API® Lesson 10 | White & Grindal Worms Hatchery & Maintenance for Feeding Fish

This lesson plan provides insight about live foods and instructions to learn the procedure to create and maintain White Worms or Grindal Worms for feeding fish. Live foods provide an activity for everyone to see the excitement when fish are presented with live food that has movement.

For Instructor/Teacher/Parent

Feeding fish a complete and balanced commercial diet, whether it be flakes or pellets, is essential to meet all the nutritional requirements ornamental fish need to survive and breed. Even if growing live foods does not provide a complete and balanced diet, it does have many benefits for the fish and the student. Growing live foods is fun and educational. Providing live foods provides another way for students to interact with their fish. Prior to beginning this exercise having a discussion on the benefits of offering a complete and balanced diets of commercially prepared foods is important. While White Worms and Grindal Worms are eagerly taken by fish although they normally do not provide the complete and balanced diet, compared to a commercially manufactured diet, to maintain the health of the fish for long and successful life. Feeding live white or Grindal worms should only be supplemental to proper feeding to maintain the long-term health of fish.

Learning Objectives

After completing the activities outlined in this lesson plan, students/family members should be able to:

- Build their own worm hatchery
- Understand the benefit and limitation of White Worms and Grindal Worms
- Define the difference between White Worms and Grindal Worms
- Define what a Complete and Balance diet entails.
- How to remove worms from the hatchery without bringing dirt into the aquarium
- How to feed fish with White Worms and Grindal Worms
- The importance of sanitary handling of the worm hatchery to avoid unwanted pests

Length

This activity will take about 1 hour to build the worm hatchery and several weeks for the worm colony to grow for a routine harvest.

Materials to complete activity

- Worm Culture (Grindal or White Worms)
- API BOTTOM FEEDER PELLETS
- Growing medium/substrate (Coco Fiber, or clean potting soil, or plastic pad)
- Dechlorinated water
- Container and lid (plastic food storage container with tight fitting lid)
- Needle Point plastic mesh or craft mesh

- Filter floss or cotton swab
- Small plastic cup (to hold the worms after harvest)
- Pipette or eyedropper
- Spray bottle

Key Terms

Review key terms (printable sheet included at the end of the lesson) with students/family members.

1) Grindal Worms
2) White Worms
3) Genius Species
4) Complete and Balanced Diet

Before You Start

Many newly hatched fish are often enticed to begin eating with live foods and then as they grow the fish can be switched over to a complete and balanced diet. Live foods can also be a trigger for mature fish to begin their breeding cycle.

Growing and feeding worms can be fun and are easy to grow with just a little care. Different types of worms may be best suited for one type of fish and not the appropriate size for another, we need to consider the size of the fish we are feeding. It is important to make sure the worms are clean prior to feeding as we do not add any unwanted dirt or organics into the aquarium.

Fish as they grow need to have the correct balance of protein, fat, carbohydrates along with vitamins and minerals. While fish will aggressively eat white worms and Grindal worms when offered, the worms by themselves seldom provide all the nutrients that fish need. One of the best ways to ensure fish are getting a complete and balanced diet is to utilize aquarium foods that have been formulated and manufacture to meet these needs such as API Flake Foods or Pellet Foods as part of their normal diet. API Flake Food is easy to grind between your fingers to the minute size for newly hatched fish. Feeding worms to newly hatched fish or small fish along with API Flake Food will ensure your fish obtain a complete and balanced diet.

Proper preparation of the water we are using to moisten the dirt in the worm hatchery is essential. If using municipal tap water, you must be sure to use a water conditioner, like API Stress Coat, to remove disinfectants such as chlorine and chloramines and make your tap water safe before using in your worm cultures. Disinfectant such as chlorine and chloramines will kill the worm culture.

Once we use our worm culture to produce/hatch multiple batches of worms for an extended period of time, it is important to clean our equipment and start new cultures. In all food preparation, keeping things clean will help to eliminate concerns for our fish. The conditions that we culture our worms are also ideal conditions for a flies or unwanted insects to infest, but some simple steps will ensure we keep our worm culture clean and pest free. All equipment that we use should be cleaned and disinfected between hatches as well as any new materials we utilize.

The time for hatching depends on the temperature, and age and conditions of the culture and type of worms being kept.

Grindal Worms and White Worms are generic names given to small white non-parasitic worms that live around the world in soil. Both are cultured the same way, apart from temperature preference. White worms, typically Enchytraeus albidus prefer much cooler temperatures than Grindal worms, Enchytraeus buchholzi. White worms require cooler temperatures to successfully breed and will slow productions and even die off at normal room temperatures. Typically, white worms do best when kept in cooler temperatures between 55° F to 65° F (13° to 18°C). White worms are also larger, typically ¾" to 1 ¼"

(19cm to32cm) in adult size than Grindal Worms (3/8" to ½" (9.5cm to 13cm)). Grindal worms reproduce best at higher temperatures of 70 to 75°F (21° to 24°C) and will even continue to reproduce in the higher 80° F ranges (27°C).

Instructions for Learning Activity

Making a Worm Hatchery

1. Obtain a plastic container with a tight-fitting lid. The tight-fitting lid is essential to keep the worms in and any unwanted pest out. Pest such as flies, or gnats can make a home in the worm culture and will bred in the moist environment. The size of the container can be any size such as a small shoebox or smaller sized food container, etc. It is best to have a low-profile container with ample surface area rather than a deeper container. The bigger the container the more worms you can grow and harvest at one time. It is advised to have multiple containers going at any one time in the event one worm culture crashes you will have back up cultures to continue.
2. Now make a series of holes in the lid about ¼" to ½" (0.64 to 1.25 cm) in diameter. The holes will be needed to allow air exchange for ventilation flow in the plastic container. You can easily drill holes into the lid, use a hole punch or even cut small openings into the lid.
3. You will need to use a fibrous material such as filter floss, cotton balls, or very tight mesh screen to cover the holes that were cut. The fibrous material selected should allow air to flow through without allowing pest to enter.

Worm Growing Medium

1. White worms or Grindal worms can grow in any moist material such as potting soil, coconut fiber, or completely absent of soil using materials such as polyester fiber or scrubbing pads. I do recommend using a soil material either potting soil or coconut fiber.
2. Place about 1" (2.5cm) of growing medium into your plastic container and level it out.
3. Wet your growing medium it needs to be moist to wet by not soupy. If you push on the growing medium it should feel wet to the touch. Remember to always use dechlorinated water whenever adding water or misting the worm culture. If using municipal tap water or any chlorinated water use an aquarium water conditioner like API Stress Coat to make your water is safe for your worm culture. Overwatering can be problem just as much as letting the culture completely dry out. The worms are very forgiving and have a wide range of moisture they will tolerate, live and reproduce in.
4. Obtain a worm culture from a fellow hobbyist or aquarium society member, local pet shop if available or online. Simply place the worm culture into your plastic box with a tight-fitting lid with holes. The worms will crawl into the growing medium and may disappear, this is normal. As your culture grows and when you feed the worms will become more and more evident.

Feeding your Worm Culture

1. Frequency of feeding your worm culture will depend on the size and population of worms. White worms are more prolific and larger than Grindal worms.
2. Now that you have just started your culture a small amount of food can be placed directly on top of the growing medium. Take a spray bottle and mist the food to make is soft and moist.
3. Worms can eat a variety of food types such as bread or grains, cooked pasta, fish foods, cat or dog chow, cereals. Remember they need to be fed but feeding them better nutrition means they will provide better nutrition when you feed your fish. For this reason, it is recommended to feed your worm culture with an aquarium food either pellets or flakes that is complete and balanced. Food should be moist and soft to make it easier for your worms to break it down and consume it. The amount of food provided is best when consumed within a 24-hour period, so do not feed too much. Do not provide additional food until all the of the previous feeding has been consumed. When you see the food has been consumed it is time to add more food.
4. Depending on the size of the starter culture you should be able to harvest the white worms or Grindal worms within three to four weeks. Worms reproduce readily given the correct

conditions. Once you have your culture growing you can then easily start new cultures and share them with other aquarium hobbyists.

Harvesting Worms for Feeding

1. To separate the worms from the growing medium is easily done using a needle point plastic mesh or craft mesh. First cut a small piece of needle point plastic mesh about 1 ½" x 2 ½" (3.8 cm x 6.35 cm). Place the cut plastic mesh directly on top of the growing medium.
2. Now place your food, flakes or pellets on top of the plastic mesh and mist with water to moisten. Be sure to close the lid after adding your food.
3. In about 24 hours, when the food is consumed open the lid and you will see the worms on top of the plastic mesh. Pick up the plastic mesh that the worms have gathered on and place into a cup of dechlorinated water. The worms will immediately drop from the plastic mesh and sink to the bottom of the cup. The benefit of the plastic mesh allows you to collect the worms without collecting any of the growing medium, keeping your aquarium cleaner.
4. Now with a small pipet suck up the worms and feed your fish.
5. Simply place the plastic mesh back into your work culture and place new food on top and you can harvest worms again the next day.
6. Note: As your worms continue to grow you will see them crawl up the sides of the container and even onto the lid. You can also wipe these worms to feed your fish as well.

Starting a New Culture

1. When you need a new culture simply follow the procedures above. To obtain a starter culture of worms just take the pipet and squirt a few worms into your new setup and you have started a new culture. Wait a few weeks for the worms to multiple and you will have a new worm culture to work with.
    a. Note: It is always advised to have multiple worm cultures going at any given time. If a culture crashes or becomes infested with flies, gnats or other unwanted pests you will have clean healthy cultures to work with.

Questions

- Pass out the Questions worksheet (printable sheet included at the end of the lesson) to each student/family member.
- Review the answers to the questions during the discussion section of the lesson.

Discussion

1. After finishing the items above including the questions and key terms, engage students/family members in a brief discussion about the lesson:
    - Why do we not want to feed white worm all the time as fish were so eager to eat them?
    - What kinds of fish or age of fish are best suited for feeding white worms to?
    - How does temperature affect hatch rate of worms?
    - Why do we separate the white worms from the growing medium before feeding?

Quiz

- Once you've finished the discussion, pass out the Quiz worksheet (printable sheet included at the end of the lesson) to each student/family member.
- Have them complete the quiz and then review the answers/have an open discussion about the answers with them. Answers are below.

1) Why do we not want to feed solely worm cultures all the time as fish were so eager to eat them?
    a. Providing fish with a complete and balanced diet is essential for the growth and health. White worms or Grindal worms provides nutrition but is often lacking a balance of essential ammino acids, vitamins, and minerals that fish need to thrive. Providing fish a commercial prepared food that guarantee a complete and balanced diet is very important.
2. What kinds of fish or age of fish are best suited for feeding white worms or Grindal worms?
    a. Newly hatched fish with very small mouths or to entice them to begin eating. If we are working with small fry (baby fish) than Grindal worms may be the preferred choice as they are smaller than white worms.
    b. Smaller fish that need a bit of stimuli from a moving food.
    c. Larger fish that need encouragement for breeding will often be stimulated by feeding a live food such as worms.
    d. Fish that have been slightly lethargic or sickly and not eating as aggressive often encourage to eat when offered live foods. As they begin eating mix the feeding of worms with a prepared complete and balanced food to assure proper nutrition.
3. How does temperature affect worm selection?
    a. Temperature range affects the breeding of worm types. White worms prefer lower temperatures for reproduction. Grindal worms do better at normal room temperatures.
4. How can we separate the worms from the growing medium before feeding?
    a. Placing a plastic mesh on top of the medium and then putting the food for the worms on top of the mesh allows the worms to collect on the mesh with the growing medium. Then dipping the mesh into a glass of water lets the worm fall from the mesh freely into the water. Simply using a pipette to suck up without the growing medium for easy feeding to our fish.
5. Why is it best to separate growing medium from the worms before feeding?
    a. The growing mediums can add unwanted dirt and debris to the aquarium. Keeping the aquarium clean from growing medium reduce overall maintenance and buildup from continuous feedings.

APPENDIX

See items below to be passed out to the family members or students for the lesson.

KEY TERMS

GRINDAL WORMS

Enchytraeus buchholzi, a white worm typically 3/8" to ½" (9.5cm to 13cm)

WHITE WORMS

Enchytraeus albidus, a white worm typically ¾" to 1 ¼" (19cm to32cm)

GENIUS SPECIES

the nomenclature given to an organism based on their specific characteristics for taxonomic category ranking

COMPLETE AND BALANCED DIET

provides all necessary proteins, fats, carbohydrate, vitamins and minerals to meet all nutritional needs. Providing a complete and balanced diet helps fish and other animals maintain good health and reduce their risk of disease.

LEARNING ACTIVITY SUPPORT

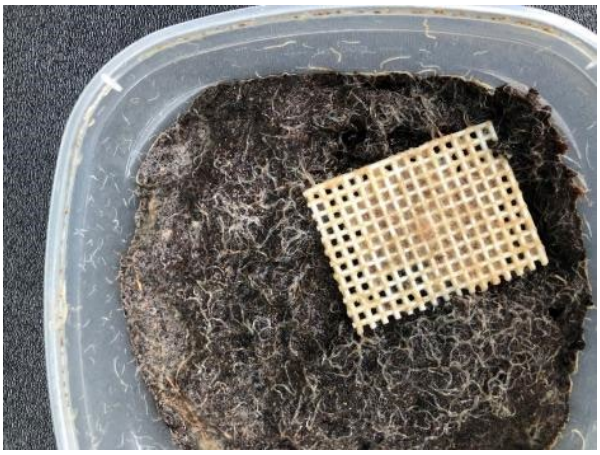
1. Plastic container and lid with holes, and poly fiber

2. Medium with worm culture and aquarium pellets

3. Needle Point Plastic Mesh

4. Fiber mesh on top of growing medium with food pellets being consumed by the worms.

5. Plastic mesh with worms and all food consumed.



6. Plastic Mesh lifted from culture with worms

7. Plastic Mesh dipped into dechlorinated water with worms released

8. Worms in pipette and ready to be fed to fish or start for a new culture

DISCUSSION QUESTIONS

1. Why do we not want to feed white worm all the time as fish were so eager to eat them?

2. What kinds of fish or age of fish are best suited for feeding white worms to?

3. How does temperature affect hatch rate of worms?

4. Why do we separate the white worms from the growing medium before feeding?

QUIZ

1. Why do we not want to feed solely worm cultures all the time as fish were so eager to eat them?

2. What kinds of fish or age of fish are best suited for feeding white worms or Grindal worms?

3. How does temperature affect worm selection?

4. How can we separate the worms from the growing medium before feeding?

5. Why is it best to separate growing medium from the worms before feeding?

CONTACT US & ADDITIONAL RESOURCES

For more information regarding this lesson plan, API® brand, or any general fishkeeping questions and/or comments, feel free to contact us below.

- Website: www.apifishcare.com
- Telephone Number: 1-800-847-0659