Introduction to Snake Worms and Their Management

PART 1: THE WORMS

Agenda

Presenters: Josef Görres and Maryam Nouri-Aiin

- **10:00 – 10:15 Introductions**
- 10:15 – 10:45 Snake worms 101 for horticulture and landscape professionals: What do we know and what do we want to know? Identification; phenology of snake worm lifecycle; known plant damage symptoms; control.
- 10:45 – 11:30 Visit to the tree nursery
- 11:30 – 11:45 Break and ID of your snake worms
- 11:45 – 12:00 What are best practices in horticulture and composting?
- 12:00 – 12:15 Become a citizen scientist: Using iNaturalist to map their distribution.
- 12:15 – 12:45 Exchanging knowledge and concerns
- 12:45 – 13:00 Closing remarks and future activities

Overview: Part 1

1. What are they and how many species are there in Vermont?
2. What is their life cycle?
3. How do they move around?
4. What can you do? What is the state of research into managing them?
5. Being a first reporter.

1. What are they? How many species?

How many in Vermont: Three out of 20 invasive species are pheretimoids

16 species in North America

Have an annular clitellum, going all around the circumference of the worm.

Move like a snake and are parthenogenic

Occur in 37 US States

Prohibited species in Wisconsin and New York.

M. hilgendorfi

Size: 109–170 mm
(4.29 –6.69 inch)

A. agrestis

Size 70–160 mm
(2.76 - 6.3 inch)

A. tokioensis

Size 30–125 mm
(1.18-4.92 inch)

Image credit: Maryam Nouri-Aiin

Place of Origin

分布

北海道から本州、四国、九州にかけて広く分布する。隠岐、対馬でも記録されている。

多くの地域で高頻度出現種に挙げられる (石塚, 2001; 上平, 2001a, b, 2002a, b, 2003a-c, 2004a, b, 2006, 2007, 2008, 2010, 2011, 2012, 2015b; 南谷ら, 2010a, b, 2013, 2015)。

栃木県内では分布が局部的で散在するとされていたが (加藤, 1972)、南谷らによる調査では最も出現頻度が高い種であり、広範囲に分布していた (南谷ら, 未発表)。

国外では韓国 (Song & Paik, 1971, 1973; Hong & James, 2009)、アメリカ合衆国 (Davies, 1954; Gates, 1963, 1966, 1982; Reynolds, 1978a, 2010c, 2011a, 2015a, b) に分布する。

原産地は日本だと推定されている **(Reynolds, 1978a)**。

図：これまでに出版された文献に基づく、フキソクミミズの分布確認地点

生息環境

Image credit: Yukio Minamiya https://japanese-mimizu.jimdo.com

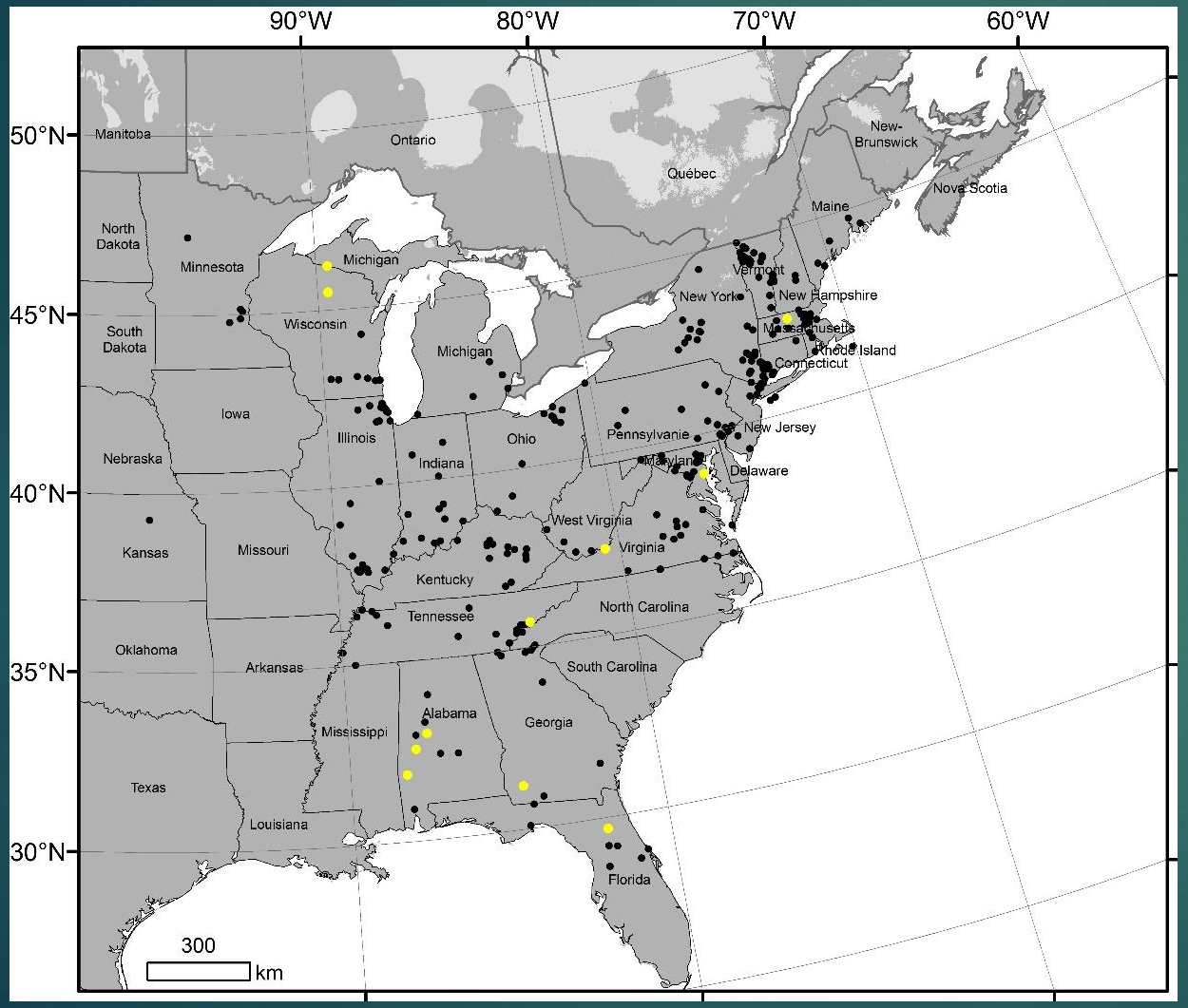
How did they get here?

- Probably with horticultural trade or people collecting plant materials
- "Folklore" has it that they came with DC Cherry Blossoms

Japan gave 3,020 cherry blossom trees as a gift to the United States in 1912 to celebrate the nations' then-growing friendship, replacing an earlier gift of 2,000 trees which had to be destroyed due to disease in 1910. These trees were planted in Sakura Park in Manhattan and line the shore of the Tidal Basin and the roadway in East Potomac Park in Washington, D.C.
From Wikipedia

Image: National Park Service

Extent of the invasion in the eastern USA and Canada



Potential geographic range, based on >90 days frost free

Unlikely range

confirmed pheretimoids

Potential study sites

Map by Jean- David Moore,
Direction de la recherche forestière
Ministère des Forêts, de la Faune et des Parcs

Quick Introduction: Why do we worry?

Image source: http://clipart-library.com

Our gardens, our nurseries, our lawns and patios, our clients etc. …

My garden

What we don't know

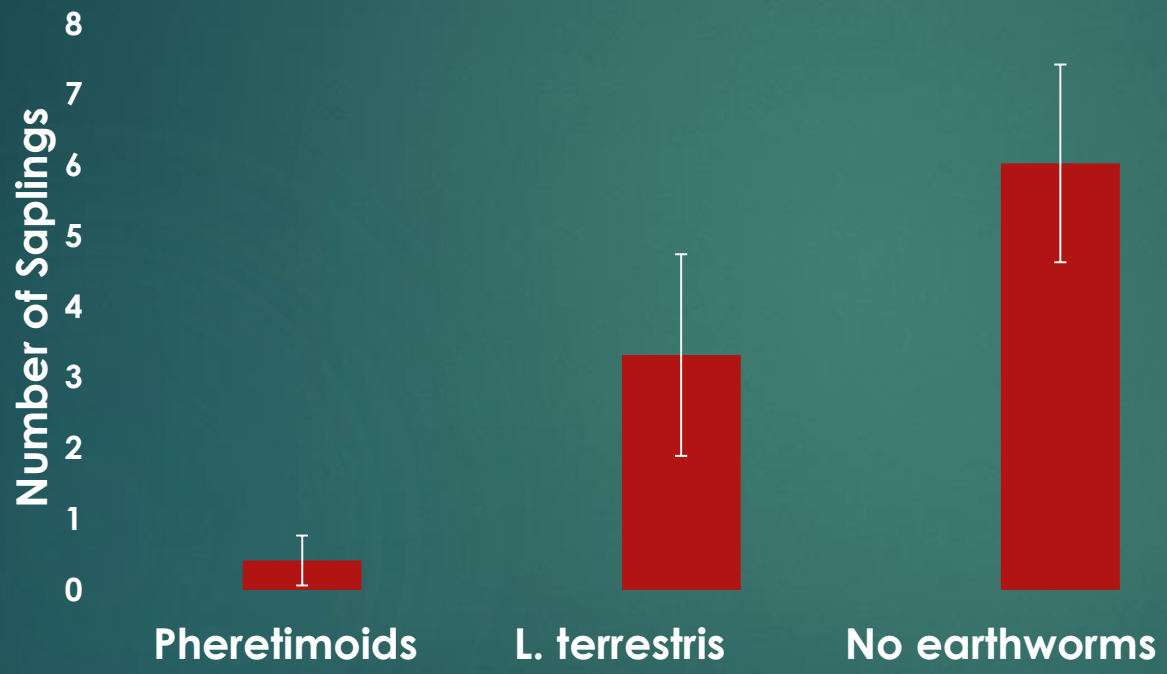
- Which plants are most affected
- What are damage symptoms that can be attributed to worms
- How much additional cost is associated with the worms (I gave up on wood mulch cause they go through it like a cheetah)
- Love to hear what you have observed

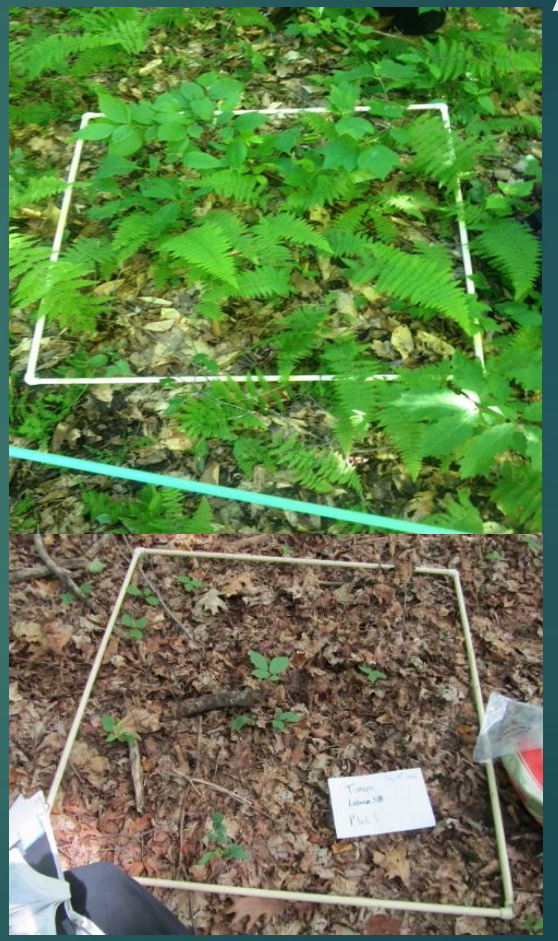
And, our sugar bush

No Earthworms

Snake Worms

Reduced regeneration of Sugar and Red Maple (unpublished data)





2. What is their life cycle?

Life Cycle

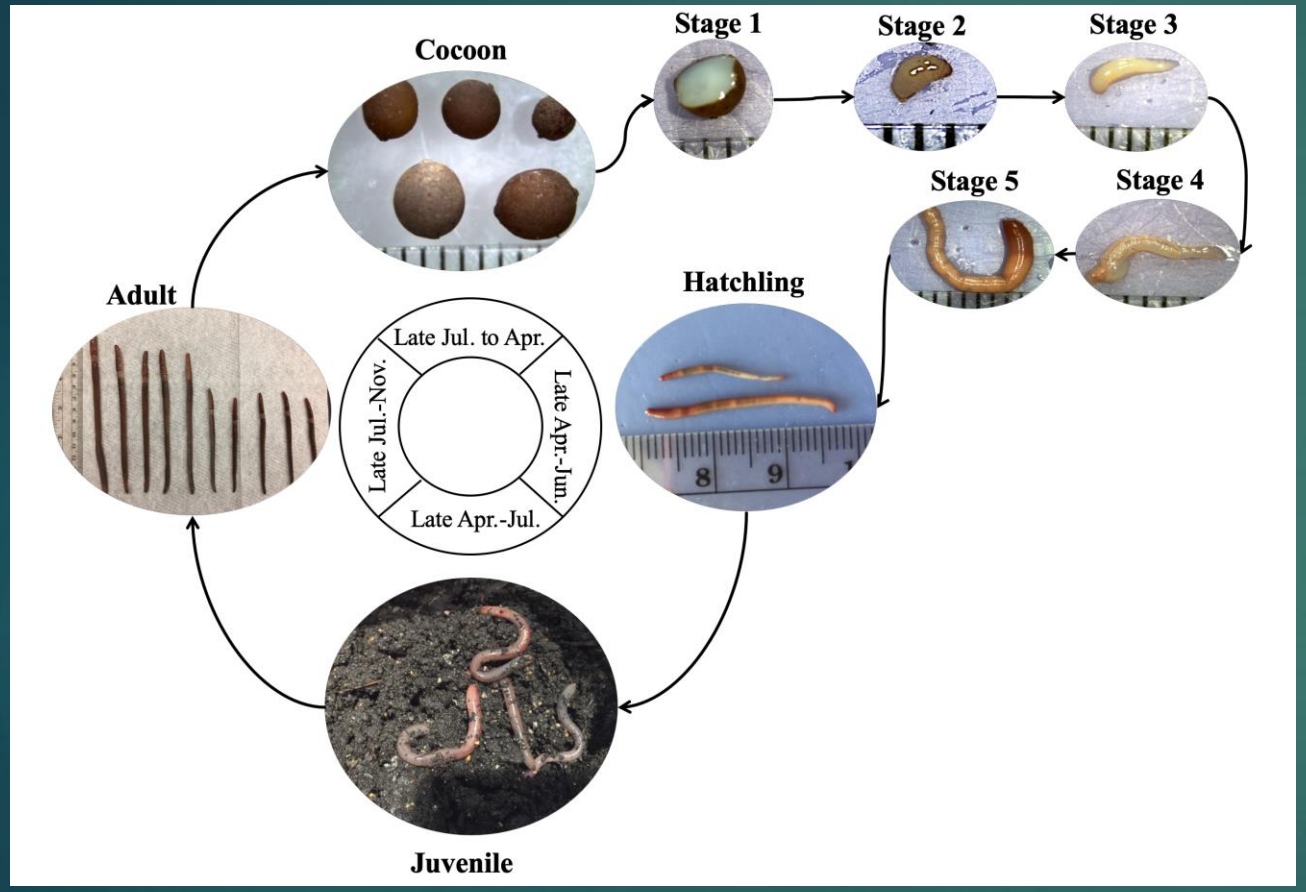
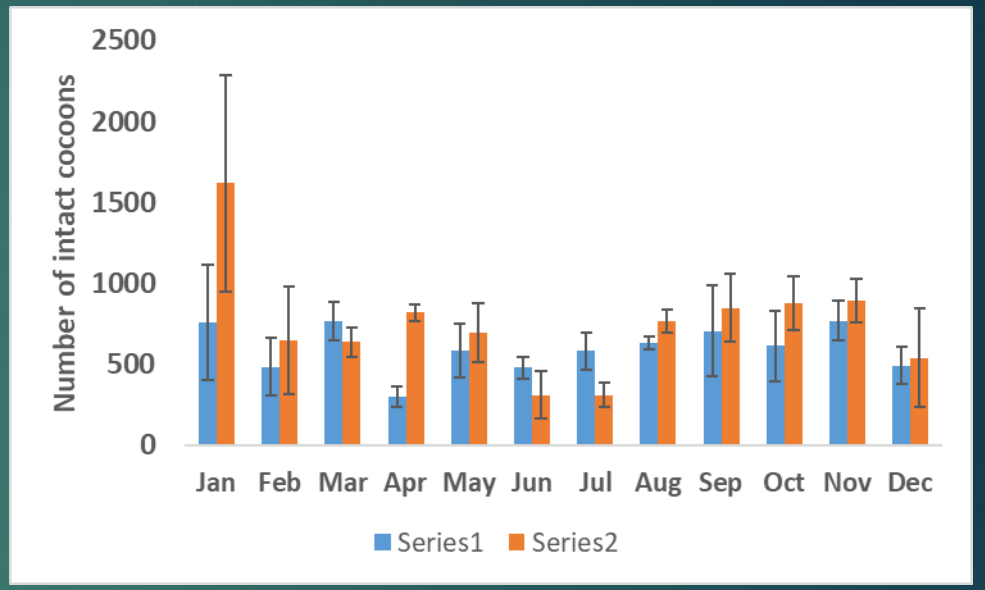
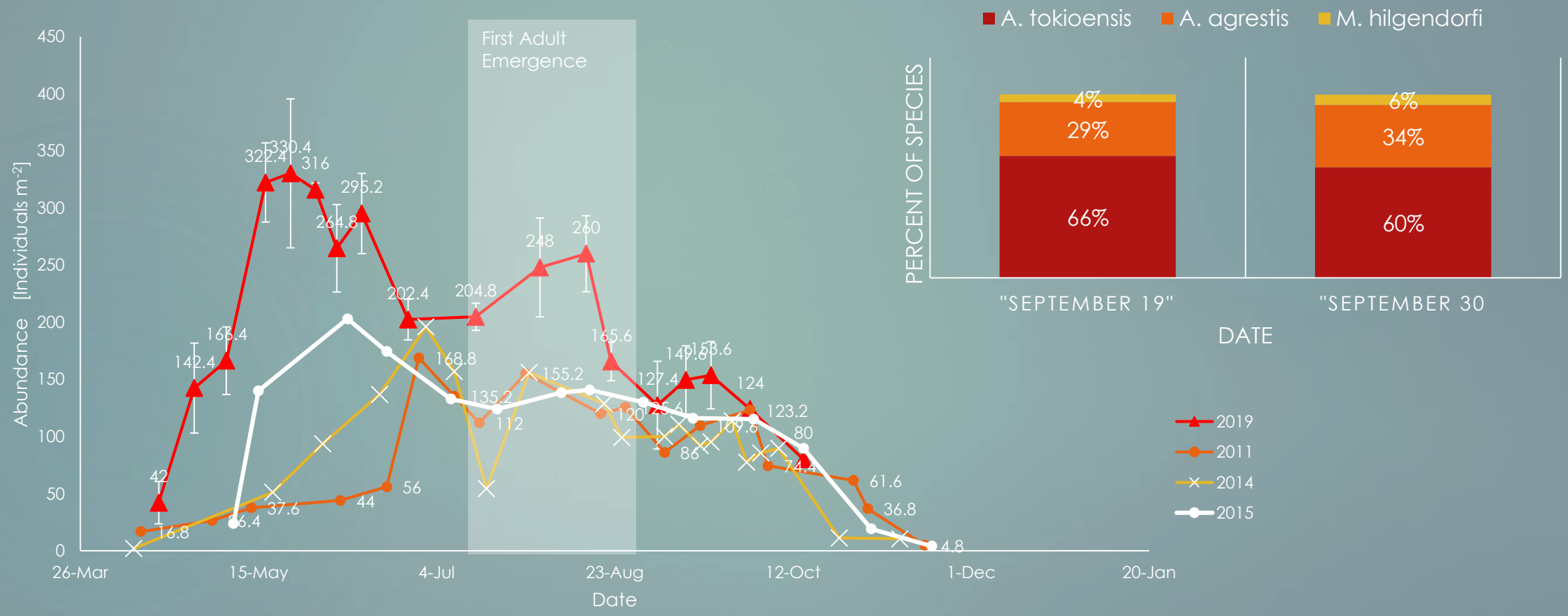


Image credit: Maryam Nouri-Aiin



Cocoons are present year round: Cocoon bank? Cocoons seem to stay viable for at least two-years. Trouble for managing the worms…

Phenology of Pheretimoid Worms in a South Burlington Woodland



3. How do they move around?

History of Earthworm Invasions in N. America

Great Lakes Worm Watch

https://collections.slsa.sa.gov.au/resource/PRG+1373/19/50

First wave of invasions:
European worms
Lumbricidae: e.g. night crawler, Red worm

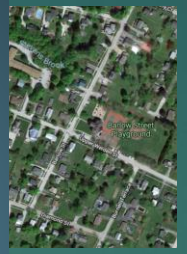
Second wave: Megascolecidae: Snake worms…

Not just Vermi-Compost

Ms. Y. has a large vegetable garden in East Calais. Last year she purchased about 20 bags of "xxxxxx-compost" and spread them on the garden. She didn't notice worms at the time. This year, her garden is full of large, aggressive worms that she believes are Amynthas agrestis from what she's read on-line. She notes that they are very aggressive and seem to be very intelligent, too….and that they have the telltale "flick of the tail" feature. I asked if the light band completely circles the body and she wasn't sure since she seems to have such an abundance of worms in different stages of life. Most disconcerting: Ms. Y opened an intact bag of xxxxxx-compost left over from last year and found one of the large worms in it.

E-mail from UVM plant clinic about the trials and tribulations of Ms. Y.

Google maps



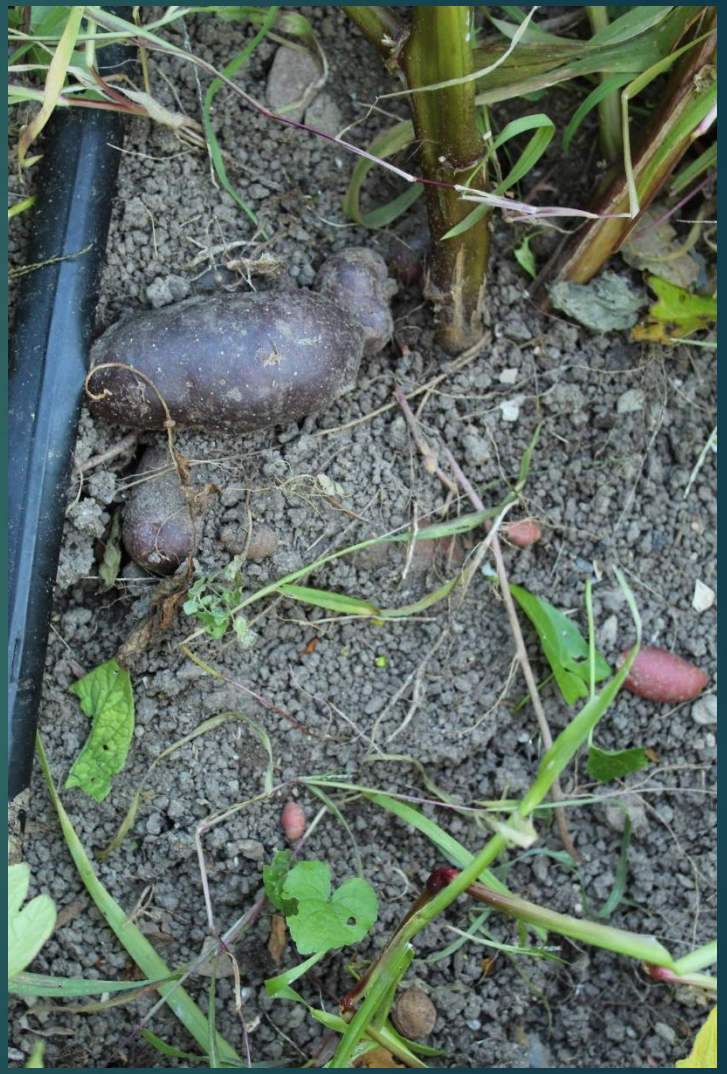
any
ardens

Forest edge…

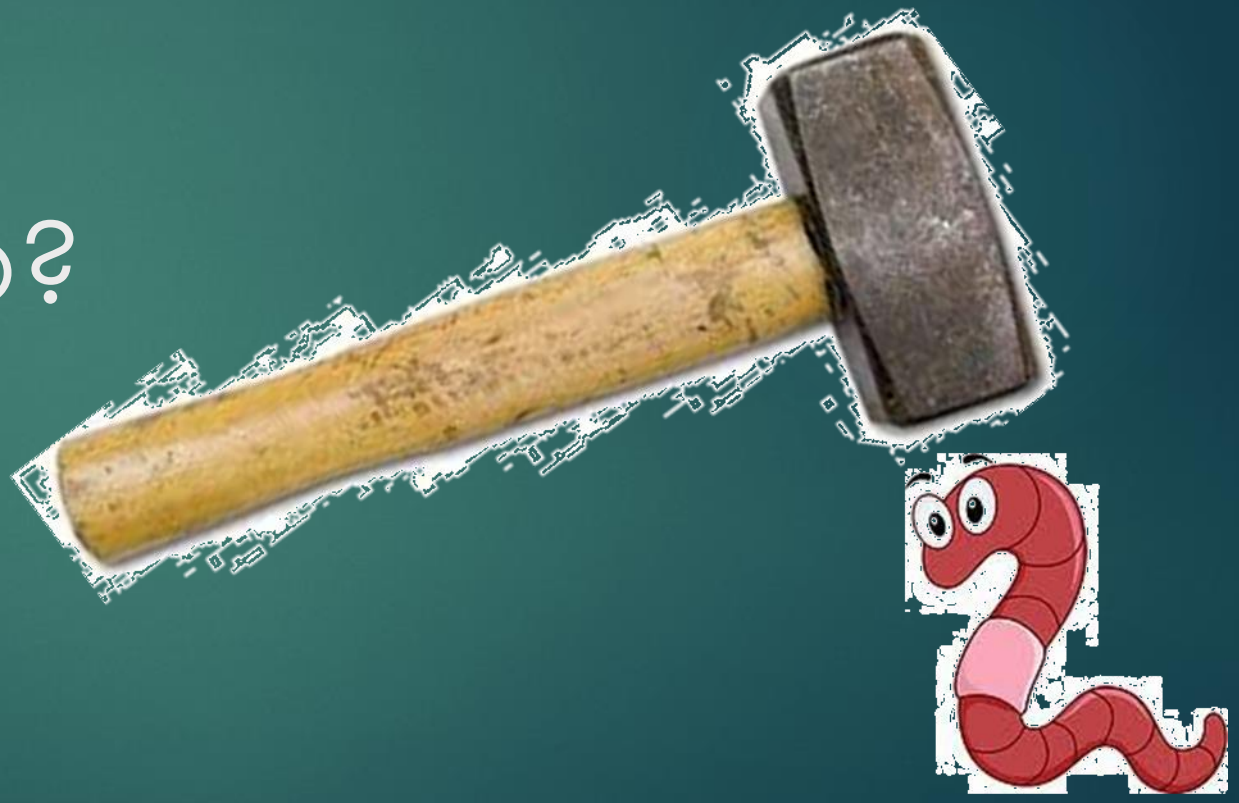
https://www.fs.usda.gov/detailfull/r4/fire-aviation/?cid=fseprd526615&width=full

Are also found in flower beds, lawns, potted plants, compost piles
Some symptoms …

- Lawn detaches
- Potted and bedded plants may show drought symptoms and wilt. Gardeners suspect fungal disease as the soil remains wet…
  - Worms feed on organic matter and thus reduce the contact between roots and soils
  - Half empty pots have been found, usually the lower half is consumed
  - Reports have hostas and showy ladyslippers affected
  - Need more eyes on the ground to report suspicious plant damage
- Vegetable roots exposed … e.g. my potatoes with greening of yellow potatoes and darkening skin of red potatoes.
- Probably no damage to compost piles but a pathway for dispersal
- Economic damage has not been estimated



What can you do?



Keep them away, if you don't have them yet…

For gardeners

- Don't use leaf mulch from other yards or municipal sources to build organic matter or mulch your vegetable beds
- Don't bring in wood mulch
- Exchange plants with soil-free roots
- Make your own compost (food waste, yard waste etc…)

For professionals

- Don't accept materials such as leaf mulch to make your own media or sterilize it
- Check whether the suppliers of plant materials you want to grow out can say their products are worm free
- Get compost only from organic sources (gets hot enough to kill cocoons) but treat the compost for the worms. They escape the heat by moving to the outside of the pile. Aerated static piles probably better.
- Make your own compost on-site.
- Move your pots on pallets or benches

How to control them? You already have them. There are no approved pesticides for earthworm!

- Precious little can be done …
- BUT
- There is hope
  - Some fungi kill them
  - Some saponins kill them (soap like substances, usually plant derived)
  - Needs to be explored more….
- Solarization of compost and mulch may help, but you have to get it hot enough.

- Don’t use Sevin!!!! It kills everything else!

Next: Visit to nursery and identification of your earthworms

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