Plant Sale Best Practices to Stop the Spread of Jumping Worms

Introduction

- Invasive Asian Jumping Worms (JWs) were confirmed in multiple locations in Ontario in the summer of 2021.
- Jumping Worms are a serious threat to our gardens and forests.
- There is currently no viable option for controlling Jumping Worms, so it is crucial to stop them from spreading.
- This document was created to support organisations involved in buying or selling plants, especially at local plant sales.

Plant & Site Preparation

- Make sure ALL plant sale members are aware of Jumping Worms including what they look like and what contaminated soil looks like.
- DO NOT ACCEPT plants from gardeners with confirmed cases of JWs.
- Sell bare-root plants whenever possible. Completely submerge plant roots in water and wash away remaining soil. Actively check for JWs.
- If plants must be sold in soil, repot with clean potting soil.
- Do not use mulch, leaves, backyard compost or other material to repot as they may harbor jumping worm eggs.
- Gather and transport plants/pots where they cannot pick-up contaminated materials like soil, leaves or mulch, e.g. on concrete, tarps or trays.
- **Arrive clean and leave clean**. Ensure volunteers clean shoes/boots/tools before arrival and brush off any soil before returning home.
- **Vehicles**: Be aware that vehicle tires may also transfer JW cocoons to and from the plant sale site. Where possible park vehicles on paved areas such as the street or parking lot.

Introducing New Plants to Your Garden & Testing for Jumping Worms

- Isolate & inspect all new plants **before** adding to your garden.
- Inspect the soil. Is it **intact** or **granular?** Intact soil is likely OK, granular soil may indicate the presence of JWs.
- If unsure, test for Jumping Worms:
    - Mix 1/3 cup ground mustard seed in one gallon of water.
    - Remove/brush away any leaves or mulch that are on top of the soil.
    - Slowly pour mustard solution onto the soil. The solution irritates the worms and drives them to the surface. All earthworms will react but look for the white clitellum of the JWs and remove them as they appear.
    - Destroy all JWs and solarize the soil. (see below)

Jumping Worm, Cocoon & Soil Treatment

- Handpick and destroy JWs using one of these options:
  - **Solarize** JWs by placing them in a plastic bag in the sun for at least 10 minutes.
  - **Soak** JWs in isopropyl (rubbing) alcohol.
  - Put JWs in a bucket of alfalfa pellets. They will dry up very quickly and have no odor.
- Dispose of dead JWs in garbage. Do not put them in the compost pile or garden.
- **Cocoons** are sensitive to heat and can be destroyed with clear plastic solarization. In late spring or summer, cover moistened soil with a sheet of transparent polyethylene for two-three weeks or until the soil temperature exceeds 40°C for at least three days. This method works best in full sun.
- **Treatment of soil/containers:**
  - **Containers**: Use boiling water to rinse the container thoroughly. This should kill any cocoons.
  - **Soil**: Strain any tested soil through a cheesecloth or tee shirt to remove water and then bag the filtered medium. Solarize the material if possible before throwing it out in the garbage.

Controls for JWs

There are currently no viable Jumping Worm control methods, however the following are being explored:

- **Abrasive materials** such as biochar (ground up charcoal) and diatomaceous earth (fossilized diatoms) show some promise in killing adult jumping worms. Incorporate one of these products into the infested soil to a depth where the worms are located.
- **Saponins**: Saponins are plant derived chemicals which can act as pesticides. Some golf courses use fertilizers containing saponins to control earthworms in their turf grasses, e.g. Castaway 3-0-1 from Planet Turf, contains saponin oil derived from *Camellia sinensis*. Saponin-based fertilizers work best when applied after rain or irrigation to expel the earthworms from the soil causing them to desiccate and die. There is a concern re potential negative impacts of saponins on other soil biota such as springtails. Alfalfa is another source of saponins.
- While the current advice is for "property owners to contact a pest control company", consider the following:
  - Because there are no known control options, companies may not be able to do much beyond "limiting" populations. The worms reproduce prolifically and a single egg is all that is needed for them to spread.
  - JWs can be spread through via vehicle tires or equipment used by any control company or landscaper.

Purchasing Soil, Mulch & Compost

- When purchasing bulk mulch or compost, use a reputable producer that has heat-treated the material to a temperature of at least 40°C for at least three days to destroy the cocoons.
- It is possible for bagged mulch or soil to also be contaminated.

Jumping Worm ID

Become familiar with the appearance of JWs & affected soil by studying photos and videos of their movement.

Comparison of Asian Jumping Worms and European Earthworms (Definitive JW ID in red)		
	Asian Jumping Worms	European worms
Scientific names	• *Amynthas tokioensis* • *Amynthas agrestis* • *Metaphire hilgendorfi*	• *Lumbricus rubellus* (Common Red wiggler) • Other various species

Life cycle	• Annual species • Several generations per season • Overwinters as cocoon • Parthenogenic (asexual reproduction) • Takes about 70 days to grow to an identifiable size • Baby JWs are tiny, about 10 mm in length. • Large worms seen early in the year are not likely JWs • Small white worms seen in spring are “pot worms”, not JWs and not actually an earthworm at all	• Live more than one season • One generation per season • Adults burrow into soil during winter to re-emerge in spring • Sexual reproduction
Cocoons	• Almost impossible to differentiate from soil particles	
Adult length	• 7 - 20 cm depending on species • 12.5 cm/3 inches (*Amynthas tokioensis*) • 14 cm/5 inches (*A. agrestis*) • 10.9 – 17 cm/8 -12 inches (*Metaphire hilgendorfi*)	• 3-10 cm (Common red wiggler) • Up to 30 cm
Skin	• 2-tone colour • Darker on their dorsal (back) than on their ventral side	• Reddish brown (Red wiggler) • Red-violet to dark brown (other earthworms)
Body	• "Rigid" body	• "Flaccid" body • Can wrap around your finger

Clitellum	• Milky white to grey in appearance • Whole, not split • **Goes all the way around the body** • **Located on segments #14-16, nearer to the head** • **“Smooth” clitellum that you can't feel with your finger**	• Raised, pink/red • Saddle shape, split down the back • Does not wrap around completely on the underside • Located on segments #26 – 32, further from the head • "Raised" clitellum that you can “feel” with your finger
Behaviour	• Very active, snake-like movements • A rigid body which can "bounce" and “flop” around • **Can shed tail when aggravated** • Usually found in top layer of soil	• Less active, “wiggles” • Slightly limp • Will not shed tail • Borrows deeper into soil
Soil signature (castings)	• Soil looks like "coffee grounds" • Very loose	• Castings in "piles"

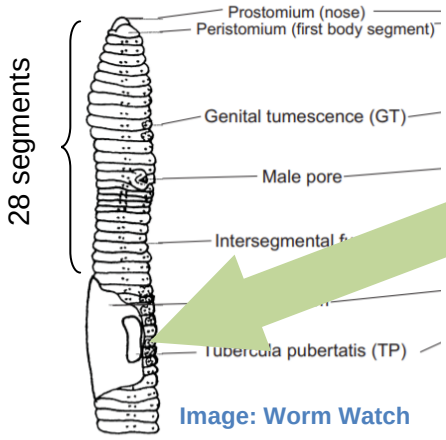

Image: Worm Watch

The location of the **clitellum** is species-specific on all earthworms. This clitellum is located starting on the 28th segment. It is therefore **NOT** a Jumping Worm. **A JW clitellum is located on the 14th - 16th segments.** This clitellum is also **saddle shaped**. It does not go completely around the body of the worm as in the case of JWs.

Stop the Spread in Your Garden

- Produce your own compost or leaf mulch.
- Purchase plants and garden products from reputable sources. Ask nurseries, landscaping companies and soil, compost & mulch providers if they've had JW issues. If they know nothing about JWs, then be concerned.
- While compost that was properly heated up should not have worms or cocoons, they can be contaminated via backhoes, handling etc.
- When visiting private gardens, botanical gardens or trails, arrive clean (shoes, tires) and leave clean removing all soil, debris.

Learn More

- Jumping Worms - University of Minnesota Extension
- Plant Sales and Jumping Worms
- Heat kills invasive jumping worm cocoons, could help limit spread
- University Place: Invasive Jumping Worms (Video)
- Invasive Asian Jumping Earthworms
- NC State Extension Jumping Worms
- Stop the spread of jumping worms and other invasive species
- Jumping Worms (MGOI Facebook post)
- They are here! (MGOI Facebook post)
- Map of Jumping Worm Sightings
- Confirmed invasive jumping worm sightings along the Canada-USA border
- New Asian pheretimoid "jumping earthworm" records in Canada
- Asian pheretimoid earthworms in North America north of Mexico: An illustrated key to the genera Amynthas, Metaphire, Pithemera, and Polypheretima (Clitellata: Megascolecidae)
- Using Organic Products to Reduce Earthworm Castings
- General Earthworm Diagram (Worm Watch)

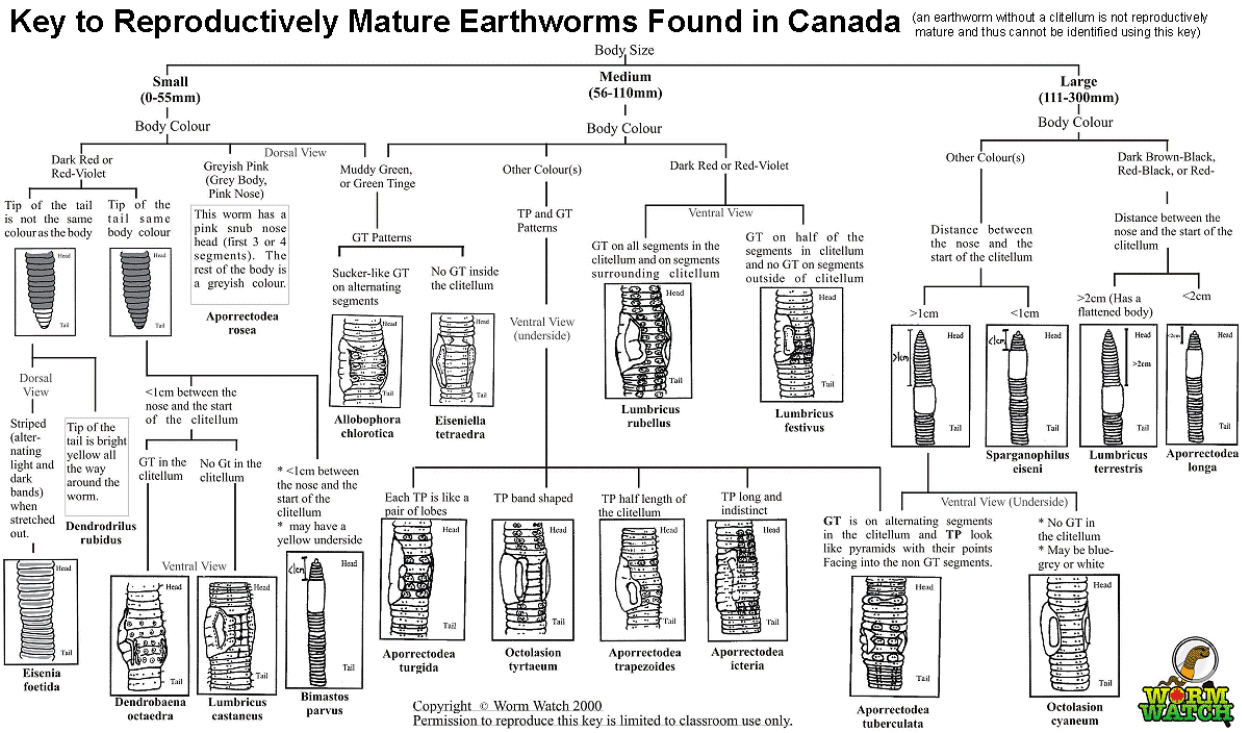

Image: Worm Watch