

Introduction part II

Empurau, *Tor tambroides*

Natural habitat and water quality

Natural habitat

- Tropical area
- Freshwater: rivers, streams
- Benthopelagic
- In Sarawak, *T. tambroides* distributed in most river systems
- Especially upstreams with fast, clear flowing waters with rocky substrates



Adults

- Found in upstream pools
- Runs over gravel and cobble in rivers
- Mature individuals migrate upstream and spawn near the mouths of small streams
- Mostly occurred in slow-running and more turbid water



Juveniles

- Can be found in or near rapids
- Can be found in large, medium and small streams
- predominant followed by bedrock, sand, gravel, cobble and pebble.
- They also can be found in small rivers and streams during the dry season.
- Move downstream at the onset of the rainy season.
- Generally favour clear waters.



Water quality

Some of the water quality parameters for *T. tambroides* recorded in aquaculture facility in Sarawak.

Water quality

Water temperature: 22.5 to 35.1 °C

Dissolved oxygen: 2.4 - 15 mg/L

pH: 5.6 to 10.9

Total ammonia (TAN): 0.02- 2.1 mg/L

Total alkalinity: 8 -72 mg/L

Conductivity: 0.004-2.58 us/cm

(ENACA, 2007)

Natural spawning and feeding habit

Natural spawning

- Breeding season is between July to September
- In nature, mature individuals migrate to upstream water to spawn
- The spawning habitat is in clear, calm and slow moving upstream waters with pebble or sandy bottom
- Mature - female > 2.5 kg, male > 0.75 kg
- Eggs are spherical, demersal and non-sticky
- Hatching occurs 69-90 hours post-fertilization

Feeding habit

- Omnivorous
- Bottom feeder
- Consume on both animal and plant food sources
- Animals: terrestrial insects, snails, mollusks, worms
- Plants: Algae, wild fruits, seeds, flowers and leaves that fall into the water - engkabang, dabai, ara, kepayang, ensurai



Engkabang



Dabai



Ensurai



Ara

Feeding empurau in captivity

- There are no commercially available artificial diets specifically formulated for empurau.
- Empurau in local captivity are often fed tilapia or seabass formulated diet.
- For example empurau broodfish were fed commercially available fish diets with 40-45% crude protein and 5-10% fat.
- This may not be suitable for empurau broodfish as their nutritional composition of amino acids, fatty acids and etc may not be suitable.

Nutrient requirement

- Protein - the dietary protein level of 40% was the most optimum for empurau fingerlings (Misieng *et al.*, 2011).
- Lipid - best performance of empurau juveniles was achieved at 5% dietary lipid (Ramezani Fard *et al.*, 2011).
- Empurau juveniles fed a diet containing low amount of n–3 PUFA (2%) and high amount of saturated fatty acid (38%) showed the best growth performance (Ramezani Fard *et al.*, 2011).
- As omnivor, empurau perform well with plant based ingredients – local source of ingredients e.g. wild fruits, palm oil etc can be used in feed formulation.

Thank you