AQUACULTURE III

10. WEEK

Aquaculture: Biotechnology

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

- The potential impact of modern biotechnology on fish aquaculture

- The introduction of molecular techniques in addition to the more traditional methods of biotechnology has supplied the resources to increase significantly production in world aquaculture. The ability to identify relevant genes endowing the phenotype of interest has certainly been helped by the ever-expanding databases, which have benefited not only from the various genome projects, but also from contemporary approaches such as the DNA chip, improved 2-D gel resolution and high throughput mass spectrometers.

Melamed, P., Gong, Z., Fletcher, G. and Hew, C.L., 2002. The potential impact of modern biotechnology on fish aquaculture. *Aquaculture*, *204*(3-4), pp.255-269.

- The potential impact of modern biotechnology on fish aquaculture

- This, combined with improvements in transgenic technologies, has opened up vast possibilities to the aquacultural biotechnologist which include improving growth rates and cost-effectiveness, increasing resistance to pathogens and stressors, improving quality of broodstock and also creating the opportunity of making new or different products through altering their genetic make up.

Melamed, P., Gong, Z., Fletcher, G. and Hew, C.L., 2002. The potential impact of modern biotechnology on fish aquaculture. *Aquaculture*, *204*(3-4), pp.255-269.

- Biotechnology offers revolution to fish health management

- Biotechnology has many applications in fish health management. The application of monoclonal antibodies (mAbs) provides a rapid means of pathogen identification; antibodies to immunoglobulins from different fish species can be used to monitor the host response following vaccination; and mAbs also have the potential for screening broodstock for previous exposure to pathogens.

Adams, A. and Thompson, K.D., 2006. Biotechnology offers revolution to fish health management. *Trends in biotechnology*, *24*(5), pp.201-205.

- Benefits, environmental risks, social concerns, and policy implications of biotechnology in aquaculture

- Among the many methodologies encompassing biotechnology in aquaculture, this report addresses: the production of genetically modified aquatic organisms (aquatic GMOs) by gene transfer, chromosome set manipulation, or hybridization or protoplast fusion between species; new health management tools, including DNA-Based diagnostics and recombinant DNA vaccines; Marker-assisted selection; cryopreservation; and stock marking.

Kapuscinski, A.R. and Hallerman, E.M., 1994. *Benefits, environmental risks, social concerns, and policy implications of biotechnology in aquaculture*(No. PB--96-107586/XAB). Minnesota Univ., St. Paul, MN (United States). Dept. of Fisheries and Wildlife.

- Benefits, environmental risks, social concerns, and policy implications of biotechnology in aquaculture

- These methodologies pose a wide range of potential economic benefits for aquaculture by providing improved or new means to affect the mix of necessary material inputs, enhance production efficiency, or improve product quality. Advances in aquaculture through biotechnology could simulate growth of the aquaculture industry to provide a larger proportion of consummer demand, and thereby reduce pressure and natural stocks from over-harvest.

Kapuscinski, A.R. and Hallerman, E.M., 1994. *Benefits, environmental risks, social concerns, and policy implications of biotechnology in aquaculture*(No. PB--96-107586/XAB). Minnesota Univ., St. Paul, MN (United States). Dept. of Fisheries and Wildlife.

- Interface of biotechnology and ecology for environmental risk assessments of transgenic fish

- Genetically engineered fish with enhanced phenotypic traits have yet to be implemented into commercial applications. This is partly because of the difficulties in reliably predicting the ecological risk of transgenic fish should they escape into the wild. The ecological consequences of the phenotypic differences between transgenic and wild-type fish, as determined in the laboratory, can be uncertain because of genotype-by-environment effects (GXE).

Devlin, R.H., Sundström, L.F. and Muir, W.M., 2006. Interface of biotechnology and ecology for environmental risk assessments of transgenic fish. *Trends in biotechnology*, *24*(2), pp.89-97.

- 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