INSECTS AS A COMPANION TO SUSTAINABLE AQUACULTURE

USING INSECTS, (AND OTHER INVERTEBRATES) TO MAKE AQUACULTURE MORE SUSTAINABLE

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THE FUTURE OF AGRICULTURE IS AQUACULTURE

It’s going to happen, it’s already happening, the world’s a-changing and we are on the forefront.

❖ Growing world population
❖ Dwindling commercial harvests
❖ Environmental awareness
❖ World Food and Agriculture Organization of the United Nations (FAO)

Forestry Paper 171
# AGRICULTURAL CONSIDERATIONS

**Feed**
- Conversion
- Source
- Nutrition
- Cost

**Product**
- Health
- Quality

**Consumer**
- Quality of life
- Quality of product
- Sustainability

**Waste**
- Composition
- Disposal
YOUR NEW BEST FRIENDS!

Drosophila hydei  Drosophila melanogaster

Tenebrio molitor

Hermetia illucens

Eisenia fetida

Great Circle Tribe

Compost Mania
FEED

- Conversion
- Source
- Nutrition
- Cost
PRODUCT

- Health
- Quality
WASTE

- Composition
- Disposal
CONSUMER

- Quality of Product
- Quality of Life
- Sustainability
THE FUTURE OF AQUACULTURE IS IN SUSTAINABILITY

Mimics natural cycles

- Insects are low trophic order decomposers + nutrient reclaimers.
- Omnivorous and carnivorous fish are built to process insects.

It’s the most logical step forward, and darn near everybody agrees it’s the direction to be going.

- Recirculating Aquaculture Systems + Hydroponics = Aquaponics → Polyculture → Integrated Multi-Trophic Aquaculture
- Applications for State, Federal, Commercial, Tribal, household and community facilities

If we can save the world WHILE being efficient and cost effective... why the heck wouldn’t we?
OH! THE POSSIBILITIES!

Sustainability!! (It could be one of our considerations, not just a by-product!)

❖ Aquatic version of permaculture

Behavior

❖ Teach fish to find living food post-release, perhaps leading to improved survival

Improved survival (hatcheries)/Fewer fish released

❖ Which in turn leads to changes in behavior, happy bios, happy wild fish fans

Excellent example for community/education and outreach

❖ Myriad opportunities to discuss fish culture, habitat and environmental issues regarding salmon

Produce more jobs

❖ Really, who’s against more jobs?
THEY EAT STYROFOAM!

...and they like it!

Biodegradation and Mineralization of Polystyrene by Plastic-Eating Mealworms, Yang et. al
ADDITIONAL INSPIRATION

- FAO Forestry Paper 171
- FAO Fisheries and Aquaculture Technical Paper 529
- Fish Hatchery Management, AFS Publication
- USDA Sustainable Agriculture Research & Education Grants
- Canadian Integrated Multi-Trophic Aquaculture Network
- Enterra Feed
- EnviroFlight
- UnionPoint Custom Feeds
- Bitwater Farms
- DipTerra LLC