International Journal of Technology and Education Research

https://e-journal.citakonsultindo.or.id/index.php/IJETER

E-ISSN: 2986-0733

Mass-Scale Natural Feed Culture Technique For Brachionus Plicatilis At The Brackish Water Aquaculture Center (Bpbap) Ujung Batee, Aceh

Goldvri D Hutabarat[1], Ria Retno[2]

[12] Prodi Manajemen Pengelolaan Sumberdaya Perairan, Fakultas Teknik Dan Pengelolaan Sumberdaya Perairan, Universitas HKBP Nommensen Pematangsiantar, Indonesia

Corresponding Author: goldvri29@gmail.com

Abstract

This study aims to analyze the Mass Scale Natural Food Culture Technique of Brachionus Plicatilis at the Brackish Water Aquaculture Center (BPBAP) Ujung Batee, Aceh. Based on the results of the Field Work Practice (PKL) activities that have been carried out at the Brackish Water Aquaculture Center (BPBAP) Ujung Batee, it can be concluded that: The mass scale natural food culture technique of Brachionus plicatilis is carried out through several stages, namely container preparation, sterilization, media preparation, seed distribution, feeding, maintenance, observation, and harvesting. Rotifer growth increased from day to day, with the highest density occurring on the 4th day at 191 ind/mL, then decreased on the 5th day at 103 ind/mL which indicated a growth phase and population decline. Factors that influence the success of rotifer culture include water quality (temperature, salinity, pH, and dissolved oxygen), the availability of natural food such as Nannochloropsis sp., and proper maintenance management. Providing additional feed such as yeast and Scott's emulsion can increase nutritional value and support optimal rotifer growth.

Keywords: Culture Technique , Natural Feed , Brachionus Plicatilis , Fisheries Center

INTRODUCTION

Field Work Practice (PKL) is the process of learning from an expert through real-world activities. Furthermore, an internship is the process of applying knowledge and skills to solve real-world problems (Gea et al., 2025). Therefore, it can be concluded that an internship is training or practice to master a specific skill under the guidance and supervision of an experienced instructor (Saputry & Latuconsina, 2022).

Copyright to the author of some rights reserved This work is licensed under aCreative Commons Attribution-ShareAlike 4.0 International License.

International Journal of Technology and Education Research

https://e-journal.citakonsultindo.or.id/index.php/IJETER

E-ISSN: 2986-0733

Rotifers (Brachionus plicatilis) are a type of zooplankton commonly used as natural food for marine fish larvae, shrimp larvae, and crab larvae during their early growth and development. Rotifers are also a crucial link in the success of fish hatcheries, and are therefore commonly cultured in mass cultures in various fish hatcheries to feed the larvae during the larval stage (Utami et al., 2025). Rotifers also offer significant potential as natural biocapsules for larvae, as they can transfer compounds from the environment to the larvae's bodies (Cahyanurani, Mahkota, Syofriani, & Harijono, 2022).

One of the key factors in the success of fish farming is the availability of feed, which is crucial for larval care. Providing adequate, high-quality feed will reduce the mortality rate of larvae. There are two types of feed available to fish: natural feed and artificial feed (Mahar et al., 2026). Natural feed is readily available in nature, while artificial feed is prepared from various ingredients and then shaped into a specific shape to fit the mouth opening of the cultivated fish (Kustiari, Mudzakir, & Sundari, 2025).

Natural food types of zooplankton such as Brachionus plicatilis have small size, high nutritional content, can be cultured at high density and rapid reproductive ability are the advantages that cause this zooplankton to be selected for mass production as natural food for larvae. B. plicatilis is a natural food zooplankton measuring 40–250 µm which is most widely used for seeding efforts (Sinaga, Imanuel, Ningrum, Zahran, & Suciyono, 2025).

The advantages of rotifers as natural food include their relatively small size, with a lorikeet length of 76-143 µm and a width of 63-114 µm, and their slow swimming ability, making them easily consumed by fish larvae. Furthermore, rotifer cultivation time is relatively short, their reproduction rate is high, their nutritional content is quite high, and their nutritional value can be enriched (Simangunsong, Ramadhani, & Rosellia, 2025). To maximize rotifer growth through feed, there are many other alternatives that can be used and combined with rotifer feed, such as yeast or fish meal (Suryana & Adi, 2024).

The success of marine fish seed production is greatly influenced by the provision of feed and feed management for marine fish larvae appropriately and efficiently (Suastika and Sumiarsa, 2011). One of the important factors in larval cultivation is natural food in the form of phytoplankton and zooplankton of good quality (Nasrullah & Ashraf, 2025). This is because natural food has good nutritional content for fish seeds and plays a role in maintaining water quality (Dwinafiah & Hasan, 2023). Rotifers are one type of zooplankton used in marine fish hatcheries due to their high nutritional content and their role to date cannot be replaced (Imanuel, 2024) .

Copyright to the author of some rights reserved This work is licensed under aCreative Commons Attribution-ShareAlike 4.0 International License.

International Journal of Technology and Education Research

https://e-journal.citakonsultindo.or.id/index.php/IJETER

E-ISSN: 2986-0733

RESEARCH METHODS

Time and Place

PKL Program (implemented for 1 month from August 1 to August 31, 2025, which took place in the working area of the Ujung Batee Brackish Water Aquaculture Center (BPBAP), Durung Village, Aceh Besar Regency.

PKL Method

The method used in this internship program was direct observation in the field, following the entire rotifer culture process in the natural food laboratory (Roy et al., 2026). The data collected consisted of primary and secondary data. Primary data were obtained through direct observation of rotifer culture activities, rotifer density measurements using a microscope and Sedgwick-Rafter, and interviews with hatchery technicians. Secondary data were obtained from literature, center activity reports, and scientific references related to rotifer culture. (Pardede, 2024).

Work procedures

Container preparation

Preparation of the culture tank begins with cleaning the tank by scrubbing the walls and base, as well as the aeration hose and airstone with a brush until clean(Widayat et al., 2020). The culture tank is then dried by letting it sit for 24 hours. Drying the tank aims to kill or inhibit the growth of other microorganisms (Fatimah, Hidayati, Tartila, & Laras, 2023).

After the tank is drained, the culture tank is filled with water and the pipe is reattached to the outlet. The water is filled with a filter bag at the end of the inlet pipe, then secured with a rubber band. Two tons of seawater are then added. The culture tank is then filled with Nannochloropsis sp. after the seawater has reached 4 tons. This is done in stages from the start of the culture until harvest. The addition of Nannochloropsis sp. aims to prepare food for the rotifers when the rotifers are spread(Widayat et al., 2020).

Spreading Rotifera Seeds (Starter)

Once the rotifer culture medium meets the requirements, the starter culture or initial culture or maintenance media obtained from other maintenance tanks are placed into the culture tank. When stocking the seeds, ensure high-quality, S-sized rotifer seeds, as rotifers are 100-180µ in size. The S type is suitable for feeding newly hatched larvae with small mouths. Then, the rotifers are fed 2 tons of *Nannochloropsis sp* . This type of food is consumed by

Copyright to the author of some rights reserved This work is licensed under aCreative Commons Attribution-ShareAlike 4.0 International License.

filtration. The seeds are spread using a scoop and spread evenly across the culture tank. Rotifer maintenance lasts for 4-5 days. During the maintenance process, the rotifers are fed 1 1/2 tons to 2 tons of *Nannochloropsis sp.* , which can be indicated by a color change from clear brown to green(Aman et al., 2025).

Yeast and Scott's

Bakery yeast is an alternative feed that can be used when phytoplankton cultures are insufficient, thus fulfilling rotifers' dietary needs or supplementing them with other enrichment emulsions such as Scott's emulsion and vitamins (Bimantara, Zuhdi, Tunggali, & Manasikana, 2024) . Baker's yeast contains high levels of carbohydrates and fats, which rotifers can utilize for growth or to increase their density. Furthermore, baker's yeast, used as feed for rotifers, can also function as a probiotic and as a source of nutrients to increase the nutritional value of aquatic organisms (Nuraisyah, Rendi, Abror, & Mukti, 2023) .

Providing yeast with the right composition is a source of nutrition for rotifers for their life and reproduction, because the addition of the right yeast to the culture medium provides various types of protein, carbohydrates, and minerals (Yoshinaga *et al.,* 1999). Scott's emulsion is a fatty acid derived from fish oil emulsion containing high EPA and DHA. The use of Scott's emulsion for Rotifera supplementary feed can have a positive impact on Rotifera density. Scott's emulsion contains fat which is very important for Rotifera growth (Pangkey, 2011).

Rotifer Density

Rotifer density calculations were carried out to determine the number of individuals contained in a 1 ml sample, and using a Sedgwick-Rafter tool with a microscope and Handcounter to facilitate density calculations. At the Ujung Batee Brackish Water Aquaculture Center (BPBAP), calculations were carried out by taking a 1 ml sample and counting it under a microscope with the help of a Handcounter (Astuti, A'yun, Vitasari, & Sari, 2023) . The Brachionus plicatilis seeds that will be stocked, then the calculation of the number of *Brachionus plicatilis* seeds needed for culture is carried out, which can use the following equation(Rubio-Portillo et al., 2025):

$K = N / V$

Information:

K = rotifer density (ind/ml)

N = Number of rotifer individuals counted

V = Volume of sample observed (ml)

Copyright to the author of some rights reserved This work is licensed under aCreative Commons Attribution-ShareAlike 4.0 International License.

International Journal of Technology and Education Research

https://e-journal.citakonsultindo.or.id/index.php/IJETER

E-ISSN: 2986-0733

The population formula above shows the density of rotifers in units of individuals per milliliter (ind/ml). To calculate the total number of individuals contained in the culture medium water by volume, the calculation is carried out using the following formula(Kato et al., 2026):

N_{total}=$\overline{K}$ ×V

Information:

N_{total}= total number of rotifer individuals in the culture medium (ind)

$\overline{K}$= average density of rotifers (ind/ml)

V = volume of culture medium (mi)

Harvesting

During harvesting, the water in the tank is not used up but is left over so that some or at least 40% of the total volume is used as the next culture seed. Then the culture tank is refilled with *Nannochloropsis sp.* to the original volume. Harvesting can be done on the 4th or 5th day as needed. Harvesting is done by installing an external outlet on the culture tank. Then, a harvest filter is installed at the end of the outlet pipe by tying it with a rubber tire, then opening the inner outlet and then the outer outlet tap is opened slowly so that the water in the culture tank exits through the pipe so that the microorganisms present are filtered into the harvest filter (Asmahwati & Rahmadani, 2025). After the harvest filter looks solid, the pipe is closed again, and the contents of the harvest filter are put into a bucket (Sukadi, 2002) . To determine whether it is solid or not, simply look at the color of the water in the harvest filter. If it is brown, it is solid, and if it is still clear, it is still not solid. Before the harvest is given to larval rearing tanks, it is first enriched with Scott's emulsion (Martadinata, Kusyairi, & Muhajir, 2024).

RESULTS AND DISCUSSION

Results

During the internship, rotifer growth was observed throughout the rearing period. Observations showed that rotifer density increased daily.

Table 1. Rotifer density results

~~Day (D)~~	Amount (ind/mL)
0	50
1	125
2	147

Copyright to the author of some rights reserved This work is licensed under aCreative Commons Attribution-ShareAlike 4.0 International License.

International Journal of Technology and Education Research

https://e-journal.citakonsultindo.or.id/index.php/IJETER

E-ISSN: 2986-0733

3	169
4	191
5	103

Rotifer *Brachionus plicatilis*

Classification and Morphology

Rotifera comes from the word *rota* which means wheel, and *fera* which means to carry. These animals usually live in fresh water, only 50 species in the sea, some in wet moss beds including the smallest metazoan, measuring 40-2,500 microns, an average of 200 microns. Generally free-living, solitary, colonial, Some are endoparasites on crustacean hosts snail eggs, earthworms, and in algae types *Vaucheria* and *Volvox.* Usually transparent, bright colors, such as red or brown due to the color of the digestive tract (Mufidah, Agustono, & Nindarwi, 2017) .

According to Anita and George (Herawati, Zahidah, & Arief, 2026) *Brachionus plicatilis* is a type of rotifer which has the following classification:

Kingdom: Rotifera
Class: Monogononta
Order: Ploimida
Family: Brachionidae
Genus: *Brachionus*
Species: *Brachionus plicatilis*

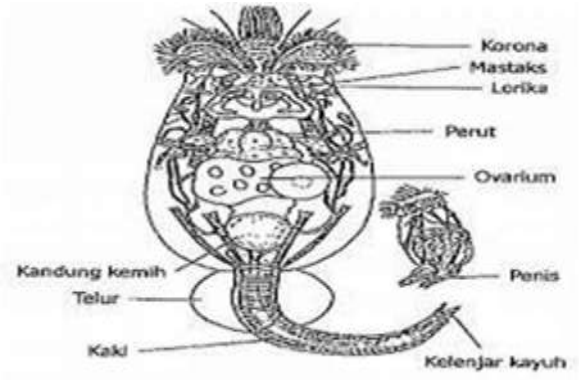


Figure 1. Morphology *of Brachionus plicatilis*

Rotifers are zooplankton that are often used as initial food for marine fish, shrimp, and crab larvae. Rotifers have the following advantages: easily digested by fish larvae, have a size that fits the mouth of fish larvae, have very slow movements so they are easily captured by larvae, are easy to mass culture, grow and develop very quickly seen from their life cycle, do not

Copyright to the author of some rights reserved This work is licensed under aCreative Commons Attribution-ShareAlike 4.0 International License.

produce toxins or other substances that can harm the life of larvae and have the best nutritional value for larval growth (Muskita, Iba, Kurnia, & Hamzah, 2024) . The body *of B. plicatilis* consists of parts, namely the head *,* body *(trunk),* and legs or tail *(foot).* The head is equipped with cilia that look like a spiral and are called corona which function to insert food into the mouth (Fujita *et al.,* 1973). The body is round and long, the body is covered with cuticle (lorica 200-400 µm); the corona organ along with cilia threads on the anterior part, mastax, stomach and ovary to the legs at the posterior end. The legs function as auxiliary organs for rotifers to attach/walk.

There are striking differences in shape between males and females. In general, males are much smaller than females and appear only during certain periods, while females are larger and reproduce parthenogenically (without mating) almost always . In fact, many species have unknown males. *Brachionus plicatilis* live between 12 and 19 days. During this time, *Brachionus plicatilis can lay as many as 5 eggs (Mujiman, 1998). Brachionus plicatilis* is generally cultured using microalgae (phytoplankton). Marine microalgae (phytoplankton) are the best natural food for rotifers (Isnansetyo and Kurniastuty, 1995). Phytoplankton and yeast are the primary feeds commonly used in rotifer cultures.

Reproduction of *Brachionus plicatilis*

Brachionus plicatilis is an organism that has separate sex organs, and can reproduce asexually by *parthenogenesis* , which is producing eggs without fertilization and the resulting new individuals are diploid (YUSUFINA, FAJARANI, & UTAMI, 2024) . The female reproductive system is called an ovum and the male is called a testis. The lifespan of rotifers ranges from 12-19 days. Rotifers hatch after 24 hours, producing two or three eggs (Tryana, 2024) .

***Brachionus plicatilis* culture**

Several stages carried out in culturing are, starting with preparation and sterilization of the tools and materials used, preparation of water media, spreading seeds, feeding, observation, maintenance and harvesting.

Sterilization of Tools and Materials

Tools and materials are the most important tools in culture activities. Therefore, optimal preparation will produce optimal cultures. Sterilization of pure cultures serves to minimize the presence of harmful microorganisms in the tank, such as protozoa, bacteria, and mosquito larvae.

Copyright to the author of some rights reserved This work is licensed under aCreative Commons Attribution-ShareAlike 4.0 International License.

International Journal of Technology and Education Research

https://e-journal.citakonsultindo.or.id/index.php/IJETER

E-ISSN: 2986-0733

Culture Tank Preparation

The container that will be used in Rotifera culture activities at BPBAP-UB is a concrete tub. The inner rotifera tub is rectangular with dimensions of 4 x 2.5 x 1.20 meters with a tub volume of 12. While the outer rotifera tub measures 3 x 2 x 1.53 meters with a tub volume of 9. To prepare the container, it begins with watering the tub using a 50,000 ppm *Oxalid acid solution* dissolved in fresh water. Then it is poured on the walls and bottom of the tub using a dipper. After that, rinse with fresh water. The *Oxalid axid solution* aims to kill pathogens and moss in the tub.

Preparation of the culture tank begins with cleaning the tank by brushing the walls and bottom of the tank, as well as the aeration hose and aeration stone thoroughly. This is then continued by drying the culture tank, by leaving the tank for 1x24 hours. This drying of the tank aims to kill or inhibit the growth of other organisms. After the tank is dry, the culture tank is then filled with water but with a pipe installed at the outlet. The water filling is done by using a filter bag at the end of the inlet pipe and then tied with a rubber tire. Starting with filling 2 tons of seawater. Next, filling *Nannochloropsis sp.* with 2 tons until the color turns green. The administration of *Nannochloropsis sp.* is given in stages from the day of culture until harvest. The addition of *Nannochloropsis sp. phytoplankton* aims to prepare rotifer food so that when the starter is spread, food is already available (Asmahwati & Rahmadani, 2025) .

Spreading Rotifera Seeds (Starter)

Rotifers are a natural food that requires careful breeding techniques to produce a good culture. After that, selecting high-quality rotifers is crucial to ensure a high-quality rotifer crop. When supplying seeds, ensure high-quality, S-sized rotifers, as rotifers typically measure 100–180 microns. The S-type is suitable for newly hatched larvae with small mouths. Two tons of *Nannochloropsis sp. is fed to the* rotifers. This feed is consumed by filtration. Prepare 10–15 liters of seeds at a good density.

Maintenance and Feeding

(Brachionus plicatilis) are monitored . Water conditions, such as salinity and temperature, are maintained within the optimal range for growth and development. Various factors influence rotifer reproductive biology, including temperature and salinity (Lubzens, 1985; Snell, 1986).

The water conditions in the rearing medium also significantly influence the growth of *Brachionus plicatilis,* particularly temperature and salinity. Furthermore, *Brachionus plicatilis*

Copyright to the author of some rights reserved This work is licensed under aCreative Commons Attribution-ShareAlike 4.0 International License.

can grow and thrive in areas exposed to sunlight due to its *euthermal nature* (Mudjiman 2018). Therefore, water quality measurements are necessary to determine the water conditions in the rearing medium so that we can regulate and adjust the water quality to suit the needs of rotifers.

The maintenance *of Brachionus plicatilis* is inseparable from the availability of phytoplankton as natural food. The type of phytoplankton used during the activity is *Nannochloropsis sp.* Yeast is also provided. Filling *Nannochloropsis sp.* aims to prepare food for rotifers, so that when rotifers enter, food is already available, and is given as much as 1 1/2 - 2 tons or can be indicated by a color change from clear brown to green. The optimal frequency of feeding twice a day is (Astuti *et al.,* 2012), as many as 500 to 1,000,000 cells/ml. *Brachionus plicatilis reproduction* can be abundant by providing food in the form of natural food that is also mass-produced. This natural food, in the form of *Nannochloropsis sp.* , is given daily. The frequency of yeast is once a day, as much as 5 ppm dissolved in 10 liters of fresh water.

Water quality

Rotifer growth is influenced by water quality, including temperature, dissolved oxygen, salinity, and pH. The ideal temperature for rotifer growth ranges from 20-30° (Muskita et al., 2024) . S-sized rotifers can survive at temperatures of 20-35°C. Temperature measurement results during the activity still support the range of 29.2 °C. At temperatures above 20°C, rotifer loricas tend to be round with sharp spines, and their reproduction increases. Conversely, at temperatures below 20°C, loricas become longer and blunt.

pH is a measure of hydrogen ion concentration and can indicate whether the water is acidic or wet. The optimum pH range for rotifer growth is between 5-9, 7.5-8.5 (Hoff and Snell in Fulks and Main 1991). The results of measurements during the activity were still within the range that supports Rotifer life, namely 8.3. Dissolved oxygen is a limiting factor in culture media, so if its availability in the water is not sufficient for the needs of aquatic biota, all biota activities will be hampered. Changes in dissolved oxygen concentration can have a direct effect that results in the death of aquatic organisms (Simanjuntak, 2012). The results of salinity measurements in rotifer culture media during the activity ranged from 21 ppt. According to Isnansetyo and Kurniastuty (1995) who stated, the optimum salinity in *B. plicatilis maintenance media* is 10-35 ppt. The results of dissolved oxygen measurements in rotifer culture media during the activity still support the range of 6.65 Mg/L, and the optimum dissolved oxygen content for rotifers is 5-7 mg/L (Sari *et al.,* 2019).

Water quality is a crucial factor that can influence the behavior of aquatic organisms, including decreased or absent appetite, slow or rapid growth. (Nuraisyah et al., 2023) , water

Copyright to the author of some rights reserved This work is licensed under aCreative Commons Attribution-ShareAlike 4.0 International License.

International Journal of Technology and Education Research

https://e-journal.citakonsultindo.or.id/index.php/IJETER

E-ISSN: 2986-0733

quality parameters are still considered optimal for Rotifera growth, as follows:

Table 2. Water Quality

No	Parameter	Unit	Water quality	Range
1	pH	-	8.3	5-9 (Fukusho, 1989).
2	Temperature	˚ C	29.2	20-30 (Fulks & Main,1991).
3	Salinity	ppt	21	10-35 (Isnasetyo & Kurniastuty, 1995).
4	Oksigen terlarut	Mg/L	6.65	5-7 Mg/L (Sari *et al* ., 2019).

Pemanenan

Rotifera harvesting can be done when the Rotifera are 4-5 days old. Harvesting can be done in the morning and afternoon. At the time of harvesting, the water in the tub is not used up but left so that some or at least 40% of the total volume as the next culture seed. Then the culture tub is filled back with *Nannochloropsis sp.* to the original volume. The harvesting process is carried out by installing an outlet pipe, then providing Styrofoam which functions as a container for harvest water, then installing a harvest filter which is tied using a rubber tire then opening the outlet valve, After the rotifers have begun to solidify in the harvest filter, the rotifers are then collected into a bucket. To determine whether the rotifers are solid or not, simply look at the color of the water in the harvest filter. If it is brown, it is solid, and if it is still clear, it means it is still not solid. Before the harvest results are given to the larval rearing tank, they are first enriched with Scott's emulsion. Giving 10 ml of Scott's emulsion to rotifers that have been harvested and collected in a bucket with a volume of 10 liters.

Rotifers obtained during culture with an initial density of 50 ind/ml, then on the 1st day there was an increase in density of 125 ind/ml, on the 2nd day the density was 147 ind/ml, on the 3rd day the density was 169 ind/ml, on the 4th day the density was 191 ind/ml, on the 5th day the density of rotifer growth decreased by 103 ind/ml. All treatments showed that the population of *Brachionus plicatilis* at the beginning of the 1st day of culture had not experienced growth because it was still in the adaptation stage to the culture environment (Fatimah et al., 2023) .

According to Isnansetyo *et al* ., (1995) stated that organisms adapt to the environment for their survival. After the 2nd day the population increases because *pathogenesis begins to*

Copyright to the author of some rights reserved This work is licensed under aCreative Commons Attribution-ShareAlike 4.0 International License.

occur which produces new offspring quickly until it reaches the peak population. This decrease occurs because rotifers experience several growth phases, namely (1) Lag phase, where the microalgae do not experience changes because they are still adapting to their environment, (2) Log/exponential phase, starting with cell division with a constant growth rate under optimum conditions, (3) Stationary phase, where the growth and death rates are balanced so that the total number of living microalgae remains constant, (4) Growth decline phase and ends at (5) Death phas

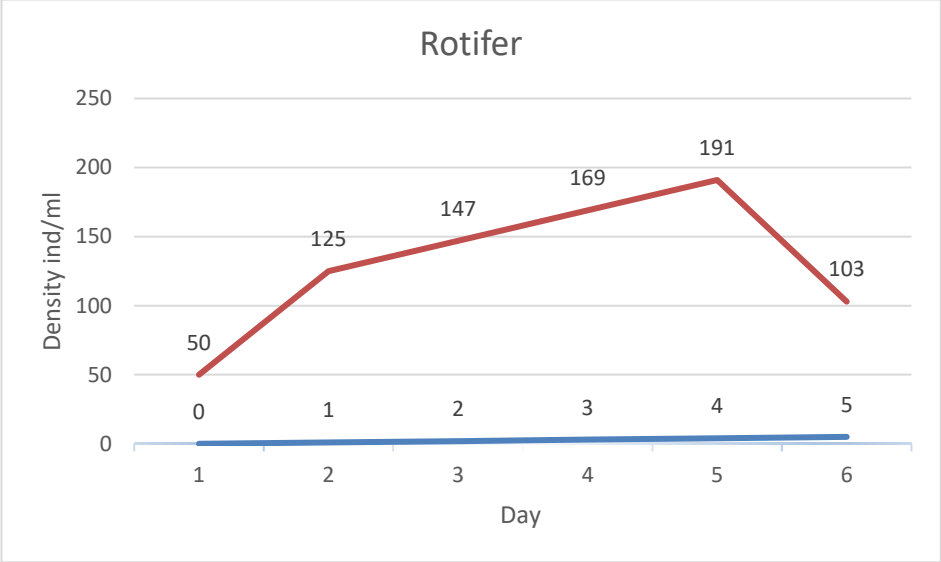


Figure 2. Graph of Rotifera density

The graph above shows that on the first day of culture , *B. plicatilis* experienced a lag phase (adaptation) where the population did not experience any changes, on the 2nd to 4th day it experienced an exponential phase where there was an increase in the growth rate, and on the 5th day it experienced a stationary phase where growth began to decrease.

CONCLUSION

Based on the results of the Field Work Practice (PKL) activities that have been carried out at the Ujung Batee Brackish Water Aquaculture Center (BPBAP), it can be concluded that:

1. The mass-scale natural food culture technique for Brachionus plicatilis is carried out through several stages, namely container preparation, sterilization, media preparation, seed distribution, feeding, maintenance, observation, and harvesting.

Copyright to the author of some rights reserved This work is licensed under aCreative Commons Attribution-ShareAlike 4.0 International License.

2. Rotifer growth increased from day to day, with the highest density occurring on the 4th day at 191 ind/mL, then decreased on the 5th day at 103 ind/mL, indicating a growth phase and population decline.
3. Factors that influence the success of rotifer culture include water quality (temperature, salinity, pH, and dissolved oxygen), the availability of natural food such as Nannochloropsis sp., and proper maintenance management.
4. Providing additional feed such as yeast and Scott's emulsion can increase nutritional value and support optimal rotifer growth.

Suggestion

Based on the results of the PKL activities that have been carried out, the suggestions that can be given are as follows:

1. It is necessary to carry out more optimal and routine water quality management to maintain the stability of the rotifer culture environment so that growth remains optimal.
2. Feeding must be done regularly and according to the dosage to prevent a decrease in water quality which can affect the growth of rotifers.
3. There needs to be more intensive observation of rotifer density every day to avoid a drastic decline in the population.
4. For future students, it is hoped that they can be more active in understanding each stage of rotifer culture in order to gain maximum experience and skills during PKL activities.

REFERENCE

Aman, S., Ullah, R., Shahzad, S. M., & Ashraf, M. (2025). Shrimps: A Nutritional Resource And Economy Booster. Planta Animalia, 4(4), 373–385.

Asmahwati, A., & Rahmadani, T. B. C. (2025). Kultur Pakan Alami Rotifera (Brachionus Plicatilis) Dengan Menggunakan Metode Skala Massal: Natural Food Culture Of Rotifera (Brachionus Plicatilis) Using Mass Scale Method. Ganec Swara, 19(2), 778–784.

Astuti, E. P., A'yun, Q., Vitasari, A., & Sari, P. D. W. (2023). Kajian Teknis Budidaya Ikan Kakap Putih (Lates Calcarifer) Di Balai Perikanan Budidaya Air Payau (Bpbap) Situbondo, Kabupaten Situbondo, Jawa Timur. Jurnal Perikanan Pantura (Jpp), 6(1), 269–280.

Bimantara, A., Zuhdi, M. N., Tunggali, A. P. P. W., & Manasikana, R. A. (2024). Intensifikasi Budidaya Perikanan (Osphronemus Gouramy) Mandiri Berbasis Sumberdaya Lokal Sebagai Upaya Peningkatan Produktivitas Pokdakan Mina Sida Karya. Warta Lpm, 58–70.

Cahyanurani, A. B., Mahkota, D., Syofriani, S., & Harijono, T. (2022). Performa Pembenihan Dan

Copyright to the author of some rights reserved This work is licensed under aCreative Commons Attribution-ShareAlike 4.0 International License.

Pemeliharaan Larva Ikan Bawal Bintang (Trachinotus Blochii) Di Balai Besar Perikanan Budidaya Laut (Bbpbl) Lampung. Jurnal Perikanan Pantura (Jpp), 5(2), 179–194.

Dwinafiah, R., & Hasan, S. A. Z. (2023). Optimalisasi Produksi Perikanan Berkualitas Berbasis Digital Yang Aman, Dan Ramah Lingkungan Sebagai Peningkatan Ekonomi Masyarakat Pesisir. Riset Sains Dan Teknologi Kelautan, 141–146.

Fatimah, N., Hidayati, S., Tartila, S. S. Q., & Laras, A. (2023). Teknik Budidaya Chlorella Sp. Dalam Air Tawar Di Balai Pengembangan Teknologi Perikanan Budidaya (Bptpb) Cangkringan, Yogyakarta. Jurnal Akuakultura Universitas Teuku Umar, 7(1), 18–21.

Gea, A. S. A., Zebua, E. K., Dawolo, A. J., Waruwu, H. K., Waruwu, I., Gulo, M., & Zebua, R. D. (2025). Kultur Pakan Alami Cacing Sutra (Tubifex Sp.) Dan Pemberian Pakan Larva Ikan Lele (Clarias Sp.) Di Desa Fadoro Dusun Bawosalo'o, Kec. Mandrehe, Kab. Nias Barat. Jurnal Perikanan Dan Kelautan, 2(1), 73–80.

Herawati, H., Zahidah, Z., & Arief, C. W. (2026). Teknik Budidaya Pakan Alami Untuk Mendukung Budidaya Perikanan Dan Ketahanan Pangan Di Desa Sukamenak, Kecamatan Darmaraja. Farmers: Journal Of Community Services, 7(1), 1–5.

Imanuel, F. (2024). Teknik Kultur Nannochloropsis Oculata Skalalaboratorium Dan Intermediet Pada Pakan Alami Di Balai Perikanan Budidaya Air Payau Situbondo, Jawa Timur. Universitas Airlangga.

Kato, C. A. T., Mies, M., Güth, A. Z., Di Dario, F., Calado, R., & Dias, J. F. (2026). Commercial Aquaculture Of Marine Ornamental Fishes Disproportionately Targets Demersal Spawners With Simple Husbandry Requirements. Journal Of Fish Biology.

Kustiari, T., Mudzakir, A., & Sundari, S. (2025). Pelatihan Sdm Uptd Perikanan Budidaya Air Tawar Jember Untuk Optimalisasi Produksi Benih Ikan Nila. Jurnal Pengabdian Masyarakat Indonesia Kreatif, 1(3), 90–97.

Mahar, M. A., Ansari, M. A., & Abbasi, M. A. (2026). Climate And Heavy Flood Impact Assessment On Growth And Dispersal Of Perna Viridis (Green Mussels) Occurring In Creeks Of Indus Delta Eco-Region Sindh Pakistan. Planta Animalia, 5(1), 263–272.

Martadinata, A., Kusyairi, A., & Muhajir, M. (2024). Pengaruh Pemberian Dosis Pakan Alami Cacing Darah (Chironomus Larvae) Beku Terhadap Pertumbuhan Berat Mutlak Benih Ikan Mas Koki (Carassius Auratus) Umur 1-2 Bulan Di Instalasi Perikanan Budidaya Mojokerto Provinsi Jawa Timur. Juvenil: Jurnal Ilmiah Kelautan Dan Perikanan, 5(2), 145–150.

Mufidah, A., Agustono, S., & Nindarwi, D. D. (2017). Teknik Kultur Chlorella Sp. Skala Laboratorium Dan Intermediet Di Balai Perikanan Budidaya Air Payau (Bpbap) Situbondo Jawa Timur. Journal Of Aquaculture And Fish Health, 7(2), 50–56.

Copyright to the author of some rights reserved This work is licensed under aCreative Commons Attribution-ShareAlike 4.0 International License.

Muskita, W. H., Iba, W., Kurnia, A., & Hamzah, M. (2024). Pakan Alami Untuk Akuakultur. Kamiya Jaya Aquatic.

Nasrullah, H., & Ashraf, M. (2025). Development Of Diet For Larval Catla Catla, Labeo Rohita And Cirrhinus Mrigala. Journal Of Basic And Emerging Sciences, 2(1), 13–25.

Nuraisyah, A., Rendi, R., Abror, M., & Mukti, R. C. (2023). Teknologi Budidaya Cacing Sutra (Tubifex Sp.) Di Balai Besar Perikanan Budidaya Air Tawar (Bbpbat) Sukabumi, Jawa Barat. Jurnal Sumberdaya Akuatik Indopasifik, 7(2), 153–160.

Pardede, A. N. (2024). Teknik Pemijahan Ikan Badut (Premnas Biaculeatus) Di Balai Perikanan Budidaya Laut (Bpbl) Batam. South East Asian Water Resources Management, 1(2), 16–22.

Roy, C., Sen, P., Lavudya, S., & Vurimindi, H. (2026). Algae And Synthetic Biology For Environmental Bioremediation. In Advances In Algal Research (Pp. 317–337). Springer.

Rubio-Portillo, E., Martin-Cuadrado, A.-B., Nadal-Molero, F., Limiñana, V. A., & Fernandez-Gonzalez, V. (2025). Marine Amphipods From Mediterranean Aquaculture: Microbial Profiling And First Insights Into Their Suitability As Human Food. Aquaculture Reports, 45, 103195.

Saputry, A. M., & Latuconsina, H. (2022). Evaluasi Pembenihan Ikan Nila (Oreochromis Niloticus) Di Instalasi Perikanan Budidaya, Kepanjen-Kabupaten Malang. Juste (Journal Of Science And Technology), 3(1), 80–89.

Simangunsong, T., Ramadhani, D. A., & Rosellia, S. (2025). Teknik Kultur Pakan Alami Moina Sp. Di Balai Besar Perikanan Budidaya Air Tawar (Bbpbat) Sukabumi, Jawa Barat. Journal Of Fisheries Agribusiness, 3(2), 20–24.

Sinaga, A. S., Imanuel, F., Ningrum, R. D. A., Zahran, M. T., & Suciyono, S. (2025). Teknik Pembenihan Ikan Kakap Merah Bakau (Lutjanus Argentimaculatus) Di Blu-Balai Perikanan Budidaya Air Payau (Bpbap) Situbondo. Filogeni: Jurnal Mahasiswa Biologi, 5(1), 26–32.

Sukadi, M. F. (2002). Peningkatan Teknologi Budidaya Perikanan (The Improvement Of Fish Culture Technology). Jurnal Iktiologi Indonesia, 2(2), 61–66.

Suryana, A., & Adi, C. P. (2024). Teknik Budidaya Artemia Salina Sebagai Pakan Alami Larva Ikan Kakap Putih (Lates Calcalifer) Di Balai Perikanan Budidaya Air Payau (Bpbap) Situbondo. Cendekia: Jurnal Ilmu Pengetahuan, 4(3), 212–220.

Tryana, A. (2024). Penyediaan Pakan Alami Hasil Kultur Pada Pemeliharaan Larva Kerapu Tikus (Chromileptes Altivelis) Di Loka Budidaya Air Payau Situbondo Kecamatan Kendit Kabupaten Situbondo Jawa Timur. Universitas Airlangga.

Utami, D. A. S., Insani, L., Kusmiatun, A., Yudiati, E., Albasri, H., & Szuster, B. W. (2025).

Copyright to the author of some rights reserved This work is licensed under aCreative Commons Attribution-ShareAlike 4.0 International License.

Commercial Probiotics Improve Growth, Feed Efficiency, Nitrogen Removal, Hemocyte Count And Suppression Of Vibrio Population In Pacific White Shrimp Culture. Ilmu Kelautan: Indonesian Journal Of Marine Sciences, 30(3), 395.

Widayat, C., Risjani, Y., Nurdiani, R., Hamilton, P. B., & Solak, C. N. (2020). Culture Practices And Characterization Of Diatoms Using Morphological And Molecular Based Methods: A Review.

Yusufina, D. P., Fajarani, R., & Utami, S. R. R. (2024). Teknik Pembenihan Ikan Bandeng (Chanos Chanos) Di Balai Besar Perikanan Budidaya Air Payau (Bbpbap) Jepara, Jawa Tengah. Universitas Airlangga.

Copyright to the author of some rights reserved This work is licensed under aCreative Commons Attribution-ShareAlike 4.0 International License.