

***“I SEE ONLY THE EYE OF THE BIRD”! Said Arjuna.***

***- What have this to do with fermented foods?***

The Great Indian Epic Mahabharatham, is full with many words of wisdom

It is well known that the great epic Mahabharatham, contains numerous words of wisdom though ancient, very modern and very much applicable in many fields of activity even today. One such piece of wisdom is delivered by Arjuna when he says “I see only the eye!” The respected and admired guru of the young Pandavas, Sri Dronacharya asked Arjuna his favourite Shishya and the most talented in archery among the Pandavas to aim at the falcon with his arrow. Then he asked: what do you see now? Arjuna replied: I see the eye of the bird! Dronacharya then asked once again “what else do you see”? I see nothing else, only the eye! Said Arjuna emphatically. If that is the case, Dronacharya replied, you may let the arrow take its course. To day this age old wisdom is taught not only by the experienced coaches of sports and games to its professional practitioners all over the world but also by many business consultants and strategic planners of international companies, public relation experts and election campaigners of prominent politicians. It has become the motto of and mode of action for any body who is up to attain or achieve something extraordinary in their career or profession. What this has to do with fermented foods is the theme of this article. It is argued here that a strong specific and determined focus on development of functional foods for export, based on traditional fermented foods of India should be the primary aim for achievement of an over all general positive effect on the productivity of the Agro-food sector of India on a long term basis. To put it simply, if you promote fermented foods in a particular way, other foods will follow from behind for sure as a natural consequence.

***- Baboo M. Nair, JB Prajapati & MC Varshneya***

### **Growth and urbanisation of the world’s population**

Any one who is interested to know something about the Food supply, Health Status and Social Well-being of the people around the world, could very well have a quick look into the websites of the World bank, FAO, WHO and UNICEF, which contain a lot of facts and figures, diagrams and tables and a few reasons to be very anxious and concerned about the future. You can find that the population of the world is increasing and it will soon become about 8 billion in 25 years. While the population in developed countries like Sweden is expected to show stability or even a small reduction, the population of the developing countries like those in south Asia will almost be doubled by that time. You may also find that the population is being urbanised at an alarming rate and soon in a limited number of years some 30 cities of the world will have a population of more than 10 million inhabitants and most of these cities will be in the so called developing countries.

### **How to feed the world is a serious matter**

More than ever before, it will be a matter of great concern for the governments of the world to know how to organise safe and secure food supply at a reasonable price to all the people. To achieve complete household food security with all what it means, we may have to resort to both extensive and intensive measures, bringing more area under cultivation as well as increase the efficiency of food production. However, previous experience shows that this cannot be done without causing serious environmental problems. In Europe, 85% of the arable land, 90 % in Asia and 55% in North America is already been used for production of food. Some surplus land suitable for cultivation is available only in

South America, Africa and Australia. One must also remember that intensive agriculture by all means is like an industry not only causing depletion of energy, water and other natural resources but also causing pollution of environment with pesticides, acidic rain, nitrogen leaching and green house effect to mention a few.

### **More are trapped in poverty than ever**

It is a fact that the world food production by way of cereals, pulses and legumes, root crops, meat, milk products and fish during the last 20 – 25 years has been considerably increased almost to the double. However, an estimated number of about 840 million people, out of which 800 million are living in south Asia and sub-Saharan Africa are considered to be suffering from what is defined as hidden hunger. Protein energy malnutrition, iodine deficiency disorder, vitamin-A deficiency and iron deficiency anaemia which are common among the very low income people of the south Asian countries who live on an income which is less than one dollar a day.

### **Vicious circle of low income, poverty & hidden hunger**

At an extremely low level of daily income, poverty becomes a trap maintaining a vicious circle of events starting from low income, low food security, and low productivity to low income again. The real loss of human resources for a country due to hidden hunger specially by way of loss of cognition, low work capacity, high risk for infection, higher infant mortality, prenatal and perinatal infant loss and permanent blindness is extremely important and considerable though difficult to estimate.

### **Higher income, affluence and chronic diseases: the other side of the coin**

The other side of the coin is the state of affairs among the higher income people of the affluent societies, where the occurrence of chronic diseases like obesity, diabetes, cardiovascular diseases, osteoporosis and cancer show an increasing frequency year by year. This situation has been found to be strongly related to higher income, better health care, safe living conditions and low amount of physical activity in combination with unbalanced intake of nutrients, intake of excessive fat and carbohydrate, intake of wrong kind of fat as well as low intake of dietary fibre. Similar phenomena are noted also among the higher income people of the developing countries. For example, there seems to be more obese individuals with a body mass index more than 20 in the city of Mumbai than in the whole country of Sweden. With obesity, diabetes and CVD are known to co-exist. The higher income population of the developed countries show a majority of individuals above 25 years, which in a few years is expected to increase to about 40% being above 60 years. In sharp contrast to this, 50% of the low income people of the developing countries are below 25 years of age and 20 % are between 10 and 19 exhibiting a growing population of youth, demanding meaningful employment and reasonable income.

### **More painful to note is**

that the number of people who live on an income which is less than one dollar a day in south Asian countries of Pakistan, India and Bangladesh put together have increased by 40% during the last ten years to a total of 530 million. Further, most of these poor people live on agriculture based economy forming about 60-70 % of the total labour force of the countries while their share of the GNP remains only 25 –30 %, mainly because, they continue to be the suppliers of raw materials with very low added value.

### **Without value addition no poverty alleviation**

Degree of value addition in agro food sector has a direct relation to the poverty level of the country. The present level of value addition in the agro-food sector in India on an average is probably 7%. Dairy sector have the highest with 14% and fruits and

vegetables around 5%. It seems that the focus of many development initiatives including the five year plans for a long time has been on producing more food for the people at low cost. The requirement of low cost/price of food products have been unable to offer room for income raise for the people who are depended on food production for their livelihood. Consequently, it follows that a policy which aims to promote development of value added products for export to foreign countries could be an effective measure towards poverty alleviation.

### **Globalisation is an opportunity for India**

It is rather well known that the efficiency of the Indian agro-food industry is very low. Some 65 percent of the Indian population works in agriculture and its share of the total value is only about 25 percent of the total GNP. Similarly India's share of international market is only around 0.5 to 1.0 percent for goods and 1.5 percent for services. which on a per capita basis is marginal. According to a report from EU, India is now EU's 12<sup>th</sup> trading partner. The volume 33 billion Euro stands impressive until you realise that the corresponding figure for Korea is 48 billion, for Russia 126 billion and for China 175 billion. It may be noted that Korea has only a population of 43 million. This makes their per capita contribution extremely impressive compared to that of India. While the number of patented innovations in the field of food science during the last ten years were 4184 from Japan, 2792 from USA, 1555 from China, 1074 from Russia, 864 from Korea, 839 from Germany 294 from France, and 271 from UK, India does not show up at all in the statistics. Now it is rather sure that it is not due to lack of talent, lack of raw material or lack of knowledge or proper technology. On the other hand it is very much due to the fact that it is not yet given the priority it deserves, by the food industry, by the research institutions, by the universities and not the least by the policy makers of the government at different levels.

### **Research for value added food products**

It is in this background, a meeting was held at Anand to discuss the use of fermented foods and its relation to public health and social well-being. You will agree that research and higher education in general and in particular research and higher education the field of food science and nutrition in relation to public health and social well-being is an extremely important area of profitable investment. Not only because it will help to increase the income and purchasing power of the people living on agriculture by producing and marketing value added products with increased input of technical know-how but also because it will help to promote improved public health, social welfare and higher quality of life. Research in food processing is also necessary to take good care of the food already produced. During the last twenty to thirty years, the food production by way of cereals, pulses, milk, meat and fish has become double. At the same time due to lack of proper post harvest handling about 25 to 40 % of the food is wasted. This is almost equal to what is required to satisfy the energy requirement of 300 million people who are estimated to suffer from hidden hunger.

### **Research for value addition will offer many additional advantages.**

Research is necessary not only for value addition of products but also for acquiring new knowledge for effective competition. Research will give arguments for marketing, new applications, new methods of production and technical support to the customers. In addition to this, regular research and development will offer ideas for diversification and ability to cope up with risk situations. Research and development offer new perspectives in business. Continued and careful research would offer patents as immaterial assets, knowledge as competitive advantages and licences as a way of capitalising on patents. Sales of some highly value added products will give opportunity for marketing other products under image marketing with advantage in pricing of all the products of the company. Research and development can be done in many ways. In the company itself, through non equity agreements, through equity agreements, through joint

ventures, by creating a new unit or by out sourcing. However collaborative network research projects are most effective.

### **Collaboration and network improves the efficiency of research**

Research and development is a considerably expensive item in the economy of a food company. However research and development could be effective and less expensive when it is carried out efficiently as collaborative network projects where various universities, industries, institutions, faculties and researchers work together towards a common goal. Development of modern food products also requires input from many different specialised areas of science and technology. Each step, starting from cultivation, harvesting, quality of the raw materials, processing, storage, nutritive value and safety before consumption, immediate effects on well-being and long term effects on health is too complex to be understood well by a single scientist. Moreover, number of specialists can work together more efficiently and create lot of knowledge about a product or process in a short period of time. That is the logical reason why Swedish Net Work for South Asian Studies has selected our proposal for financial support. Some relevant problems of high priority, we hope that the group-work will definitely produce some viable research proposals for which international support can be obtained.

### **Advanced research cannot be done with out higher education.**

Production of safe and secure food products with high nutritional value and documented health benefits based on Indian raw materials require not only good knowledge in basic sciences like mathematics, chemistry, physics, biology, etc but also new knowledge in areas like food engineering, food technology, food microbiology, food toxicology, packaging, storage, transport, as well as nutrition and health sciences. In addition to this, good communication skills, good understanding for product design, marketing, economics and law are necessary to understand the dynamics of the globalisation process and its requirement of various types of food products. Therefore any input in research should go hand in hand with equivalent input in higher education. The objectives as well as methods of the advanced education need special attention and it should be coordinated with other beneficiaries.

### **Fermentation is a unique process with great potential**

Any programme or project or policy input needs a focus to be successful at the end. It is almost like Arjuna says to Drona that he see only the eye of the falcon. In promoting food processing in India it is wise to choose fermentation as the method of choice and point of focus. Fermentation is a suitable method of food preservation because it easily satisfies in a positive way a large number of criteria which can be applied to a feasible method of food processing. It is an environment friendly process, consume less energy, produce less waste and easy to manage under house hold conditions as well as in industrial scale. It is a typical example of bio-diversity put into efficient use, could be applied to a wide verity of raw materials to produce a variety of different finished food products. It has the advantage of being generally regarded as safe (GRAS) and at the same time offer immense opportunity for production of products which can be classified as "organic foods", "natural foods", "health foods", "convenience foods", "ethnic foods" "neutraceuticals" "functional foods", "probiotics", "synbiotics" and not to forget "food for clinical nutrition". Fermented foods are manufactured and consumed in practically every parts of the world. Cereals, pulses, root crops, vegetables, fruits, meat and fish are preserved by one or other method of fermentation in some part of the world. To mention further, India has a strong historical base, wisdom, experience and regional diversity in this fascinating area of fermented foods.

The knowledge of making traditional fermented foods has been recognised to be of immense value to the future generations by FAO, WHO and a number of other related agencies. Many may remember that Dr. Metchnikoff who was awarded one of the earliest

Nobel prizes was also famous for his observations on the use of fermented foods in the day to day diet on the health status and well-being of the people. That was some time in the year 1908. Now in 2006 after all these years, the positive effects of fermented foods with prebiotic substances and, probiotic organisms in synbiotic foods is a matter of great attention among the researchers, medical practitioners, food companies, and marketing agencies, because the demand for such products is enormous and growing fast day by day. The future of food and pharma industry belongs to fermented functional foods.

### **SASNET – Fermented Foods Initiative**

It is in this context that SASNET – Fermented Foods was established in November 2003 as an outcome of the first international seminar and workshop on Fermented foods, health status and social well-being organized at Anand with the help of Swedish South Asian Studies Network of Lund University, Sweden. The Network put this initiative at an international forum and could attract a project sponsored by European Union. Under this project, the Network sensitized various stakeholders by organization of series of strategic meeting sand workshops for policy makers of institutions of research and higher education, food industry, scientists, press/media as well as social/health workers. The network also promoted a few collaborative research projects through post-graduate students. The second international conference of the network was organized in December 2005, wherein the minister of Food Processing Industries of Govt. of India was present, who appreciated our ideas.

For the benefit of scientists who are interested in conducting research in this area, the essence of the outcome of the several meetings organized by the Network is given below in the form of the relevant problems of high priority for research in the area of fermented foods.

1. Systematic documentation of traditional fermented foods in a broad data base..
2. The effects of lactic acid fermentation on the fate of parasites and studies on the effect of the process on viruses.
3. The effect of fermentation on pathogenic and spoilage type bacteria.
4. The effect of fermented foods on the incidence of diarrhoea among infants and young children receiving fermented or non-fermented foods.
5. Effect of fermentation on mycotoxins and on the toxicity of breakdown products.
6. Effect of fermentation on environmental contaminants.
7. Effect of fermentation on bacterial toxins.
8. Determination of the overall feasibility of the use of specific micro- organisms with probiotic activities.
9. Optimisation of processing with respect to biogenic amines.
10. Effect of fermentation on the level of antinutritional factors focusing specifically on the mechanisms of change during the whole process.
11. Effect of fermentation on the bioavailability of nutrients, especially iron, zinc, calcium and protein.
12. Effect of fermented foods on the micronutrient status and growth of children under five, fed fermented and non fermented cereals.
13. Characterisation of traditional fermentation, especially where they are used or could be used for feeding infants and children.
14. Development of starter cultures for lactic acid bacterial fermentation.
15. Methods for optimisation of fermentation conditions to achieve specific benefits.
16. Effect of fermented foods on the immunoactivity and its use in applied nutrition.
17. Effect of fermented foods on the glycemic index and degree of satiety in healthy as well as diabetic and obese individuals.
18. Effect of fermented foods on HIV patients.
19. Nutritional value of fermented foods in relation to requirements of weaning infants.
20. Screening, identification, characterisation, documentation and industrial application of probiotic organisms from different traditional foods and geographic regions.

## **We propose that the ministry of food processing industries may establish**

It is in this background we propose that the ministry of food processing industries may establish a set of four centres of excellence to promote development of value added functional food products for export based on the enormous treasure of traditional fermented foods handed over to the people of India by their forefathers.

The centre of excellence may carry out;

- A specially designed internationalised master's degree programme of two years duration in food science and biotechnology with special emphasis on development and design of Indian food products for export.
- Advanced Research for acquiring new knowledge for development of value added functional fermented foods based on the traditional fermented foods of India.
- Scientific documentation of the health effects of such foods by carrying out unbiased clinical trials and analysis in a model laboratory of its own in collaboration with other faculties and institutions in the country and abroad.
- Collection and storage of data on traditional fermented foods of India and other countries in south Asia as a basis for development of novel food products.
- Coordination of the functions of the SASNET - Fermented Foods so that it can serve as nodal agency for the Government of India.

It is our wish that the proposal can be considered with highest priority as the globalisation process is quick and dynamic and to take a position in the global market, India should take a forerunner position not to lose its priority status when it comes to modern food products based on traditional food and dietary habits of the various parts of India

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*This article is based on a presentation made at a meeting held on 2<sup>nd</sup> may 2006 at Panch sheel Bhavan New Delhi at the ministry of food processing Industries, Government of India under the chairmanship of the honorable minister for food Processing Industries Sri Subodh Kant Sahai. At the meeting a core group under the chairmanship of the minister was formed. The mandate of the core group is to develop the concept of the centre of excellence. The authors of this article are members of the core group of which Dr. MC Varshneya is the vice chairman and Dr. Jb Prajapati is the secretary. This article was also published in the Indian Food Industry in an edited form.*

*-The Editor*