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TROPICAL RECIRCULATING AQUACULTURE SYSTEM FOR COMMERCIAL MARINE FISH PRODUCTION

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BACKGROUND

- 85% of global fish stocks are over-exploited, depleted, fully exploited or in recovery from exploitation.
- Fishery resources in Malaysian waters had declined significantly from 2.56 tones per sq. km in 1971 to only 0.21 tones per sq. km in 2007.
- Vision 2020 targets the agriculture sector to attain an annual growth of around 3.5%. The capture fisheries and aquaculture sub-sector is targeted to play a main role in achieving this sector's projection. The Fisheries sector generates income and employment in Malaysia.
- Past policy focused on growth and increase of fish landings, while neglecting issues of resource sustainability, environment protection and socioeconomic upliftment of the fishing community
- Annual total fish landings have been exceeding the maximum sustainable yield. As a result, several species of local fishes have disappeared. Moreover, marine life habitats such as mangroves, sea grass beds and coral reefs, which are sanctuaries for the reproduction and regeneration of marine life such as fish, prawns and crabs, have been destroyed.
- The demand for fish in 2020 will be at 1.68 billion kilograms (with a projected population of 33.6 million). While our demand for seafood is growing, our fish stocks are rapidly dwindling and we are eating juveniles. Aquaculture is only a solution if sustainably managed.

PRODUCT DESCRIPTION

- Tropical Recirculating Aquaculture System (TRAS) was developed for commercial inland marine fish production in tropics
- The technology is made by integration of local naturally ventilated building structure and recirculating aquaculture system
- Building structure protects fish growing up against solar radiation, rain, wind, pests, insects and diseases
- Natural Ventilation exchanges air, reduces temperature and humidity of in-house environment
- TRAS consists of circular fiber glass tanks, suction pump, bead filter, ultra violet sterilizer, oxygen saturator and water supply.
- Recirculating of seawater provides conducive environment for inland commercial marine fish production



NOVELTIES

- Naturally Ventilated Building Structure and Tropical Recirculating Aquaculture System (TRAS) enable commercial inland marine fish production in tropics
- Building structure generates air temperature and humidity between 25-30°C and 60-80 % respectively.
- Natural Ventilation controls temperature and humidity at no cost in controlling building environmental cooling.
- Recirculating Aquaculture System simulates conducive marine fish ecological habitat requirements.
- Enables high yield and premium quality of inland marine fish production all year round
- Minimizes risk against, water pollution, insects and diseases as compared to conventional sea cage or open earth pond production.
- Green technology, modern, sustainable and environmental friendly marine fish production system.

APPLICATIONS

- Naturally Ventilated Building Structure and Tropical Recirculating Aquaculture System (TRAS) suitable for commercial inland marine fish production.
- The system replaces expensive imported recirculating aquaculture system and mechanization system in tropics.
- Replaces conventional open earth pond or marine fish cage production which is not technically feasible and economically viable.
- Contributed to mass production of Naturally Ventilated Building Structure and Tropical Recirculating Aquaculture System as in industrial building system.
- Natural ventilation system exchanges air in hot and humid tropical weather for building cooling, reducing air temperature and humidity.
- Recirculating Aquaculture System provides conducive environment for commercial marine fish production.

INVENTION ADVANTAGES

- Local design criteria, materials, industrial building system and mass production.
- Durable, reliable, functional and low maintenance of Building Structure and Recirculating Aquaculture System.
- Natural Ventilation System at no energy cost to control air exchanges, temperature and humidity.
- Cost-effective and low maintenance by integration of building and Recirculating Aquaculture System.
- Enables commercial high value inland marine aquaculture production.



COMMERCIAL POTENTIALITIES

- Mass production of building and Recirculating Aquaculture System.
- Quality marine fish can be produced all year round.
- Less labor in marine fish production as compared to conventional open earth pond or fish cage system.
- High yield and premium quality marine fish production.
- 16 ton garupei production: 2-3 years payback, 45% IRR and RM 490,000.00 net present value.

RECIRCULATING AQUACULTURE SYSTEM	
Species	Grouper
Carrying capacity	10 kg/m ³
Feeding rate	10 kg/day
TAN production	0.46 kg TAN per day
TSS production	2.5 kg TSS per day
Oxygen requirement	7.5 kg O ₂
Water circulating flow rate	100 gpm

RAS Water Quality	
Salinity	25 - 32 ppt
Temperature	25 - 30 °C
Oxygen	4 - 6 mg/L
Total Ammonia Cal Nitrogen, TAN	≤1.6 mg/L
Nitrite	≤0.1 mg/L
Nitrate	≤200 mg/L
Total Suspended Solids	≤80 mg/L
Alkalinity	≤300 mg/L

