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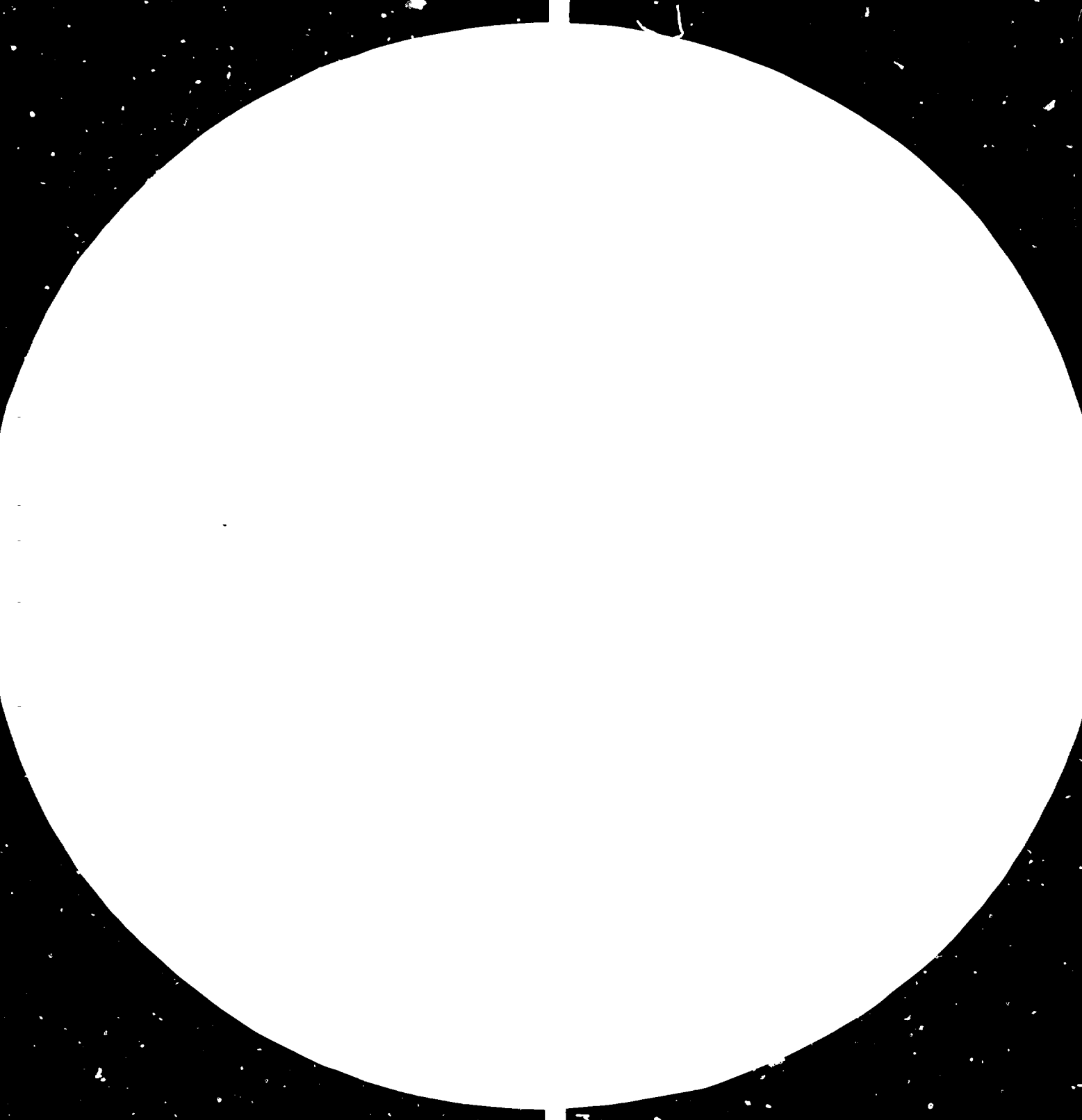
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Resolution test patterns are used to measure the resolution of a system. The resolution is the ability of a system to distinguish between two points that are close together. The resolution is measured in cycles per inch (CPI). The resolution of a system is the number of cycles per inch that the system can resolve. The resolution of a system is the number of cycles per inch that the system can resolve.



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TECHNOLOGY SERVICES DELIVERY SYSTEM (TSDS) EXPERIENCES
IN THE PHILIPPINES,
TECHNOLOGY RESOURCE INSTITUTION (TRI) EXPERIENCES - I *

by

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INTRODUCTION

The Department of Food Science and Technology at the University of the Philippines at Los Baños (DFST, UPLB) was created in 1972^{1/} to strengthen and consolidate all efforts at the Los Baños campus in helping increase food availability for the growing population. The department started with a core of four full time and three part-time teaching staff and has grown to 17 staff members representing various disciplines and fields of expertise in food science and technology, marketing and management.

The DFST started initially as a graduate instruction and research unit. The department has expanded its curricula to offer the Bachelor of Science in Food Technology (BSFT) and the Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees in Food Science. The enrollment has increased from 8 graduate students to a present level of 150 undergraduate and 40 graduate students. About one third of the graduate student come from Asian countries. The research program has been expanded to cover important aspects of conservation, handling and utilization of major commodities such as fruits, vegetables, legumes, oilseeds, cereals, rootcrops, fish, meat and poultry through

^{1/} Approved at the 321st meeting of the Board of Regents, University of the Philippines, June 29, 1972.

grants from national and international agencies.

FUNCTIONS

As an organic unit of the university, the DFST is involved in teaching, research and extension activities. Its primary objective is to promote the development of the food industry, through

1. Education and training of people for position of leadership in the Food industry
2. Conduct of basic and applied research in food processing and utilization of locally available foods
3. Establishment of appropriate technology for the production and manufacture of exportable food products
4. Technical assistance to the food industry, especially those engaged in cottage, small and medium scale operation.

ORGANIZATIONAL SET-UP

The department is headed by a Chairman and is composed of five divisions with specialized laboratories. These laboratories are: a) Fish, Meat and Poultry; b) Fruit and Vegetable; c) Legumes and Oilseeds; d) Cereals and Rootcrops; and e) Food Microbiology. These divisions are supported by common service facilities such as the Sensory Evaluation Laboratory, Pilot Plant, Cold Storage and Machine Shop.

The department staff consists of highly trained educators, researchers and scientists with specialization varying from food processing, engineering, chemistry,

biochemistry, microbiology and sanitation and sensory evaluation (Appendix A). The Staff teaches courses along their disciplines of specialization but pursue research activities along their commodities of interest.

PROGRAMS

a. Instruction

The department offers a four-year undergraduate course leading to the degree of Bachelor of Science in Food Technology for those who are interested to join the technical staff of food processing companies and government research agencies.

The department also offers graduate program in Food Science leading to the Master of Science (M.S.) and Doctor of Philosophy (Ph.D) degrees for individuals holding or aiming for key positions in academic and research institutions as well as in the food industry. Graduate students can specialize in any of the following fields:

1. Food Processing and Engineering. Students who want to work on this area must have a strong background in the physical sciences. Studies involve 1) development of new products/ processes and suitable processing and packaging equipment; 2) establishment of processing parameters, effective plant layout and quality assurance programs; 3) development of standards; 4) process improvements and; 5) energy utilization of food processes.
2. Food Chemistry and Biochemistry. This area is concerned with studies on 1) the chemical,

physical and nutritional changes during processing; 2) effects of chemical composition on processing parameters; 3) physicochemical and functional properties of food materials; 4) the relationship between chemical structure and flavor; and 5) the safety of food additives and many others. To work on these areas, students need a sound background in biology and chemistry.

3. Food Microbiology. The emphasis on this area are 1) the effective harnessing of microorganisms for the production of stable and nutritious food products through fermentation; 2) the control of microbial spoilage; and 3) microbiological contamination control through sanitation and hygiene. A student of Food Microbiology should have a working knowledge of biology, organic chemistry and biochemistry.

b. Research

The research thrusts in the department are:

1. Improvement of traditional technology for the processing and utilization of indigenous raw materials
2. The development of new products, processes and processing equipment
3. Utilization of agricultural by-products for food and energy

The research activities pursued in the various laboratories according to national and regional properties are as follows:

1. Fish, Meat and Poultry Laboratory

- a. Development of feasible technology for efficient processing of meat and poultry at various levels of operation from cottage level to centralized regional operation.
- b. Improvement of smoked and dried fish products by developing practical processing facilities and improving processing procedures to get relatively stable but highly acceptable products.
- c. Improvement of handling and distribution of fish and meat products.
- d. Quality improvement and cost reduction in the production of meat products through supplementation with starchy materials.

Funding Agencies: PCARR, IDRC, NRCF and NFAC

2. Fruits and Vegetable Laboratory

- a. Improvement and/or development of fruit products out of indigenous tropical fruits such as mangoes, avocado, papaya, banana and others.
- b. Development of appropriate techniques for processing locally abundant fruits and vegetables at the village level.

Funding Agencies: JICA and NFAC

3. Legumes and Oilseeds Laboratory

- a. Production of flour from cowpea, mungo and soybean for utilization into high protein foods such as noodles, bread, drinks, baby food and meat substitutes.

- b. Extraction, isolation and characterization of legume protein.
- c. Production of edible protein and oil from coconut meat and development of their utilization.
- d. Feasibility studies on the production and processing of important oilseeds and spices.
- e. Preparation of processed foods from cowpea, mungo and soybean.

Funding Agencies: IDRC, PCA, NRCP, IFS and SEARCA

4. Cereal and Rootcrops Laboratory

- a. Utilization of starchy materials in pasta and meat products.
- b. Improvement of the processing of rootcrops such as camote, cassava and yam into pellets, chips and starches.
- c. Supplementation, fortification or substitution of wheat flour with locally available flour such as from rice, corn, soybean, cassava, mungo, cowpea and banana.
- d. Development of extrusion technology for locally available raw material.

Funding Agencies: NFAC, NNC, PCARR, and ASEAN

5. Food Microbiology Laboratory

- a. Product or process improvement of fermented foods in Southeast Asia.
- b. Development of acceptable fermented products from abundant raw materials.
- c. Development of technology for production of protein foods from microorganisms.
- d. Contamination control through adequate sanitation and hygiene.

e. Control of food spoilage and food poisoning microorganisms.

f. Plant waste processing and utilization.

Funding Agencies: SEARCA, NFAC, PCARR, NPCP, IFS, NSDB and JICA

c. Extension

The DFST stands ready to assist food processors in starting their operations or in identifying and solving their technical problems. The department staff performs plant visits and also conducts short courses and seminars on various aspects of food processing. It also renders technical assistance to other government agencies by training selected staff members in specialized aspects of food analysis and research techniques. To immediately disseminate research findings to the food industry, the department publishes regularly popular bulletins, pamphlets on specific food processes. The department participates actively in the Countryside Action Program of the University. It conducts food processing workshop/seminars in Quezon and the Bicol region to improve the livelihood of the rural people. In addition other staff members provide assistance to other government institutions concerned with food processing and post harvest technology.

DFST (UPLB) - TSDS (MTI) Cooperative Assistance to SMI

The DFST has worked closely with the Ministry of Trade and Industry (MTI) since 1979 in the implementation of the Technology Services Delivery System (TSDS) and the

Quality Control and Productivity Improvement (QCPI) project for the benefit of small and medium scale food industries. The department rendered technical assistance to SMI in three projects (processing of dried beef in Cebu City, processing and formulation of candied peanut products in Cagayan and Isabela and product quality improvement of pili nut candies in Legaspi City. The technical assistance was made possible through a grant from CSMI, MTI.

Initially a regional survey of food practices and processing capacities of existing SMI in the provinces or cities was conducted by representatives of the department. The survey included plant visits and dialogue with the processors and/or investors in coordination with personnel of the Small Business Assistance Center (SBAC) and the Council of Small and Medium Scale Industries (CSMI). A survey was also conducted for the Zamboanga-Jolo region on fish processing.

The more common problems observed and aired during these plant visits were:

- a) raw materials quality, availability, storage practices and cost
- b) quality control and sanitation practices
- c) shelf life of products
- d) lack of or poor condition of equipment
- e) by-product utilization

Seminars were held in the above mentioned cities and provinces after the plant visits. The topics discussed were raw material handling and standardization, sanitation and food quality, FDA laws, product and process improvement, alternative food processes and packaging materials and design.

The most critical problem was on product stability or shelf life. This was complicated by improper sanitation practices, a poor understanding of packaging materials, deterioration of raw materials due to improper drying and storage, etc. Research and development activities were conducted in the laboratories to improve shelf life with the use of preservatives and appropriate packaging material. The results of these studies were disseminated through workshop/seminars in their respective areas with the recommendations well received by the cooperators.

The DFST, UPLB is ready to extend further technical assistance to SMI. Follow up visits and identification of cooperators in the surveyed must be conducted after research and development activities to evaluate progress of the studies. However, absence of continuous funding is the major constraint.

Other areas in which the SMI needs help are in marketing procurement of raw materials, financing and upgrading of facilities. Hopefully the newly launched Kilusang Kabuhayan at Kaunlaran livelihood program of the Philippine government will be able to help the small and medium industries.

APPENDIX "A"

LIST OF UPLB-DFST STAFF AND THEIR FIELD OF INTEREST:

JULIAN A. BANZON, Ph.D., Iowa State University. 1940
(Chemistry) Emeritus Professor. Serves as
consultant to the Philippine Coconut Authority,
Philippine Coconut Research and Development
Foundation, Liberty Flour Mills, Inc., and
available as member in graduate advisory
committees.

EDUARDO C. SISON, Ph.D., Michigan State University, 1971
(Food Processing and Marketing Management).
Associate Professor. Teaches courses on livestock
and poultry production; production management
and advanced food processing. Works on improve-
ment of processing and utilization of meat,
poultry and fish and on cost minimization of meat
production.

LEONCIO C. RAYMUNDO, Ph.D., University of Rhode Island,
1971 (Biological Science). Associate Professor.
Teaches food biochemistry and post harvest handling
of fruits and vegetables. Works on biochemistry,
handling and storage, and processing and utilization
of fruits and vegetables.

RICARDO R. DEL ROSARIO, Ph.D., Michigan State University,
1970. (Food Science). Associate Professor. Teaches
courses in food chemistry and food analysis, oilseed
processing and advances in lipids and carbohydrates.
Works on processing and utilization of legumes,
coconut, cereals and rootcrops. Also involved in
cereal chemistry composite flour formulation and
extrusion technology.

VIRGILIO V. GARCIA, Ph.D., Virginia Polytechnic Institute
and State University, 1979 (Food Science). Associate
Professor. Teaches courses on food processing,
thermal processing, food dehydration, freezing,
protein food processing and advances in food proteins.
Works on the development of food processing technologies
for the barrios, processing of legume and rootcrops,
biochemistry of legumes and rootcrops.

- ELIAS E. ESCUETA, Ph.D., Cornell University, 1979
(Food Science). Assistant Professor. Teaches courses in food chemistry and rheology and works on the processing and utilization of legumes.
- REYNALDO C. MABESA, Ph.D., University of Missouri, 1978.
(Food Science). Assistant Professor. Works on food microbiology, sanitation and hygiene. Teaches courses in the same areas.
- LINDA B. MABESA, Ph.D., University of Missouri, 1977.
(Food Science). Assistant Professor. Teaches courses in food evaluation and statistical quality control. Works on consumer preference for various food attributes and on nutritional evaluation of food processing.
- PRISCILLA C. SANCHEZ, MS. UPLB. 1965 (Plant Pathology).
Assistant Professor. Teaches food microbiology courses; works on the fermentation of tropical foods.
- ERNESTO V. CARPIO, MS. UPLB, 1978 (Food Science). Instructor.
Teaches food engineering courses and works on fish processing and food process equipment design.
- FRISCO I. CONSOLACION, MS. UPLB, 1976 (Food Science).
Instructor. Serves as extension coordinator and also works on flavor components.
- CAYETANO L. INTONG, JR. MS. UPLB, 1971 (Crop Processing).
Instructor. In-charge of the pilot plant, cold storage and shop. Works on the development of crop and food processing equipment.
- CRISPIN A. CAPAREDA, BSST. UPLB, 1961 (Sugar Engineering).
Instructor. Teaches undergraduate courses in fruit and vegetable processing and on physical methods of food processing.
- ERLINDA I. DIZON, BSA? UPLB, 1974 (Microbiology). Instructor.
Teaches undergraduate food fermentation courses and works on the production and improvement of fish and soysauces.
- MYRNA O. NISPEROS, BSFT, UPLB. Instructor. Teaches courses in food chemistry processing. Works on postharvest handling of fruits and vegetables.

PHAM BINH CHAY, Ph, D., UPLB, 1981 (Food Science).

Assistant Professor.

MILAGROS P. HOJILLA, BSFT, 1980, UPLB. Instructor II.

Teaches courses in food chemistry.

ROBERTO R. REYES, BSAE, UPLB, 1980. Instructor.

Teaches courses in food engineering



