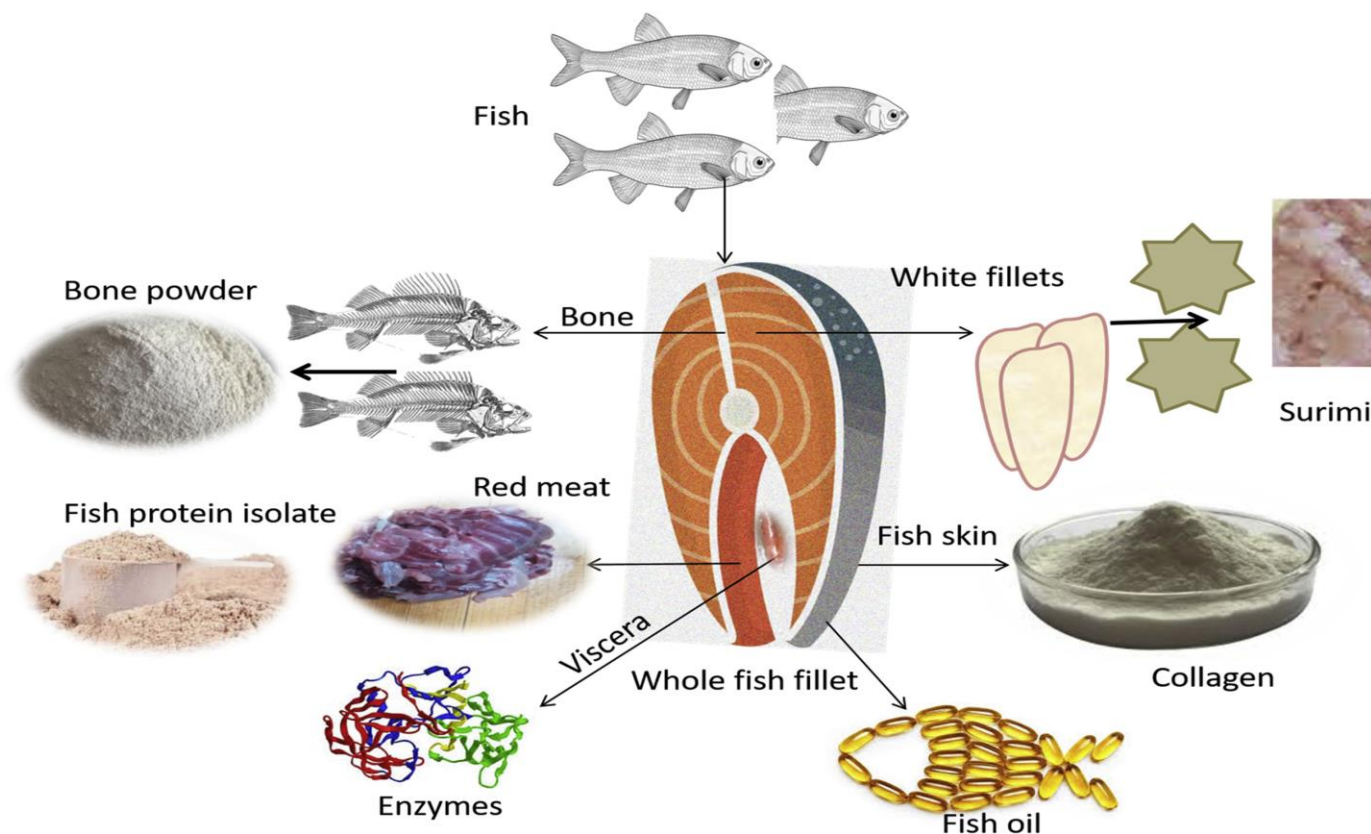




VALORISATION OF REST RAW MATERIALS IN SEAFOOD SUPPLY CHAIN



ICAR – CIFT PROPOSITIONS



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Technology Transfer & Professional Service Functions

During the past 10 years, ICAR-CIFT has licensed several technologies on Rest raw materials and has undertaken many professional service projects

36 Technology Transfer Projects

9 Consultancies

8 Collaborative/contract Research Projects



ICAR- CIFT PROPOSTIONS

Ten commercially viable technologies of ICAR-CIFT, which have received maximum inquiries from the industry are presented in the following slides



CHITIN /CHITOSAN/DERIVATIVES

- CHITIN is a Natural polymer extracted from exoskeleton of shrimp, crab etc.
- CIFT has developed a technology for producing chitosan with specific molecular weight and degree of deacetylation
- Chito-oligosaccharides, glucosamine and caroteino-protein complexes are some of the other derivatives/co-products
- Applications: Biomedical and pharmaceuticals, food industry, agriculture, textile, cosmetic and personal care, feed industry, packaging industry, water treatment etc.
- Average cost of production: Rs. 80 /kg (chitin); Rs.280 /kg (chitosan)
- Average market price :Rs. 200 to 400/kg (chitin); Rs.500 to 3000/kg (chitosan)



CARBOXYMETHYL CHITOSAN

- It is a Water soluble derivative of chitosan; native chitosan is soluble only under acidic condition, which limits its application
- Carboxymethyl chitosan is soluble at broader pH range from 7 to 10
- Applications: Biomedical, Food and beverage, Agriculture, Textiles, water treatment, cosmetic, paper industry etc.
- Average cost of production : Rs.800/kg
- Average market price : Rs.2000 to 10000 /kg



FISH COLLAGEN / GELATIN

- Major connective tissue protein
- Constitute about 30% of fish cutting discards
- Major sources: skin, scale, bone, intestine, air bladder
- Applications: Wound healing, Dermal filler, Drug delivery, bone and joint health, medical implants, cosmetics and personal care , nutraceutical industries
- Average market price : Rs.10000 to 30000/kg



FISH COLLAGEN PEPTIDE

- Hydrolysed form of collagen
- Easily digestible and more bioavailable
- Dietary supplement for Bone and Joint health
- Anti-ageing and cosmetic properties
- Sport nutrition to support muscle recovery
- Pet feed supplement especially for muscular breeds
- Major sources: skin, scale, bone, intestine, air bladder
- Average cost of production : Rs. 800/kg
- Average market price : Rs.8000 to 25000 /kg



ASTAXANTHIN

- Astaxanthin is a carotenoid pigment,
- Mainly extracted from shrimp peeling discards
- Can be easily integrated with chitin production line
- Potent anti-oxidant, anti-inflammatory, anti-tumour, UV-protective, cardioprotective, anti-ageing, stress reducing, support brain , heart, eye , joint and immune health , improves endurance
- Average cost of production : Rs.7.5/capsule (4mg)
- Average market price of Capsule (4mg) : Rs.30-40/capsule
- Average market price of powder : Rs.30000 to 60000/kg



MELANIN

- Melanin is a pigment responsible for the black pigmentation of skin, hair, eye etc
- Isolated from cephalopod ink
- Known for characteristic photoprotective, anti-oxidant properties.
- Find applications in nutraceutical, cosmetic and personal care, biomedical imaging, natural colouring agent in food and beverages ..
- Average cost of production : Rs.380/kg
- Average market price : Rs.10,000 to 40,000/kg



HYDROXYAPATITE

- Main component of tooth, bone and nail of animals
- Fish scale and bone is a rich source of natural hydroxyapatite
- Widely employed as implants and grafts in dental and orthopedic applications
- Biocompatible and well tolerated by human body
- Average cost of production : Rs. 360/kg
- Average market price: Medical grade Rs.70000 to 1.5 lakh



FISH CALCIUM

- Source of dietary calcium supplement
- Commercial calcium is essentially calcium carbonate
- Calcium from fish source is calcium phosphate : nutritionally better since it contains phosphorus also
- Major source: Fish bone, scale, fish head etc
- Average cost of production : Rs.3/capsule
- Average market price : Rs.40/tablet



AQUA/POULTRY FEED

Designed and installed a Production line: Adopted by several farmers



- Wet fish market waste is directly converted to feed
- Production line : 500 kg/Day feed production capacity
- Both sinking and floating feed lines are installed
- Average cost of machinery line : 20 lakhs
- Average cost of production : Rs.25/kg floating feed @ average protein content 30%

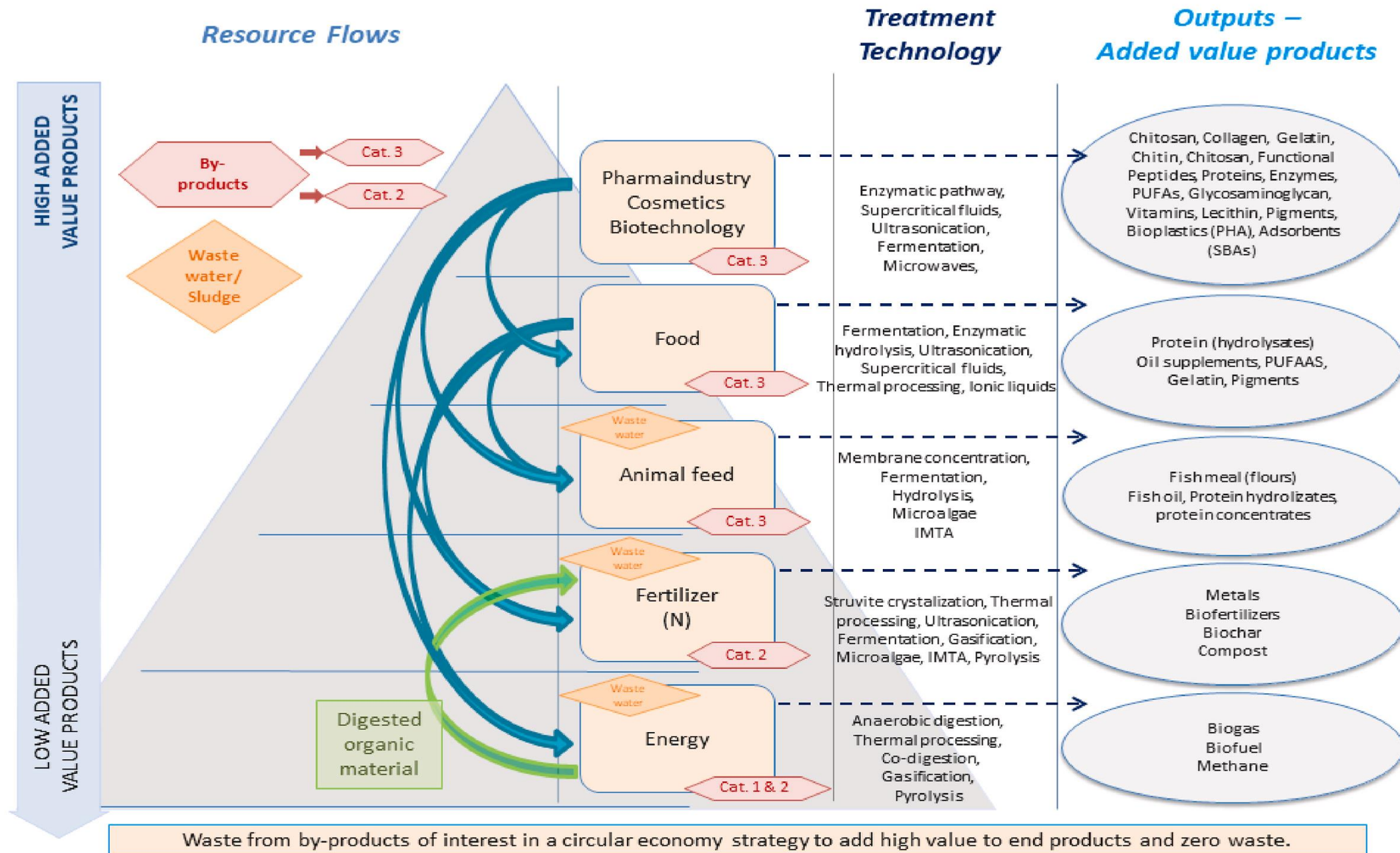


FOLIAR SPRAY



- Efficacy of foliar spray was tested under different field conditions by KVKs, Agricultural Universities, ICAR institutes and farmers
- Upto 25% increase in yield in Maize and 20% in Tomato (KVK, Dharwad)
- Upto 20% increase in yield in Turmeric tubers; Oleoresin content was increased by 16%, Essential oil content by 5% , and curcumin content by 6% (ICAR-IISR, Calicut)
- Pest resistance, microbial resistance (root wilt) and yield increased in cardamom plantation (Farmer's direct feed back)
- Improved stress resilience and germination rate in rice plants when used as seed priming solution (Department of Botany, Calicut University)





CHALLENGES

- Like many other food production systems, seafood must employ the concepts of life cycle thinking and the circular economy to increase production efficiency and mitigate its environmental impact. This is either through valorization strategies or nutrient recovery technologies
- Collection and handling of rest raw materials –Logistics, cold chain .
- Low value products to high value compounds.
- Green chemistry based processing protocols for optimal valorization-Multiple green processes, integrated in a marine biorefinery to optimize valorization on a zero-waste trade-off, for a circular blue economy.
- Policies for the sector to promote valorization of seafood side streams.
- Market options - Targeting markets & trade promotions.
- Cost benefit analysis for the business.



TECHNOLOGY TRANSFER

Technology Name	Client
Chitin, chitosan, chito-oligomers from shrimp shell waste	<ul style="list-style-type: none"> • Chiranjeevi Processors, Tamilnadu • Meck Pharmaceuticals & Chemicals Pvt. Ltd. • Longshore Technologies LLP • Suncrest Biopolymers, Hyderabad • Kings Infra Ventures Ltd., Kerala • Matsyafed • Mr. A. Selvan, Thoothukudi
Fish collagen peptide	<ul style="list-style-type: none"> • Eklavya Biotech Pvt Ltd, Mumbai • M/s. ANDR, Uduppi • ABAD Fisheries Pvt. Ltd., Ernakulam • Pratik Kantila, Kothari • M/s Sunsharp Biotech Pvt. Ltd.
Hydroxyapatite	<ul style="list-style-type: none"> • M/s. ANDR, Uduppi • ABAD Fisheries Pvt. Ltd., Ernakulam
Fish calcium	<ul style="list-style-type: none"> • Eklavya Biotech Pvt Ltd, Mumbai • M/s. ANDR, Uduppi
Collagen supplements for pet nutrition	<ul style="list-style-type: none"> • ABAD Fisheries Pvt. Ltd., Ernakulam



TECHNOLOGY TRANSFER

Fish manure -AgrowFish	<ul style="list-style-type: none">• Katla Seafoods• Suncrest Biopolymers, Hyderabad• KVK, Kottayam
Fish/shrimp feed from fishery waste/by products	<ul style="list-style-type: none">• Matsyafed, Kerala• Mr. Fazil Backer P.A.• Mrs. Akhila Mol• Universal Green Foods Pvt. Ltd., Kanjirapally
Foliar spray from fish/shrimp waste	<ul style="list-style-type: none">• Kallar Plantation, Idukki• Mrs. Mary Sunitha, Chellanam Seafish• Grand Fresh. Mangalore• Linga chemicals• Suncrest Biopolymers, Hyderabad
Growth enhancer and spray dried feed supplements from shrimp shell waste.	<ul style="list-style-type: none">• Quest Bio Organics, Orissa
Multipurpose Fertilizers from fish Hydrolysate (Soluble)	<ul style="list-style-type: none">• Sandesh K Salian

TECHNOLOGY TRANSFER

Collagen peptide cosmetic and personal care products	• M/S Blooming boon, Cochin
Collagen concentrated fish skin	• Sulchem Industries, Kollam
Enzyme based de-proteinization of shrimp shell waste and hydrolysate production	• Mr. Koshy Thomas, Fab Dye Kem, Cochin
Protein Hydrolysate from fish, shrimp and distillery by products	• Sanj Feed Technologies Pvt Ltd, Vijayawada
Poultry/ aquafeed from shrimp head extract/ hydrolyzed extract	• Suncrest Biopolymers, Hyderabad



CONSULTANCY PROJECTS

No	Consultancy	Client
1.	Extraction of Chitin and Chitosan from prawn shell waste	V.V.Biotech Private Limited, Bodhgaya M/S Alert, Vijayawada
2.	Production and quality assessment of fish meal and oil	Herald Marine Products. Pvt. Ltd., Cochin
3.	Development of fish and shellfish silage for crop applications	San Isidro Pvt. Ltd, Cochin
4.	Production of chitin and chitosan	FAB DYE KEM Pvt Ltd, Cochin
5.	Production of chitin, chitosan, and foliar spray	Quest Bio Organics Pvt. Ltd., Orissa
6.	Production of feed from black soldier fly	Zewa Ecosystems Pvt. Ltd., Thrissur
7.	Production of aquatic and poultry feed using black soldier fly larvae	Mag Feeds Pvt. Ltd., Thrissur
8.	Thermal optimization for extraction of collagen from fish scale	M/s Athos Collagen, Gujarat
9.	Handling and processing practices of fish and prawn waste at Sassoon Dock	Sassoon Dock, Mumbai



COLLABORATIVE RESEARCH / CONTRACT SERVICE

No	Technology Name	Client
1	Extraction, characterization, and clinical evaluation of biomolecules of aquatic origin	Pushpagiri Medical Society , Thiruvala
2	Fish and bio-waste management system using larvae of Black Soldier Fly'	Nehru College of Engineering & Research Centre, Pambady
3	Development of hydroxyapatite-based products	Muthoot Institute of Technology and Science (MITS), Kochi
4	Seed priming solution from fish processing discards	University of Calicut, Kerala
5	Feed from fish discards	Mr. Yeju K.S, Thrissur
6	Fish meal-based feed	Mr. Sabu John, Kottayam
7	Foliar spray samples from fish / shellfish waste	Dr. Thomas K Sebastian, Kottayam
8	Contract Service: Extraction of Collagen peptide from fish skin and bones.	Amar Polyfils Private Limited, Gujarat





Thank You

