

Fire ants – a story of how introduced insects can wreak havoc on our world



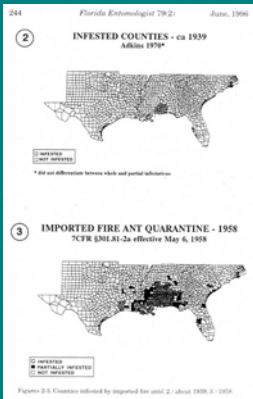
Queen Invicta
(Fire Ant Invincible)

Lyrics by Bill Oliver

She stepped off the boat in Mobile, Alabama
Sometime back in the thirties from her home in deep Brazil
She had six legs and a stinger, fire in her eyes
And the ability to recreate herself a billion times

She didn't plan to come here, to become chaotic
Imported and exotic, she came against her will
She stalked the Southern states, from Florida to Texas
Gained a reputation as the Queen Ant of the Hill

Refrain:
And they call her Queen Invicta
Fire Ant Invincible
Nothing here could stop her
Predator or chemical

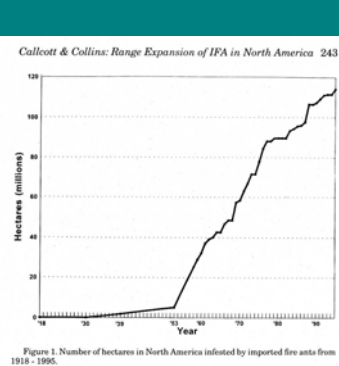
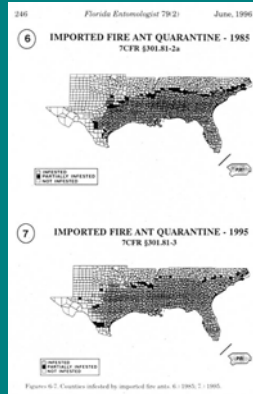
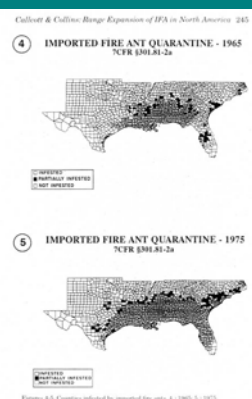


Solenopsis invicta (red imported fire ant) imported into Mobile, Alabama between 1933 and 1945.

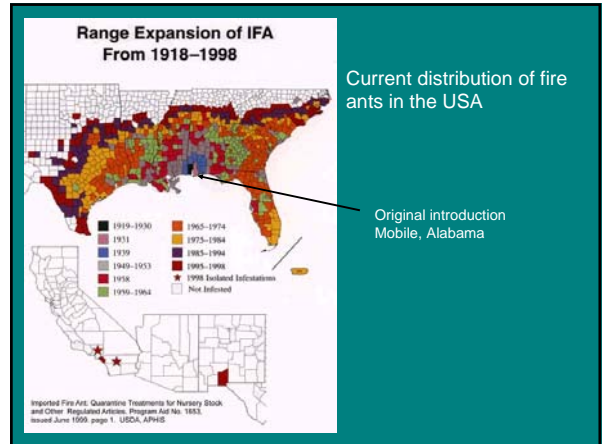
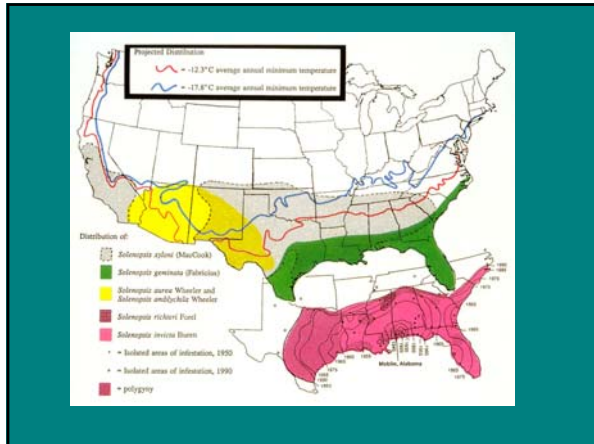
Solenopsis richteri (black imported fire ant) imported into Mobile, Alabama in 1918.

Most likely carried in soil ballast in ships, which was offloaded in Mobile to make room for heavy equipment.

Most likely source: Brazil



Rate of expansion:
Before 1958:
150,000 hectares/year
After 1958:
2.4 million hectares/year
[1 hectare = 2.5 acres]



Imported fire ants are spreading still...

Fire Ants Are Emerging Nuisance For Virginia Residents
ScienceDaily (May 29, 2007)

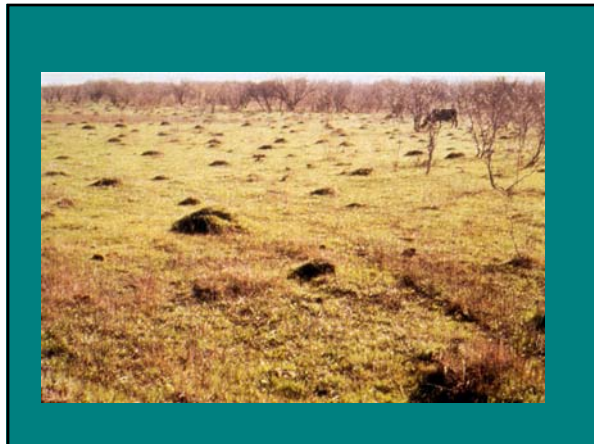
"Red imported fire ants (RIFAs), which have caused trouble in Florida and Texas for decades, are now advancing in Virginia. Colonies of the tiny, highly aggressive insects have been observed in the commonwealth since 1989 and, in recent years, have caught the attention of Virginia Tech scientists who are trying to learn more about the increasing number of fire ant infestations."

"Fire ants caught the public's attention in 2006 when a 30-year-old landscape worker in Virginia Beach died after a fire ant attack."

Problems were immediately evident:

Colony size and density was much greater in N. America than in S. America.

	South America	North America
Density	20 colonies/h	200-500 colonies/h
Mound size	13 liters	27 liters



How did they spread so fast?

- Transport in soil and nursery stock
- Nuptial flights
- Rafting down rivers
- Natural attraction to shiny surfaces (e.g., cars)

Problems created by fire ants

- a. Public health problems
- b. Agricultural problems
- c. Wildlife and the environment
- d. Miscellaneous bizarre effects.



Ouch!



Stings:

- 1500 cases of severe allergic reactions/year
- 2-5 deaths per year
- \$2.84 million per year to treat sting victims

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Crops:
\$125 million/year to soybean growers alone

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Egret chick killed by fire ants

Problems created by fire ants

Fire Ants Killing Baby Song Birds At High Rates

ScienceDaily (Sep. 17, 2007)

"Red imported fire ants may be killing as many as a fifth of baby song birds before they leave the nest, according to research recently completed at Texas A&M University"



<http://www.sciencedaily.com/releases/2007/09/070912143334.htm>

Problems created by fire ants

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Miscellaneous bizarre effects



Relay switch from traffic control box



Electrical utility housing



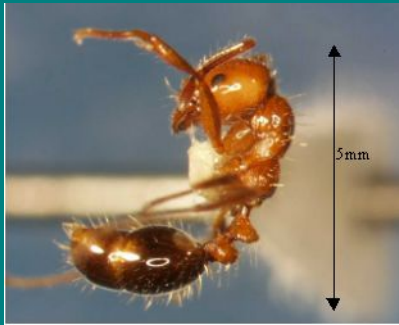
Economic cost of fire ants?

Estimated total between 1957 and 1984:
\$172 million

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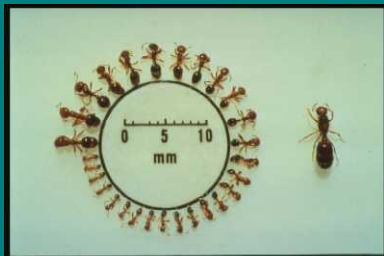
Biology of the imported fire ant, *Solenopsis invicta*



Biology of the imported fire ant, *Solenopsis invicta*

1. Mating behavior – swarms of winged males and females issue from nests after summer rains. Typical colony produces 3000-7000 reproductives.
2. Colonies are founded by single females who lay 50-90 eggs over about a 1 week period. One half of the eggs are "trophic" eggs that are consumed by the early instar ant larvae.
3. First brood workers are tiny (called "minims"). Workers start foraging at this time and the queen has lost about 50% of her body weight.
4. Colonies build up to about 200,000 workers on average
5. Fire ants are omnivorous; mostly feed on insects but they can also feed on small vertebrates, seeds, small seedlings and plant oils.
6. Monogyne vs. polygyne colonies.

Biology of the imported fire ant, *Solenopsis invicta*



Typical colony: 200,000 workers

Biology of the imported fire ant, *Solenopsis invicta*



Nests



Monogyne vs. polygyne colonies

Monogyne colonies: single queen, 200,000 workers. Nestmates recognize one another and exclude non-nestmates.

Polygyne colonies: many queens (>100!) with large, interconnected nests forming enormous super colonies. No ability to discriminate between nestmates and non-nestmates. Can create extremely high nest densities.

Polygyne colonies reproduce by (1) budding and (2) joining.

Genetic basis of Monogyne vs. polygyne colonies

At one genetic locus (GP-9) there are two alleles:

B, b

BB females – form monogynous colonies, large

Bb females – form polygynous colonies, small

bb females – die

Possibly due to inbreeding at the first introduction to N. America.

Don't mess with fire ants!

Red imported fire ants:

http://video.nationalgeographic.com/video/player/animals/bugs-animals/ants-and-termites/ant_redfire.html

Red imported fire ants attacking other insects:

http://video.nationalgeographic.com/video/player/animals/bugs-animals/ants-and-termites/ant_fireswarm.html

Don't mess with Texas!



Fire ant control methods

Chemical control:

0.3% mirex (pesticide)
14.7% soybean oil
85% corncob grits

Worked well against ants (in 1968) but toxic effects were also detected in non-target animals; mirex began to accumulate in humans exposed to it (in adipose tissue) and was later discovered to be a carcinogen. By 1978 mirex was outlawed.

Don't mess with Texas!



Biological control of fire ants using parasitic phorid flies:

Pseudacteon curvatus

<http://uts.cc.utexas.edu/~gilbert/research/fireants/fireant.html>

Take home messages:

1. We cannot predict the impacts of biological invasions until it is too late to control the invaders.
2. Biological invasions are generally caused by human activities.
3. Biological invasions can have catastrophic effects on native ecosystems and organisms.
4. Take quarantine warnings seriously when you travel.

For LOTS more information see: <http://fireant.tamu.edu/>