

## The Effect of Urea and Chicken Manure on the Population Growth of *Moina* sp.

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### Abstract

This study aims to determine the effect of urea and chicken manure on the population growth rate of *Moina* sp. This study used an experimental method with three treatments with three replications. Treatment A (control), B (urea fertilizer) at a dose of 0.2 g/liter of water and C (chicken manure) at a dose of 0.2 g/liter of water. The container used is a plastic container measuring 20 x 20 x 20 cm. The volume of water used is 5 liters. The stocking density of *Moina* sp is 30 individuals/liter of water. The observed parameter is the population growth rate of *Moina* sp. The results showed that the use of chicken manure resulted in a population growth rate of *Moina* sp. of 0.11 which was achieved until the fifteenth day. While using urea and control fertilizers did not produce a population growth rate, during maintenance *Moina* sp experienced death. The results of the analysis of variance showed that each treatment had a very significant effect. Followed by a follow-up test using the Least Significant Difference (LSD) that Treatment C (chicken manure) was significantly different from Treatments A (control) and B (urea fertilizer) and for treatments A (control) and B (urea fertilizer) were not significantly different at 5% level.

**Keywords:** *Moina* sp; urea fertilizer; manure; population growth

### Introduction

The success of aquaculture business depends highly on the availability of seeds or larvae to be cultivated to market size or consumption size. The business depends on the development and use of natural food organisms as the main feed for the growth of fish larvae, especially in the critical phase where the egg yolk supply in the larva's body has been exhausted (Lumenta, 2000).

Natural feed is relatively small (150 – 1000 microns) in accordance with the mouth opening of larvae or seeds and moves less actively making it easier for larvae or seeds to prey on them. Due to its live nature, natural feed does not contaminate the larval rearing media (Sipayung et al., 2009).

Several types of natural feed are suitable for freshwater fish larvae, including Infusoria (*Paramecium* sp.), Rotifera (*Brachionus* sp.), Cladocera (*Moina* sp. and *Daphnia* sp.). These natural feeds have complete nutritional content and are easily digested in the intestines of the fish larvae. Its relatively small body size is in accordance with the width of the mouth opening of the fish larvae. Its active nature stimulates the larvae to feed on them (Darmanto et al., 2000).

*Moina* is a low-level crustacean from the phylum arthropoda. Like other natural feed, *Moina* sp. acts as protein, fat, carbohydrates, vitamins and minerals sources (Sipayung et al., 2009). The advantages of

*Moina* sp. from other natural feed that is easily obtained from nature to be cultured.

Natural feed cultures must use organic and/or inorganic fertilizers. Organic fertilizers such as chicken manure have between 20 – 25% dry matter, in which there are several important elements such as nitrogen, phosphorus and potassium (Patuti, 2005). Likewise with inorganic fertilizers such as urea fertilizer. This is in accordance with the statement of Lubis et al., (2013) that Urea fertilizer is a chemical fertilizer containing high levels of Nitrogen (N). Nitrogen is a nutrient that is needed by plants. Reinforced by the statement of Muhadi (1979) as a nitrogen source with a 46% nitrogen content, urea fertilizer is widely used in Indonesia.

Given the potential and the lack of information regarding the use of appropriate fertilizers, especially about chicken manure and urea, to optimize growth in the culture media of *Moina* sp., this research is to fill this gap.

### Research Methods

This research was conducted from June to July 2016 at the Balai Benih Ikan (BBI) in Gorontalo City. The tools used in this study consisted of a plastic container with a volume of 8 liters, a thermometer, litmus paper, a measuring cup, a dropper, an analytical scale (grams), a digital camera and

utensils. The materials used are fresh water, urea fertilizer, chicken manure fertilizer and *Moina* sp.

The variables observed in this study include the population growth rate and water quality which are described descriptively. The growth rate of *Moina* sp was calculated using the formula according to Fogg (1975).

This study uses an experimental method with an experimental design patterned Completely Randomized Design (CRD). To determine the effect of treatment on the population growth rate of *Moina* sp. One-way Analysis of Variance (ANOVA) test was performed, by performing the F test from data analysis of Completely Randomized Design.

## Results and Discussion

### Density

The density level of *Moina* sp with the application of manure, urea fertilizer and without fertilization which was stocked in 5 liters of fresh water with a stocking density of 450 individuals maintained for 15 days can be seen in Figure 1.

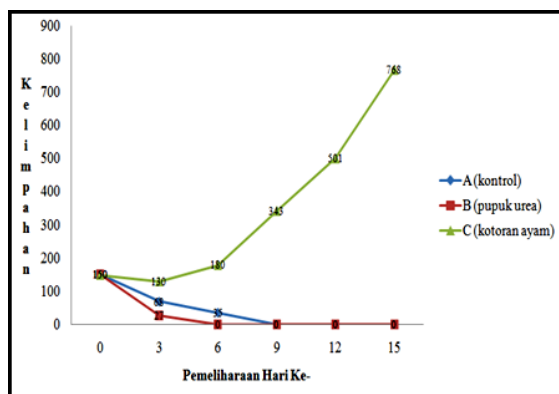


Figure 1. Density level of *Moina* sp during culture

Based on the results of the observation, treatment C showed that the density level after the 6th day was 343 individuals/5L. Treatment B showed a decrease in the number after the 3rd day, namely 68 individuals/5L until the 6th day and the next day they died. Meanwhile, treatment A also showed a decrease in number after the 9th day, namely 27 individuals/5L and the next day they died.

The density level for treatment C continued to increase from the 3rd day of maintenance through to the peak level when the rearing entered the 15th day of the culture period. When harvested, the density level of *Moina* sp for treatment C (chicken manure) was 768 individuals/5L or equivalent to 154 individuals/L of water.

### Growth rate

Based on the results of the calculation of the growth rate of *Moina* sp given different fertilizer media, the results are as follows:

Table 1. Growth rate of *Moina* sp.

Ulangan	Perlakuan		
	A (Kontrol)	B (Pupuk Urea)	C (Kotoran Ayam)
1	0,00	0,00	0,11
2	0,00	0,00	0,12
3	0,00	0,00	0,10
Rataan	0,00	0,00	0,11

Each treatment gives different results based on the live media used. For the treatment without fertilization (control) and with urea fertilizer did not show any growth rate. Based on observations, treatment without fertilization (control) and treatment with urea showed a decrease in the number of populations and finally all *Moina* died. Meanwhile, the treatment using manure (chicken manure) showed an increase in the population with a growth rate of 0.11 individual/liter/day.

This is due to an adequate supply of food obtained from the manure. It was clearly seen during maintenance that the water medium changed gradually to a brownish color when the manure has decomposed due to the activity of decomposing bacteria which triggers the growth of other organisms such as detritus, pathogens, fungi and the like suitable for *Moina* sp. as a food source for metabolic and reproductive processes.

Chrismadha and Ali (2007) in Andriyani et al (2014) state that the development of phytoplankton communities in pond water is generally triggered by an increase in water fertility due to the process of fertilization and artificial feeding. Kadarwan (1974) in Casmuji (002) stated that organic fertilizers such as the manure of chicken, cow, pig, goat, sheep, and horse can serve as a direct food source for *Moina* sp and other fish food organisms or be decomposed by bacteria into organic materials that stimulate the growth of phytoplankton in the form of Rhodophyceae or red algae. However, from the various types of manure, chicken manure is considered better than other manure.

Winarlin et al., (2010) conducted a study on the utilization of chicken manure waste for the production of natural feed (*Moina* sp). The results of this study indicate that the development of the abundance of plankton, both phytoplankton and zooplankton (*Moina* sp) from one day after stocking until the end of the study tends to increase. The use of manure/chicken

manure resulted in the growth of zooplankton (*Moinasp*) faster than the growth of phytoplankton.

*Moina* sp culture without fertilization did not show any growth rate in this study. It is suspected that the culture of *Moina* sp without fertilization has a relatively short life cycle without reproduction due to the lack of food supply for reproduction. Food obtained from water media without fertilization is more used for survival. *Moina* sp can only survive for 6 days.

Sumantadinata (1995) in Sipayung et al., (2009), newly hatched *Moina* sp will not be able to survive if there is a shortage of food in the container as its habitat, which causes the *Moina* sp will not eat.

Population changes are caused by two environmental factors. The first factor comes from the population itself, for example, lack of food and lack of space to live because the population is too dense. The second factor may be the effect of water temperature (Soeiatmadja in Sambode et al., 2013).

*Moina* sp culture using urea fertilizer did not show growth rate either. It is possible that the urea fertilizer used is not suitable for the fertilizer medium to grow and decompose. Fertilization using urea fertilizer is usually more used for cultivating natural feed in ponds. So that the hope for the growth of phytoplankton in the culture media was not fulfilled and consequently the cultivated *Moina* sp did not get a food supply. This is reinforced by the statement of Mudjiman (2004), water fleas or Cladocera such as *Daphnia* and *Moina* sp can be grown in ponds through fertilization using 2 ppm urea fertilizer or 2 mg/L water.

On the other hand, it is fundamentally known that to be able to fertilize waters, other elements are needed, namely soil or mud, not just water. So that the use of urea fertilizer in this study is not effective for culturing *Moina* sp without the soil element or growing media from the urea fertilizer.

Based on data analysis (Anova) which was carried out using the F test, it turned out that the result value of  $F_{count} = 448.55 > F_{table} 0.01 = 10.92$ . So it was decided to accept  $H_1$  and reject  $H_0$ . This means: the application of different fertilizers has a very significant effect on the density level of natural feed for *Moina* sp. To determine the extent of the effect of each treatment on the density of *Moina* sp, further tests were carried out using BNT (Least Significant Difference). The data from BNT showed that treatment C (chicken manure) was significantly different from treatment A (control) and treatment B (urea fertilizer) while treatments A and B were not significantly different at the 0.05 level.

According to Syahrial (2008) in Zamroni et al., (2011), the highest abundance of plankton is using

organic fertilizer (chicken manure) when compared to inorganic fertilizer (urea fertilizer). Huang et al., (2011) in Zamroni (2011), the most complete nutrient content is fertilizer derived from chicken manure when compared to pig manure and other livestock.

## Water Qualities

Results of water qualities measurements carried out during the study can be seen in Table 2.

**Table 2.** Water qualities during *Moina* culture

Perlakuan	Kualitas Air	Waktu Pengamatan Hari Ke-					
		0	3	6	9	12	15
A	Suhu (°C)	26	26	26	26		
	pH	7	7	7	7		
	DO (mg/l)	4,1	4,1	4,0	4,1		
B	Suhu (°C)	26	26				
	pH	6	6				
	DO (mg/l)	4,1	4,0				
C	Suhu (°C)	26	26	26	26	26	26
	pH	7	7	7	7	7	7
	DO (mg/l)	4,2	4,1	4,1	4,1	4,2	4,1

The water quality conditions, both temperature (°C) and pH, were still within the tolerance threshold for the survival *Moina* sp. This is in accordance with the opinion of Mudjiman (2004), the environment that supports the growth of water fleas has a temperature between 22-31°C and a pH between 6.6-7.4. Mudjiman (2008) added that *Moina* sp lives in good waters at temperatures ranging from 14-30°C, pH ranging from 6.5-9.0, DO in the range of 3-5mg/l, brightness 60-80cm. The types of food that are good for growth are bacteria and phytoplankton.

*Moina* sp will develop into adults for 5 days at an ambient temperature of 21-31°C and a pH of 6.6-7.4. In such environmental conditions *Moina* sp is able to survive for 30 days and once every 2 days can lay eggs. The number of eggs is about 33 grains. So, during its lifetime it can lay eggs as much as 15 times with the number of eggs released around 500 eggs (Saputra, 2008).

Temperature is an important environmental factor for all aquatic organisms. The tolerance limit of each organism to temperature is different, depending on the physiology of the organism. A good temperature range for *Moina* sp culture is 22-31°C (Mokoginta, 2003). Based on the results of research by Tontooyo (2013), the temperature range of 25.9 – 29.9°C and pH 6.89 – 7.49 is still within the tolerance threshold for the growth of *Moina* sp.

### Conclusion

Chicken manure have an effect on the population growth rate of *Moina* sp. with a yield of 0.11. Water qualities during culture of *Moina* sp is still

in the range for growth and life: Temperatures are between 26-27°C and pH in the range of 6-7. While urea fertilizer gives zero growth rate to *Moina* sp.

### References

- Andriyani, Heni, Widyastuti, Endang, Widyartini, Sunu,Dwi, 2014. Kelimpahan Chlorophyta Pada Media Budidaya Ikan Nila yang Diberi Pakan Fermentasi Dengan Penambahan Tepung Kulit Ubi Kayu dan Probiotik. Jurnal. Fakultas Biologi. Universitas Jenderal Sudirman. Purwakerto.
- Bangulu, Adnan. 2014. Tingkat Kepadatan *Moina* sp Dengan Pengaruh Pemberian Dosis Pupuk Kandang yang Berbeda. Skripsi. Jurusan Teknologi Perikanan. Fakultas Ilmu-Ilmu Pertanian. Universitas Negeri Gorontalo. (tidak diterbitkan).
- Casmuji. 2002. Penggunaan Pupuk Kandang Dalam Produksi *Moina* sp. <http://id.shvoong.com/kultur-kutuaair-moina>.
- Darmanto, Darti,S., dan Adisha. 2000. Laporan Akhir Hasil Pengkajian Budidaya Pakan Alami untuk Benih Ikan Ekonomis Penting. Instalasi Penelitian danPengkajian Teknologi Pertanian. Jakarta.
- Lubis, Efrida, Darmawati dan Hidayat, Arif Mhd. 2013. Pengaruh Pemberian Limbah Cair Tahu dan Pupuk Urea Terhadap Pertumbuhan dan Produksi Tanaman Kedelai (*Glycine max* L.(Merii). Jurnal. Fakultas Pertanian. Universitas Muhammadiyah Sumatera Utara.
- Lumenta, C. 2000. Manajemen Pemberian Pakan. Bahan Ajar. FPIK UNSRAT. Manado.
- Mokoginta, Ing. 2003. Budidaya Pakan Alami Air Tawar, Modul : Budidaya *Daphnia*. Direktorat Pendidikan Menengah Kejuruan-Dikdasmen Depdiknas.
- Mudjiman, Ahmad. 2004. Makanan Ikan Edisi Revisi. Penebar Swadaya: Jakarta.
- Muhadi, I. 1979. Pengetahuan Pupuk. Fakultas Kehutanan Universitas Gajah Mada. Yogyakarta : Penerbit Yayasan Pembina.
- Nugraha, Maulana, Yoga. 2010. Kajian Penggunaan Pupuk Organik dan Jenis Pupuk N Terhadap Kadar N Tanah, Serapan N dan Hasil Tanaman Sawi (*Brassica juncea* L.) Pada Tanah Litosol Gemolong. Skripsi. Fakultas Pertanian. Universitas Sebelas Maret Surakarta.
- Patuti, M. 2005. Penggunaan Pupuk Kandang dan Susu dalam Budidaya Massal *Daphnia* sp. Skripsi. Fakultas Perikanan dan Ilmu Kelautan. UNSRAT. Manado.
- Rismunandar. 1985. Dasar – Dasar Perabukan. Sinar Baru. Bandung.
- Sambode, Denovis, Henneke, Pangkey, Sartje, Lantu. 2013. Pertumbuhan Cladocera Jenis Chydoridae Pada Media Kultur yang Berbeda. Jurnal. Fakultas Perikanan dan Ilmu Kelautan. UNSTRAT.
- Sanchez, P. 1976. Properties and Management of Soil In The Tropics. New York ; A Willey – Interscience Publication.
- Saputra, Dadang. 2008. Peluang Usaha Pakan Alami. Titian Ilmu. Bandung.
- Sipayung, Anwar, dedi, Setiawibowo Ahmad, Dodi, Triwijiwati Yulia. 2009. Bioenkapsulasi *Moina* sp Menggunakan Minyak Jagung dan Minyak Ikan Sebagai Solusi Pemenuhan Kebutuhan Nutrien Ikan. Jurnal. Program Kreativitas Mahasiswa. Istitut Pertanian Bogor.
- Sutejo, M.M. dan A.G. Kartasapoetra. 1990. Pupuk dan Cara Pemupukan. PT. Bina Aksara. Jakarta.
- Tontooyo, Wahyudin. 2013. Pengaruh pemberian pupuk yang berbeda terhadap tingkat kelimpahan *moina* sp. Di balai benih ikan (bbi) kota gorontalo provinsi gorontalo. Skripsi. Jurusan Perikanan Fakultas Ilmu-ilmu Pertanian Universitas Negeri Gorontalo. Gorontalo.
- Winarlin, Ani, Widiyati, Kosdiarti, dan Nuryati. 2010. Pemanfaatan Limbah Kotoran Ayam Untuk Produksi Pakan Alami (*Moina* sp.). Balai Riset Perikanan Budidaya Air Tawar. Bogor.
- Zamroni, Mochammad, Chumaidi, Wahyuningtyas, Ayu, Lita. 2011. Pengaruh Dosis Pemupukan Dengan Menggunakan Pupuk Kotoran Ayam Terhadap Kelimpahan dan Keanekaragaman Plankton Pada Kolam Tanah. Fakultas Matematika dan Ilmu Pengetahuan Alam. Universitas Negeri Jakarta.