केंद्रीय समुद्री मात्स्यिकी अनुसंधान संस्थान
CENTRAL MARINE FISHERIES RESEARCH INSTITUTE

Socio Economic Evaluation and Technology Transfer Division

Entrepreneur- Ready Technologies of CMFRI

Green Mussel Extract (GMe)

Brief Description

- 'GMe' contains 100 % natural, marine, bioactive anti-inflammatory principles extracted from green mussel.
- Constituents :A blend of nutraceuticals and nutritional elements including omega 3 fatty acids, glycogen complex, phospholipids, essential amino acids, vitamins, naturally chelated minerals, antioxidants, carotenoids and enriched polysaccharides.
- Content: Each capsule contains GME active principle 600 mg supplemented with 100 % natural ingredients.
- Target Users : Those having problems with chronic joint pain, arthritis and the product improves cardiovascular functioning.
- Dosage : Two capsules per day along with food.

Technology Benefits

- A product which is effective for chronic joint pain, arthritis and inflammatory diseases.
- Free from deleterious trans-fatty acids, free radical adducts and low molecular weight carbonyl compounds.
- Improves cardiovascular functioning and is a complete nutritional supplement.
- Alternative to synthetic non steroidal anti-inflammatory drugs having undesirable side effects.
- A highly cost effective indigenous product.

Financial Aspects

- Total investment = 7.26 crores*
- Rate of Return = 45.42%
- Profitability = 50.44%
- Market Potential = 600 crores/ year

*(Project duration 20 years)

VARNA- The marine ornamental fish feed

Brief Description

- 'Varna' is a scientifically evaluated slow sinking marine ornamental fish feed.
- Constituents : 38 % protein, 9 % fat, 39 % carbohydrates, 7% ash (minerals) and less than 2% fiber. Contents are marine protein, soy protein, wheat flour, oil vitamins, minerals, colour imparting nutrients like carotenoids from natural sources, immune promoters, probionts and antioxidants.
- Availability : In particle size: 0.25mm, 0.75 mm and 1 mm.
- Target Users : Ornamental fish farmers/ Aquarium hobbyists.
- Recommended usage: Feed 2-3 % of the fish body weight once in a day.

Technology Benefits

- Capable of maintaining growth, health, colour and vigour of the fishes.
- Scientifically evaluated and standardized feed.
- Quality assured with all essential ingredients.

Financial Aspects

- Total investment = 74.50 lakhs*
- Rate of Return = 41.26%
- Profitability = 51.66%
- Market Potential = 200 crores/ year

*(Project duration 20 years)

Broodstock development, Captive breeding & Larval rearing of Marine Ornamental Fishes

Brief Description

- Achieved breakthrough in developing a package of technologies on broodstock development, captive breeding and larval rearing of 17 species of marine ornamental fishes.
- Clown fishes : 7 species: True percula/ clown anemone fish, *(Amphiprion percula)* Tomato clown *(A. frenatus)*, Sebae clown, False clown, Maroon clown / Spine cheek anemone fish, Orange anemone fish, and Clarkii clown.
- Damsels fishes : 9 species : Blue damsel, Striped damsel, Three spot damsel, Peacock Damsel, Yellow tail damsel, Green chromis, Filamentous tail damsel, One spot damsel and Sapphire devil.
- Dotty backs : 1 species : Read head dotty back.

Technology Benefits

- High survivability of larvae in captive condition than wild caught.
- Disease resistant.
- High fecundity.

Financial Aspects

- Total investment = 32.4 lakhs*
- Rate of Return = 300%
- Profitability = 375.29%
- Market Potential = 1000 crores/ year

*(Project duration 10 years)

Larval production of Cobia

Brief Description

- Achieved breakthrough in Broodstock Development, Induced breeding and larval production of Cobia, *(Rachycentron canadum)*at Mandapam.
- Collected Fishes weighing 10 kg & above in live condition from commercial catches and transported to hatchery.
- The conditioned fishes are stocked and reared in cages with appropriate broodstock feeds.
- Cannulation of the fishes done at regular intervals & males and females about to reach the spawning stage are isolated and stocked in separate cages.
- When the ova diameter of the female reaches around 700 microns, the fish can be selected for inducing spawning. A ratio of 2 males: 1 female is ideal for spawning.
- Induction of spawning is done by administering HCG at doses of 500 IU per kg body weight for females and 250 IU per kg body weight for male.
- Successful spawning obtained within 48 hours. Eggs spawned 2.1 million, Fertilized eggs 1.9 million.
- Collected the floating eggs by a 500 micron mesh and incubated in the incubation tanks.
- The eggs hatch after 22 hours of incubation at a temperature range of 28 – 30°C. The newly hatched larvae(1.5 million) are stored in the larval storage tanks for marketing.


Spawning behaviour inside the spawning tank


Administration of hormones for Final oocyte maturation and spawning


Fertilized eggs collected on 500 micron mesh


Developing embryo of Cobia


Cobia larvae on 4th day of post hatch

Technology Benefits

- High survivability of larvae.
- High fecundity.
- The larvae can be reared to fingerlings at the idling shrimp hatcheries, which can be modified for the purpose.
- A fingerling of 6cm size can be sold @ Rs.10/-

Financial Aspects

- Total investment = 63.50 lakhs *
- Rate of Return = 74.19%
- Profitability = 89.76%
- Market Potential = 10 crores/ year

*(Project duration 10 years)

Cost effective open sea cage

Brief Description

- Developed at Karwar with dimensions: Diameter 6 m, Height 120 cm, Depth 6 m, Total weight 700kg.
- Make : Good quality 1.5" GI pipe (B Class), Joints double welded for extra strength, Structure provided with single coat epoxy primer & double coat epoxy grey paint to prevent rusting.
- Additional floatation with fibre barrels of 200 litres filled with 30 lb air & inflated barrel provides stable platform for operations.
- Outer net at 60 cm above water level prevents predatory fish entry to middle space.

Technology Benefits

- Low Cost cage of Rs 1 lakh including netting & mooring and a single crop can recover the investment of input cost.
- Less Weight : 700 kg.
- Can take the weight of 20-25 persons at a time on the platform safely for managerial operations.
- As the size is same as HDPE cage, area wise both cages give the same performance.

Financial Aspects

- Total investment = 5.89 lakhs*
- Rate of Return = 69.78%
- Profitability = 88.58%
- Market Potential = 2000 crores/ year (for increasing fish production by 1 lakh tonnes)

*(Project duration 1 year)

A device for breeding and culturing marine fish in open sea: Open Sea Cage Farming in HDPE Cage

Brief Description

- A promising venture which offers the fishers a chance for optimally utilizing the existing water resources.
- The open sea cages are used for cultivating marine fishes with domestic and export orientation.
- Make: High Density Poly Ethylene (HDPE). Dimensions: Diameter 6 m, Height 120 cm, Depth 6 m.
- Candidate species grown in cages: Sea bass, Red snapper, Chanos, Mullets, Cobia, Pompano, Groupers, Koth, Pomfrets, Lobsters etc.

Technology Benefits

- Optimally maintains the size and quality of the marine fishes.
- Eco-friendly system without any human intervention.
- Sustained survival rate of above 75%.
- Great potential of expanding the scale of mariculture production.

Financial Aspects

- Total investment = 8.61 lakhs*
- Rate of Return = 33.80%
- Profitability = 62.71%
- Market Potential = 2000 crores/ year (for increasing fish production by 1 lakh tonnes)

*(Project duration 1 year)

Green Algal extract (GAe)

Brief Description

- A 100% vegetarian nutraceutical 'Green Algal extract' (Cadalmin™ GAe) against joint pain and arthritis.
- Provides a unique blend of 100 % natural, bio-active anti- inflammatory ingredient extracted from seaweeds with an ecofriendly 'green' technology.
- Concerted efforts of CMFRI scientists to explore new sources of secondary metabolites from seaweeds led to its design and development.
- Components with anti-inflammatory properties isolated from seaweeds/marine macro algae which are natural alternatives to synthetic anti-inflammatory drugs to combat arthritis.

Technology Benefits

- A green alternative to the existing allopathic medications of joint pain and arthritis having undesirable side-effects & serious health consequences like stomach bleeding, stroke, and acute renal failure etc.
- Active ingredients are chemically engineered to retian the anti-inflammatory properties for an extended shelf life and stability.
- Suppresses the edema produced by histamine & exhibits its anti-inflammatory action by means of either inhibiting the synthesis, release or action of anti-inflammatory mediators.
- Active ingredients also suppress the build-up of uric acid in hyperuricemic patients.
- Product is free from carcinogenic trans fatty acids, radical adducts, low molecular weight carbonyl compounds & inhibits the pathogenic bacterial build-up due to in-built antibacterial principles embedded.
- Perfectly vegetarian product, with its therapeutic values & an import substitute with an international appeal, providing great market potential especially for the vegetarian population.
- Hygienically processed active ingredients are packed in low moisture content 100% plant-based Naturecaps capsules as 'Cadalmin™ GAe' meeting need of the end users.
- Each capsule contains GAe active principle of 500 mg.
- Highly cost effective indigenous product.
- Recommended dosage: 2 capsules a day after food for the first 3 months, followed by a maintenance dose of 1 capsule daily.

Financial Aspects

Total investment = 1.72 crores*
Rate of Return = 214.73%
Profitability = 352.03%
*(Project duration 20 years)

A Success in Finfish Breeding: Pompano *(Trachynotus blochii)* at CMFRI

Brief Description

- Silver Pompano, a high value marine tropical finfish due to its fast growth rate & high market demand is a potential mariculture giant which has vast domestic and global business prospects & CMFRI achieved the milestone of first successful broodstock development, induced breeding and larval production which is akin to highly priced Pomfrets, popularly referred as American Pomfret.
- As it is caught only sporadically in the commercial fishery, its natural availability in the sea is scarce & is a much sought after species whose demand can be met only through aquaculture.
- Farming can be carried out in ponds, tanks and floating sea cages & is able to acclimatize and grow well even at a lower salinity of about 10 ppt & hence suited for farming in the vast low saline and brackish waters.
- Success in breeding at CMFRI, Mandapam research Centre is a major step in the development of seed production technology.

Larva on 2dph


Aview of larva


Fingerlings 45dph


Sampled pompano weighing 250 gram

Technology Benefits

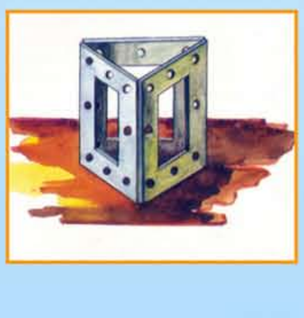
- In the breeding process, after the successful larval rearing, fish was transported by road from Mandapam, in Tamilnadu to Antervedi in the East Godavari district of Andhra Pradesh at a distance of 1200 km and about 3,600 seeds were stocked in 1 acre pond of a farmer & fed with indigenous pellet feed and maintained good pond environment, resulting in a survival of more than 95%.
- Formulated pellet feed cost is about Rs 25/kg & an FCR of 1:1.8 was achieved in this crop. Within 8 months, they reached a size range of 450-550 g weight, An excellent table size for marketing.
- Fish can feed at all angles, which makes it a versatile and most aquaculture friendly and by separating the nursery phase, 2 harvests in one year can be made. About 12,000 seed can be stocked in one hectare & about 5 tons of fish can be harvested per crop.
- Looks and tastes like silver pomfrets and fetches a farm gate price of about Rs 200/kg. Collected as young ones, nurtured them to maturity and successfully induced them to spawn with suitable hormonal protocols developed by CMFRI.
- As the total availability of high valued marine fish in India from marine capture fisheries is about only 2 lakh tonnes per year, such fish are in great demand in all Metros, particularly during the national trawl ban period on east and west coasts & demand is estimated at about 2 lakh tonnes & fetches highest price during this period. Therefore it's harvest gains importance to aquaculture to bring barren coastal saline low lying lands to produce high valued fish, to improve the food production and nutritional enhancement of the country.

Artificial Fish Habitats/Fish Aggregating Devices

Brief Description

- An object or a construction which promotes an ecosystem and provides habitat for fishes
- A device for increasing fish biomass in the inshore areas.
- AFH attracts shelter and concentrate fishes and helps to increase fish production in coastal areas.
- Enables fisherolk to to fish near the shore without spending much time and energy to locate fish in far away areas.
- In AFH areas, the catch per unit effort is higher compared to non-AFH areas.
- AFH areas form additional fishing grounds to the artisanal fisherfolk.


Midwater fish habitats



Types of AFH

- Artificial Reef or bottom AFH placed on the sea bottom:
  Materials : Old tyres, concrete structures of different shapes, fibre-glass-re-inforced plastic (FRP), High Density Polyethylene(HDPE), Weighted logs and braches of trees.
- Surface AFH anchored or drifting near the surface: Anchored floats or bamboo rafts are used.
- Midwater AFH anchored in the water column: A log uses as float from which a rope hangs to the bottom in shallow waters. A stone is used as a weight & coconut leaves are attached along the rope.

Selection of reef site & device

- A firm sand or shell bottom is suitable to prevent subsidence.
- Bottom profile should be flat or gently sloping.
- Site nearer to a fishing village will simplify the logistics of installation & to minimize travel time.
- Sites with strong tidal currents prone to erosion, river mouths where siltation may bury the reef, soft clay, silt and sediments, high wave energy locations, areas of seasonally shifting sand etc. should not be considered.
- Commercial fishing areas: operating fisherfolk should be convinced of its advantages.
- Material: A triangular ferrocement module of 5 ft :

Advantages
- Total weight is 120 kg & handling & placement are easy.
- Provides maximum surface areas for epifaunal growth.
- Design helps to function effectively in different positions.
- Ferrocement helps to reduce cost of the device.
- Enhances economic returns and sustainable fisheries development.

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