

---

---

## PROCEEDINGS OF THE ANNUAL GENERAL MEETING 1992

---

---

The Second Annual General Meeting (1992) of the Pakistan Society of Food Scientists and Technologists was held on April 23, 1992 at the Ayub Agricultural Research Institute, Jhang Road, Faisalabad. The meeting was initiated in a most befitting manner by celestial recitation from the Holy Quran by Mr. Ahmad Raza, a student member. This was followed by a 'naat' by Mr. Muhammad Niaz, another student member. The Secretary of the Society, Dr. Javaid Aziz Awan, welcomed the Chief Guest, Dr. Ch. Altaf Hussain, Director General Agriculture (Research) Ayub Agricultural Research Institute Faisalabad and the delegates. The deliberations were divided into the Inaugural, Technical I, Technical II and Business Sessions.

### INAUGURAL SESSION

The Inaugural Session was chaired by the Chief Guest Dr. Ch. Altaf Hussain, Director General Agriculture (Research), Ayub Agricultural Research Institute, Faisalabad. The President, Pakistan Society of Food Scientists and Technologists, Prof. Dr. M. Shafiq Chaudhry welcomed the delegates from all parts of the country. In his Keynote address the President dwelled on the menace of food adulteration in the country. He proposed the establishment of an independent authority which should be fully equipped in respect of properly trained manpower, analytical equipment and a clear cut mandate for its operations. In his inaugural address, the worthy Chief Guest, Dr. Ch. Altaf Hussain stressed on the significance of Food Science and Technology and said that for Pakistan to be stable, it must reach a real self sufficiency in food for which the Food Scientists and Technologists must cooperate with the breeders, agronomists, horticulturists and the animal husbandry people. He drew the attention of the delegates to the utilization of waste from food industries which is generating thousands of tons of organic matter annually and adding to environmental pollution. He welcomed the publication of Food

Science News and hoped that this would grow into a journal to provide a link between the teachers, industrialists, government organizations, research institutes and other professionals in this discipline.

### TECHNICAL SESSION I

First Technical Session started immediately after the refreshment break. This was jointly chaired by Dr. F.H. Shah, (S.I.), Prof. Dr. Muhammad Saeed and Prof. Dr. M. Shafiq Chaudhry. The theme of this Session was the Presidential Keynote Address. The participants took keen interest in the deliberations and contributed immensely. After thorough discussions the participants unanimously agreed on the followings:

1. Some members reported that there were contradictions in the food laws, hence there was a need for corrections/revision. There was no uniformity in the products because the standards of identity were not prescribed. It was suggested that there must be an effective monitoring system and continuous routine sampling. Efforts should be made to catch the source of adulteration rather than the petty retail traders.
2. There is widespread corruption in the existing law enforcement agencies since the people employed are not qualified in the discipline. It was suggested that qualified personnel must be employed to enforce the food laws. Furthermore, samples taken from the industries should be sent to some approved laboratories in universities, research institutes, and specific laboratories designated for the purpose.
3. There is a need for the experts in various disciplines to devote time to enlighten the fresh graduates. Orientation courses should be held at all levels in the country to refresh the knowledge of the staff already working in the field.

4. The food processing industry must be manned by food technologists.
5. Experts should write popular articles for news papers, etc. on food adulteration.
6. Directorates of food should be established in each province to monitor the food supplies.

#### TECHNICAL SESSION II

The Second Technical Session was chaired by Dr. N.A. Sufi, Head, Food Technology Division, PCSIR Laboratories, Peshawar. He was assisted by Mian Abdul Malik, Food Technologist, Ayub Agricultural Research Institute Faisalabad and Mr. Shafaat Ahmed, Operations Manager, Mitchell Fruit Farms, Renala Khurd, District Okara.

Following papers were presented in this Session:

#### 1. PROBLEMS ASSOCIATED WITH THE MANUFACTURE, STORAGE AND MARKETING OF ICE CREAM IN PAKISTAN

by  
**Mr. Muhammad Sultan Mahmood**  
*Manager Technical Services,*  
*Synarome Manufacturing Co. (Pvt) Ltd.,*  
*Shah Alami Market, Lahore.*

(Full paper is being published in this issue of the Food Science News).

#### 2. DAIRY INDUSTRY IN PAKISTAN AND WORLD DAIRY INDUSTRY BY 2000

by  
**Mr. M. Akhtar Durrani**  
*Director, Agropol and Empak Dairies, Lahore.*

(The paper was published in the previous issue of Food Science News (Vol. 2, No. 1-2, 1992).

#### 3. ISLAMIC CODEX ALIMENTARIUS

by  
**Dr. Javaid Aziz Awan**  
*Associate Professor,*  
*Department of Food Technology,*  
*University of Agriculture, Faisalabad.*

(This paper has been published in Science and Technology in Islamic World, 10 (1): 7-18, 1992 and Proceedings of National Seminar on Food Safety and Nutrition, February 23-24, 1991), PCSIR Laboratories Complex, Lahore.

#### BUSINESS SESSION

The Business Session was chaired by the President, Prof. Dr. M. Shafiq Chaudhry who was assisted by the Vice President Dr. Mumtaz Ali and the Secretary Dr. Javaid Aziz Awan.

#### SECRETARY'S REPORT

The Secretary presented his report to the house. He informed that the first meeting was held in 1990 when 60 professional members and 66 student members registered. By the Grace of Almighty, this number rose to 191 professional members and 107 student members by the end of 1991. He said that the Food Science News, the official organ of the Society, was being published from the funds obtained exclusively through advertisements.

The Secretary appreciated the efforts made by Prof. Dr. Muhammad Saeed, Chairman, Department of Food Science and Technology, NWFP Agriculture University Peshawar in promoting the cause of the Society in the NWFP. Dr. Saeed was elected as Director for NWFP. The Secretary stressed the need to foster stronger links between the members. For this, it was essential that the members communicate with each other through the Food Science News. The members should inform the Secretary about changes in their own status or employment and advances in career. Changes in their respective organisations with regard to new products, new technologies, new processes, etc. should also be communicated so that these are made known to other members through the Food Science News. The Secretary further appealed to the members to strengthen the Society by inviting more food technologists to become members of the Society since greater the number, greater the strength. The Secretary requested members who are in a position to insert an advertisement in the Food Science News to send the advertisements with the required amount to him. This would help the organisation to be known to the proper circles and assist the publi-

cation of the Food Science News.

### TREASURER'S REPORT

The Treasurer's report was also presented by the Secretary. The house was informed that by June 30, 1991, the Society had received a total income of Rs. 45,275.00 through membership dues, donations and advertisements. Total expenditure incurred was Rs. 34,389.90. Details of the unaudited account are given below:

| <b>Income</b>        |                      |
|----------------------|----------------------|
| Membership dues      | Rs. 15,675.00        |
| Advertisements       | Rs. 19,600.00        |
| Donations            | Rs. 10,000.00        |
| <b>Total</b>         | <b>Rs. 45,275.00</b> |
| <b>Expenditures</b>  |                      |
| Printing expenses    | Rs. 19,589.00        |
| Postage              | Rs. 561.40           |
| Publicity            | Rs. 1,733.10         |
| Expenses on AGM 1991 | Rs. 10,330.00        |
| Stationery           | Rs. 973.00           |
| Miscellaneous        | Rs. 1,203.40         |
| <b>Total</b>         | <b>Rs. 34,389.90</b> |
| <b>Balance</b>       | <b>Rs. 10,885.10</b> |

### ELECTIONS

According to the by-laws of the Society, the Executive Council can remain in office for a period of two years after which fresh elections are required. Elections were held to elect the Executive Council of the Society. Dr. F.H. Shah (S.I.) and Prof. Dr. Muhammad Latif Rasulpuri conducted the elections.

Following candidates were nominated:

#### **President**

Prof. Dr. M. Shafiq Chaudhry  
Prof. Dr. Amjad Ali

#### **Vice-President**

Prof. Dr. Muhammad Saeed

#### **Secretary**

Dr. Javaid Aziz Awan  
Dr. Riaz Ahmad Riaz

#### **Joint Secretary**

Mr. Sabir Zameer Siddiqi

#### **Treasurer**

Ms. Nuzhat Huma  
Mr. Ahmad Rizwan Pasha

Prof. Dr. Amjad Ali withdrew in favour of Prof. (Retd.) Dr. M. Shafiq Chaudhry. During the election time, Mr. Ahmad Rizwan Pasha was absent, hence Ms. Nuzhat Huma was the only contestant for the office of the Treasurer. Voting was held for the office of the Secretary. The members elected Dr. Javaid Aziz Awan by overwhelming majority.

On the request of the student members, two posts of Councillors were created by the General Body. The following student members were unanimously elected:-

Mr. Ali Athar,  
Department of Food Technology,  
University of Agriculture, Faisalabad.

Mr. Muhammad Ayub Khan,  
Department of Food Science and Technology,  
NWFP University of Agriculture,  
Peshawar.

Immediately, the office bearers took oath of their respective offices.

---

## **INAUGURAL ADDRESS**

**DR. CH. ALTAF HUSSAIN**

Director General Agriculture (Research),  
Ayub Agricultural Research Institute, Faisalabad.

*President,  
Pakistan Society of Food  
Scientists and Technologists*

*Professional Food Scientists  
and Technologists, Budding Scientists,  
Distinguished Guests, Ladies and Gentlemen!*

It is my great pleasure to be amongst food scientists and technologists from various parts of the country who are here to participate in the annual general meeting of the Pakistan Society of Food Scientists and Technologists. It was exactly 30 years ago, when the first batch of 20 students graduated with food technology as a major subject from the West Pakistan Agricultural University, Lyallpur. Today apart from University of Agriculture, Faisalabad several other institutions are offering programmes in Food Science and Technology. The family of food scientists and technologists is growing rapidly and is contributing to the economy of the country and health of the people. Food Science and Technology graduates are manning the diverse food industries that have developed tremendously during the past few decades.

For a developing country like Pakistan, supply of sufficient and safe food throughout the year is essential. The so-called self sufficiency in food in Pakistan is merely like sand dunes in the desert which keep on shifting with a change in the weather. Pakistan, to be stable, must reach a real self sufficiency in food for which the food scientists and technologists must cooperate with the breeders, agronomists, horticulturists and the animal husbandry people.

At present about 10 to 15% cereals and 40% fruits and vegetables are wasted annually for several reasons. The food scientists and technologists have helped to reduce these losses, but still more efforts are needed in this direction. Pakistan cannot afford to waste food. At present more concentration is towards beverage industry, but there is a need to explore the possibilities of providing more processed foods to the consumer. During the past few decades Pakistani market has seen a rise in the beverage industry. Another sector that has grown to some extent is the milk industry. Apart from these, few

industrialists are processing foods for the armed forces. Recent installation of the citrus juice concentration plant near Sargodha by Cargil has helped to reduce the wastage and stabilize the prices of Kinnow this year. More such ventures are required to stabilize the economy and help provide the consumer with safe and nutritious foods.

Another aspect that requires the attention of food scientists and technologists is the utilization of wastes from food industries. These industries are generating organic wastes in thousands of tons annually which is just being dumped, and is creating environmental pollution as well as causing health hazards. If these wastes can be economically utilized, they will not only bring monetary returns but will also provide a cleaner environment.

The President Pakistan Society of Food Scientists and Technologists has elaborated on food adulteration and food laws situation in the country. The increase in the food industry and probably poor legislation control over food products has resulted in the supply of unsafe foods. While the food adulterators are trying to cheat and rob, the contaminants and deliberate use of non-food grade ingredients are a potential health risk to the consumer. Recent studies conducted in Pakistan have revealed the presence of chemical and microbiological toxins in several foods. I feel you can play a vital role in this regard.

A notable milestone in the field of food science and technology in Pakistan is the publication of Food Science News which is a step towards uniting the Food Scientists and Technologists in this country. I have seen some issues which are quite impressive and informative. I have a feeling that this publication will soon grow into a journal which is the need of the day. This would be a strong link between the teachers, industrialists, government organizations, research institutes and other professionals in this discipline.

I am confident that this meeting of the food professionals will serve as a nucleus for further expansion of the society in this country and will bring the scholars and industrialists together to serve this nation. With these remarks, I declare this meeting open.

---

## KEYNOTE ADDRESS

Prof. (Retd.) Dr. Muhammad Shafiq Chaudhry  
President,  
Pakistan Society of Food Scientists and Technologists,

*Dr. Ch. Altaf Hussain*  
*Director General Agriculture (Research)*  
*Ayub Agricultural Research Institute,*  
*Faisalabad.*

*Professional Food Scientists*  
*and Technologists,*  
*Distinguished Guests,*  
*Ladies & Gentlemen,*

It is my most pleasant duty to welcome our Chief Guest, Dr. Altaf Hussain, Director General (Research), Ayub Agricultural Research Institute, Faisalabad and the delegates to this Second Annual General Meeting of the Pakistan Society of Food Scientists and Technologists. This year, I have chosen to speak on the issue of adulteration which has spread to all forms of manufacturing and trade in the world. The mode and magnitude of adulteration, however, varies from country to country and from commodity to commodity. Today, we hear of adulteration not only in foods but also in such commodities as cement, medicine, insecticides, oils, lubricants, etc. There is a growing concern about this problem in private and public sectors in Pakistan which is evident from the following events of the past two years:

A two days seminar on Food Safety and Nutrition was organised by the PCSIR Laboratories at Lahore.

A two days campaign to spread awareness about adulteration among people from different walks of life was conducted by Lahore Municipal Corporation.

The Government of Pakistan launched a vigorous campaign against adulteration in December, 1991. This campaign failed due to threats of strike from the traders and manufactures. However, a National Council for Food Quality Control was formed to look into this problem.

Adulteration has become a mega-problem because of hidden inherent malpractices of corruption in the country. Other factors which contribute to this problem include lack of standards of identity of many food items, dearth of trained field and laboratory staff, ill-equipped laboratories and lack of consumer education.

It would simply be proper to propose the establishment of an independent authority (give it any name) which should be fully equipped in respect of properly trained manpower, analytical equipment and a clear-cut mandate for its operations. Consumer education should be given top priority because rejection of substandard item by the consumers will go to a great extent to eliminate the trade of such commodities.

---

---

## RECENT PUBLICATIONS

---

---

The Executive Council of the Pakistan Society of Food Scientists and Technologists decided that information on recent publications from Pakistani food scientists will be published in the Food Science News, starting from this issue. This will include the name(s) of the author(s), year of publication, title of the article, source/publisher and the address of the major author. Where available, abstracts will also be published. Authors/Scientists are requested to send reprints of their publications to the Secretary, Pakistan Society of Food Scientists and Technologists, c/o Department of Food Technology, University of Agriculture, Faisalabad-38040, for inclusion in the forthcoming issues.

### RESEARCH PAPERS/ARTICLES

#### A. ISLAM AND FOOD SCIENCE

F.H. SHAH, W.H. SHAH AND TASNIM KAUSAR (1991). **Quranic method of storage of wheat.** *Islamic Thought & Scientific Creativity*, 2 (2): 23-27. PCSIR Laboratories Complex, Lahore-16.

Experimental studies have been made to prove the efficacy of the storage of wheat by leaving the grains in the ears after harvesting and storing them in mud-bins. It has been shown that losses due to insect infestation were almost nil. 100 insects when added to the storage bins, at the start of the experiments, multiplied to 314 and 764 in wheat grains after 45 and 72 days of storage respectively. As against this, total number of insects in wheat-ears were found to be only 104 and 132 after 45 and 72 days storage respectively, and more than two-third of these were found dead.

#### B. ANIMAL PRODUCTS

HAMID AHMAD, SULTAN SHAKOOR CHAUDHRY AND RAZIA RAFIQ SIDDIQUI (1987). **Scientific study and development of meat barian - a traditional food product.** *Pak. J. Sci. Ind. Res.*, 30 (6): 472.

PCSIR Laboratories Complex, Lahore-16.

This overview is a part of the systematic study of a rural-based traditional dry food of the subcontinent, "barian" or "varian". It is usually made by wet or dry grinding and mixing of generally consumed pulses. The traditional method of "barian" making, drying and mode of selling are described. The possibility of its export and the marketing aspects for a traditional product have been also examined. The discussion is based on reasons to a detailed study of this traditional food item.

HAMID AHMAD, SULTAN SHAKOOR CHAUDHRY, RAZIA RAFIQ SIDDIQUI AND SHAGUFTA NASREEN

(1987). **Scientific study and development of meat barian - a traditional food product. Part II. Study of various formulations and technologies.** *Pak. J. Sci. Ind. Res.*, 30 (7): 556. PCSIR Laboratories Complex, Lahore-16.

Part II of this study deals with the multiple formulations of pulses in the traditional methods. Dal Mash, Mung, Lentils and gram singly and in combination have been tested. The possibility of using a machine in the methods of "barian" making has been tested. Three different drying methods, i.e. open-sun, solar and oven-drying have been used to see their effect on the product quality and the drying time. An effort has been made to incorporate beef in the traditional pulses-mix of "barian". Fresh and pre-treated beef, minced, fibre-like or chopped, were examined for their use in giving meaty look and taste to the traditional product.

HAMID AHMAD, S.S. CHAUDHRY, SHAGUFTA NASREEN AND RAZIA RAFIQ SIDDIQUI (1989). **Scientific study and development of meat barian - a traditional food product. Part III. Study of different processing and drying methods.** *Pak. J. Sci. Ind. Res.*, 32 (4):286. PCSIR Laboratories Complex, Lahore-16.

Part III of this study deals with the selected formulations of 'Barian' made from dal mash mung with the use of 25% beef in the fresh state. Three methods of drying, namely (i) open sun (ii) in solar dryer (iii) mechanical drying using natural gas, have been tested for the quality of the dried product. Drying temperature of 70°C and mechanical drying proved to be the most quality effective means. The nutritional and biological evaluation, carried out by the measurement of available lysine, vitamins B<sub>1</sub> and B<sub>2</sub> and rat trials proved again in favour of mechanically dried 'Barian'. The microbiological testing, after drying by the three methods, as well gave the most hygienic product in case of natural gas drying.

HAMID AHMAD, SULTAN SHAKOOR CHOUDHRY AND RAZIA RAFIQUE SIDDIQUI (1991). **Scientific study and development of meat-barian - a traditional food product of the Indian sub-continent.** 37th Int. Cong. Meat Sci. Technol., Kulmbach, Germany.

PCSIR Laboratories Complex, Lahore-16.

HAMID AHMAD, SULTAN SHAKOOR CHAUDHRY, RAZIA RAFIQUE SIDDIQUI, MOHAMMAD ASHRAF AND SHAGUFTA NASREEN (1992). **Scientific study and development of meat-barian, a traditional food product. Part IV. Comparison of chemical constituents of commercial and laboratory made legume product (barian).** Pak. J. Sci. Ind. 35 (7-8): 317.

PCSIR Laboratories Complex, Lahore-16.

Comparison of chemical analysis of the nutritionally important components in the laboratory made Mash/Mung dal barian containing 25% beef has been made with a variety and market samples collected from Lahore, Jhelum, Multan, Rawalpindi and Peshawar. Protein content did not differ in quantity although quality difference existed due to the use of animal protein in case of Laboratory samples. Other parameters like starch fat, ash, calcium, iron have also been compared without any significant differences. Titre value and dehydration value were determined to evaluate quality of the scientifically prepared laboratory products. Extract water analysis after 1 and 4 hours of soaking of Barian in the water has been determined to prove improved quality of the laboratory made products.

HAMID AHMAD AND SULTAN SHAKOOR CHOUDHRY, (1988). **Scientific study and development of dried meat products for local conditions.** Proc. First Nat. Workshop on Future Policies Regarding Food Processing and Preservation in Pakistan.

PCSIR Laboratories Complex, Lahore-16.

Among the dried meat products 'Barian' is the most well known. The paper deals with this legume-meat product in a systematic and scientific manner. Various meat legume formulations comprising of beeflo and three legumes (*Vigna radiata*, *Vigna mungo* and gram pulse) have been tested to find out the best composition. Although the formula using 50% beeflo on fresh wet basis was more likeable yet the one with 25% (F.M. basis) beeflo was more economical and marketable. Amongst different legumes, *Vigna mungo* (Urd) rated best amongst the single and multi-combinations. The possibility of

using simple machine to replace the process of traditional manual casting was also tested with little success. Three different drying methods have been compared to dry meat-"Barian" i.e. open-sun solar dryer and hot-air driven oven. The more uniform, controlled and quicker drying by the later method was found to be best for organoleptic qualities and nutrient retention. Cheap packing material like polypropylene (PP) and polyethylene (PE) of different densities were used to study the shelf-life of dried "Barian" upto 6 months. Both packaging materials were equally good for storage except that the more clear polypropylene had the visual advantage.

HAMID AHMAD (1990). **Pakistan country statement for FAO seminar on meat development and traditional and low cost meat preservation methods for Asia and the Pacific.** FAO Seminar on Meat Development and Low Cost Meat Preservation Methods in Asia and the Pacific, Bangkok.

PCSIR Laboratories Complex, Lahore-16.

HAMID AHMAD, S. SHAKOOR CH., R. RAFIQ SIDDIQUI AND MOHAMMAD ASHRAF (1991). **Nutritional aspects of dehydrated minced beef and products.**

PCSIR Laboratories Complex, Lahore-16.

Nutritional losses incurred during production and subsequent storage of dehydrated beef mince and mince products have been studied. Major nutrients of these food items undergo quantitative changes due to loss of moisture. Storability of the products in two grades of polypropylene (pp) pouches and their consumer acceptability in terms of sensory evaluation have been investigated.

### **C. PLANT PRODUCTS**

AMJAD HUSSAIN, MOHAMMAD SAEED AND WAZIR HUSSAIN SHAH (1991). **Influence of varietal characteristics and packing materials on freezing preservation of various pea cultivars.** Pak. J. Sci. Ind. Res., 34 (9): 327-330.

Pakistan Agricultural Research Council, Islamabad, Pakistan.

Moisture and vitamin C content of all the four varieties namely local Bazi Khel, P-35, P-8 and H-57 decreased during storage, while alcohol insoluble solids, reducing sugars, total sugars and protein content did not show any significant change. The paper board wrapped with polyethylene gave greater protection to vitamin C than polyethylene only. Colour of frozen P-8 variety after 6 months storage

was rated the highest followed by P-35 and H-57. Local Bazi Khel was ranked the poorest by the panel. Overall acceptability of H-57 after six months storage was rated the highest. P-35 and P-8 did not vary significantly and both were liked by the taste panel. However packing materials did not have any significant effect on colour and overall acceptability of all the four varieties of peas.

AMJAD HUSSAIN AND W.H. SHAH (1991). **Preparation and evaluation of guava products.** *Pak. J. Agri. Res.*, 12 (2): 106-111. Pakistan Agricultural Research Council, Islamabad, Pakistan.

Guava fruit is the richest source of vitamin C among all the common fruits grown in Pakistan and contains as much as 136 mg/100 g vitamin C on fresh weight basis. It is second best to banana in calorie value. Methods for home-scale production of guava squash, cheese, jam, jelly, pickle and chutney were worked out and details of recipe of each product have been reported. Comparison of prices of commercially produced and home scale preparations indicated that home-scale preparations of cheese, jam, jelly and squash were about 56, 63, 63 and 66% cheaper, respectively. However, home-scale products were subjectively evaluated to be as good as commercially prepared products. A detailed procedure and illustrations are reported to provide a sufficient guidance for home-scale preparation of these products at the time when there is a glut of guava in the market.

#### **D. MICROBIOLOGY & BIOTECHNOLOGY**

M.A. QADEER AND SHAHJAHAN BAIG (1989). **Effect of nitrogen sources on the production of extracellular polysaccharide by *Xanthomonas campestris* NRRL B-1459.** *Sci. Int.* (Lahore), 14: 262-264.

PCSIR Laboratories Complex, Lahore-16.

A strain of *Xanthomonas campestris* NRRL B-1459 produced a large quantity of extracellular polysaccharide and could utilize several inorganic and organic nitrogenous sources for polysaccharide production. The inorganic salts tested were diammonium hydrogen phosphate, sodium nitrate, ammonium phosphate or ammonium sulphate, and optimum level of nitrogen ranged from 0.030 to 0.040%. However, the complex organic nitrogenous agro-industrial by-products evaluated were penicillin waste mycelium or cotton seed meal (local or imported). Proflo, particularly its extract

containing diammonium hydrogen phosphate stimulated polysaccharide production. Pyruvate in the polysaccharide molecule doubled in the presence of organic nitrogen sources.

SHAHJAHAN BAIG, M. ABDUL QADEER, M. SAEED AKHTAR AND TAHSEEN AHMED (1990). **Utilization of unhydrolyzed cheese whey for the production of extracellular polysaccharide by *Xanthomonas cucurbitae* PCSIR B-52.** *J. Ferment. Bioengg.*, 69: 345-349.

PCSIR Laboratories Complex, Lahore-16.

A strain of *Xanthomonas cucurbitae* PCSIR B-52 produced extracellular polysaccharide using partially deproteinized cheese whey without hydrolysis. A synthetic lactose-salt medium was also utilized to determine the optimum level of lactose desirable for successful fermentation. The amount of extracellular polysaccharide was maximised at 7.8 g/L lactose. The bacterium efficiently consumed cheese whey, particularly in the presence of corn steep liquor and penicillin waste mycelium in shaken flasks. The polysaccharide, bacterial cell mass and viscosity gradients were improved as a result of efficient oxygen transfer in a mechanically agitated fermentor. A depletion in dissolved oxygen tension resulted during the exponential growth phase. The fermentation pattern of extracellular polysaccharide was also studied by repeated batch process.

M.A. QADEER, J. IQBAL, R. AHMAD AND M. RAHMAN (1991). **Submerged fermentation of pectinases by *Aspergillus foetidus*.** *J. Pure App. Sci.*, 10 (1): 1-5.

PCSIR Laboratories Complex, Lahore-16.

The biosynthesis of pectinases by *A. foetidus* was investigated by the submerged fermentation in shake flasks. The parameters studied were the evaluation of different substrates, such as wheat bran, defatted soybean, sunflower, cottonseed meals and pharmanedia, the optimum incubation time and the effect of different nitrogen sources on the production of pectinases. Wheat bran was found to be an ideal substrate providing all the nutrients essential for the mould growth and enzyme formation. The optimum concentration of all nutrients was found to be 5% w/v for both pectinesterase and polygalacturonase. The production of enzymes reached maximum 48 hours after inoculation. The addition of urea in wheat bran culture medium gave maximum results of pectinase synthesis by mould culture.

O. YOUNUS, S. QURATULAIN, A. ADNAN AND M.A. QADEER (1991). **Solid substrate fermentation of antibiotic bacitracin by *Bacillus licheniformis***. *J. Pure App. Sci.*, 10 (2): 79-84.  
PCSIR Laboratories Complex, Lahore-16.

The agricultural by-products such as wheat bran, rice hulls, defatted oil seed cakes of soybean, sunflower or cotton were evaluated for antibiotic formation by solid substrate fermentation. Soybean meal was found to be the ideal substrate for the production of bacitracin (2400.0 IU/g). The effect of partial replacement of soybean meal by different amounts of (i) wheat bran (ii) rice hulls was also studied. The substrate containing a mixture of 75% soybean meal and 25% wheat bran gave maximum antibiotic activity i.e. 2670.0 IU/g. The antibiotic formation reached maximum, 42 hr. after inoculation.

O. YOUNUS, S. QURATULAIN, M. A. QADEER, A. ADNAN AND I.H. SHAH (1992). **Evaluation of defatted soybean meal for the production of antibiotic bacitracin by *Bacillus licheniformis* PCSIR-90 in the stirred fermenter**. *J. Pure App. Sci.*, 11 (2): 105-113.  
PCSIR Labs. Complex, Lahore.

The present study is concerned with the scale up production of antibiotic bacitracin by *Bacillus licheniformis* PCSIR-90, in 10 L, 50 L and 100 L glass stainless steel fermenter. Defatted soybean meal was used as substrate, producing 346.0 IU/mL of bacitracin. The fermentation was run for 25-30 hours at  $37 \pm 2^\circ\text{C}$ . The parameters studied, during the course of fermentation were (i) antibiotic activity, (ii) pH changes (iii) dissolved oxygen saturation (iv)  $\text{CO}_2$  evolution (v) glucose consumption. Feed batch process consisting of four cycles was also carried out.

## PROCEEDINGS OF NATIONAL SEMINAR ON FOOD SAFETY AND NUTRITION

National Seminar on Food Safety and Nutrition was held at the PCSIR Laboratories Complex, Lahore on February 23-24, 1991 (Food Science News, 1 (2): 1991). The proceedings of this Seminar have now been published by the PCSIR Laboratories Complex, Lahore. This book consists of 128 pages and contains Welcome Address (by the Director General, PCSIR Laboratories Complex, Lahore), Keynote Address (by Prof. Dr. Qamar Iqbal, Chairman, PCSIR Complex), Inaugural Address (by Prof. Khurshid Ahmad, Senator) the following articles:-

1. A.F.M. EHTESHAMUDDIN  
**Overview on food safety situation in Pakistan**  
PCSIR Laboratories Complex, Lahore.

2. ISMAIL KHAN  
**Wholesomeness of irradiated food**  
Nuclear Institute for Food and Agriculture,  
Tarnab, Peshawar.

3. M. JAMIL, M. ASLAM AND A.F.M. EHTESHAMUDDIN  
**Studies on the development of maltine an instant tonic drink**  
PCSIR Laboratories Complex, Lahore.

4. NUSRAT EJAZ AND F.H. SHAH  
**Rapid screening method for aflatoxin detection**  
PCSIR Laboratories Complex, Lahore.

5. ABDUL HAMID, ABDUS SALAM SHEIKH AND F.H. SHAH  
**Food colours: A hazard to food safety**  
PCSIR Laboratories Complex, Lahore.

6. S.M. ALI  
**Changing concepts of protein needs**  
PCSIR Laboratories Complex, Lahore.

7. NAZAR MOHAMMAD, MOHAMMAD JAMIL, MOHAMMAD ANWAR AND M. AFZAL  
**Storage of okra and bitter gourd in polyethylene film**  
PCSIR Laboratories Complex, Lahore.

8. TASNIM KAUSER AND F.H. SHAH  
**Mushroom (oyster) as nutritional source**  
PCSIR Laboratories Complex, Lahore.

O. YOUNUS, S. QURATULAIN, A. ADNAN AND M.A. QADEER (1991). **Solid substrate fermentation of antibiotic bacitracin by *Bacillus licheniformis***. *J. Pure App. Sci.*, 10 (2): 79-84.  
PCSIR Laboratories Complex, Lahore-16.

The agricultural by-products such as wheat bran, rice hulls, defatted oil seed cakes of soybean, sunflower or cotton were evaluated for antibiotic formation by solid substrate fermentation. Soybean meal was found to be the ideal substrate for the production of bacitracin (2400.0 IU/g). The effect of partial replacement of soybean meal by different amounts of (i) wheat bran (ii) rice hulls was also studied. The substrate containing a mixture of 75% soybean meal and 25% wheat bran gave maximum antibiotic activity i.e. 2670.0 IU/g. The antibiotic formation reached maximum, 42 hr. after inoculation.

O. YOUNUS, S. QURATULAIN, M. A. QADEER, A. ADNAN AND I.H. SHAH (1992). **Evaluation of defatted soybean meal for the production of antibiotic bacitracin by *Bacillus licheniformis* PCSIR-90 in the stirred fermenter**. *J. Pure App. Sci.*, 11 (2): 105-113.  
PCSIR Labs. Complex, Lahore.

The present study is concerned with the scale up production of antibiotic bacitracin by *Bacillus licheniformis* PCSIR-90, in 10 L, 50 L and 100 L glass stainless steel fermenter. Defatted soybean meal was used as substrate, producing 346.0 IU/mL of bacitracin. The fermentation was run for 25-30 hours at  $37 \pm 2^\circ\text{C}$ . The parameters studied, during the course of fermentation were (i) antibiotic activity, (ii) pH changes (iii) dissolved oxygen saturation (iv)  $\text{CO}_2$  evolution (v) glucose consumption. Feed batch process consisting of four cycles was also carried out.

## PROCEEDINGS OF NATIONAL SEMINAR ON FOOD SAFETY AND NUTRITION

National Seminar on Food Safety and Nutrition was held at the PCSIR Laboratories Complex, Lahore on February 23-24, 1991 (Food Science News, 1 (2): 1991). The proceedings of this Seminar have now been published by the PCSIR Laboratories Complex, Lahore. This book consists of 128 pages and contains Welcome Address (by the Director General, PCSIR Laboratories Complex, Lahore), Keynote Address (by Prof. Dr. Qamar Iqbal, Chairman, PCSIR Complex), Inaugural Address (by Prof. Khurshid Ahmad, Senator) the following articles:-

1. A.F.M. EHTESHAMUDDIN  
**Overview on food safety situation in Pakistan**  
PCSIR Laboratories Complex, Lahore.

2. ISMAIL KHAN  
**Wholesomeness of irradiated food**  
Nuclear Institute for Food and Agriculture,  
Tarnab, Peshawar.

3. M. JAMIL, M. ASLAM AND A.F.M. EHTESHAMUDDIN  
**Studies on the development of maltine an instant tonic drink**  
PCSIR Laboratories Complex, Lahore.

4. NUSRAT EJAZ AND F.H. SHAH  
**Rapid screening method for aflatoxin detection**  
PCSIR Laboratories Complex, Lahore.

5. ABDUL HAMID, ABDUS SALAM SHEIKH AND F.H. SHAH  
**Food colours: A hazard to food safety**  
PCSIR Laboratories Complex, Lahore.

6. S.M. ALI  
**Changing concepts of protein needs**  
PCSIR Laboratories Complex, Lahore.

7. NAZAR MOHAMMAD, MOHAMMAD JAMIL, MOHAMMAD ANWAR AND M. AFZAL  
**Storage of okra and bitter gourd in polyethylene film**  
PCSIR Laboratories Complex, Lahore.

8. TASNIM KAUSER AND F.H. SHAH  
**Mushroom (oyster) as nutritional source**  
PCSIR Laboratories Complex, Lahore.

9. A. HUSSAIN, W.H. SHAH AND F.H. SHAH  
**Problems of balanced diet in the rural areas of Pakistan**  
PCSIR Laboratories Complex, Lahore.
10. M. JAMIL QURESHI, FARHAT F. JAMIL, F. ANWARUL-HAQ AND S.H. MUJTABA NAQVI  
**Bioavailability and toxicological potential of wheat bound pirimiphos - methyl residues in rats**  
Nuclear Institute for Agriculture and Biology, Faisalabad.
11. IKRAMUL HAQ, AMIN M. HUSSAIN AND M.J. QURESHI  
**Incidence of *Clostridium botulinum* in fish and its behaviour during inoculated pack storage**  
Nuclear Institute for Agriculture and Biology, Faisalabad.
12. KABIR QURESHI  
**Milk hygiene practices in Pakistan**  
Prime Dairies (Pvt) Ltd., Lahore.
13. A.K. BALOCH, SAIFULLAH KHAN AND W.A. WAQAR  
**Role of some chemical treatments on storage stability of tomato powder**  
Department of Food Science and Technology, Gomal University, Dera Ismail Khan.
14. M.A. QADEER, S. JAFFAR, K. FATIMA AND S. AHMAD  
**Microbiological examination of raw milk, butter and cheese available in the market**  
PCSIR Laboratories Complex, Lahore.
15. M.A. QAZI, M. RAHMAN AND S.U. KHAWAJA  
**Microbiological studies on dry fruits**  
PCSIR Laboratories, Quetta.
16. HAMID AHMAD, S. SHAKOOR CH., R. RAFIQ SIDDIQUI AND MOHAMMAD ASHRAF  
**Nutritional aspects of dehydrated minced beef and products**  
PCSIR Laboratories Complex, Lahore.
17. AMJAD ALI AND M. SHAHID  
**Dietary lipids: risks and benefits**  
Department of Food Technology, University of Agriculture, Faisalabad.
18. M.A.A. BEG  
**Pathways of potentially toxic chemicals into the food chain and possible methods for abating the situation**  
PCSIR Laboratories Complex, Karachi.
19. JAVAID AZIZ AWAN  
**Islamic Codex Alimentarius**  
Department of Food Technology, University of Agriculture, Faisalabad.
20. SALAHUDDIN  
**Role of trace elements in health and disease**  
PCSIR Laboratories Complex, Lahore.
21. A.K. BALOCH, SAIFULLAH KHAN AND W.A. BALOCH  
**Effect of temperature on the rate of drying and heat damage to carrots during dehydration**  
Department of Food Science and Technology, Gomal University, Dera Ismail Khan.
22. WASIM A. FAROOQI, A. SATTAR (JR.) AND M. JAMIL QURESHI  
**Improvement and maintenance of fruit quality by the application of post harvest techniques**  
Nuclear Institute for Agriculture and Biology, Faisalabad.
23. M.Y. CHAUDHRY, M.A. SHAH AND S. ALI  
**Biological evaluation of single cell protein produces from molasses**  
PCSIR Laboratories Complex, Lahore.

# PROBLEMS ASSOCIATED WITH THE MANUFACTURE, STORAGE AND MARKETING OF ICE CREAM IN PAKISTAN

**Muhammad Sultan Mahmood**  
 Manager Technical Services,  
 Synarome Manufacturing Co. (Pvt) Ltd.,  
 Shah Alami Market,  
 Lahore-Pakistan.

## INTRODUCTION

Ice cream is a frozen dairy food made by freezing a pasteurised mix with agitation to incorporate air and ensure uniformity of consistency. This mix is composed of a combination of milk products, sugar, water and other optional ingredients, with or without eggs or egg products, with permitted food flavouring and with or without added stabilisers or emulsifiers and all wholesome edible materials. The composition of ice cream varies in different markets and different localities. The composition of a good average ice cream is shown in Table 1.

consists of liquid, air and solid and constitutes a three phase system.

Ice cream is a palatable, nutritious, healthful and relatively inexpensive food. One serving of good average composition of Vanilla ice cream (1/6 qt.) supplies approximately 200 kcal., 3.9 g protein, 0.31 g calcium, 0.104 g phosphorus, 0.14 g iron, 548 IU vitamin A, 0.038 g thiamine and 0.236 mg riboflavin.

### Development of ice cream industry

Ice cream industry, as known today, has been developed mainly in the United States. The product was introduced from Europe. Ice

description is not available other than that snow was brought down from the mountains by runners to cool and perhaps freeze desserts. In the 13th century, Marco Polo returned to Italy from his famous journey to the Orient and brought recipes for water ices said to have been used in France, Germany and England during the next few centuries. Ice cream probably came to America with the early English colonist. In 1851, the first wholesale ice cream industry in America was established in Baltimore, Maryland. Thus a product whose origin was in Asia was developed and commercially distributed in the USA. There are still some varieties of ice creams like *Kulfa*, *Kulfi* and *Faludha* which are prepared and sold only in South Asia. *Kulfa* and *Kulfi* are ice creams that are rich in *Khoa* and butter. *Faludha* is a starch based product served with ices, *Khoa* and sweeteners. These products are a speciality in Pakistan and its adjoining regions.

The role of corner ice cream vendors cannot be eliminated in developing and popularising ice cream. At present, ice cream worth 700 million Rupees is being sold in Pakistan and out of it about 300 million (half) is earned only by small corner ice cream vendors. I will not condemn but regret to say that these vendors are not properly regularised. The hygienic conditions and other safety regulations are not being observed by these vendors, which may be contributing towards different epidemics like cholera and other food borne diseases. There is a need to regularise these ice cream corner vendors.

At present, Polka Lahore, Polka Karachi, Yummy Lahore, Rocco Lahore, Donnee Lahore, Mirella Islamabad, Azeem Food and Igloo Karachi are producing ice cream on commercial basis in

Table 1. Per cent composition of ice cream

| Ingredient                 | Average | Range |
|----------------------------|---------|-------|
| Fat                        | 12      | 8-20  |
| Milk solids not fat (MSNF) | 11      | 8-15  |
| Sugar                      | 15      | 13-20 |
| Stabiliser and emulsifier  | 0.3     | 0-0.7 |
| Total solids               | 38.2    | 36-43 |

The physical structure of ice cream stems from a complicated physicochemical process. Air cells are dispersed in a continuous liquid phase with embedded ice crystals. The liquid phase also contains solidified fat globules, milk proteins, insoluble salts, lactose crystals and, in some cases, stabilisers of colloidal dimensions, and sugars and soluble salts in solutions. The finished product

cream must have been evolved from iced beverage and water ices that were popular in the early medieval period. Wines and fruit juices were cooled with ice and snow brought from the mountains by runners to the court of Nero, Emperor of Rome, in the first century A.D. It is possible that the iced sweet-meats, and other frozen foods had their origin in early Egypt or Babylon. A definite

Pakistan. Although all these commercial producers are coordinating with each other to tackle different technical and commercial problems, there is still a need to establish more closer contacts among them to make ice cream industry a success.

## ICE CREAM PROCESSES

### 1. Mixing

In order to obtain a well-blended and good homogeneous mix, it is essential to have effective mixing units. Normally, an ice cream mix consists of fat, milk solids not fat, sugar, emulsifying and stabilising agents, colours and flavouring materials, all dispersed and dissolved in the water phase.

in Table 2 are suggested for commercial use.

### 2. Mix processing

Mix processing can be divided into following main stages:

- a. Heating
- b. Homogenisation
- c. Ageing
- d. Freezing
- e. Hardening
- f. Storage
- g. Shipping

#### a. Heating

Heating is undertaken in order to liquefy the fat and emulsifier and thereby dissolve sugar and stabilisers more easily. For bacteriological reasons, the mix has to be pasteurised at 177°F

uniform globule size. Proper homogenised mix provides better whippability, a smooth texture and improved melt down.

#### c. Ageing

After homogenisation and cooling, ice cream requires ageing for two main reasons:

1. fat to crystallise, and
2. milk proteins to absorb free water as water of hydration.

The ageing temperature should not exceed 40°F (5-6°C). Many plants age the mix around 36 F (2.2°C) or a little lower 28-30°F (-1.1 to -2.2°C). There seems to be no advantage in this - in fact, there is a danger that the first of the mix to enter the freezer might freeze fast to the cold walls of the freezer and may damage the dasher. The ageing of the mix was done for 24 hours, but recent experimental works seem to prove that under average commercial conditions, 3-4 hours are sufficient for the purpose.

#### d. Freezing

When the mix has been properly aged, it is ready for the freezing process, which generally follows immediately.

Table 2. Commercial formulation of ice cream

|                          | Plain | Tutti Frutti | Chocolate | Soft serve |
|--------------------------|-------|--------------|-----------|------------|
| Skimmed milk powder (kg) | 114.5 | 115.0        | 106.0     | 10.0       |
| Butter (kg)              | 120.0 | 95.0         | 95.0      | 12.0       |
| Sugar (kg)               | 144.4 | 144.0        | 160.0     | 12.0       |
| Stabiliser (kg)          | 6.0   | 6.0          | 6.0       | 0.4        |
| Flavour (mL)             | 300.0 | 700.0        | 900.0     | 30.0       |
| Colour (g)               | 80.0  | 60.0         | 300.0     | 8.0        |
| Cocoa powder (kg)        | -     | -            | 15.0      | -          |
| Caramel (kg)             | -     | -            | 8.0       | -          |
| Corn syrup (kg)          | -     | -            | -         | 0.3        |

Milk fat can be replaced by suitably blended vegetable fat from coconut, palm and peanuts. These produce excellent ice cream, very similar to that made with milk fat.

The choice of basic ingredients depends on such factors as quality, price, preservation, storing facilities and the ease with which they can be used. They may vary from country to country according to the food laws in force. The different ice cream formulations

(80°C). Heat treatment is also essential for the water binding effect of milk proteins.

#### b. Homogenisation

Homogenisation is usually accomplished by forcing the mix through a small orifice under suitable conditions of temperature and pressure (2100 PSI or 150 Bar), using a positive displacement plunger pump to furnish the pressure. It is a process whereby an emulsion obtains a more

### Classification of freezers

#### 1. Batch Freezers

- a. Brine freezers
- b. Direct expansion
- c. Salt and ice type

#### 2. Continuous Freezers

Direct Expansion

#### 3. Soft Serve Freezers - Batch and Automatic

(Continuous Freezer of Direct Expansion Type)

The main purpose of freezing is to transform the liquid mix into a semi-solid state. During freezing process, the most important part of structure building takes place, i.e. incorporation of air in well dispersed state, partial agglomeration of the globules and freezing of approximately 50 per cent water. The emulsifier will assist the destabilisation of fat and provide a better and stronger structure. During the following hardening process, this system is stabilised by freezing the remaining water onto the ice crystal nuclei already formed.

Mix must be flavoured and coloured before it enters the freezer. It should be frozen at a temperature of 23-21°F (-5 to -6°C) as quickly as possible.

#### e. Hardening

When ice cream is drawn from the freezer, it is put into the containers to be placed in the hardening room at a temperature of -30 to -50°F (-34.4 to -45.6°C) for 24 hours to get proper shape. Some manufacturers of larger volumes use hardening tunnels containing air blast at -30 to -50°F (-34.4 to -45.6°C) for rapid hardening.

#### f. Storage

After the ice cream is hardened, it may be immediately marketed or stored at -13°F (-25°C) for a week or two.

#### g. Shipping

The manufacturer usually ships the ice cream to the retailer under refrigeration at the same temperature as is maintained in the retailer's cabinets.

#### Problems faced by ice cream industry in Pakistan

Process of ice cream manufacturing is seriously handicapped with the availability and quality of the raw materials. Almost all in-

puts like milk powder, stabilisers and flavours have to be imported involving huge foreign exchange and transportation costs. The bottle-necks in arranging import permits and other official formalities are still there. The quality of imported raw materials like milk powder and coconut powder, etc. deteriorate due to delays at various points of transportation. It will be more appropriate to arrange the production of powder milk in the country as we are producing a good amount of fluid milk. By processing our own milk, on one hand, our farmers can be encouraged to produce more milk by paying them proper return for their investments and on the other, we can supply good quality milk powder to the ice cream and other food manufacturing industries. At present, only few plants are producing milk powder for their specific consumers like Armed Forces of Pakistan. However, at present, milk powder produced in Pakistan is more expensive than the imported one.

The other raw materials like butter and sugar that are being produced in the country are of very poor quality. The butter is not being produced on scientific lines which results in very defective chemical and organoleptic properties. The acidity and rancidity in butter are very important parameters for ice cream manufacturing which are poorly controlled. High acidity in butter may spoil the whole batch of ice cream.

Sugar, one of the most important ingredient, although, abundantly available in the country is not of good quality. Furthermore, there is no persistency in the quality. The colour and sweetening power of sugar varies from batch to batch resulting in problems during processing. There is a need for quality control in sugar production.

The imported ingredients especially flavours and stabilisers are very expensive due to heavy custom duties and high initial cost. Work should be initiated to produce these chemicals in the country, in accordance with specific requirements and taste of Pakistani people. Pakistanis are very conservative regarding their taste and do not accept any product easily even with a slight change in taste and flavour. I may quote the example of mango flavour which is not available in the world that can be added to enhance or substitute fresh mango pulp satisfactorily.

Almost all ice cream manufacturing and distributing machinery is being imported from other countries. There are always problems of spare parts and after sales service. The duty imposed is about 125 per cent along with other added taxes increasing cumulative cost to such an extent that it affects the pricing of ice cream adversely. Steps should be taken to reduce the import duties and to manufacture some components of machinery locally.

The distribution mechanism of ice cream is quite complex. After manufacturing, ice cream is stored at low temperature (-13°F, -25°C) for hardening. This is transported in freezer vans to quite distant areas. The retailer again stores it in freezer cabinets before selling it to consumers. During all this mechanism, specific constant temperature is to be maintained to ensure good quality. Unfortunately, Pakistan has to import all these equipments from abroad and foreign manufacturers have standardised them for their own specific needs. Let us take the example of freezer vans. These are designed for 96°F (35°C) ambient temperature whereas in Pakistan, we often experience 113°F (45°C) or above during summer.

It is simply not possible for a freezing unit designed for 96°F (35°C) to work under 113°F (45°C) temperature conditions.

In Pakistan, power supply is the most uncertain commodity for an industrial manufacturer. There are always frequent power failures without any notice which further complicate the production problems. The quality of ice cream cannot be ensured without constant power supply. Regular load shedding of electricity should also be reduced as much as possible. Supply of gas is still another constraint in ice cream production. The industrial load shedding of gas compels the manufacturers to find some other means of energy which affects the cost adversely. Necessary steps should be taken to solve electricity and gas problems.

Marketing of ice cream is a complex problem. Although commercial ice cream manufacturers

produce a superior quality ice cream under more hygienic conditions, still they have to compete for price with small corner vendors. As mentioned earlier, the delivery vans are not designed for high temperature conditions of Pakistan, hence, there are frequent failures in refrigeration systems of delivery vans resulting in huge losses. At retailer's point, due to power failure, quality of ice cream, particularly texture, deteriorates.

In the end, I would like to draw the attention of our policy makers towards taxes and duty problems. Most of agro-based industries are exempted from various kinds of taxes and duties. Although ice cream is a dairy industry and depends entirely on livestock produce, its production is not treated as an agro-based industry. I will request the Government of Pakistan to treat this industry at par with other agro-based industries.

## SOURCES

- Arbuckle, W.S., 1964. The effects of low temperature freezing upon the texture of ice cream. *Ice Cream World*, 71 (7): 26-28.
- Arbuckle, W.S., 1977. *Ice Cream Service Handbook*. Avi Pub. Co., Westport.
- Atherton, H.V. and J.A. Newlander, 1977. *Chemistry and Testing of Dairy Products*. Avi Pub. Co., Westport.
- Woolrich, W.R., 1965. *Handbook of Refrigerating Engineering*. Vol. 1 & 2. Avi Pub. Co., Westport.
- Happer, W.J. and C.W. Hall, 1976. *Dairy Technology Engineering*. Avi Pub. Co., Westport.
- Jenness, R. and S. Patton, 1959. *Principles of Dairy Chemistry*. John Wiley & Sons, New York.
- Webb, B.H., A.H. Johnson and J.A. Alford, 1974. *Fundamentals of Dairy Chemistry*. 2nd Ed., Avi Pub. Co., Westport.

## PIONEERS IN MUSHROOM & SPAWN PRODUCTS



# ASJID

## MUSHROOMS

**WHY IMPORT WHEN WE CAN PRODUCE THEM**

623-D, Peoples Colony, Faisalabad-Pakistan.  
Tel: Off. 0411-47842, Res: 0411-41782  
Telex: 45345 FAISL PK. Fax: 610963 Attn: JOYA

---

# NEWS

---

## HONOURED

### *Gold Medal awarded*

Dr. Waseem A. Farooqi, Professional Member of the Society was awarded Gold Medal by the Horticultural Foundation of Pakistan. Dr. Farooqi, apart from his academic qualifications in horticulture, also received specialized training in Post-harvest Physiology and Technology from Australia and Italy. He has been engaged in research on shelf-life extension of fruits at Nuclear Institute for Agriculture and Biology, Faisalabad. His centre



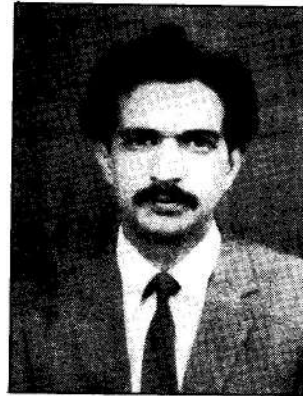
of activity has been citrus (Kinnow) and mango. He is author and co-author of more than 60 papers and has two patents to his credit. Dr. Farooqi was awarded the Gold Medal in recognition of his services in Post-harvest Physiology. The Medal was awarded by Mr. Lutuf Ullah Mufti, Federal Secretary, Ministry of Food, Agriculture and Cooperatives, Government of Pakistan, Islamabad.

### *Best Paper Award*

Dr. Abdus Sattar, P.S.O., Nuclear Institute for Food and Agriculture has been awarded "Scientist of the Year Award" by the National Book Council of Pakistan. This award was given to Dr. Sattar on an article published in 1990. This is the first award to any agricultural scientist and the fourth since independence.

### *Ph.D. Degree awarded*

Mr. Sakhawat Ali, Scientific Officer, Biotechnology and Food Research, PCSIR Laboratories Complex, Lahore has been awarded Ph.D. in Zoology (Nutrition) by the University



of the Punjab, Lahore on the approval of his thesis entitled "Nutritional evaluation of indigenous feeds on quail".

### *Promoted*

Mrs. Sherin Iqbal, Mrs. Hameeda Abid, Scientific Officers of the Food Technology Research Division, PCSIR Laboratories, Peshawar have been promoted to the post of Senior Scientific Officer. **Congratulations!**

### *Workshop attended*

Dr. N.A. Sufi, Chief Scientific Officer of PCSIR Laboratories, Peshawar participated and represented Pakistan in a three days Regional Workshop on "The utilization of under-exploited fruits and nuts in Asia" held at Dhaka Bangladesh on July 21st through 23rd, 1992. This Workshop was jointly organized by the International Centre for the Under-utilized Crops (ICUC) U.K., Commonwealth Science Council (CSC), U.K. and Bangladesh Agriculture Research Council (BARC). The Workshop ended with the adoption of a set of recommendations. Under the programme, Bangladesh will undertake research work on processing and marketing of jackfruits, India 'ber', Malaysia mangosteen, Pakistan guava and Sri Lanka anona species of fruits.