

PRODUCTION OF DRIED NATURAL FEED (*Daphnia magna*) WITH COMBINATION OF CAROPHYLL FOR FRESHWATER ORNAMENTAL FISH

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Abstract

Feed is an important factor in fish rearing. Basically, the feed given must be easily digested and have high nutrition. In fish farming, especially ornamental fish, natural feed is one of the supporting factors in the success of ornamental fish farming. *Daphnia magna* is one of the commonly used natural feeds for freshwater fish. Additives in the form of carophyll have the main composition of synthetic coloring materials, which are dominated by free astaxanthin (free astaxanthin) which can improve the quality of color in freshwater ornamental fish. The main parameters observed were natural food culture techniques, harvest and post-harvest, *Daphnia* production process and the effectiveness of *Daphnia* on improving the color quality of freshwater ornamental fish. Based on observations made every week for approximately 2 months, the color brightness level of Albino Full Red guppies is getting brighter.

Keyword: natural food, *Daphnia magna*, carophyll, freshwater ornamental fish.

Introduction

Natural feed is one of the supporting factors to support the success of fish farming, especially ornamental fish in order to obtain maximum results. Natural food can improve the quality and quantity of seeds and ensure the sustainability of the resulting seed production. One of the most important natural foods in aquatic ecosystems is phytoplankton, which contributes the largest contribution to the total primary product of a water body (Lestari *et al.*, 2019). The increase in ornamental fish farming in various regions has increased the need for feed and made the price of feed also increase.

The high demand for ornamental fish with beautiful colors makes ornamental fish farmers experience obstacles in cultivating them because it takes a long time to bring out the color in the fish. One of the natural feeds that is often used in freshwater fish hatchery activities is *Daphnia* sp. for this reason, innovation emerged by utilizing a combination of *Daphnia* natural feed as the main raw material and carophyll material as an additional raw material to meet the needs of ornamental fish feed. *Daphnia magna* is one of the natural foods commonly used for freshwater fish larvae (Maulidiyanti *et al.* 2015). *Daphnia* nutrient content varies with age and depends on the food eaten. *Daphnia* food is protozoa, bacteria, periphyton and organic particles. Therefore, *Daphnia* can be

used as a carrier medium for nutritional enhancers, immunostulants and probiotics (Wahyuni *et al.*, 2017). According to Jadmiko (2014), *Daphnia* sp. as a natural food source has several advantages, namely high nutritional content, small size so that it fits the size of the larval mouth, slow movement, so it is easily captured by fish larvae, and the level of pollution to the larval rearing medium is lower than the use of artificial feed.

The nutritional value contained in *Daphnia* wet weight is 4% protein, 0.54% fat, and 0.67% carbohydrates (Lithner, 2009). Additives in the form of carophyll have the main composition of synthetic coloring materials, which are dominated by free astaxanthin (free astaxanthin) which can improve the quality of color in ornamental fish. This is an opportunity that can be utilized as a business in the field of fisheries and the background of this research by producing dry natural feed (*Daphnia magna*) with a combination of carophyll for freshwater ornamental fish feed.

Materials and Methods

This research was conducted at the *Daphnia magna* culture field in Karanggagung Village, Palang District, Tuban Regency, East Java Province 2021. This research uses experimental methods and descriptive analysis. Furthermore, the *Daphnia magna*

culture technique is carried out which includes: preparation of culture media, stocking *Daphnia* seeds and monitoring water quality. starting from construction improvements, aeration and wheel location settings, preparation of media water, harvesting and post-harvest activities and Damoph production process activities which include preparation of *Daphnia magna* culture containers, stocking *Daphnia magna* seeds, maintaining *Daphnia magna*, harvesting *Daphnia magna*, drying *Daphnia magna* and mixing *Daphnia* and Carophyll.

Results and Discussion

Daphnia magna culture technique

Preparation culture of media

Daphnia magna culture media in the form of a rectangular tarpaulin pool with a volume of 3 m³ as many as 4 pools. The stages of preparation of *Daphnia magna* culture media are as follows.

Washing of culture containers

Tub washing is done before stocking *Daphnia magna* seeds. Tub washing is done by spraying running water into the pool and rubbing the walls of the tarpaulin pool until clean to remove odors or harmful substances that can affect *Daphnia magna* culture. 3.1.1.2

Water replenishment

Water filling is done directly by flowing fresh water from the well using a long hose into the *Daphnia magna* culture pond. *Daphnia magna* culture does not require special treatment so that it can use freshwater media and still pay attention to the quality of the media water so that it is stable so as not to affect the *Daphnia magna* culture process.

Fertilization

Fertilization is done by inserting sacks containing quail manure (kohe) after filling 1 kg/m² of water. This fertilizer contains organic matter from the decomposition process that will grow more bacteria. Bacteria and organic matter is food for *Daphnia magna*. According to Ilman *et al.* (2019), *Daphnia magna* is a Crustacean animal or commonly called a crustacean shrimp that is used as a source of food for fish.

The culture of *Daphnia magna* as live food has been done through various techniques with the addition of different nutrients or feed ingredients, for example using chicken manure and coconut meal and fermentation of bran

using baker's yeast (Izzah, 2014).

Stocking of Daphnia magna seeds

Stocking of *Daphnia magna* seeds is done after the preparation of the culture medium is complete. Seeds are obtained from *Daphnia magna* farmers with transparent plastic media provided with oxygen. Before stocking the seeds, acclimatization needs to be done, namely the adjustment of seeds to the culture container environment. Adjustment of seeds to the environment by immersing or placing the seed holder above the surface of the water in the culture container while adding little by little water to the media, then after a few minutes the seeds can be stocked on the culture container. According to Noerdjito (2004), said that *Daphnia magna* can be stocked on water media with a density of 20 tails / liter. However, in practice, the seeds were spread as much as 15 gr / m³ to produce the appropriate target at harvest time, which is 2 kg / pond.

Water Quality Monitoring

Water addition is carried out if the water in the culture container decreases due to the evaporation process, then water is added until the water level returns to its normal position. In addition, changing the water medium in this observation can also reduce the impact of high ammonia. Water quality can affect the growth and survival of *Daphnia magna*. According to Pamungkas (2017) that the supporting factors in the growth of *Daphnia sp.* population in addition to being influenced by nutrient content is also influenced by water quality. Water changes are made during total harvest when 14 days from the first stocking period. Water changes by opening the drain until the water is low.

Harvest and Postharvest

Harvest

Harvesting *Daphnia sp.* (Figure 1) can be done at the peak of its growth, namely on day 14. Harvesting *Daphnia sp.* can be done at the peak of the population after inoculation of *Daphnia sp.* Mokoginto (2003), the growth of *Daphnia sp.* biomass is calculated based on the difference between the final weight with the initial weight. The biomass is calculated based on the total final weight with the initial weight of *Daphnia sp.* The biomass is calculated based on the total weight of *Daphnia sp.* previously cultured using fertilizer from organic materials

of chicken manure, rice bran, and coconut meal through fermentation of probiotic bacteria and harvested after the 6th day at the peak of the population. Harvesting can be done by harvesting all *Daphnia* sp. in the container / tub. Harvesting *Daphnia magna* in tarpaulin ponds can be done by netting or menseser the whole *Daphnia magna*.



Figure 1. Harvesting *Daphnia magna*
(Personal documentation, 2021)

Post-harvest

After the harvest is complete, it is continued with post-harvest activities, namely the product production stage. Before going to the product production stage, water is added to the cultivation container after harvest with the aim of continuing the *Daphnia magna* culture in the next cycle. Water changes are made during total harvest when 14 days from the first stocking period. Water changes by opening the drain until the water is low.

Damoph Production Process

Damoph production is a business activity of culturing *Daphnia magna* until the harvest period and then mixing it with additional ingredients and then selling it. The time required for Damoph production is 2-3 weeks (14 days of *daphnia* culture and 7 days for Damoph production). *Daphnia magna* culture time is 7-14 days.

Preparation of Daphnia magna culture container

The culture container used was a tarpaulin pond with a volume of 3 m³. Before the tarpaulin is used in the pool, the tarpaulin

is washed thoroughly to remove odors or harmful substances that can affect the culture of *Daphnia magna*. Next, the pool is filled with water. After filling the water, the next step is fertilization. This fertilization is done using quail manure (kohe). Fertilization is done by inserting a sack containing quail manure into the *Daphnia magna* culture container. This fertilization is done with the aim to grow plankton.

Stocking of Daphnia magna seeds

The seeds that are stocked will determine the final result. The seeds are obtained from *Daphnia magna* farmers with transparent plastic media that is given oxygen. Before stocking the seeds, acclimatization needs to be done. Adjustment of seeds to the environment by immersing or placing the seed holder above the surface of the water in the culture container while adding little by little water to the media, then after a few minutes the seeds can be stocked in the culture container. Seed stocking is about 15 gr/m³

Daphnia magna maintenance

Daphnia magna maintenance activities include re-fertilization, and water quality monitoring.

a. Re-fertilization

Maintenance of *Daphnia magna* includes refertilization that is routinely done every 3 days. Re-fertilization is done by adding 18 quail droppings. The goal is the same that is to grow plankton in the culture container as food for *Daphnia magna*.

b. Water quality monitoring

Water quality monitoring is done simply by physically looking at the culture media water. The addition of water to normal limits if there is a reduction in water due to the evaporation process. Water changes are made during the total harvest when 14 days from the first stocking period. Change the water by opening the discharge channel until there is little water left.

Harvesting Daphnia magna

Harvesting *Daphnia magna* in tarpaulin ponds can be done by netting or catching the whole *Daphnia magna*.

Drying Daphnia magna

Drying *Daphnia magna* is a process after total harvesting on the last day of the rearing period. Drying is done naturally with normal

room temperature and fan / blower assistance. Duration of drying approximately one day or *Daphnia magna* in a completely dry state.













Mixing with Carophyll

The blending process is the process of combining natural raw materials (*Daphnia magna*) with additional ingredients, in this case carophyll. Carophyll is a synthetic additive produced from antaxanthin and canthaxanthin pigments of salmon, sea fish, and also poultry feathers. Carophyll serves to affect pigmentation in ornamental fish to make it brighter and more attractive. Carophyll is available in several types of Amazing Pink, Amazing Yellow and Amazing Red such as Carophyll Pink, Carophyll Yellow, and Carophyll Red. After mixing is done, the next step is drying again until completely dry in order to avoid the growth of parasite fungi in the product and so as not to damage the quality of the Damoph product.

Effectiveness of Damoph on improving color quality

Based on observations made every week for approximately 2 months, the level of color brightness of Albino Full Red guppies can be seen in Table 1.

Tabel 1. Perubahan warna ikan setelah pemberian Damoph

	Damoph	<i>Daphnia magna</i> kering
1.		
2.		
3.		
4.		
5.		
6.		

The results of observations made for approximately 2 months show that Damoph products are effective in helping to brighten the color of fish faster than the use of similar products without containing the additional ingredients in Damoph products (Carophyll).

Conclusion

Based on the research conducted in Karanggagung Village, Palang Subdistrict, Tuban Regency, East Java, it can be concluded that:

1. The culture ponds consisted of 4 ponds with a volume of 3 m³ with a household-scale outdoor system.
2. The number of *Daphnia magna* seeds stocked in a tarpaulin pond is about 15gr/m³.
3. Monitoring water quality is done every day 2 times a day.
4. Harvesting *Daphnia magna* is done on day 14 with a maintenance period or culture period for 7-14 days.
5. *Daphnia magna* produced will be processed into a dry feed product called *Damoph* 6. The production process consists of drying, mixing, and packaging after the harvest period is done.

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