Giant African Land Snail, *Achatina fulica*

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Background

- Originally from coastal East Africa and its islands
- Has spread to other parts of Africa, Asia, some Pacific islands, Australia, New Zealand, South America, the Caribbean, and the United States
- Can be found in agricultural areas, natural forests, planted forests, riparian zones, wetlands, disturbed areas, and even urban areas in warm tropical climates with high humidity
- Also known scientifically as *Lissachatina fulica*
- Common names include giant African land snail and giant African snail

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Hosts






Image citation:
Cotton - Charles T. Bryson, USDA Agricultural Research Service, www.bugwood.org, #1116132
Banana - Charles T. Bryson, USDA Agricultural Research Service, www.bugwood.org, #1197011
Papaya - Forest & Kim Starr, Starr Environmental, www.bugwood.org, #5420178
Pumpkin - Howard F. Schwartz, Colorado State University, www.bugwood.org, #5365883
Cucumber - Howard F. Schwartz, Colorado State University, www.bugwood.org., #5363704
Carrots - M.E. Bartolo, www.bugwood.org, #5359190

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Environmental Impacts

- Consumes large quantities and numbers of species of native plants
  - May cause indirect damage to plants due to the sheer numbers of snails being so heavy that the plants beak under their weight
  - May also be a vector of several plant pathogens
- Outcompetes and may even eat native snails
- It eats so much it can alter the nutrient cycling
- Their shells can neutralize acid soils and therefore damage plants that prefer acidic soils
- Indirectly, the biocontrol and chemical control that is used on this species can affect native snail species as well.

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Structural Concerns and Nuisance Issues

Image citation:
Florida Department of Agriculture and Consumer Services, Division of Plant Industry

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Public Health Concerns

- Intermediate host that vectors:
  - rat lungworm, *Angiostrongylus cantonensis* (roundworm)
  - *A. costaricensis* (roundworm)
  - *Aeromonas hydrophila* (bacteria)
  - Sickness caused by drinking their slime?

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Identification

- Eggs

Image citation:
Top left – Lyle Buss, Department of Entomology and Nematology, University of Florida
Bottom left - David Robinson, USDA-APHIS-PPQ
Right - Yuri Yashin, achatina.ru, www.bugwood.org, #1265029

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Identification

- Juveniles

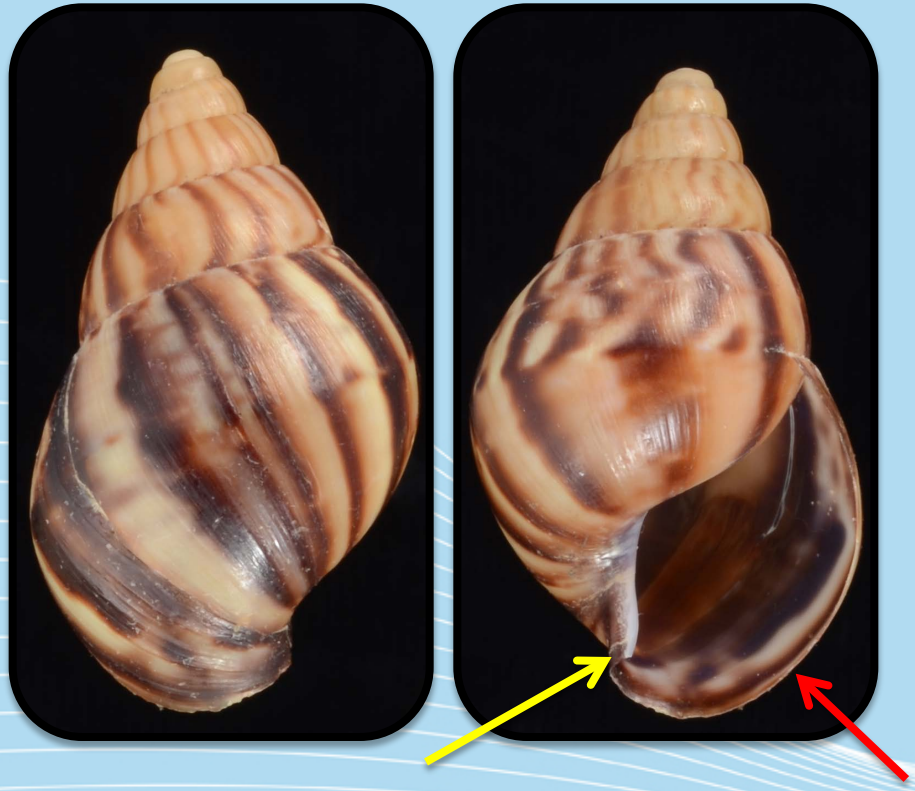

Image citation:
Left and middle - Lyle Buss, Department of Entomology and Nematology, University of Florida
Right top and bottom - Florida Department of Agriculture and Consumer Services, Division of Plant Industry

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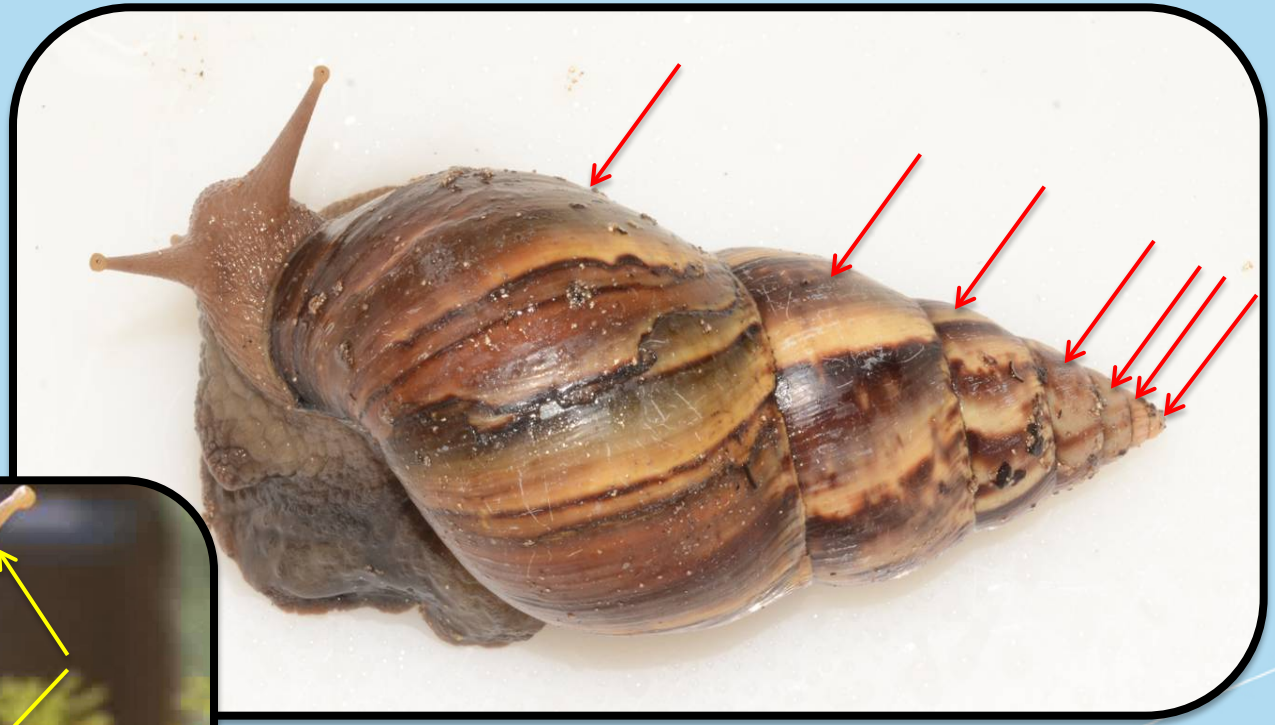
Identification

- Adults



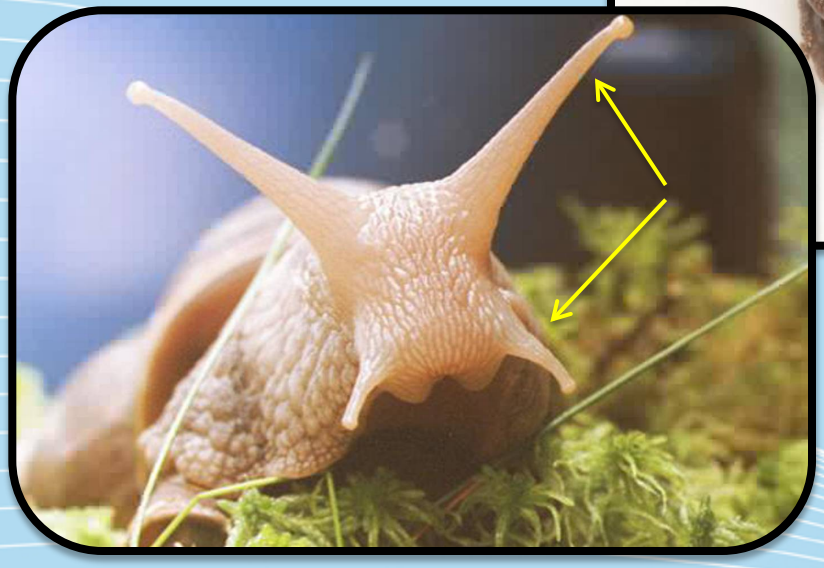


Image citation:
Left - Lyle Buss, Department of Entomology and Nematology, University of Florida
Right - Yuri Yashin, achatina.ru, www.bugwood.org, #1265024

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Identification

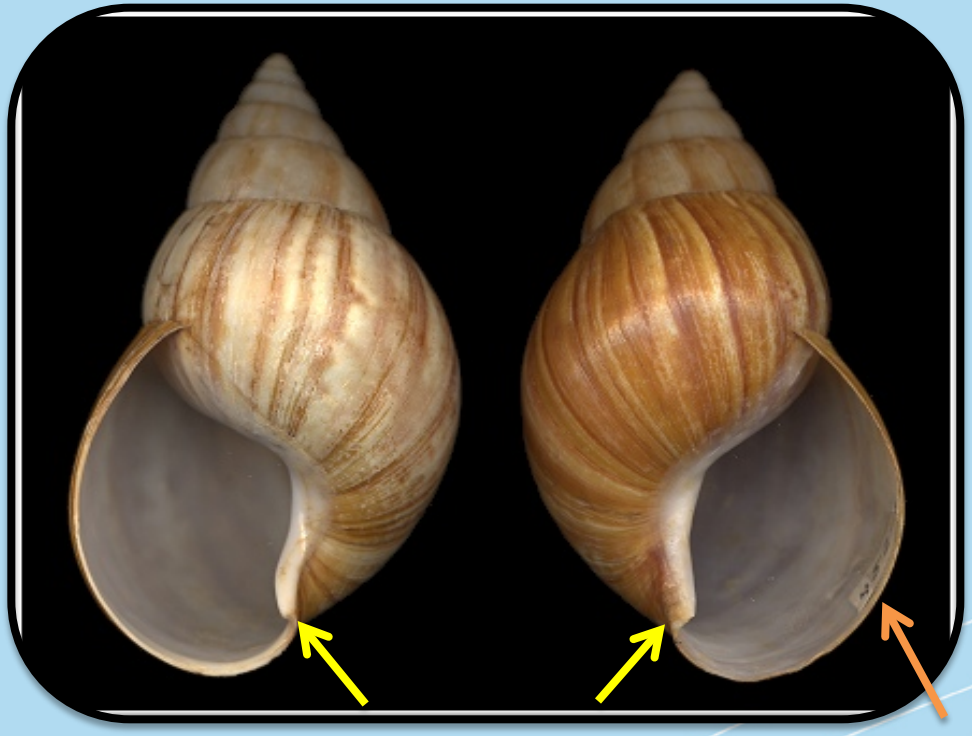

Image citation:
Left - Lyle Buss, Department of Entomology and Nematology, University of Florida
Right – Harry Lee, Jacksonville, http://www.jaxshells.org/817i.htm

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Identification

- Adult shell pattern vs. juvenile shell pattern

juvenile

adults

Image citation:
Lyle Buss, Department of Entomology and Nematology, University of Florida

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Life Cycle

- Hermaphrodites that must cross-fertilize
  - Can store sperm
- Clutch size varies from 100-400 eggs
  - Laid 8-20 days after copulation
  - Usually in 3-4 batches
- Eggs are typically laid in a nest under the soil
- Incubation varies
  - A few hours to 41 days
- Reaches sexual maturity in a year

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Diapause and Dispersal

- Nocturnal
- Undergoes hibernation or aestivation
- Spread can be accidental through commerce and trade
  - movement of plants, garden rubbish, building materials, and vehicles
- Spread can also be intentional by humans
  - Religious rituals, pet trade, etc.
- Has been documented to travel 50 meters overnight, 125m per month, and 250m per year.
- Spread in the U.S. is limited by temperature, moisture, and calcium availability

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Monitoring

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Chemical Management

- Metaldehyde
- Methiocarb
- Wet wheat flour mixed with dichlorvos
- Iron phosphate
- Boric Acid
- Extract of the fruit of *Thevetia peruviana* and alligator apple (*Annona glabra*) are reported to be naturally occurring molluscicides which act as snail repellents

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Biological Management

- Predatory snails
  - *Euglandina rosea*
  - *Gonaxis kibweziensis*
  - *Gonaxis quadrilateralis*
  - *Edentulina ovoidea*
  - *Edentulina affinis*
- Platyheminthes
  - *Platydemus manokwari*
  - *Geoplana septemlineata*

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Cultural Management

- Handpicking the snails and destroying them
- Fences, ditches, and bare soil around crop beds
- Salt and copper foil barriers
- Removal of detritus and other places where the snail likes to hide

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Florida Department of Agriculture and Consumer Services, Division of Plant Industry

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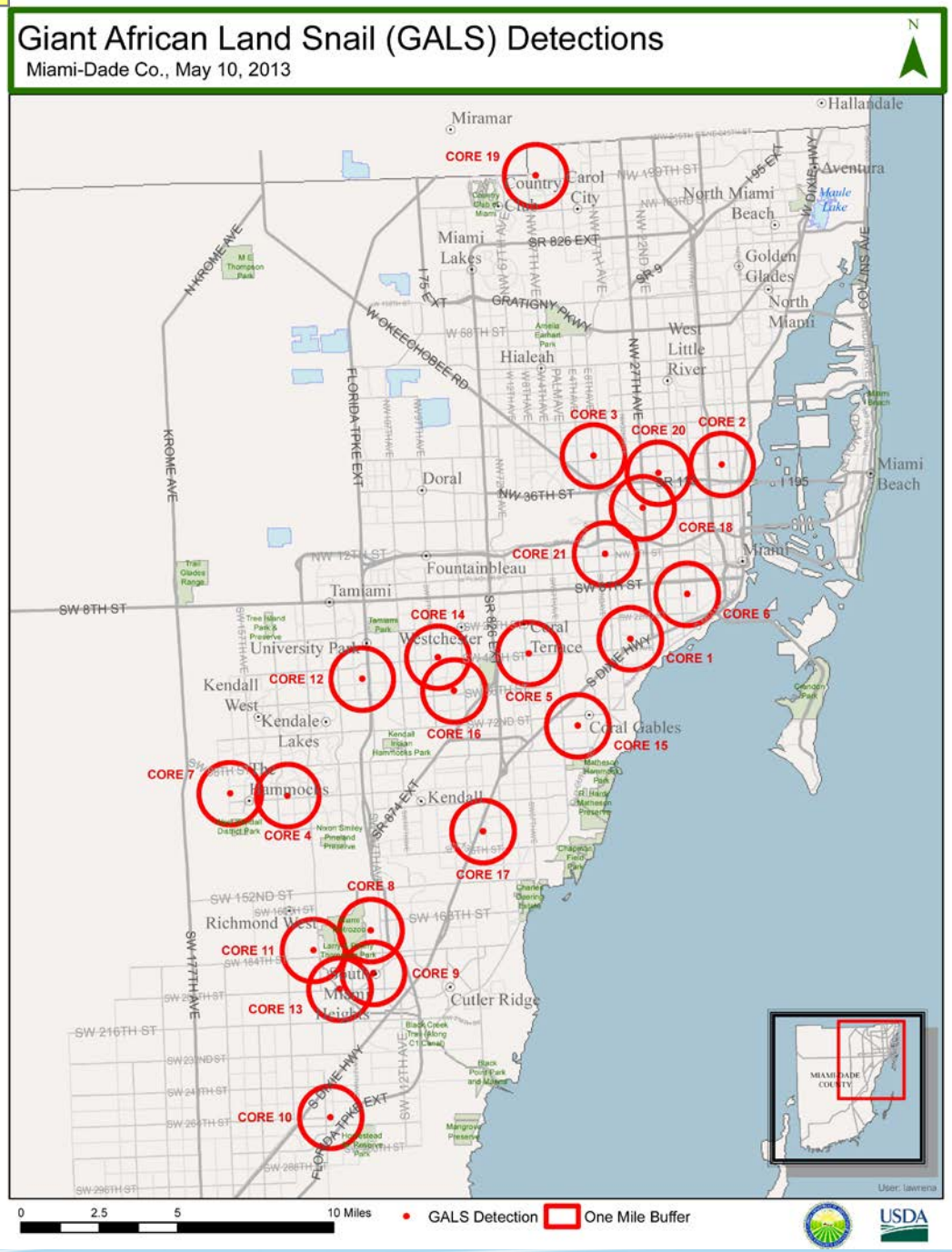

Current Eradication Programs in the U.S.

- Populations detected in Miami-Dade county on September 8, 2011
  - So far there are 14 separate locations
- Still underway as an eradication effort
- For more information, go to their website
- If you see these snails, call (888)397-1517

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Traps

Copper trap

Salt trap

Beer trap

Tanglefoot trap

Image citation:
Salt trap and beer trap - Ronal Landival Azuero Saritama AGROCALIDAD (Ecuador)
copper trap - Jess Van Dyke
tanglefoot trap – Lyle Buss, Department of Entomology and Nematology, university of Florida

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Similar Species found in the U.S.

Achatina fulica

Euglandina rosea

Prietocella barbara

Euglandina singleyana

Image citation:
Achatina fulica - Lyle Buss, Department of Entomology and Nematology, University of Florida
Euglandina rosea - http://www.jaxshells.org/0572.htm
Prietocella barbara – Lyle Buss, Department of Entomology and Nematology, University of Florida
Euglandina singleyana - Lyle Buss, Department of Entomology and Nematology, University of Florida

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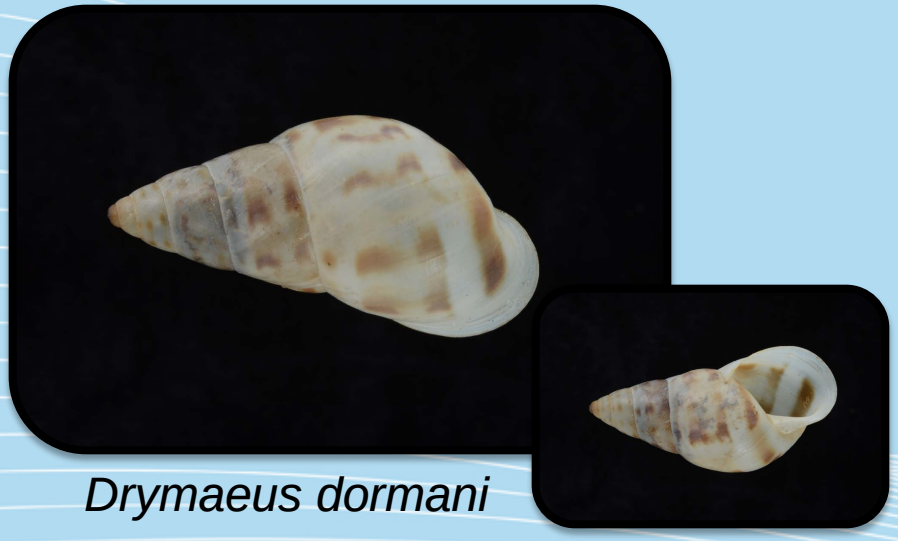
Similar Species found in the U.S.

Drymaeus multilineatus

Drymaeus dominicus



Drymaeus dormani

Achatina fulica

Image citation:
Achatina fulica - Lyle Buss, Department of Entomology and Nematology, University of Florida
Drymaeus multilineatus - http://www.jaxshells.org/galleryt.htm
Drymaeus dormani - Lyle Buss, Department of Entomology and Nematology, University of Florida
Drymaeus dominicus - http://www.jaxshells.org/2aj01.htm

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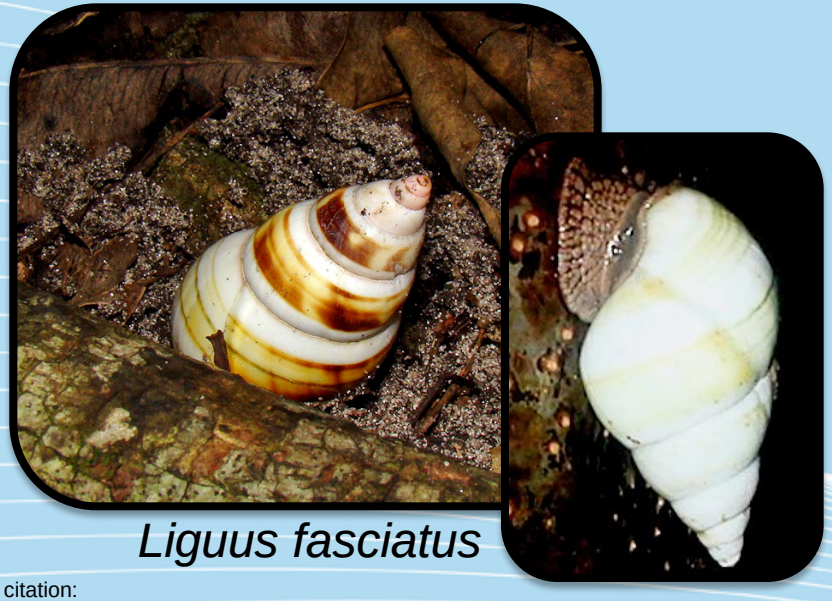
Similar Species found in the U.S.

Achatina fulica

Orthalicus reses



Liguus fasciatus

Orthalicus floridensis

Image citation:
Achatina fulica - Lyle Buss, Department of Entomology and Nematology, University of Florida
Liguus fasciatus – left - http://www.jaxshells.org/3023.htm and right - wikimedia commons
Orthalicus floridensis - http://www.jaxshells.org/2586.htm
Orthalicus reses - http://www.jaxshells.org/8730.htm

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Similar Species found in the U.S.

Achatina fulica

Rabdotus alternatus

Rabdotus schiedeanus

Rabdotus dealbatus

Image citation:
Achatina fulica - Lyle Buss, Department of Entomology and Nematology, University of Florida
Rabdotus schiedeanus – Lyle Buss, Department of Entomology and Nematology, University of Florida
Rabdotus alternatus – Lyle Buss, Department of Entomology and Nematology, University of Florida
Rabdotus dealbatus - Lyle Buss, Department of Entomology and Nematology, University of Florida

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Federal Regulations

- Snails in the genus *Achatina* are specifically prohibited from both interstate movement and importation into the U.S.
- No live snails are allowed into the U.S. for human consumption.
- Processed snails may be imported with a permit
- No permits are required for dead snails or slugs, but odds are they will be inspected.
- Regulation is based mainly on whether or not it is or could possibly be a plant pest or human disease vector.

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Questions?

- For more information, check out www.protectingusnow.org

- You can also contact:
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  - Stephanie D. Stocks, M.S., Assistant-In Extension Scientist, Department of Entomology and Nematology, University of Florida, sstocks@ufl.edu

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U.S. Department of Homeland Security (DHS)

USDA-APHIS

Extension Disaster Education Network (EDEN)

U.S. Forest Service

National Plant Board (NPB) and State Departments of Agriculture

Cooperative Agriculture Pest Survey Program (CAPS)

National Plant Diagnostic Network (NPDN)

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References

- Anonymous. 2001. Florida Tree Snail - *Liguus fasciatus*. Field Guide to the Rare Animals of Florida. Accessed 11/28/2011 –
  - http://www.fnai.org/FieldGuide/pdf/Liguus_fasciatus.pdf
- Auffenberg, K., Stange, L.A. and Fasulo, T.R. 2011. Snail-eating snails of Florida. Accessed 11/28/2011 –
  - http://entnemdept.ufl.edu/creatures/misc/gastro/snail_eating_snails.htm
- Burch, J. B. 1962. How to Know: The Eastern Land Snails. Wm. C. Brown Company Publishers, Dubuque, Iowa.
- Centers for Disease Control and Prevention. 2010. Accessed 11/17/2011 -
  - http://www.cdc.gov/parasites/angiostrongylus
- Civeyrel, L. and Simberloff, D. 1996. "A tale of two snails: is the cure worse than the disease?". Biodiversity and Conservation, volume 5, number 10, pp. 1231-1252.
- Koo, J., F. Pien, and M.M. Kliks. 1988. "Angiostrongylus (Parastrongylus) Eosinophilic Meningitis". Reviews of Infectious Diseases, vol. 10, no. 6 pp. 1155-1162.

References

- Florida Department of Agriculture and Consumer Services official press release. Accessed 11/14/2011 –
  - http://www.freshfromflorida.com/press/2010/03112010.html
- Florida Department of Agriculture and Consumer Services video. Accessed 11/14/2011
  - http://www.youtube.com/user/fdacsdpi#p/a/u/0/Wc8Dx2HcPgg
- Forys, E.A., Quistorf, A., Allen, C.R. and D.P. Wojcik. 2001. "The Likely Cause of Extinction of the Tree Snail *Orthalicus reses reses* (Say)". Journal of Molluscan Studies, vol. 67, pp. 369-376.
- Global Invasive Species Database. 2010. *Achatina fulica*. Accessed 10/27/2011 –
  - http://issg.org/database/species/ecology.asp?si=64&fr=1&sts=sss&lang=EN
- Global Invasive Species Database. 2010. *Achatina fulica* (Giant African Land Snail) Impacts Information. Accessed 11/14/2011 –
  - http://issg.org/database/species/reference_files/achful/achful_imp.pdf
- Global Invasive Species Database. 2010. *Achatina fulica* (Giant African Land Snail) Management Information. Accessed 11/15/2011 –
  - http://www.issg.org/database/species/reference_files/achful/achful_man.pdf

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References

- Invasive Species Compendium (Beta). 2011. *Lissachatina fulica* (giant African land snail). Accessed 11/18/2011 –
  - http://www.cabi.org/isc/?compid=5&dsid=2640&loadmodule=datasheet&page=481&site=144
- Meade, A.R. 1961. The Giant African Snail: A Problem in Economic Malacology. University of Chicago Press.
- MobileReference. 2008. The Illustrated Encyclopedia of Trees and Shrubs: An Essential Guide To Trees and Shrubs of the World. Published by Mobile Reference. Accessed 12/21/2011 –
  - http://books.google.com/books?id=mZEhZMOFLiQC&printsec=frontcover#v=onepage&q=Thevetia%20peruviana%20&f=false
- Pawson, P.A. and R. Chase. 1984. "The Life Cycle and Reproductive Activity of *Achatina fulica* (Bowdich) in Laboratory Culture". Journal of Molluscan Studies, vol. 50, pp. 85-91.
- Pilsbry, H.A. 1939. Land Mollusca of North America (north of Mexico). George W. Carpenter Fund for the Encouragement of Original Scientific Research, Philadelphia.

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References

- Robinson, D.G. 2002. *Achatina fulica* Bowdich, 1822. Accessed 11/17/2011 –
  - http://www.aphis.usda.gov/plant_health/plant_pest_info/gas/downloads/achatinafulica.pdf
- Smith, T., L. Whilby, and A. Derksen. 2010. Florida CAPS/DPI Giant African Snail, *Achatina* spp. (Pulmonata: Achatinidae) Survey Report. Program report number 2010-02-GAS-01. Accessed 11/17/2011 –
  - http://www.freshfromflorida.com/pi/caps/images/pdf_2010_giant_african_snail_survey_report_03-11-2010.pdf
- Smith, T. 2011. Lecture given to the Plant Biosecurity class at the University of Florida (ALS 4161/6166) on October 19, 2011.. Accessed 11/18/2011 –
  - http://entnem.ifas.ufl.edu/accordent/Hodges/Lecture16/ (starting at 11:52)
- Sturgeon, R.K. 1971. "*Achatina fulica* Infestation in North Miami, Florida". The Biologist, vol. 53, no. 3, pp.93-103.
- SunSentinal Newspaper. 2010. Accessed 11/17/2011 -
  - http://articles.sun-sentinel.com/2010-03-11/news/fl-illegal-snails-santeria-20100310_1_snails-smuggled-search-warrant
- Taber, S.W and S. B. Fleenor. 2005. Invertebrates of Central Texas Wetlands. Texas Tech University Press.

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References

- Tranter, J.A. 1993. "The giant African land snail, *Achatina fulica*, and other species". Journal of Biological Education, vol. 27, issue 2, p. 108.
- Tomiyama, K. 1994. "Courtship behavior of the Giant African Snail, *Achatina fulica* (Ferussac) (Stylommatophora: Achatinidae) in the Field". Journal of Molluscan Studies, Vol. 60, pp. 47-54.
- USDA National Agricultural Library - National Invasive Species Information Center. Giant African Snail. 2011. Accessed 11/17/2011 –
  - http://www.invasivespeciesinfo.gov/animals/africansnail.shtml
- USDA–APHIS. 2005. New Pest Response Guidelines. Giant African Snails: Snail Pests in the Family Achatinidae. USDA–APHIS–PPQ–Emergency and Domestic Programs–Emergency Planning, Riverdale, Maryland. Accessed 11/11/2011 –
  - http://www.aphis.usda.gov/import_export/plants/manuals/emergency/downloads/nprg_gas.pdf
- USDA-APHIS-PPQ. 2011. Giant African Snail Cooperative Eradication Program: Environmental Assessment October 2011. Accessed 11/17/2011 –
  - http://www.aphis.usda.gov/plant_health/ea/downloads/GAS-MiamiEA.pdf

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References

- Venette, R.C. and M. Larson. 2004. Mini Risk Assessment Giant African Snail, *Achatina fulica* Bowdich (Gastropoda: Achatinidae). Accessed 11/16/2011 –
  - http://www.aphis.usda.gov/plant_health/plant_pest_info/pest_detection/downloads/pra/afulicapra.pdf
- U.S. Fish and Wildlife Service, Southeast Region. 2008. Stock Island tree snail (*Orthalicus reses* (not including *nesodryas*)) 5-Year Review: Summary and Evaluation. Accessed 11/28/2011 –
  - http://www.fws.gov/southeast/5yearReviews/5yearreviews/StockIslandTreeSnail20090914.pdf
- Wall Street Journal. October 4, 2011. "Giant Alien Snails Attack Miami, Though They're Not in Much of a Rush - Eradication Teams Go House to House, Nabbing 10,000 Invaders; 'Crunch Under Our Feet'" . Accessed 11/18/2011 –
  - http://online.wsj.com/article/SB10001424052970203791904576608673000592148.html