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## RESEARCH REPORTS

Sustainable Aquaculture for a Secure future

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**Title:** Fry and Fingerling Production

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**Abstract:** Tilapia production from aquaculture worldwide has grown rapidly, increasing from 241,681 metric tons (MT) in 1986 to 472,969 MT in 1992 (FAA, 1994). This growth has been facilitated in part through improvements in tilapia fry and fingerling production technology (e.g., mass production of monosex fingerlings through sex inversion) and dissemination of technology to fish farmers. Continued rapid expansion of tilapia aquaculture will require additional improvements in tilapia reproduction in order to ensure consistent, unlimited availability of high-quality fingerlings.

Mass production of tilapia fingerlings requires the successful implementation of a number of activities. The first step is the procurement of adequate numbers of good quality broodfish of known lineage and of the proper age and size. Adequate numbers of broodfish may be defined as the number of broodfish necessary to produce the number of eggs needed to give the desired number of advanced fingerlings for stocking into grow-out units. Good management practices are required to maintain the broodfish population in good physical and genetic condition. These management practices usually involve maintenance of broodfish in fertile earthen ponds and provision of a formulated supplemental feed. Original and replacement broodfish should be offspring from a large, randomly breeding population in order to avoid problems associated with greater potential for expression of deleterious recessive alleles as a result of inbreeding.

Spawning can be natural or artificial; artificial spawning involves the manual collection of eggs and milt from broodfish. As tilapia are sequential spawners, natural spawning predominates. Artificial spawning generally is limited to specific research projects. Spawning cycle duration will vary from days to months, depending on the management practice employed and on the

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size of fingerling produced. Segregation of broodfish by sex and intensive feeding of broodfish between spawning cycles (conditioning) may or may not be practiced. Broodfish are spawned in a variety of containers, and the eggs and sac-fry may or may not be removed for artificial incubation. A hatchery facility is necessary if eggs and sac-fry are removed from brooding females. Produced fry are mixed sex, or they can be treated with an androgen to produce monosex (all-male) populations. Finally, swim-up fry are nursed to advanced fingerling or stocker size for stocking into grow-out units.

Tilapia are classified as substrate incubators or mouth-brooders, the latter being either maternal or paternal/biparental (Trewavas, 1982; Chapter 8 in this volume). Both groups of tilapia provide their eggs and young with a high degree of parental care, thereby increasing offspring survival (Jalabert and Zohar, 1982; Philippart and Ruwet, 1982; Macintosh and Little, 1995). The discussion in this chapter primarily concentrates on the commercially important species, which include Nile tilapia (*Oreochromis niloticus*), blue tilapia (*O. au reus*), Mozambique tilapia (*O. mossambicus*), and red tilapia (*Oreochromis sp.*). *Oreochromis niloticus* is cultured most commonly worldwide, followed by *O. mossambicus* and *O. aureus* (FAO, 1994). The Egyptian and Ivory Coast strains of *O. niloticus* are the predominant aquacultural strains worldwide.

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