A wide-angle photograph of a vast green field of Commelina benghalensis. A person wearing a red cap and light-colored clothing stands in the middle of the field, providing a sense of scale. The background shows a line of trees under a clear blue sky.

**Demography of**  
*Commelina benghalensis*  
**in the Southern U.S.A.**

**Mike Burton**  
**Department of Crop Science**  
**NCSU**



Burton, NC, 2001



28 October 2003

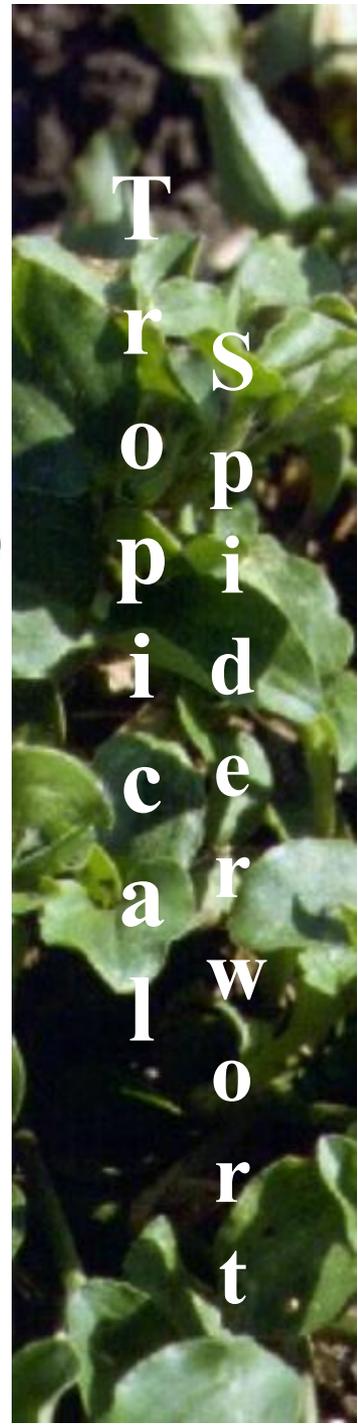
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# Organization

## *C. benghalensis* demography

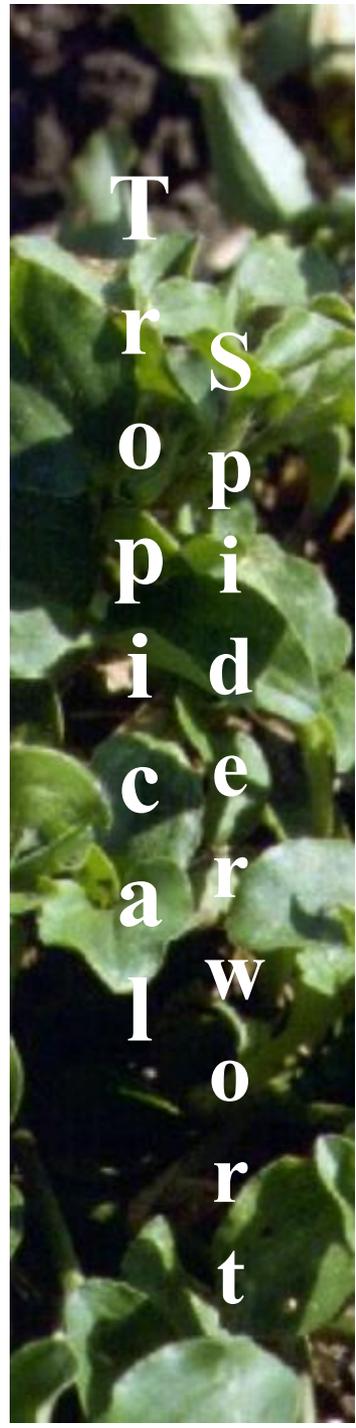
- Why do we have so much? (Propagation)
- How is it getting around? (Dispersal)
- Where is it now? (Distribution)



# Organization

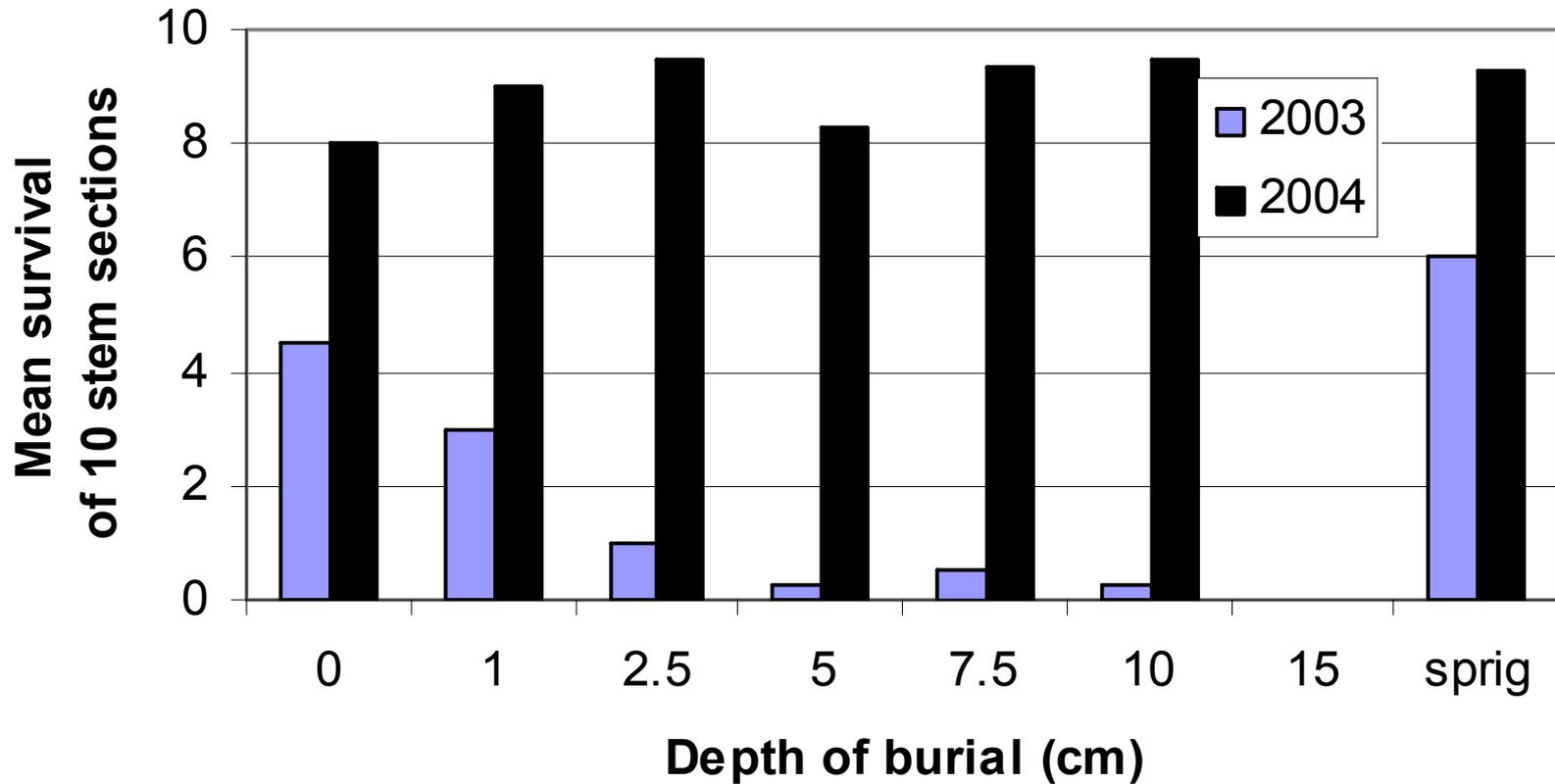
## *C. benghalensis* demography

- Why do we have so much? (Propagation)
  - Vegetative reproduction
  - Sexual reproduction
  - Seedbank longevity
- How is it getting around? (Dispersal)
- Where is it now? (Distribution)



# Simulated disking 2003-04

(The 15 cm depth was not used in 2004)



## Simulated Fall Disking

2003



Two-node stem cuttings were buried or sprigged after corn harvest in 2003. Cuttings were evaluated four weeks later. Roughly half of sprigged cuttings survived and nearly 10% entered reproductive mode. Less than 5% of completely buried cuttings began sexual reproductive development (i.e. without photosynthesis).

## **Multiple Generations Within a Year?**

Benghal dayflower can flower in 30 days and fruit dehisce two weeks later. Some seeds were returned to moist sand two days after dehiscence and emerged as seedlings twelve days later.

<b><u>Seed size*</u></b>	<b><u>Days to flower</u></b>	<b><u>Days to fruit maturation</u></b>
<b>Large</b>	<b>26</b>	<b>14</b>
<b>Small</b>	<b>30</b>	<b>14</b>

\* Aerial seeds

SEPAL (NCSU Phytotron) studies 2003-2004  
Temp: 30/26C day/night, PAR: 500  $\mu\text{mol m}^{-2} \text{s}^{-1}$

*Commelina benghalensis*

2002 Arlene Mendoza

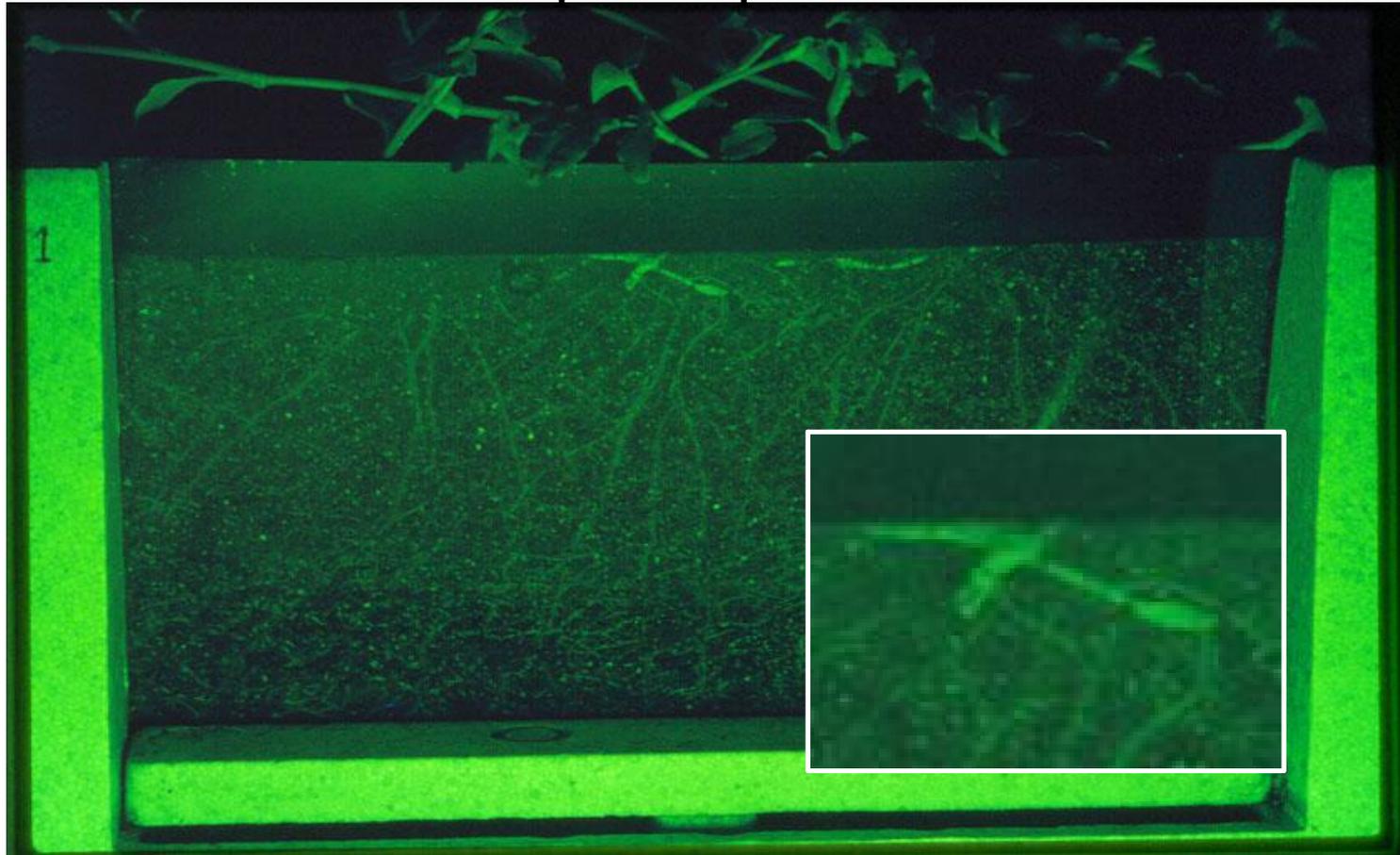
Tropical spiderwort, Benghal dayflower

North Carolina State University

Underground flowers



# Tracking subterranean reproductive development of tropical spiderwort



The use of a green “safe-light” was required  
to reduce photomorphogenesis.



Close-up of tropical spiderwort rhizomes and subterranean spathes

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# Tropical Spiderwort Subterranean Reproductive Development

~16 d

~10 d

6 d

New



30 d after initiation, subt. spathes had decayed

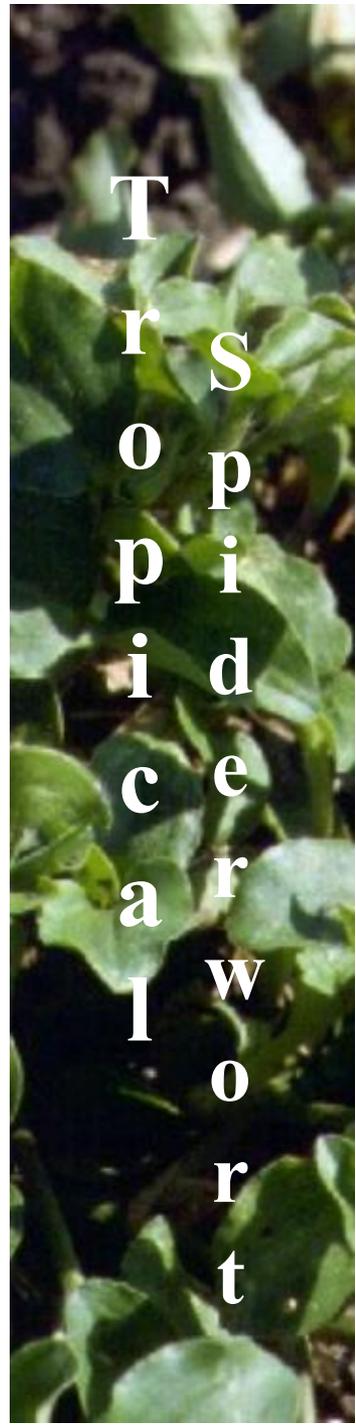
# Seedbank Longevity

- When reproduction was denied in an affected field, germination declined to 25% in the second year and continued in a third year.
- Seeds exhumed 6 and 12 months after burial had 65 to 70% survival, and small seeds declined from 83 to 65% survival. Dormancy also declined in small seeds from 40 to 20%.

# Organization

## *C. benghalensis* demography

- Why do we have so much? (Propagation)
- How is it getting around? (Dispersal)
  - Product movement
  - Equipment
  - Animals?
- Where is it now? (Distribution)



# Potential dispersal mechanisms

- Moved with equipment (e.g. tillage, custom harvesters, mowers, etc.).
- Moved with seed/plant material/soil.
- Field disposal of gin trash.
- Nursery and livestock industries.
- Blown by wind or water erosion, floods, hurricanes.
- Animal movement [deer browse, doves (?), rodents].

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**Goldsboro, NC  
November 2003**

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Photo: S. Clewis



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Photo: S. Clewis 2003

**Cotton Gin Trash**





***C. benghalensis* seedling emerged in gin trash pile (GA).**

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Photo: T. Webster

# Tropical spiderwort seed in combine (picker) harvested seed cotton

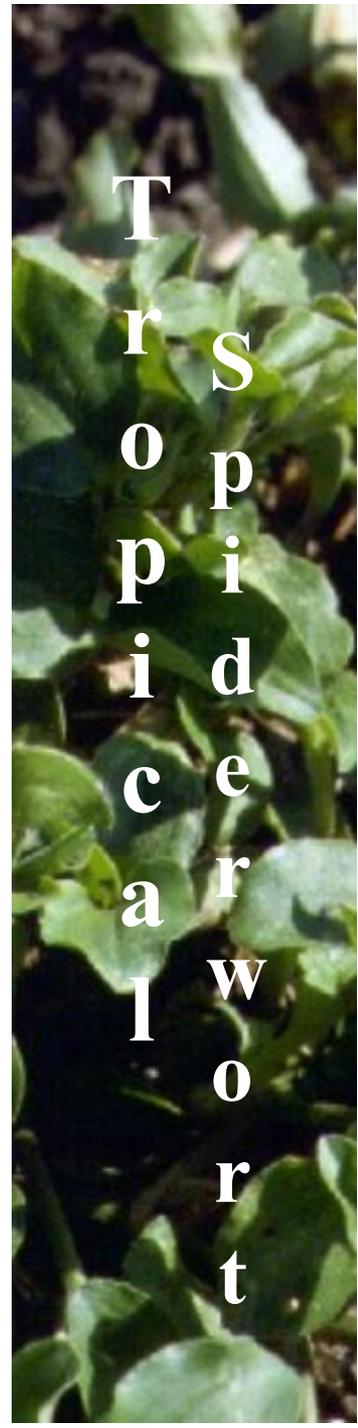


# How many seeds were in the lint?

Our most severe NC infestation contained an  
average of 57 seeds per kg of seed cotton

...which could translate into roughly 2500  
seeds per 100 lbs of seed cotton.

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*C. benghalensis* in  
liriope bibs identified by  
NCDA inspectors at  
Lowe's in Garner and  
Clinton, NC, in August  
2005. The SC nursery  
that shipped the bibs to  
NC reportedly shipped to  
at least 13 other states,  
mostly in the North-  
eastern/Mid-Atlantic  
USA. The nursery  
indicated it had received  
material from LA.

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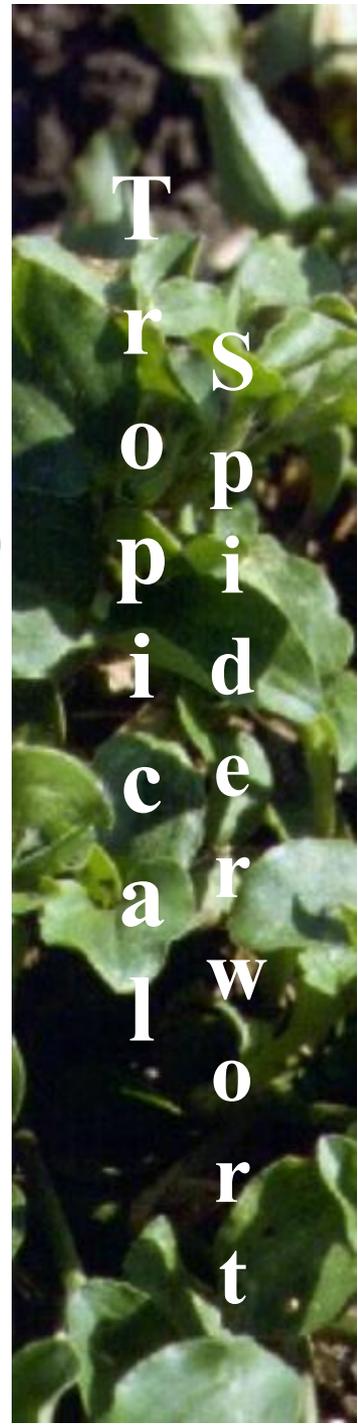


# Organization

## *C. benghalensis* demography

- Why do we have so much? (Propagation)
- How is it getting around? (Dispersal)
- Where is it now? (Distribution)
  - Counties
  - States
  - Nation

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# Center for Environmental Farming Systems Goldsboro, NC (Wayne Co.)



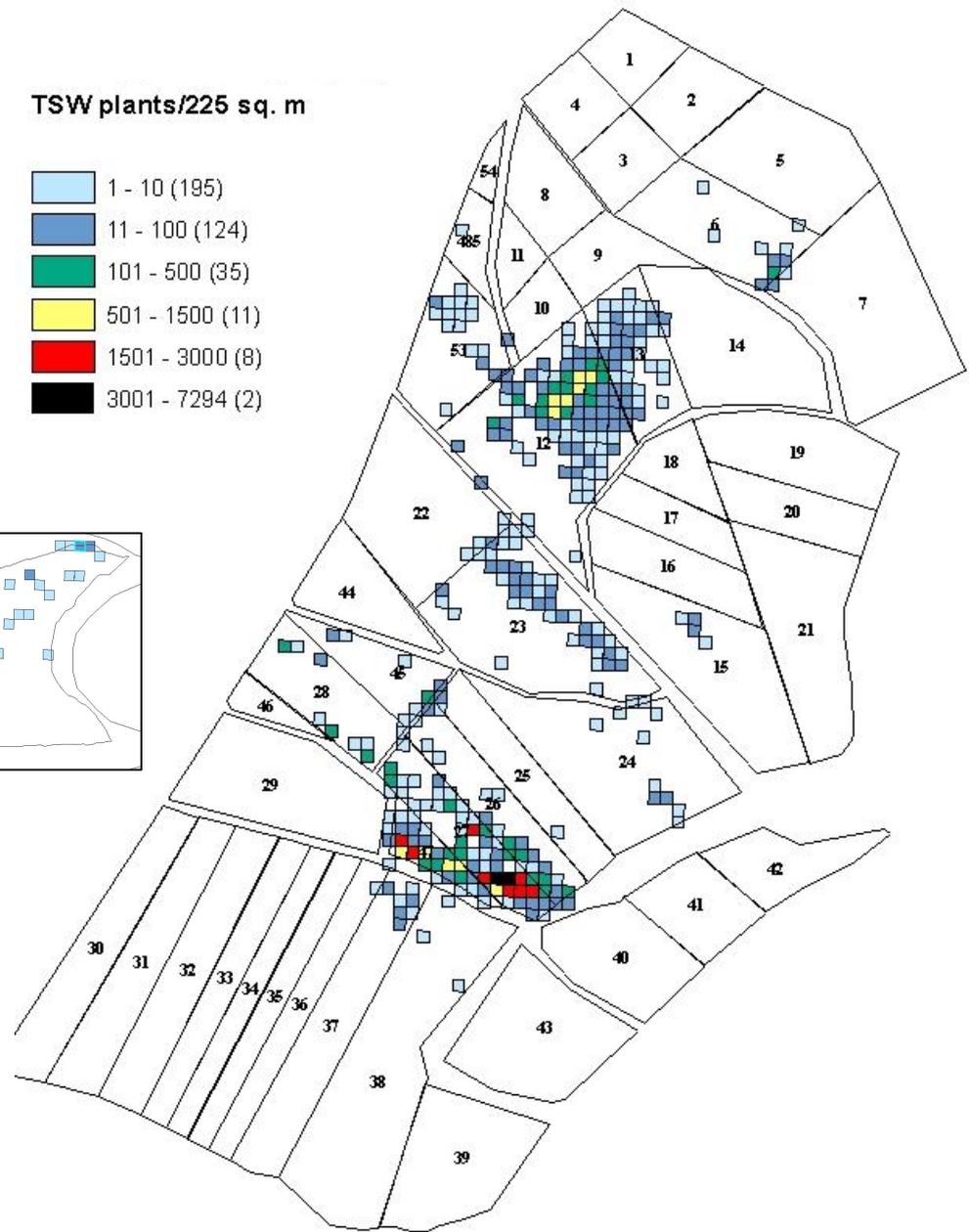
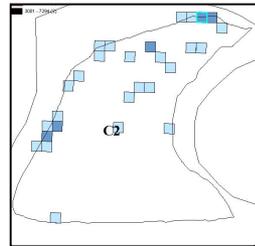
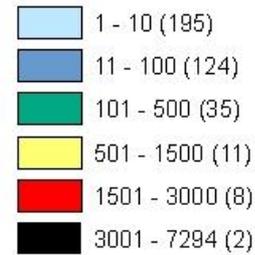
# 2005 Cumulative Emergence CEFS FSRU

Inset is an affected field  
on the nearby organic  
Small Farm Unit.

Surveys conducted  
under the supervision  
of Matt Finney.

Burton

TSW plants/225 sq. m

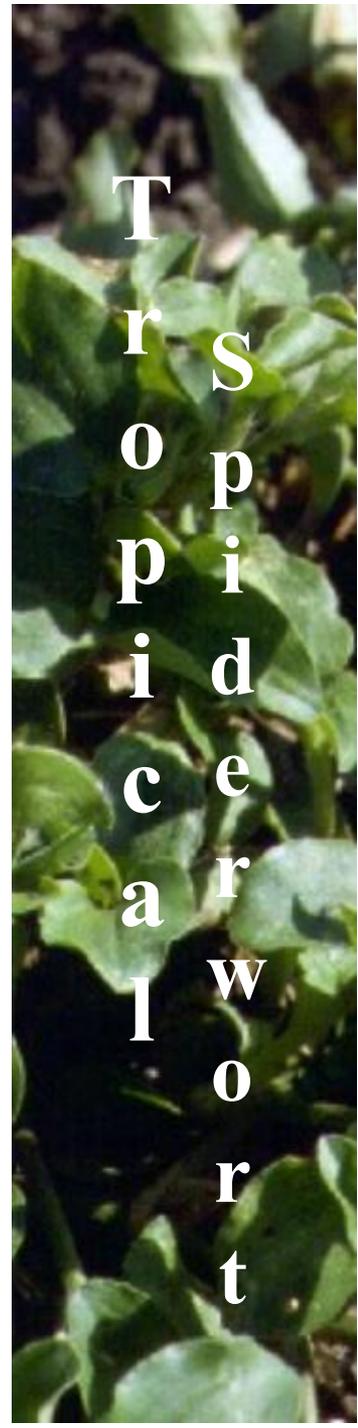


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# CEFS Quarantine/Spiderwort Eradication Efforts

- In 2004 NCDA received APHIS funds to:
  - hire personnel to
  - fumigate (>100 acres in 2004)
  - survey and treat infestations
  - build a wash facility
- All vehicles/equipment must be cleaned prior to exiting the farm, and before moving to non-infested fields.
- Compliance agreements with NCDA.
- No materials (soil, plant, etc.) leave farm without approval.

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## **Known NC distribution:**

■ 2001 CEFS, Wayne Co. (eradic. program initiated 2004)

■ 2005 Tidewater Research Stn., Washington Co.

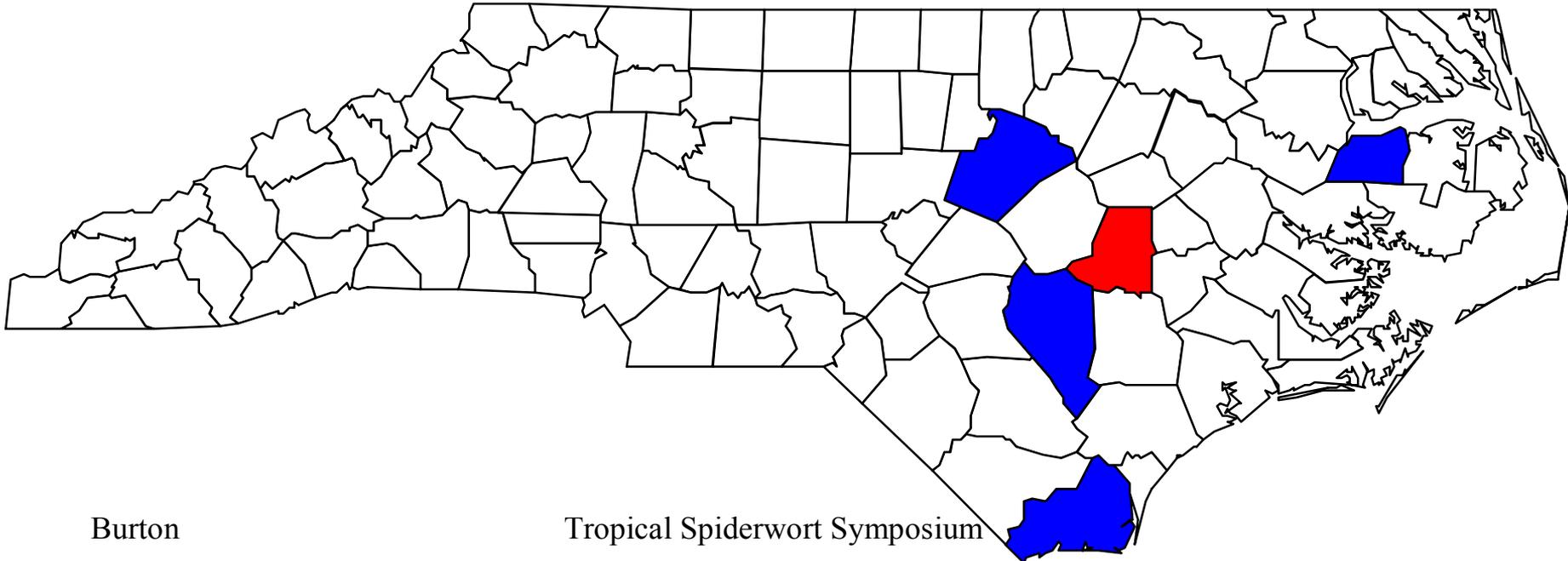
*Lowe's, Wake Co. (Garner) – SC source*

*Lowe's, Sampson Co. (Clinton) – SC source*

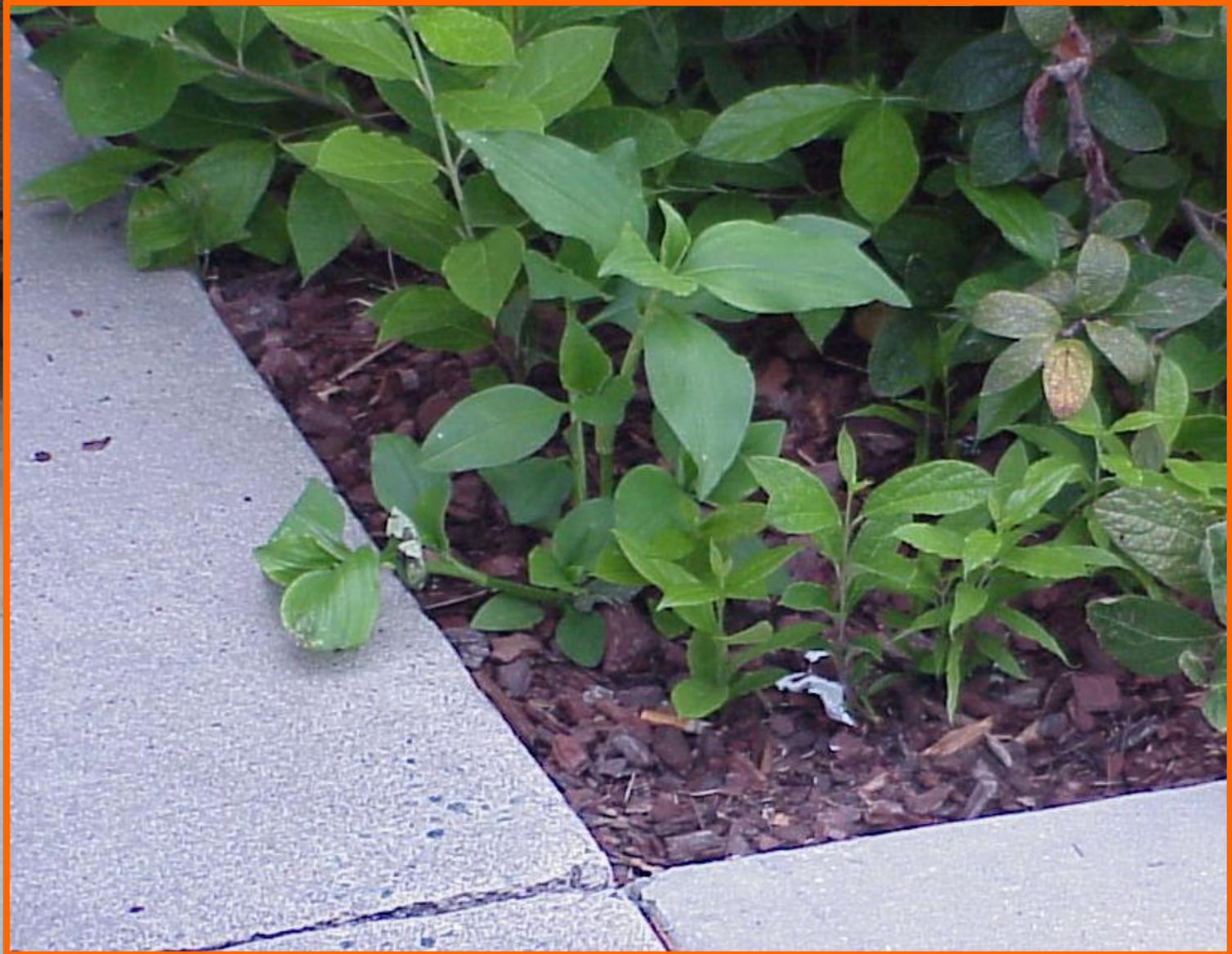
*Nursery, Brunswick Co. (Ocean Isle)*

*Horticulture Field Labs, Wake Co. (Raleigh)*

*Slaughterhouse, Sampson Co. – GA or FL source?*



# I-95 Georgia Welcome Station

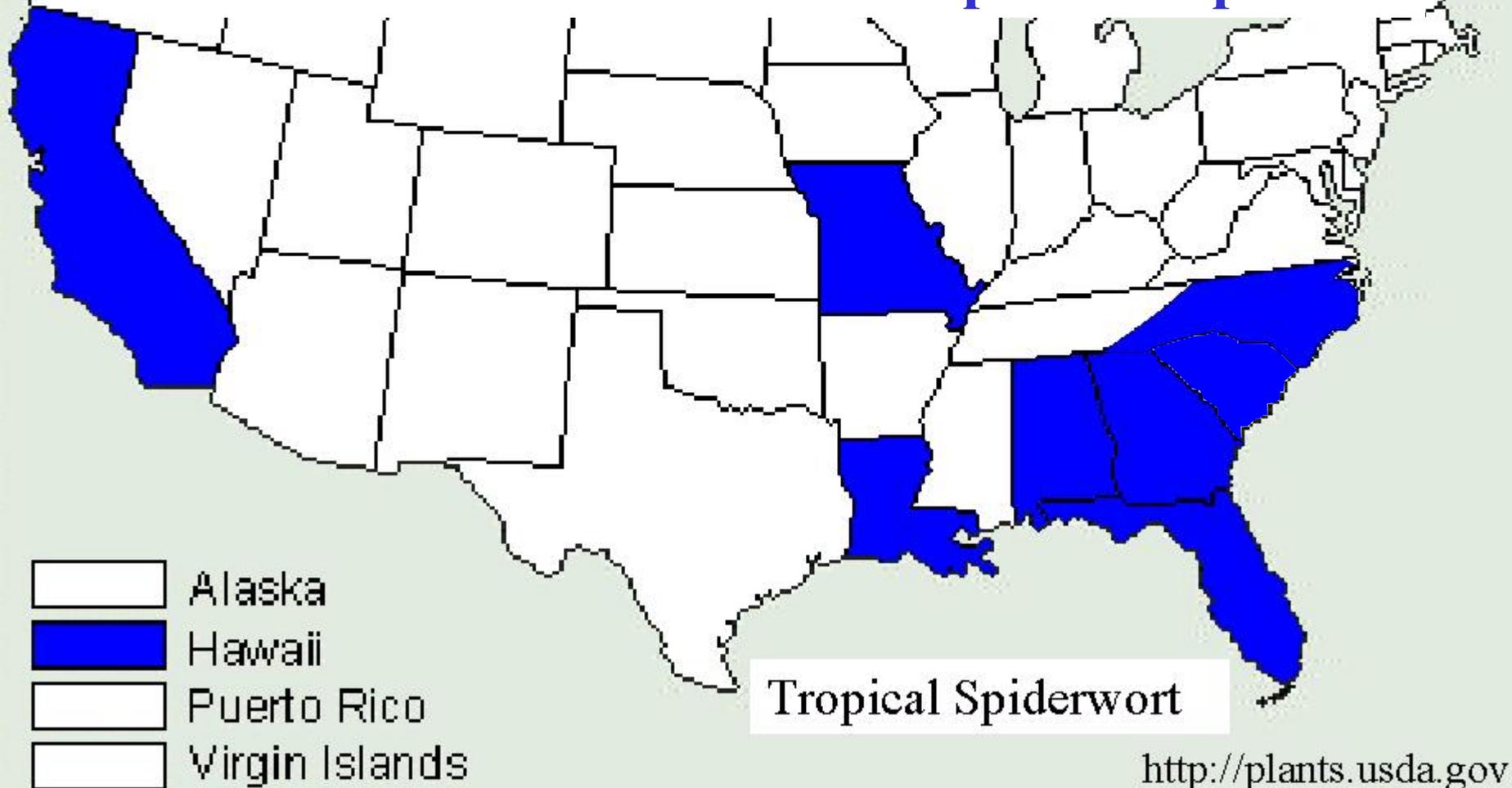




Includes Other Herbaria and  
Personal Communications



**Actual known occurrences if maps were updated.**



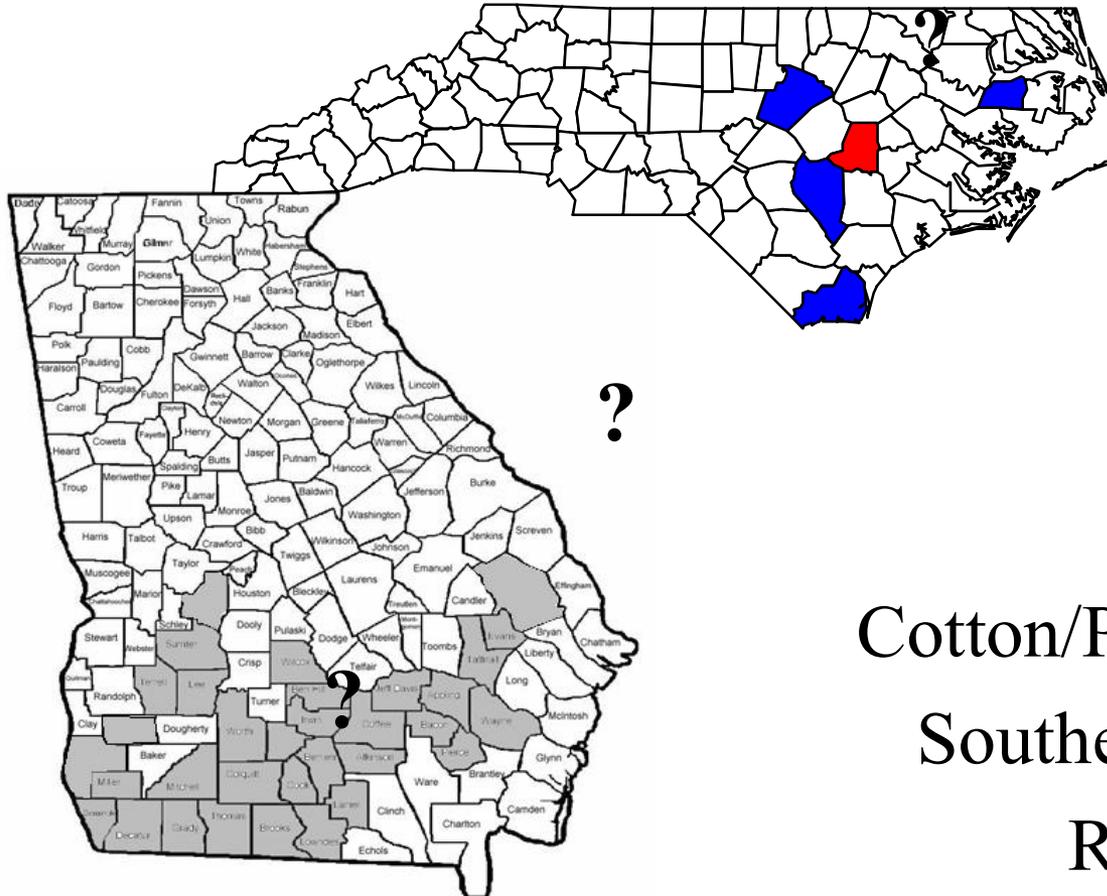
# Sicklepod

*(Senna obtusifolia)*

- Only known as a botanical/agronomic oddity in NC in early 1970s.
- 1989-1996 (earlier?), it was first in the “most troublesome” category and 4th “most common” among soybean weeds.
- In 1996 the advent of glyphosate-resistant soybean took sicklepod completely out of the “most troublesome” category.

# Where will it be next?

## What do we need to know/start doing to slow/stop its spread?



Cotton/Peanut belt

Southern Corn

Rice

?

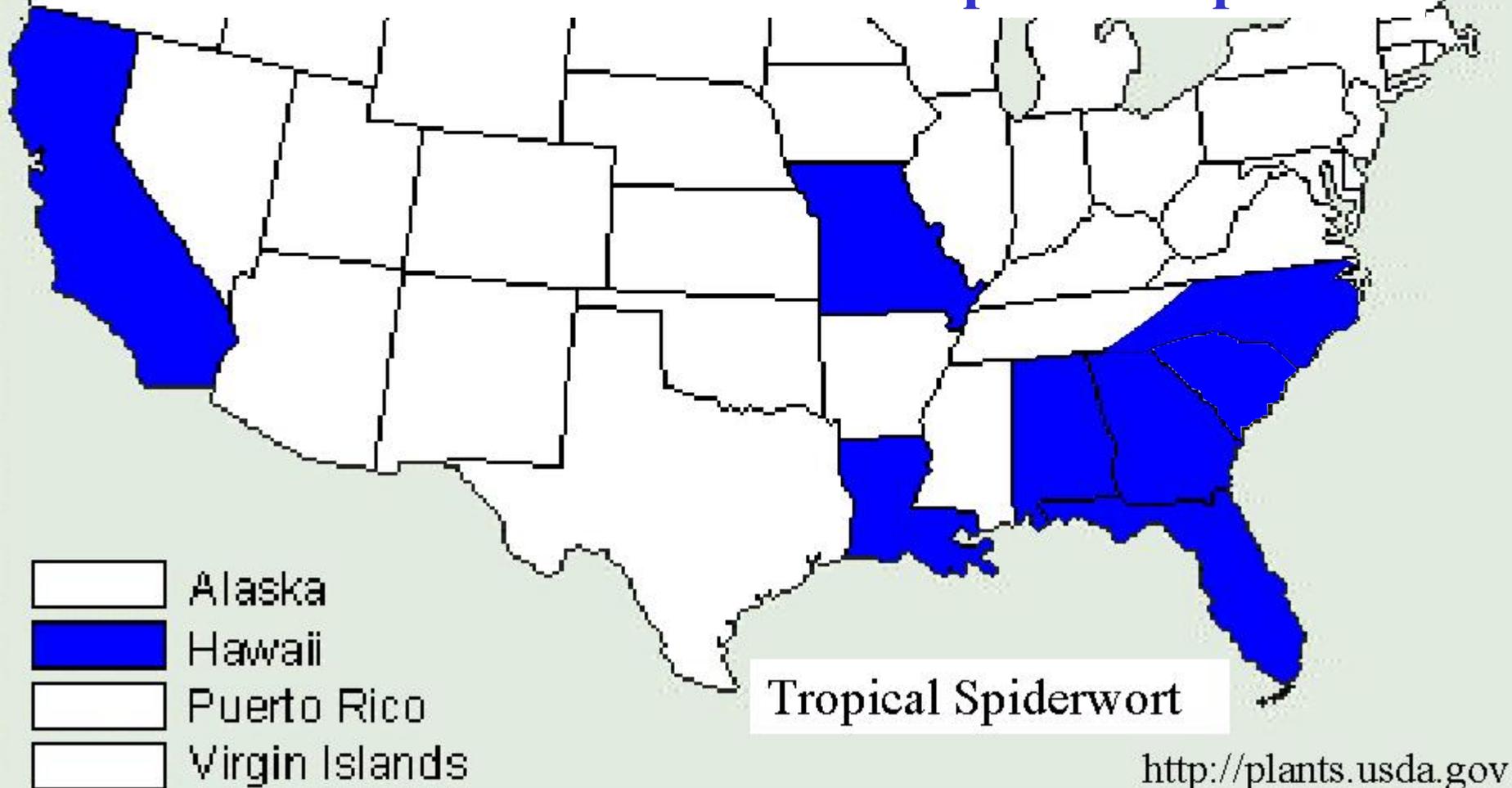
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Includes Other Herbaria and  
Personal Communications



**Actual known occurrences if maps were updated.**



Tropical Spiderwort

<http://plants.usda.gov>