LESSON 6: ADDING WORMS

TEACHER GUIDE

LESSON OBJECTIVE

To understand the important role of worms in an aquaponics system.

LESSON MATERIALS

- Paper
- and crayons or colored pencils

LECTURE WITH BACKGROUND INFORMATION

Red worm is a generic term commonly used to describe a group of worms that characteristically live in the upper litter layer of the soil horizon.

Their "job" is to consume the dead and decaying matter converting it to castings. Redworms cannot survive in a soil environment. That is the realm of the earthworm .

Many common names of different types of redworms are used interchangeably (examples are red wiggler, brandling worm, tiger worm and manure worm). This is why most vermiculturists will use the scientific names of their redworms.

Different species of redworms actually have different tolerances to temperature, ph and feedstock variations. Some have a wandering habit and some do not. All this makes a difference as to whether a redworm will work well in a bin situation, and in differing regions.

The *Eisenia fetida* (commonly also called a red wiggler, but not all worms called red wigglers are actually *Eisenia fetida*) is the most versatile redworm of those commonly used in vermicomposting., It has the fastest reproduction rate, and will consume half its body weight on matter a day. It can tolerate wide temperature ranges.

OTHER RED WORM FACTS

- Red worms can live in a wide range of temperatures. They're happiest from 55-70 degrees, but can handle 45-80 degrees.
- Red worms are hermaphrodites—they have both male and female sexual organs—and reproduce quickly in confinement. Their population may double or triple in 1 year.

NOTE: When adding worms to your aquaponics system, the rule of thumb is one handful of worms to each growbed.

ASSESSMENT ANSWER KEY

1. **b.** Red Wiggler

2. Red worms eat the fish waste and decaying plant roots, transforming them into food for the plants, which also helps clean the water

STUDENT GUIDE – WHY DO WE ADD WORMS?

VOCABULARY

Worm castings – worm manure; it looks like fine ground coffee but has no odor.

Worm (Vermicompost) tea – when worm castings are steeped in water to create a more concentrated fertilizer

LECTURE AND DISCUSSION

When we studied the nitrogen cycle, we talked about the aquaponics system having 3 parts to its filter: bacteria, plants and worms.

Today we will talk about worms.

ASK: There are many different types of worms, how many can you name?

[Earthworm, tapeworm, flatworm, roundworm, bristleworm,....]

Fun Fact: Some worms are so small they can only be seen with a microscope, and some are extremely big, like the African giant earthworm that can be as much as 180 ft long.

However, in an aquaponics system, there is only one type of worm that interests us. That is the red wiggler worm (or "red" worm).

The red worm is not the same as an earthworm. Here is why:

Earthworms prefer to live in soil near plant roots.

Red worms, on the other hand, live near the surface of soil in the "litter" layer where you find rotting leaves and decaying manure. Red Worms cannot survive in deep soil.

Since there is no soil in aquaponic grow beds, earthworms would be very unhappy there. However there is plenty of fish waste and decaying plant material, so we use red worms.

FUN FACT: Redworms are being used in 3rd world countries to combat the diseases linked with open sewers, the drains that carry human waste. The redworms actually eat and kill pathogens, bacteria and viruses that cause disease, living in these open sewers.

In aquaponic systems, red worms eat the solid fish waste (fish poop) and dead roots, transforming them into a perfect fertilizer for plants, called worm castings. Worm castings look like fine coffee grounds and have no noticeable odor.

Worm casting and vermicompost are two words often used interchangeably, but vermicompost is a little different. It contains worm castings, decomposing waste, and worms of all ages.

Worm castings in the home garden often contain 5 to 11 times more nitrogen, phosphorous and potassium (nutrients plants need) than surrounding soil. Secretions in the worms intestines make nutrients more concentrated and available for plant roots to take up.

FUN FACT: When worm castings are steeped in hot water they become an even stronger fertilizer known as vermicompost tea or worm tea. This "tea" not only helps keep plants healthy by providing plenty of nutrients, when sprayed on the leaves it can also help control bugs and plant funguses.

Red worms eat half their weight each day. They reproduce quickly too. In good conditions, they can double or triple their population in one year.

ASK: If aquaponic grow beds are repeatedly filled with water throughout each day, becoming a deep puddle of water, and worms normally die in puddles of water on the sidewalk, why do red worms survive in an aquaponics system?

The reason is oxygen. Worms breathe through their skin and the grow bed is flooded with water that is full of oxygen. Also, worms like moisture and the grow bed has plenty of that, too.

ACTIVITY

ART & SCIENCE: Draw the composting cycle.

1. Fish produce waste and parts of plant roots decay.

2. Worms eat the fish waste and plant debris, which helps keep water clean and healthy for the fish.

3. Worms produce vermicompost (worm castings).

4. The vermicompost provides plenty of healthful nutrients for growing plants.

CONCLUSION

Review each students' drawing to ensure (s)he understands the composting cycle.

Name_____ Date_____

ASSESSMENT 6 – ADDING WORMS

1. What type of worm is used in a aquaponics?
   a. African giant earthworm
   b. Red Wiggler
   c. Tapeworm

2. In your own words, what is the benefit of adding worms to an aquaponic grow bed?