



Compendium of Technologies AAU ::::

VOLUME 1





Dr Bidyut Chandra Deka

Vice Chancellor , Assam Agriculture University

The Compendium of AAU Technologies (Edition 1) is being released at a time when, globally, innovation and inventions are receiving sharper focus.

I wish to bring your attention to one critical question that we must ask ourselves : How are the technologies that are being brought out by research and academic institutions solving/ easing the problems of the community at large? One of the key objectives of such institutions is use technology as an “enabler” for overcoming the challenges that commonly people on the ground face.

I am happy that the Assam Agricultural University, Jorhat, which is one of the oldest agricultural universities in the north east region of India, is showcasing a select few of its technologies in this first edition, in the form of a Compendium.

A lot of effort, enthusiasm and resources have been put to use in bringing out these technologies. Some of the technologies are indeed effective as they are reducing the pain-point of customers and consumers and across different user groups. These technologies are ready to hit the markets. Entrepreneurs who are desiring to embark on their own ventures using these AAU technologies, are most welcome to contact the Technology Transfer Office as per the details given here in. Handholding towards commercialisation will be extended to desirous entrepreneurs.

I wish to congratulate the scientific team members for their unflinching determination and efforts in bringing out this Compendium.

Best wishes,

Dr. Bidyut C Deka
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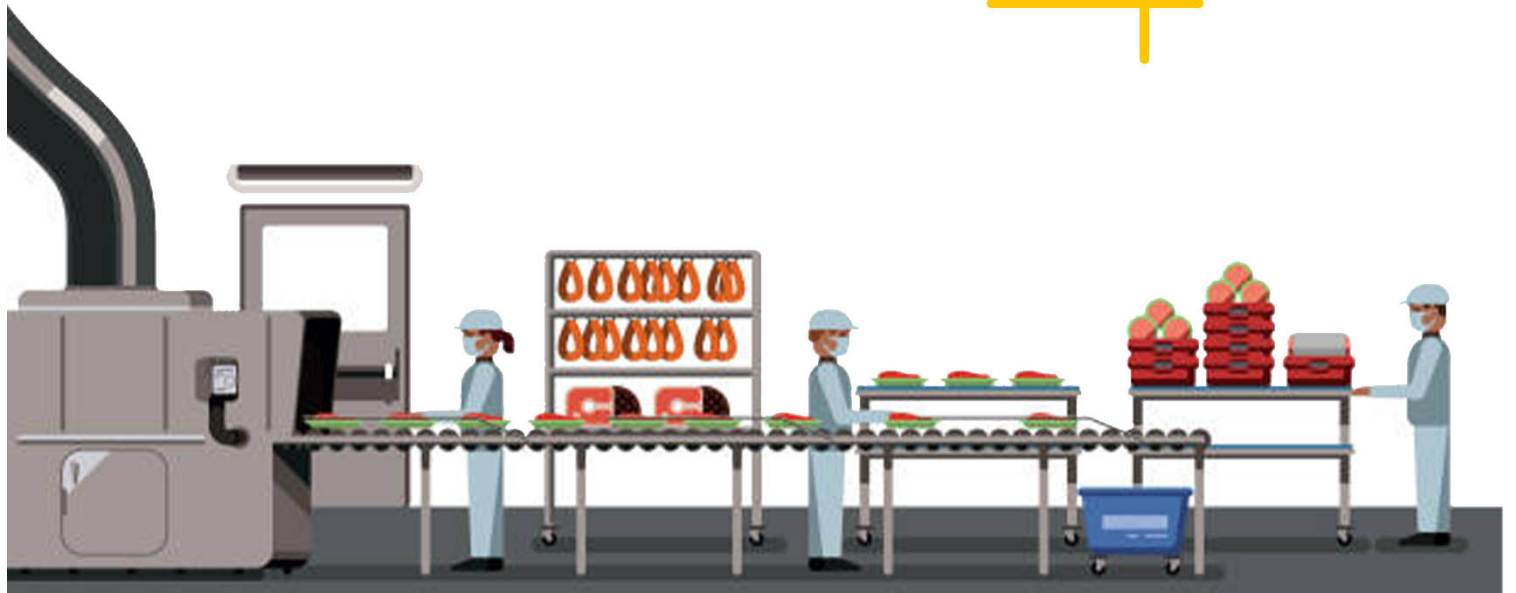
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FOOD PROCESSING & VALUE ADDITION



VITAMIN-E FORTIFIED BREAD



Vitamin E is a well-known immunity-boosting, cardiovascular-protective antioxidant, which is otherwise bitter-tasting, thermo-sensitive (degrades during processing/cooking), available in limited food products and is poorly absorbed in the human body. So, the supplemental form of Vitamin E (α -tocopherol) is usually recommended. However, clinical studies proved that vitamin E bioavailability from fortified breakfast cereal is more significant than that from encapsulated supplements, and its bioavailability can be enhanced by food fortification. So the "Vitamin E encapsulated Bread" can serve as an additive and fortificant for daily staple foods (e.g., bread).

Uniqueness

- Easy absorption of Vitamin E in human body.
- These tiny vitamin-rich beads in daily staple foods (e.g. bread, chapatti, etc.) is an excellent way of boosting immunity and cardio-protection to any age-group population.
- Hassle-free people will escape from popping up capsules every day.
- Natural mucilage used as polymer for encapsulation, which aids in mucoadhesion for sustained release of Vit E during digestion.
- No such vitamin-fortified bread is available in the market currently.

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PROTEIN-RICH ELEPHANT APPLE JUICE POWDER



Elephant apple is a minor fruit, grows in wild regions of South-East Asian countries, and is a reservoir of several benevolent phytochemicals. Juice processing from Elephant apple fruit is very cumbersome to cut and extract juice due to its fibrous, hard calyxes and sporadic availability. The recuperated fluid is usually deficient with high astringency and turns unacceptably dark soon after extraction. Hence processed products from this fruit is almost nil. The product prepared in this invention is a quality protein-rich, water-dispersible fruit juice powder made using Elephant apple fruit and whey, which has an attractive white colour with a tangy taste and aroma.

Uniqueness

- Extremely beneficial for health as it treats hypertension symptoms, rejuvenates ageing skin, good for kidney disorders
- Presently, the elephant apple is a seasonal fruit, but converting it into powder would make it available throughout the year.
- Commercially, spray-dried Elephant apple fruit juice powder is not available currently. The dry powder is rich in quality protein and antioxidants.
- Natural mucilage used as polymer for encapsulation, which aids in mucoadhesion for sustained release of Vit E during digestion.
- Free-flowing white-coloured juice powder, Highly dispersible juice powder, with no cumbersome processing for the consumer.

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PET FOOD PRODUCTION FROM BUTCHERY BY-PRODUCTS



Dog loaf was prepared using slaughterhouse by-products thoroughly washed with clean potable water. The by-products @ 60% are minced and mixed with other non-meat ingredients to prepare an emulsion. The emulsion was filled in moulds and then placed in the cooking vat at 85°C for 1 hour. The products were packed under a vacuum in food-grade packaging materials. The cost of production of the final product was found to be Rs. 250/kg for dog loaf and Rs. 200/Kg for pet treat.

Uniqueness

- The dog loaf with 60% by-products was found to be nutritionally rich with crude protein (17.14%) and fat content (2.54%)
- The shelf life of the products was found to be 14 days at refrigerated temperature.
- Pet treats were prepared using by-products from poultry, which were thoroughly washed, chopped, dried at 80°C for about 48 hours, and pulverized.
- Although the product's nutritional value is at par with the pet food available in the market, the cost per unit of the product is significantly less.
- Dog loaf is a novel product and is not available in the market. Locally available by-products of animal and agricultural origin are used for the preparation.

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MOZZARELLA CHEESE FROM COW'S MILK



It is a type of soft, unripened, white cheese manufactured mainly for its functional properties rather than for its flavour and is used by the food sector as an ingredient in pizza, cheeseburger, cheese-based salads, etc. The novelty of the product lies in the fact that it is prepared from cow's milk rather than Italian buffalo milk with the fortification of iron. The iron-fortified product was prepared using kiwi fruit crude extract from cow and goat milk.

Uniqueness

- The product is extremely beneficial for health as Iron could be fortified in the product upto a level of 1gm per litre of milk. Besides it has a protein content of 49.94% and a fat content of 12.52%. The total yield of Mozzarella cheese from 1 kg of milk is 10.50%.
- The technology is cheaper as compared to other available commercial cheese.
- It can create a lot of buzz in the market as iron fortified mozzarella cheese is not available in the market.
- The unit cost is Unit cost is Rs. 603.60 per kg. Minimum initial investment of Rs. 1,00,000.00 is required. Operational cost of Rs. 50,000.00.

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READY TO COOK FISH STEAKS WITH HIGH NUTRITIONAL VALUE AND LONGER SHELF LIFE



Through this technology ready to cook fish steaks with good nutritional quality and long shelf life can be prepared from highly demanded food fish like "Catla". The product is prepared using common antimicrobial agents, vacuum packed and stored under frozen conditions. The technology can be used for entrepreneurship development through commercial production of hygienically packed ready to cook fish steaks.

Uniqueness

- The shelf life of the steaks is 21 days.
- The product can be helpful for entrepreneurship development to meet the growing demand of the urban population with busy life schedules.
- Presently, fish steaks are not readily available in the northeastern market, creating market penetration.

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NUTRIENT DENSE MULTIGRAIN MIX FOR UNDER NUTRITION



This multigrain mix is nutrient-dense and suitable for preventing undernutrition in macro and micronutrient deficiencies. It can also increase body weight and enhance haemoglobin levels in the case of malnourished individuals. Specific features are protein and energy dense and presence of considerable amounts of micronutrients, particularly minerals, due to the incorporation of different types of locally available natural whole grains with functional properties, dehydrated vegetables.

Uniqueness

- It can be prepared with locally available nutrient-rich ingredients.
- The product can be stored at room temperature for six months in airtight conditions.
- Compared to its contemporaries, the product is placed at a low price of 80 INR per unit.

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JATROPHA BASED HERBAL OINTMENT



The invention reveals the prospective use of Jatropha oil to prepare a herbal ointment with the properties of ectoparasiticide and antimicrobial actions in managing ectoparasite infestation and various cutaneous skin ailments in livestock. The cream was found very effective in healing Orf lesions in goats. Furthermore, in field conditions, this ointment was found to be stable, easy to apply, and farmers' acceptance was also found to be good.

Uniqueness

- This invention opens up a new avenue of managing. Livestock's skin problems since all the ingredients required to prepare the ointment are readily available in rural areas.
- There is enough scope of exploring this ointment in a start-up small scale and cottage industries as an income-generating avenue as well as by other pharmaceutical industries.
- It is purely a herbal ointment.
- The price per unit is 40 INR, and to set up a production unit, the minimum investment is 1 lakh INR.

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JATROPHA SOAP




The physical and clinical properties of the soap were good and found promising in decreasing the population of ectoparasites like flea, ticks and lice after 2nd or 3rd week of application based on the hygienic condition of shed and animal.

Uniqueness

- It is a herbal product and doesn't contain harmful chemicals.
- The product is eco friendly.
- Priced at a per-unit price of 45 INR (wt: 75 gm) and a minimum initial investment of 1 lakh INR, it can be a small scale industry.

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XAJ-BREWING TECHNOLOGIES



Xaj: Nutrifacts (per 100 ml):
Energy: 110.85 Kcal
Alcohol: 10.4 ml
Carbohydrate: 6.9 g
Protein: 1.6 g
Fat: 0.45 g
Minerals:
 Calcium: 3.6 mg
 Sodium: 2.4 mg
 Potassium: 23.0 mg
 Magnesium: 7.2 mg
Vitamins:
 Thiamine: 0.03 mg
 Niacin: 2.24 mg
 Riboflavin: 0.03 mg
Antioxidants: 61.12 µmol/g

Market potential:
✓ Sensory qualities at par with Intl. standard
✓ No unpleasant taste or smell
✓ Shelf-life: 6 months in 4°C; 3 months in RT
✓ Heritage tag
✓ Servings in ethnic restaurants, resorts

This Xaj-brewing technology developed by the Laboratory of Microbiology, Assam Agricultural University, Jorhat involves the production of a defined starter culture with compatible fungi, yeast isolates and plant parts towards standard brewing of rice based alcoholic beverages. The Laboratory developed a defined starter culture using compatible and well-characterized microbial consortium of fungal and yeast isolates. The In-house proximate analysis as well as a report from FSSAI accredited laboratory has revealed the beverage to be rich in micro- and macronutrients, vitamins, antioxidants, and to be safe for human consumption.

Uniqueness

- The Beverage is safe for human consumption. Besides, it has been proven to be rich in micro- and macronutrients, vitamins, antioxidants making it a healthier alternative to conventional alcoholic drinks.
- Generally, the traditional drinks have an unpleasant taste or smell associated with it. On the contrary the beverage developed at AAU satiates the senses and is at par with International standards.
- The Shelf-life of the product is 6 months in 4°C and 3 months in room temperature making it a viable option for commercialization.
- Heritage tag of the drink can make it popular in the Tourism industry.
- The drink has vast marketing potentials in ethnic restaurants and resorts .

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ORGANIC ACETIC ACID (BIO-VENIGER) FROM CHEPAGUTI



A standard and efficient strategy for the production of an organic vinegar from the chepaguti waste was developed. Earlier, no organic vinegar (or, as such any valuable products) had been produced from the rice-based alcoholic beverage waste chepaguti. The production of the organic vinegar was achieved by developing a standard defined mixed-culture comprising acetic acid bacteria, yeast and fungal isolates. It also maintained a thorough and well-defined method right from pre-treatment of the biowaste till production of quality vinegar.

Uniqueness

- Bio vinegar is produced from agricultural waste materials and thus it is Organic in origin;
- Studies have reported that rice wine waste is rich in nutrients, deriving from both the rice itself and the microorganisms involved in the fermentation processes. So, Vinegar produced from Chepaguti will be nutrient rich.
- Sustainable use of rice biowaste to bio vinegar;
- Higher amount of acetic acid and quality vinegar as compared to the commercial products
- Japanese vinegar Kurosu and Chinese vinegar Zhenjiang produced from Rice are widely accepted products in the market. So, a bio vinegar produced from locally available Chepaguti will be of great economic value to Assam

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IMPROVED PURPLE RICE AAU-TTB-DHAN41 (LABANYA)



Normal white rice is deficient in Fe, Zn, fibre, antioxidants etc; the nutritional qualities desirable in the rice grain and thus are not suitable for people with diseases like diabetes, cancer and cardiovascular diseases. Besides there is a huge demand for non-basmati rice in the international market (source: www.apeda.gov.in). Assam has premium quality rice like Joha (aromatic) Rice, Black Rice, Red Rice however, could not capture the both national and international markets. This is mainly due to the inherent problems like low Head Rice Recovery, stickiness and requires more time to cook. The Improved Purple Rice AAU-TTB-Dhan41 (Labanya) has been developed which also aims to meet the daily dietary requirement of the patients with diabetes (Type 2), cancer and cardiovascular diseases along with the general public. This variety has been developed at the RARS, AAU, Titabor. The Labanya is a high yielding aromatic purple rice variety rich in protein, iron and fibre. The fibre helps in slow absorption of the glucose (sugar) from the

Uniqueness

- It has high head rice recovery (HRR)
- It takes less time for cooking like normal rice.
- It is an aromatic high yielding purple rice.
- It is also rich in antioxidants such as anthocyanins phytochemicals which reduces the Low Density Lipoprotein (LDL) cholesterol also known as the bad cholesterol, thus helps preventing cardiovascular disease.

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FARM MECHANIZATION



USER FRIENDLY TEA PLUCKING BASKET



The ergonomically designed tea basket can be used for load carrying on the back like a haversack bag. It is suitable for different crops and commodities and can be used for tea leaves harvesting. Besides, the basket can also be used to harvest fruit and vegetables in orchards. The labour requirement is exact as an existing basket, and the basket is shaped to reduce the physiological cost of the workers.

Uniqueness

- The weave of the basket does not allow to accumulate water during rainy days, resulting- remaining light, not heavy.
- Leaf carrying capacity is more, which increases efficiency and more income generation.
- Prevent falling the leaves outside the basket while throwing after plucking and reduce wastage.
- Safety factors incorporated. it is user Friendly and can be carried on the back like a school bag rather than hanging from the head.
- The new basket was conceptualised keeping in mind the ergonomics—the body structure of the workers and their working conditions. The improved basket fits the back curvature of the women, which keeps it in place, unlike the existing round basket.

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POULTRY PROCESSING CUM BY-PRODUCTS COLLECTION CART



The product is a small intelligent, eco-friendly mobile poultry shop with slaughtering cum by-product collection unit conducive for sale of poultry meat under hygienic conditions was developed. An e-rickshaw (Battery operated) has been modified to form the mobile processing unit having facilities for carrying out all slaughtering operations like bleeding, defeathering, dressing and storing carcass and by-products under chilling conditions. Most of the units in the machine are operated on 12 V DC supplied using 4 lithium ion battery fitted with the rickshaw. . The different components of the unit are- live bird cage (50 birds capacity), bleeding unit, hot water tank for scalding, defeathering unit, carcass fabrication table (S.S), butchers log for chopping of meat, weighing balance (battery operated), chiller for storage of fresh meat, chilled by-product collection chamber (separate chamber for head and shank and viscera), water storage tank (75 litre capacity) with pump, wash basin, effluent collection tank.

Uniqueness

- The unit will be suitable for small poultry vendors/butchers in cities and villages.
- Consumers can get hygienic and wholesome meat supplied at their doorstep.
- Proper collection of by-products may facilitate the effective utilization for higher revenue generation.
- Presently the per-unit production cost is placed at 1,80,000.00 INR, which can be affordable by small-time business owners.

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MOBILE PORK CUTTING, DISPLAY AND SALE CART



Pork sold in regular market retail shops involves unhygienic practices. A small bamboo/ wooden table, banana leaf, or plastic/ Nylon sheets sells pork in traditional markets. The house flies, unidentifiable insects, and dust and dirt can contaminate pork, thereby increasing the microbial load and causing early spoilage of meat, leading to post-harvest losses. Therefore, a hygienic, low-cost pork cut and display selling cart for marketing pork in clean condition and extending the meat's shelf-life has been developed. Besides, the unit is made from stainless steel. Its components include a freezer for storage of bulk pork, a Water storage tank, a Washbasin, a Cutting area with butcher's log, a Cabinet for storage of knife, apron, and other accessories.

Uniqueness

- Presently no e-cart is available for the sale of pork in the regular market. The cart has a facility for pork storage at low temperatures, thereby extending the shelf life.
- The cart is placed at a low price of 70000 INR, which small-time business owners can avail themselves of as it would increase their efficacy.
- The cart is made of stainless steel top with a refrigerated display chamber and a cold storage capacity of 200 kg pork.
- Customers will have the option of availing healthy and hygienic meat.

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BAMBOO SHOOT GRATING MACHINE



BAMBOO SHOOT GRATER
CAPACITY: 2 /Min
Cost : Rs.25,500/-
Power : 0.25 hp

Dog loaf was prepared using slaughterhouse by-products thoroughly washed with clean potable water. The by-products @ 60% are minced and mixed with other non-meat ingredients to prepare an emulsion. The emulsion was filled in moulds and then placed in the cooking vat at 85oC for 1 hour. The products were packed under a vacuum in food-grade packaging materials. The cost of production of the final product was found to be Rs. 250/kg for dog loaf and Rs. 200/Kg for pet treat.

Uniqueness

- Replaced cumbersome manual process by motor driven grater blade.
- Presently such product is not available in the market hence if launched it can create a buzz
- The manual process requires a lot of time and energy but bamboo shoot grading machine may reduce the time and energy as well.

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CHUNGACHAOL MAKING MACHINE (STALK COOKED RICE)



Stalk cooked rice or ChungaChaol in Assamese is a popular delicacy of Assam. The traditional way of making the delicacy is difficult and time-consuming. Hence the mechanized bamboo stalk cooked rice making machine developed in Assam Agricultural University can contain pre-soaked glutinous rice variety "Bora" loaded in eight bamboo stalks @ 500g rice to 200ml water. The bamboo stalks' mouths are tightly plugged with withered banana leaves and baked using LPG in the machine. Each batch comprises eight bamboo stalks.

Uniqueness

- Presently such a machine is not available in the market.
- The cost per unit is 24,700 INR per unit. Due to the low price, entrepreneurs can avail the product for increasing efficacy as presently making stalk cooked rice is a strenuous activity.
- With the help of the machine, the availability of ChungaChaul in the market can increase.

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MAAT CHITAP (LOCAL BAMBOO TRAP)



It is A kind of snap trap made of bamboo used to trap field (burrowing) rodents. The trap is placed just in front of the live burrow to make rodents go in or out of the burrow through the trap. As and when, rodent put its step on the lock lever of the trap, it gets trapped within a second. The parts of the device include a standing bar, bow bar, base lever, snap lever, nail lever, shoulder lever and key lever. The measurement of Maat Chitap are as follows stand bar: 40-45 cm with 1 cm thickness, bow bar (50 cm) long of 3 cm breadth of 1 cm thickness, snap bar 32 cm length, 2.5 cm breadth and 1 cm thickness, shoulder livers (12-14 cm) long lock lever (32 cm) in length, tied with other two levers. Base liver, snap livers, and another end is lying in the hole of the standing bar freely on the base bar.

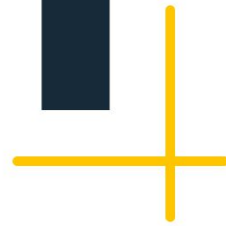
Uniqueness

- The product is made in a low-cost technology.
- It is environment friendly as it does not harm humans and other non-target organisms.
- The trap is being evaluated in Kharif rice, and the results are at par with available mechanical traps.
- The per unit cost of the trap is as low as 150 INR, which is relatively low compared to mechanical traps.

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AGRO INPUT



"AAUVETMIN" AREA SPECIFIC MINERAL MIXTURE



The 'AAUVETMIN', area-specific mineral mixture was developed by the Department of Veterinary Physiology, College of Veterinary Science, Assam Agricultural University, Khanapara, Guwahati-781022. The area-specific mineral mixture 'AAUVETMIN' contained calcium, phosphorus, zinc, magnesium, copper etc. and was found to be effective in enhancing the growth, reproductive performance and immune system development of the animal.

Uniqueness

- Stimulates the growth of offspring.
- Animal will come into puberty at early age.
- Augment the reproductive efficiency of animal
- Regularizes the oestrous cycle of the animal.
- Reduces the inter-calving period of animal.
- Treat the problem like silent heat, repeat breeding etc.
- Priced at a low price of 250 INR per packet .

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SUSHAMA - THE AAU FISH FEED



The AAU Fish Feed developed at Assam Agricultural University is Sushama. It is a balanced feed for carps with high protein (28-30%) and other nutrients, including vitamins, minerals, and micronutrients. The feed is prepared basically from agricultural byproducts, in mesh form, suitable for all size groups of cultivable carps. Performance of the feed is excellent in terms of FCR 1:1, shelf life, acceptability, growth and taste value of fish.

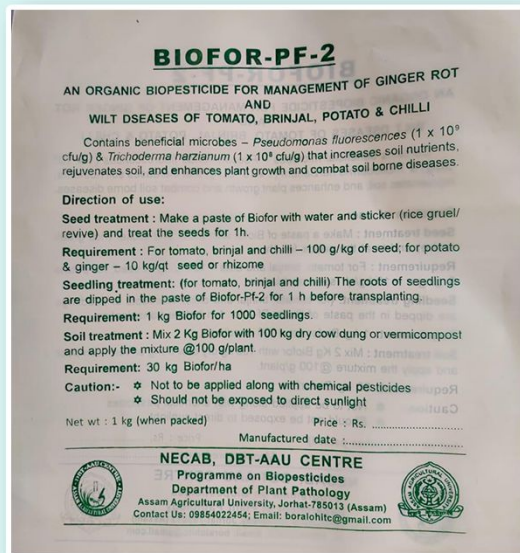
Uniqueness

- Sushama is prepared without using fish meal in its composition.
- It is a balanced fish feed for carps that supplements the primary nutritional components and minerals and micronutrients, suitable for all size groups of fish.
- Relatively cheap than the other products available in the market.

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BIOFOR PF-2



An organic biopesticide for managing ginger rot and Wilt diseases of tomato, brinjal, potato & chilli. It Contains beneficial microbes – *Pseudomonas fluorescences* (1×10^9 cfu/g) & *Trichoderma harzianum* (1×10^8 cfu/g) that increases soil nutrients, rejuvenate the soil and enhance plant growth and combat soil-borne diseases.

Uniqueness

- It is Environment friendly as it doesn't contain any toxic elements harmful to nature and human life.
- Quality product with virulent strain and desired CFU count.
- Having significant field performance.
- The price of Biofor Pf-2 is relatively low and placed at 90 INR per kilogram.

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BIOGREEN



The talc-based bio formulation containing aggressive strains of Trichoderma viride and further plant growth-promoting microbes with standard osmoticant & stickers. It can biologically control diseases of the vegetable crop, field crops and tea plantation.

Uniqueness

- Being plant growth-promoting organisms, Biogreen enhances the crop plants' plant growth and yield attributes, besides controlling harmful plant pathogens.
- It has minimum colony-forming units: 2×10^6 cfu/g.
- Quality product with virulent strain and desired CFU count.
- Having significant field performance.
- The cost of Product per kilogram is 110 Per kg.

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