Invasive Species

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Insect Spectacular

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What comes to mind when you hear “Invasive Species”

- Bad
- Destructive
- Not wanted
- Others……

What is an “Invasive Species”

- USDA
- Invasive species can be plants, animals, and other living organisms (e.g., microbes). To learn more, see our Species Profiles which provides general information about species considered to be invasive.
- Wikipedia
- An **invasive species** is an introduced organism that negatively alters its new environment.

Q: How many invasive species are there in the US?

A: Although the numbers vary widely, some of the current research estimates that there are approximately 50,000 (Pimentel, 2004) non-native species in the United States today. However, of that 50,000 species, approximately 4,300 have been considered invasive species (Corn et. al, 1999).

Source: US Fish and Wildlife Service

List of Insect Invasive Species in North America (from Wikipedia)

- *Acrolepiopsis assectella* (leek moth)
- *Adelges piceae* (balsam woolly adelgid)
- *Adelges tsugae* (hemlock woolly adelgid)
- *Aedes albopictus* (Asian tiger mosquito)
- *Aethina tumida* (small hive beetle)
- *Agrilus planipennis* (emerald ash borer)
- *Aleurocanthus woglumi* (citrus blackfly) [1]
- *Anastrepha ludens* (Mexican fruit fly)
- *Anastrepha suspensa* (Greater Antillean fruit fly) [2]
- *Anoplophora glabripennis* (Asian long-horned beetle)
- *Aphis spiraecola* (green citrus aphid) [3]
- *Apis mellifera scutellata* (Africanized honeybee)
- *Archips fuscocupreanus* (exotic leafroller moth) [4]
- *Aulacaspis yasumatsui* (cycad aulacaspis scale)

- *Bemisia tabaci* (silverleaf whitefly)
- *Cactoblastis cactorum* (cactus moth)
- *Cerataphis lataniae* (palm aphid) [5]
- *Ceratitis capitata* (Mediterranean fruit fly) [6]
- *Cnestus mutilatus* (Camphor shot borer) [7]
- *Coptotermes formosanus* (Formosan subterranean termite)
- *Cryptotermes brevis* (West Indian drywood termite)
- *Ctenarytaina eucalypti* (blue gum psyllid) [8]
- *Culex quinquefasciatus* (southern house mosquito) [9]
- *Diaphorina citri* (Asian citrus psyllid)
- *Dinoderus minutus* (Bamboo borer) [10]
- *Diprion similis* (introduced pine sawfly)
- *Drosophila suzukii* (spotted wing drosophila)
- *Duponchelia fovealis* (a moth from the Mediterranean region)

- *Elatobium abietinum* (green spruce aphid) [11]
- *Epiphyas postvittana* (light brown apple moth)
- *Epitrix tuberis* (tuber flea beetle) [12]
- *Euwallacea fornicatus* (Polyphagous and Kuroshio shot hole borers) [2]
- *Forficula auricularia* (common earwig)
- *Gilpinia hercyniae* (European spruce sawfly) [13]
- *Glycaspis brimblecombei* (red gum lerp psyllid) [14]
- *Halyomorpha halys* (brown marmorated stink bug)
- *Harmonia axyridis* (Asian lady beetle)
- *Hypogeococcus pungens* (cactus mealybug)
- *Icerya purchasi* (cottony cushion scale)
- *Leptocybe invasa* (Blue gum chalcid wasp) [15]
- *Lilioceris lilii* (scarlet lily beetle)
- *Linepithema humile* (Argentine ant)
- *Lycorma delicatula* (Spotted lanternfly)
- *Lymantria dispar* (European gypsy moth)

- *Maconellicoccus hirsutus* (pink hibiscus mealybug) [16]
- *Metamasius callizona* (bromeliad beetle) [17]
- *Monomorium pharaonis* (pharaoh ant)
- *Myrmica rubra* (Common European Red Ant)
- *Neodiprion sertifer* (European pine sawfly)
- *Neolecanium cornuparvum* (magnolia scale) [18]
- *Opogona sacchari* (Banana moth) [19]
- *Papilio demoleus* (common lime butterfly)
- *Paracoccus marginatus* (papaya mealybug)
- *Paratachardina pseudolobata* (lobate lac scale)
- *Paratrechina longicornis* (longhorn crazy ant)
- *Pheidole megacephala* (big-headed ant) [20]
- *Phenacoccus solenopsis* (cotton mealybug) [21]
- *Phyllocnistis citrella* (citrus leafminer)
- *Pineus pini* (pine woolly aphid) [22]
- *Polistes dominula* (European paper wasp)
- *Popillia japonica* (Japanese beetle)
- *Pseudococcus viburni* (obscure mealybug)
- *Rhinocyllus conicus* (thistle-head weevil)
- *Rhyacionia buoliana* (pine shoot moth) [23]

- *Scirtothrips dorsalis* (chili thrips)
- *Scirtothrips perseae* (avocado thrips) [24]
- *Scolytus schevyrewi* (banded elm bark beetle)
- *Solenopsis invicta* (red imported fire ant)
- *Solenopsis richteri* (black imported fire ant)
- *Sternochetus mangiferae* (mango seed weevil)
- *Tapinoma melanocephalum* (ghost ant)
- *Tetropium fuscum* (brown spruce longhorn beetle) [25]
- *Thrips palmi* (melon thrips)
- *Toxoptera citricida* (brown citrus aphid) [26]
- *Trichomyrmex destructor* (destructive trailing ant)
- *Vespula germanica* (European wasp)
- *Wasmannia auropunctata* (electric ant)
- *Xanthogaleruca luteola* (elm-leaf beetle)
- *Xyleborinus saxesenii* (fruit-tree pinhole borer) [27]
- *Xyleborus dispar* (pear blight beetle) [28]
- *Xyleborus glabratus* (redbay ambrosia beetle)
- *Xyleborus similis* [29]
- *Xylosandrus compactus* (black twig borer)
- *Xylosandrus crassiusculus* (Asian ambrosia beetle) [30]
- *Xylosandrus germanus* (black timber bark beetle) [31]
- *Xylosandrus morigerus* (brown twig beetle) [32]

List of Arachnid Invasive Species

- *Acarapis woodi* (honey bee tracheal mite) [33]
- *Aculops fuchsiae* (fuchsia gall mite)
- *Raoiella indica* (red palm mite)
- *Rhipicephalus microplus* (Asian blue tick)
- *Varroa destructor* (Varroa mite)[3]

How Invasive Species Arrive in the U.S.

- Accidental
  - On imported goods, packaging, and plant material
- Colonists brought them before the concept of Invasive species occurred
  - Movement of livestock
  - Movement of traded goods and commodities
  - Stored product insect are a great example
- On purpose introductions that don't go as planned
  - i.e.-Biological control becomes structural pest and health pest

Multicolored Asian Lady Beetle

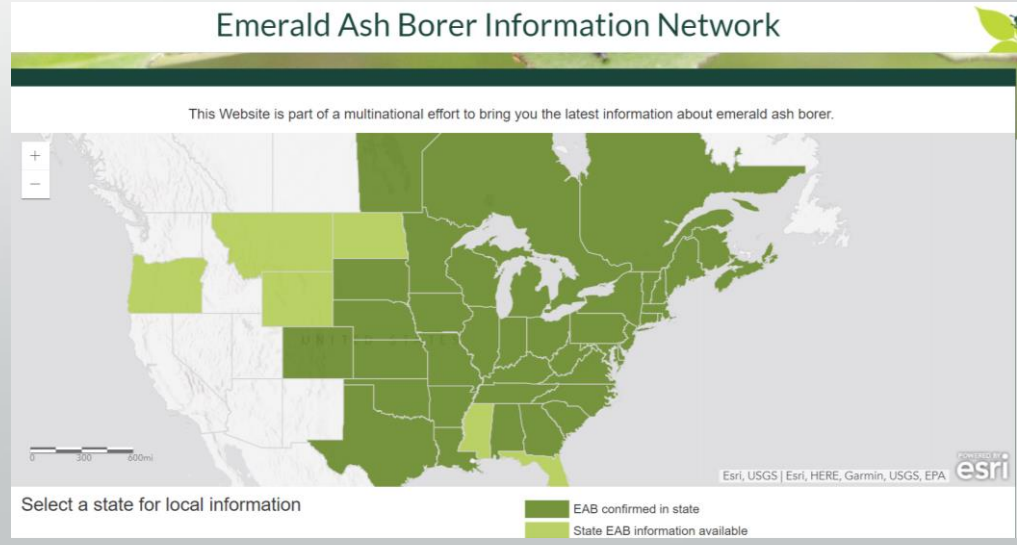
- From Asia, brought in by USDA in the 1960s
- Introduced for biological control of aphids
- Spread throughout the US in the 1990s and early 2000s
- Beneficial for controlling aphids, mealybugs and other insects
- Become a pest in the fall
  - Congregate in large numbers to enter buildings for overwintering
  - They can bite people
  - Source of allergy issues for some people

Wikipedia.org

Extension.umn.edu

Emerald Ash Borer

- More recent invasive species
- State quarantines in place
- "Don't Move Firewood" and "Burn it where you Buy It" campaigns
- Entered the US and found in Michigan, 2002
- Buried in packaging materials



Spotted Lanternfly

- Not a fly, it's a hemipteran
- Quarantine insect at the county level
  - Affects moving vehicles and other objects from moving into areas which have no SLF
- Active delineating survey happening to try to prevent spread
- Large, about 1-inch long
- Horticultural pest
  - Causes oozing sap, wilting, leaf curling and tree dieback
  - Exudes thick honeydew affecting plants

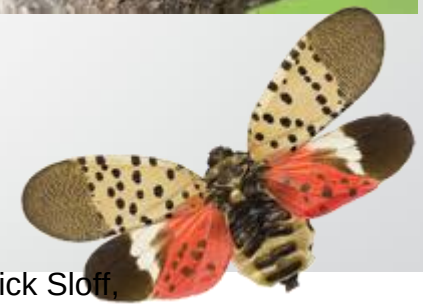
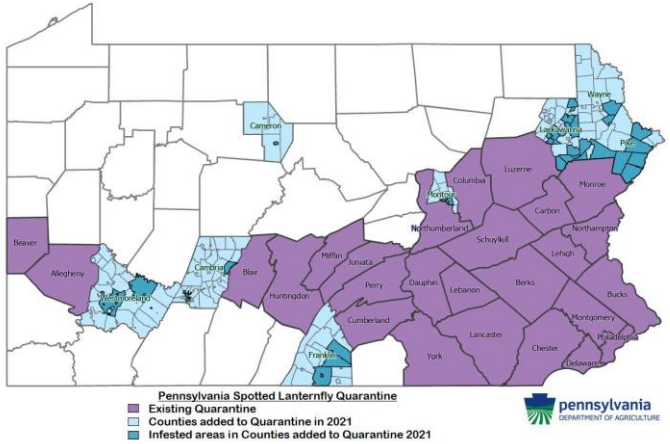
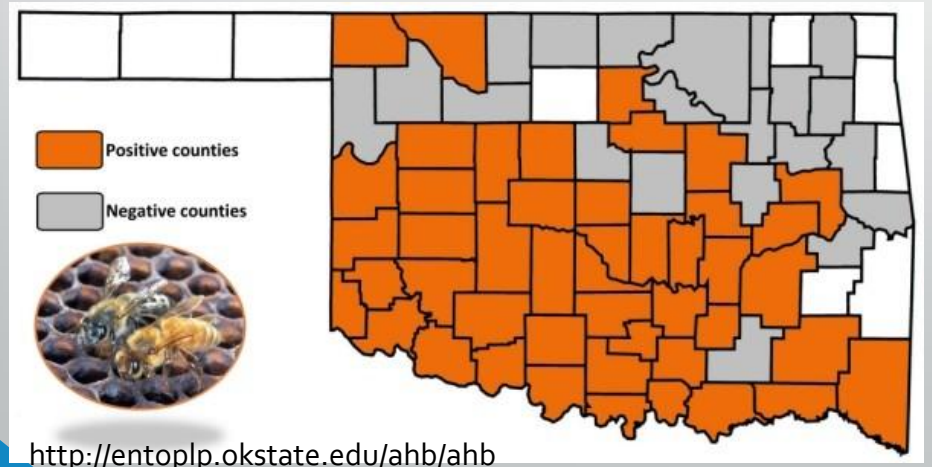


Image Credit: Nick Sloff,
Penn State College of Agricultural Sciences



Africanized Honey Bee

- Cannot tell the difference from European Honey bees by looking at them
- USDA Hayden Bee Lab in Arizona is the "official" identifiers
- Morphometrics are used for official identifications (measurements)
- Invaded by natural movement of 200-300 miles per year
- Many are hybrids with European bees and DNA testing may be performed



http://entoplp.okstate.edu/ahb/ahb

https://entnemdept.ufl.edu/creatures/misc/bees/ahb.htm

news.cornell.edu

Gypsy Moth

https://www.aphis.usda.gov/aphis/maps

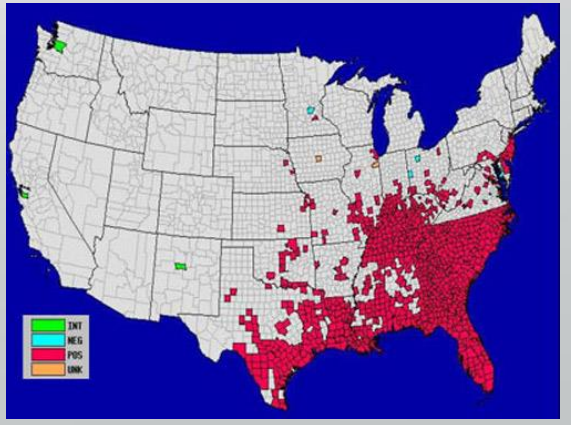
- Has been in the US since the late 1860s
- Brought in from France by E. Leopold Trouvelot to study insect with silk production
- The insects accidentally escaped from his home in Massachusetts
- A quarantine pest at the state level for many states
- Horticultural pest of deciduous trees
- Nuisance pest from irritating hairs on caterpillars and frass mess
- Consider how long this pest has been in the US…..
  - Minimal spread versus later introductions

Extension.umn.edu

Asian Tiger Mosquito

- Entered the US in 1985 in at Houston, TX port
- In a shipment of used tires from Southeast Asia
- Another entry to California on "lucky bamboo" from China
- Health concern, transmits yellow fever, dog heartworm, encephalitis, Zika virus and others (as many as 30 diseases vectored)
- Now found in 30 states according to USDA

entnemdept.ufl.edu



Problem with Invasive Species

- Enter a new area without their natural predators and parasites
- Populations sometimes build rapidly, unchecked
- Can heavily target a crop plant, structure or other commodity
- Costs millions of dollars in eradication or containment methods
- Some affect plant movement, commodity movement and more for the long-term or permanently

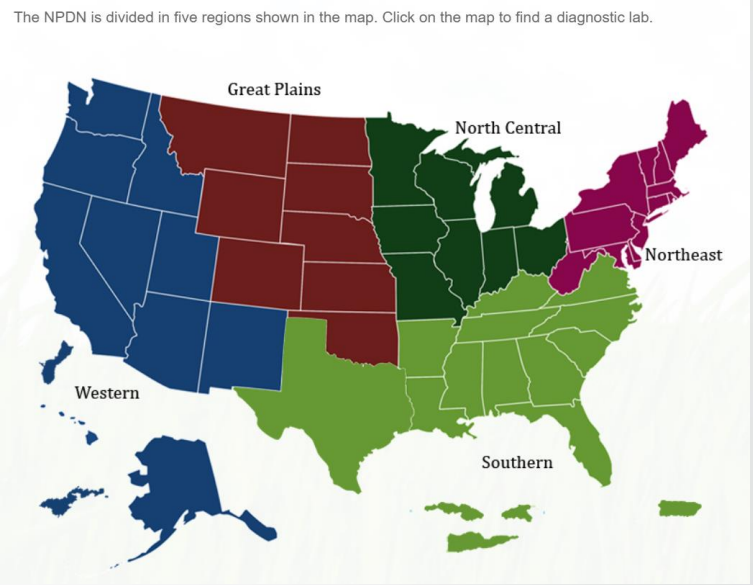
Tackling Invasive Species

- USDA-APHIS-PPQ
- State Plant Regulatory Officials
- National Plant Diagnostic Network
- BugWood

USDA-APHIS-PPQ

- Inspect plants and materials entering the United States
- Inspect plant materials leaving the United States (Phytosanitary Certificate)
- Survey work
- Delimiting surveys
- Help slow the spread of invasive species
- Education and distributing materials about invasive species
- Eradication work if applicable

NPDN

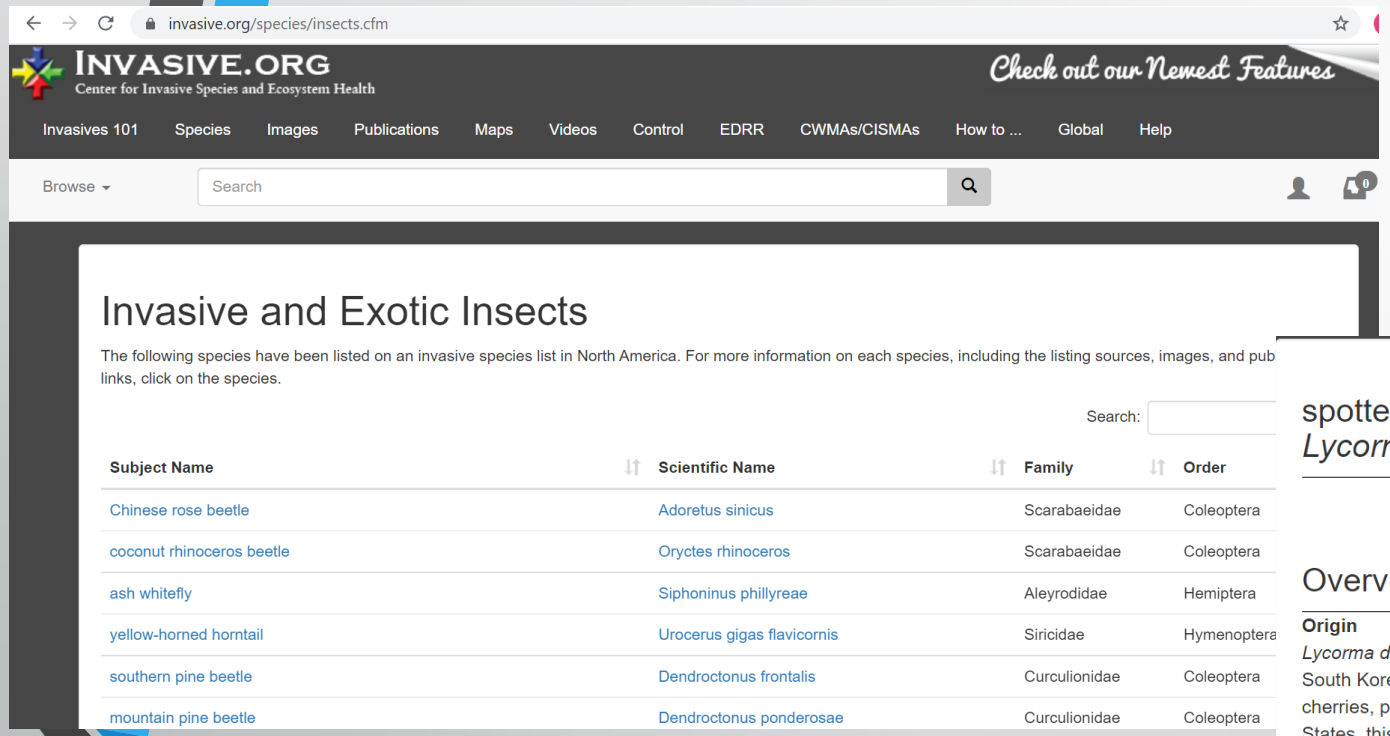


- National Plant Diagnostic Network
- npdn.org
- Network of University Plant Pest Diagnosticians
- Work with State Regulatory Officials (SPRO) and Federal officials in each state (SPHD)

BugWood Wiki - Invasipedia

- https://wiki.bugwood.org/Invasipedia
- https://www.invasive.org/species/insects.cfm
- Invasipedia houses information on invasive plants, animals, and pathogens, and especially how to best manage them. Its foundation is the large amount of species management information developed by the The Nature Conservancy's Global Invasive Species Team. It is now supported by the Center for Invasive Species and Ecosystem Health as part of the BugwoodWiki.

Invasive.org



In Kansas

- Kansas Department of Agriculture – Plant Protection and Weed Control
- https://agriculture.ks.gov/divisions-programs/plant-protect-weed-control
- The purpose of our program is to:
  - Protect the state's native and cultivated plants from the introduction and outbreak of harmful plant pests, including insects, plant diseases, weeds and other organisms;
  - Provide inspection and certification services to ensure compliance with statutes and quarantines and to facilitate movement of plants and plant products to other states and countries.
  - Manage pests of regulatory significance within the state
  - Ensure that plants, plant products, and seed offered for sale in Kansas meet the requirements of the Plant Pest and Agricultural Commodity Act, the Kansas Seed Law, the Kansas Noxious Weed Law, and the Commercial Industrial Hemp Act

2021 Kansas Pest Surveys

- Alfalfa commodity
- Brown marmorated stink bug
- Callery pear
- Emerald ash borer
- Gypsy moth
- Karnal bunt
- Phytophthora ramorum
- Pine wilt
- Small grains commodity
- Spotted wing drosophila
- Walnut twig beetle
- Wheat

What should you do if you think you found a new or invasive species?

- Check the Kansas Department of Agriculture Plant Protection Program
- Call them and send in a sample if needed
- They may request the sample go to Kansas State University for identification
- If it is a new species to Kansas, a protocol is followed for proper state a federal identification
- After identifications and notifications, a plan is agreed upon by state and federal departments

Thank you for your attention! Questions?

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- 913-267-1066

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