



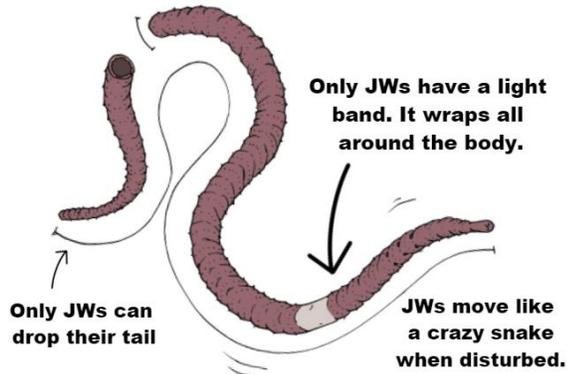
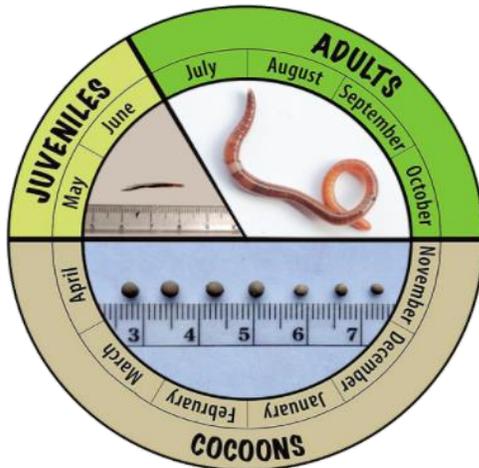
Invasive Jumping Worms – Dealing with Infestations in Your Garden

What you Need to Know

- If you have confirmed JWs in your garden, immediate action and precautions are necessary. Although jumping worms are a major threat, don't let that fear or their presence overwhelm you. Continue to enjoy your garden and know that you are not alone in fighting this new pest.
- Learn as much as you can about JWs. Do your part to limit their spread and to support research. Report your JWs location at Ontario's Early Detection & Distribution Mapping System <https://www.eddmaps.org/>.
- **People spread worms** without realizing it. JW egg cases (cocoon) can be in soil, mulch, plants, landscaping equipment and in even the treads of shoes and tires. One cocoon or worm is enough to infest a garden.
- If you know the source of the JW infestation, speak to that provider/person and explain the problem. Share information about Jumping Worms.
- Do not share any plants, soil, leaves, or mulch from your garden with others. If you have shared garden products before knowing of your infestation, alert them to a possible risk.
- Ensure that visitors, landscape companies or tradespeople are aware that JWs were found in your garden. You may also want to make neighbours aware.
- When visiting other private gardens, botanical gardens or trails, **arrive clean and leave clean**. Use a brush to remove soil and debris on your footwear. Park on paved areas where possible.
- Let visitors to your garden know you have confirmed JWs. Ensure they arrive clean and leave clean. Visitors should carefully clean footwear or tie plastic bags using tape at the ankle to keep them on. Bags should be turned inside out after wearing and disposed of in the garbage.



- **Know the JW Life Cycle:** JWs die off in winter. Cocoons begin to hatch when soil temperatures reach 10°C/50°F and continue to hatch throughout the summer. Cocoons are the size of a poppy seed and new JWs will be tiny. When JWs mature (July to October), it's easier to tell them apart from other earthworms. This may be the best time to inspect and treat plants and gardens.



Jumping Worms die in winter and hatch from eggs in spring. **Cocoons** can survive temperatures of $-40^{\circ}\text{C}/-40^{\circ}\text{F}$ so winter temperatures do not kill them. From May to June, Jumping Worms are tiny. If you find a large worm in the spring, it won't be a JW. When Jumping Worms mature (July to October) they develop a **light band** (clitellum) near their head.

Controlling JWs in Your Garden

There are currently no controls for JWs and no one management strategy will be effective. A combination of strategies is best to manage populations.

Change How You Garden

- When you garden, wear one pair of shoes that never leave your property.
- Clean your equipment and footwear before and after use to limit spread in your own garden.
- **Yard waste:** Contact your municipal government and ask if they follow the "process for reducing pathogens". This process ensures that compost reaches $55^{\circ}\text{C}/131^{\circ}\text{F}$ for a certain number of days. Do not send your yard waste to municipal facilities unless composting treatment reaches temperatures that will destroy Jumping Worms and cocoons. Consider solarizing yard waste instead and reusing it in your garden.
- Continue to **carefully inspect, and quarantine** any new plants, soil or mulch that you purchase or receive. **Quarantine** new plants by placing them in a container (e.g., sturdy plastic bag, pot, tub) that prevents worms from escaping or cocoons from washing away.
- **Timing:** Avoid planting in summer when JW pressure is highest. Plant in spring before JWs mature. Plant trees in fall to allow them to establish when JW populations start to decline. Ensure all new plants are well watered.
- JWs live in the top few inches of soil. **Plant species** that are drought tolerant and have deeper roots. Native grasses, groundcovers and other perennials thickly planted, showed some signs of success in invaded soils. There are reports that Jack-in-the-pulpit roots deter JWs and that native ferns and prairie plants are unaffected by JWs.
- **Monitor your garden** for changes in soil and plant health to identify further spread. If plants are failing, inspect the roots and remove & destroy any JWs.



Jumping worm **castings** are dark and possess a similar size and shape as Grape Nuts cereal. They are also described as looking like coffee grounds. Affected plants may look wilted despite soil being moist.

Mechanical Controls

Solarizing (heat-treating) soil, compost & mulch under plastic may be used to kill cocoons & worms. In general, clear plastic is more effective than black plastic. Heat treating in bags or sandwiched between two sheets of plastic had the best results as worms were not able to escape. Solarizing in garden areas had mixed results as worms can simply move away. Soil, compost & mulch must be heat-treated to a temperature of 40°C/104°F for at least 3 days. If outside temperatures drop, it will take longer. Solarizing works best in sunny areas. Solarising may be an effective way of treating purchased soil, mulch and compost. Solarising may be an effective way of killing JWs and cocoons in purchased soil, mulch and compost.

- **Solar Sandwich:** Place a sheet of translucent plastic drop cloth in a sunny location. Pile soil/mulch/compost on the sheet. Place a second translucent drop cloth on top. Pull the sides of the bottom sheet over the top sheet and secure in place to stop worms from escaping. Solarize so contents reach 40°C/104°F temperatures for at least 3 days.
- **Solarizing in Bags:** Place soil/mulch/compost in sturdy plastic bags and moisten. Secure bags tightly so worms can't escape. Set out in the sun. If thoroughly solarized in a minimum of 40°C/104°F temperatures for at least 3 days, the soil should be safe to re-use in the garden.
- **Garden Areas:** Moisten soil & cover area with clear plastic. Digging a 4-6-inch-deep trench around the area and pushing the plastic down into the trench may stop worms from escaping. Fill the trench with soil to secure plastic in place. Time will vary according to conditions, but the soil temperature needs to exceed 40°C/104°F for at least 3 days. Keep plastic in place for a **minimum of 2 to 3 weeks.**

Tilling: While tilling is no longer recommended in gardens because it harms soil organisms, JWs will eventually destroy organisms in the soil, so this method is an option. JWs live in the top two or three inches of soil. Tilling only works when worms are small. Rototill in late spring, approximately the last week of May, depending on your area and temperatures. Tilling late in the year is not effective as cocoons will have been laid and are unaffected by tilling.

Hand Removal & Disposal

Repeated hand removal may be useful in controlling populations, especially to prevent mature JWs from laying eggs. Because Jumping Worms live close to the soil surface, they can be driven out by disturbing the soil with a rake, or by using 'grunting' or a mustard solution. All earthworms will react, but look for the **light band (clitellum)** of the mature JWs and remove the worms as they appear. If you are not sure, it is safest to dispose of all of the earthworms. Kill worms by freezing, leaving in a bag out in the sun, or soaking in vinegar or rubbing alcohol. Discard in garbage. Do not put JWs in any compost pile, garden or natural lands.



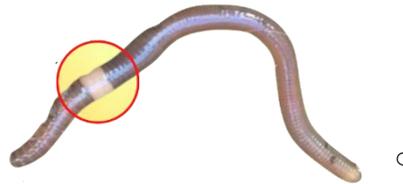
Grunting is a technique used by worm hunters to drive worms out of the ground using vibrations. A stake or branch is pushed into the ground 4 to 6 inches and a second rougher stick is used to rub back and forth against the first to cause vibrations. The vibrations cause worms to come to the surface where they can be removed and disposed of.

<https://www.facebook.com/sarah.gwozdz/videos/576329933608174>

Mustard will irritate all worms and drive them out of the soil.

- Mix 1/3 cup ground mustard seed in 4.5 liters (1 gallon) of water.
- Brush away any leaves or mulch on top of the soil.
- Slowly pour the mustard solution onto the soil.

Look for this **light band** (clitellum) found near the head of mature JWs. It goes all around the worm in a solid ring. Other earthworms have a band that is red/pink and saddle shaped.



Potential Solutions for the Future and Concerns

The Canadian Food Inspection Agency office (CFIA) is advising "property owners to contact a pest control company" for Jumping Worms. There are currently no pesticides or products approved for the control of JWs, so companies may not be able to do much beyond "limiting" populations. JWs may also spread from your garden by vehicle tires or equipment used by any control company or landscaper.

- There was some success reported by adding **coco mulch and dry mustard powder** to new plantings. Warning: Coco mulch is highly toxic to dogs.
- **Chicken Foraging:** There are reports that chickens like eating Jumping Worms and may reduce JW populations. However, bioaccumulation of metals can occur in earthworms living in contaminated soils. Concentrations may be high enough to be problematic for humans if they eat the eggs of chickens who feed on the worms. **Never feed JWs to native birds.**
- **Biochar** (ground up charcoal) and **diatomaceous earth** (fossilized diatoms): These materials incorporated into infested soil may harm and possibly kill worms, but neither method has potential to control populations. Diatomaceous earth is available in most stores that sell garden products. Biochar may be sold as a soil conditioner.
- **Biocontrol:** An entomopathogenic fungus, *Beauveria bassiana*, shows some promise as a biological control. It is sold commercially as Botaniguard. Because it is not approved to control worms, it cannot be recommended at this time.
- **Saponins:** Some golf courses use fertilizers containing saponins to control earthworms in their turf grasses. Saponin-based fertilizers may not be available for home gardeners. Alfalfa is another source of saponins.

Things You Should Not Use

- **Insecticides:** Worms are not insects, they are annelids. Insecticides should only be used for target species on the label.
- **Vinegar:** Vinegar may kill worms, but it will also kill plants.



- **Random Chemicals:** Avoid the temptation to use chemicals, herbicides, fungicides or household products to try and control Jumping Worms. They are unlikely to work and may harm your garden and yourself.

Conclusion

Along with ongoing research, dedicated home gardeners are our best hope in reducing the spread of JWs. Educate others especially landscapers and nurseries. Consider connecting with JW support groups or contacting your government representative with your concerns. Share any successes you've had controlling JWs in your garden.

Learn More

- [Jumping Worms](#) - Invasive Species Centre
- [Jumping worms \(Megascolecidae: Pheretima\) in Connecticut](#)
- [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](#) (infested soil images)
- [Map of Jumping Worm Sightings](#) in U.S. (EDDMaps)
- [Jumping Worm Sightings](#) - Ontario
- [Soil Solarization for Gardens & Landscapes](#)
- [Confirmed invasive jumping worm sightings along the Canada-USA border](#) (ResearchGate)
- [New Asian pheretimoid "jumping earthworm" records in Canada](#)
- Asian pheretimoid earthworms in North America north of Mexico: [An illustrated key to the genera Amynthes, Metaphire, Pithemera, and Polypheretima \(Clitellata: Megascolecidae\)](#)