Prospects for biological control of cogongrass

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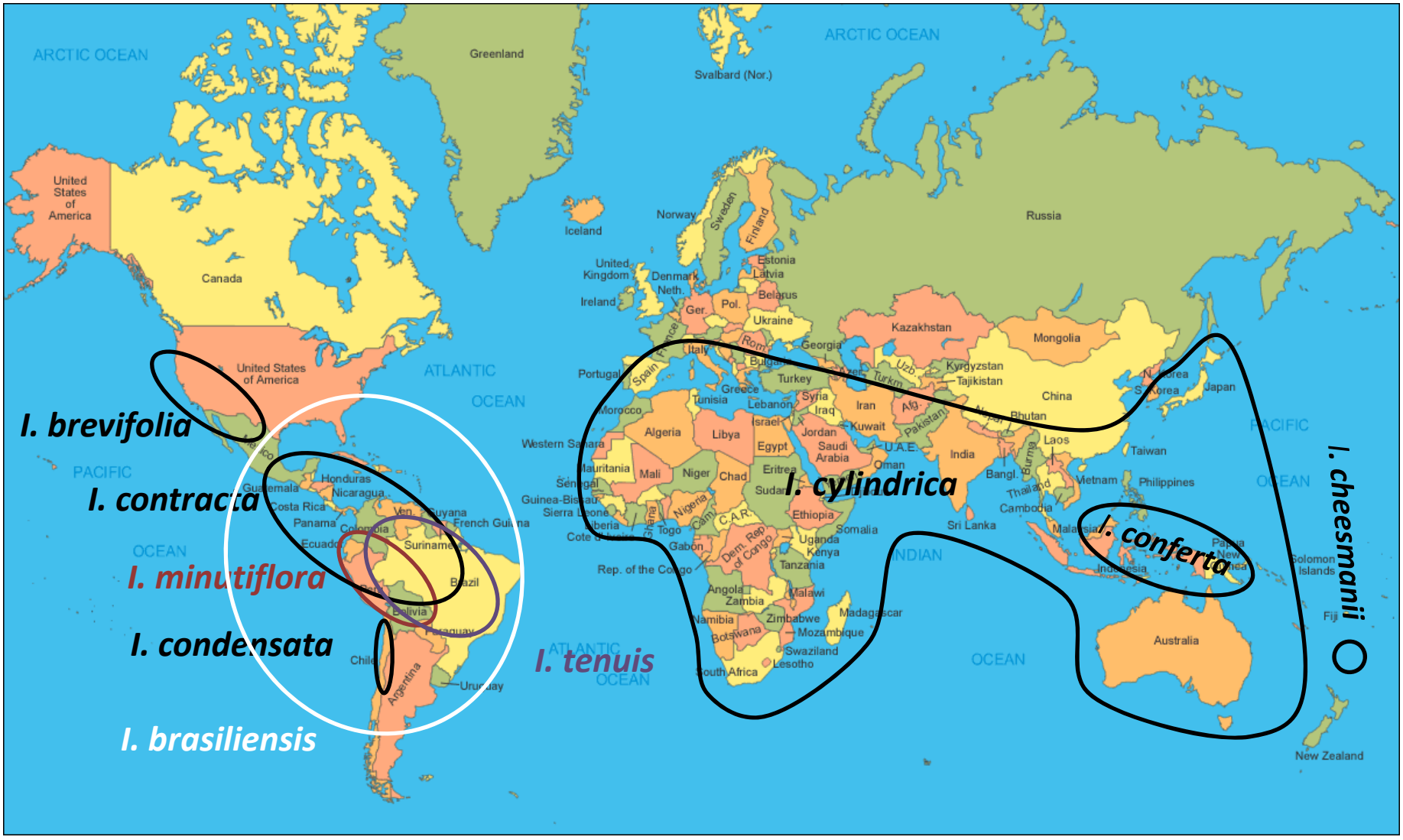
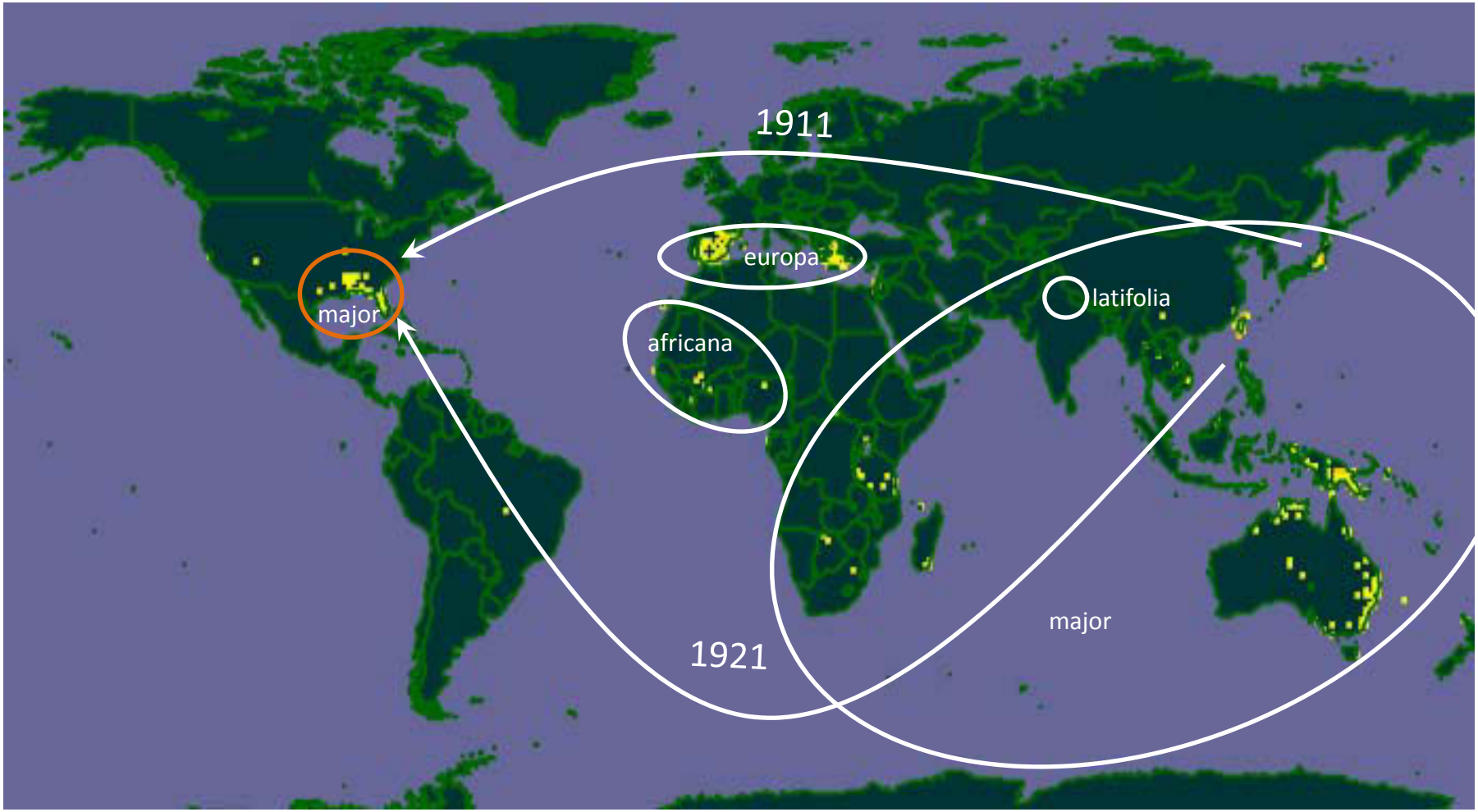
Outline

- Origin of cogongrass
- Relatives in the USA
- Previous work on biological control
- Areas to explore
- African stemborers

Native distributions of *Imperata* spp.



Distribution of *Imperata cylindrica*

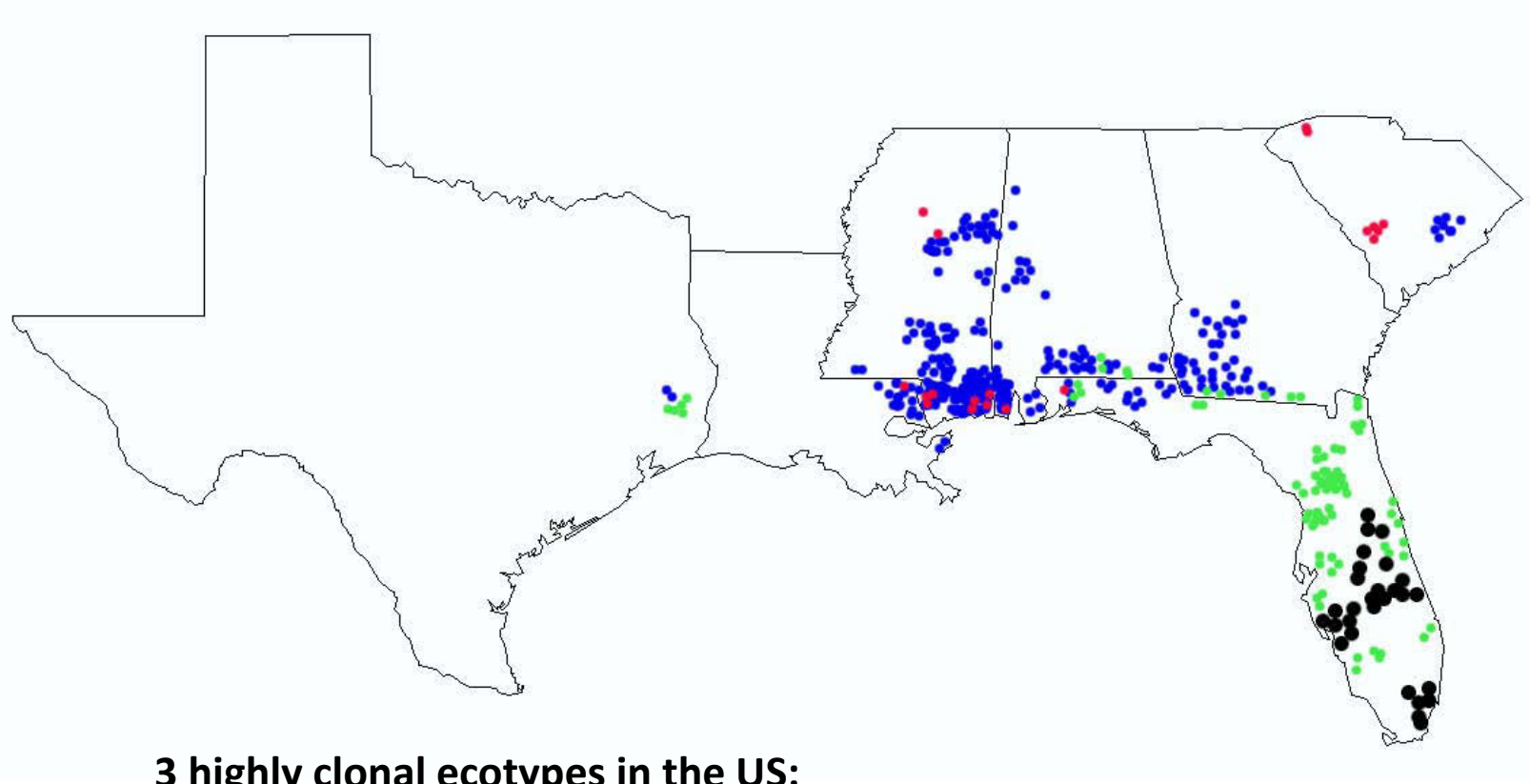


Source: Global Biodiversity Information Facility (gbif.org)

Imperata species in the USA

?

Genotyped accessions in affected areas of the SE US



3 highly clonal ecotypes in the US:

Japanese Blood Grass "Escapes"

"Deep South" Ecotype (most predominant)

Florida Peninsular Ecotype

N = 510 accessions

● **To be genotyped Spring 2013**

Courtesy of Dr. Millie Burrell, Texas A&M University

Classification of cogongrass

- Family – Poaceae
  - Sub-family – Panicoideae
    - Tribe – Andropogoneae
      - Sub-tribe – Saccharinae
        - *Imperata cylindrica*
        - *Saccharum officinarum* (sugarcane)
      - Sub-tribe – Sorghinae
        - *Sorghum bicolor* (cultivated sorghum)
      - Sub-tribe Tripsacinae
        - *Zea mays* (corn)

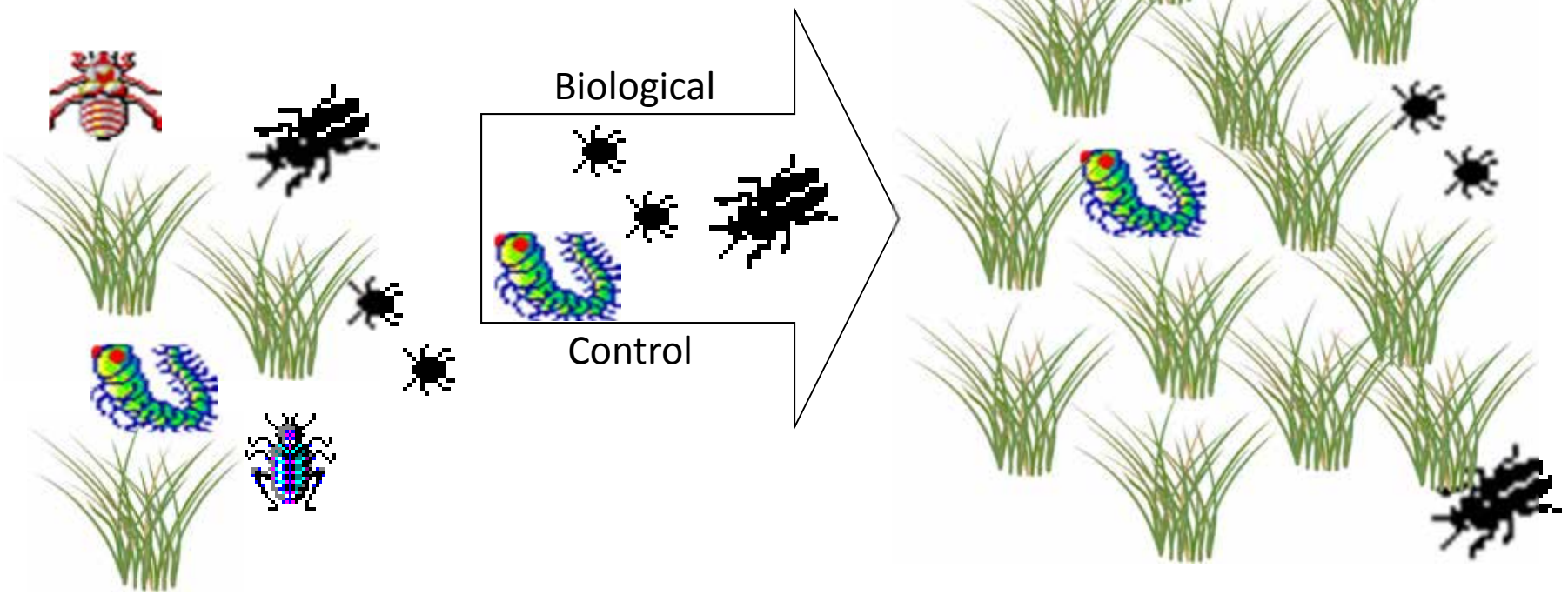
Saccharinae in Florida

Polytris amaura	Javanesegrass	Exotic
Microstegium vimineum	Napalese browntop	Exotic/invasive in some areas
Miscanthus sinensis	Zebragrass	Exotic/invasive in some areas
Imperata brasiliensis	Brazilian satintail	Native/exotic?
Saccharum		
alopecuroides	Silver plumegrass	Native
baldwinii	Narrow plumegrass	Native
brevibarbe	Bentawn plumegrass	Native
coarctatum	Sugarcane plumegrass	Native
giganteum	Sugarcane plumegrass	Native
ravennae	Ravennagrass	Exotic
officinarum	Sugarcane	Exotic

How biological control works

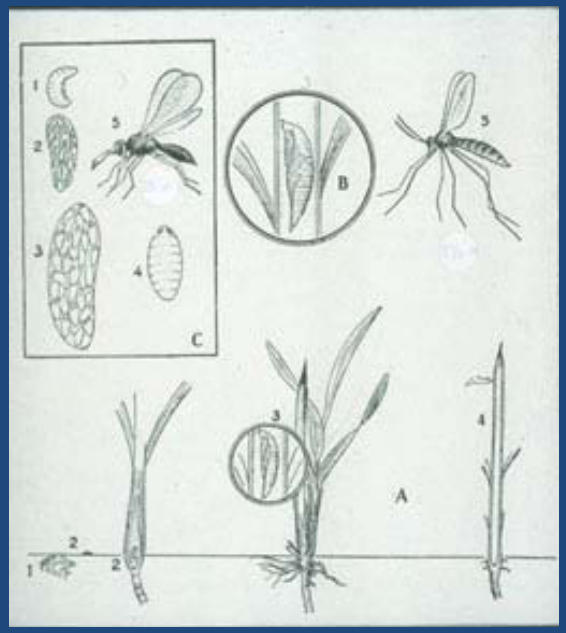
Native home

Invaded area

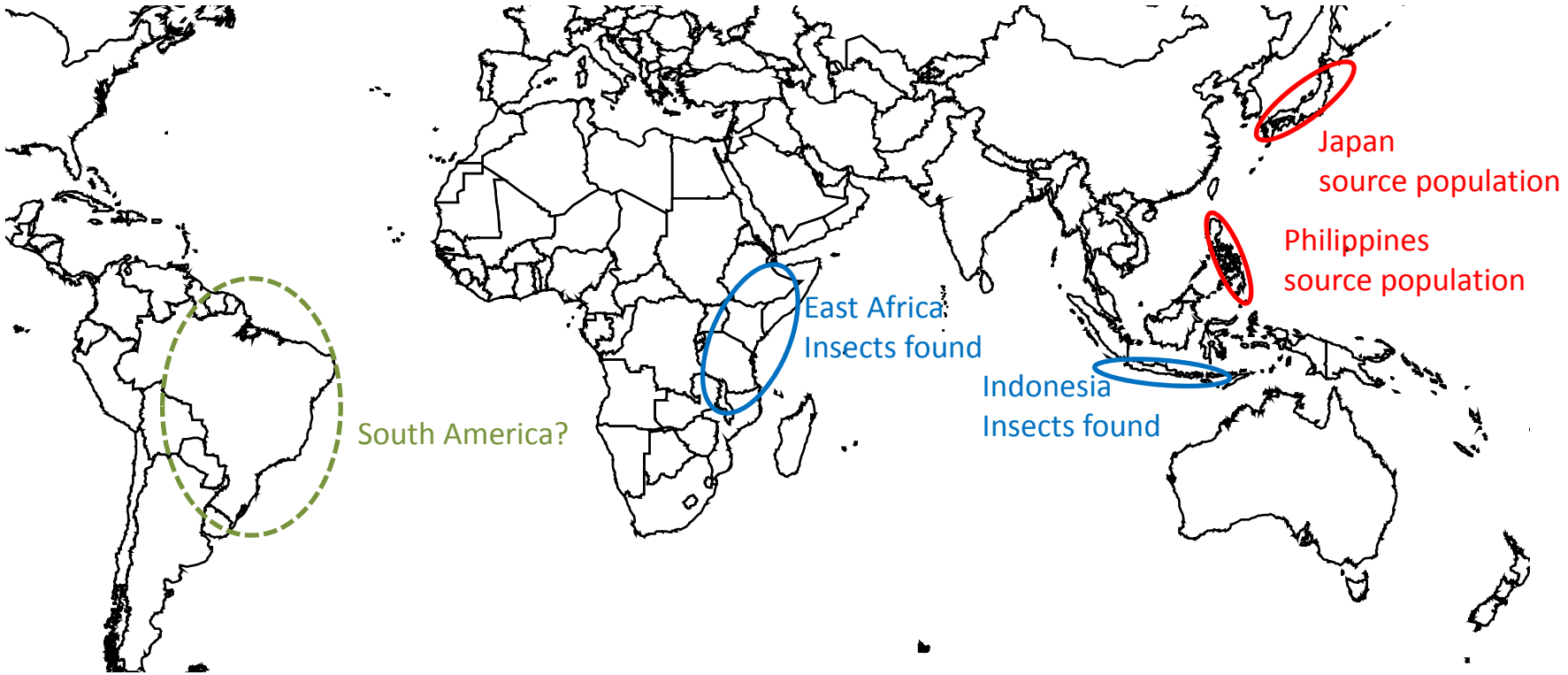


Previous work on biological control of cogongrass

- Outside of the USA, 66 pathogens, 42 insects, two nematodes, and one mite have been found on *I. cylindrica* (Van Loon et al. 2002)
- Two fungal pathogens tested in Florida; *Bipolaris sacchari* and *Drechslera gigantea* (Yandoc et al. 2005)
- Only insect natural enemy investigated was a gall midge from Java, *Orseolia javanica*. Limited host range testing suggested that it may be a specialist of cogongrass
- In 2008/09, stemboring lepidopterans were found feeding on cogongrass in Africa



Where to look for natural enemies?



Importance of cogongrass in different regions based on peer-reviewed publications

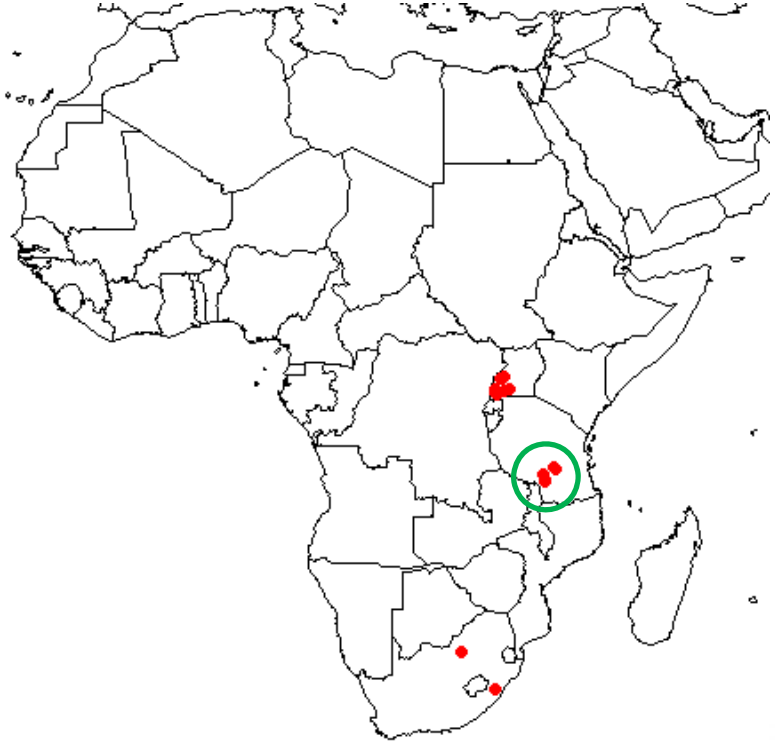
Region	Number of publications
USA (Alabama, Florida, Georgia, Mississippi, southeastern USA, USA)	19
Asia (Taiwan, China, Philippines, Indonesia, Thailand, Cambodia, Laos, Vietnam, India, Asia)	31
West Africa (Cameroon, Nigeria, Ghana, Benin, Togo, Ivory Coast, West Africa)	69
East/southern Africa (Kenya, Tanzania, Uganda, Ethiopia, Zambia, Zimbabae, Malawi, Mozambique, East Africa, South Africa)	1
South America (Brazil, Uruguay, Argentina, Paraguay, Bolivia, Columbia, Peru, Chile, Ecuador, Venezuela, South America)	2

*search terms = Imperata + weed + region

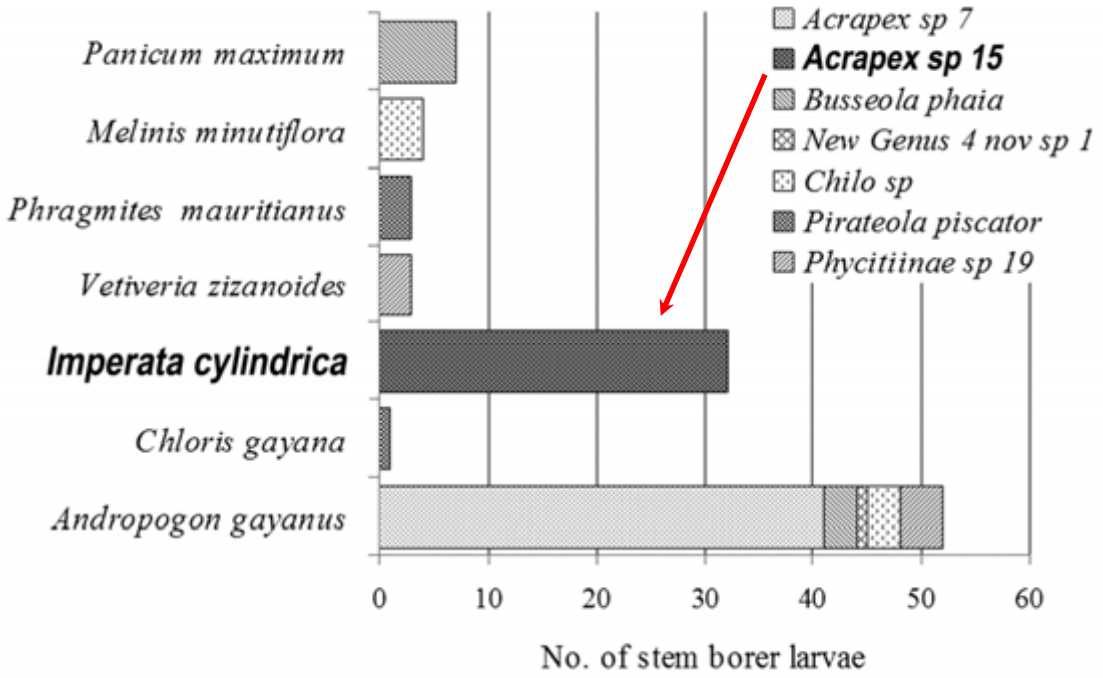
International Center of Insect Physiology and Ecology
Nairobi, Kenya

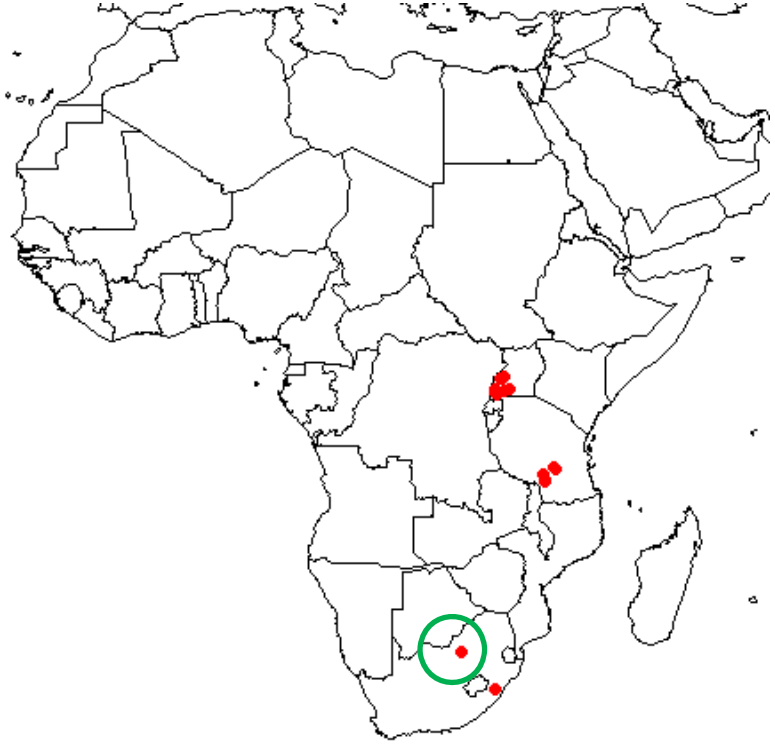
icipe International Centre of Insect Physiology and Ecology

Biodiversity of lepidopteran stemborers of African grasses

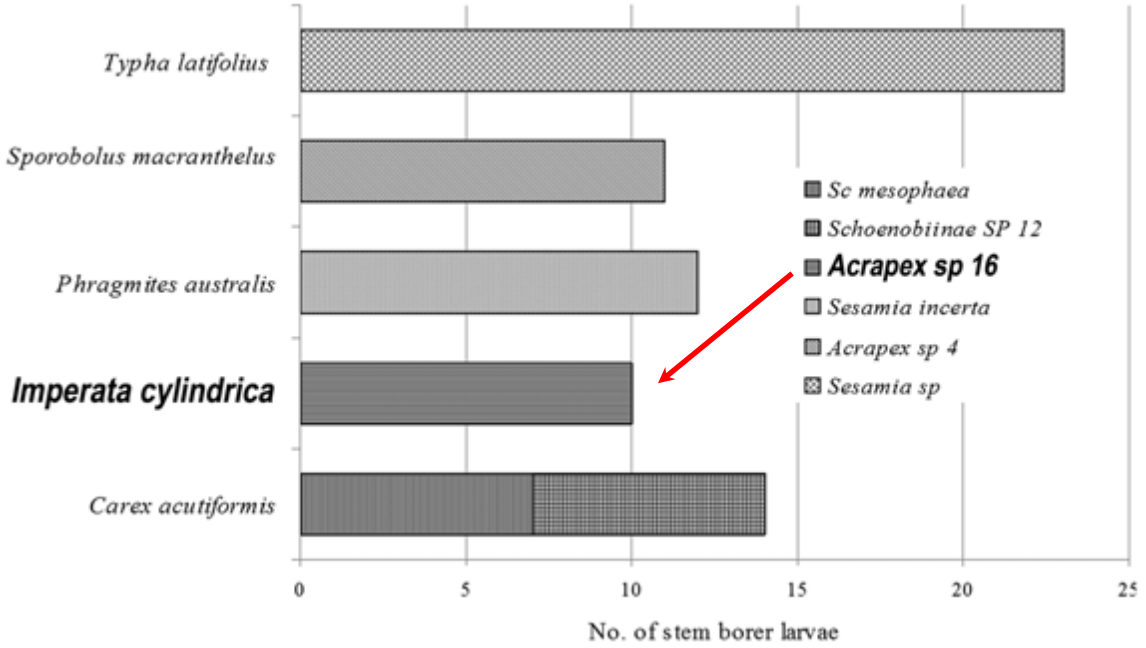


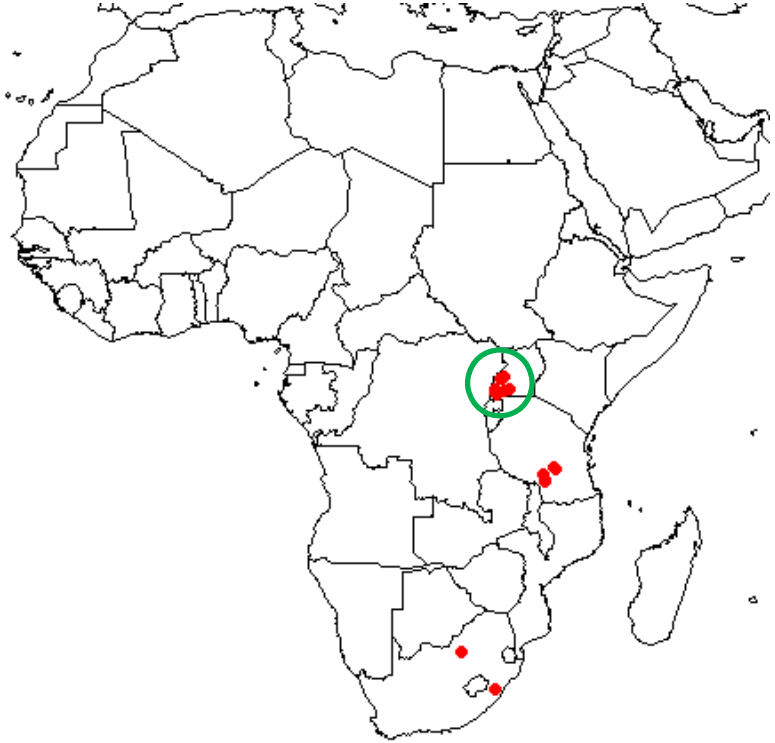
Njombe, Tanzania



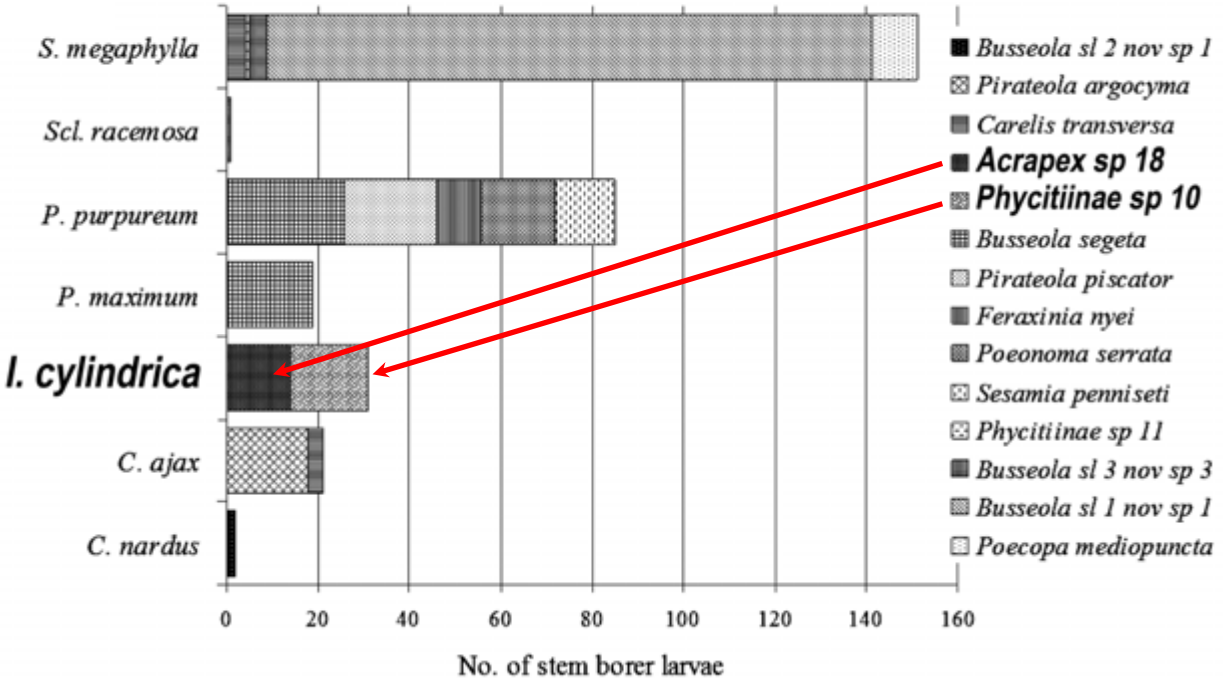


Ventersdorp, South Africa





Kalinzu, Uganda



Tanzania *Acrapex* locations projected onto the USA

Based on:

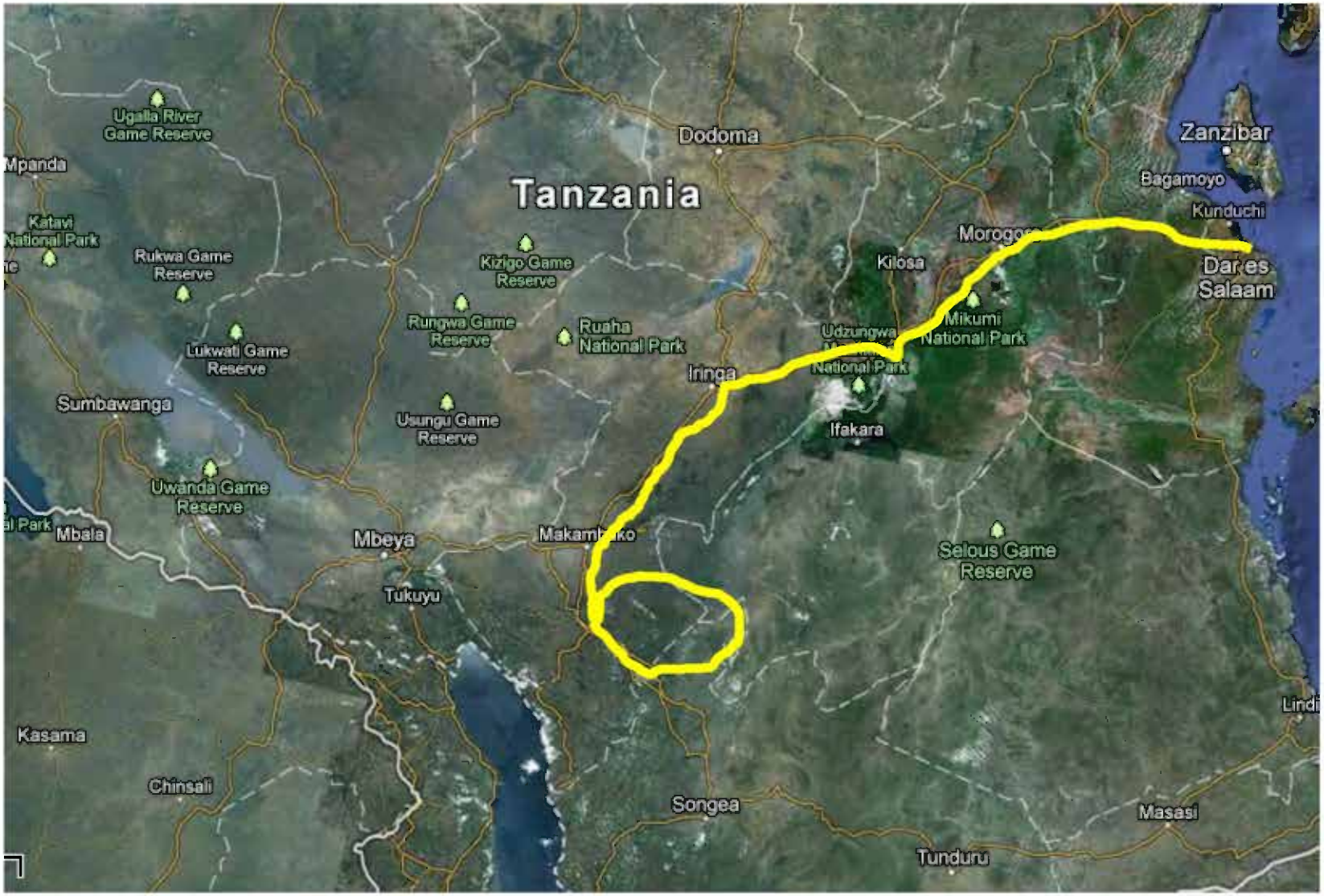
- annual precipitation
- minimum temperature in the coldest month

Uganda *Acrapex* locations projected onto the USA

South Africa *Acrapex* locations projected onto the USA

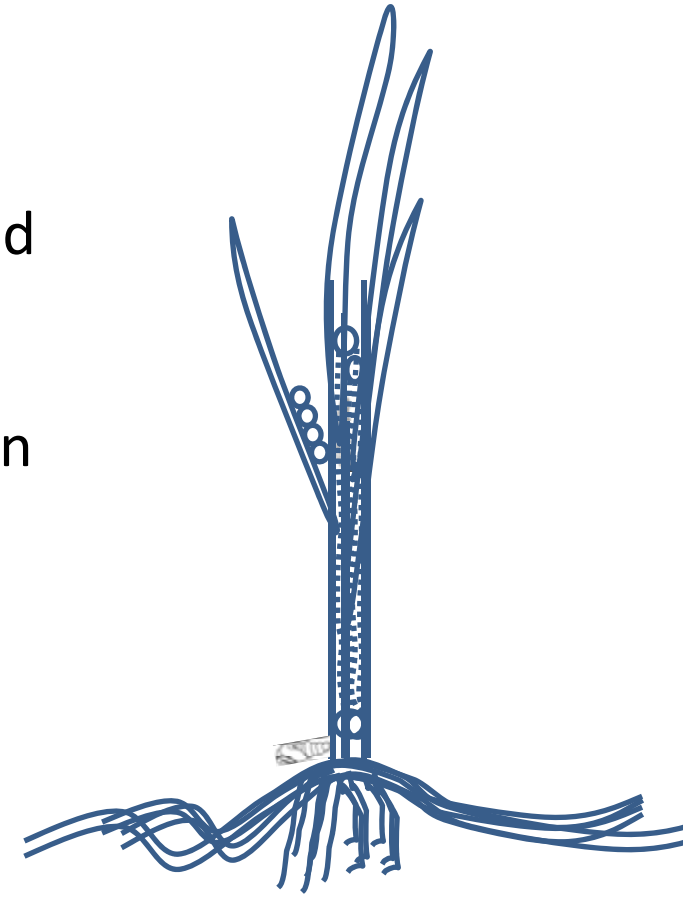
February trip to Tanzania

- Meet collaborators
- Collect borers from cogongrass
- Establish colonies of one or more species at ICIPE in Nairobi, Kenya and UF/IFAS in Fort Pierce, FL
- Conduct host range testing


Tanzania
Dodoma
Zanzibar
Bagamoyo
Kunduchi
Dar es Salaam
Morogoro
Kilosa
Mikumi National Park
Udzungwa National Park
Iringa
Ifakara
Ugalla River Game Reserve
Mpanda
Katavi National Park
Rukwa Game Reserve
Kizigo Game Reserve
Rungwa Game Reserve
Ruaha National Park
Lukwati Game Reserve
Sumbawanga
Usungu Game Reserve
Uwanda Game Reserve
Mbala
Mbeya
Tukuyu
Selous Game Reserve
Kasama
Chinsali
Songea
Masasi
Tunduru

Biology of *Acrapex* sp.: what we know and what we can surmise

- Eggs probably laid on cogongrass stems
- Larvae borer into stem near top of stem and bore downwards to the rhizome
- Larvae bore out of bottom of stem and then bore into another stem
- Pupate in soil near bottom of stem



Status of stemborers collected in Tanzania February 15-18, 2013

Location of rearing	Larvae	Pupae	Adults	Eggs	Neonate larvae
UF	82	24	10	216	21
ICIPE	490	123	16	366	170

Future plans

- Second collection trip ASAP
- Try again to establish colonies of *Acrapex* sp. at ICIPE and in Florida
- Develop rearing procedures
- Begin host range testing
- Expand exploration to include Japan, Philippines and Indonesia -- South America??

Thanks!

Acknowledgments

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Florida Fish and Wildlife