Journal of Aquatic Science & Management, Vol. 7, No. 1, 26-29 (April 2019) *e*-ISSN 2337-5000
Graduate Program, UNSRAT, Manado, Indonesia – Asosiasi Pengelola Sumber Daya Perairan Indonesia
(*Online submissions* – http://ejournal.unsrat.ac.id/index.php/jasm/index)

The size variation of rotifer *Brachionus rotundiformis* cultivated with different feed at 40 ppt salinity

Variasi ukuran rotifer *Brachionus rotundiformis* yang diberi pakan berbeda pada salinitas 40 ppt

Joice R.T.S.L Rimper,[1]* Silvana D. Harikedua,[2] Veibe Warouw[1]

[1] *Marine Science Study Program, Faculty of Fisheries and Marine Science, Sam Ratulangi University. Jl. Kampus Unsrat Bahu, Manado 95115, North Sulawesi, Indonesia*
[2] *Fishery Product Technology Study Program, Faculty of Fisheries and Marine Science, Sam Ratulangi University, Manado, North Sulawesi, Indonesia*
* *Email: joice.rimper@unsrat.ac.id*

Abstract: Rotifer *Brachionus rotundiformis* is a group of zooplankton which is used by fish larvae for feeding to initiate their growth. This zooplankton is widely favored by marine fauna larvae because of its small size can fits well with various larval mouth; thus, it is easily preyed by larvae. This study aimed to determine the variation of rotifer *B. rotundiformis* morphometry if cultured with different feed at 40 ppt. The use of 40 ppt salinity is expected to provide a variable morphometric size because *B. rotundiformis* has a polymorphism property. Microalgae used as feed for rotifer *B. rotundiformis* were *Prochloron* sp. and *Nanochloropsis oculata*. Microalgae were cultured with Hirata medium. In the early stages, *B. rotundiformis* was cultured at optimum temperature (28 ºC) and salinity 20 ppt, then it was cultured at salinity 40 ppt. Salinity adaptation was done by raising the salinity of the medium by 2 ppt every two days in a 10 ml reaction tube containing 10 individuals. After adaptation, *B. rotundiformis* was transferred in a 1000 ml container with a density of 50 individuals. For the morphometric aspect, the total length, the length of the lorica, the width of the lorica and the anterior width were measured. The result showed the morphometric of rotifer *B. rotundiformis* fed with microalgae *Prochloron* sp. at 40 ppt salinity was smaller than that of the rotifer fed with *N. oculata*. Based on that finding it can be concluded that *B. rotundiformis* fed with *Prochloron* sp. at a salinity of 40 ppt has the potential to be developed as feed for fish larvae. Further investigations on how to accelerate the cultivation of microalgae *Prochloron* sp. as feeding for *B. rotundiformis* are needed.

Keywords: rotifer; *Brachionus rotundiformis*; fish larvae; polymorphism; marine algae.

Abstrak: Rotifer *Brachionus rotundiformis* merupakan golongan zooplankton yang digunakan sebagai makanan bagi larva ikan. Zooplankton ini banyak disukai oleh larva fauna laut, karena ukurannya kecil yang cocok dengan berbagai bukaan mulut larva. Penelitian ini bertujuan untuk mengetahui variasi morfometri rotifer *B. rotundiformis*, jika dikultur pada salinitas yang tinggi (40 ppt) dengan pemberian pakan berbeda. Penggunaan salinitas 40 ppt diharapkan bisa memberikan ukuran morfometrik yang bervariasi, karena rotifer jenis ini memiliki sifat polimorfisme. Alga mikro yang digunakan sebagai pakan adalah *Prochloron* sp. Dan *Nanochloropsis oculata.* Alga mikro tersebut dikultur dalam media Hirata. Pada tahap awal, *B. rotundiformis* dikultur pada suhu optimum (28 ºC) dengan salinitas 20 ppt; kemudian, dikultur pada salinitas 40 ppt. Adaptasi salinitas dilakukan dengan menaikkan salinitas medium sebanyak 2 ppt setiap dua hari dalam tabung reaksi berukuran 10 ml, yang berisi 10 individu. Setelah diadaptasikan, rotifer dipindahkan ke wadah berukuran 1000 ml dengan kepadatan sebanyak 50 individu dan dikultur pada salinitas 40 ppt. Aspek morfometri berupa panjang total, panjang lorica, lebar lorica, dan lebar anterior diukur. Hasil penelitian menunjukkan, bahwa panjang total rotifer *B. rotundiformis*, yang diberi pakan *Prochloron* sp. berukuran lebih kecil dibandingkan dengan rotifer yang diberi pakan *N. oculata*. Berdasarkan hasil penelitian dapat disimpulkan, bahwa *B. rotundiformis* yang diberi pakan *Prochloron* sp. pada salinitas 40 ppt memiliki potensi untuk dikembangkan sebagai bahan pakan bagi larva ikan. Penelitian lebih lanjut tentang cara mempercepat budidaya microalgae *Prochloron* sp. sebagai makan untuk *B. rotundiformis* diperlukan.

Kata-kata kunci: rotifer; *Brachionus rotundiformis*; larva ikan; polymorfisme; alga laut.

INTRODUCTION

The ocean hidden enormous natural resources that can be exploited with responsibility for human welfare. Marine potency resides not only on macro organism but also on micbiological potential is not only a macroorganism, but also a microorganism. Plankton has two functions in the marine food chain

as a primary and secondary producer. Some zooplankton have been widely used as live feed for larvae, namely rotifer *Brachionus rotundiformis* (Rumengan, 1997). Rotifer *B. rotundiformis* has the potential to be developed for the feeding of fish larvae in its early stage (Fieder and Purser, 2000; Assavaaree et al., 2001). Rotifer *B. rotundiformis* is favored by a variety of marine fauna larvae because it is a relatively small in size and suitable for larvae mouth. Due to the rotifer characteristics, it is suggested that rotifer could be cultivated as natural food for fish larvae. In an attempt to identify the possibility of cultivating rotifer in a laboratory, this study aimed to determine the variation of rotifer morphometric size cultured with different feed and high salinity at 40 ppt.

In this study, microalgae used as feed for rotifer *B. rotundiformis* were *Prochloron* sp. and *N. oculata*. Microalgae *N. oculata* is one of the most popular feed for culture rotifer in Japan (Maruyama, et al., 1986; Maruyama and Hirayama, 1993) while *Prochloron* sp. is a newly tested feed. Recent study from Ogello et al. (2017) discovered that dried microorganisms of *N. oculata* and *Chlorella vulgaris* can accelerate the growth of rotifer *B. rotundiformis*. Rimper et al. (2008) succesfully showed *B. rotundiformis* can be cultured with microalgae *N. oculata* and *Prochloron* sp. at 20 ppt salinity. This finding revealed that microalgae *Prochloron* sp. has smaller morphometry than *N. oculata*. Therefore, the objective of this study was to determine the variation of rotifer morphometric size cultured with different feed at higher salinity (40 ppt). The hypothesis is that higher salinity treatment will result in a different morphometry. It is expected that 40 ppt salinity treatment could provide a various morphometric size because *B. rotundiformis* has a polymorphism property. Polymorphism is a symptom when an organism changes in shape and size of lorica if the environmental conditions alter (Nogrady et al., 1993).

MATERIALS AND METHODS

The study was conducted in Marine Biotechnology, Marine Biology, and Chemical Laboratory, Faculty of Fisheries and Marine Sciences, Sam Ratulangi University of Manado. Microalgae used for feeding the rotifers were *N. oculata* and *Prochloron* sp. with a density of 3 x 10^6 cells/ml. Microalgae were cultured in Hirata medium (Hirata, 1975). The culture container was equipped with an aerator to promote algal growth. The algae incubator had 20 watt lamps as source of light for algae. The room was set at 25ºC. The microalgae used for feeding *B. rotundiformis* was centrifuged and the precipitate was stored in the refrigerator as feed stock. *B. rotundiformis* was cultured in a 1000 ml container. In the early stages, *B. rotundiformis* was cultured at optimum temperature (28 ºC) and salinity (20 ppt). Furthermore, *B. rotundiformis* was adapted at 40 ppt salinity. The seawater was boiled about two hours and cooled to increase the salinity. The water was measured with a refractometer until a salinity of 40 ppt was obtained. The adaptation of *B. rotundiformis* in different salinity was done by raising the salinity of the medium 2 ppt every two days in a 10 mL reaction tube containing 10 individuals. After adaptation, *B. rotundiformis* was transferred into a 1000 mL container with a density of 50 individuals and cultured at 40 ppt salinity with two different feed types (*N. oculata* and *Prochloron* sp.).

The morphometric measurements were based on three parts, namely the length of the lorica (LL), the width of the lorica (WL) and the anterior width (AW) (Hagiwara et al., 1995).

RESULTS

The study demonstrated that there are higher variations of rotifer *B. rotundiformis* morphometry with different feed treatment and cultivated at 40 ppt salinity. The mean value based on morphometry measurement on rotifer fed with *N. oculata* was: Total length (TL) = 221 µm; Length of Lorika (LL) = 137.98 µm; Anterior width (AW) = 68.85 µm; Lorika's width (LW) = 109.65 µm. Meanwhile, the morphometry of rotifer fed with *Prochloron* sp. were: Total Length (TL) = 157.70 µm; Length of Lorika (LL) = 120,63; Anterior Wide (AW) = 56.16; Lorika's width (LW) = 96.83 µm (Figure 1). Apparently, the morphometric of rotifer *B. rotundiformis* fed with microalgae *Prochloron* sp. at 40 ppt salinity was smaller than that of the rotifer fed with *N. oculata*.

DISCUSSION

The study showed that the smallest rotifer *B. rotundiformis* morphometry was found in rotifer fed with *Prochloron* sp. This phenomenon was likely due to the polymorphism of rotifer *B. rotundiformis.* Polymorphism was the condition where shape and size of the lorika undergoing changes to a kind of plasticity if the environmental conditions

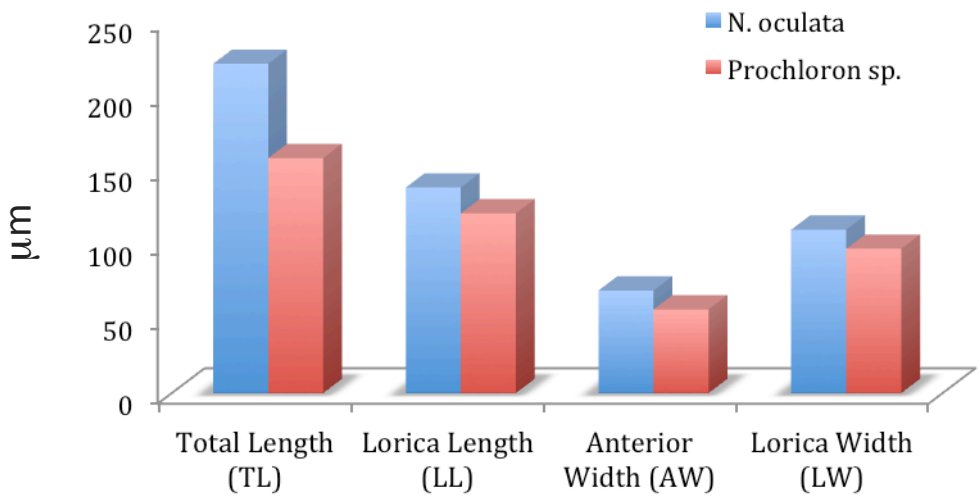

Figure 1. Morphometric length (µm) of rotifer *Brachionus rotundiformis* fed with microalgae *Nanochloropsis oculata* and *Prochloron* sp. at 40 ppt salinity

transformed (Nogrady et al., 1993). This polymorphism can lead to a considerable difference of 15% morphometric (Fukusho, 1989).

The results showed that feeding *Prochloron* sp. to *B. rotudinformis* resulting in a smaller morphometric size when compared to *N. oculata* feed. This result was expected. Moreover, this result demonstrated that this situation could be beneficial since marine biologist could manipulate the development of *B. rotudiformis* as a natural feed that fits different sizes of fish larval mouth.

CONCLUSION

The morphometric of rotifer *B. rotundiformis* fed with microalgae *Prochloron* sp. at 40 ppt salinity was smaller than that of the rotifer fed with *N. oculata*. Further investigations on how to accelerate the cultivation of microalgae *Prochloron* sp. as feeding for *B. rotundiformis* are needed.

REFERENCES

ASSAVAAREE, M., HAGIWARA, A. and LUBZENS, E. (2001) Factor affecting low temperature preservation of the marine rotifer *Brachionus rotundiformis* Tschugunoff. *Hydrobiologia,* 446-447, 355-361.

FIEDER, D.S. and PURSER, G.J. (2000) Effect of rapid changes in temperature and salinity on availability of the rotifers *Brachionus rotundiformis* and *Brachionus plicatilis*. *Aquaculture,* 189, 85-99.

FUKUSHO, K. (1989) Biology and mass production of the rotifer *Brachionus plicatilis*. *Int. J. Aq. Fish. Technol.*, 1, 232-240.

HAGIWARA, A., KOTANI, T., SNELL, T.W., ASSAVAREE, A.M. and HIRAYAMA, K. (1995) Morphology reproduction, genetics and mating behavior of small tropical marine *Brachionus* Strain. *Journal of Marine Biology and Ecology,* 194, 25-37.

HIRATA, H. (1975) *Preliminary Report on The Photoperiodic Acclimation for Growth of Chlorella Cells in Syncronized Culture*. Japan: Kagoshima University.

MARUYAMA, I. and HIRAYAMA, K. 1993. The culture of the rotifer *Brachionus plicatilis* with *Chlorella vulgaris* containing vitamin B12 in its cells. *J. World Aquac. Soc*., 24, 194-198.

MARUYAMA, I.T., NAKAMURA, T., MATSUBAYASHI, Y., ANDO and MAEDA, T. (1986) Identification of the algae known as marine *Chlorela* as a member of the eustig mathophyceae. *Jap. J. Phycol*., 34, 312-325.

NOGRADY, T., WALLACE, R.L. and SNEEL, T.W. 1993. *Rotifer, Biology, Ecology and Systematic.* Volume 2. Netherland: Academic Publishing.

OGELLO, E., SAKAKURA, O.Y. and HAGIWARA, A. (2017) Culturing *Brachionus rotundiformis* Tschugunoff (Rotifera) using dried foods: application of gamma-aminobutyric acid (GABA). *Hydrobiologia*, 1-12.

RIMPER, J., KASWADJI, R., WIDIGDO, B., SUGIRI, N. and RUMENGAN, I.F.M. (2008) Body size of rotifers (*Brachionus rotundiformis*) from estuaries in North Sulawesi. *Marine Finfish Aquaculture Network*, XIII (I).

RUMENGAN, I.F.M. (1997) Rotifer laut (*Brachionus* spp.) sebagai bio kapsul bagi larva berbagai jenis fauna laut. *Warta Wanita Ilmu Pengetahuan dan Teknologi,* 19, 5-10.

Received: 3 March 2019
Accepted: 25 April 2019