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Pre-extension Demonstration of Nile Tilapia Fingerlings Multiplication at Wayu Tuka District, East Wolega Zone of Oromia Region, Ethiopia

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Abstract

This study was initiated to demonstrate and popularize *Oreochromis niloticus* multiplication technologies in Wayu Tuqa (East wolega zone) during the 2019/20 production season. A selected strain of *Oreochomis niloticus*, A Tilapia with good growth performance was demonstrated for fingerling production. The pond size was 10m x 10m replicated on FTC fields. The result of descriptive statistics shows that a mean yield of 1200 fingerling hapa^{-1} was recorded. Since aquaculture is at its infant stage in the area, *Oreochromis niolicus* of Chamo strain can be evaluated for its growth performance and stress resistance in the area. Large production of fingerlings in a hapa in the area can easily avail fingerling in the area, which increases the income as well as the livelihood of the Aquaculture farming in the area. Therefore, organizations should further scale up/out the fish multiplication technology in the study districts and other similar areas to reach a greater number of farmers.

Keywords: Aquaculture; Fingerling multiplication; *Oreochromis niloticus*

Introduction

The Nile tilapia, *Oreochromis niloticus L* (Pisces: Cichlidae) is one of the most important fish species in the inland fisheries, particularly in rift valley lakes (1). The species is also the most important in the commercial fisheries of Ethiopia. Tilapia is one of the ideal candidates for aquaculture because of their tolerance to wide pH fluctuations, high ammonia and nitrite levels, and low dissolved oxygen levels (2).

In addition, tilapia is fast-growing and omnivorous, with an ability to utilize a wide range of feed ingredients such as detritus, algae, macrophytes, and bacteria (3,4). Tilapia culture is one of the fastest-growing forms of aquaculture worldwide, with more than 3 497 390 tons produced in 2010 (5).

Despite the startup of aquaculture in some parts of the country, the absence of good quality seed has constrained the sustainability of aquaculture (6). Sustainable production and supply of fish seed are essential for farm-level aquaculture production. Lack of widespread hatcheries has led to either for the transportation of selected fingerlings for a longer distance or the utilization of wild-collected fingerlings for aquaculture.

The development of appropriate technologies and management approaches for resource-poor households requires their participation, which can, in turn, improve their capacity for self-experimentation. This paper presents the results of an on-farm trial with farming households Wayu Tuqa (East Wollega zone) to assess the adoption and performance of Hapa based seed production.

Materials and Methods

The site and FREG selection

The study was conducted in Wayu Tuka districts of East Wollega, the zone of Oromia Region during the 2019/2020 production season. To apply the technologies farmer training center (FTC) was selected. The selection of the district was based on accessibility for field monitoring and visit and potentiality for distribution of fingerlings to local, fish producing farmers.

One FREG was established with three hosting farmers with the rest being participant farmers. Development Agents and district experts collaborated in site and farmer selection. The FREG member farmers were selected based on willingness; accessibility for the supervision of activities and willingness to share innovations with other farmers. Besides; the experimenting farmers were selected based on the availability of sufficient water and land to accommodate the trials.

Activity design and field management

The ponds were constructed at the FTC, Land clearing was conducted and two new earthen ponds each surface area of 100m^2 with 1.50m depth were constructed at the FTC (Figure 1) The pond bottom was compacted, and filled with diverted nearby river water.

Figure 1: Site clearing and pond Construction at Wayu Tuka FTC, data collection from Hapa system and demonstration.

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In each pond, a 2.0 ×1.0 × 1.0 m spawning and nursing hapas; were installed with poles for suspending the hapas. *Oreochromis niloticus* brood fish of Chamo strains were raised in brood ponds for a year, they were sex separated in different ponds at the FTC. The brood fish had been fed a locally available ration of fine wheat bran and nug cake as a dry mash twice daily at 5% body weight d^{-1}. Brood fish were stocked at 3 female and 1 male ratio. The broods were removed after one month; the fish fries were left to grow in their respective hapas.

Data Analysis

The efficiency of the production of nursed fry was compared in terms of hapa (fry m^{-2}), pond (fry m^{-2} $pond^{-1}$). Pairwise T-test was used to test differences in Nile tilapia seed production in the study areas.

Result and Discussion

Training

Practical training on Hapa based tilapia seed production was held for the FREG involved in the trial. The contents of training focused on the reproductive biology of Nile tilapia, identification of male and female brood fish, preparation of ponds and hapas, stocking and management of brood fish, swim-up fry collection, nursing, and marketing fry.

Fish Seed Production

The survival rate of Nile tilapia ranged between 96 to 98% and fish maintained healthy and active during the experimental period. Tilapia seed production in hapas in ponds was successful at Wayu Tuka FTC. There was a variation in mean swim-up fry production per harvest among individual hapas. Mean swim-up fry production in hapas (fry $harvest^{-1}$ hapa) was 1200 ± 78 compared to 379± 39 in an open pond. The differences in the mean swim-up fry production between the two methods were highly statistically significant ($p > 0.05$). fish farming in hapas can result in a higher number of fingerling (7).

Distribution of produced fingerlings

Nile tilapia fingerlings were in high demand from grow-out farmers. 77% of the nursed fry produced were distributed for stocking at the FREG farmers participating in integrated fish horticulture farming.

Conclusion and recommendation

The demonstration activity was conducted in five AGP II districts using FREG approach in two consecutive years, 2019-2020. Fry production in hapa and open pond were used for demonstration. The results indicated that fry production in hapa produced a higher number of fingerlings at the demonstration sites. The participant farmers and other stakeholders got better knowledge and skill of using the technologies. Based on the number of fingerlings distributed, hapav based fish production was selected as the best technology. Therefore, hapa based fish production was recommended to be promoted to other places with similar agro-ecologies.

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