

Jumping Worm (JWs) Best Management Practices

JUMPING WORM LIFECYCLE AND IDENTIFICATION

COCOON

- All year round in soil
- Spherical, dark brown, 2 to 5 mm (1/12 to 1/5")
- Require soil sieve washing to extract them



JUVENILE

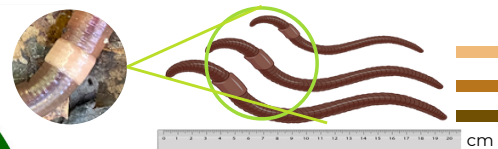
- Impossible to identify to species by morphology
- Start to hatch early April
- Already thrashes when young
- High abundance in end of June/early July
- Inhabit the top 2-3 inches of soil



A. tokionesis *A. agrestis* *M. hilgendorfi*



ADULT



- First adults emerge end of July
- Highest adult abundance is at the end of August/ early September
- Adults could be identified by their thrashing movement
- Clitellum; the ring around their body closer to their head, milky color
- Inhabit the top 2-3 inches of soil

PREVENTING AND LIMITING THE SPREAD OF JWs

Early detection allows for possible eradication of earthworms and protection of native ecosystems.

Challenges: Fully removing invasive earthworms post-introduction is difficult due to enforcement and resource demands for regulations and public involvement.

- Avoid transport of soil and horticultural media from infested places.
- Avoid importing compost, wood chips, etc. without assessing potential for infestation.
- If you live in an un-infested area, select worm free purchases, bare root plant, start them from seeds.
- Inspect plant materials for adults and juveniles before planting on your farm and property. Cocoons are extremely difficult to detect.
- Establish cleaning station with water and boot brushes before entering un-infested areas to reduce spread from contaminated footwear
- Once worms are present, power-wash equipment before moving to un-infested areas.
- Once worms are present at your nursery, provide customers with choices, bare root plants, plants grown in "clean" potting soil, and information about JWs.
- Dispose of your horticultural waste responsibly. For example, do not dump it in the woods. Contact your commercial composting companies for advice.

Adaptation

If your property is infested, it may not be practicable to eradicate JWs, but you can manage the ecosystem to reduce negative impacts. Measures you can take include: reducing the worm population (see below), investigate plants that are less susceptible to JWs soil disturbance, and planting species with varying root depths. Some pesticides are being evaluated on JWs, but not legal to use.

Adaptation **does not address the root problem** of invasion and may not be sufficient to prevent long-term ecological changes.

JUMPING WORM PEST STATUS IN THE US

Jumping worms are recognized as prohibited or restricted species in: New York, Wisconsin, Maine, California, and Minnesota

	Impact	Reported	Pest status
Garden	Changing soil physical properties	✓	Not recognized as garden pests
Nursery	Changing soil physical properties; induce drought symptoms in potted plants	✓	Not recognized as nursery pests
Farm	Changing soil physical properties	✓	Not recognized as farm pests
Forest	Changing soil physical properties, increase soil erosion, fast consumption of leaf litter, negative impact on forest regeneration, micro/macro fauna	✓	Recognized as forest pests

THE MOST EFFECTIVE AND PRACTICAL TREATMENTS

Top soil solarization: Using clear plastic for soil solarization can raise soil temperatures above 104°F, effectively killing JW cocoons in the top few inches of soil. However, adult worms that burrow deeper may survive due to cooler temperatures below.

The best time for soil solarization is June, as April often has many viable cocoons but temperatures in Vermont may not reliably reach the necessary 104°F.

Leaf litter, mulch, compost, and soil solarization: Collect leaf litter and the top 1 to 2 inches of soil from heavily infested areas, spread it evenly, and solarize it to ensure the temperature reaches at least 104°F for a minimum of 2 hours at every depth of the pile, effectively killing both cocoons and worms. Enhance the effectiveness of solarization by placing an insulating material underneath to prevent worms from escaping and to help maintain the necessary temperature throughout the material's depth. This method is a practical approach for heavily infested vegetable beds or gardens. This method is more effective when there is the highest abundance of juveniles (see below) since high proportions of them live in the leaf litter.

Manual removal: One effective way to manage jumping worms in gardens is to manually remove them during weeding or other gardening activities. Collect them along with the weeds in a bin with drainage holes the size of mustard seeds (2 mm). Allow the worms to help decompose the weeds, and later in the season, transfer them to a composting facility or place them in a plastic bag for solarization when temperatures are sufficiently high. The solarized material can then be used as fertilizer or processed to be compost tea, as the decomposed worm bodies are rich in nutrients and beneficial microbes for plants. Another option is to just collect them in water, they die within less than 24 hours in water.

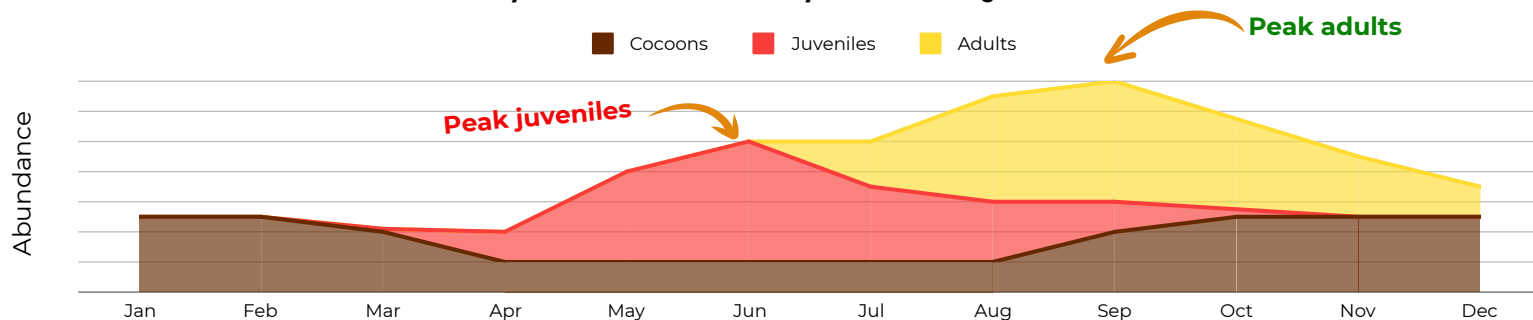
Following methods that are not yet experimentally tested, no guaranteed results.

Shallow tilling, though not yet experimentally tested, may be effective against juvenile and adult jumping worms, particularly when targeting them during peak abundance in late June/early July and late August/early September. However, this method is not effective against worm cocoons. Tillage might reduce earthworm abundance by disturbing their habitat.

Avoid adding mulch, organic residue, and organic fertilizers like seed meals and peanut shells. While this may help keep their numbers lower, complete eradication may not be achievable, and results may not be immediately noticeable. Use inorganic fertilizers (mineral-based) versus carbon-containing fertilizers (seed meals, animal by-products) to avoid feeding worms.

Mustard flush is used to bring earthworms to the soil surface. However, it is not recommended as it does not expel or kill all worms and requires handpicking, and it is ineffective against cocoons. CAUTION: Some individuals may have severe mustard allergies.

Effective control requires close attention to the life cycle and abundance. For example, the best time to control juveniles is between end of May and mid-June when they are in their highest abundance.



CONSIDERATIONS AND APPLICABILITY

- Unsuitable for Vermicomposting:** JW species, being annual, are inactive for significant parts of the year, making them inappropriate for vermicomposting. They potentially could outcompete the efficient red wiggler worms and spread beyond compost piles.
- Species-Specific Efficacy of Control Measures:** Many control strategies are designed for general earthworm management, particularly in sports fields and may not be effective on JWs. However, direct research on JWs is scarce; there is uncertainty about how these methods affect different species and their effectiveness.
- Holistic Management:** Like many other invasives and pest species, there is not a "magic bullet" for JWs infestations. Employing a variety of management techniques, customized for the specific local environment and JW behaviors, appears to be the most effective approach for controlling JW populations.
- Continuous Evaluation:** Regularly evaluate the success of control methods to adjust and enhance JW management tactics over time.
- Life Stage Sensitivity:** **Be mindful that some control methods may only target specific life stages of JWs.** Consequently, there might be a delay before you notice a reduction in their presence in treated areas.
- Safety Reminder:** Always **read the label** of any product to ensure that it is appropriate for your specific situation and to use it safely and effectively.