A wide-angle photograph of a vast, green field of Commelina benghalensis. The field is densely packed with low-growing plants. In the center of the field, a person wearing a red cap and light-colored clothing stands, 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

Burton

Tropical Spiderwort Symposium

Organization

C. benghalensis demography

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

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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)

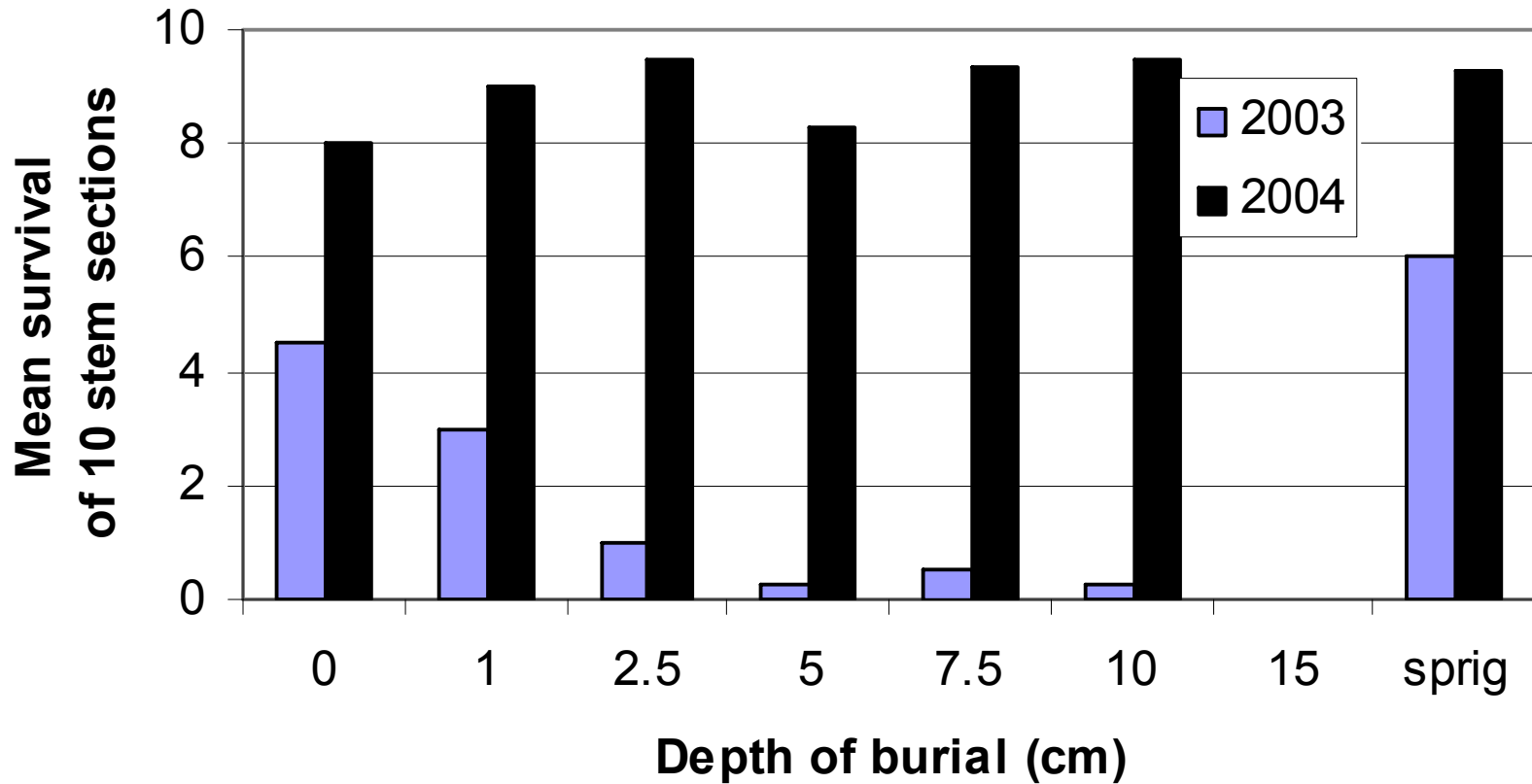
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Simulated disking 2003-04

(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.

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

* 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

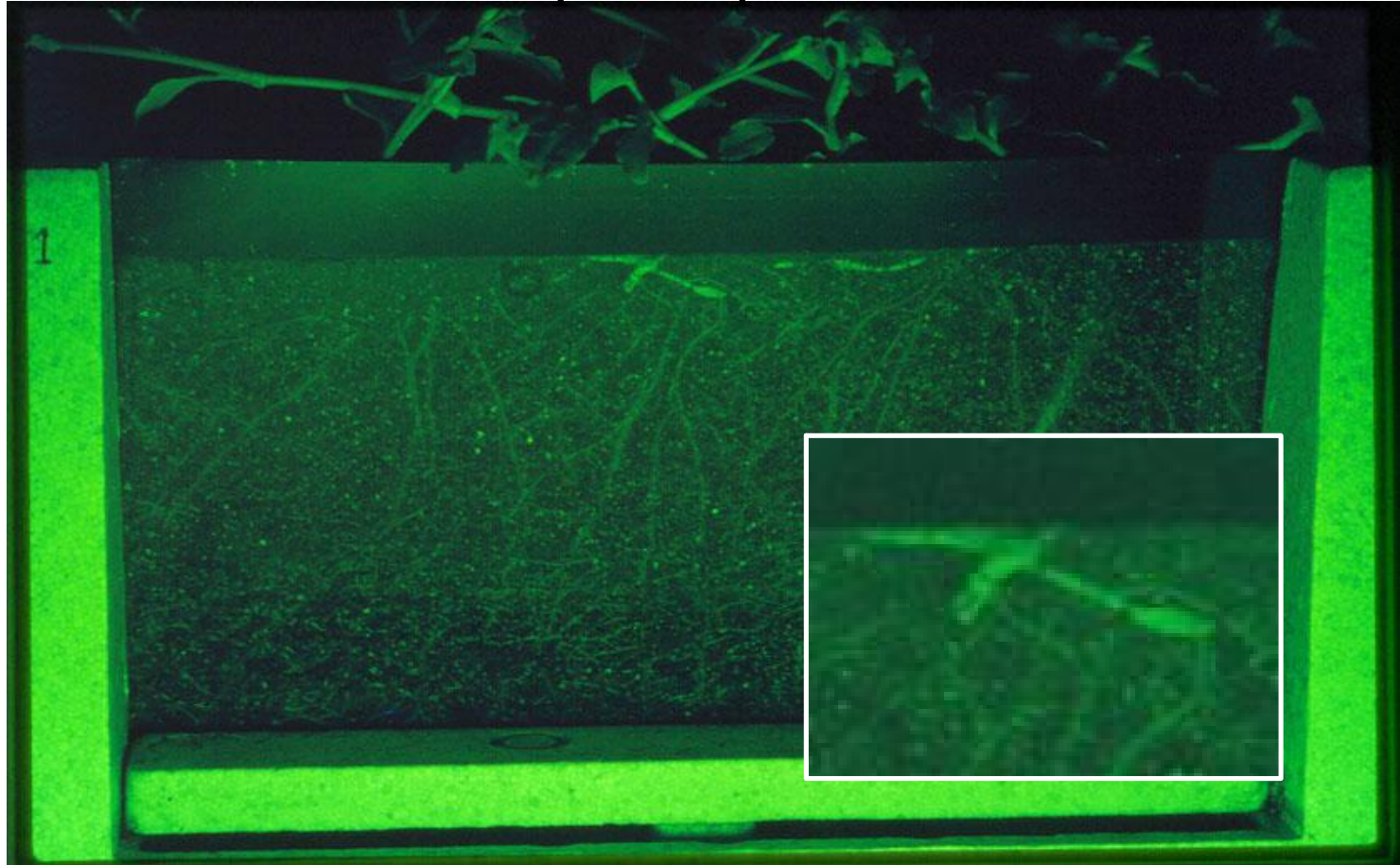
Tropical spiderwort, Bengal dayflower

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)

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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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Tropical Spiderwort Symposium

Photo: S. Clewis



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Tropical Spiderwort Symposium

Photo: S. Clewis 2003

Cotton Gin Trash



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***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.



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

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

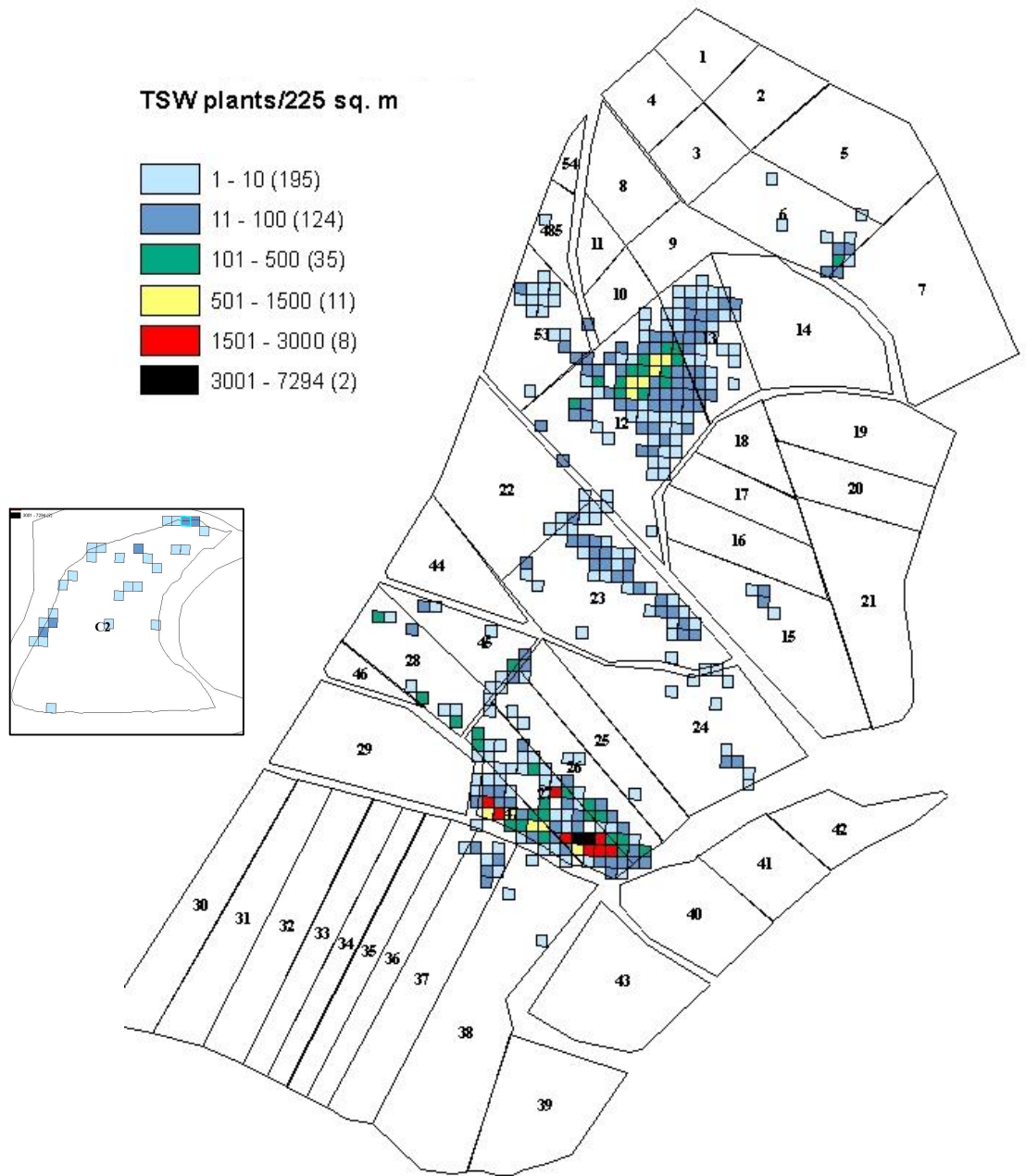


2005 Cumulative Emergence CEFS FSRU

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

Surveys conducted
under the supervision
of Matt Finney.

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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.

Known NC distribution:

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

■ 2005 Tidewater Research Stn., Washington Co.

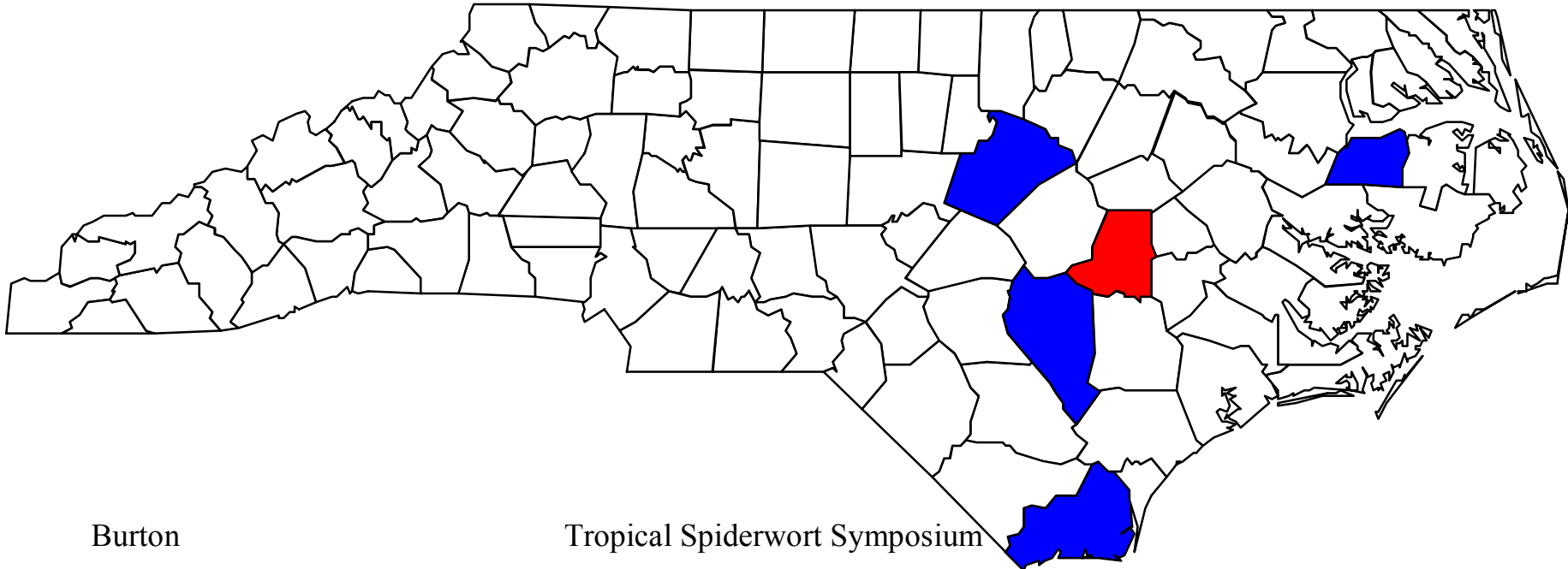
Lowe's, Wake Co. (Garner) – SC source

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

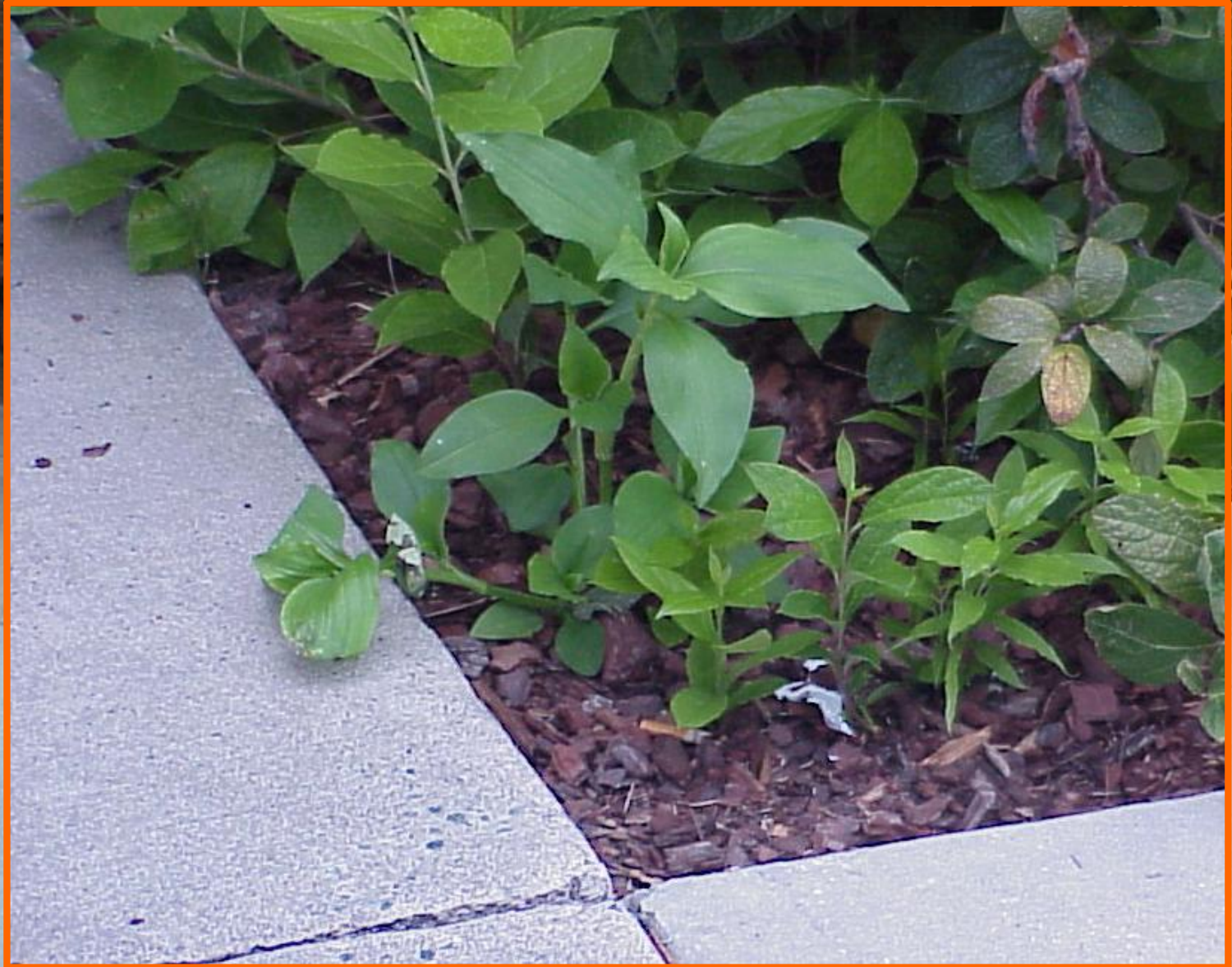
Nursery, Brunswick Co. (Ocean Isle)

Horticulture Field Labs, Wake Co. (Raleigh)

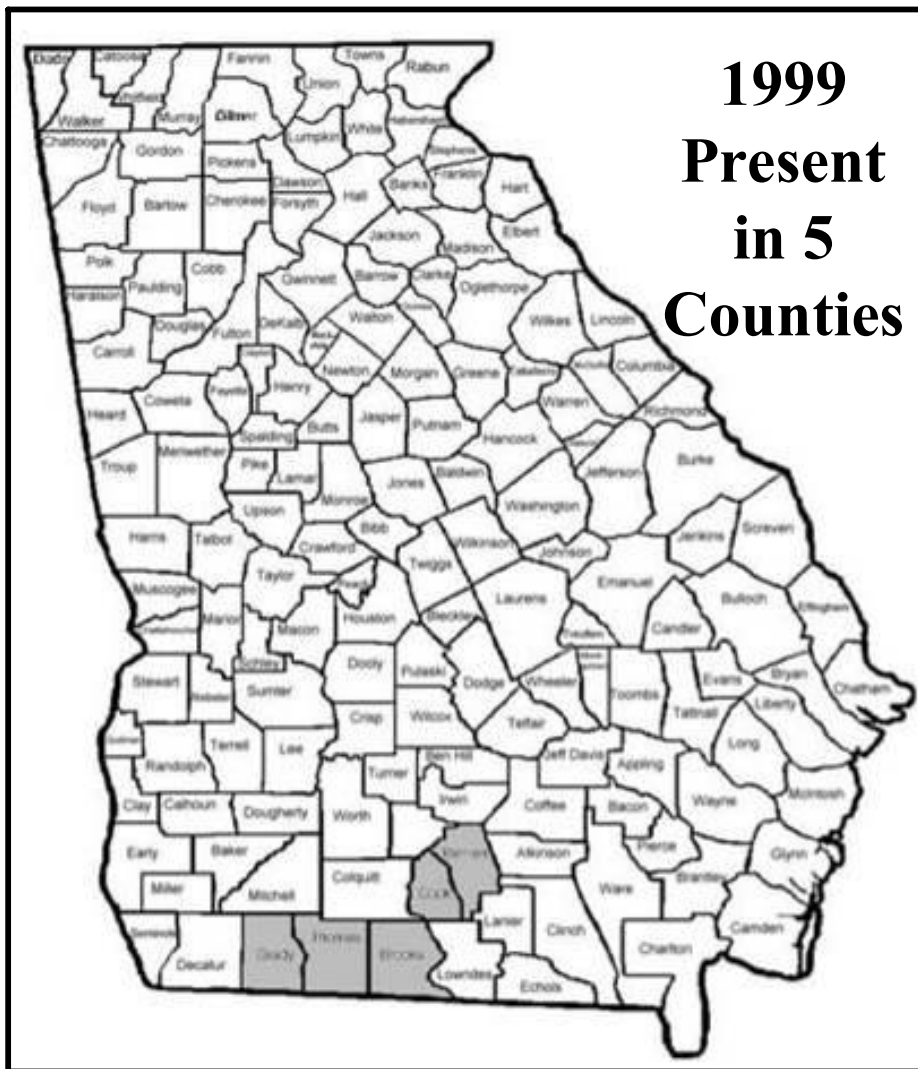
Slaughterhouse, Sampson Co. – GA or FL source?



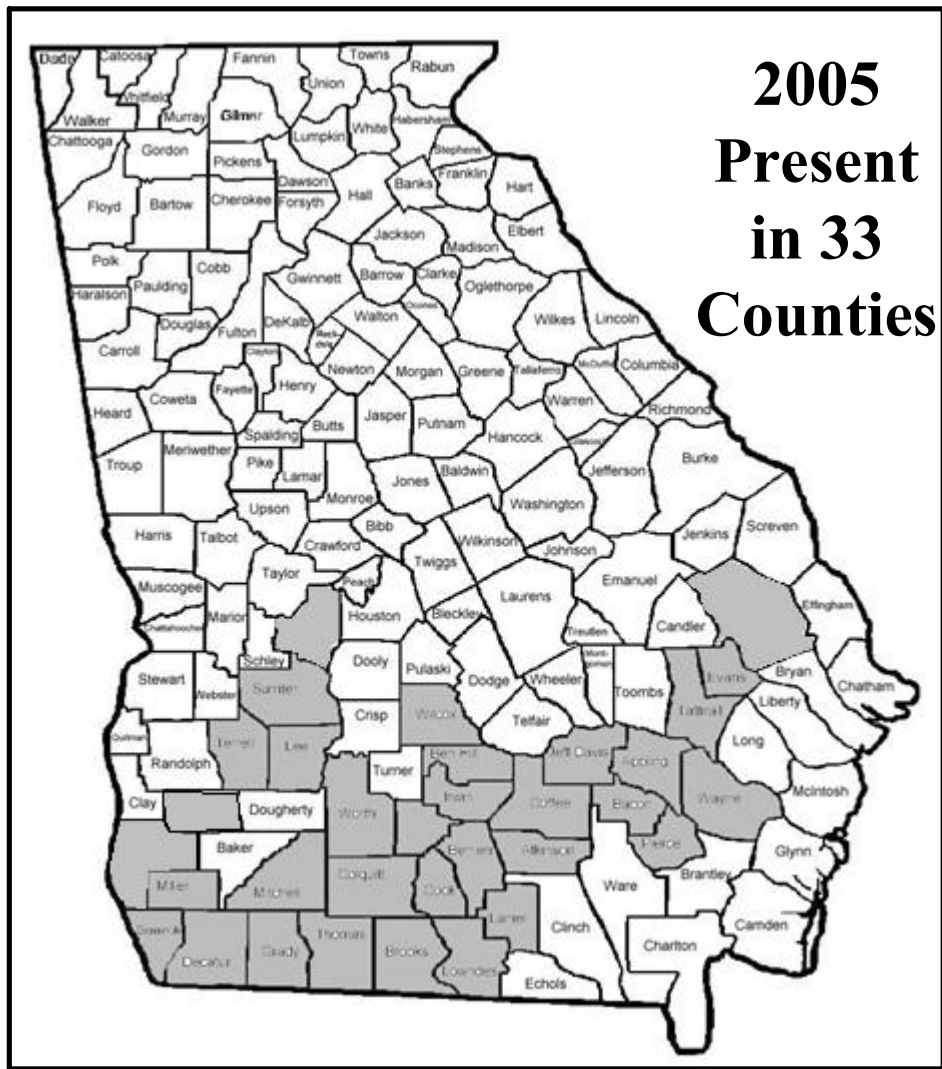
I-95 Georgia Welcome Station



C. benghalensis Distribution in Georgia



Survey: Culpepper, UGA Weed Science
Burton

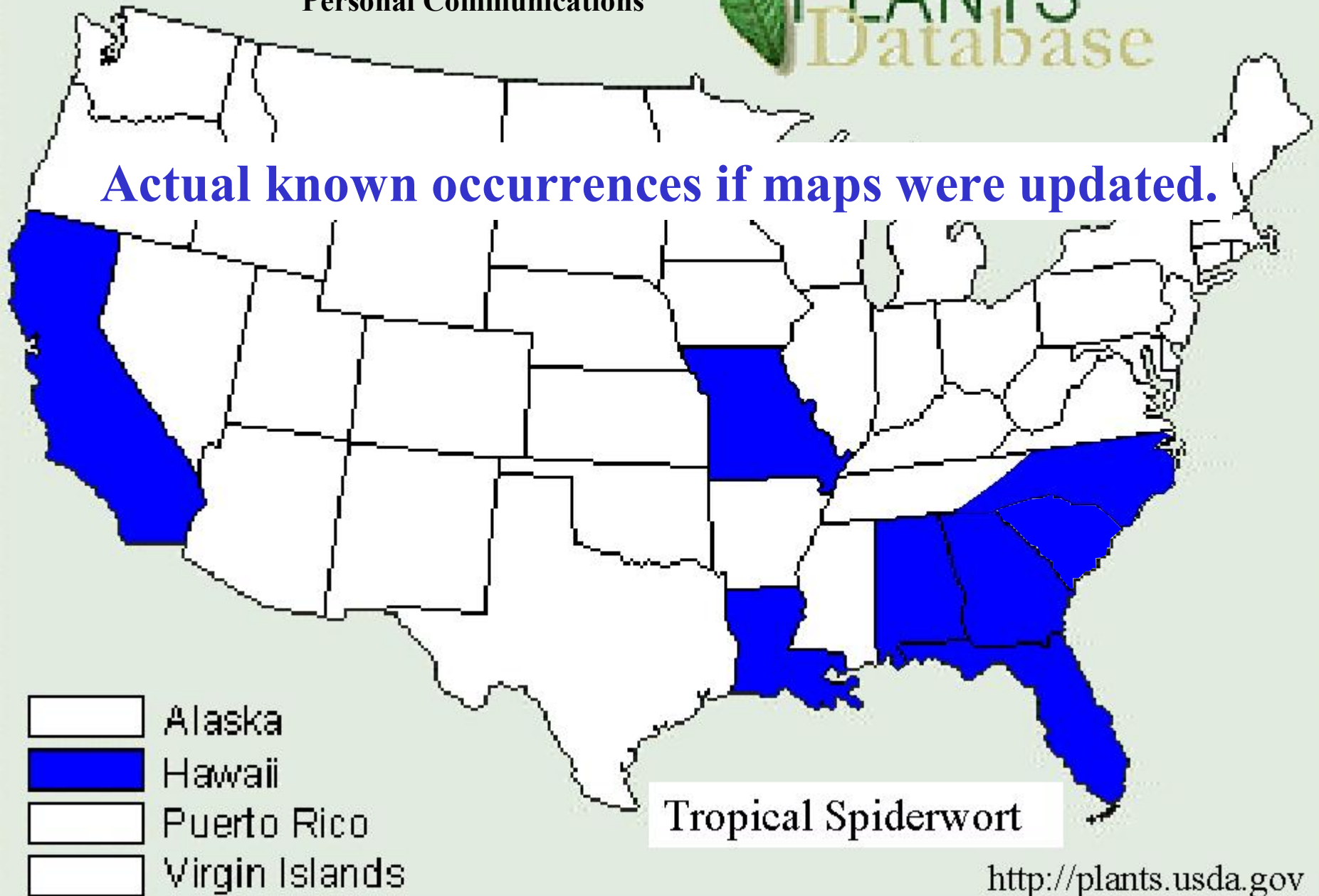


Survey: Georgia Department of Agriculture
Tropical Spiderwort Symposium

Includes Other Herbaria and
Personal Communications



Actual known occurrences if maps were updated.

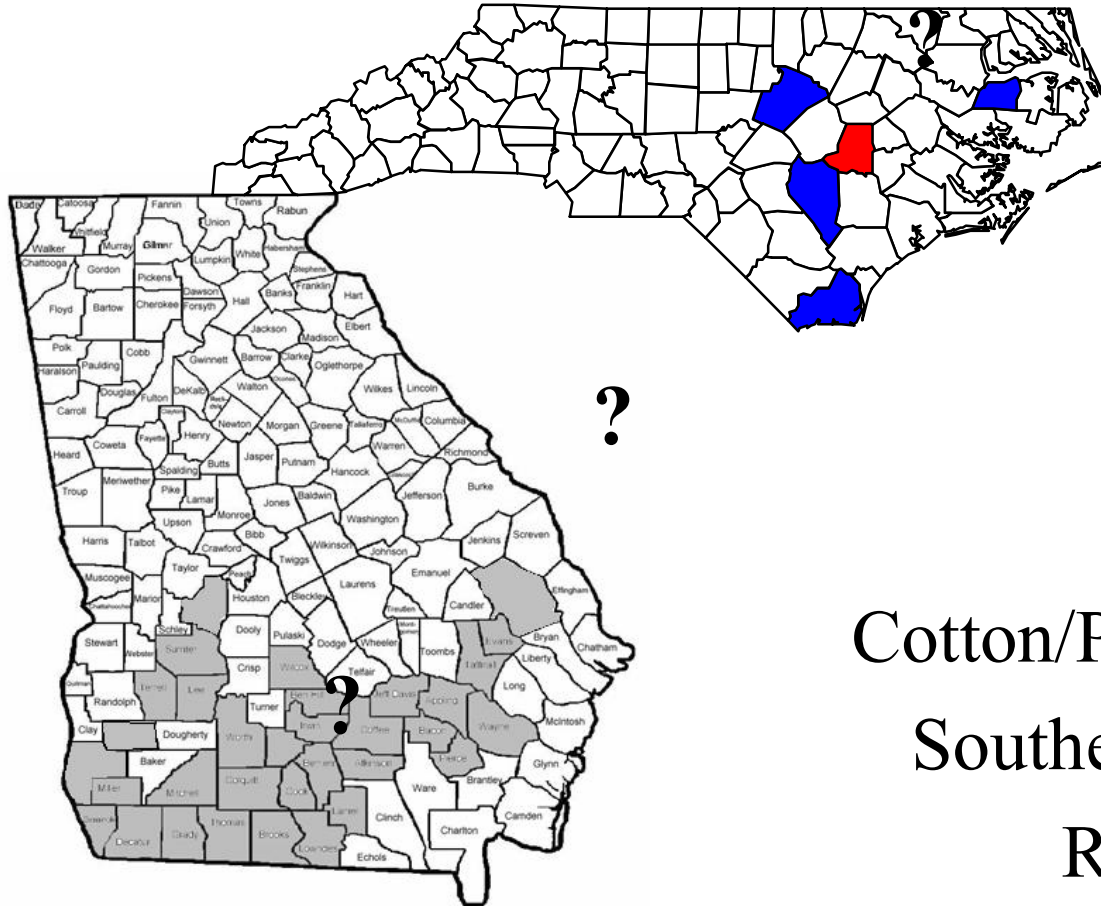


Sicklepod

(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

Includes Other Herbaria and
Personal Communications



Actual known occurrences if maps were updated.

-  Alaska
-  Hawaii
-  Puerto Rico
-  Virgin Islands

Tropical Spiderwort

<http://plants.usda.gov>