Product Name	Keora Pickle
Brief Description	A nutritious, natural pickle produced from the ripe fruit of *Sonneratia apetala* (Keora), a mangrove species native to the Sundarbans and coastal belt of Bangladesh. The process utilizes modern processing technology with a blend of spices, mustard oil, and natural preservatives to create a healthy, flavorful pickle rich in vitamin C, dietary fiber, and essential minerals, with natural preservative qualities and a shelf life of up to one year without artificial preservatives. 
Problem Being Addressed	Traditional pickles are often high in sugar, additives, and preservatives, raising concerns about nutritional value and health implications. Conventional production methods may result in loss of essential nutrients during processing. Consumers increasingly demand products made with natural ingredients, minimal additives, and sustainable practices. Keora fruit offers a natural, healthier alternative rich in antioxidants, vitamins, and dietary fiber, addressing food security and malnutrition in coastal Bangladesh while providing a nutritious alternative to traditional processed foods.
Primary Applications	Commercial pickle production, health food market, coastal community food products, export-oriented processed fruit products, institutional food supply, and value-added mangrove fruit utilization.
Target Users & Buyers	Food processing companies, health-conscious consumers, coastal communities in Bangladesh, export markets (India, Africa, Southeast Asia), government food security programs, NGOs working on livelihood development, and retail supermarkets and grocery chains.
Development Status	The process is fully developed and standardized, with laboratory-scale production validated, an industrial-scale production method established using a 500 kg automatic pickle making machine, shelf life studies completed (up to 1 year), and sensory evaluation conducted with a 10-judge panel. It is ready for commercial technology transfer and licensing, developed by a 6-member inventor team from BCSIR, Dhaka.
Testing & Quality Validation	**Physicochemical Properties:** pH 3.02; Acidity 0.73% (BSTI std ≤0.90%); TSS 70.5% (above 60% standard); Moisture 19.59%; Ash 3.26%; Total Sugar 46.1%; Reducing Sugar 36.3%; Non-Reducing Sugar 9.8%; Pectin 3.4 mg/kg; Vitamin C 4958.33 mg/. **Mineral Profile:** Na (19,365.9 µg/kg), K (3,262.6 µg/kg), Ca (31.17 µg/kg), Mg (8.87 µg/kg), Fe (32.17 µg/kg), Mn (12.61 µg/kg), Cu (1.67 mg/kg), Zn (5.98 mg/kg), P (405.86 mg/kg). Proximate Analysis: Protein 0.87%, Fat 2.05%, Fiber 4.5%, Carbohydrate 69.73%, Energy 301 kcal/100g. **Microbiological Safety:** Total Heterotrophic Bacteria; Total Coliform; Fecal Coliform; E. coli, Salmonella, Shigella, Vibrio all are absent; Toxic metals (As, Cd, Pb, Hg, Cr) all within safe limits. **Sensory Evaluation:** Overall Acceptability (7.70–7.75) and all rated Good.
Core Technical Advantages	Low pH (3.02) and high organic acids naturally preserve this pickle for up to a year without artificial additives. It's pathogen-free (no E. coli, Salmonella, Shigella, Vibrio) and rich in vitamin C (4,958.33 mg/kg), fiber (4.5%), and essential minerals. A spice blend garlic, pepper, mustard oil, fenugreek, fennel,

	cumin, black cumin, mustard, cardamom, cinnamon, clove delivers authentic flavor. Standardized production ensures consistency, sensory excellence, and stable 12-month quality. Two variants (with/without seeds) suit consumer preferences.
Raw Materials & Supply Chain	*Sonneratia apetala* (Keora) fruit; Sugar; Salt (NaCl); Lemon Juice; Sodium Benzoate: (food grade preservative, 98–100% purity, Sigma Aldrich, Germany); Mustard Oil: (food grade); Garlic (fresh); Pepper (food grade); Spice Mix: Fenugreek, Fennel, Cumin, Black Cumin, Mustard; Cardamom, Cinnamon, Clove and Water.
Key Machinery	Automatic Jam Making Machine: 500 kg capacity (industrial-scale production); Frying Pan/Steam Jacketed Kettle: For cooking at 80–105°C; Blender/Mixer; Sieve: 100–150 mesh for filtration; Analytical Balance; Glass Jars; pH Meter, TSS Refractometer, Viscometer; Autoclave/Sterilization Equipment and Storage Facility.
Indicative Economics	Raw material costs stay low: Keora fruit is abundant across Sundarbans coasts, while sugar, salt, and spices sell at commodity prices. Each batch yields 1,000g (seedless) to 1,500g (with seeds), scalable to 500kg machinery, using just 0.05g sodium benzoate and a cheap garlic-pepper-mustard spice blend. One-year shelf life cuts waste and storage costs, adds value to underused mangrove fruit, creates coastal income, and targets the premium health pickle export market with high ROI.
Market Evidence & Readiness	Standardized formulation protocol developed at BCSIR is ready for commercial technology transfer, industrial scale-up, and license agreements.
Contract Address	Director, INARS, BCSIR, Dhaka and Sr. Ind. Liaison Office, BCSIR, Dhaka. Md. Ripaj Uddin, SO; E.mail:md.ripajuddin@gmail.com; Mob:01737134073