

UMass Extension's 2021 Invasive Insect Webinar Series – Day 1

Audience Questions and Answers

Invasive Earthworms in Massachusetts - Biology, Impacts, and Research Updates

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The following are questions from the audience that the presenter did not have time to answer. Responses below are provided by Dr. Kostromytska. An archived recording of this presentation can be found here: <https://ag.umass.edu/landscape/education-events/invasive-insect-webinars> . We recommend that you review that presentation in conjunction with reading the below Q&A.

Question: Are the worms that were discussed in this presentation harmful to people or their pets?

Answer: No.

Question: How long (in years) have the *Amyntas* spp. earthworms (jumping worms) been established in the U.S.?

Answer: Since the 1940s-1950s, so approximately 60-70 years in the Northeast. But some sources report much earlier infestations in other parts of the country.

Question: Have you done any systematic surveys for *Amyntas* spp. (jumping worms)?

Answer: Not yet. That is partially why we are collecting data about their presence. The next steps will be sampling and species ID and recording. Older reports exist, but they should be updated.

Question: Are they coming in on soils coming from imported plants?

Answer: They have been in the US for quite a long time, so they are probably spreading from domestic sources at this point.

Question: How large are the *Amyntas* spp. (jumping worm) cocoons and freshly emerged worms?

Answer: *A. agrestis* cocoons are ~3mm (a little more than 1/10") and smaller species such as *A. tokioensis* are ~2mm (a little less than 1/10"). I do not have exact numbers for the hatchlings, but they are very small.

Question: Do *Amyntas spp.* (jumping worms) wiggle and split in half?

Answer: Yes, they move in an s-shaped manner and wiggle a lot. That is why sometimes they are called “snake worms”. Some species, if handled, will shed their tails. It is their defense strategy. Their movements are quite different from the European earthworm.

Question: How deep in the ground do *Amyntas spp.* (jumping worms) lay their eggs? And how long do the eggs need to be at the 40-50° degree temperature before hatching?

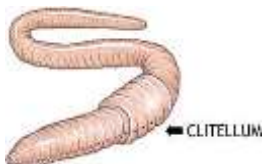
Answer: Some resources suggest that the hatchlings require 5-6 weeks at a temperature of 40-50°F. Most hatching occurs when the temperature reaches 50°F. During short winter warm-ups (50°F and higher), a small percentage of *Amyntas spp.* hatch, but do not survive when the temperature drops. *Amyntas* species are reported to be epigeic, or epi-endogeic, meaning they inhabit the top organic layer (measurements will probably differ depending on the location and specific soil profiles). However, they can burrow deeper. Most of the cocoons in the reported research were collected within 4 inches of the surface.

Question: Are all these worms you discussed anecia?

Answer: Night crawlers are anecic, pale worms are endogeic, *Amyntas spp.* are epigeic or epi-endogeic.

Question: Is the clitellum the band around the earthworm?

Answer:



Yes.

Question: After the ice age, why did native earthworm species not repopulate by moving north? How can these invasive species colonize so quickly when native species could not?

Answer: Native species from the south naturally move very slowly, and perhaps adaption success is limited by Northern climates.

Question: Are invasive earthworms posing a threat at the residential landscape level?

Answer: In my experience, I have had a couple reports that they have weakened turf. Theoretically, they can cause root aeration, causing weakening and/or death of the plant. There have also been reports that they can greatly accelerate bark mulch decomposition.

Question: Are these invasive earthworms problems in turfgrass and sod?

Answer: *Amyntas spp.* have not yet been reported as a turf pest/problem. We observed some jumping worms in lawns that are adjacent to wooded areas with leaf litter and have only received a few reports about them weakening turf; however other factors might have been involved in those cases. I am not aware of reports on sod farms and highly managed turf (sport fields, golf courses). European species are more of a problem on short cut turf only (but not on rough or residential lawn cutting height).

Question: I heard there are minimal concerns about the invasive worms in our urban landscapes, but what about our forests?

Answer: The potential impact of these invasive earthworms on our forests is definitely the biggest concern at this point. For the urban landscape, their impact remains to be determined, but for forests, invasive earthworms are definitely detrimental. Therefore, it is important to limit their spread.

Question: Can you say more about why *Amyntas spp.* (jumping worms) are not good for vegetables?

Answer: I am not aware of any evidence proving they have either beneficial or harmful effects, except their detrimental effect on native forests. Therefore, all measures should be taken to avoid their spread. Theoretically, the possible risk from them is root aeration – because they convert soil into pellets, and they are usually present in large numbers, move a lot, and dramatically disrupt soil structure. Another effect they can have is that nutrients (nitrogen and others) become rapidly available. As result, I have had reports of plants showing great vegetative growth, with no fruit production. But it was not quantified, so we still do not know the exact impact these worms can have in this scenario.

Question: Are *Amyntas spp.* (jumping worms) likely to adapt to colder temperatures?

Answer: It is possible. The adult worms do not survive temperatures below 40°C. However, at this point, it is known that only cocoons can survive through the winter. But if warm winters persists in the future, it might increase the probability of the worm's survival.

Question: Does one type of earthworm dominate an area driving out so called native species?

Answer: *Amyntas* species are known to out compete native and European species. The numbers gradually decline in the presence of *Amyntas* species. However, in landscapes their habitats only slightly overlap.

Question: If I understand correctly, the soils in Japan are coarse and volcanic. Could these worms have adapted to this and so have become hyper active due to the harsher native soils? With that, it would be logical to think they would find Northeastern soils very easy to move

through, hence the extensive damage they can cause to the forest understory. Could this be so?

Answer: These worms do not burrow too deep in the soil, they remain in the organic matter layer for the most part. Therefore, soil type may have no impact.

Question: Are jumping worms attracted to compost piles? Can the use of the compost help spread the jumping worm?

Answer: Very often jumping worms are found in compost and are very commonly spread through compost use. However, why they are often found in compost is yet unknown. Two possible explanations are: first they are attracted to it, as you have mentioned. However, they probably do not move too far on their own. Second, the infested composts are purchased and used in new locations. Sometimes jumping worms are used for composting (intentionally or not), because they are great at going through organic matter very fast. One of the recommendations is to buy compost from trusted sources. If you try to compost, avoid collected leaf litter from the adjacent woods (for composting) – snake worms can be introduced from there.

Question: How can a homeowner ensure they are getting compost that doesn't contain invasive earthworms?

Answer: Use a certified supplier, they usually have to follow a standard heating procedure.

Inspecting the compost for worms might not be too effective – because it is hard to see the cocoons, especially depending upon the time of year. They are present in the spring.

It is recommended to use bagged compost where possible, since this poses less risk.

Question: Are there efforts to stop the use of *Amyntas* spp. earthworms for fishing bait or composting? (Such as making them illegal to sell in the USA?) Are there safe/best practices like never releasing composting (bin) earthworms into the wild, etc.?

Answer: Absolutely! No bait worms should be released into the wild, no matter what species. *Amyntas* spp. (jumping worms) should not be used for composting. Many states regulate these worms (Wisconsin and New York for example, but not MA). So the basic recommendation is that they should not be used for compost or as fishing baits.

Question: So should composters freeze their piles, since *Amyntas* spp. (jumping worms) like the heat, to kill them off (before we share our composts)?

Answer: Cocoons with eggs overwinter; they survive quite harsh temperatures. More research was done on the effects of heating, so usually suppliers use heating to kill worms and their cocoons (104°F or higher). It would be great research to look at the lowest survival threshold for cocoons.

Question: I've been composting with earthworms for over 30 years (purchased red worms over 30 years ago). I see no evidence of jumping worms in my worm bin. (I think I have jumping worms outdoors under my mulch pile.) Is it safe to use my untreated vermicomposting on my garden? Red worms don't survive our winters, correct?

Answer: I am not sure what species exactly you are using. I bought several batches red worms and they have been multiple species, including jumping worms. I am not aware that red worms are problematic. Try to identify the species you using for composting prior to moving it to new areas.

Question: We recommend manufactured soils made from compost for wetland restoration and construction. How would you recommend we perform inspection of these soils?

Answer: It is recommended to use certified suppliers. They have standard procedures for compost processing. So I think it is possible to ask the suppliers about the procedures they have in place, making sure that the compost is heated to at least to 104°F.

The timing of getting compost is also important. In the spring, even at close inspection, it is hard to visually notice the cocoons. As an option, random subsamples can be taken and examined under magnification (so the presence of cocoons can be determined). Later in the season (mid-summer) it is much easier to see the adult worms with visual inspection.

Question: If you hand pick the worms in a garden setting, what is the proper way to dispose of them?

Answer: Proper disposal methods include solarizing them, soaking them in alcohol, or dropping them into a bucket of soapy water.

Question: The control methods (discussed in the presentation) seem really detrimental to other soil biota and limited in coverage. Do the worms have the ability to move away from these treatment areas?

Answer: Yes, they can do that. We are working in the lab to figure out something that works better and can repel worms from areas that are valuable/you wish to protect.

Question: If these invasive earthworms are such an issue, is the invasion of the hammerhead worm/planarian (*Bipalium spp.*) a bad thing? If they kill all of the earthworms, will we miss the earthworms?

Answer: Great questions. Some researchers call the flat worms “helpers” in dealing with the invasive earthworm species. However, invasive species with relatively wide host ranges often pose a serious risk to native species and native ecosystem balance and diversity.

Question: Will voles and moles eat *Amyntas* spp. (jumping worms)? Should we stop discouraging them in hopes that they will help manage the invasive earthworms?

Answer: They probably will, however the extent/impact of their predation is unknown. The question is which organism will cause more disruption – the moles or the worms? I think the best that we can do is make sure we do not contribute to the spread of the invasive earthworms.

Question: Are mole populations affected by changes in earthworm distribution or do other factors cause mole population increases? Are moles mainly feeding on worms or grubs or both? What is the best mole control? Poison worms are popular in the Midwest. Do they really work? Or is trapping the best?

Answer:

- 1) I do not know about the effect of the earthworms on mole abundance. It is true that earthworms constitute a large portion of a mole's diet. And the tunneling comes close to the surface and is therefore more noticeable if their prey is closer to the surface.
- 2) I am not an expert on mammal controls. However it is strictly regulated. These regulations vary from state to state.

Question: Is there more damage to other invertebrates in the soil than benefit of getting rid of the invasive worms (jumping worms)?

Answer: It will depend on the methods and specific procedures which are used. Just a reminder, no chemical is specifically labeled/registered to use to control earthworms. Some chemicals which are used to control other pests, such as insects and diseases, have non-target effects and may reduce earthworm populations.

Question: Do invasive jumping worms do better at a high or low pH? I believe they change the pH, one issue in forests, though I'm wondering if a certain pH would decrease viability, especially of newly hatched/immature *Amyntas* spp. (jumping worms)?

Answer: It is commonly believed that earthworms do not perform well in soils with low pH and *Amyntas* spp. are no exception. Modifying/lowering the soil pH was proposed for the management of European earthworms; however, it had limited success because it is not easy to achieve low enough pH without the detrimental effects on plant growth. No research on hatchlings has been done at this point.

Question: I've noticed that the castings repel water. If they can be used for nutrients, is there something to break the film so the "coffee grounds" will dissolve and release nutrients?

Answer: I am not aware of any research looking into this.

Question: Since the pellets of the *Amyntas* spp. (jumping worms) are less easily decomposed, does this present a benefit for carbon sequestration?

Answer: This is beyond my expertise. I would prefer to avoid providing speculation until more research is available.

Question: Can you suggest plants or plant characteristics that will help mitigate soil erosion on a wooded hillside infested with earthworms? White snakeroot and Christmas fern are establishing themselves – any other suggestions?

Answer: Sorry this question is beyond my expertise.

Editor's Answer – Depending upon the specific site conditions, the following list of North American species may be helpful for you. However, when reviewing, take note of the specific site characteristics you are looking to meet. <https://ag.umass.edu/landscape/fact-sheets/north-american-plants-for-new-england-gardens>

