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Hatchery Performance of Nilem (*Osteochilus hasselti*) at Technical Implementation Unit of Fish Health and Environmental Laboratory (UPT LKIL), Pasuruan, East Java

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ABSTRACT

Nilem fish (*Osteochilus hasselti*) is a freshwater fish commodity with enormous potential for the aquaculture sector. In aquaculture activities, fish hatchery is one of the crucial aspects. To date, the performance of nilem fish hatchery activities at the UPT LKIL has not been reported. This study was conducted to understand techniques for hatching Nilem fish using a semi-artificial system at the UPT LKIL Pasuruan, East Java. This study was conducted over 60 days at the UPT LKIL Pasuruan, East Java (Figure 1). The method used during this study was descriptive. The results showed that the hatchery activity at UPT LKIL Pasuruan, East Java showed 94% fertilized eggs, a 91% hatch rate, and an 88% survival rate. It can be concluded that the hatchery of Nilem fish at UPT LKIL Pasuruan showed good performance. These great results were supported by the use of ovaprim, good dissolved oxygen content, and fine protein feed. Although the temperature and pH were higher, UPT LKIL conducted water changes to neutralize them. UPT LKIL should prepare an indoor pond to prevent sunlight penetration so that the temperature and pH are not high.

INTRODUCTION [Cambria 11 pt, 1 space, Bold]

Nilem fish (*Osteochilus hasselti*) is a freshwater fish commodity with enormous potential for the aquaculture sector. This fish is often found living wild in public waters, especially in rivers with moderate currents and clear water, as well as swamps. Nilem fish have a medium-sized body, with a total length of up to 260 mm (Pranowo *et al*., 2024). Nilem fish production in Indonesia reaches 385,701,378 kg per year, with demand continuing to increase annually (Hastuti *et al*., 2024b). This phenomenon is because Nilem fish has a delicious, savory taste and is widely sought after (Diansyah *et al*., 2024). Therefore, nilem fish becomes a source of income for fish farmers in Indonesia.

In aquaculture activities, the fish hatchery is one of the most crucial aspects. This is because a good hatchery process will produce optimal larvae performance, such as fast growth

and high survivability (Setyono *et al*., 2025). Furthermore, hatchery activities are carried out to maintain the continuity of aquaculture by supplying superior and healthy larvae (Pranowo *et al*., 2024). Nile fish hatcheries have been developed in several areas in East Java, one of which is Technical Implementation Unit of Fish Health and Environmental Laboratory (UPT LKIL), Pasuruan, East Java. To date, the performance of nilem fish hatchery activities at the UPT LKIL has not been reported. Nilem fish hatchery activities have only been reported in Malang, Batu, and Ponorogo (Sa'adah *et al*., 2023). Therefore, this study was conducted to understand nilem fish hatchery techniques using a semi-artificial system at the UPT LKIL Pasuruan, East Java.

METHOD

This study was conducted for 60 days, starting from June 30 to August 29, 2025, at the UPT LKIL Pasuruan, East Java (Figure 1). The method used during this study was descriptive. Descriptive research attempts to describe and interpret objects based on their actual conditions. The reported data is obtained by the researcher as they are, based on the events that occurred at that time (Furidha, 2023). This method aims to create an accurate picture of an event or object, both in terms of facts and the nature and relationships between phenomena (Furidha, 2023). Data collection for this study was from primary and secondary sources. Primary data collection is obtained through active participation and continuous observation to obtain facts and direct interviews with prepared questions or questionnaires to obtain useful information (Sari *et al*., 2026). Meanwhile, secondary data is indirect data and is obtained from existing documents and can be obtained from literature or other supporting information (Haromain *et al*., 2024).

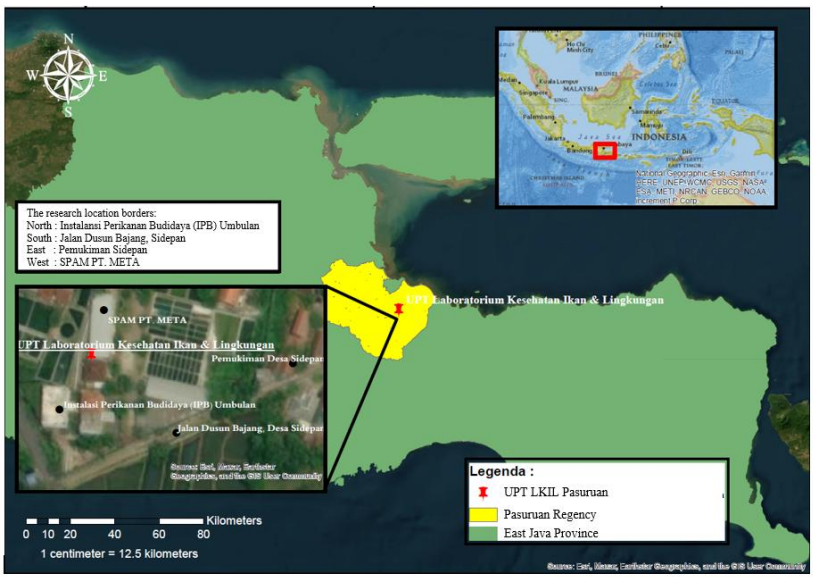

Figure 1. The location of this study at Technical Implementation Unit of Fish Health and Environmental Laboratory (UPT LKIL Pasuruan)

Nilem fish spawning at the UPT LKIL Pasuruan was carried out in a rectangular concrete pool measuring 13 m x 4.4 m x 0.93 m. A net (hapa) was installed at the edge of the pool, with stones weighted on each side to serve as a spawning container. The breeding protocol in this study used a 1:2 female-to-male ratio. The male broodstock used was 6-12 months old with a weight of 80-110 grams, while the female was 6-12 months old with a weight of 120-150 grams, and both were ready to spawn. Ovaprim (Syndel, Canada) was given at a dose of 0.2 ml/kg of the female broodstock weight. Hormone injections into the Nilem broodstock were carried out during the day at 1:00 PM WIB (Waktu Indonesia Barat/West Indonesia Time) so that at night the behavior of the broodstock could be observed during the spawning process. Injections into the Nilem broodstock were carried out by intramuscular injection at the bottom of the dorsal

fin and under the 1st-2nd scales at a 45° angle. Nilem broodstock at the UPT LKIL Pasuruan showed signs of spawning at 8:00 PM WIB (Waktu Indonesia Barat/West Indonesia Time) with symptoms such as the broodstock starting to chase each other and the male broodstock repeatedly approaching the female broodstock's abdomen. After the eggs came out, the fish that had spawned were immediately separated from the net (hapa), with the number of tilapia fish eggs during spawning being 50,000.

The measured data for this study were fertilization rate (FR), hatching rate (HR), and survival rate (SR). The fertilization rate can be calculated using numerical sampling, which involves collecting 100 egg samples and then calculating the number of fertilized eggs. According to Esa *et al*. (2023), the formula used is as follows:

$$FR = \frac{\Sigma Fertilized\ egg}{\Sigma Total\ egg}\ x\ 100\%$$

The hatching rate is the percentage of eggs that successfully hatch into larvae from fertilized eggs. According to Esa *et al*. (2023), the egg hatching stage is measured by comparing the total number of eggs that hatch to the total number of fertilized eggs multiplied by one hundred percent using the formula:

$$HR = \frac{\Sigma Hatched\ egg}{\Sigma Fertilized\ egg}\ x\ 100\%$$

Survival rate is the level of survival—the percentage of the number of fish that survive to the end of the rearing period compared to the initial number. The survival rate value was calculated from the time the egg hatches until the next 2 months, before the nursery phase. According to Esa et al. (2023), survival rate can be calculated using the formula:

$$SR = \frac{\Sigma Number\ of\ fish\ at\ the\ end\ of\ culture}{\Sigma Number\ of\ fish\ at\ the\ beginning\ of\ culture}\ x\ 100\%$$

Water quality was also measured in this study. The data measured included temperature (5200A Water Quality Multiparameter Checker, YSI, USA), dissolved oxygen (DO) (5200A Water Quality Multiparameter Checker, YSI, USA), and pH (pH paper, Merck, German). Water quality data was measured from the time the eggs hatched until the next two months, before the nursery phase.

RESULT AND DISCUSSION

The fertilization rate data for Nilem fish at UPT LKIL can be seen in Figure 2. The calculation of the fertilization rate of Nilem fish eggs at UPT LKIL was 94%. The results are obtained from the percentage of fertilized eggs (46,946) divided by the number of eggs released (50,000). It is in accordance with the research of Bhagawati *et al*. (2021), which stated that the high fertilization percentage of Nilem fish eggs reached 93%–95%. The high fertilization rate in this study is due to the application of the hormone ovaprim. Ovaprim is a mixture of gonadotropin-releasing (GnRH) analogs (Bhagawati *et al*., 2021). Hormones injected into fish increase the GnRH content released by the hypothalamus, thereby increasing the performance of the hypothalamus gland in producing GnRH and stimulating target organs to spawn more optimally (Sahadan *et al*., 2022).

Hatching rate data for Nilem fish at UPT LKIL Pasuruan can be seen in Figure 3. The calculated hatching rate for Nilem fish eggs at UPT LKIL Pasuruan was 91%. The result is obtained from the percentage of hatched eggs, which was 42,871, divided by the number of fertilized eggs (46,946). This result is higher than the study by Hastuti et al. (2024a), who added thyroxine to the hatching medium with a hatching rate of 79.73%. This optimal value is supported by external parameters such as the environment. In this study, the Dissolved Oxygen (DO) values showed optimal values (5.35–30.6 mg/L).

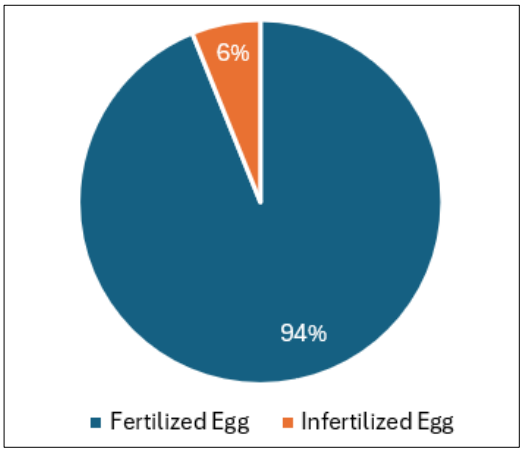

Figure 2. Fertilization rate data of Nilem fish at UPT LKIL Pasuruan in this study

Fish eggs also breathe through gas diffusion from water so that the embryo consumes oxygen for its cell metabolism, and oxygen demand increases as the eggs approach hatching time. If DO is too low, embryo development slows, is hampered, or even stops before hatching (Mariu et al., 2023). Optimal environmental conditions such as DO are needed to increase the hatching rate.

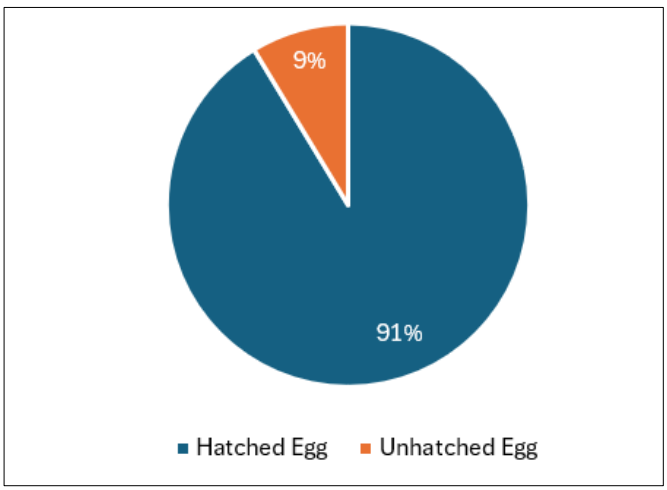

Figure 3. Hatching rate data of Nilem fish at UPT LKIL Pasuruan in this study

Survival rate data of Nilem fish at UPT LKIL Pasuruan can be seen in Figure 4. Survival rate is the ratio of the number of live fish at the end of larval rearing to the number of live fish at the beginning of larval rearing in one period within a population. The survival rate of Nilem fish at the UPT LKIL was 88%, which was still considered high. This survival rate value is better than the previous study (Hastuti et al., 2024a) of induced nilem fish by sGnRH-a hormone injection with a value of 84.70%. This high survival rate is influenced by optimal feeding. The feed content is 31% protein, 5% fat, 5% fiber, and a maximum water content of 12%. These specifications of protein comply with the certified seeding unit standards and previous study with 31% of protein (Andriani *et al*., 2019). Protein consists of amino acids, which are used for tissue formation, growth, and repair of damaged cells (Matondang, 2022). Some studies have shown that high-protein feed increases fish survival rates during the hatchery phase (Eissa *et al*., 2022; Remilekun *et al*., 2022).

Water quality data in this study can be seen in Table 1. Observations were carried out twice a day, in the morning at 07.00 and in the afternoon at 16.00. The DO value in this study was 5.35-30.6 mg/L and is considered optimal. According to Sa'adah *et al*. (2023), the optimal

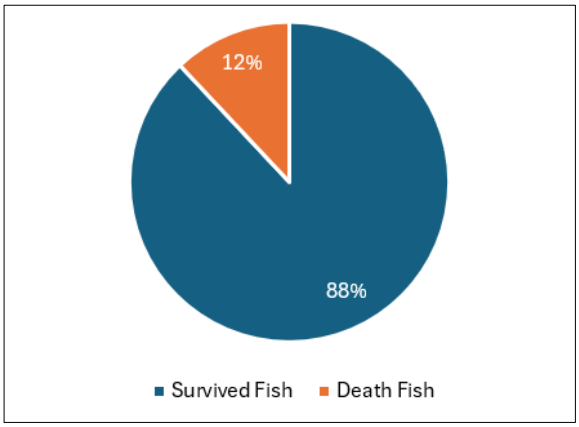

Figure 4. Survival rate data of Nilem fish at UPT LKIL Pasuruan in this study

DO for fish cultivation so that fish are not easily stressed is > 5 mg/L. However, the temperature and pH showed less than optimal values. The pond temperature showed a value of 24 - 32.5°C. This temperature is considered high based on the statement of Hastuti *et al*. (2024a) that a good temperature for cultivating Nilem fish is between 25 and 30°C. The pH value showed 7.16-8.6, and this value is considered high compared to previous studies (Hastuti *et al*., 2024a). High temperature and pH can cause stress to fish and can even kill the fish being cultivated. The high temperature and pH values are due to the pond's location, which is directly exposed to sunlight, which also increases the water temperature and pH due to phytoplankton photosynthesis (Pramleonita *et al*., 2018). To address the high temperature and pH values, the UPT LKIL conducted water changes to neutralize them.

Table 1. Water Quality Parameter of Nilem Fish Hatchery Activity in UPT LKIL Pasuruan.

No.	Parameter	Results	Optimum Value
1	Temperature (°C)	24 – 32.5	26 – 30 (Hastuti *et al*., 2024a)
2	DO (mg/L)	5.35 – 30.6	>5 (Sa'adah *et al*., 2023)
3	pH	7.16 – 8.6	6 – 8 (Hastuti *et al*., 2024a)

CONCLUSION

It can be concluded that the hatchery of Nilem fish at UPT LKIL Pasuruan showed good performance with 94% fertilized eggs, a 91% hatched rate, and an 88% survival rate. These great results were supported by the use of ovaprim, good dissolved oxygen content, and fine protein feed. Although the temperature and pH were higher, UPT LKIL conducted water changes to neutralize them. To be more efficient in dealing with high temperatures and pH due to the outdoor location, UPT LKIL Pasuruan should prepare shading nets (paranet) above the pond to prevent sunlight penetration efficiently and cheaply.

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REFERENCES

Andriani, Y., Akbar, F. K., Zahidah, R. R., & Haetami, K. (2019). Nilem carp fish (*Osteochilus hasselti*) performance in various feed energy-protein ratios. *Asian Journal of Research in Zoology*, *2*, 1-8.

Bhagawati, D., Nuryanto, A., & Rofiqoh, A. A. (2021). Optimalisasi Wadah Budidaya untuk Pembenihan Ikan Skala Rumah Tangga Pada Lahan Terbatas di Kelurahan Sumampir

Kabupaten Banyumas. *Panrita Abdi-Jurnal Pengabdian pada Masyarakat*, *5*(3), 315-327.

Diansyah, S., Erina, Y., & Jannah, M. R. (2017). Pemberian Pakan Alami yang Berbeda Terhadap Pertumbuhan dan Kelangsungan Hidup Larva Ikan Nilem *(Osteochilus hasseltii)*. *Jurnal Akuakultura Universitas Teuku Umar*, *1*(1), 1-10. https://doi.org/10.35308/ja.v1i1.478

Eissa, E. S. H., Abd El-Hamed, N. N., Ahmed, N. H., & Badran, M. F. (2022). Improvement the hatchery seed production strategy on embryonic development and larval growth performance and development stages of green tiger prawn, Penaeus semisulcatus using environmental aspects. *Thalassas: An International Journal of Marine Sciences*, *38*(2), 1327-1338.

Esa, Y. B., Dadile, A. M., Syukri, F., Christianus, A., & Diyaware, M. Y. (2023). Evaluation of fecundity, fertilization, hatching, and gonadosomatic index of exotic *Clarias gariepinus* (Burchell, 1822) and native Clarias macromystax (Gunther, 1864) under semi-arid conditions of Nigeria. *Animals*, *13*(11), 1723.

Furidha, B. W. (2023). Comprehension of the descriptive qualitative research method: A critical assessment of the literature. *Acitya Wisesa: Journal Of Multidisciplinary Research*, *2*(4), 1-8. https://doi.org/10.56943/jmr.v2i4.443

Haromain, N., & Muardana, I. M. (2024). Pembuatan dan Penerapan Awik-awik sebagai Solusi Mengurangi Penangkapan Perikanan Elasmobranch (studi pustaka Tanjung Luar Lombok Timur). *Jurnal Ilmu Pendidikan dan Sosial*, *1*(1), 14-21.

Hastuti, S., Nugroho, R. A., Yuniarti, T., Nurdiana, F., & Subandiyono, S. (2024a). Improving the Hatching Rate of Nilem Fish (*Osteochilus hasselti*) Eggs Through the Addition of Thyroxine to the Hatching Medium. *International Journal of Research Publication and Reviews*, Vol 5 (7), 3097-3101 https://ijrpr.com/uploads/V5ISSUE7/IJRPR31622.pdf

Hastuti, S., Yuniarti, T., & Subandiyono, S. (2024b). Enhancing Reproductive Performance of Nilem Fish (*Osteochilus hasselti*) through Artificial Spawning. *Journal of Biology and Nature*, *16*(1), 8-14. https://ikprress.org/index.php/JOBAN/article/view/8549/7643

Matondang, S. E. (2022). Perbandingan Kadar Protein Ikan Air Tawar Dan Ikan Air Laut. *LAVOISIER: Chemistry Education Journal*, *1*(1), 9-16.

Mariu, A., Chatha, A. M. M., Naz, S., Khan, M. F., Safdar, W., & Ashraf, I. (2023). Effect of temperature, pH, salinity and dissolved oxygen on fishes. *Journal of Zoology and Systematics*, *1*(2), 1-12.

Pramleonita, M., Yuliani, N., Arizal, R., & Wardoyo, S. E. (2018). Parameter fisika dan kimia air kolam ikan nila hitam (Oreochromis niloticus). *Sains Natural: Journal of Biology and Chemistry*, *8*(1), 24-34.

Pranowo, N. L., Fatmawanti, I. N., Pujiana, M., Asiah, R. N., & Ulkhaq, M. F. (2022). Teknik Pembenihan Ikan Nilem (*Osteochilus hasselti*) di Unit Pelaksana Teknis (UPT) Laboratorium Kesehatan Ikan dan Lingkungan, Pasuruan, Jawa Timur. *JAGO TOLIS : Jurnal Agrokompleks Tolis*, *4*(3), 217-222. https://doi.org/10.56630/jago.v4i3.644

Remilekun, A. O., Akinola, O. G., & Olubusola, O. O. (2022). Comparative growth performance and survival of hatchery-reared African catfish fry (Clarias gariepinus Burchell 1822) fed on live and artificial diets. *International Journal of Fisheries and Aquatic Studies*, *10*(2), 106-112.

Sa'adah, F., Lisminingsih, R. D., & Latuconsina, H. (2023). Hubungan Parameter Kualitas Air dengan Sintasan dan Pertumbuhan Ikan Nilem (*Osteochilus vittatus*). *Jurnal Riset Perikanan dan Kelautan*, *5*(1), 22-32. https://doi.org/10.33506/jrpk.v5i1.2136

Sahadan, F. N., Christianus, A., Ina-Salwany, M. Y., Ismail, F. S., Othman, R., & Zulperi, Z. (2022). Gonadotropin-releasing hormone (GnRH)-its approaches to improve reproduction in fish. *Sains Malaysiana*, *51*(11), 3539-3549.

Sari, P. D. N., Maulina, I., Zidni, I., & Nurhayati, A. (2026). Efektivitas Pelaksanaan Program Penyuluhan Pada Pembudidaya Ikan Nila (*Oreochromis niloticus*) di Kecamatan Darmaraja, Kabupaten Sumedang. *Jurnal Penyuluhan Perikanan dan Kelautan*, *19*(3), 189-205.

Setyono, B. D. H., Ula, N. N., & Affandi, R. I. (2025). Optimization of Hatchery Techniques to Enhance Larval Survival and Business Feasibility of Guppy (*Poecilia reticulata*). *Journal of Fish Health*, *5*(2), 266-276. https://doi.org/10.29303/jfh.v5i2.7093