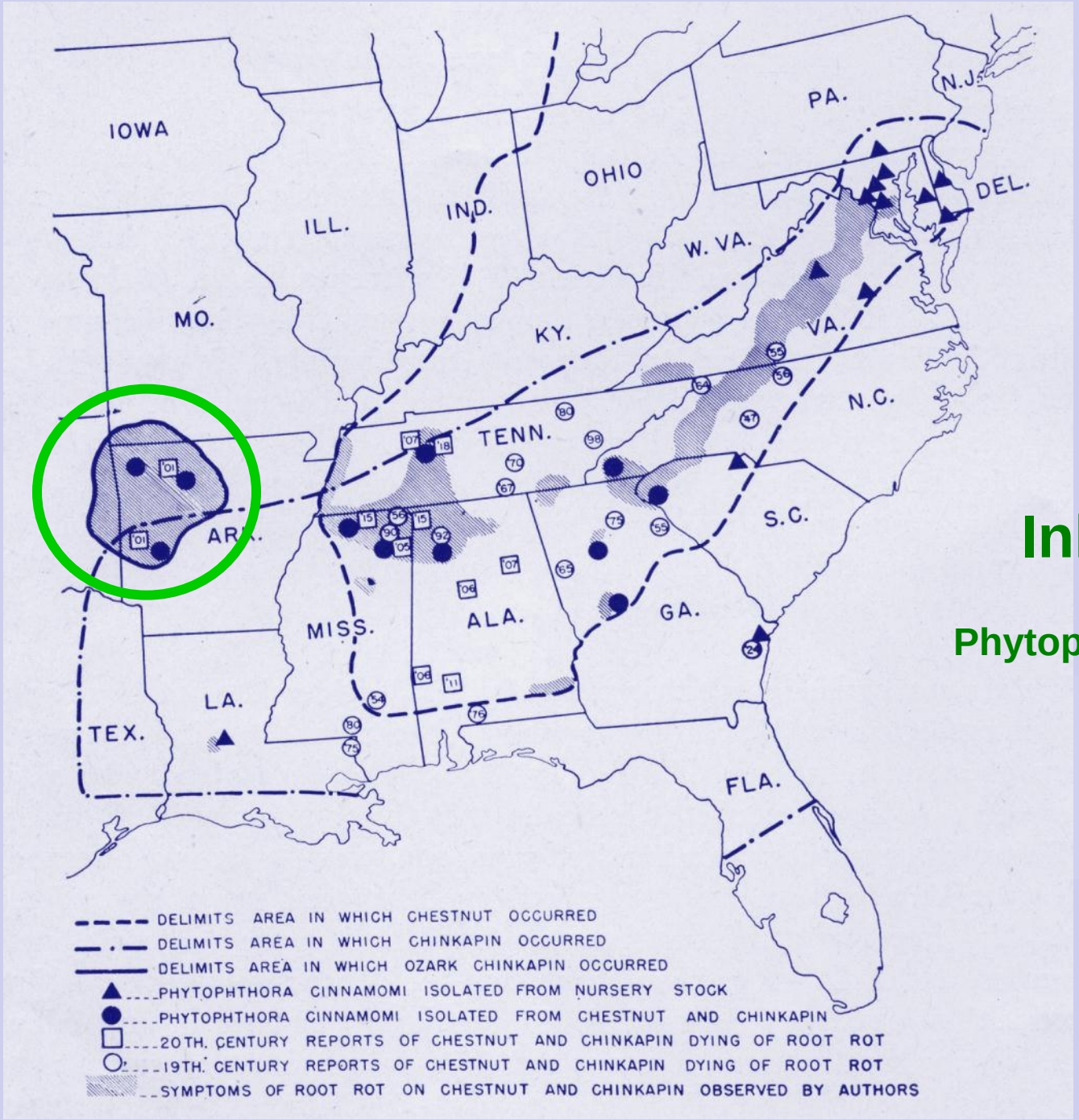


Photo by Stacy Clark



Ink Disease

caused by Phytophthora cinnamomi

Crandall, Gravatt & Ryan 1945

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Second Threat

Chestnut Blight Disease caused by *Cryphonectria parasitica*

Infects through wounds on all above ground parts of the trees

Chestnut blight disease on American chestnut

The Connecticut Experiment Station has a large collection of *Castanea* to work with.

Six year old seedling from cross of two Russellville, Arkansas trees, 10 ft tall

Oklahoma ozarkensis

How susceptible are they to chestnut blight?

There are subtle differences in the ways the trees respond to infection. The Ozark chinquapins react more like the Chinese chestnuts than like the American chestnuts.

Inoculations with two strains of the chestnut blight fungus in boxes in the lab

In the field Ozark chinquapins show different levels of susceptibility to chestnut blight disease, and some resist much better than others (and better than American chestnuts).

Keeping them alive

Biological control of chestnut blight disease with a virus in the fungus

“hypovirulence”

Ancient (Federal) History

- Keith Langdon,
  Hot Springs National Park
  - ✓ sent me canker samples in 1982
  - ✓ I sent him H strains to treat the disease
  - ✓ He's no longer there

- James Guldin, same place 2002,
  (hasn't found those trees yet)

- Susan Hooks, is still there
  (hasn't found those trees yet)

- Is hypovirulence working in Hot Springs?

Three Other Threats

Fire

Drought

People (land use)

What good are these trees?

(why should the governor of Connecticut care?)

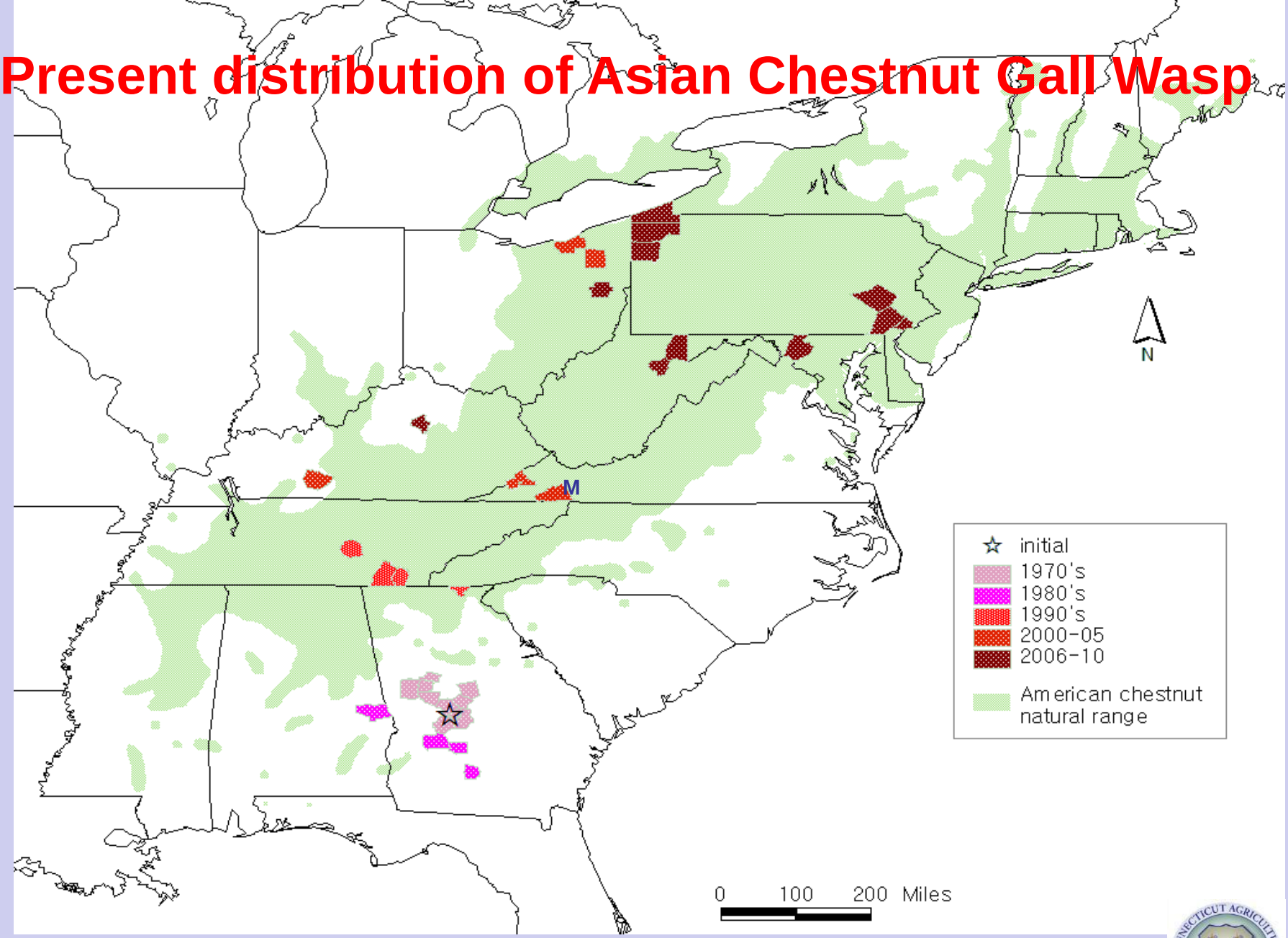
Asian chestnut gall wasp is now in the U.S. and causes serious damage on chestnuts

Chinquapins

(Ozark, Allegheny, Chinese)

are resistant to Asian chestnut gall wasp

Present distribution of Asian Chestnut Gall Wasp



Map by Ignazio Graziosi from Dr. Lynne Rieske-Kinney, University of Kentucky

Breeding

chestnuts and chinquapins for resistance to everything

(ink disease, chestnut blight, gall wasp, etc.)

Hybrids with gall wasp resistance from Ozark chinquapins, blight resistance from Chinese chestnuts, and form from American chestnuts (trees 17 years old)

Bent Creek, NC

Trees have different levels of gall wasp resistance

Photo by Stacy Clark

Chestnut count, Connecticut Experiment Station orchards, 1,505 trees in the ground

Castanea dentata	American chestnut	232
Castanea crenata	Japanese chestnut	15
Castanea mollissima	Chinese chestnut	40
Castanea sativa	European chestnut	40
Castanea alnifolia	Florida chinquapin	3
Castanea pumila	Allegheny chinquapin	2
Castanea ozarkensis	Ozark chinquapin	65
Castanea henryi	Chinese chinquapin	6
Castanea seguinii	Chinese dwarf chestnut	4
Hybrids	all possible combinations	1098

2008 Crosses made

- ***C. ozarkensis*** **(OK) X [*C. crenata**C. *ozarkensis* (AR)]:**

  23 trees

- ***C. ozarkensis*** **(OK) X [*C. ozarkensis* (AR)**C. crenata*]:**

  26 trees

2009 Crosses made

- ***C. ozarkensis*** **(OK) X *C. ozarkensis (*AR): 125 trees**
- **between *C. ozarkensis (*Oklahoma): 242 trees**

  (41 different crosses)

2011 crosses

- Nut cultivars with ozarkensis for gall wasp resistance

- ozarkensis hybrids with pollen from trees that YOU find

SEND

POLLEN