Nile tilapia (*Oreochromis niloticus*) fish hatchery technique: the survival rate evaluation in IBAT Pandaan, Pasuruan, East Java

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Abstract. Nile tilapia (*Oreochromis niloticus*) is a freshwater fish that has great potential to be developed and has a fairly high economic value. One of the important factors to support the success of Tilapia fish farming is the availability of seeds. Instalasi Budidaya Air Tawar (IBAT) Pandaan is contributing to the fulfillment of the superior seeds through the activities of tilapia fish hatchery. The purpose of this study was to identify the performance of hatcheries techniques of tilapia fish in Instalasi Budidaya Air Tawar (IBAT) Pandaan, Pasuruan, East Java through the survival rate. This research used in this study was descriptive method, supported by primer and secondary data. The survival rate result showed that high value of survival rate of 92% and showed good condition of fish. This was due to the good technique of tilapia hatcheries included the pond preparation, broodstock selection and preparation, hatchery, feeding, and water quality control.

1. Introduction

Tilapia is one of the important commodity of freshwater fish in Indonesia. This is because tilapia has high nutritional content. Tilapia contains more than 20% protein, 7.01% fat, 6.80% ash, and 4.28% water per 100 gram fish weight [1, 2, 3]. Tilapia also has the advantage of thick fish meat and good taste [4]. Tilapia is known as a fish that is strong against environmental changes. Tilapia can live in both fresh and brackish water [5]. Tilapia as cultured fish has considerable potential because it is easy to breed, grows relatively fast and has economic value [6, 7]. Due to its advantage, many tilapia hatchery efforts are carried out.

Fish hatchery is an important activity in aquaculture because it is the initial activities in fish aquaculture. One important factor to support the success of tilapia aquaculture is the availability of seeds [8]. The availability of sustainable seeds and meeting the requirements of good quality and quantity greatly affects the growth of tilapia [9, 10]. Fish hatchery activities include selection and preparation of the parent, spawning, maintenance of larvae or seeds and water quality management [11]. One of the places that has successfully applied tilapia hatchery techniques in Indonesia is the Pandaan Freshwater Cultivation Installation (IBAT), Pasuruan, East Java. IBAT Pandaan has been conducting tilapia hatchery activities for more than 1 year [12]. This shows that the place has experience in the field of tilapia hatchery. This study aimed to determine the performance of tilapia hatchery techniques in IBAT Pandaan. The performance was measured through the survival rate of
tilapia seeds hatched in IBAT Pandaan. Survival rate was an important factor and challenge in aquaculture since it appears as a huge bottleneck in aquaculture production.

2. Materials and methods

2.1. Sample preparation
The sample was 400 broodstocks of tilapia from IBAT (100 male and 300 female). The size of the male was +/- 40 cm and 1000 g of weight while the female was 30 cm with 300-400 g of weight. The breeding was used traditional method (without addition of chemical compound) with the ratio of 1:3.

2.2. Sampling and survival rate estimation
This research used in this study was qualitative study with descriptive method. Descriptive method was done by coming to the data source and analyzing the data as it was [13]. The data taken in this study consisted of two types of data, primary data and secondary data. Primary data was data obtained directly from the original source. Primary data could be in the form of opinions individually or in groups, the results of observations of an object (physical), events or activities, and the results of testing [14]. There were three methods that could be used in primary data collection: observation, active participation and interviews [15]. Secondary data was data obtained indirectly through intermediary media [16]. Secondary data was used by researchers to provide an additional picture or for further processing. Survival rate of the tilapia fingerlings in this study was measured using the formula below [17]:

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SR = \frac{N_0 - N_t}{N_0} \times 100\%
\]

Description:
- **SR** = Survival rate (%)
- **N_t** = Total fish died during experiment
- **N_0** = Total fish at the start of experiment

3. Results and discussion
The results showed that the survival rate of the tilapia hatchery technique was 92% (Figure 1). The value of survival rate was better than previous studies which was ranging from 70-90% [18]. This could be caused by several key factors: well pond preparation, good hatchery technique, high feed quality, and appropriate environmental conditions [19, 20, 21, 22]. The success of this tilapia hatchery was influenced by the well pond preparation as a proper place for the hatchery activity. Pond preparation included drying, liming, and fertilizing which aimed to obtain optimal pond conditions so that the hatchery process runs well [23]. The pond soil was reversed so that it became loose and fertile and accelerated the process of decomposition of organic compounds [12]. The reversal process also caused toxic compounds at the bottom of the pond to evaporate [24]. While the purpose of drying was to eliminate pests and sources of disease in ponds, eradicate wild fishes that were predatory or competitors and organic matter contained in ponds [25]. Liming was conducted by using CaCO3 lime to improve the acidity of the pond bottom pH, disinfectants and nutrient providers needed by plankton [26].
Figure 1. Survival rate fingerlings result of tilapia in IBAT Pandaan.

After pond preparation, broodstocks were selected to get high quality fingerlings. The broodstock selection was one of the important things in the hatchery process since they would inherit the traits to their fingerlings [27]. Good quality broodstock had the characteristics of healthy body condition, normal body shape, neatly arranged scales, agile movements, good response to the environment and good offspring history [28, 29].

400 broodstocks tilapia consisting of 100 male and 300 female were prepared for hatchery activity. The ratio used was 1: 3 according to previous studies [30]. Comparison and selection of suitable parent would produce quality seeds. Good quality broodstock and proper hatchery technique would increase the survival rate of tilapia.

Feed also affected the survival rate of tilapia seeds. Feed given must meet nutritional standards for fish so that the high survival rate and fast growth [31]. The feed used by IBAT Pandaan contained with 31-33% protein and 4-6% fat in the form of pellets since good feed had complete nutritional content such as protein and fat [32]. According to previous studies [33], protein was the most important element in feed. Protein was needed by the fish's body both for growth and to produce energy [34]. In addition, protein also played role in the formation of body tissue, replacing damaged, constituent components of enzymes and hormones, and metabolic processes [35].

The high survival rate could also be caused by the water quality. Based on the results of measurements of the average water quality in the ponds of tilapia fish in IBAT Pandaan, the results followed: temperature 26-29°C, DO 5-7 mg/l, and pH 6.5-8. According to previous study [36], these water quality parameters were optimum in supporting tilapia aquaculture activities.

4. Conclusion
This study showed that the performance of hatchery activities at IBAT Pandaan was good with the survival rate of 92%. The high survival rate is influenced by good hatchery techniques, including pond preparation, parent selection and hatchery, feed and water quality control.

5. References
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