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Sustainable Aquaculture for a Secure Future

Title: Alternative artificial incubation system for intensive fry production of Nile tilapia (*Oreochromis niloticus*)

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Abstract: Jar incubation system is a well established artificial incubation system for intensive fry production of Nile tilapia. However, this system needs special hatchery structure and huge amount of water for circulation of eggs. The present study aimed to explore a simple, economic and water efficient alternative incubation system appropriate for small-scale hatchery operators. Two incubation systems, i.e. atkin incubation system and aquarium incubation system were compared with jar incubation systems in terms of water use, hatching rate and subsequent survival of larvae. Results showed that the amount of water used was significantly higher in atkin ($127.0 \pm 3.1 \text{ m}^3$) and jar ($36.8 \pm 4.9 \text{ m}^3$) incubation systems compared to aquarium ($0.05 \pm 0.0 \text{ m}^3$) incubation system. The hatching percentage was significantly higher in jar incubation system ($95.5 \pm 0.6\%$) compared to aquarium ($65.2 \pm 7.7\%$) and atkin ($57.8 \pm 2.2\%$) incubation systems. Hatching tended to occur slightly earlier in the jar incubator than other systems. After 7 days of rearing, the mean larval survival rate was highest in jar incubation ($96.9 \pm 0.5\%$), intermediate in aquarium incubation ($90.9 \pm 3.4\%$) and lowest in atkin incubation (81.0 ± 3.1) system ($P < 0.05$). The dissolved oxygen was significantly higher in aquarium ($6.1 \pm 0.0 \text{ mg/L}$) than jar ($3.0 \pm 0.0 \text{ mg/L}$) and atkin ($3.0 \pm 0.1 \text{ mg/L}$) incubation systems. Further experiments indicated that about 5000 eggs can be successfully hatched with a hatching rate of 95% and reared to swim-up fry in in 50 L size glass aquarium with water exchange twice daily. This system is best suited for incubation of late stage eggs and rearing of newly hatched larvae up to free swimming stage. The results indicate that aquarium incubation can be used as an alternative of jar incubation system for Nile tilapia eggs, especially in water scarce areas.

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