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ITDI R&D Activities on Seaweeds

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By virtue of Executive Order No. 128 dated 30 January 1987, the National Science and Technology Authority (NSTA) was reorganized into the Department of Science and Technology (DOST). Under this reorganization, the Materials Science Research Institute (MSRI) was merged with the National Institute of Science and Technology (NIST) and was renamed Industrial Technology Development Institute (ITDI). The ITDI remained to be one of the Research and Development Institutes (RDIs) of the DOST.

ITDI is mandated to conduct research and development (R&D) of technologies using indigenous raw materials of the country for adaptation and possible commercialization in the areas of chemicals and minerals, food processing, electronics and process control, fuels and energy, environmental, material science, and microbiology and genetics. Alongside the development of technologies, ITDI is also mandated to render a wide range of technical services for various sectors of the local industry.

Accomplishments

One of the research areas that ITDI is undertaking is the utilization of seaweeds and its derivative for various industrial applications. A total of 22 research projects (List 1) were completed ranging from process modifications, purification techniques and pharmaceutical applications of marine hydrocolloids. Among the completed projects, the production of hard and soft capsules from carrageenan is the most significant (Fig. 1). It garnered awards and recognition in 1998. The project won 3rd prize in the 8th Scientific Poster Exhibit of Health and Related Technologies, Professional Category sponsored by Philippine Council for Health and Related Technologies (PCHRT) given on July 15, 1998. It also bagged the 1st prize award for the Most Outstanding Creative Research (LIKHA Award) in the National Inventors' Week, given on November 23, 1998. At present, the project is being undertaken in collaboration with Shemberg Marketing Corporation and Drugmakers Laboratories, Inc. for the commercialization studies.



Figure 1. Carrageenan capsules

The on-going projects for this year is focused in the utilization of carrageenan for pharmaceutical products (List 2). The development of absorbable sutures from carrageenan (Fig. 2) obtained the 1st prize award for the 12th Scientific Poster Exhibit of Health and Related Technologies, Professional Category sponsored by PCHRT given on July 20, 2001.



Figure 2. Carrageenan absorbable sutures

For the next three years, ITDI has lined-up several projects for the utilization of carrageenan (List 3). Aside from the regular research projects that are being undertaken, ITDI rendered technical services like contract researches and technology transfer like lecture-demo/training on seaweed processing to would be entrepreneurs. These include the production of gulaman bars, agar, semi-refined and refined carrageenan. List 4 shows the completed contract projects from 1988- 2000 including technical assistance extended to small medium enterprises.

Aside from the local funding that ITDI received from the Philippine Government, other foreign resources are being tapped. A number of proposed projects (List 5) were submitted to various institutions abroad for funding.

ITDI's vision is to be a "world-class S&T Institute with a social conscience, generating and transferring effective and efficient technologies, and providing quality and reliable services to industry and country, for the upliftment of the quality of life of the Filipino people".

List 1. Completed projects, 1984-2000

1. Agar-agar production and purification process
2. Local production of agar-agar from *Gracilaria verrucosa* (Hudson) Papenfuss for microbiological, food and pharmaceutical applications
3. Pharmaceutical uses of NIST-purified agar
4. Alginic acid from *Sargassum* species
5. A modified method of producing alginic acid from *Sargassum*
6. Extraction of an agar-like mucilage from *Digenea simplex*
7. Development / production of USP grade excipients/additives from technical grade materials
8. A formulated stabilizer-emulsifier with dispersible hydrophilic colloid (carrageenan) for pharmaceutical/cosmetic use
9. Local plant hydrocolloids-properties and pharmaceutical uses
10. Agarose from *Gracilaria* species (lab-scale)

11. Post-harvest treatment of seaweeds
12. Seaweed tablet as natural source of iodine
13. Bench-scale production of agarose from *Gracilaria* species
14. Production of λ carrageenan from *Halymenia* species
15. Development of new products from carrageenan: Transparent film and absorbable gauze pad
16. Alternative method for the production of refined carrageenan
17. Dermopharmacy of seaweed extractives
18. Isolation and characterization of hypocholesterolemic substance from seaweeds
19. Pharmaceutical products from carrageenan (anti-coagulant and hypocholesterolemic agent)
20. Scale-up studies on the production of refined carrageenan using the alternative method
21. Production of hard and soft capsules from carrageenan
22. Pre-commercialization studies of carrageenan capsules

List 2. On-going projects, 2001

1. Absorbable sutures from carrageenan
2. Development of packaging materials from carrageenan
3. Commercialization studies of carrageenan capsules with Drugmakers Lab. Inc. and Shemberg Marketing Corporation

List 3. Projects to be implemented for the next three years

1. Utilization of carrageenan for the production of surgical gloves and suppositories
2. Production of fat burner soap using seaweed extracts
3. Carrageenan in drug delivery system
4. Utilization of carrageenan for the production of spermicide film

List 4. Completed contract researches and technical assistance extended

A. Completed contract researches, 1988-2000

1. SGV-ITDI feasibility studies on carrageenan
2. DMMSU-ITDI feasibility studies on semi-refined carrageenan
3. FMC (Marine Colloids Phils. Inc.) - ITDI pre-feasibility studies on the establishment of a food grade agar extraction plant
4. Production of semi-refined carrageenan (Mr. Chua as proponent)
5. Production of semi-refined carrageenan (Mrs. Abengoza as proponent)
6. Feasibility studies on the establishment of a carrageenan plant in Samar
7. Feasibility studies on the establishment of a carrageenan plant in Antique
8. ITDI-Shemberg joint studies on carrageenan capsules

B. Technical assistance extended

1. Pilot production of bacteriological-grade agar in Zamboanga City
2. Production of gulaman bars in Lavizares, Northern Samar
3. Production of gulaman bars in Pulilan, Bulacan

List 5. Proposed projects for foreign funding

1. Purified iodine from seaweed
2. Natural products from seaweed
3. Production of chlorophyll and its derivatives from red and brown seaweeds
4. Development of a mild anesthetic drug from *Caulerpa* species
5. Carrageenan film technology
6. Functional oligosaccharides from carrageenan
7. Carrageenan for microencapsulation of various drugs