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Effect of the use of ovaprim® on the spawning of kissing gourami (*Helostoma temminckii*) at UPR doa mandeh, ogan ilir

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ABSTRACT

The kissing gourami (Helostoma temminckii) is a freshwater species increasingly cultivated in controlled aquaculture systems. However, its production is hindered by the limited availability of broodstock and fry, which still heavily depend on natural catches that fluctuate seasonally. To address this challenge, controlled environment aquaculture offers a sustainable solution to boost the kissing gourami population. One effective method is semi-natural spawning through gonadotropin hormone induction using Ovaprim®, which promotes year-round reproductive readiness in broodstock. This study aims to apply and evaluate the semi-natural spawning technique of kissing gourami using Ovaprim® at UPR Doa Mandeh, Ogan Ilir. Conducted between August and September 2024, the research compared two treatments: natural spawning (P0) and semi-natural spawning (P1). The findings demonstrated promising results, with a fecundity of 9,619 eggs, a fertilization rate of 90.4%, a hatching rate of 94%, and a survival rate of 95%. Water quality parameters remained within optimal ranges, with broodstock pond temperatures between 30–30.6°C and pH levels of 7.27–7.53, while the rearing aquarium maintained a temperature of 31°C and a pH of 7.62–7.66. These results highlight the potential of semi-natural spawning using Ovaprim® as a viable approach for enhancing kissing gourami reproduction, reducing dependency on wild populations, and supporting sustainable aquaculture practices.

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Keywords
Aquaculture, Cultivation, Kissing gourami, Semi-natural spawning.

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INTRODUCTION

Kissing gourami (*Helostoma temminckii*) is a fish that lives in freshwater and has begun to be developed for cultivation. The kissing gourami commodity is classified as economical because the high selling price in the market and the savory taste of the meat make the kissing gourami very popular in Indonesia. Even in some countries such as Brunei and Malaysia, kissing gourami are widely traded for consumption due to their abundant availability in surrounding waters. Based on these advantages, kissing gourami are classified as potential fish to be cultivated, so it is necessary to carry out kissing gourami hatchery activities (Mariska et al., 2013). According to KKP data (2019), the production of kissing gourami aquaculture in 2020 was 524,043 tons. In 2021, it was 601,503 tons. In 2022, it was 664,854 tons. In 2023, it was 725,842 tons; in 2024, it was 786,326 tons. This upward trend reflects the growing demand and successful expansion of kissing gourami farming, highlighting the potential for further development in sustainable aquaculture.

The availability of kissing gourami in nature remains uncertain, yet its production still relies heavily on natural catches, often with unregulated harvesting practices. It raises concerns about the potential risk of extinction due to overfishing. Effective and sustainable solutions are urgently needed to ensure the sustainability of kissing gourami populations and enhance their production (Lisna et al., 2016). One of the main challenges in reducing the community's reliance on wild swamp fish is the limited availability of hatchery technology and the lack of sustainable aquaculture practices comparable to those used for other fish species (Yonarta et al., 2023a). The success of fish farming is influenced by multiple factors, with one of the most critical being the availability of high-quality feed in sufficient quantities. The fish feed contains essential macro and micronutrients vital to growth and development. Macronutrients—including proteins, fats, and carbohydrates—serve as primary energy sources, while micronutrients, such as vitamins and minerals, support overall health and physiological functions (Afrianto & Liviawaty, 2005).

Fish hatchery activities are conducted to produce high-quality fish seeds, which will later be used for the enlargement stage of aquaculture. Proper nutrition is essential to meet the fish's dietary needs during the enlargement process. According to Sari (2021), feeding with 35% protein content yields the best growth performance in fish. The kissing gourami hatchery can be done using natural or artificial spawning methods. In natural spawning, fish reproduce without human intervention by migrating to forests, swamps, or creeks to spawn. Conversely, artificial spawning is performed with human assistance (Nurdawati & Prasetyo, 2007). This research, however, employed a semi-natural spawning method, where gonadotropin hormone injections were administered to both broodstocks. The injected broodstock was then placed in a single spawning container, allowing them to spawn naturally. Aquaculture efforts must be carried out without relying on natural catches to overcome the problem of fish availability. One practical approach is the semi-natural cultivation of kissing gourami using the Ovaprim® brand gonadotropin hormone.

This research is relevant as the natural availability of kissing gourami is becoming increasingly uncertain due to uncontrolled fishing, which poses a significant risk of population decline and potential extinction. This article provides practical solutions to support the sustainability of fish stocks by focusing on semi-natural spawning techniques. According to Nuraini et al. (2017), ovaprim combines salmon gonadotropin-releasing hormone (sGnRH) and domperidone. Semi-natural spawning with ovaprim® injection, the use of ovaprim® can accelerate the spawning process in fish, namely at the time of gonad maturation where the analog sGnRH plays a role in stimulating the pituitary to release gonadotropin (Sugistia et al., 2017). Based on the results of the research of Akbar et al. (2023), the ratio of male and female sex is 2:1, resulting in the highest egg hatching rate of 95.6% and egg fertilization of 93.5%.

METHOD

The research was conducted at UPR Doa Mandeh, Ogan Ilir, using two treatments: natural spawning (P0) and semi-natural (P1) with Ovaprim® brand gonadotropin hormones. This article describes the preparation process, broodstock selection, and hormone injection with adjusted doses for male and female broodstock. The use of parameters such as fecundity, degree of fertilization, degree of hatching, and viability provides a solid basis for evaluating the effectiveness of this method. This research began with preparing maintenance containers for the spawning process. The containers were boxes measuring (62 × 42 × 32) cm^3. Before used, each container was thoroughly cleaned with a sponge, filled with water, and left to settle to ensure optimal conditions for fish maintenance. The kissing gourami broodstock used for spawning was sourced from the Musi River and then acclimatized to allow the fish to adapt to the new environment before spawning. During the maintenance period, feeding was carried out three times a day—in the morning, afternoon, and evening—using the satiation feeding method. The kissing gourami broodstock was carefully selected, and its gonadal maturity level was observed. One method of assessment involved examining the lower abdomen, as a visibly enlarged abdomen indicates maturation. For spawning, two pairs of broodstock with fully matured gonads were selected. The weight of each fish was measured to determine the appropriate Ovaprim® dosage required for the hormonal injection process.

The spawning of kissing gourami was carried out using a semi-natural method, where gonadotropin hormone injections with Ovaprim® were administered to stimulate the ovulation process. The prepared broodstock from the rearing container was injected with Ovaprim® at a dose of 0.2 mL/kg for females and 0.4 mL/kg for males, following a 2:1 male-to-female ratio. The injection was administered at a 45° angle on the dorsal fin. Spawning occurred 8–12 hours post-injection (Arfah et al., 2007). The hatching process took place in the same container used for spawning. The broodstock was removed from the hatchery and transferred to a separate container to prevent egg predation. Egg hatching began after 12 hours, though it did not co-occur. Observations were conducted 24 hours post-spawning (Hasan et al., 2016). The parameters observed in this activity are Fecundity (total number of eggs produced, Fertilization rate (percentage of fertilized eggs), Hatching rate (percentage of hatched eggs, and Survival rate. The following formulas were used to calculate these parameters:

Fecundity:

$$F = \frac{Wg}{Ws} x\ N \qquad (1)$$

Where Wg: Total weight of the gonads (g), Ws: Total weight of the gonads sample (g), and N: Number of sample eggs (unit)

Fertilization rate:

$$\text{Fertilization rate} = \frac{\text{Number of fertilized eggs}}{\text{Total number of eggs}} \text{x } 100\% \qquad (2)$$

Hatching rate:

$$\text{Hatching Rate} = \frac{\text{number of Hatched eggs}}{\text{Total number of fertilizer eggs}} \text{x } 100\% \qquad (3)$$

Survival rate (KH):

$$\text{Survival rate} = \frac{\text{Number of fish at the end of rearing.}}{\text{Number of fish at the beginning of rearing.}} \text{x } 100\% \quad (4)$$

RESULTS AND DISCUSSION

The results of fecundity, fertilization rate, hatching rate, and survival rate of kissing gourami larvae, and water quality during the research activities that have been carried out are presented in Table 1. and Table 2.

Table 1. Data on fecundity, fertilization rate, hatching rate, and survival rate of hatchery larvae of hatching fish.

Treatment	Fecundity (unit)	Fertilization rate (%)	Hatching rate (%)	Survival rate (%)
P0	4.161	86	93	93
P1	9.619	90,4	94	95

Table 2. Data on the water quality of fish hatchery

Treatment	Phase	Parameter		
		Temperature (°C)	pH	References
P0	Egg hatching	30	7,27	7.0-8.0 (Effendi, 2015)
P1		30,6	7,53	
P0	Larval maintenance	31	7,66	20-30°C (Arifin et al.,2017)
P1		31	7,62	

The results showed that semi-natural spawning with Ovaprim® (P1) performed better than natural spawning (P0). The Fecundity value: P1 reached 9,619 units, much higher than P0 (4,161 units). The results of fecundity in P1 treatment are higher. It is suspected that the size of the broodstock fish dramatically affects the amount of fecundity. It is supported by the statement of Fujaya (2001) that the fecundity of each female individual depends on the age, size, species, and environmental conditions (availability of food, water temperature, and season). The fecundity value is relatively low compared to a study conducted by (Akbar et al., 2023), which obtained a fecundity result of 95,329 units with a parent weight of 250 g.

The fertilization rate of kissing gourami eggs is presented in Table 1, showing that the P1 treatment yielded the best results compared to P0. The fertilization rate for P1 was 90.4%, higher than P0, which recorded 86%. The higher fertilization success in P1 is likely influenced by several key factors, including egg and sperm quality, water parameters such as pH, dissolved oxygen, and temperature, as well as the impact of human handling (Yonarta et al., 2023). These findings align with the research of Masrizal and Efrizal (1997), which stated that hatchability is primarily determined by successful sperm fertilization, although environmental factors can also play a significant role. Furthermore, the fertilization rate observed in this study is relatively high compared to Cahyanti et al. (2021), who reported a 70.6% fertilization rate in their kissing gourami spawning research. Additionally, the fertilized Tambakan fish eggs exhibit transparent characteristics, making it easy to differentiate between viable and dead eggs, as Hijriyati (2012) described.

Table 1 presents the hatching rate of kissing gourami eggs, showing that the P1 treatment resulted in a slightly higher hatching rate than P0. The hatching rate for P1 was 94%, slightly better than P0, which recorded 93%. The hatching process in fish eggs occurs due to the combined effects of embryo movement within the egg and the enzymatic activity of chorionase, an enzyme produced by glandular cells that facilitates eggshell breakdown during hatching (Kossakowski, 2012). The higher hatching rate in P1 is suspected to be influenced by optimal water quality factors, particularly temperature, as it plays a crucial role in egg metabolism and development. It aligns with the findings of Yufika et al. (2019), who emphasized that oxygen levels, temperature, and pH significantly impact the hatching success of fish eggs. Moreover, the hatching rate observed in this study falls within the high category, as defined by Hijriyati (2012), who classified hatching rates of 30–50% as low, while values above 60% are considered high.

The survival rate of kissing gourami larvae is presented in Table 1, showing that the P1 treatment resulted in a higher survival rate than P0. The larval survival rate for P1 was 95%, outperforming P0, which recorded 93%. The higher survival rate observed in P1 is likely influenced by factors, including stocking density, which can impact oxygen competition among larvae. According to Yonarta et al., (2023), higher stocking densities lead to increased competition for space and resources, which can negatively affect the survival of weaker individuals. Furthermore, the P1 treatment survival rate of 95% is considered relatively high, especially compared to the study by Sugihartono & David (2014), which reported a maximum survival rate of 86.21%. These findings suggest that optimized spawning and environmental management contribute significantly to improving kissing gourami larval survival.

Table 2 presents the water quality measurements taken during maintenance, including temperature and pH levels. The results indicate that the water quality was within the optimal range for hatching kissing gourami eggs and maintaining larvae. During the hatching phase, the recorded temperature ranged from 30–30.6°C, which falls within the optimal range for egg hatching. According to Sutisna and Sutarmanto (1995), the ideal temperature for successful egg hatching is between 25–30°C, a range further supported by Akbar et al., (2023), who stated that the suitable temperature for egg incubation is 25–30°C. For the larval rearing phase, the recorded water temperature was 31°C. While Arifin et al. (2017) suggested that the optimal temperature for kissing gourami cultivation ranges from 20–30°C, the slightly higher temperature observed during maintenance was still within tolerable limits for larval development.

The pH values recorded during the hatching phase ranged from 7.27 to 7.53, which is considered optimal. According to Tataje et al. (2015), a pH below 5.5 can inactivate the chorionase enzyme, posing a serious risk to embryonic development and potentially leading to mortality. The chorionase enzyme, which plays a crucial role in the hatching process, functions most effectively within a pH range of 7.1–9.6 (Tang & Affandi, 2001). This enzyme, produced by the endodermal gland in the embryo's pharynx, helps soften the chorion layer, which consists of pseudokeratin, making it easier for the eggs to hatch (Fani & Sri, 2019).

During the maintenance phase, the recorded pH levels ranged from 7.62 to 7.66, which is classified as suitable for kissing gourami cultivation. This is consistent with Effendi (2015), who stated that optimal water quality for fish farming falls within a neutral pH range of 7.0–8.0. These findings confirm that the water conditions during both hatching and maintenance were within ideal parameters for successful larval development and survival.

CONCLUSION

The application of the semi-natural spawning technique for kissing gourami (*Helostoma temminckii*) using Ovaprim® hormone at UPR Doa Mandeh, Ogan Ilir yielded promising results, with a fecundity of 9,619 eggs, a fertilization rate of 90.4%, a hatching rate of 94%, and a survival rate of 95%. These findings highlight the effectiveness of hormonal induction in enhancing reproductive success, contributing to the sustainability of kissing gourami aquaculture. This study provides valuable insights into improving controlled breeding techniques, reducing reliance on wild populations, and supporting sustainable fish farming. However, further research is needed to optimize hormone dosages, assess long-term broodstock performance, and explore large-scale commercial applications to fully maximize its potential in aquaculture.

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