



Aquaculture with Small Fish Species has the Potential to Improve Nutrition and Combat Micronutrient Deficiencies

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Outline

- Agriculture success in Bangladesh: Aquaculture
- Small fish consumption
- Small as a rich source of micronutrients
- Potential of small fish to combat micronutrient deficiencies
- Inclusion of small fish in aquaculture: Ponds, wetlands and rice fields

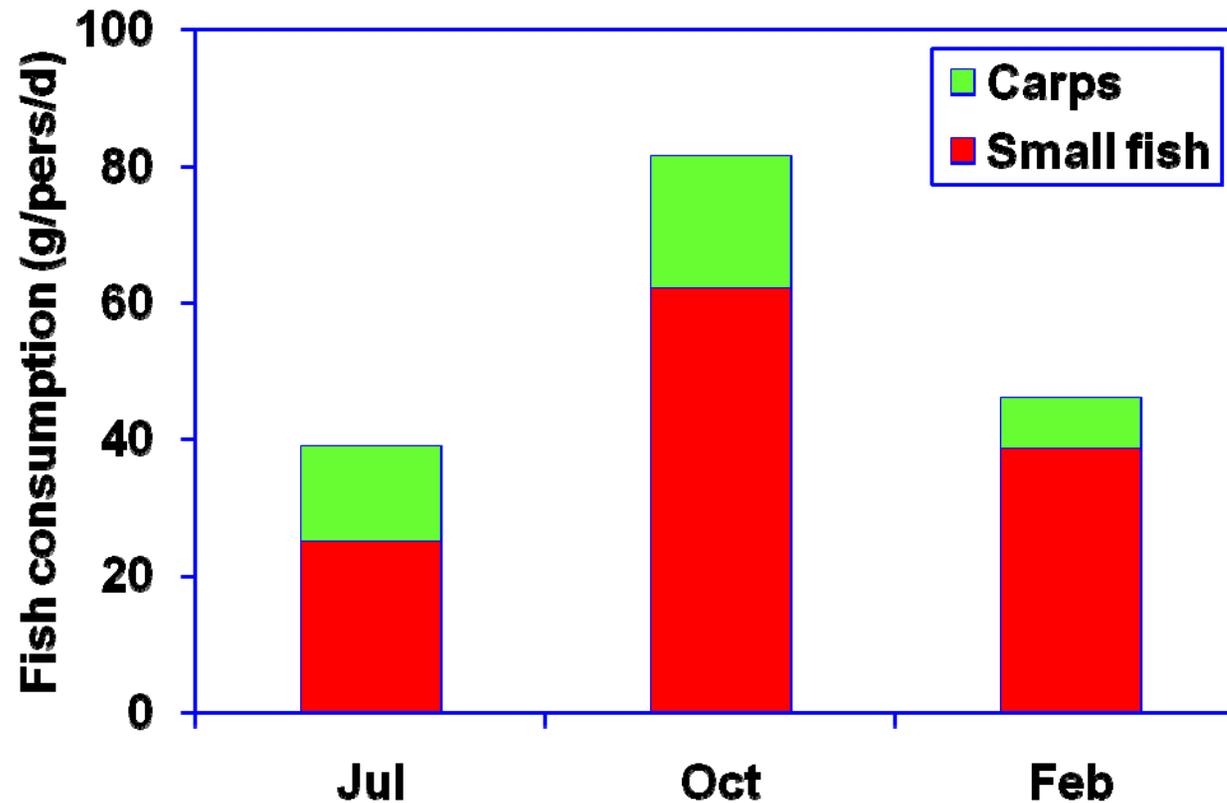
Diversity of Small Fish



Success in Pond Aquaculture



Fish Consumption in Rural Households in Bangladesh



Small Fish in the Diets of Rural Populations

- Common, everyday food, though small quantity, of all household members, including women and children
- Well-liked
- Add diversity to diets based on one staple food
- Carrier of oil, vegetables and spices



Contribution of Fish to Nutrient Intakes

Fish protein (all fish)

Essential fatty acids (high price)

Small Fish – eaten whole with head, bones, viscera:
rich in essential micronutrients (vitamins and
minerals); e.g. vitamin A, iron, zinc, calcium,
with high bioavailability

Small Fish: Source of vitamins and minerals



Average household recommendations:

40% vitamin A

32% calcium

Small Fish Species: Rich Source of Multiple Essential Micronutrients

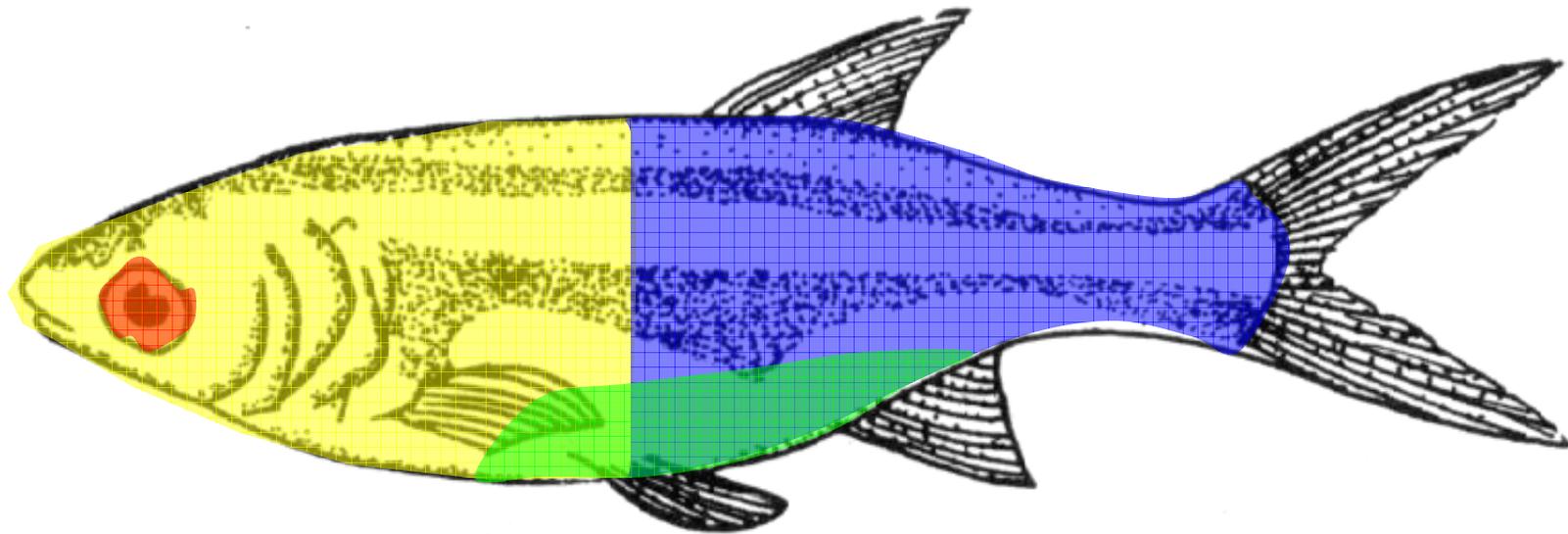


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Vitamin A Content in Fish Species

Species	Vitamin A Mean (RAE/100 g,raw, edible parts)
<i>Amblypharyngodon mola</i>	2,680
<i>Rasbora tornieri</i>	1,477
<i>Clupeoides borneensis</i>	250
<i>Channa punctatus</i>	140
Corica soborna	90
Silver carp	30

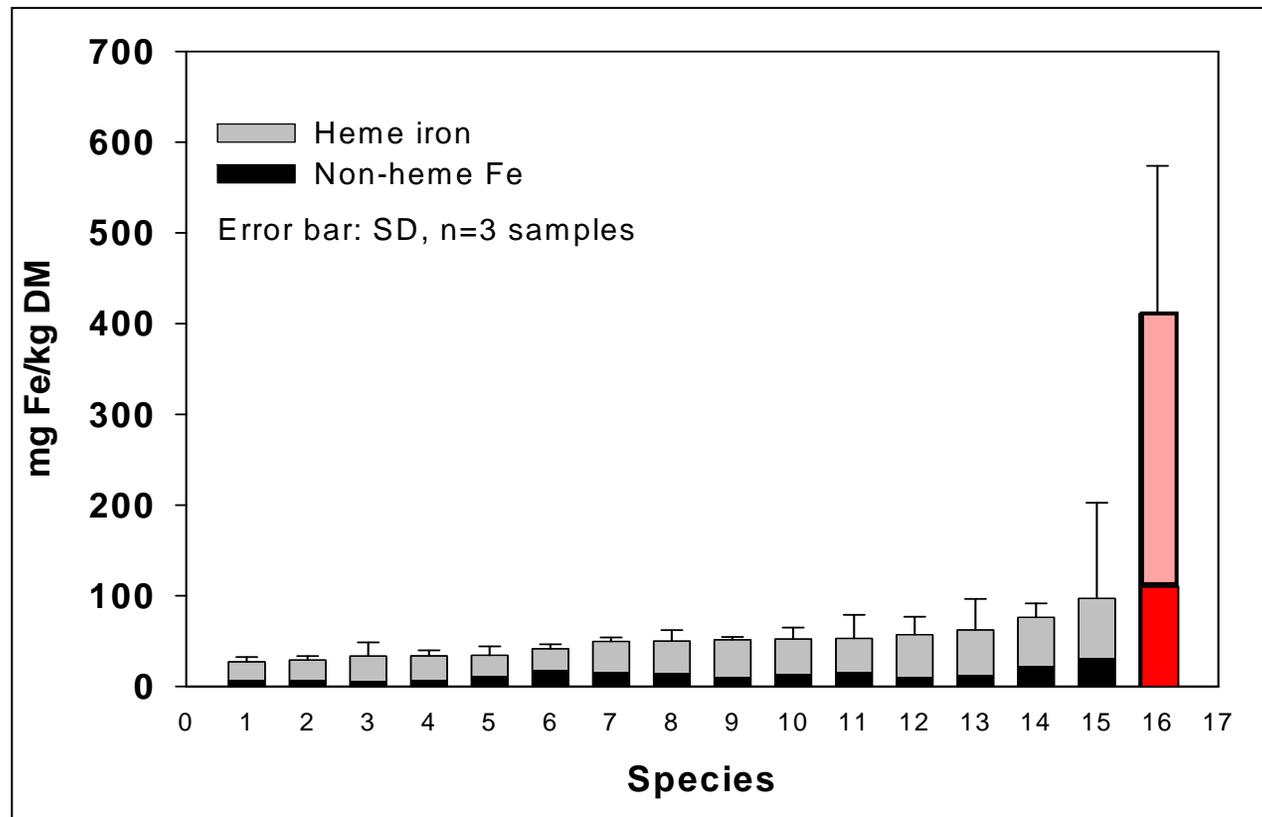


Vitamin A content in mola: 2,680 RE/100 g raw edible part

Contribution of Mola in Pond Aquaculture to Vitamin A Recommendation

- **Estimated number of small household ponds in Bangladesh: 4 million**
- **Estimated minimal production of mola / pond / year: 10 kg**
- **Estimated contribution to vitamin A recommendation: 6 million children**

Iron Content in Common Cambodian Fish Species

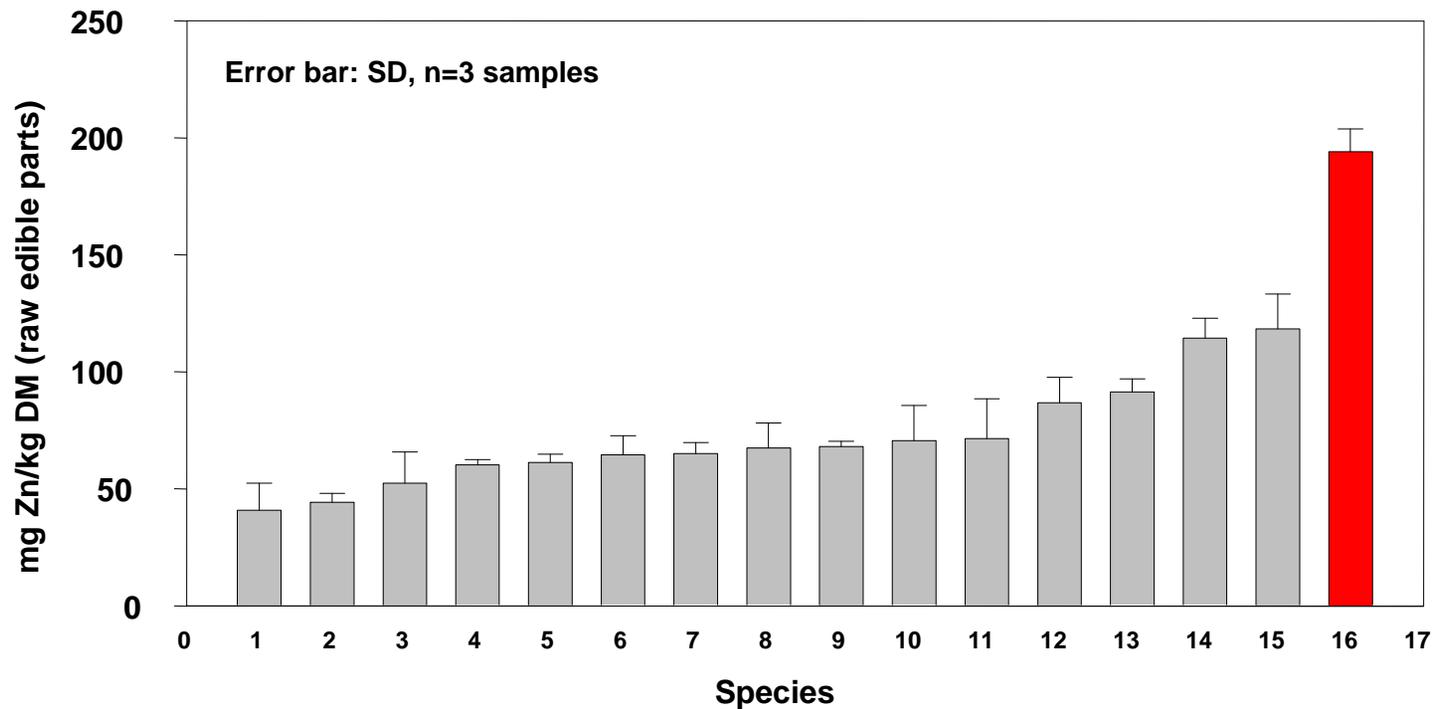


Species: 1. *Rasbora tornieri*; 2. *Cyclocheilichthys apogon*; 3. *Barbodes altus*; 4. *Barbodes gonionotus*; 5. *Puntioplites proctozysron*; 6. *Osteochilus hasselti*; 7. *Trichogaster microlepis*; 8. *Parachela siamensis*; 9. *Channa marulius*; 10. *Euryglossa panoides*; 11. *Helostoma temmincki*; 12. *Parambassis wolffi*; 13. *Channa micropeltes*; 14. *Dangila sp*; 15. *Dermogenys pusilla*; 16. *Esomus longimanus*.

Iron Contribution from a Traditional Sour Soup Meal with Fish

	Meal	<i>Esomus longimanus</i> intake (g)	Total absolute Fe requirement median (mg Fe/d)	Proportion of Fe requirement (%)
Woman	257 g sour soup 357 g rice	49	1.46	42
Child (1 – 3 y)	100 g sour soup	25	0.46	42

Zinc Content in Common Cambodian Fish Species



1 Species: 1. *Barbodes altus*; 2. *Barbodes gonionotus*; 3. *Puntiplites proctozysron*; 4. *Channa marulius*; 5. *Channa micropeltes*; 6. *Helostoma temmincki*; 7. *Trichogaster microlepis*; 8. *Parambassis wolffi*; 9. *Osteochilus hasselti*; 10. *Dangila sp.*; 11. *Euryglossa panoides*; 12. *Cyclocheilichthys apogon*; 13. *Parachela siamensis*; 14. *Rasbora tornieri*; 15. *Dermogenys pusilla*; 16. *Esomus longimanus*

Bioavailability of Minerals

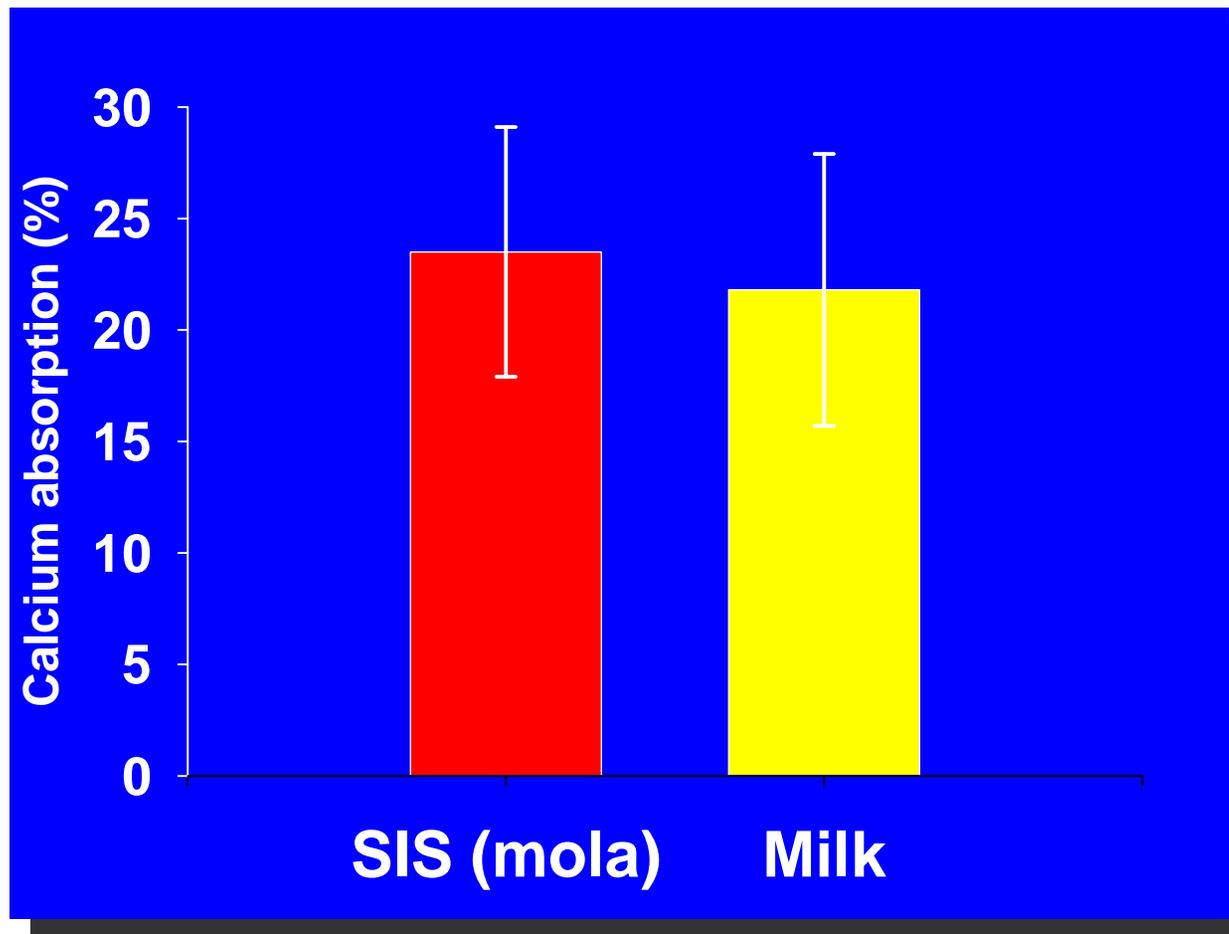
**Fish enhances the bioavailability
of iron and zinc from all foods in the meal.**

Calcium Content in some Fish Species

	Content in raw, cleaned parts mg Ca/100 g	Correction factor for plate waste	Content in raw, edible parts mg Ca/100 g
Mola	853	0.91	775
Puti	1171	0.67	784
Taki	766	0.26	199
Silver carp	903	0.04	36
Mrigal	960	0	0

Calcium Absorption from Fish

Human study, isotope labelled test meal



Aquaculture in Small Ponds: Inclusion of Micronutrient Rich Small Fish

- Increases total fish production
- Increases the nutritional quality of the production
- Does not decrease carp or prawn production
- Small fish breed in ponds and partial harvesting must be practised
- Frequent harvesting of small amounts of small fish favours home consumption

Aquaculture in Wetlands and Rice Fields



- Stocking of large fish
- Management and promotion of non-stocked fish: small fish
- Monitor diversity and production of small fish