How to Set Up a Worm Bin

European Nightcrawlers

Photo credit: Ethical Axolotls

Keeping a worm bin is an effective way for axolotl owners to keep a consistent supply of food for their pet. A worm bin gets rid of the need to frequently buy new containers of food from bait shops, and allows owners to place orders less often. This article will detail what a worm bin is, how to create one, and what type of food is best for your axolotl!

Let's start with a little background. There are roughly six varieties of worms used to feed axolotls. Those we refer to here, earthworms, are colloquially known as nightcrawlers, red wigglers, or gray worms. Scientifically referred to as the *Lumbricidae* family, these are considered the safest and most nutritionally complete food available for axolotls longer than 7.5 cm (3 inches).

Photo credit: Clker-Free-Vector-Images from Pixabay

When building a worm bin, consider using old supplies found around your home. Although nearly every supply needed can be found at a home improvement store, repurposing items for a worm bin can reduce costs and help the planet!

Supplies

- Plastic storage tote with lid (12 qt - 18 qt)
- Bedding (shredded cardboard/newspaper)
- Bioactive substrate (fertilizer-free top soil, coconut coir, peat)
- 'Vegan' food scraps

- Worms

The Container

A plastic bin of 12 quarts or larger is ideal to house your worms. This size allows a microbial biome to develop. Carefully drill, or otherwise puncture, several rows of ⅛ inch holes into the lid of the container. Optionally, you may use window screening or similar mesh material as a lid, which will improve airflow in the bin. The amount of light the bin receives determines if the worms remain in the bed; the bin should be opaque with the top of the bin ideally receiving some light to deter escaping worms.

Bedding

There are multiple types of bedding that can be used in a worm bin. Some great options for bedding are shredded cardboard, shredded newspaper, straw, or manure from herbivorous animals. Bedding gives the worms a place to live and hide. It also assists worms in their mechanical digestion. Shredded beddings should be soaked in dechlorinated water and then squeezed until most of the water has been removed. The bedding should be moist, but not dripping wet. No matter the size of the bin, you should have approximately 15cm (6") of bedding in the bin.

Bioactive substrate

The next necessary component of a worm bin is bio-substrate. This is a type of substrate that assists in the worms' bacterial digestion. If it's alive or has been alive, it likely has a microbial system that worms will love. Leaf litter, fertilizer-free soil, coconut coir, peat moss, and manure from herbivorous animals (manure is both a bedding and a substrate!) are all excellent biological substrates. Add at a 1:1 ratio to the bedding.

Make sure to sterilize any substrates that you collected outdoors. Boiling works best for this.

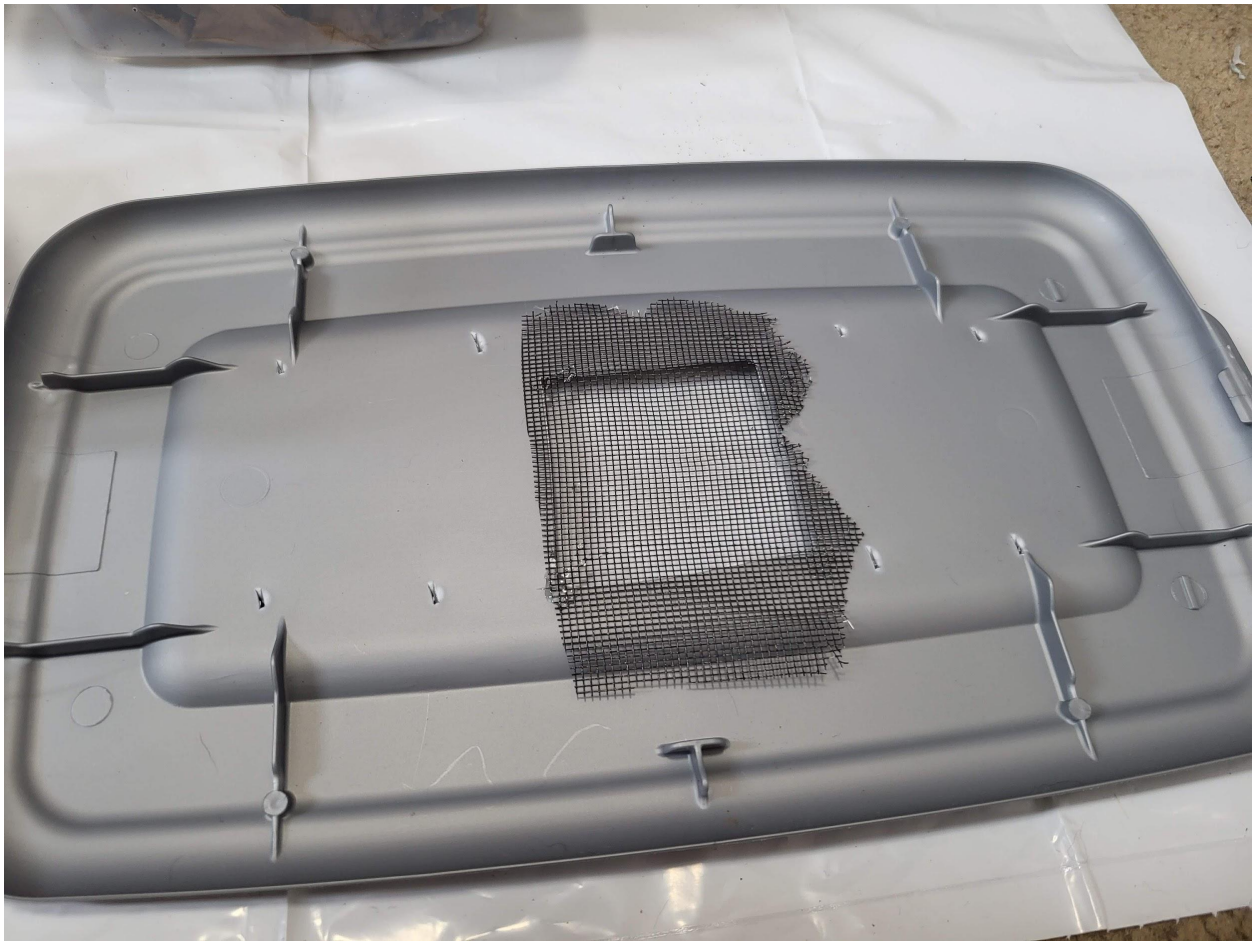
Worm Diet

Worms can be fed with food scraps so long as they are not animal products, with the exception of eggshells with the membrane removed. Citrus, spicy foods, or foods from the allum family (such as garlic and onions) should also not be fed. Do not overfeed your worms, as this will create a nitrogen spike in the soil, which acidifies it. This in turn causes the worms to attempt to escape, or eventually die.

Putting it all together

1. Collect your supplies from the list. Start with only around 1 cup of food, add more as needed.

2. Prepare the bin by washing with warm soapy water, making sure to rinse well.



3. Carefully puncture air holes into the lid. A box cutter or sharp scissors are good tools to use. Affix mesh onto larger holes as desired. Super glue is an excellent adhesive to use for the screening.

4. Add the damp bedding to the bin, making sure to distribute it well.

5. Mix in the bio-substrate until the bedding is mostly covered.

6. Add around a cup of food to the bin, covering with the bedding to prevent any pest insects from being attracted to the bin.

7. Add worms! They'll burrow down, no need to cover them up.

To feed worms to your axolotl, simply dig out a worm with your desired tool, rinse the dirt off in water without soap, and prepare the worm according to the axolotl's preference. Some axolotls prefer worms that have been blanched - this is common with red wigglers feedings, as the worms produce a bitter slime coat when stressed.

Extra tips:

- Any of the worm varieties listed in the beginning of this article are safe to use. 1lb equals approximately 1,000 red wigglers or 400 nightcrawlers

- Stir the soil weekly. This will prevent dangerous anaerobic bacteria from building up at the bottom of the bin (this will also prevent foul odors).

- Unwanted pests can be prevented by burying worm feed beneath bedding and leaving a sheet of cardboard on top of the soil. Only add more food once the previous food is gone or the bedding becomes dry.

- Keep your bin between 60°F and 80°F, in a cool and dry place. Under the aquarium stand is usually a great location, if a garage is unavailable.

- Although all earthworms have a positive calcium phosphate ratio, gut-loading worms with leafy greens, eggshells (with membrane removed), and calcium powders is a safe way to improve the nutritional value of earthworms and prevent calcium deficiency in your axolotl.

- Freeze your grocery scraps so you do not have to waste or overfeed your worms - just toss a block of frozen scraps right in! No need to thaw.

- Paper or cardboard shredders make bedding production a lot easier.

Table 1. Data on the nutritional content of numerous species of earthworms.

	Protein (dry)	Fat (dry)	Calcium (dry)	Calories per Gram	Moisture	Ash	Fiber
Lumbricus terrestris	56.1% - 60.7%	4.4%	1.52%	4	81.1	11.4 - 28.7	N/A
Aporrectodea caliginosa / Allolobophora chlorotica	62.2%	1.77%	1.72%	N/A	78.3	35.2	N/A
Eisenia fetida (Red Wiggler)	54.6% - 70.42%	1.89%	1.72%	2.99	83.3	10.8	0.7
Perionyx excavatus	46.57% - 60.25%	8.03% - 9.18%	N/A	N/A	N/A	5.14	N/A
Eudrilus Eugeniae	56.4%	7.9%	N/A	N/A	85.3	13.1	5.9

Common Names For Worm Species and Their Identification

Lumbricus terrestris:

Nightcrawler, Canadian Crawlers, tiger worms, bait worms, fishing worms

Identification: 10-25 cm in length, reddish cream in color, 32-35 segments before their clitellum.

Photo credit: Thibaud Decaens

Aporrectodea caliginosa / *Allolobophora chlorotica:*

Gray worm, British worm, field worm

Identification: 4-10 cm in length, pale grayish-pink in color, ~25 segments before their clitellum.

Photo credit: Ross Gray

Eisenia hortensis:

European Nightcrawler, Dendrobaena veneta, Dendrobaena hortensis, Dendra

Identification: 12-20 cm in length, brown-red in color, segments before their clitellum.

Photo credit: Devin Gustus

Eisenia fetida:

Red Wiggler, compost worm, banded worm, manure worm, trout worm, brandling worms.

Identification: 5-7 cm in length, deep rust-red in color, ~25 segments before their clitellum.

Photo credit: BiasLabs Ltd

Eudrilus Eugeniae:

African Nightcrawler

Identification: 20-30 cm in length, grayish-purple color, ~13 segments before clitellum.

Photo credit: Devin Gustas

Perionyx Excavatus:

Compost worm, red wiggler 'variety pack', blues, Indian Blues
Identification: 6-8 cm in length, bluish red color, 12 segments before clitellum.

Photo credit: Scientific Report

Other great resources!

Peach Creek Nursery: Worms sold in bulk
https://www.peachcreeknursery.com/?page_id=91

O'Connor, Carolyn. 2012: Building A Worm Bin.
https://www.sierra-worm-compost.com/building-a-worm-bin.html

Citations that will eventually be formatted

https://www.researchgate.net/publication/262637363_Nutritional_potentiality_of_earthworm_Perionyx_excavatus_for_substituting_fishmeal_used_in_local_feed_company_in_Bangladesh Perionyx excavagus nutritional value

https://midwestworms.com/
Earthworm identification, scientific names

https://www.researchgate.net/publication/272795217_Impact_of_Preparation_Process_on_the_Protein_Structure_and_on_the_Volatile_Compounds_in_Eisenia_foetida_Protein_Powders

Eisenia Fetida protein content

http://bamboozoo.weebly.com/the-feeders--bugs.html
Earthworm nutritional value

Handbook on Ingredients for Aquaculture Feeds
Author(s): Joachim W Hertrampf; Felicitas Piedad-Pascual
Publisher: Kluwer Academic Publishers, Year: 2000

https://www.earthwormsoc.org.uk/earthworm-ecology
Earthworm identification

https://www.sierra-worm-compost.com/building-a-worm-bin.html
Building a worm bin

https://www.sierra-worm-compost.com/worm-bin-problems.html
Worm bin troubleshooting

https://link.springer.com/article/10.1007/s10499-021-00737-y
https://www.deepdyve.com/lp/springer-journals/earthworm-meal-perionyx-excavatus-as-an-alternative-protein-source-to-Js97XENKoe
Earthworm meal (Perionyx excavatus) as an alternative protein source to fish meal in feed for juvenile butter catfish (Ompok pabda)

https://www.lllreptile.com/articles/134-feeding-insectivorous-reptiles/
Reptile/Amphibian calcium phosphate ratio

https://www.cabidigitallibrary.org/doi/10.1079/cabicompendium.109385
Lumbricus terrestris

https://www.sciencelearn.org.nz/images/3628-grey-worm
Aporrectodea caliginosa

https://dengarden.com/gardening/Identifying-the-European-Nightcrawler-Composting-Worm
European Nightcrawlers

http://www.wormfarmfacts.com/African-Night-Crawler.html#:~:text=African%20Night%20Crawler%20are%20a,is%20compared%20to%20the%20redworm.
African Nightcrawler

https://thebluewormbin.com/worm-identification-african-nightcrawlers/
African Nightcrawler

https://www.nature.com/articles/s41598-020-77719-2/figures/1
Compost worm identification

https://www.biaslabs.co.uk/species/eisenia-fetida/
Blueworm identification