AQUACULTURE III

9. WEEK

Ecological and Genetic Implications of Aquaculture Activities

WEEKLY TOPICS

Week	Topics
1. Week	Aquaculture Science and Aquaculture Engineering
2. Week	Aquaculture: Economic and Environmental
3. Week	Aquaculture: Innovation and Social Transformation
4. Week	Aquaculture: Food Ethics
5. Week	Shellfish Aquaculture and the Environment
6. Week	Advances in aquaculture hatchery technology
7. Week	Recirculating Aquaculture
8. Week	Selection and Breeding Programs in Aquaculture
9. Week	Ecological and Genetic Implications of Aquaculture Activities
10. Week	Aquaculture: Biotechnology
11. Week	Aquaculture nutrition: gut health, probiotics, and prebiotics
12. Week	Mucosal Health in Aquaculture
13. Week	Off-Flavors in Aquaculture
14. Week	Sustainable Aquaculture Techniques

Ecological and Genetic Implications of Aquaculture Activities

Aquaculture is a rapidly growing industry and aquaculture practices can directly interact with and depend upon the surrounding environment. Therefore, the effects of all types of aquaculture on living natural resources and ecosystems are of significant and increasing national and international interest.

The aquaculture effects and their solutions range from local to global and simple to highly technical. Effects common to many levels and types of aquaculture emerge, as well as both common and unique solutions.

Bert, T.M. ed., 2007. *Ecological and genetic implications of aquaculture activities* (Vol. 6). Springer Science & Business Media.

Impact of aquaculture

Finfish and shellfish aquaculture impact on the environment in different ways. Finfish culture is usually an intensive industry that involves an addition of solids and nutrients to the marine environment, and is recognised as potentially causing environmental degradation through these inputs. A build up of organic material beneath fish farms can impact on the flora and fauna of an area, in some cases causing major changes to sediment chemistry and in turn affecting the overlying water column. Additional impacts may occur as a result of other farm discharges and waste products, for example from shore based stun and bleed operations. The escaping of exotic species, transmission and control of disease, and control of predatory species are also areas of concern in this type of aquaculture.

http://www.environment.gov.au/resource/impact-aquaculture

Genetic Management of Hatchery-Based Stock Enhancement

Maintaining the genetic diversity of admixed populations and their wild-population components first requires managing both the genetic variability (e.g., numbers of alleles) and the genetic composition (frequencies of alleles) in the broodstocks and the broods. These genetic diversity components should be maintained at levels appropriate for each stock enhancement program throughout all aspects of stock enhancement—from broodstock selection through the rearing and releasing the broods and then, after release of the broods, in the admixed populations and their wild-population components until the admixed populations attain genetic equilibrium.

Bert, T.M., Crawford, C.R., Tringali, M.D., Seyoum, S., Galvin, J.L., Higham, M. and Lund, C., 2007. Genetic management of hatchery-based stock enhancement. In *Ecological and genetic implications of aquaculture activities* (pp. 123-174). Springer, Dordrecht.

The rationale and relevance of genetics in aquaculture: An overview

The application of genetics to the breeding and management of cultivable aquatic organisms is likely to result in considerable improvement as it has with domesticated mammalian and avian livestock. Because aquatic organisms are still largely undomesticated and relatively little is yet known about many basic features of their genetic constitution, genetic improvement studies have wider implications in aquaculture than in agriculture.

Wilkins, N.P., 1981. The rationale and relevance of genetics in aquaculture: an overview. *Aquaculture*, *22*, pp.209-228.

The rationale and relevance of genetics in aquaculture: An overview

Analysis of existing variability must be carried out on wild stocks to determine levels of genetic variability and to investigate those aspects of reproductive biology not encountered in terrestrial livestock. In breeding studies, both the traditional selective breeding strategies of established animals breeders, and the more novel schemes of gynogenesis, self-fertilization, sex manipulation and induced polyploidy may be feasible.

Wilkins, N.P., 1981. The rationale and relevance of genetics in aquaculture: an overview. *Aquaculture*, *22*, pp.209-228.

Genetic Effects of Cultured Fish on Natural Fish Populations

Strategies for the genetic protection of native populations from the effects of aquaculture are outlined including more secure containment, the use of sterilized fish, and modifying the points of rearing and release. We recommend strong restrictions on gene flow from cultured to wild populations and effective monitoring of such gene flow.

Hindar, K., Ryman, N. and Utter, F., 1991. Genetic effects of cultured fish on natural fish populations. *Canadian Journal of Fisheries and Aquatic Sciences*, *48*(5), pp.945-957.

- References

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- The State Of World Fisheries And Aquaculture 2016, Fao. 2016
- Advances In Aquaculture Hatchery Technology 2013, Woodhead Publishing Series In Food Science, Technology And Nutrition: Number 242
- Aquaculture: An Introductory Text, 2005, Robert R. Stickney
- Aquaculture Farming Aquatic Animals And Plants,2012, John S. Lucas