

PROCEEDINGS OF THE ANNUAL GENERAL MEETING, 1993

The Third Annual General Meeting of the Pakistan Society of Food Scientists and Technologists was held on Thursday, April 29, 1993 in the Auditorium of the Pakistan Council of Scientific and Industrial Research Laboratories Complex, Lahore. Dr. Javaid Aziz Awan who is also the Secretary of the Society welcomed the participants and invited the dignitaries on the stage. The meeting started by recitation from the Holy Quran by Hafiz Sameer Ahmad followed by *Naat-e-Rasool-Maqbool* (pbuh). Dr. Muhammad Akbar Saeed, Director General, PCSIR Laboratories Complex, Lahore, while delivering his welcome address, enumerated various factors responsible for global food shortage like rapid increase in population, scarcity of land and water resources and post-harvest losses. He outlined the ways by which PCSIR Biotechnology and Food Division had been striving to find the solution to these problems. He stressed on the need of devising a comprehensive strategy for solving the basic problems of food that our people are confronting.

In his Presidential address, Professor Dr. Muhammad Shafiq Chaudhry, President, Pakistan Society of Food Scientists and Technologists emphasised on the need of training of manpower for food industries in Pakistan. He said that in the present era of specialisation, the teaching institutions should reshape their curricula to coop the needs of the food industry.

The Chief Guest, Dr. Abdul Qadir Ansari, S.I., Chairman, Pakistan Council of Scientific and Industrial Research explained the need and importance of research to solve various problems being faced by the food industries and common people in Pakistan. Emphasising the importance of latest food technologies, its acquisition and adaptation at local level, he pin-pointed requirements for achieving better and safe nutritional status of general population of the country. He said marketing was another important issue especially in the present scenario where the menace of adulteration is attaining its high peaks and the food and feedstuffs have been suffering from multifarious problems in view of improper food safety and its nutritional status. Dr. Ansari also introduced his concept of 'village-head technology' to keep the foodstuff duly managed. He said the basic unit of food and fruit produce is village or town, therefore, villages/towns should be given due status that could result in multifaceted advantages ranging from job creation to the glut season handling of food and fruit produces.

After the Inaugural Address, Dr. Awan invited the guests to tea hosted by PCSIR Laboratories in the honour of participants.

In the Technical Session I, Dr. A.F.M. Ehteshamuddin, Mr. Ibrar Hussain and Dr. M. Afzal Malik delivered papers on various aspects. Dr. Ehteshamuddin spoke on the research and development achievements of the Biotechnology and Food Research Centre, PCSIR Laboratories Complex, Lahore. He gave a brief account of possible directions of future research to attain self-reliance based on indigenous technologies. Dr. Afzal Malik presented his research on the production of

golden syrup from molasses. He said that about a million tonne of molasses was obtained annually as a byproduct of sugar industry in Pakistan, most of which was being exported at nominal prices. Hence, there was a need to utilise this byproduct. He elaborated on process technology for the preparation of golden syrup which included decolourisation-deodourisation, deionisation and concentration.

In the Technical Session II, Prof. (Retd.) M.B. Bhatti introduced a venture capital financing scheme. He gave a brief description of the scheme and elaborated on the procedure for obtaining loan. In his presentation of citrus processing potential in Pakistan, Mr. Aizad Ahmad discussed the production of citrus fruits in Pakistan and the world. He explained the production of frozen concentrated Kinnow juice, the problems related to citriculture in Pakistan and some recommendations. He said that the present deplorable situation could be bettered by proper extension services, recognition of citrus as a major industry and establishment of a citrus research station. Dr. Wasim A. Farooqi talked about the post-harvest technology of fruits. He especially referred to the research work conducted on citrus, mangoes and other fruits at the Nuclear Institute for Agriculture and Biology (NIAB), Faisalabad.

The Business Session was chaired by the President, Prof. Dr. Muhammad Shafiq Chaudhry who was assisted by the Vice President, Prof. Dr. Muhammad Saeed and the Secretary, Dr. Javaid Aziz Awan. Members actively participated in the proceedings of the Business Meeting and forwarded suggestions which were noted for compliance at appropriate time. Owing to various economical factors, it was suggested to raise the membership dues and charge registration fee for Annual General Meetings. This was unanimously accepted. Membership dues have been fixed at Rs. 100.00 for Professional and Associate Members and Rs. 50.00 for Student Members. Registration fee for AGMs has been fixed at Rs. 50.00.

At the end, the Secretary thanked the organisers, the PCSIR Laboratories, Lahore and all the participants who came from all over the Pakistan. He wished them safe journey home.

ELEMENTS OF FOOD AND NUTRITION

J.A. AWAN

The book describes the role of nutrients in health and disease, their recommended dietary allowances and contents in selected foods. It is intended to be used by the students of Food Technology, Home Economics, Nutrition, Dietetics, Nursing, Catering and Hotel Management and allied disciplines.

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WELCOME ADDRESS

Dr. Muhammad Akbar Saeed

Director General, PCSIR Laboratories Complex, Lahore.

Dr. Abdul Qadir Ansari, S.I.,

Chairman,

PCSIR Laboratories Complex, Lahore.

Professor Dr. Muhammad Shafiq Chaudhry,

President,

Pakistan Society of Food

Scientists & Technologists,

Fellow Scientists

& Technologists,

Ladies & Gentlemen!

Asslam-o-Alaikum:

On behalf of the PCSIR Laboratories Complex, Lahore, it is my profound privilege to welcome all the participants to the inaugural session of the Annual General Meeting of Pakistan Society of Food Scientists and Technologists.

I am personally indebted to Professor Dr. M. Shafiq Chaudhry for holding the meeting of food scientists and technologists of the country at our premises, thus providing a unique opportunity to the scientists related to food and biotechnological sciences to get-together and exchange ideas on various aspects of food industries. I also welcome Dr. Abdul Qadir Ansari, Chairman, PCSIR Laboratories who has very graciously accepted to Chair the inaugural session of the meeting. This shows his keen interest in the scientific pursuit being carried out in research and development organisations in Pakistan.

I am sure in the light of the deliberations of this meeting, we would be able to devise a comprehensive strategy to solve the basic problems of foods confronting our people.

It is worthwhile to briefly explain the aims and objectives of PCSIR Laboratories established in all the provinces of Pakistan. PCSIR was created in 1953 with the primary objective to gain technological self-reliance based on indigenous capacity. Towards the realisation of this basic objective, research and development activity of the organisation may be classified as:

- Systematic evaluation, development and utilisation of indigenous raw materials leading to the development of new processes or products or adaptation of known processes which go in line with our local conditions.
- To conduct research and development work on problems which we are facing at national levels.

- To undertake work on standardisation so as to make the indigenous foods comparable in quality with imported products and to seek new avenues for further manufacturing opportunities.

- To associate the existing industry for the effective research findings in the working of various units of PCSIR to test the bench findings to pilot plant scales to obtain data for the designing of commercial scale plants.

The above objectives of the PCSIR are being pursued by:

- a. four multidisciplinary laboratories at Karachi, Lahore, Peshawar and Quetta,
- b. Fuel Research Centre, Karachi,
- c. Leather Research Centre, Karachi,
- d. Solar Energy Centre; Hyderabad, and
- e. National Physical and Standard Laboratory, Islamabad.

PCSIR Laboratories Complex, Lahore is organised into six centres and two divisions namely:

- a. Applied Chemistry Research Centre,
- b. Biotechnology and Food Research Centre (named as Dr. Bashir Ahmad Research Centre),
- c. Minerals and Metallurgy Research Centre,
- d. Glass and Ceramics Research Centre,
- e. Applied Physics, Computers and Instrumentation Centre,
- f. Centre for Environmental Protection Studies,
- g. Research Industrialisation Division, and
- h. General Services Division.

These Centres and Divisions are manned by highly trained researchers. A good number of them has been trained in some of the finest universities/institutions of the world. Necessary additional facilities such as workshop, library and pilot plants are also available to meet the research and development support needs. By way of developing hundreds of new processes and technologies, these laboratories have been rendering assistance to the national industrial base, both in public and the private sectors. These sectors have been further benefitting from the expertise available in the PCSIR through advisory and analytical services. The contributions made to the educational sector is also noteworthy and the number of students that have carried out their research theses towards Masters and the Doctoral degrees run into hundreds. In order that these nation-building activities may

continue, special attention is needed to maintain the manpower expertise level and the research and development facilities commensurate with the continuously advancing frontiers of science and technology.

Pakistan, being an agricultural country is trying to preserve different products by applying modern methods available in food technology. Pakistan produces various agricultural commodities for home consumption as well as for export. Besides rice, we are exporting vegetables and fruits, salted and frozen fish to other countries. Most of these are seasonal items and perish readily. Therefore, proper handling methods especially for prolonging the keeping quality of these highly perishable commodities should be developed. Poor handling, packing and transportation of the commodities for local consumption also result in huge losses in terms of quantity and quality. The estimated losses of rice and wheat are worth Rs. 4,725 million. Similarly, in case of other agricultural commodities and fish such losses are approximately to the extent of Rs. 2.79 and 3.00 million, respectively.

Appropriate research and development findings in the field of food technology will help in reducing the losses and make these highly nutritious food available to the people and also result in saving valuable foreign exchange which is being spent on their import.

The Biotechnology and Food Research Centre of PCSIR Laboratories Complex, Lahore has completed a number of projects aimed at preservation of food materials, production of value-added products based on low quality agricultural produce and agro-wastes and development of bio-industrial processes. Many of these have been leased out and are in commercial production. Some significant developments among these are:

- Commercial dehydration of vegetables;
- Bating enzymes;
- Production of cattle feed;
- Production of desizing enzymes;
- Production of infant food; and
- Fungicidal wax emulsion.

The Centre is working in the areas of:

- a. minimisation of post-harvest food losses, enhancement of shelf-life, conversion of less nutritious food products including agro-industrial wastes into nutritious food and feedstuffs;
- b. production of acids, enzymes, antibiotics and other products based on fermentation technology;
- c. advisory, quality control and trouble shooting services to various food and feed industries;
- d. assistance to various universities for research thesis facilities and guidance for M.Sc./Ph.D. thesis work.

The Centre has six pilot plants related with food processing and preservation, fruits and vegetable dehydration, fermentation and feed processing. An integrated rural unit facility has been created for studying problems related with rural uplift programmes. Various research projects have been pursued in collaboration with PL-480, FAO, US-National Science Foundation, Pakistan Science Foundation, PCAT, WHO, IDRC, PARC and various other national and international agencies. The Biotechnology, Food and Fermentation Centre is reasonably well equipped, largely through fundings from the above cited agencies and under the Balancing and Modernisation Programme made possible through grant in aid by the Government of Japan.

Food is the basic necessity of man. But despite all the efforts to considerably increase the food supply, large areas of the world still suffer from food shortage due to various factors, particularly, tremendous increase in population and scarcity of land and water resources. So far as PCSIR is concerned, the Organisation is fully aware of this problem and as already illustrated, is doing whatever is possible to contribute its solution. On behalf of the scientists of the PCSIR, I wish to assure you that we will continue to strive to achieve the goal set for us no matter what the odds are. In the end, I would like to thank you once again for your participation in the meeting.

Thank you!

INAUGURAL ADDRESS
DR. ABDUL QADIR ANSARI, S.I.,
Chairman, PCSIR Laboratories

Professor Dr. Muhammad Shafiq Chaudhry,
President,
Pakistan Society of Food Scientists & Technologists,
Dr. M. Akbar Saeed
Director General,
PCSIR Laboratories Complex,
Lahore.
Fellow Scientists &
Technologists;
Ladies & Gentlemen!

The meeting of the Pakistan Society of Food Scientists and Technologists being held today, I understand, is considering the various problems being confronted by the food industries in general and the food and nutrition status of the nation in particular. The country with an agro-based economy, having large population to feed, need to utilise every bit being produced in the agricultural fields and orchards. The current food wastage of 15-40 per cent of the total produce during various pre- and post-harvest stages cannot be afforded even under the most complacent of circumstances. Indeed, it is for the food researchers to develop processes and technologies which on the one hand minimise such colossal wastage and on the other, develop such value-added products that may become sources of foreign exchange earnings. The endeavour of the scientists must, therefore, be to develop new products which not only conserve the indigenous agricultural produce but also improve their nutritious values and marketability.

Since, the basic unit of food and fruit production is the village and town level, the concept of village-head technology may be adopted to suit the prevalent conditions. This will have multifaceted advantages including job creation in rural areas, slowing the trend of migration to large urban centres, prevention of spoilage during transit and processing of produce during the glut season which cannot be efficiently handled by the few large food processing factories.

Development of new products is a continuous process all over the world. The result is that with every passing year, we find addition of scores of new products in the market. These products include convenience foods, ready-to-eat foods, low cost dietetic and geriatric foods, foods for vulnerable groups, etc. Bulk of such products are imported or manufactured using imported technologies. Transformation of the raw food produce into new

products in accordance with the consumer and economic demands of the nation requires well-planned research and successful utilisation of any technologies or organisational skill at research and development levels.

One aspect that needs special mention is the problem of adulteration. This menace has become very deep-rooted in our society. Many unscrupulous elements, in complete disregard of the harmful effects, have become quite daringly involved in the adulteration of food items. This they are doing for the gain of a few petty bucks, quite unmindful of the havoc, their actions are playing with the health of the general population. Most of the adulterants are now well proven to be carcinogenic and I need not dwell further as to why anything that has the slightest doubt of cancer causing properties must be avoided at all costs. It is the duty of all food technologists and nutritionists to wage a crusade against the act of adulteration. They must be fully exploit the mass medium for the mobilisation of public opinion against those who perpetrate and/or abate the heinous acts of food adulteration. They must endeavour to modernise food laws to bring them in conformity with modern developments and research findings on the harmful effects of the commonly used adulterants. Evidently, they must become so vocal in the eradication of food adulteration that the government gets forced to apply pure food laws without impunity.

A related issue is the education of masses. The general level of awareness in the public is extremely low in almost all areas that touch upon their lives, more so in respect of food and nutrition. It is the bounden duty of those who know to share their knowledge with the rest. For the furtherance of this cause, I would also suggest that the food scientists will make every effort to extend their laboratory findings to the general public for adoption to give a meaningful direction to their efforts.

I hope that the meeting will address itself to the few areas, I have outlined heretofore and make suitable recommendations to the concerned Government agencies for implementation. I pray to Almighty Allah for the success of the deliberations of the meeting.

Thank you!

KEYNOTE ADDRESS

Prof. (Retd.) Dr. Muhammad Shafiq Chaudhry

President,

Pakistan Society of Food Scientists and Technologists.

It is my privilege to welcome our Chief Guest, Dr. A.Q. Ansar, Chairman, PCSIR and the honourable delegates to this Third Annual General Meeting of Pakistan Society of Food Scientists and Technologists. It is indeed a pleasure to see all of you here today. The subject that I have chosen to speak on is the Training of Manpower for Food Industries in Pakistan. The success of any industry depends upon, among other factors, the availability of properly trained manpower. This is equally and more accurately applicable to the food industries in view of the fact that a food technologist has to cope with highly perishable raw materials and the quality characteristics of which are extremely variable.

The number of food industries has grown rapidly and at present, this sector is the second largest employer of manpower in Pakistan. The manpower required by the food processing industries may be categorised into three classes viz. food technologists (graduates in food science and technology), supervisors and workers.

The need to produce properly trained food technologists was recognised as early 1960 when a degree program in Food Technology was introduced at the Punjab Agricultural College and Research Institute, Lyallpur (now the famous University of Agriculture, Faisalabad). Since then, four other institutions have included Food Technology curricula in their train-

ing programmes. These are: NWFP Agricultural University Peshawar, University College of Agriculture, Rawalakot, Barani College of Agriculture, Rawalpindi and Gomal University, Dera Ismail Khan. These institutions have done a tremendous job so far and their graduates have performed par excellence within and outside of Pakistan.

The teaching programmes of all these institutions have followed the curriculum developed at the University of Agriculture, Faisalabad. The emphasis at the undergraduate level is placed on general principles of food preservation with an introduction to the processing of various food groups. Specialised courses are offered at Masters and Doctoral levels. It has been observed that most students in the Masters degree programme opt to take one or two courses in more than one specialisation in order to broaden the scope for their employment. This, however, does not find favour with employers in the food processing industries because they would prefer a person with more courses related to their industry. Now that, we have well defined groups of food processing industries, the teaching institutions may reshape and modify their curricula to produce graduates according to the needs of the industry. Let us recognise the changes we expect to see in the next few years and plan on going into the 21st century with more specialists than generalists.

CITRUS PROCESSING POTENTIAL IN PAKISTAN*

AIZAD AHMAD

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The World Health Organization recommends a minimum of 400 g fruits and vegetables each day for a healthy human diet. The per capita consumption of fruits and vegetables in Pakistan is a meagre 88 g and 114 g per day, respectively. Citrus fruits are the major fruit produced in Pakistan both area-wise and yield-wise. In the Punjab, Kinnow was grown on an area of 93.7 thousand hectares with a production of 927.6 thousand tonnes in 1990. Pakistan is amongst the top ten citrus growing countries of the world, yet, it has no recognition. This is due to mismanagement of God-bestowed resources. The Kinnow crop is available only for a short season, and it is susceptible to decay. This causes an economic loss for the farmers and results in unavailability of nutrients for the masses. It is possible to reduce this post-harvest loss by the encouragement of citrus processing units.

The fruitful examples of other countries present us food for thought. In the Interjuice 91 Congress in Brazil, it was mentioned that 19 million tonnes of oranges are processed world wide (Fig. 1). Of this, Brazil accounts for 53%, the USA 31%, the Mediterranean region 10%, and 6% for others. Brazil now leads the world as a producer and processor. The story of how Brazil attained this status is very interesting.

Brazil was producing only 6000 tonnes citrus in 1963. It is obvious that increased production was coupled with a growth of processing capacity. In 1991, it had 119 million fruit-bearing trees and produced 240 million boxes (9.792 million tonnes) of citrus. Its orange production is estimated to be 37% of the world total. It processed 89% of its total production into 830,000 tonnes of 65° Brix Frozen Concentrated Orange Juice (FCOJ). Today, Brazil holds a 75% share of the total world trade in orange juice. In 1991, orange juice worth 1.4 billion US \$ was exported from Brazil at a rate of 1020 US \$ per tonne. Pakistan possesses the potential to capture a decent share of this gigantic market and thus could travel in the footsteps of Brazil. The attainment of the lofty objectives presented above is possible through the encouragement of greater fruit production and the establishment of citrus industries with a research oriented incentive.

The USDA recommended method for the production of FCOJ stipulates that the fruit should attain a Brix-Acid (sweetness to sourness) ratio of at least 10.0 before picking. The fruit is procured on the basis of weight or soluble solids per kg. The incoming fruit is sampled for quality, Brix, acidity, Brix-acid ratio, and juice percentage. The fruit is unloaded from a ramp onto a belt conveyor and taken to the top of the fruit feeding system by means of a bucket elevator. The fruit is hand graded and sorted by roller conveyors for small, diseased, and deformed fruit. It may be stored in bins for up to 24 hours, if necessary. The fruit is conveyed to brush washers for the removal of dirt and extraneous materials. A sizer separates large and small fruit on the basis of rotational tendency.

The fruit is then fed into FMC extractors comprising of two horizontal cups which express the juice by means of simultaneously exerting pressure and cutting a hole at the bottom of the fruit. The juice is squeezed through a sieve tube which segregates the seeds and rag from the juice. The peel (almost 50% of the fruit) may either be fed to a feed mill for conversion to animal feed and extraction of peel oil or else used as a fuel, etc.

The juice is fed into a screw-type finisher which removes the floating pulp. A pasteurizer at 90-95°C destroys the microbial population and inactivates the enzymes such as pectinesterases. Juice quality is improved by centrifugation at high speed for the discharge of bottom pulp. It may be mentioned that the finisher and centrifuge pulp can also be processed for export purposes. The inlet and outlet juice is monitored for Brix and pulp percent. The limonin (bitter component) in the refined juice may be removed by means of ultra-filtration or reverse osmosis. The limonin in the filtrate is adsorbed by passing through a resin column.

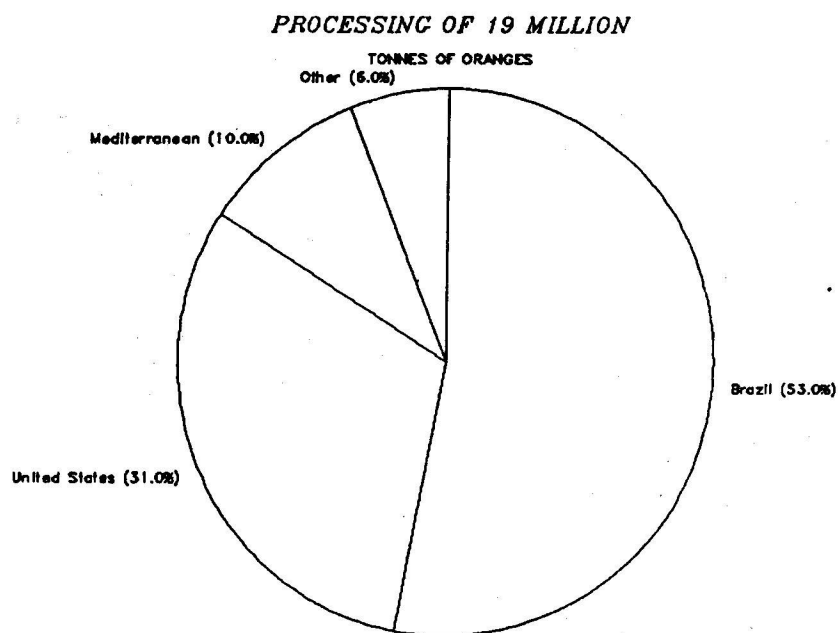
Finally, the juice is introduced into a five/six stage Thermally Accelerated Short Time Evaporator (TASTE) which heats from the juice by means of steam from a boiler to evaporate the water from the juice. Thus, a juice of 11-14 Brix can be concentrated into a 65-66 degree Brix concentrate in the final stage of the TASTE with successive heating by vapors from previous stages. However, the loss of volatile constituents may be reduced by means of an essence recovery system. Here, the product is closely monitored for Brix, viscosity, and defects.

*A paper presented at the Annual General Meeting of the Pakistan Society of Food Scientists and Technologists on April 29, 1993 at PCSIR Laboratories Complex, Lahore.

The final product is chilled and taken into cold-walled tanks. The addition of cut-back single-strength juice is homogeneous, a batch approval is given for filling by the Quality Control Personnel. The frozen concentrate is usually filled into steel drums (of 260-270 Kg capacity) double lined with polyethylene bags. These drums are then stacked in a cold store at -15 to -20°C.

The major markets for export are Holland, Germany, USA, France, UK, South Korea, and Japan.

However, certain problems are related to citriculture in Pakistan. Citrus is a monoculture industry with only a three month season. Unregulated nursery business and the absence of budwood certification results in transmission of diseases and viruses. Citriculture management practices are substandard resulting in low



Thus, the above method tends to separate the inedible portions of the fruit, refines the juice, annihilates the detrimental microbes, inactivates enzymes, reduces the water activity of the product, and thus inhibits decay or nutritional loss during prolonged storage. The concentrate is transported abroad in refrigerated containers by road and ship.

At present, there are three citrus processing plants in Pakistan operating on similar principles described above: Fresh Juices Ltd., in Bhai Pheru, Cargill Pakistan Citrus Ltd. and Sunflo Cit-Russ Ltd., both the latter in Sargodha. I may also point out that twelve food technologists are working in these three industries. Sunflo Cit-Russ Ltd. has the largest processing capacity.

The Frozen Concentrated Kinnow Juice (FCKJ) so far produced has been accepted in the international market on the basis of quality. In fact, the colour and flavour of our product excels that of Brazil. It is awarded 40/40 marks for colour on USDA standards. The Brix-acid ratio, pH, formal number, and ascorbic acid are appropriate. The Brix, defects, bottom pulp percentage, oil percent, viscosity, pectinesterase enzyme activity, gelatin, yeast, bacteria & mold content, and limonin are controlled according to USDA standards.

yields. In fact, the average yield of Kinnow mandarin in Pakistan is a low 9.2 tonnes per hectare, while the average citrus yield in USA and Brazil is 20-30 tonnes per hectare. The Kinnow has a short crushing season and is an alternate bearer, i.e. heavy crop in one year and light crop in the second year. The skin is soft and susceptible to decay. Excessive seediness results in high limonin in the extracted juice causing bitterness.

The problems mentioned above were extensively discussed during an International Seminar on Citriculture in Pakistan at the University of Agriculture, Faisalabad. Eminent scientists and bureaucrats agreed that the present deplorable situation can be bettered by proper extension services, recognition of citrus as a major industry, and establishment of a Citrus Research Station. evolve varieties with greater yield, less number of seeds, and longer bearing season. The Government should provide incentives for the establishment of industries and the taxes on the export of citrus and its by-products should be reduced.

The Kinnow has already been introduced to the international scene. It is high time that we combine and utilize technology, management, and science for the recognition of our country.

Production of golden syrup from molasses¹

A.F.M. Ehteshamuddin, M. Afzal Malik, Akbar Ali Cheema,
M. Islam Chaudhry and Akmal Javed,
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INTRODUCTION

About one million tonnes of molasses is obtained annually as a by-product of sugar industry. Only a limited quantity is being utilized in Pakistan for the production of alcohol and the rest is exported at nominal prices. Molasses contains about 50% sugar which cannot be recovered economically through crystallization. It is, therefore, necessary to explore ways and means for its profitable utilization by conversion into value-added products.

Survey of literature on molasses shows that attempts are being made to purify it to make it fit for human consumption. Progress in this field is, however, kept as a trade secret. In view of the availability of raw materials in abundance in Pakistan and the acute need to enhance food resources to feed growing population, Lahore Laboratories of PCSIR undertook research on molasses for development of technology that would facilitate its conversion into a nutritious foodstuff.

Technical problems with molasses

During processing of cane juice into sugar, use of high temperature leads to caramelization of juice that imparts a dark brown colour to molasses. Besides, use of different chemicals like milk of lime etc. during processing, leads to high accumulation of inorganic ions in the molasses. The above treatment renders the molasses unpalatable and unacceptable for human consumption. Therefore, processing of molasses for conversion into an edible product, demands development of technology for removal of colour and ions from it. This paper represents attempts made in that direction.

Process Technology

Preparation of golden syrup from cane molasses mainly involves the following steps:

- i. Decolorization- Deodorization.
- ii. Deionization
- iii. Concentration

i. Decolorization- Deodorization

It was found that molasses as such could not be processed hence its suitably diluted solution was used during processing.

Large number of colour adsorbents and filter aids were screened for removal of colour. Activated carbon was found to be the only material that could decolorize the molasses. It was found that boiling of molasses for five minutes, in the presence of activated carbon, followed by filtration through ordinary filter paper gave an almost colourless filtrate. Slight turbidity and colour that still remained in the filtrate was, however, totally removed with the help of another colour adsorbent. The mixture consisting of diluted molasses and colour adsorbents was boiled, allowed to stand for sometime and then filtered. A straw-coloured filtrate, devoid of any odour was obtained.

ii. Deionization

For removal of inorganic ions from the decolorized molasses, ion exchange chromatography was used. Passage of decolorized molasses through cationic and anionic resins, in turn, successfully removed the ions. Since conductivity represents a quantitative measure of the presence of ions in a liquid medium, degree of progressive deionization of molasses was monitored by conductivity measurement of eluates from the resin columns.

Conductivity Data

Before deionization	21700/US
After deionization	159/US

This shows almost 100% deionization. Exhausted resins were regenerated with standard methods. It was also observed that resins could be recycled with regeneration indefinitely.

iii. Concentration

Diluted molasses after decolorization and deionization, is concentrated in rotary vacuum evaporator at a temperature of 60-70°C which yields a palatable honey-like viscous product, known as "Golden Syrup"

CONCLUSION

Studies on a laboratory scale indicated technical feasibility of the project. Scale up studies being undertaken would lead to the feasibility of commercial production of golden syrup.

¹Paper presented at the Annual General Meeting of the Pakistan Society of Food Scientists and Technologists on April 29, 1993 at PCSIR Laboratories Complex, Lahore.

VENTURE CAPITAL FINANCING SCHEME: AN INTRODUCTION

Prof. (Retd.) M.B. Bhatti

Food Industry/Venture Capital Consultant

House No. 39, Street No. 17, Sector I-9/1, Islamabad.

Today, it is a pleasure to be amongst learned Food Scientists/Technologists assembled at this august meeting of the Pakistan Society of Food Scientists and Technologists. May I take this opportunity to address you on the New Venture Capital Financing Scheme of USA. As you all are busy in promoting Food Technology development and technology transfer, I thought it fit to apprise you of this latest scheme with the sole aim of giving a Fillup/impetus/helping Hand to the development of all businesses in the field of Food Technology (Processing, Export/Import, Ready Made Buying/Selling, Joint-Ventures, Buy-Back, etc.)

Under this VENCAP SCHEME, funds in million, billion and trillion dollars can be made available for setting up of new ventures in the field of industries, foreign trading, and real estate businesses, etc. Initial expenses for obtaining loan shall not exceed more than 8% of the desired capital for any business promotion. It is estimated that time required to complete loan processing formalities may not exceed 90 days if clients seriously/actively pursue this matter.

The loan requests must be submitted to me on company letter head along with two copies of feasibility reports of the proposed project. The project shall be reviewed by a Board of Experts in the USA and shall be approved within 30 days or so if it is profitable, viable and feasible (*in other words, it must show a minimum profit of 25% per each revolution of the completed business deal*). These developmental loans are primarily aimed at encouraging private investments between the private sectors in USA and Pakistan or South East Asian countries such as India, Sri-Lanka, Nepal, Bhutan, Thailand, Bangladesh, Burma, Malaysia and Australia, etc.

The beauty of this scheme is that the sanctioned loan is to be refunded in 10 years in ten equal instalments. The refundable amount shall be approximately the same as the one has taken. There is no condition of debt-equity-ratio. Even total financing can be arranged under this scheme. The sponsors shall be provided with a Bank Guarantee from a Prime Bank in USA and choice of bank for obtaining loan shall be the client's responsibility. For obtaining more details on procedure, interested persons can contact me at the end of this lecture or by writing a letter at the address

given above in due course. I trust, my Dear Food Technologists, your efforts for the cause of development of food science and technology shall be duly rewarded by the nation in the not too distant future.

Ladies and Gentleman, I conclude my talk and say Long Live Food Technology, Long-Live Pakistan Society of Food Scientists and Technologists, Long-live Pakistan.

Procedure for obtaining prime bank guarantees for total/partial foreign loans for setting up of industries, estate business, import/export, joint ventures etc.

1. Application by Chief Executive or Managing Director with complete address, telephone No. telex No. fax No. and legal status of the company on company's letterhead, in duplicate.
2. Feasibility report, in duplicate, showing viability/profitability of the project for ten years.
3. The client shall provide to VENCAP necessary collaterals and company's statement of account and balance sheet for the last three years.
4. Initial processing fees shall be 32,000/- US \$. if loan request is less than 1,500,000 US \$. For higher loan request, a flat rate of 2% of total loan request is charged as initial processing fee. This fee is payable, in advance, at the time of signing the contract in USA. Fee is payable in the form of crossed bank draft in favour of VENTURE CAPITAL CONSULTANTS, USA.
5. Commission of 3% of total loan request is payable by clients at the time of disbursement of loan.
6. VENCAP shall provide 10 year's bank guarantee from prime bank. Selection of a suitable lending bank shall be the responsibility of the client.
7. Letter of guarantee/commitment should be availed of by the clients within the prescribed period fixed by VENCAP, USA.
8. Contract shall be signed by loanee in USA and travel/room/board expenses of the visiting company's representatives shall be borne by project sponsors.
9. Loan request is to be of double the requirement of the project cost. Actual project cost shall be disbursed to client while upper 50% shall be placed in fixed deposit in a sinking fund to be established

- simultaneously. Interest accumulated thereon at the end of ten years shall be used to pay back the principal amount of the project cost loaned to the client.
10. Interest is payable on double the loan amount for ten years at Libor Exchange Rate, London. Loan shall be refundable in ten years by yearly installments and contract terminated thereafter.
 11. Project proposals shall be reviewed by Review Board in USA and initial processing fee becomes payable after Board's approval is received by client and contract is signed in USA.
 12. After receipt of approval of project proposal from VENCAP, all negotiations/payment of further commissions shall be the direct responsibility of the loanee/creditors.
 13. Minimum loan limit: 500,000 US \$.
Maximum limit: Unlimited.
 14. Applications should be submitted to Mr. M.B. Bhatti, Liaison Office, House No. 39, Street - 17, Sector I-9/1, Islamabad, G.P.O. Box 1880, Islamabad-Pakistan, Telex No. 5643-IHI-PK. Fax No. 0092-51-820763.

IS YOUR ADDRESS CORRECT?

The Pakistan Society of Food Scientists and Technologists is publishing an upto date Membership Directory in the next issue of Food Science News. Kindly check the label on the envelop. If it is incorrect, please correct and return the same to the Secretary, Pakistan Society of Food Scientists and Technologists, C/o Department of Food Technology, University of Agriculture, Faisalabad 38040, Pakistan positively by October. 30, 1994.

RECENT PUBLICATIONS

The abstracts are being reproduced in the quarterly Food Science News to keep the scientists and professionals abreast with latest findings. Those interested in particular articles should please write directly to the authors whose address(es) appear(s) with the abstract. The researchers are requested to send reprints of their recent articles (from 1990 onward) to the Secretary, Pakistan Society of Food Scientists and Technologists, C/o Department of Food Technology, University of Agriculture, Faisalabad 38040, Pakistan for publication in the forthcoming issues of Food Science News.

RESEARCH PAPERS/ARTICLES

FRUITS AND VEGETABLES

RIAZ AHMED RIAZ (1993). **Some practical implications of ethylene in commercial horticulture.** *Modern Agri.* 3 (10-11): 21-25.

Department of Food Technology,
University of Agriculture, Faisalabad.

Control of ethylene in the post-harvest environment is of great importance in commercial horticulture. Application of ethylene facilitates the orderly marketing of apples, citrus, tomatoes, bananas, mango and honeydew melons. Safe and efficient application methods have been developed and are readily available for commercial use. Detrimental effects of ethylene of harvested horticultural products largely can be avoided by careful management of post harvest environment, but this management is not always practical in commercial situations. Technologies exist for removing ethylene action, but there is still considerable room for improvement during storage and handling of most commodities.

RIAZ AHMED RIAZ AND IFTIKHAR AHMAD TABASSUM (1991). **Effect of frozen storage on the quality of jamun fruits.** *Pak. J. Sci. Ind. Res.*, 34 (5): 188-190.

Department of Food Technology,
University of Agriculture, Faisalabad.

The effects of frozen storage on the quality of edible portion of different jamun varieties was studied. During storage, acidity, ash, total soluble solids and reducing sugar contents increased while moisture, ascorbic acid, pH and non-reducing sugars decreased in both varieties of jamun. Though scores for colour, flavour, taste, and texture decreased while those of sweetness increased upto 300 days of frozen storage, the frozen product remained in good quality as regards its acceptability.

RIAZ AHMAD RIAZ, SULTAN MAHMOOD KHAN AND MUHAMMAD ABBAS BHATTI (1991). **Effect of blanching and storage on the quality of the dehydrated oyster mushrooms (*Pleurotus ostreatus*).** *Mushroom J. Tropics*, 11: 39-44.

When blanched in water at 80°C, a blanching time of 2 minutes was found to be adequately effective to inactivate peroxidase enzyme activity in the sliced mushrooms. Blanching for a prolonged time caused substantial loss of nutrients in hot water. The blanched mushrooms after dehydration were found to be much superior to the outbalanced counterpart in respect of nutritional and organoleptic characteristics. On the contrary, the rehydration ratio was better in dried mushrooms prepared without blanching. Though storage caused some observable deterioration in quality, the dehydrated mushrooms were found to be acceptable even after a storage period of 6 months.

SAEED BABAR, ABDUL MOEED HASHMI, MUHAMMAD MUNIR BAJWA AND RIAZ AHMED RIAZ (1991). **Effect of frozen storage on the quality of ready to cook brinjal.** *Tehqique*, 8 (2): 7-16.

Department of Food Technology,
University of Agriculture, Faisalabad.

Freeze preservation is one of the promising method in the world because there is little effect on the taste, flavour and nutritional value during frozen storage of vegetables. In this preliminary study, fresh long type brinjal were prepared into ready-to-cook form, packed in polythene bags and stored in deep freezer at 18°C. There was substantial increases in reducing sugars and drip loss while on the other hand moisture, pH and ascorbic acid contents decreased during frozen storage of brinjals. Outbalanced brinjals were found to be superior in organoleptic quality when compared with blanched brinjals. Blanching was an unnecessary step for frozen storage of brinjals.

TAFAZZAL HUSSAIN, MIRZA QAISER BAIG AND HAROON RASHID (1991). Extraction and evaluation of pectin from mango peel. Pak. J. Agri. Res., 12 (3): 213-216.

Department of Food Technology,
University of Agriculture, Faisalabad.

The study was carried out to observe the effects of different pH levels and variable times of heating on the quality and quantity of pectin. It is observed that not only the method of pectin extraction, but the type of fruit and even its variety and stage of maturity greatly influence physicochemical properties of the pectin. The most important characteristics studied were yield, equivalent weight, methoxyl content, settling time and grade of pectin. Pectin is commercially derived from citrus peels, apple pomace and guava peels, however the present attempt was made to extract and evaluate pectin from mango peels.

MILK AND MILK PRODUCTS

GHULAM MOHYUDDIN*, SYED KHURRAM R. ZAIDI* AND MUHAMMAD IMRAN AL-HAQ (1990). Milk drinks prepared by UHT technique. Pak. J. Agri. Res., 11 (1): 30-34.

*Department of Food Technology,
University of Agriculture, Faisalabad &
Barani Agricultural College, Rawalpindi.

Pineapple flavoured milk-based drink was manufactured at a milk plant by employing direct steam injection UHT technique. Ingredients added were skimmed milk powder, apple pulp, sugar, stabilizer, citric acid, sodium citrate, potassium sorbate, pineapple flavour and water. Apple pulp added richness to the drinking pleasure of the beverage. Milk curdling was checked by addition of the stabilizer (Givaudan's No. 76084-72), heating to 144°C and maintaining the pH at 4.5. Chemical and sensory tests of the product were conducted for 90 days to observe quality stability under ambient and refrigerated storage conditions. Maximum colour, taste and flavour retention was reported by the judges for refrigerated drinks. Samples stored otherwise exhibited acceptability up to 75 days. UHT processed fruit containing milk beverage offered longer shelf-life and better quality as compared to pasteurized product. Acidity, total soluble solids and total sugars increased, whereas, pH and ascorbic acid decreased throughout the storage period under both the conditions of storage.

TAFAZZAL HUSSAIN, KHALID MAHMOOD AND HAROON RASHID (1992). Impact of some lipids on various physicochemical characteristics of ice cream. J. Pure App. Sci., 11 (2): 91-97.

Department of Food Technology,
University of Agriculture, Faisalabad.

Ice cream is a product which may contain a variety of ingredients like milk cream, sugar etc. A standard base mix is one from which a standard ice cream of only flavour and colour may be prepared. The composition of this mix is generally made to conform with the legal requirements of a country especially with respect to the microbial load. Lipids used in preparing ice cream has a great effect on various quality parameters as well as its cost of production.

HAROON RASHID AND TAFAZZAL HUSSAIN (1992). Utilization of whey to produce wholesome beverage. J. Pure App. Sci., 11 (1): 45-48.

Department of Food Technology,
University of Agriculture, Faisalabad.

The whey is the byproduct obtained from processing of milk for cheese, butter and some sweetmeat manufacture. Its nature varies with the type of the product to be prepared i.e. It is sweet when obtained from unripen cream during butter manufacture and cheddar cheese making while it is called acid whey obtained from ripen cream and from cottage cheese. Generally it contains minerals, lactose and water soluble vitamins and proteins called whey protein. On account of its medicinal value its use is recommended as a remedial measure for various diseases. Some scientists and public health authorities have concern over its wastage in sewage which creates health problems. The present study was therefore taken to make use of butter whey to produce wholesome beverage.

RIAZ AHMED RIAZ, MUHAMMAD MUSHTAQ AHMAD, GHULAM RASOOL AND SAEED BABAR (1991). Extraction of casein from out dated yoghurt and long life milk. Pak. J. Sci. Ind. Res., 365-366.

Department of Food Technology,
University of Agriculture, Faisalabad.

An attempt has been made to prepare caseins from fresh whole milk, expired ultra high temperature (UHT) milk and expired yoghurt by lactic acid precipitation, It was found that fresh whole milk ca-

sein was well comparable with standard casein in respect of lactose, protein and fat. Whereas caseins obtained from expired UHT milk and yoghurt had comparatively low lactose and protein but abnormally high fat content. Bulk density, porosity and water sorption power of these caseins were poor as compared to standard casein. Organoleptically the whole casein ranked good, whereas UHT milk and yoghurt caseins were fair. Removal of fat with hexane helped to improve the quality and storage stability of caseins obtained from out dated UHT milk and yoghurt.

CEREALS

FAQIR M. ANJUM, A. ALI AND NIAZ M. CHAUDHRY (1991). **Fatty acids, mineral composition and functional (bread and chapati) properties of high protein and high lysine barley lines.** *J. Sci. Food Agri.*, 55: 511-519.

Department of Food Technology,
University of Agriculture, Faisalabad.
Ayub Agricultural Research Institute, Faisalabad.

Six barley lines derived from crosses involving Hiproly (SV 73608 x Mona⁵) and Riso 1508 with higher yield recipients V 4342 and V 5681, along with the four parents, were analyzed for fatty acids and mineral composition. Dough properties, bread and chapatis were characterized by blending barley line (B 82503) at 2.5-25% with bread wheat flour (Pak 81). Fatty acid contents were myristic acid, 0.60-1.16% palmitic acid, 16.68-20.84%, stearic acid, 1.30-3.33%, oleic acid 16.19-19.11%, linoleic acid, 50.13-57.67%, linolenic acid 5.90-8.33% and degree of unsaturation 1.40-1.50%. The derived lines contained similar amounts of essential fatty acids. Significant variation for magnesium, copper, zinc, phosphorus and potassium was observed but overlapped among the line and parents. The calcium, iron, and manganese showed non-significant differences among lines and parents. Blending up to 10% barley flour with bread wheat flour gave farinograph characteristics comparable to those of pure wheat flour, but increasing the proportion of barley beyond this decreased the mix time and dough stability. Bread baking tests verified that up to 10% barley could be mixed with wheat.

FAQIR M. ANJUM, M.A. BAJWA, A. ALI AND M. UL-LAH (1991). **Nutritional characterization of high protein and high lysine barley lines.** *J. Sci. Food Agri.*, 55: 341-351.

Department of Food Technology,
University of Agriculture, Faisalabad.
Ayub Agricultural Research Institute, Faisalabad.

Six high protein and high lysine barley lines were derived from four crosses involving high protein and/or high lysine donors, i.e. Riso 1508 and Sv 73608 (Hiproly x Mona⁵), with well adapted local strains V 5681 and V 4342. The trial was grown at the Wheat Research Institute, Faisalabad, Pakistan. The lines were chemically and nutritionally characterized and the results were compared with the parents. The biological value, net protein utilization and lysine contents were higher in all the derived lines than in their local parents, i.e. V 5681 and V 4342. The increased lysine levels in the lines B 82503 and B 82507 may be a consequence of the reduction of prolamin fractions with simultaneous increases in salt soluble fractions. In all the lines, lysine and nutritional quality increase were a reflection of high protein and/or high lysine parents. The line B 82503 had grain yield comparable to its local parent V 5681 but it was superior in lysine and some nutritional attributes to its high lysine donor parent Riso 1508. In some lines, lysine improvement was achieved without impairing grain yield.

FAQIR M. ANJUM AND C.E. WALKER (1991). **Review on the significance of starch and protein to wheat kernel hardness.** *J. Sci. Food Agri.*, 56: 1-13.

Department of Food Technology,
University of Agriculture, Faisalabad.
Department of Grain Science and Industry,
Kansas State University, Manhattan, USA.

Wheat starch contains large lenticular (A-type), composed of two structurally different polysaccharides, amylose (20-30%) and amylopectin (70-80%), plus small amounts of lipids, nitrogen and phosphorus. Vitreous character is related to air spaces between granules, whereas hardness relates to protein-starch bond strength and protein matrix

continuity between granules. Grain hardness is controlled genetically by one or more major genes, modified by one or more minor genes. Environmental factors also exert effects. Most hardness measurements are grouped into categories based on grinding, crushing, abrasion or indentation. Recent methods, viz. microscopy, NIR, single kernel cutting, tensile strength and an accoustical technique, seem to have promise. Three basic mechanisms of grain hardness have been postulated: (a) chemically induced adhesion between the protein matrix and starch granule, (b) continuity of the protein matrix, and (c) net charge on the protein. Some recent studies have revealed small amounts of protein as an integral component of the starch granule. The surface granule proteins showed relatively low molecular weight polypeptide bands (5-30 kDa), whereas the integral starch granule proteins had higher molecular weights (59-149 kDa). The 59 kDa protein is postulated to be the enzyme that synthesises amylose. The 15 kDa polypeptide is related to kernel softness, because it is strong in soft wheats, weak or faint in hard wheats, and absent in durum wheats. Reconstituted tablets made from hard wheat starch showed higher tensile strength than those made from soft wheat. Tablets reconstituted from soft wheat starch from 15 kDa protein exhibited increased tensile strength, suggesting that the 15 kDa protein acts as a 'non-striking' agent between the starch granules and the protein matrix. Some lipids are associated with amylose and the starch granule surface but their significance is not clear.

BEVERAGES

MUHAMMAD IMRAN-AL-HAQ* AND GHULAM MOHYUDDIN (1992). Keeping quality of pasteurized milk-based mango drink. *Pak. J. Agri.* 13 (3): 260-266.

*Barani Agricultural College, Rawalpindi & Department of Food Technology, University of Agriculture, Faisalabad.

Milk-based mango drink was manufactured by mixing skimmed milk powder (3%), mango pulp (3%), sugar (13%), sodium citrate (0.02%), potassium sorbate (0.01%) and citric acid (0.2%). The mix was stabilized with the addition of Mexpectin RS-450 (0.3%) and pasteurized at 80°C for 15 seconds. To observe keeping quality, the product was stored under ambient and refrigeration conditions. Periodic sensory assessment indicated that the drink kept under ambient conditions was acceptable for two days only. Scores for colour, taste and flavour were

highest after three weeks of refrigeration storage. Thereafter, a decline was observed in the ratings. Generally, the drink was acceptable by the panel. The chemical analysis of refrigerated samples showed a rise in acidity, total soluble solids and reducing sugars and a decline in pH, non-reducing sugars and ascorbic acid levels during seven weeks of storage.

MUHAMMAD IMRAN AL-HAQ* AND GHULAM MOHYUDDIN (1992). Commercial manufacturing of pasteurized mango fruit flavoured milk-based beverages. *Pak. J. Sci. Ind. Res.* 35 (10): 420-424.

*Barani Agriculture College, Rawalpindi & Department of Food Technology, University of Agriculture, Faisalabad.

Mango, the king of fruits, is cherished by the rich and poor alike in Pakistan for its organoleptic, nutritive and therapeutic values. Milk-shakes and mango-fruit beverages are among the most popular beverages in summer. By using different levels of the pulp of 'Chaunsa' variety of mango, and three popular stabilizers, 18 beverages were prepared; and after one day's cold storage, these were organoleptically evaluated by a panel of judges to select the best beverage. Mexpectin RS-450 gave the best results and that formation was industrially manufactured by HTST pasteurized and homogenizing at 80°C. The industrially manufactured product was packed in brick packs on combi-block machine and by using the triangle taste test, the shelf-life was observed to be 49 days when kept refrigerated.

ABDUL REHMAN*, MUHAMMAD IMRAN AL-HAQ AND GHULAM MOHYUDDIN* (1992). Development of pasteurized banana milk-based beverages using cow and buffalo milk. *Pak. J. Sci. Ind. Res.* 35 (6): 250-254.

*Department of Food Technology, University of Agriculture, Faisalabad & Barani Agricultural College, Rawalpindi.

By using cow and buffalo milks 24 different formulations of banana milk beverages were prepared. The amount of banana pulp and stabilizers was varied, beverages were pasteurized at 80°C, bottled and cold stored at 4-8°C. After preliminary sensory evaluation, the first-higher eight formulations were again manufactured for further study and to determine shelf-life under cold storage conditions. On comparison, it was found that buffalo milk based beverages were liked more by the people of Pakistan. The reason seemed to be the palate and taste

of the people of the subcontinent for the buffalo milk rather than the cow milk. For manufacturing such beverages, Grindsted's Mexpectin Rs-450 as well as Grindsted's Gelodan S.M. can be used @ 0.15 or 0.20% but more viscous beverages secured higher scores and Mexpectin had an edge over the Gelodan. Due to the use of potassium sorbate in the formulations and cold storage, the bottled beverages gave shelf-life of one month.

MUHAMMAD SIDDIQUE AWAN AND RIAZ AHMED RIAZ (1993). **Comparative study of changes during storage in uncarbonated and carbonated lime fruit juice beverages.** Modern Agri., 4 (1): 19-22. University College of Agriculture, Rawalakot, Azad Kashmir. Department of Food Technology, University of Agriculture, Faisalabad.

This project was undertaken to study the changes in chemical composition and organoleptic attributes during storage in uncarbonated and carbonated lime fruit juice beverages. The total soluble solids of both the juice remain constant whole the time during storage. A little increase in acidity with decrease in pH was also observed. There was increase in reducing sugars with substantial decrease in non-reducing sugars. Organoleptic attributes decreased with increase in storage period. Changes in chemical composition and organoleptic attributes were comparatively less in carbonated beverage than its control counterpart.

MUHAMMAD SIDDIQUE AWAN AND RIAZ AHMED RIAZ (1993). **Quality check on lime fruit drink.** Modern Agri., 3 (12): 20-22. University College of Agriculture, Rawalakot, Azad Kashmir. Department of Food Technology, University of Agriculture, Faisalabad.

A ready to serve drink rich in vitamin C with good acceptability can be prepared using comminuted lime fruit bases. There was a substantial loss of ascorbic acid during storage with significant changes in acidity and degree of Brix. Though sensory quality decreased with increase in storage period yet all the drinks irrespective of preparatory techniques remained acceptable upto 90 days when kept in shade. The quality of the drink deteriorated rapidly when kept in the sun.

RIAZ AHMAD RIAZ, TAHIR ZAHOOR AND MOHAMMAD OSMAN ABDULLAH (1993). **Effect of storage on the quality of vitamin C fortified date syrup.** Pak. J. Agri. Sci., 30 (1): 17-21. Department of Food Technology, University of Agriculture, Faisalabad.

Date is an important fruit of Pakistan. Good quality dates are consumed as such. On the hand, second quality dates are virtually wasted. In this study, an effort was made to utilized inferior grade dates in preparation of vitamin C fortified syrup. For this purpose, sugar was extracted by cooking the dates with water and then concentrated to 70°. Brix under vacuum in the presence of some clarifying agents. After adding vitamin C, the date syrup was hot filled into bottles, sealed with crown corks and stored at ambient temperature for three months. Freshly prepared date syrup contained 70% total soluble solids, 5.35 to 6.62 pH, 2.16 to 2.27% ash and 64 to 67 mg ascorbic acid. A substantial loss of ascorbic acid, a slight decrease in pH with a non-significant change in total soluble solids and ash in date syrup during storage was noticed. Organoleptically, the products compared well with pure honey and apple jam on breakfast bread toasts. It was concluded that inferior grade dates could be converted successfully into date syrup rich in vitamin C with a good storage stability.

SARFRAZ HUSSAIN, MOHAMMAD ISMAIL SIDDIQUE, NAJMA PARVEEN AND NAEEM ZAFAR PARWAZ (1993). **Effect of packaging materials on the quality of fruit juice based drinks.** JAPS. 3 (1-2): 1993. Department of Food Technology, Department of Chemistry, University of Agriculture, Faisalabad. Ayub Agricultural Research Institute, Faisalabad.

Four types of packaging materials i.e. glass, plastic, tetrapak and brickpak were used to judge the overall acceptability of apple, orange and mango juices. The juices were chemically and microbiologically tested for quality and acceptability over a storage period of 0,30 and 90 days at about 20°C in a laboratory cupboard. It was found that all the samples over the storage period were within the acceptable limits with minor changes in the chemical constituents. Ascorbic acid showed major losses in glass bottles while in other packaging materials minor losses occurred on storage.

SCIENTIST WINS DISTINCTION

Dr. Abdus Sattar, Head, Food Science Division, Nuclear Institute for Food and Agriculture (NIFA), Peshawar, in recognition of his national and international publications has been conferred "Scientist of 1990 Award" by National Book Council, Ministry of Education, Government of the Pakistan. This award carrying prize money of Rs. 2,00,000.00 will be shared by Dr. M. Qasim, Director, National Centre of Excellence in Geology, University of Peshawar with Dr. Sattar.



Dr. Abdus Sattar, born on January 13, 1941 in Hoshiarpur (India), got his early education from Bahalike and Mandi Chuharkana (now Farooqabad) and obtained B.Sc. in 1962 and M.Sc. in 1966 majoring in Food Technology from University of Agriculture, Faisalabad.

He began his research career from Pakistan Council of Scientific and Industrial Research Laboratories, Peshawar in 1962 and later joined Pakistan Atomic Energy Commission in 1967 as Scientific Officer, where he conducted work on food irradiation in collaboration with Dr. Amir Muhammed. He is one of the pioneers in initiating research and development work in Pakistan on the peaceful applications of atomic energy for improving hygienic quality and conservation of food resources. In 1971, he received Commonwealth Scholarship Award for higher studies in Canada and completed M.Sc. degree from

Department of Food Science, College of Agriculture, University of Guelph in 1972 and subsequently, Ph.D. from the Department of Biological Sciences, University of Guelph in 1975 under the joint Supervision of Dr. J.M. deMan, Professor Emeritus and Dr. J.C. Alexander. His research investigations in Canada on photochemical reactions in different food systems such as milk, oils, fats and vitamins resulted in understanding the mechanisms and kinetics as well as control of light induced changes under model and natural systems.

On his return in 1975, he rose to the rank of Senior Scientific Officer at the Nuclear Institute for Agriculture and Biology (NIAB), Faisalabad where he remained involved in research and development programmes on food irradiation and implications of trace elements in biological materials.

In 1982, Dr. Sattar moved to Peshawar at NIFA and headed Food Chemistry Division and later Food Science Division. He was promoted to the post of Principal Scientific Officer. He was awarded an IAEA Fellowship in 1985 to work on Radiolytic Changes in Foods and Enzymes at Federal Research Centre for Nutrition, Karlsruhe, Federal Republic of Germany where he made new advancements in radiation chemistry while with Professor Dr. J.D. Diehl and Dr. H. Delincee.

Dr. Sattar has so far supervised 8 Ph.D., 6 M.Phil and 23 M.Sc. students. He has contributed significantly to national and international literature in the subject of Food Science and Nutrition. He had the pleasure of visiting Canada, USA, UK, Germany, Saudi Arabia, Iran and China in various capacities. During the past 31 years of postgraduate research pursuits, he has contributed over 200 publications with internationals and 2 patents in 22 countries of the world.

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