Aquaculture of Groupers

Groupers, belonging to the genus *Epinephelus*, are highly valued in aquaculture due to their delicious taste, high nutritional value, and large size. Among over 100 species of groupers, several are commonly cultured in aquaculture systems, including the brown-marbled grouper (*E. fuscoguttatus*), orange-spotted grouper (*E. coioides*), giant grouper (*E. lanceolatus*), and Malabar grouper (*E. malabaricus*) (Miao et al., 2017; De Silva & Gunasekera, 2017; Benetti et al., 2019). The choice of species for farming typically depends on market demand, growth rates, tolerance to captive conditions, and disease resistance. Global production of groupers in 2019 reached approximately 522,000 tonnes, with China being the largest producer at 265,413 tonnes, followed by Indonesia, Taiwan, Thailand, and the Philippines (FAO, 2021).

Grouper aquaculture typically begins with the selection of healthy broodstock. Mature broodstock (aged 1-3 years) are induced to spawn, and eggs and sperm are collected for controlled fertilization. After hatching, larvae are transferred to nursery tanks or ponds until they reach about 3-4 inches. At this stage, fingerlings are moved to grow-out facilities such as floating net cages or ponds, where they continue to grow until they reach a marketable size of 1-3 kilograms, depending on the species and market demand.

Grouper species are primarily carnivorous and require high-protein diets. Commercial pelleted feed for groupers typically contains 40-50% protein and 10-20% lipid to meet their nutritional requirements (Benitez-Santana et al., 2017). These pellets are designed to be durable and withstand the powerful jaws of groupers. Groupers tend to feed near the surface, so floating or slow-sinking pellets are commonly used (Lovell, 2016).

Challenges in grouper aquaculture include high mortality rates caused by diseases, slow growth rates, and the complexity of managing broodstock. Diseases such as vibriosis and viral infections contribute to significant losses on grouper farms, while slow growth can extend production cycles to up to three years, increasing operational costs (Tan et al., 2018; Ghosh & Sahu, 2018). Broodstock management is a complex process requiring careful control of environmental conditions, nutrition, and hormonal treatments for successful spawning (Bhavanath et al., 2019). The lack of specialized commercial feeds for certain grouper species can also negatively impact growth performance and health (Yin et al., 2019). Despite these challenges, grouper aquaculture continues to expand due to the high demand for this species in domestic and international markets, where groupers are prized for their flavor and texture.

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