



Invasive plants in longleaf pine ecosystems

2021 Virtual Longleaf Academy



Dr. Dave Coyle
Dept. of Forestry and
Environmental Conservation
Clemson University
 @drdavecoyle 



COOPERATIVE EXTENSION
College of Agriculture, Forestry and Life Sciences



Department of
**FORESTRY AND ENVIRONMENTAL
CONSERVATION**

What IS an Invasive?

ANY plant or animal that has been
introduced



What IS an Invasive?

ANY plant or animal that has been introduced, and aggressively competes with and displaces local native communities.



Polar bears finally migrate to Antarctica

What IS an Invasive?

ANY plant or animal that has been introduced, and aggressively competes with and displaces local native communities.

Normally having **No Natural Enemies** to limit reproduction and spread.

Terms

Native = from here

Non-native = not from here

Exotic = not from here

Alien = not from here

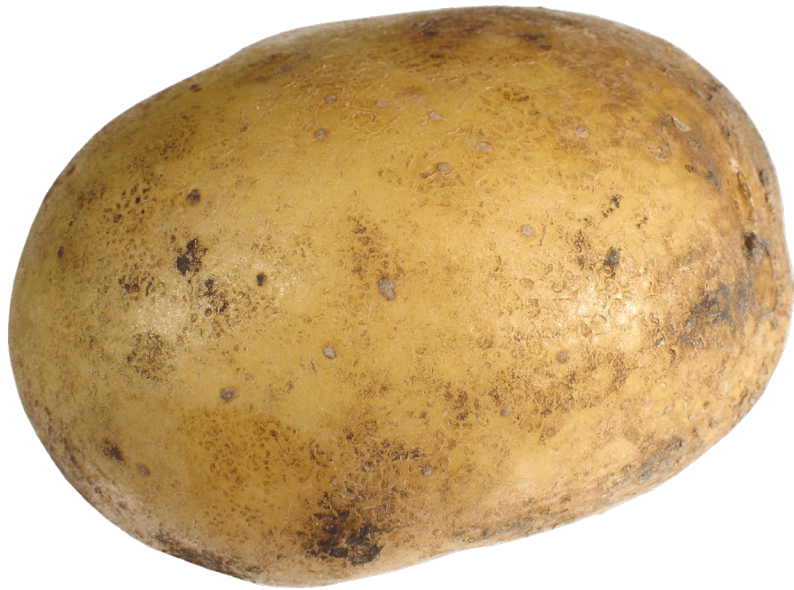
Invasive

Not from here

Causes damage

Displaces natives

Are all non-native plants bad?



Invasive plants: Why did they get here?



Reminder of home



Business opportunity

Invasive plants are often introduced as ornamentals or forages



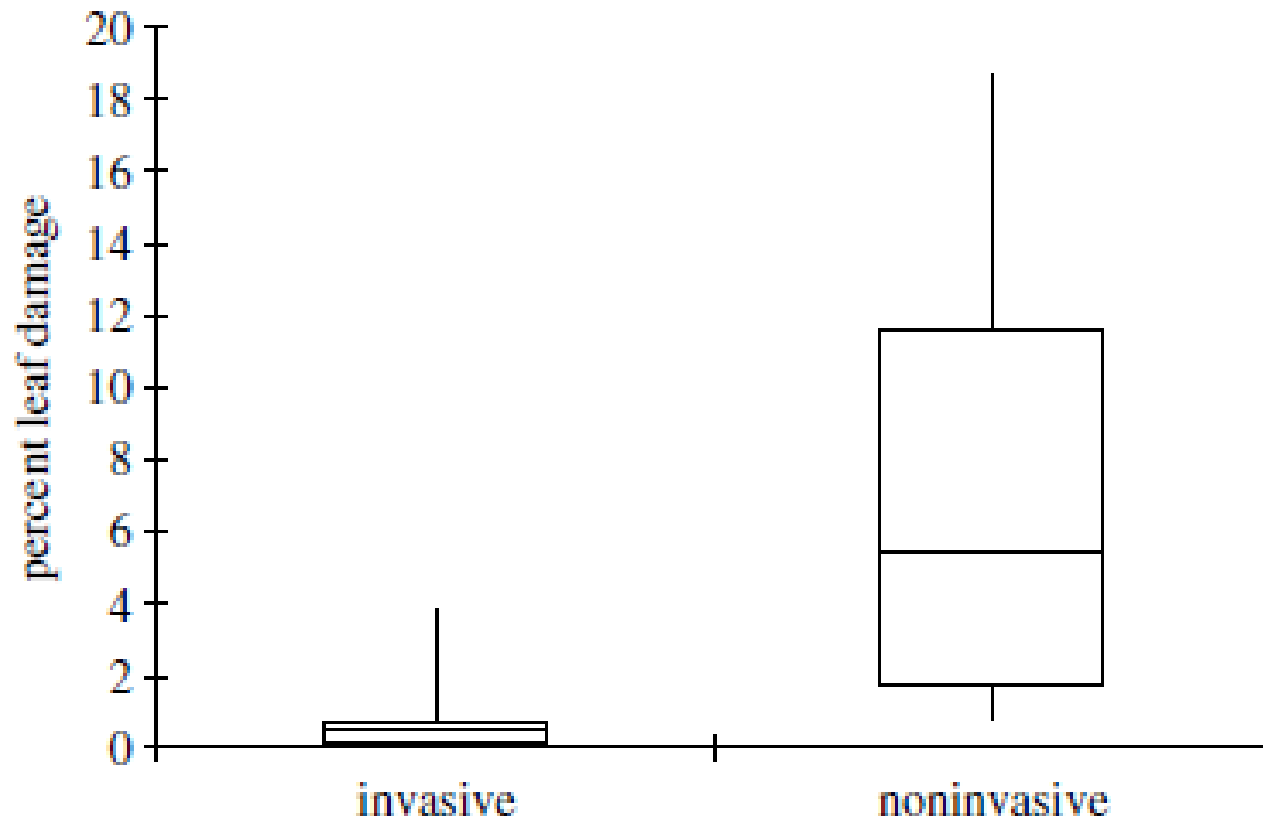
Invasive plants are often introduced as ornamentals or forages

<u>The ideal forage plant^a</u>	<u>The common invasive plant^b</u>
Easy to establish	Germinates in many environments
Adequate seed production, seedling vigor	Extensive seed production with good seed longevity
Vegetative reproduction	Vigorous vegetative reproduction
Rapid growth rate and high yield	Rapid growth (vegetative phase to flowering)
Competes for resources	Competes interspecifically (structure, allelopathy)
Resistant to herbivory or removal	Armed or toxic to escape herbivory
Insect and disease resistant	Free from native predators

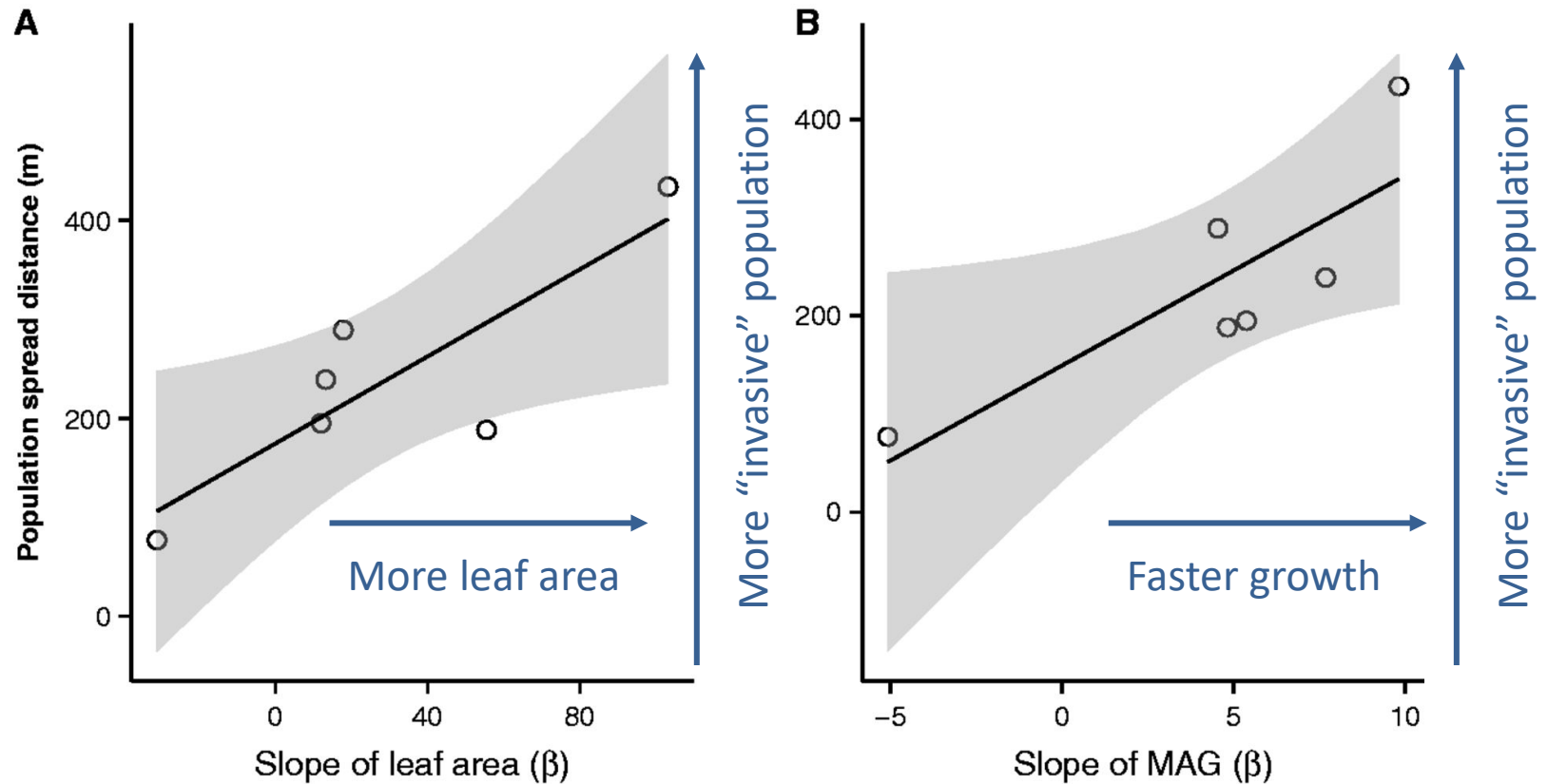
^a Adapted from Barnes et al. 2007.

^b Adapted from Baker 1974; Sutherland 2004.

Few things eat invasive plants



Invasive plants have rapid early growth and can adapt to new environments



Invasive plants often establish in disturbed areas

Juncus bulbosus in a disturbed area near Lake Ina, Australia



Invasive plants have very hearty roots or rhizomes



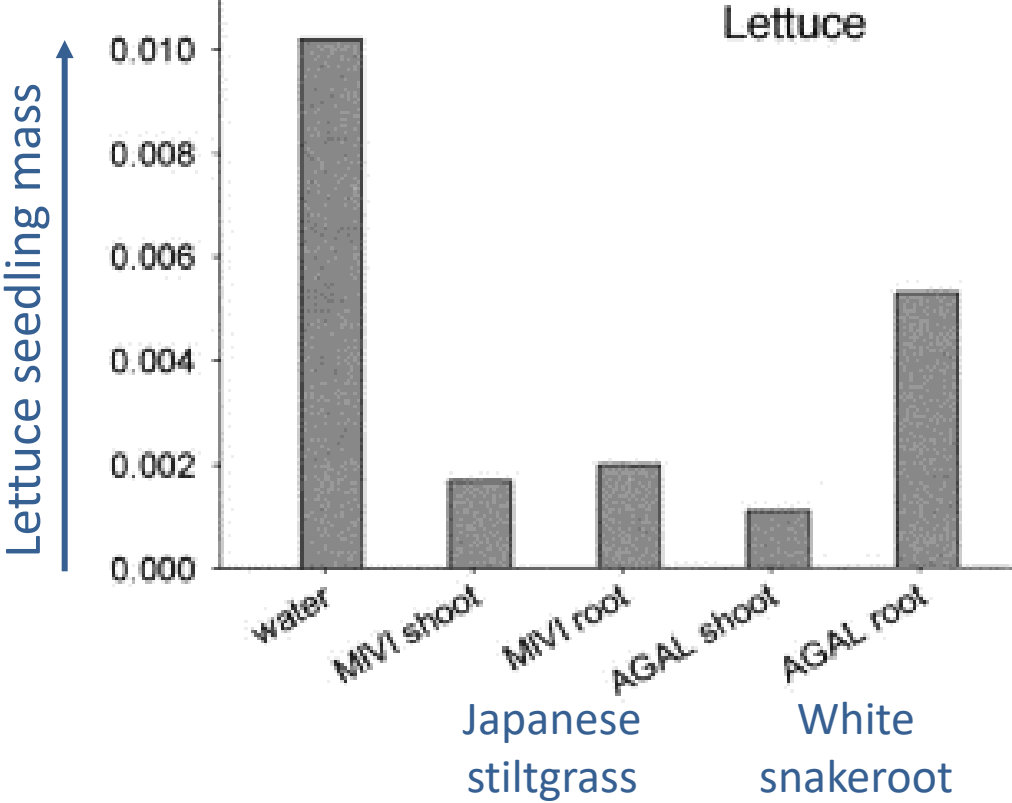
Invasive plants often form exclusive, dense infestations



Invasive plants have a wide tolerance to many environmental conditions



Invasive plants often have allelopathic chemicals that can suppress competing plant growth



Invasive plants may employ a “sit and wait” strategy



Oriental bittersweet

Seedlings establish

Wait for canopy gap

Aggressively overtake trees

When did they get here?

Tree-of-Heaven	1784
Mimosa-Silktree	1745
Paulownia-Princesstree	1800's
Chinaberry	mid 1800's
Callery pear	1908
Russian olive	1900's
Autumn olive	1900's
Chinese tallowtree	1700's
Chinese privet	1800's
Japanese privet	1845
Bush honeysuckle	1700's & 1800's
Nandina	1800's
Invasive roses-multiflora	1800's
Cogongrass	1911



2019 Dirty Dozen List

Top Nonnative Invasive Plants in Georgia

Rank	Species	2009 - 2015		Trend	
		2017 Acres	Average Acres		Percent Change
1	Nonnative privet	644,317	679,897	-5%	Stable
2	Nepalese browntop	90,204	97,688	-8%	Stable
3	Chinaberry	47,757	59,659	-20%	Decreasing
4	Nonnative lespedeza	35,862	40,586	-12%	Decreasing
5	Kudzu	30,961	37,433	-17%	Decreasing
6	Chinese tallowtree	24,321	15,066	61%	Increasing
7	Japanese climbing fern	19,978	19,428	3%	Stable
8	Nonnative olive	19,456	19,248	1%	Stable
9	English Ivy	12,981	8,581	51%	Increasing
10	Mimosa	11,647	15,066	-23%	Decreasing
11	Trifoliolate Orange* <small>*New addition in 2019</small>	8,600	3,404	153%	Increasing
12	Wisteria	7,874	8,498	-7%	Stable
Cogongrass Control Efforts (Acres)(9/18/2019)		337	Decreasing - 261 Acres of the 337 acres of cogongrass, in Georgia, are reported as inactive or eradicated.		

The Georgia Forestry Commission documents all known cogongrass infestations. Since 2007, cogongrass has been detected in 65 counties, and 27 of those 65 counties are now free of cogongrass. Georgia's proactive treatment program assists landowners across the state, and 85% of all known cogongrass spots in Georgia are considered inactive or eradicated.

Invasive Species: Any plant or animal that has been introduced and aggressively competes with and displaces local native communities; normally having no native enemies to limit reproduction and spread.

The Dirty Dozen List of Nonnative Invasive Species is ranked by the total acres occupied according to Forest Inventory and Analysis data. Honey suckle and fescue are not included in this list.

Trends:

Stable (0 - 10% Change) / Increasing or Decreasing (>10% change)

Invasive Plant Books

A Field Guide for the Identification of Invasive Plants in Southern Forests



Invasive Plant Books



A Management Guide for Invasive Plants in Southern Forests

James H. Miller, Steven T. Manning, and Stephen F. Enloe



United States Department of Agriculture • Forest Service • Southern Research Station
General Technical Report SRS-131

To request these free books:

<http://www.srs.fs.usda.gov/pubs>

Also an app on your smart phone:

Search “Invasive Plants”



Invasive Plants in Southern Forests:
Identification and Management

By Charles T. Barger

Invasive plant control options: hand pulling or girdling



Invasive plant control options: mechanical/cultural control



Invasive plant control options: prescribed burning



Invasive plant control options: grazing



Invasive plant control options: herbicide



Invasive plant control options

Broadcast - Foliar Application

Backpack sprayer

Tractor/ATV mounted tank

Aerial

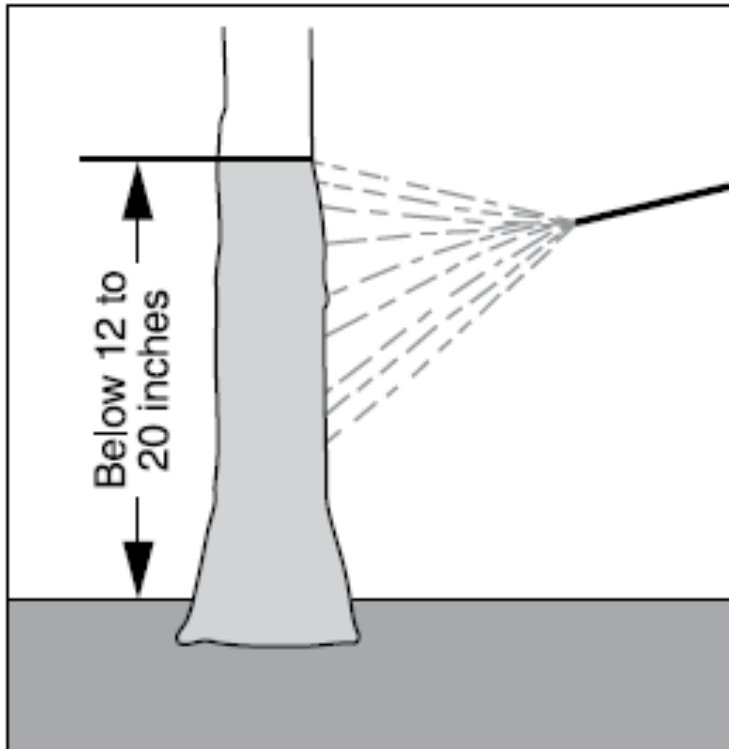


Invasive plant control options

Basal Bark application

Backpack sprayer

Wand or wick



Invasive plant control options

Stem injection (Hack and Squirt)

Hatchett/machette and spray bottle



Invasive plant control options

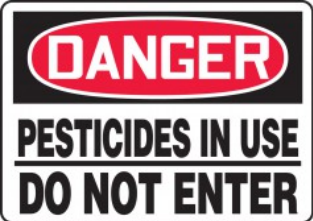
Stump treatment

Handsaw/Chainsaw and spray bottle

Small stems

Large stems





Pesticides

READ AND FOLLOW ALL LABEL INFORMATION!!

Use Personal Protective Equipment

Long sleeve shirt

Long pants

Boots

Chemical resistant gloves

Eye protection

Use the correct herbicide, with correct application methods and correct tools.



Common active ingredients

Glyphosate (Roundup)

Non-selective

Broadleaf > conifers > grasses

Stops shikimic acid
pathway

Stops protein synthesis



Common active ingredients

Triclopyr (Garlon, Trycera)
Broadleaf and woody plants
(hardwoods, vines)
Not grasses or conifers)
Mimics a plant growth
hormone (auxin)
Causes uncontrolled growth
and death



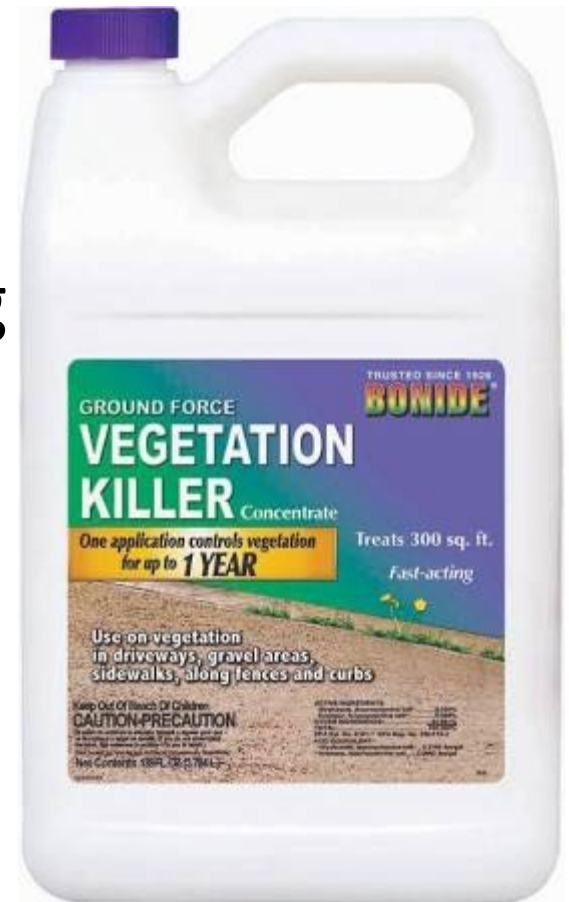
Common active ingredients

Imazapyr (Arsenal, Chopper)

Non-selective

Prevents plants from producing
an enzyme (protein)

Acetolactate synthase



Common active ingredients

Sulfometuron/metsulfuron methyl
(MSM) (Oust)

Most broadleaf annuals and
perennials

Some woody plants tolerant
(e.g. loblolly)

Some hardwoods susceptible
(e.g. some oaks)

Pre- or post-emergence

Blocks cell division in growing regions

Stem and especially root tips



Cogongrass (*Imperata cylindrica*)

One of the world's worst noxious weeds

Infests nearly 500 million acres worldwide

Native to Asia, now everywhere but Antarctica

First appeared in Alabama in 1912

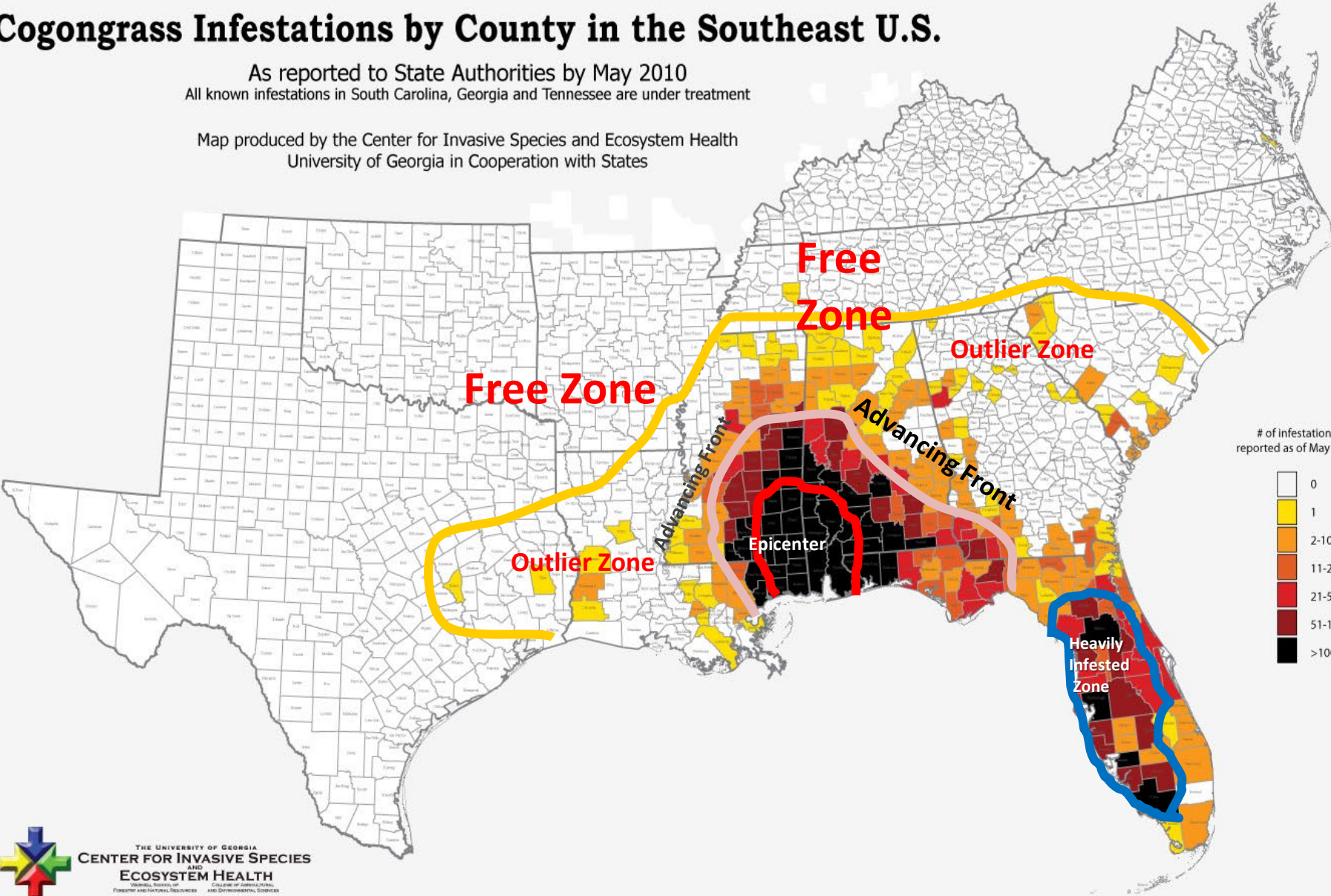
Introduced in MS, FL as forage (1920s-1930s)

AUG 5 2005

Cogongrass Infestations by County in the Southeast U.S.

As reported to State Authorities by May 2010
All known infestations in South Carolina, Georgia and Tennessee are under treatment

Map produced by the Center for Invasive Species and Ecosystem Health
University of Georgia in Cooperation with States



Cogongrass

**Flowers early spring to early summer
(April-early June)**



Cogongrass

Average 3000+ seed per plant



Cogongrass

Off centered white mid-rib

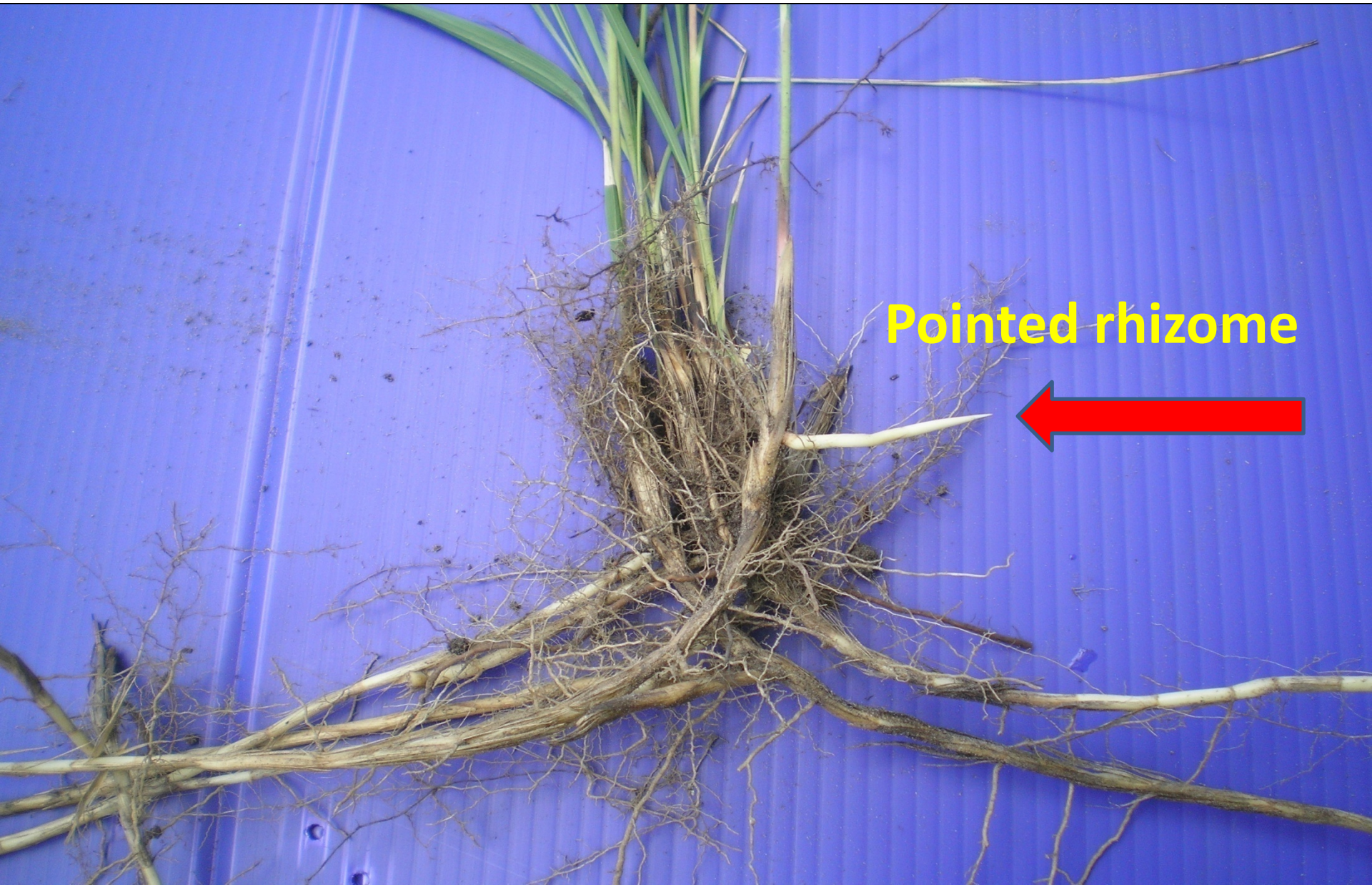


Cogongrass

Very dense mat of rhizomes



Cogongrass



Pointed rhizome

Cogongrass: the perfect weed

Goats will not even eat
this plant

More difficult to manage
than kudzu

Burns like gas

Chokes out all other
plants

Grows well in **full sun** or
full shade



Can you kill it with fire?



Integrated management



For best results combine:

Burning

Chemical applications (glyphosate and/or imazapyr)

Tillage (mechanical disturbance)

Burn or mow before herbicide

Remove excess thatch and older leaves

Initiate regrowth from rhizomes, reduces biomass

Tillage following herbicide works best

Chinese privet

One of the most invasive species in the SE US

Colonizes low wet areas readily

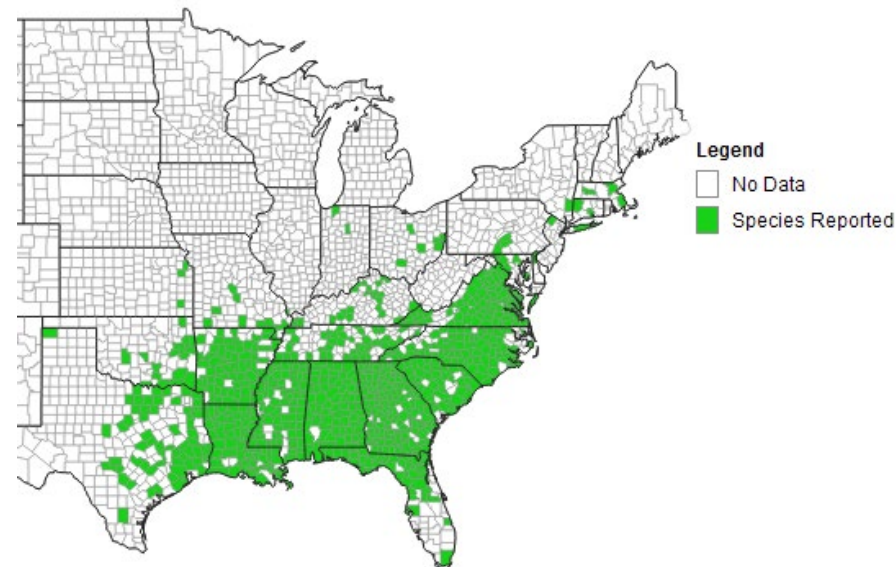
Spread easily by wildlife (birds)

Once established is very difficult to remove

Shades and out competes many native species

Forms dense thicket walls

Massive seed bank





gettyimages®

Bill Frakes

Chinese privet (*Ligustrum sinense*)





Chinese privet: mechanical control



4% Glyphosate

1 oz. Escort / acre



December 14, 2007

First Spraying



February 14, 2008

Two Months Later

Can you kill it with fire?



Integrated management for privet

Spraying works great

Especially in winter!

Also triclopyr basal bark treatment (+ surfactant)

Fire will kill sprouts and top-kill older plants

Will need repeated fire

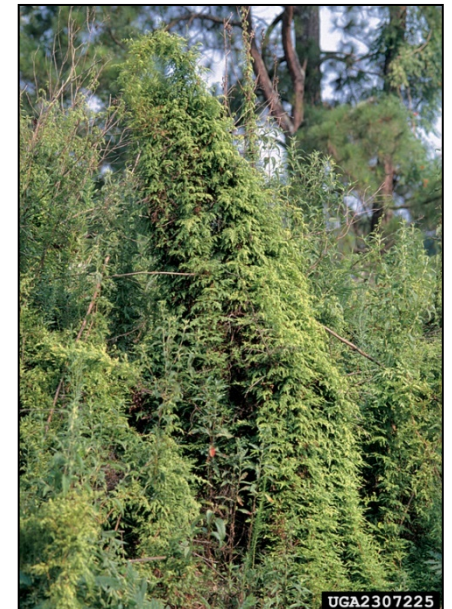
For heavy infestations, may need initial
mechanical/herbicide application, then fire

Japanese climbing fern (*Lygodium japonicum*)

Can climb up to 80 feet

Brown fronds persist in winter = fire hazard

Spreads rapidly by rhizomes and wind-dispersed spores,
especially on clothing and in pine straw



Japanese climbing fern

Rapidly forms mats, smothering shrubs and trees.





Japanese climbing fern

Dies back in winter with dead vines providing a trellis for reestablishment in the spring.



Can you kill it with fire?



Japanese climbing fern management

You can kill it with fire, but I wouldn't.

Metsulfuron methyl (1.5-2 oz per acre + 0.25%
non-ionic surfactant)

Hardwoods are susceptible to MM

Glyphosate (4% solution) with surfactant

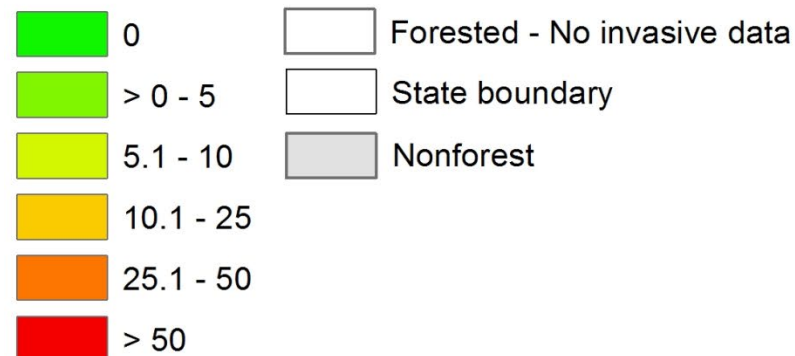
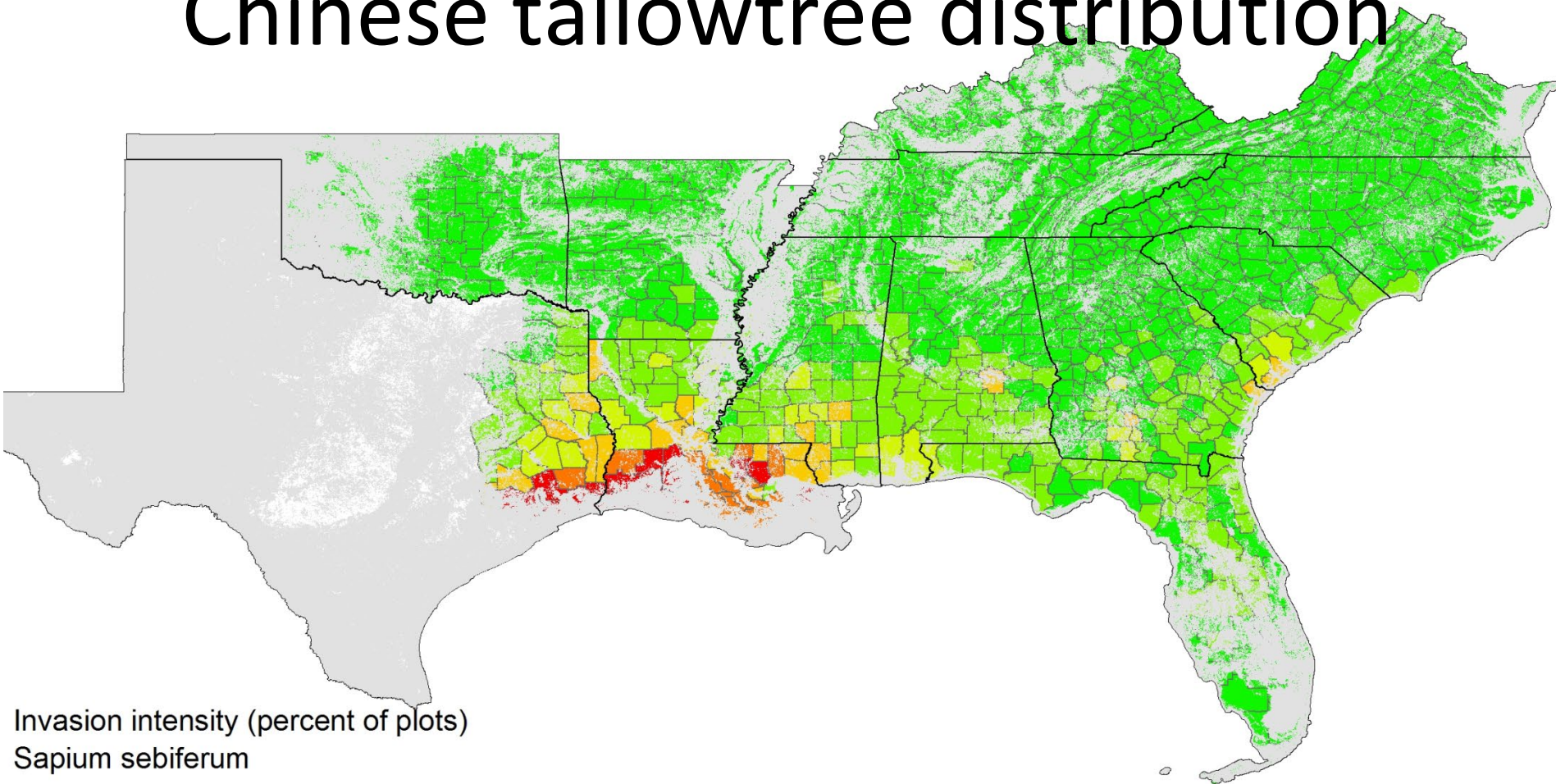
Apply in summer before spores are released

Chinese tallowtree (*Triadica sebifera*)

Planted as ornamentals for showy fall color
Plants can produce 100,000 seeds/year
Spread by birds and water



Chinese tallowtree distribution



Map created by Christopher M. oswalt - USDA Forest Service,
Southern Research Station, Forest Inventory & Analysis.

June 9, 2016.

Chinese tallowtree: chemical control

Foliar Spray Method: (July - October)

Clearcast™: 32-64 oz. per acre

Arsenal AC: 1% solution in water with a surfactant.

Krenite S: 30% solution in water with a surfactant.

Garlon 4® 2% solution in water with a surfactant.

Cut Stump Method: Excellent results are reported with:

50% solution of Garlon 3A or 10% solution of Arsenal AC.

Stem injections using Arsenal AC, Garlon 3A, or Pathfinder II (anytime except March and April).

Basal Bark Method:

Triclopyr: Garlon 4® (20% plus basal oil).

The use of a penetrant is highly recommended.

Pathfinder® II and Chopper®: ready-to-apply products.

Treatment can be done at any time of the year.

Can you kill it with fire?



Chinese tallow tree and prescribed fire

Burning generally does NOT impact older trees

Burning will kill small seedlings

Damage from fire may not show up
immediately

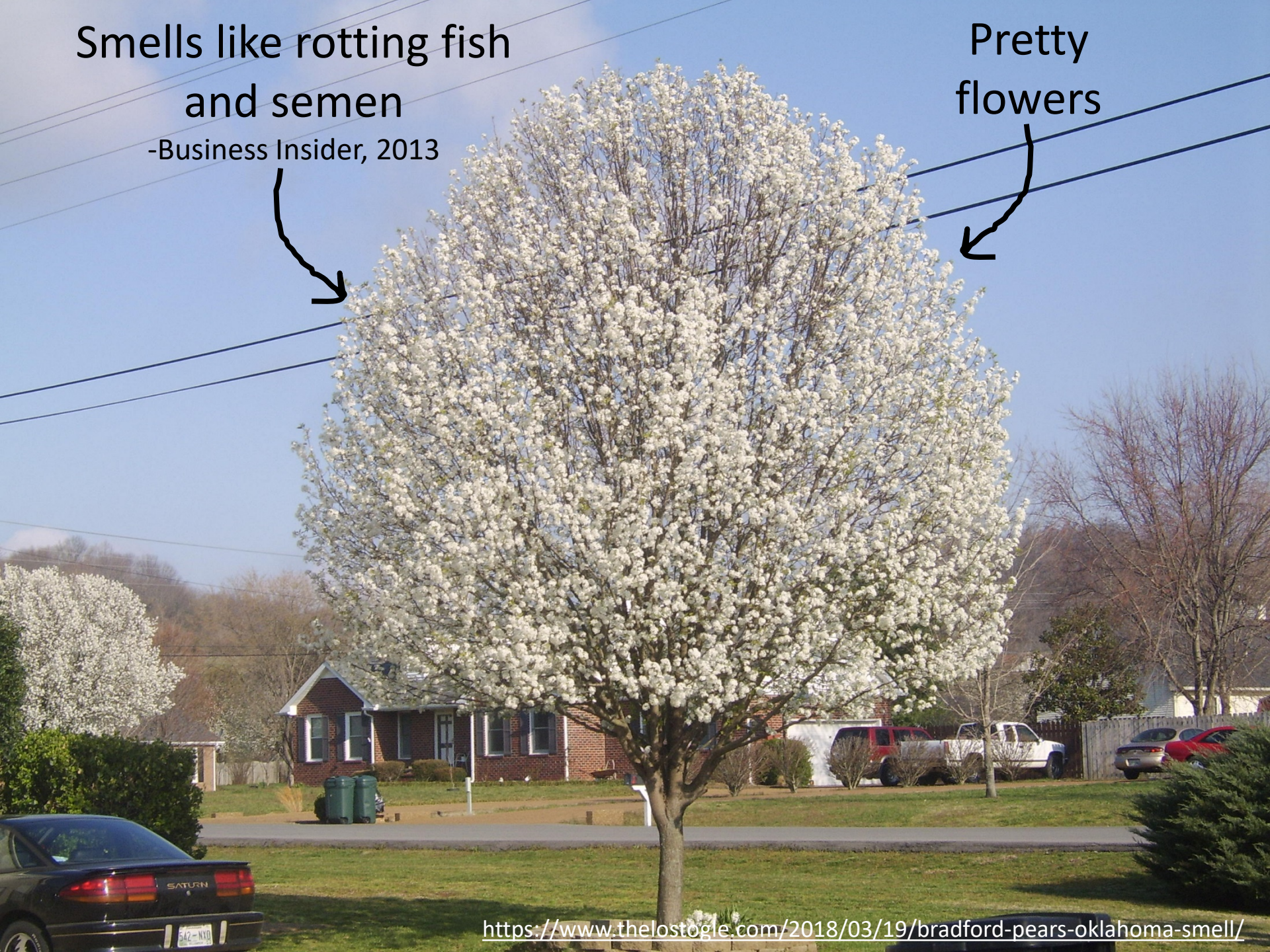
Take home? Prescribed fire may be a tool in
the toolbox – contrary to what we thought
previously.

And finally, let's talk about Callery pear
(aka Bradford pear)
(*Pyrus calleryana*)

Smells like rotting fish
and semen

-Business Insider, 2013

Pretty
flowers



Bradford pear

Commercially released in 1961

Escaped cultivation in AR in 1964, 1965 in MD

Structural problems noticed in early 1980s

\$23 million in sales in 2009

Many new cultivars created



Bradford pear: what they knew

Only Bradford pear = no seeds

B B B B B B B B B B B B B
B B B B B B B B B B B B B
B B B B B B B B B B B B B

Bradford pear: what they knew

Only Bradford pear = no seeds

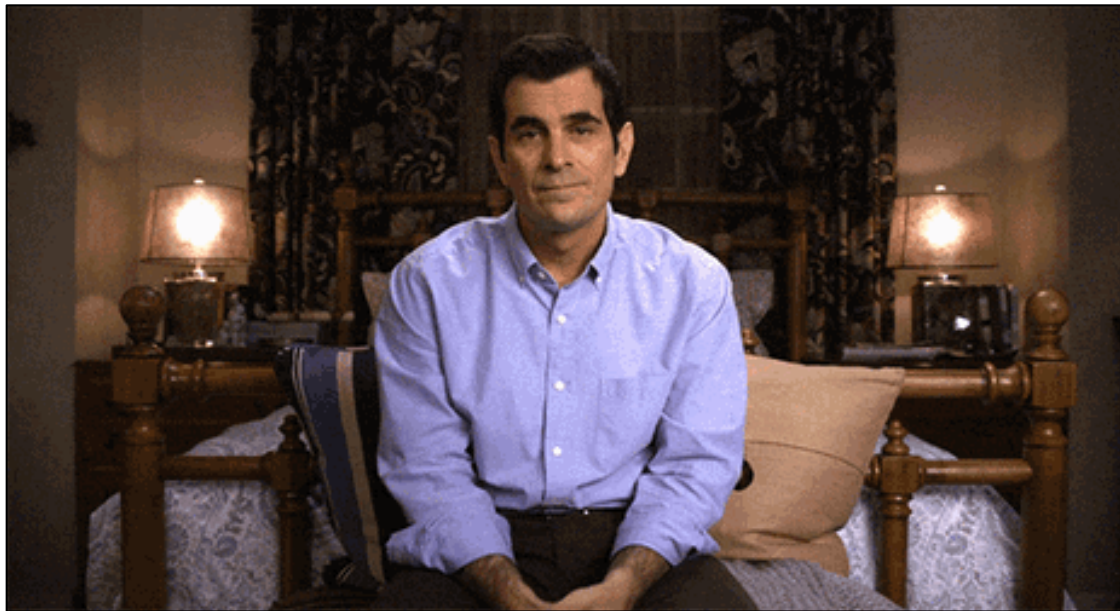
Bradford pear + other *Pyrus* = seeds

B B B B B B B B B B B B B
B B B B B B C B B B B B B
B B B B B B B B B B B B B

Bradford pear: what they knew

Only Bradford pear = no seeds

Bradford pear + other *Pyrus* = seeds





**Callery
pear trees**

**Bradford
pear trees**

So now we have wild callery pear in
old fields...



Along roadsides...



All the white trees

In unsold lots...



For Sale
SVN | SMITH GROUP
COMMERCIAL REAL ESTATE
706-769-8794
Matthew Smith, CCIM
706.340.4018
4.69 Acres
All Utilities Zoned Commercial



In forests...

All the green
understory trees

But who cares, really?



But who cares, really?



What to do?

with

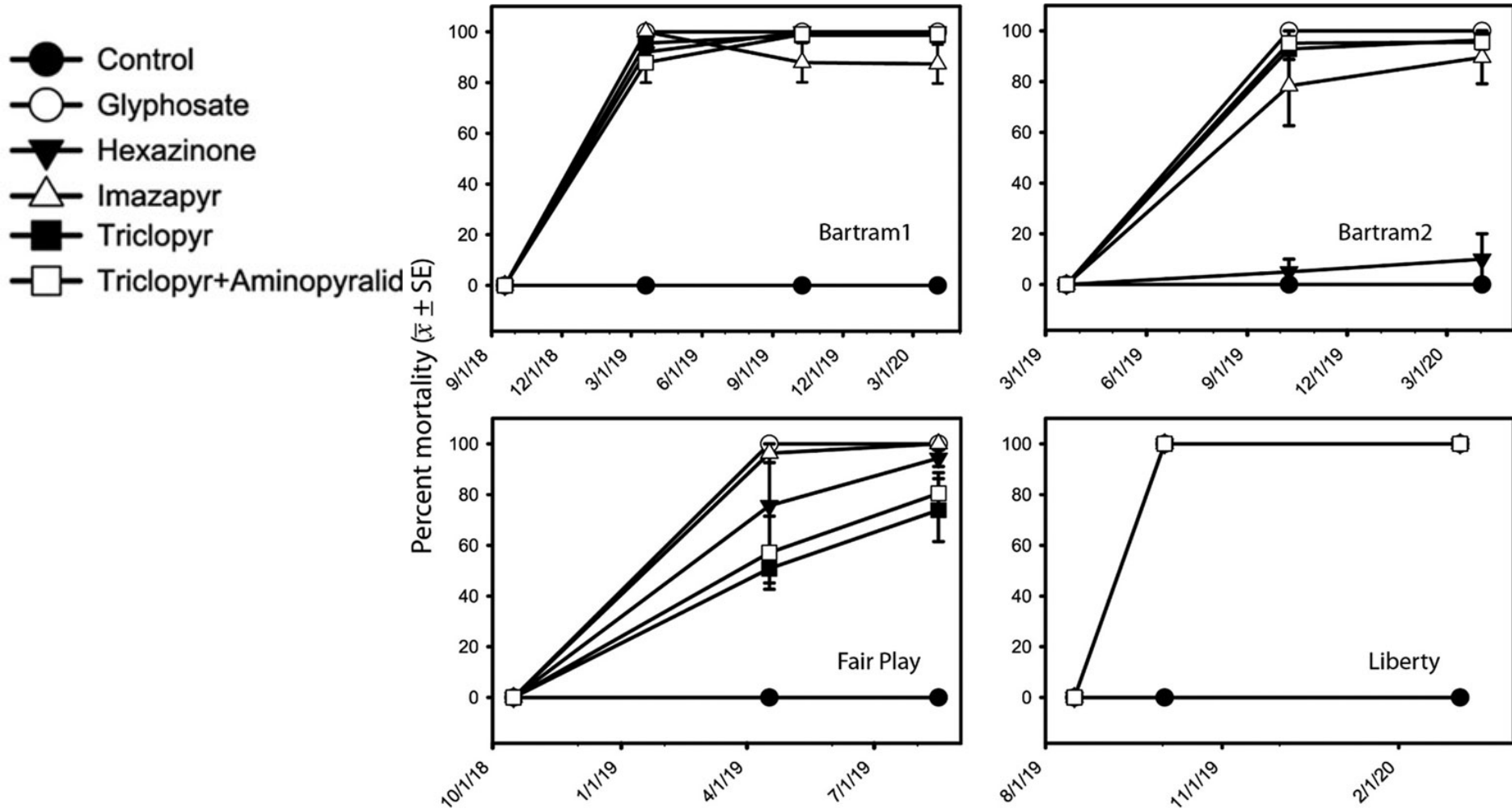


What to do?

Biocontrol?



Herbicides work!



Quick tips for invasive plant management

Will nearly ALWAYS take multiple years/treatments

Privet: hit it in late winter with glyphosate

It's the only green thing in most places

Vines: may need to cut, then spray

Shrubs: foliar/basal bark depending on structure and amount

Trees: basal bark/hack & squirt depending on size, cut & treat later may work too

Questions?

dcoyle@clemson.edu



drdavecoyle

@drdavecoyle



Thank you!