

EDITORIAL

Indian cooking has always been accentuated with spices. Indians have always had problems getting used to western food, which they felt insipid. Even when garnished with herbs and condiments that they usually add to 'spice up' their food, our palates find them not enough spicy. Even the western food that is available in India is much more spiced up. This is true of even hamburgers and pizzas that have been adapted to Indian tastes.

Indians used spices for centuries, or more appropriately for thousands of years. Our sages have not only discovered newer spices for their culinary or gustatory properties, but more importantly their medicinal properties. They taught us how to enjoy a healthy life with a touch of spice.

For quite some time, we were made to believe, for some reasons, that spices were indulgences. We would certainly eat more food when it is rightly spiced to make it tasty. There are of course certain spices that are recommended by our sages to be used in certain seasons or in certain conditions.

In the last couple of centuries we were preoccupied by modern medicinal science. It took us some time to overcome our inhibition thus created and accept spices as healthful ingredients of foods. Many research studies have shown spices like garlic, turmeric and others to have beneficial effects to help us remain healthy. Now we have realised the patient testing of goodness of spices by our sages over centuries to find out their medicinal properties.

It is not just spices, but many other food ingredients including fruits, vegetables, fermented dairy products, cereals & pulses and many others, have been provided by our ancestors so they become our cultural heritages not only giving us satisfaction but also ensuring health and longevity. With this realisation our scientists must take cue from this and re-establish the facts as were known to our ancient sages who discovered the goodness of our dietary ingredients by their own scientific standards as were established then.

Modern science wants manifestation by modern standards of scientific studies. This is not only necessary to give our spices the pride of place in global kitchens, but also then to protect our intellectual rights. Let us learn from the lapses in the past and the hard and expensive battles that needed to be fought in case of turmeric. We still have a lead over the others since we have our ancient knowledge backing us. We only need to do some work and re-establish the facts. We then either protect them by patents or publish them so at least no one else can corner the benefits of our spices.

We are very happy to welcome our new members, **Danisco India, Cal-lite Foods and Roquette India**. We sincerely hope that they will have a long and fruitful association with PFNDAI and our other members.

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World of Spices: by Dr. J. S. Pai

When one walks into a food store, there is a myriad of bottles and pouches of multicoloured powders or sometimes the whole spices. Herbs and spices are known to mankind even before the recorded history as people searched for adding tastes to foods, preserving foods and treating ailments by observing effect of natural ingredients. Over centuries, the interest in herbs and spices has varied with highest in 16th to 18th centuries where they were traded as near currencies and continents discovered for acquisition of spices. In 20th century the interest paled due to synthetic products. Now again due to technological advances benefits of spices and herbs that were known to our ancestors are being rediscovered.

Spices in World History

If the spices were to reflect their importance in the world history, they would be represented along with diamonds, rubies, emeralds and gold. When you open a bottle of a spice its fragrance would billow softly throughout the room. This mystical fragrance has been the inspiration for trade, exploration, war and poetry since the beginning of civilisation. Since quite early, spices played a prevalent part in man's daily life – and death. Archaeologists discovered spices in Egyptian tombs as early as 3000 BC. The strong preservative quality of many spices made them ideal for embalming. Nutmeg has a Sanskrit name and is referred to in ancient scripts. Ancient Indian epic Ramayana mentions cloves. Throughout history, spices have claimed attention for their mystical properties. People were also no longer happy with spices growing in their own backyards and wanted to explore uncharted territories for the search of new and exotic spices from exotic lands.

The spice trade developed throughout the Middle East around 2000 BC with cinnamon and pepper. Nutmeg was introduced in Europe in 6th century BC. Romans used cloves in the 1st century AD. Arabs controlled routes of spice trade between Asia and Europe. Pepper was the most common spice, the most exclusive being saffron for its colour and flavour. Other commonly traded include cinnamon, cassia, cumin, nutmeg, ginger and cloves imported from Asia and Africa.

Control of trade routes and spice-producing regions was the main reason for Portuguese navigator Vasco da Gama sailing to India in 1499. Around the same time, Christopher Columbus returned from the New World and described many new spices available there.

World Spice Trade

The world today imports of spices are about 525,000 tonnes worth US\$ 1.5 billion (growing at 4%) against the world production of 8.5 million tonnes worth US\$ 25 billion. Thus, most of the spices grown are consumed domestically. Bulk of export is of whole or unground spices, while only 15-20% are ground spices and their mixtures, essential oils and oleoresins. Increase in spice demands especially in Europe, USA and Japan is due to shift to natural products. Although this market is small at present, growth is 25-30%.

India is the largest producer of spices with annual production in 2000 was about 2.3 million tonnes which was almost half the world production of about 5 million tonnes. Other major producers of spices

are China with 0.5 million tonnes, Indonesia 0.26, Pakistan 0.20, Nigeria and Bangladesh around 0.15 and Ethiopia 0.12 million tonnes. India's estimated production is around 4.22 million tonnes valued at about US \$ 5 billion. Because of varying climates from tropical to sub-tropical to temperate – almost all spices grow quite well in India. Since early history, India has been leading spice exporter. It exported about 375 thousand tonnes valued at about US\$ 800 million in 2006-07 and had 47% world spice trade in volume. Some of the leading spices exported were chilli, pepper, turmeric, cumin, coriander, garlic, tamarind, fenugreek, ginger, curry powder as well as oils and resins. The current year's target is over 400 thousand tonnes with a value of over US\$ one billion.

There has been a greater emphasis on the export of value-added products like spice oils and oleoresins. Many production units have been producing high quality value-added spice products using modern technology and machinery. Traceability and compliance are two critical aspects that will substantially affect food trade in the future. As quality standards for food products become stricter world over, traceability will be a key factor for success in the market. Spice processing and food manufacturing companies are trying to establish backward linkages in this respect.

Spices & Herbs

Spice refers to seasoning made from dried seed, fruit, root or bark. The word herb comes from Latin "herba" meaning grass. Herbs are usually leafy, green plant parts often used fresh. These are mainly used for flavouring purposes and sometimes as a preservative to prevent harmful bacteria. Many of these substances are also used for other purposes, such as medicinal, religious, cosmetic, perfumery etc. Turmeric is used as preservative. Licorice is medicinal. More recently even garlic has been shown to have medicinal properties.

Herbs may be used fresh and commonly chopped into small pieces before adding to food. Spices are commonly dried and often ground or grated into a powder. Small seeds like fennel, coriander or mustard may be used both whole and in powder form.

Some examples of common spices and herbs: Leaves or branches of aromatic plants:- basil, bay leaf, parsley, thyme, oregano, coriander leaves, curry leaves, mint, etc.; Ripened fruits:- kokam, nutmeg, tamarind, cardamom, vanilla etc.; Seeds:- fennel, coriander seeds, fenugreek, mustard, black pepper, ajowan, anardana, caraway, cumin, poppy seeds etc.; Roots or bulbs:- garlic, onion, celery, ginger, turmeric etc.; Flowers: saffron; Bark: cinnamon, cassia etc.; Miscellaneous: clove, asafoetida etc.

This is just a short list as ISO has identified over 100 spices and herbs out of which India produces about 75 commercially. There are many which are grown and used but not sold so they are not accounted for. The above is not a standard classification and some may classify in different ways.

Spice Industry in India

India has about 45% share of world market, exporting some 50 spices in whole form and over 80 products in value added form. Currently, 33% of total export by value is in value added forms like spice oils and oleoresins, curry powders and mixes, speciality extracts and blends. Some of the major hurdles for increased exports are inadequate surpluses for exports and insufficient quantities of quality spices. India exports only 8% of the total production. There is severe shortage of exportable

varieties as domestic demand has substantially increased. Even productivity is low e.g. pepper productivity is around 300 kg/ha whereas it 1500 to 2000 kg/ha in Malaysia, Indonesia and Vietnam.

Small and poor farmers find it difficult to participate in the market economy. Some processors have contract farming that will sustain small farmers as well as process house gets assured supply of the variety needed for market.

Application of biotechnology including tissue culture for rapid propagation of species like cardamom, ginger, vanilla, curry leaf, turmeric and cloves has shown promise to meet increases in demand for planting material as well as ensuring genetic purity. Consumers in many countries are demanding organically grown spices so standards and accreditation processes are being set up to meet these requirements. Export markets demand spices of high quality with respect to microbial load and chemical contamination including pesticide and other farm chemicals. Farmers need to be made aware of this if there is to be a large increase in exports fetching higher revenues.

Post-Harvest Handling

This involves drying, curing and primary packing. Good post-harvest practices reduce problems of contamination. Traditional practices are still predominant in spice production and so the problems in quality of spices for exports. Some countries are able to supply aflatoxin-free or low-microbial load spices. Use of hygiene, mechanical devices, better storage practices etc. improves the microbial quality of spices that would improve competitiveness in export market.

Value-added Products

Value addition has been practiced in Indian spice industry as raw whole spices would not yield as much revenue. Preparing some of the products not only reduces bulk to be handled but the product becomes more stable in most cases and its convenience in various applications improves tremendously. Spice powders, mixed spices and curry powder, spice oils and oleoresins are some of the value-added products that are currently prepared. Further processing to prepare colorants and isolates have applications in many other industries like pharmaceuticals, cosmetics etc.

Spice Powders

Spices are ground not only to prepare standardised products that are convenient to pack and use, they can also be further processed to prepare various value-added products. One of the major applications is powders is preparation of mixed spices like curry powders or masalas. Common spices used in curry powder are coriander, turmeric, chillies, cumin, pepper, ginger, cinnamon, cassia, clove etc. Other ingredients like salt and starch may be added. Sometimes further products may be prepared such as curry pastes and seasonings. These mixes and preparations are used in a variety of food preparations like chicken, fish, meat, vegetables, tea and noodles.

Spice Oils & Oleoresins

Spice oils are volatile components in spices and give the aroma of the spice. They are commonly extracted by steam distillation although there are other methods developed. They have advantage over spices due to standardisation, consistency and hygiene. Spices normally have quite varied properties because of the natural, regional and climatic variation. Spice oils can also be custom-made

to meet rigorous requirements of the user. They are used in food, medicines, cosmetics, perfumes and personal hygiene products like toothpaste, mouthwashes etc.

Oleoresins represent the total flavour profile of the spice. They contain volatile as well as non-volatile constituents. They can replace whole or ground spices without impairment of flavour and aroma characteristics. They are prepared first by distilling out spice oils and then by extracting spices with non-aqueous solvents followed by removal of solvent. Finally spice oils are added back to give complete flavour substances. They can be complete and balanced, consistent and standardised. They are more cost-effective than spices and control of food quality is easier with them. They are free from contamination and are quite stable. They are used in processed meat, fish and vegetables, soups, sauces, chutneys and dressings, cheeses and other milk products, bakery products, confectionery and snack products as well as beverages. Common oleoresins prepared are chilli, pepper, ginger, turmeric etc. but more recently products are prepared from basil, fennel, mustard, fenugreek, nutmeg, onion, garlic, rosemary, cinnamon, clove, coriander, curry leaves etc. Even blended oleoresins are prepared for use like curry powder etc.

Some of the value-added products prepared from oleoresins and spice oils include carrier dispersion in which resins are mixed with salt or other ingredients, spray dried products where resins with carrier may be spray dried into a powder and micro-encapsulation where stabiliser like gum Arabic or starch may be used for coating resins to protect them from aroma loss or oxidative deterioration. Most modern process of use of super-critical fluid extractions using carbon dioxide produces extremely high quality resins with products resembling more closely the flavour profile of the whole spices. Some of the manufacturers in India have adopted this technology for producing high grade products well accepted in western markets.

As the trend for natural ingredients is gaining momentum beginning with western countries, the demand for spices as natural flavour ingredients as well as natural colorants is increasing. In ancient times, spices were used both for their flavour and colour attributes. Many natural colours are prepared from spices. Curcumin in turmeric and carotenoids in chillies have been used for a long time as colorants. Red, yellow and orange colours are being produced using spice ingredients.

Medicinal Properties

Herbs and spices are again getting recognition of their health benefits. Although various cultures believed in their medicinal properties, modern science is proving that spices provide healthier life. Many spices have high antioxidant contents and their relation to cancer prevention, heart health and anti-inflammatory action. According to study published in British Journal of Nutrition herbs and spices increase antioxidant capacity of salads. American Institute of Cancer Research suggests that health-protective phytochemicals in spices and herbs can fight cancer and other diseases. Much of clinical research has focused on turmeric, cinnamon, ginger and garlic.

Curcumin is the yellow pigment in turmeric and curry powder. Cell culture and animal studies have shown its components to have antioxidant, anti-inflammatory, antiviral, antibacterial and antifungal properties with potential activity against certain diseases like cancer, diabetes, arthritis, Alzheimer's disease etc.

Garlic contains allicin, allixin, allyl sulphides, quercetin and organo-sulphur compound, with potential activity against cancer. A large study reported in American Journal of Epidemiology showed that women consuming significant amounts of garlic were less likely to develop colon cancer. Studies of its effect on heart protection yielded mixed results. Garlic has also been linked to anti-clotting and reduction in blood pressure.

Ginger contains health-promoting gingerols, shogaols, beta-carotene, capsaicin, caffeic acid, curcumin and salicylate. Ginger has antioxidant and anti-inflammatory properties that may lower risk of cancer and inflammatory disease. Ginger's most consistently proven benefit is its ability to relieve nausea.

Cinnamon has antimicrobial effects and potential role in insulin activity. Its terpenoids especially eugenol and cinnamaldehyde contribute to its medicinal properties. Studies reported modest improvement in lowering blood glucose with cinnamon supplementation. It also helps in lowering LDL cholesterol.

Herbs like oregano, rosemary, mint and basil are useful due to phytochemical and antioxidant power. Rosemary relieves pain and improves mood. Peppermint has antimicrobial, antiviral, antioxidant, antitumour and anti-allergenic potential. Basil contains hypolipidemic and antioxidant substances having protection against certain cancers as shown in mice. Oregano has been shown to have constituent that destroys *Listeria* bacteria.

Future

Spices have regained its earlier prime position in food industry and in food preparation. People have not only come back for their sensory attributes but also because of many health benefits they offer. Spicy food for some time was not considered desirable but now again they have been considered highly desirable. Even western countries have been craving for curried preparations and such delicacies like chicken tikka. Indian manufacturers have maintained the steady pace of modernisation using newer techniques of preparation of value-added products. There are also newer post-harvest technologies available that are safer than chemical treatments. Radiation processing has emerged as the safest and the most effective processing method that does not cause any adverse changes in the flavour profile of spices.

Research and developmental activities will focus on the health benefits of the spices and spice ingredients. Many research institutes in the US and Europe have been working of some of these aspects as discussed above. Indian researchers need to intensify their research activities to demonstrate the benefits that were shown many centuries ago to validate them using modern scientific tools of research. Further these benefits and products need to be protected for Intellectual Property Rights so others do not exploit them to the disadvantage of people who originally shown it to the world.

Water of Health

Consumers are now seeking both nutrition and wellness instantly so Enhanced Waters are preferred. Water does not just quench thirst, but today also satiates, beautifies, immunises, invigorates, sharpens and protects against aging. First half of 2007 saw 31% growth in enhanced waters which are entering into functional beverage market. In 2006, fortified and flavoured waters market was US\$ 1.4 billion and is projected to be US\$ 3.5 by 2011. Best consumers are aged 18-34 and the children.

Big brands market tried and true branding, while actively developing value-added waters to their portfolio. Such waters are quite important in performance beverage category that caters to a wide range of consumers with some unique requirements. In contrast to energy drinks and sports drinks, performance beverages are blurring clear distinction with ingredients like vitamins, minerals, antioxidants, natural flavour with additional claims of low, no or reduced calories, sugar or carbohydrates, no artificial additives, claim of organic etc. to justify high costs. As against the bigger giants sticking with their tried products, smaller pioneer companies showed innovation in bringing about large number of enhanced-waters. Now big companies are buying such companies so they can market these successful enhanced-waters.

Smaller companies are still showing ability to rapidly innovate to meet emerging consumer demands. Also organic and natural claims have impacted the market. Some new flavour trends are seen with combination of aloe and starfruit, guava and chamomile as well as new dragonfruit and superfruit açai. Some of the products including Vitality, Calm, Energy and Burn of Vital Lifewaters have under 40 calories per 20 oz and contain carnitine, chromium, taurine, botanicals like gotu kola, lemon balm and passion flower. They also contain B vitamins and one has inositol and caffeine.

A natural touch

A Canadian company markets Dailyvitamin, Dailyenergy and Dailyhydration products as certified "essence" waters. With lemon or orange flavour there is no sweetener. Modest amounts of fructose, malic acid, ascorbic acid and fruit aromatics cleverly masks B vitamin and magnesium taste and has only 25 calories in Dailyvitamin. Another company markets Twist water, featuring pure fruit juice and fruit essence in artesian water. There is no sweetener, preservative or artificial ingredients.

Herbal Water uses herb-derived flavours and other healthful compounds without calories, artificial additives and preservatives. Targeting educated consumers with refreshment and health, there are no blatant health claims. They appeal with flavour combinations like clove-cinnamon-cardamom, cinnamon-orange peel, lavender-mint-lemongrass-thyme, lemongrass-mint-vanilla, ginger-lemon peel and jasmine-vanilla.

Enhanced waters are not simple concoctions and demand superb knowledge of ingredients and technologies to ensure colour and flavour stability as consumers are very demanding and sophisticated. Glaceau has GRAS ingredients to highly purified water to create vitamin water Revive (Vitamin B and potassium), Fucus (Vitamin A and lutein), and B-Relaxed (vitamin B and theanine). Smartwater has electrolytes as marketing tool but does not detail functionality. Fruitwater contains natural flavours and lesser fructose for positioning as all-natural and low-calorie. Negative connotation of corn syrup has made industry to go for fructose or sugar (called "evaporated cane juice").

Aquafina Alive Energy and Immunity contain new sweeteners and ingredients, while SoBe Life Water with fructose and herbs uses sodium salts for rounding flavour. Propel Calcium showed rapid growth due to consciousness among women about bone health. Another product TwinCal contains 60mg calcium in each bottle. Many minerals like potassium, magnesium, phosphorus and calcium are added to waters at hypotonic or isotonic levels for hydration and restoration of salts lost. Hydration is key selling point in health and beauty.

Waves of the future

There are some waters beyond flavourings and vitamins, using functional chemicals and proteins and designed more functionality for endurance or weight loss. Soluble proteins and amino acids are useful for endurance, weight management and muscle recovery. Casein hydrolysate and similar ingredients are used for quick dissolution and rapid absorption of peptides.

Special K20 Protein Water has 5g protein per 16 oz bottle with just 50 calories. Special K20 Protein Water Mix not only help with hydration and weight management but also dulls hunger. Guarana is added to a fitness water for improved cognition and enhanced fat-cell reduction. Weight management is targeted by some enhanced waters. TrimWater uses hydroxycitric acid to suppress appetite, chromium picolinate to help manage energy and glucosamine hydrochloride to help control blood glucose. Fructose and acesulfame K provide sweetness with lower calories.

Aquanova is fortified with vitamin E and alpha-lipoic acid which has a role in energy metabolism with its protective effect against diabetes and also anti-aging benefits.

Water-soluble formulations of fat-soluble compounds are clinically shown to enhance bioavailability over conventional dispersions in oil; they also make the products more palatable.

Condensed from: article by Kantha Shelke in FoodProcessing.Com May 2008

Omega-3 Fatty Acids: Dr. J. S. Pai

Omega-3 (also called n-3) fatty acids are unsaturated fatty acids having a double bond in n-3 position which is the third bond from the methyl end of the fatty acid. Important dietary omega-3 fatty acids (FA) are α -linolenic acid (ALA), eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). Humans cannot synthesise these de novo but can form 20- and 22-carbon omega-3 FA from 18-carbon ALA.

There are also omega-6 (n-6) FA occurring in fat and oil sources, the commonest being linoleic acid (LA) and arachidonic acid (AA). These are called essential fatty acids as they were found to be essential for normal growth in young children and animals. These facilitated normal growth and also were beneficial in skin integrity, renal function etc. Small amounts of omega-3 FA are also found to contribute to healthy growth and play important protective role in many other conditions.

Both omega-3 and omega-6 FA are necessary to maintain good health. Recent research studies have shown that there are some definite health benefits especially because of the present predisposition toward cardio-vascular ailments and many other problems because of our dietary habits and modern lifestyle.

Health Benefits

US Food & Drug Administration has given “qualified health claims” status to EPA and DHA. Although research is supportive but not conclusive, it does indicate that consumption of omega-3 FA may reduce risk of coronary heart disease. There is evidence that people with other problems of blood circulation including varicose veins benefit from omega-3 as they stimulate circulation and breakdown of fibrin, a compound involved in clot formation. They also help reduce blood pressure and there is evidence that shows omega-3 FA reduce blood triglycerides and their regular intake lowers both primary and secondary heart attack risk.

Other reported benefits include conditions like rheumatoid arthritis and cardiac arrhythmias. Research supports anti-inflammatory benefits of omega-3 FA in patients with neck pain and with rheumatoid arthritis. Relief was comparable to those getting non-steroidal anti-inflammatory drugs (NSAID). Omega-3 can reduce joint tenderness and need for corticosteroids in rheumatic arthritis.

Trial of fish oil and mustard oil was conducted for one year in Indian patients with suspected acute myocardial infarction. After one year total cardiac events were significantly less in fish oil and mustard oil groups when compared with control. Nonfatal infarctions were also significantly less. Total cardiac deaths were less in fish group. Fish and mustard groups also showed significant reduction in total cardiac arrhythmias as well as in oxidative stress. Study suggests that fish and mustard oils may provide rapid protective effects in patients with acute myocardial infarction.

Results indicate that consuming fish or fish oil containing omega-3 FA EPA and DHA is associated with decreased cardiovascular death, whereas consumption of ALA is not as effective. Therapeutic effect appears to be due to suppression of fatal arrhythmias rather than stabilisation of atherosclerotic plaques. Dose of 3g/d EPA+DHA can improve cardiovascular disease risk factors, including decreasing plasma triglycerides, bp, platelet aggregation, and inflammation, while improving vascular reactivity.

There are reports suggesting that fish oil intake reduces the risk of ischemic and thrombotic stroke with daily intakes up to 4.4g EPA and 2.2g DHA have not shown major adverse effects, but very large intake are not advisable. In a major study with over 11,000 patients with recent myocardial infarction were given 1g/day omega-3 FA and they showed substantial reduction in occurrence of death. In another study, patients with high serum triglycerides were given 4g/day EPA+DHA with some monounsaturated FA. Patients showed reduction in triglycerides and VLDL cholesterol.

Significant reduction of mortality with low dose (1g/d) of omega-3 appears very early during treatment resulting decrease of sudden death. Omega-3 have antiarrhythmic and antifibrillatory role.

Infants have been given fish oil with cow's milk and showed improvement in immune function. Pregnant women who ate fish once a week during their first trimester had 3.6 times less risk of low birth weight and premature birth than those who ate no fish. During pregnancy, omega-3 FA are incorporated into fetal brain and retinal lipids. DHA is required physiologically for optimal development and function of the central nervous system. Maternal intake of omega-3 FA must be sufficient to maintain maternal tissue stores and meet fetal accrument. AMDR of 0.6-1.2% of energy for omega-3 FA is recommended for pregnant women.

Omega-3 FA have also shown effects on mental health. Some evidence is reported of omega-3 FA supplementation being helpful in cases of depression and anxiety when given alone or with other medication. People with poor memory have accumulation of amyloid and tau proteins in brain. Mice with similar accumulation were given DHA and after three months showed reduced accumulation. Another study was carried out with children with learning and behavioural problems. When they were given 3g/day omega-3 and omega-6 FA with vitamins and minerals showed improved developmental health especially regarding learning and focus. Fish oils and omega-3 appear to reduce Attention-Deficit Hyperactivity Disorder (ADHD)-related symptoms in some children. Omega-3 fatty acids reduced hyperactivity in children with autism spectrum disorders.

Omega-3 FA also show neuro-protective action in Parkinson's disease. High doses prevented neurotoxin-induced decrease of dopamine commonly seen in Parkinson's disease. A protective effect has been reported in Alzheimer's disease. Omega-3 are known to have membrane-enhancing capabilities in brain cells. They help brain repair damage by promoting neuronal growth. EPA has shown to significantly increase grey and white matter of cerebral tissue in schizophrenia and Huntington's disease patients. Low brain omega-3 are thought to contribute to negative and neurocognitive symptoms in schizophrenia.

Health Risks

There are some risks of overuse of omega-3 FA. In patients taking aspirin or warfarin, more than 3g/day EPA and DHA may have possibility of increased bleeding. Also very large doses may have chances of hemorrhagic stroke. They may reduce glycaemic control in diabetes at high doses and may also suppress immune and inflammatory responses leading to decreased resistance to infections. Certain individuals may show increased LDL cholesterol. Persons with congestive heart failure, chronic recurrent angina or getting inadequate blood flow to heart are advised to talk to physicians before taking omega-3 FA or eating foods high in them. For normal individuals taking foods high in omega-3 FA such as fish, do not have any major concerns of adverse effects. Fish oil or ALA adverse effects are generally minor and typically gastrointestinal like diarrhea, which are eliminated when dose is reduced or discontinued.

Daily values

Fats are not assigned recommended daily allowances. Micronutrients have acceptable intake and for omega-3 men have been recommended 1.6g/day and women 1.1 g/day. Their Acceptable Macronutrient Distribution Range (AMDR) is 0.6% to 1.2% of total calories. Growing body of literature suggests that higher intakes of ALA, EPA and DHA may afford some protection against coronary heart disease. AMDR for EPA and DHA has been recommended at 10%. Researchers also believe that omega-6 intake should not be more than 4 to 5 times that of the omega-3 intake.

Omega-3 supplementation in food has been a recent trend with global food companies launching products like bread, pizza, yogurt, orange juice, milk, confections and infant formula fortified with omega-3.

Omega-3 in Foods

Good sources of ALA are leafy green vegetables, nuts, vegetable oils canola, soy, flax seeds. Good sources of EPA & DHA are fish and organ meat. LA is found in many vegetable oils.

Most abundant sources of EPA and DHA are oily fish like salmon, herring, mackerel and sardine and contain seven times omega-3 compared to omega-6. Other oily fish like tuna contain less. Consumers of oily fish should be aware of potential presence of heavy metals and fat-soluble pollutants like PCB, dioxin etc. Supplement manufacturers remove them improving the safety. Although fish is a good source of omega-3, fish do not synthesise them but obtain them from algae.

Flax seeds have linseed oil, very high in omega-3 content, six times richer than most fish oils. It contains about 55% ALA, which is converted in body to EPA and DHA at 2-15% and 2-5% efficiency respectively. Oil from brown algae (kelp) is a good source of EPA and walnut and acai palm fruit also contain omega-3 fatty acids.

Omega-3 & Omega-6 FA in Diet Together

Some seed oils have both omega-3 and omega-6 FA together as in rape or mustard oil, soy oil etc. The omega-6 are predominant and mainly consisting of LA. There are minor proportions of omega-3 FA, mostly ALA. Some of the ratios of omega-6 to omega-3 FA in some common oils: canola (rape) 2:1, soybean 7:1, olive 3–13:1, sunflower (no omega-3), flax 1:3, cottonseed (almost no omega-3), peanut (no omega-3), and corn oil 46 to 1 ratio of omega-6 to omega-3 FA.

Omega-3 and omega-6 FA form eicosanoids that have important biological functions in the body and have short active time before being metabolised. However, if synthesis exceeds metabolism rate, there is accumulation of eicosanoids from omega-6 FA that have deleterious effects. Eicosanoids from omega-3 FA are formed less rapidly than those from omega-6 FA and their formation competes with each other. Eicosanoids from omega-3 FA are anti-inflammatory as opposed to those from omega-6 FA being inflammatory and are associated with clumping of platelets, arthritis, lupus and asthma. Thus ratio of omega-3 to omega-6 FA is important to keep a balance between eicosanoids.

Since the synthesis of longer chain omega-3 and omega-6 FA also competes with each other and since longer chain omega-3 FA, EPA and DHA are more beneficial, it is important that ALA should be sufficiently high concentration compared with LA in the diet so formation of EPA and DHA from ALA will not be hindered much.

Omega-3 and Vegetarian Diet

Vegetarian diets are normally low in total fat, saturated fat and cholesterol compared with non-vegetarian diet. Vegetarian usually consume relatively low ALA compared with LA and consume very little of EPA and DHA as these are usually obtained from non-vegetarian sources. Consequently tissue levels of omega-3 FA are very low in vegetarians and are denied the benefits such as cardio-protective effects. Conversion of ALA to EPA and DHA is also low (5-10% for EPA & 2-10% for DHA). Hence total requirement for omega-3 is much higher for vegetarians who mostly get their omega-3 through ALA. Vegetarians must make dietary changes to improve omega-3 status.

Typical Western diet, even though non-vegetarian has omega-3 FA intake of about 150mg/day, whereas National Institute of Health has recommended 650mg/day combined EPA & DHA. American Heart Association recommends 2 fish meals per week i.e. about 300mg/day for people without coronary heart disease (CHD) but recommends 1000mg/day for patients with documented CHD.

Vegetarians may not accept fish diet or fish oil supplements. Even non-vegetarians who habitually do not consume fish, may have difficulty with fish diet. EPA and DHA are extracted from marine sources including fish oil and algae. Seed oils are now developed that are rich in omega-3 FA. Transgenic varieties of canola (Rapeseed), soybean and safflower rich in EPA and DHA are being developed. However, most vegetarians may depend on ALA for their requirements of omega-3 FA. Although more of it is required in order to get the similar benefits as EPA and DHA but there are reports to show that ALA is effective in reducing CHD risk. Both fish oil and mustard oil which is the richest source of ALA among seed oils have shown promise to provide rapid protective effects in patients with acute myocardial infarction.

In one study with middle aged Indians, canola oil was added to groundnut and sunflower oils to elevate ALA level and decrease LA level. Even modest increase has shown significant improvement in omega-3 nutritional status. This is important for vegetarians who do not wish to consume fish or fish oils. ALA intake is inversely associated with risk of CHD. Improvement of omega-3 FA in cereal based diets through the use of cooking oils with LA and ALA may contribute several health benefits including reduced risk of CHD, low birth weight and poor growth and development of babies, and many other chronic diseases in adults. There are now products available with added omega-3 FA to improve their nutritional status. That will be an alternative to either fish diet or cooking oil combination. Intake of ALA, EPA and/or DHA must be increased in order to get the health benefits.

Essential Oils' Antimicrobial Efficacy Studied

Researchers from the Dublin Institute of Technology recently studied the antimicrobial impact of several essential oils, in various combinations, to determine their potential effects on common foodborne pathogens. The results of this research were published in the May 10 edition of the *International Journal of Food Microbiology*.

The essential oils studied were basil, lemon balm, marjoram, oregano, rosemary, sage and thyme. These were combined in various permutations to determine their impact on pathogens like *Bacillus cereus*, *Escherichia coli*, *Listeria monocytogenes* and *Pseudomonas aeruginosa*. The researchers also studied the effects of various concentrations of essential oils on *E. coli*.

Tests showed promising results for oregano in combination with basil, thyme or marjoram. The researchers note that "all oregano combinations showed additive efficacy against *B. cereus*, and oregano combined with marjoram, thyme or basil also had an additive effect against *E. coli* and *P. aeruginosa*. Mixtures of marjoram or thyme, when combined with basil, rosemary or sage, also displayed additive effects against *L. monocytogenes*.

However, the researchers found that the actual degree of efficacy was dependant on the concentrations of various ingredients in the food system. For instance, they note that starch and oil concentrations of 5% and 10% had a negative impact on efficacy. On the other hand, the essential oils were more effective in the presence of high protein concentrations and at pH 5 (versus a higher, more alkaline pH of 6 or 7).

Overall, the Irish researchers concluded that combinations of essential oils "could minimize application concentrations and consequently reduce any adverse sensory impact in food. However, their application for microbial control might be affected by food composition..." Therefore, they suggest that careful selection of essential oils "appropriate to the sensory and compositional status of the food system is required." They suggest that essential oils might prove most effective against foodborne pathogens "when applied to ready-to-use foods containing a high protein level at acidic pH, as well as lower levels of fats or carbohydrates."

From: Food Product Design May 12, 2008

Fruit juices are essential for Kids

Washington – In a recent study conducted, scientist at the Louisiana State University and Baylor College of Medicine has established that fruit juices don't make kids obese.

During the appraisal, the scientists assessed 21 studies about a relationship between consumption of 100 percent fruit juice by children and adolescents and weight. They found "there is no systematic association between consumption of 100% fruit juice and overweight in children or adolescents."

"Health professionals and policy makers should be encouraged to objectively review the literature on all beverages and encourage consumption of healthful beverages including water, milk, and 100% fruit juice," said the investigator.

"The data support the consumption of 100 percent fruit juice in moderate amounts, and this may be an important strategy to help children meet the current recommendations for fruit," they also added.

"The rising epidemic of overweight and obese children should be a cause for great concern amongst healthcare professionals and the public at large," said James M. Rippe

"The findings that the consumption of 100 percent juice by children and adolescents is not associated with overweight is very important since 100 percent fruit juices are nutrient dense and their consumption represents an excellent way to help children meet the dietary guidelines for Americans," he added.

The investigators of the research are Carol E. O'Neil, PhD, MPH, LDN, RD, Louisiana State University, and Theresa A. Nicklas, DrPH, USDA/ARS Children's Nutrition Research Centre, Baylor College of Medicine.

The study appears in the American Journal of Lifestyle Medicine.

From: Health O Style – Online magazine by Ayushveda May 26, 2008

Lifestyle Changes Result in Growth of Functional Foods Purchased by Younger Consumers: New Study

April 8, 2008 -- Datamonitor -- Functional food and beverages are commonly associated with senior citizens trying to maintain vitality and reduce the risk of disease. However, lifestyle changes are resulting in younger consumers purchasing functional foods with greater regularity, in order to combat the myriad of health problems faced on a daily basis, such as fatigue.

Overcoming consumer skepticism about a wide range of issues related to functional products and their purported benefits will be important in gaining long-term mass acceptance. Industry players should also be wary of pushing a food or beverage products functionality too far.

Sales of functional products are rising across all food and drink categories in the US and Europe alike, and growth rates continue to outperform growth in the food and drink categories overall. On a regional basis, the Asia-Pacific functional food and drink market will continue to outperform the US market over the next five years.

For more information visit <http://www.researchandmarkets.com/reports/c88023>

From: http://www.soyatech.com/news_story.php?id=7776

Mediterranean diet 'cuts cancer'

Adopting just a couple of elements of the Mediterranean diet could cut the risk of cancer by 12%, say scientists.

A study of 26,000 Greek people found just using more olive oil alone cut the risk by 9%. The diet, reports the British Journal of Cancer, also includes higher amounts of fruits, vegetables, cereals, and less red meat. A separate study found adding broccoli to meals might help men vulnerable to prostate cancer cut their risk.

The Mediterranean diet came under scrutiny after researchers noticed lower rates of illnesses such as heart disease in countries such as Spain and Greece. They noticed that people living there generally ate more vegetables and fish, less red meat, cooked in olive oil and drank moderate amounts of alcohol. The latest study is one of the largest yet to look at the potential impact on cancer of the various parts of this diet.

'No superfood'

Researchers from Harvard University persuaded thousands of Greek people of various ages to record their food intake over an eight-year-period. Their adherence to the Mediterranean diet was ranked using a scoring system, and the group with the worst score compared with those who followed a couple of aspects of the diet, and those who followed it the most closely.

The biggest effect they found - a 9% reduction in risk - was achieved simply by eating more "unsaturated" fats such as olive oil. But just two changes - eating less red meat, and more peas, beans and lentils, cut the risk of cancer by 12%. Dr Dimitrios Trichopoulos, who led the study, said: "Adjusting one's overall dietary habits towards the traditional Mediterranean pattern had an important effect."

Sara Hiom, from Cancer Research UK, said the research highlighted the importance of a healthy balanced diet. "It shows there are a number of things you can do, and there is no one 'superfood' that can stop you developing the disease."

Broccoli benefit

The other study suggesting that food had the power to prevent cancer came from the Institute of Food Research in Norwich. Scientists compared the effects of adding 400 grams of broccoli or peas a week to the diet of men at high risk of prostate cancer - and in the case of broccoli found differences in the activity of genes in the prostate which other studies have linked to cancer. Their findings raised the possibility that broccoli, or other "cruciferous" vegetables, such as cauliflower and Brussels sprouts, could help prevent or slow down the disease, particularly if the man had a particular gene variant - GSTM1. Professor Richard Mithen, who led the research, published in the Public Library of Science journal, said: "Eating two or three portions of cruciferous vegetables per week, and maybe a few more if you lack the GSTM1 gene - should be encouraged."

Professor Karol Sikora, medical director of CancerPartnersUK, said the study was the first time in a properly controlled clinical trial that broccoli had been shown to change the expression of specific genes in the prostate gland. "Although the observation period was too short and the numbers too small to show that the incidence of cancer actually fell, it is the first clear demonstration that broccoli and presumably other cruciferous vegetables may well reduce cancer risk."

Story from BBC NEWS:

<http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/7483164.stm>

One Country's Table Scraps, Another Country's Meal

Grocery bills are rising through the roof. Food banks are running short of donations. And food shortages are causing sporadic riots in poor countries through the world. You'd never know it if you saw what was ending up in your landfill. As it turns out, Americans waste an astounding amount of food — an estimated 27 percent of the food available for consumption, according to a government study — and it happens at the supermarket, in restaurants and cafeterias and in your very own kitchen. It works out to about a pound of food every day for every American.

Grocery stores discard products because of spoilage or minor cosmetic blemishes. Restaurants throw away what they don't use. And consumers toss out everything from bananas that have turned brown to last week's Chinese leftovers. In 1997, in one of the few studies of food waste, the Department of Agriculture estimated that two years before, 96.4 billion pounds of the 356 billion pounds of edible food in the United States was never eaten. Fresh produce, milk, grain products and sweeteners made up two-thirds of the waste. An update is under way.

The study didn't account for the explosion of ready-to-eat foods now available at supermarkets, from rotisserie chickens to sandwiches and soups. What do you think happens to that potato salad and meatloaf at the end of the day? A more recent study by the Environmental Protection Agency estimated that Americans generate roughly 30 million tons of food waste each year, which is about 12 percent of the total waste stream. All but about 2 percent of that food waste ends up in landfills; by comparison, 62 percent of yard waste is composted. The numbers seem all the more staggering now, given the cost of groceries and the emerging food crisis abroad.

After President Bush said recently that India's burgeoning middle class was helping to push up food prices by demanding better food, officials in India complained that not only do Americans eat too much — if they slimmed down to the weight of middle-class Indians, said one, "many people in sub-Saharan Africa would find food on their plate" — but they also throw out too much food. And consider this: the rotting food that ends up in landfills produces methane, a major source of greenhouse gases.

America's Second Harvest — The Nation's Food Bank Network, a group of more than 200 food banks, reports that donations of food are down 9 percent, but the number of people showing up for food has increased 20 percent. The group distributes more than two billion pounds of donated and recovered food and consumer products each year.

The problem isn't unique to the United States. In England, a recent study revealed that Britons toss away a third of the food they purchase, including more than four million whole apples, 1.2 million sausages and 2.8 million tomatoes. In Sweden, families with small children threw out about a quarter of the food they bought, a recent study there found.

And most distressing, perhaps, is that in some parts of Africa a quarter or more of the crops go bad before they can be eaten. A study presented last week to the United Nations Commission on Sustainable Development found that the high losses in developing nations "are mainly due to a lack of technology and infrastructure" as well as insect infestations, microbial growth, damage and high temperatures and humidity.

For decades, wasting food has fallen into the category of things that everyone knows is a bad idea but that few do anything about, sort of like speeding and reapplying sunscreen. Didn't your mother tell you to eat all the food on your plate?

Food has long been relatively cheap, and portions were increasingly huge. With so much news about how fat everyone was getting — 66 percent of adult Americans are overweight or obese, according to 2003-04 government health survey — there was a compelling argument to be made that it was better to toss the leftover deep-dish pizza than eat it again the next day.

For cafeterias, restaurants and supermarkets, it was just as easy to toss food that wasn't sold into trash bins than to worry about somebody getting sick from it. And then filing a lawsuit. "The path of least resistance is just to chuck it," said Jonathan Bloom, who started a blog last year called wastedfood.com that tracks the issue.

Of course, eliminating food waste won't solve the problems of world hunger and greenhouse-gas pollution. But it could make a dent in this country and wouldn't require a huge amount of effort or money. The Department of Agriculture estimated that recovering just 5 percent of the food that is wasted could feed four million people a day; recovering 25 percent would feed 20 million people.

The Department of Agriculture said it was updating its figures on food waste and officials there weren't yet able to say if the problem has gotten better or worse. In many major cities, including New York, food rescue organizations do nearly all the work for cafeterias and restaurants that are willing to participate. The food generally needs to be covered and in some cases placed in a freezer. Food rescue groups pick it up. One of them, City Harvest, collects excess food each day from about 170 establishments in New York.

"We're not talking about table scraps," said Joel Berg, executive director of the New York City Coalition Against Hunger, explaining the types of wasted food that is edible. "We're talking about a pan of lasagna that was never served."

For food that isn't edible, a growing number of states and cities are offering programs to donate it to livestock farmers or to compost it. In Massachusetts, for instance, the state worked with the grocery industry to create a program to set aside for composting food that can't be used by food banks. "The great part about this is grocers save money on their garbage bill and they contribute a product to composting," said Kate M. Krebs, executive director of the National Recycling Coalition, who calls the wasting of food "the most wrenching issue of our day." The City of San Francisco is turning food waste from residents and restaurants into tons of compost a day. The city has structured its garbage collection system so that it provides incentives for recycling and composting.

There are also efforts to cut down on the amount of food that people pile on their plates. A handful of restaurant chains including T.G.I. Friday's are offering smaller portions. And a growing number of college cafeterias have eliminated trays, meaning students have to carry their food to a table rather than loading up a tray. "It's sort of one of the ideas you read about and think, 'Why didn't I think of that?'" Mr. Bloom said.

The federal government tried once before, during the Clinton administration, to get the nation fired up about food waste, but the effort was discontinued by the Bush administration. The secretary of agriculture at the time, Dan Glickman, created a program to encourage food recovery and gleaning, which means collecting leftover crops from farm fields. He assigned a member of his staff, Mr. Berg, to oversee the program, and Mr. Berg spent the next several years encouraging farmers, schools, hospitals and companies to donate extra crops and food to feeding charities. A Good Samaritan law was passed by Congress that protected food donors from liability for donating food and groceries, spurring more donations. "We made a dent," said Mr. Berg, now at the New York City hunger group. "We reduced waste and increased the amount of people being fed. It wasn't a panacea, but it helped."

With the current food crisis, it seems possible that the issue of food waste might have more traction this time around. Mr. Bloom said he was encouraged by the increasing Web chatter about saving money on food, something that used to be confined to the “frugal mommy blogs.”

“The fundamental thing that I’m fighting against is, ‘why should I care? I paid for it,’ ” Mr. Bloom said. “The rising prices are really an answer to that.”

From: By Andrew Martin in New York Times May 18, 2008

Soy may fight Asthma

Study reveals soy foods may be of benefit to asthma patients.

Results of a study at the Northwestern University Feinberg School of Medicine in Chicago suggest soyfoods may be of benefit to asthma patients. Working first with human immune cells exposed to soy isoflavones, the Northwestern team found the cells produced much less leukotrine, known to cause inflammation. Airway inflammation is a basic characteristic underlying asthma. The isoflavones were then tested for similar effects in humans. After four weeks of consuming isoflavone supplements, cells taken from the subjects showed one-third less of the inflammatory substance than before taking the isoflavones. The researchers concluded the findings warrant additional research on isoflavones as a possible means of helping to ameliorate asthma and related diseases.

From: FoodProcessing.com April 2008

Rice Joins Ranks of Whole Grain Health Claim

FDA extended its health claim for whole grain foods to include whole grain rice. Further, FDA states that all single ingredient whole grain foods qualify for the claim, regardless of whether they meet the requirement for a minimum level of dietary fiber, as long as they meet the other general health claim requirements.

The dietary fiber requirement was established in 1999 in order to monitor compliance with the claim. FDA now states that compliance for single ingredient whole grain foods will be monitored by examining package ingredient statements, not through fiber content.

The whole grain health claim reads: "Diets rich in whole grain foods and other plant foods and low in total fat, saturated fat and cholesterol may reduce the risk of heart disease and some cancers."
From: Food Product Design May 8, 2008

Towards a New and Improved Green Revolution: Experts Present a New Approach for Ensuring Food Security: by Stephen Leahy

Johannesburg -- Apr 07, 2008 -- Inter Press Service/All Africa Global Media via COMTEX -- As food prices soar and hundreds of millions go hungry, experts from around the world will this week present a new approach for ensuring food security, at the intergovernmental plenary for the International Assessment of Agricultural Science and Technology for Development (IAASTD). In the past year the price of corn has risen by 31 percent, soybeans by 87 percent and wheat by 130 percent. Global grain stores are currently at their lowest levels ever, with reserves of just 40 days left in the silos. Meanwhile, food production must double in the next 25 to 50 years to feed the additional three billion people expected on the planet by 2050. "The question of how to feed the world could hardly be more urgent," said Robert Watson, director of the IAASTD and chief scientist at the British environment and agriculture department.

The findings of the three-year IAASTD indicate that modern agriculture will have to change radically from the dominant corporate model if the world is to avoid social breakdown and environmental collapse, he explained. "Agriculture has a footprint on all of the big environmental issues...climate change, biodiversity, land degradation, water quality, etc." The IAASTD brought together more than 400 scientists who examined all current knowledge about agricultural practices and science to find ways to double food production in the next 25 to 50 years and do so sustainably, while helping to lift the poor out of poverty. They concluded that the way to meet these challenges is through combining local and traditional know-how with formal knowledge. The effort produced five regional assessments and a synthesis report, as well as an executive summary for decision makers.

Representatives from 30 governments of developed and developing countries, the biotechnology and pesticide industry and a wide range of non-governmental organisations (NGOs), including Greenpeace and Oxfam, were involved. Public sessions were also held to gather input from producer and consumer groups, as well as others within the private sector. However, last year the two biggest biotech and pesticide companies, Syngenta and BASF, along with their industry association -- Crop Life International -- abandoned the assessment process. This was on the grounds that the final draft of the synthesis report was overly cautious about the potential risks of genetically modified crops, and sceptical of the benefits.

"It's unfortunate that they backed out...I don't think they are used to working with a wide variety of participants as equals," said Josh Brandon, an agriculture campaigner with the Canadian branch of Greenpeace. He had high praise for the scientists involved in IAASTD -- and for the attention given to problems presented by biotechnology and the Green Revolution, such as the patenting of seeds, genetic contamination, and air and water pollution by pesticides. The term "Green Revolution" was coined in 1968 by William Gaud -- then administrator of the United States Agency for International Development -- in reference to the increased agricultural yields that were experienced in Asia and Latin America from the late 1960s through greater use of fertilizers and better crop varieties, amongst others.

However Robert Paarlberg, a political scientist and agriculture policy expert at Harvard University, in the United States, also has concerns about the way in which the IAASTD tackles biotechnology. He is particularly critical of the assessment for sub-Saharan Africa, saying it reads as if written by activists "who believe that the Green Revolution was a tragedy not a triumph of lifting hundreds of millions out of hunger and poverty in Asia."

Paarlberg, who did not participate in the IAASTD, recently published a book titled 'Starved for Science: How Biotechnology Is Being Kept Out of Africa'. In it, he argues that poverty and hunger in Africa are largely a result of agriculture there not having been improved by science, including modern

biotechnology. But Harriet Friedman, a sociologist at the University of Toronto in Canada and one of the editors of the assessment documents, counters that the IAASTD is based on scientific findings, not opinion: "The biotech industry and its supporters have a very narrow view of agricultural science."

The assessment places the focus on improving sustainable agriculture and small-scale production, which is receiving little investment for research. Paarlberg said that U.S. funding for agricultural research in Africa had dropped substantially in the past years, as had financing from the World Bank. The bank is a major sponsor of the IAASTD along with a number of United Nations agencies.

In addition to analysing how the world can be fed, the assessment focuses on supporting poorer communities with agricultural science and technology, noted Cathy Holtslander, a project organiser for the Beyond Factory Farming Coalition, an animal protection NGO in Canada. The final synthesis document, to be presented at the end of this week, is intended to act as a blueprint for governments about the future direction of agriculture. "It's not necessary that the assessment's findings are accepted by all governments," said Friedman. "This about a sea change in public consciousness."

From: http://www.soyatech.com/news_story.php?id=7698

Research Highlights

Pasta enriched with mustard protein isolate

These researchers studied the effect of pasta fortified with protein from mustard. Mustard is one of the major oilseed crops of India, with an annual production of 5 million tons. The meal is rich in protein and of excellent nutritional quality, being rich in lysine with adequate amounts of sulfur-containing amino acids--limiting amino acids in most of the cereals and oilseed proteins. However, the presence of antinutritional constituents limits the use of rapeseed/mustard as a source of protein in food products.

The group has developed a new method for the production of mustard protein isolate with reduced toxic and antinutritional constituents for food and feed. And their goal here was to prepare supplemented pasta products using the mustard protein isolate to determine its rheological properties and cooking, nutritional, and color characteristics.

Their results showed that as the supplementation level increased, the dough development time increased from 3.5 min in the control to 13.8 min. The mixing tolerance index decreased as the supplementation increased. The most pronounced effect of enrichment on chemical composition was the increase in protein content; the increase was around 4.5% with supplementation of each 5% mustard protein isolate. Study of cooking characteristics of enriched pasta samples showed that cooked weight, cooking loss, protein loss, and stickiness decreased and firmness increased as the supplementation level increased. The nutritional properties of sample showed that enrichment of semolina with mustard protein had a pronounced effect on lysine, cysteine, arginine, and histidine contents.

Rice gene may help double crop yields

A group of Chinese researchers indicate that varieties of rice with a particular gene grow taller, flower later and produce twice the number of grains as plants that lack the gene.

The group indicates that natural variation in the Ghd7 rice gene regulates heading date and yield potential in rice. Natural Ghd7 variants with reduced function enable rice to be cultivated in temperate and cooler regions, suggesting an important role for Ghd7 in adaptation.

Global demand for rice has increased 1.16% a year over the past decade, compared with production gains averaging 1.14%, according to U.S. Department of Agriculture statistics.

Model stomach to investigate digestion kinetics

Knowledge of the disintegration kinetics of food particulates in the human stomach is essential for assessing the bioaccessibility of nutrients in solid foods and understanding stomach emptying.

These researchers developed a model stomach system and to investigate the kinetics of food disintegration. The researchers comment that the system is capable of simulating the stomach by providing a wide range of continuous and periodic forces comparable to those measured in vivo.

They found it to be a good match between the kinetics of food disintegration and in vivo stomach emptying.

Gut bacteria and blood glucose control

Nestlé Researchers have established a link between the composition of bacteria in the gut with blood glucose control. Studies at the Nestlé Research Center, Lausanne, Switzerland demonstrate that modulating gut microbiota improves the regulation of glycemic control and reverses the insulin resistance that occurs with obesity.

Obese, diabetic animal models were given antibiotics to appropriately modify their gut microflora. The robust benefit of the modulated microbiota was evidenced by significantly enhanced oral glucose tolerance, insulin sensitivity, restored hepatic glycogen storage and reduced hepatic fat accumulation. Additionally, results revealed that the modified gut microbiota influenced whole body glucose homeostasis, independent of food intake or obesity.

Gut microbial communities have been shown to play a critical role in the development of innate immunity, production of essential vitamins, and other biological processes. Nestlé scientists took this knowledge a step further to determine that the presence or absence of specific bacteria in the gut may modulate the systemic inflammation which contributes to insulin resistance and obesity.

“Our results strongly support the idea that modulating gut microbiota could be beneficial for improving glycemic control and insulin sensitivity,” said Nestlé Research scientist Dr. Chieh Jason Chou. “The next questions for Nestlé Research to answer are: Is there a gut microbiota profile that lowers the risk of obesity and diabetes development? And can we modulate gut microbiota accordingly, with food-based interventions, to improve metabolic regulation and glucose control?”

Nestlé will continue to work in this area to leverage the potential of gut microbiota regulation as an effective therapeutic strategy for managing type 2 diabetes.

“Super yeasts” produce 300 times more protein

Researchers in California report development of a new kind of genetically modified yeast cell that produces complex proteins up to 300 times more than possible in the past. These “super yeasts” could help boost production and lower prices for a new generation of protein-based drugs that show promise for fighting diabetes, obesity, and other diseases, the researchers suggest. Their study is scheduled for the May 14 issue of the *Journal of the American Chemical Society*, a weekly publication.

In their report, Lei Wang and Qian Wang explain that the yeasts are intended for speeding production of proteins containing so-called “unnatural amino acids” (UAAs). Living things normally use the same basic set of 20 amino acids to make proteins. Scientists have made additional amino acids, the UAAs, which show promise for building new proteins with a broad range of medical and industrial applications. However, researchers had had difficulty in efficiently incorporating these UAAs into useful protein products.

Wang and Wang are reporting a solution to that problem. They inserted parts of the simple but highly efficient protein-making machinery of *E. coli* bacteria into the advanced but inefficient protein-making machinery of yeast cells. The result was a best-of-both world’s creation: A genetically-engineered yeast cell that produces complex proteins containing UAAs at levels 300 times higher than normal yeast cells. -- MTS

Genes linked to sugary food consumption

A new study finds that individuals with a specific genetic variation consistently consume more sugary foods. The study offers the first evidence of the role that a variation in the GLUT2 gene – a gene that controls sugar entry into the cells – has on sugar intake, and may help explain individual preferences for foods high in sugar.

The study was conducted by a group at the Dept. of Nutritional Sciences, University of Toronto, Toronto, Canada.

Edible coatings extend shelf life of hard-boiled eggs

These researchers from Oregon State coated hard-boiled eggs with chitosan–lysozyme (CL), whey protein isolate (WPI), or Bake sheen (BS), and then inoculated them with *Listeria monocytogenes* or *Salmonella enterica* Ser. Enteritidis at 104 CFU/g. The eggs were then stored 4 wk at 10 °C.

Coatings reduced the populations of coliforms and total plate counts, and completely inhibited mold growth during the 10-wk storage period. Coatings also reduced the weight loss of eggs, 4.1% to 4.8% on coated eggs compared with 7.5% in uncoated ones. The pH of CL-coated eggs remained stable throughout the storage period, while the control eggs increased from 7.6 to 8.6. Color changes in CL- and WPI-coated eggshells were less ($P < 0.05$) than those of BS-coated and the control. Chitosan-lysozyme coatings appeared to be one of the more effective treatments.

Time for food science research is now

As an excellent report in the *New York Times* has pointed out, during the past few decades overall surpluses of agricultural commodities have not only kept prices down, but have also contributed to a decrease in funding for grain commodity and food research.

An important question: “**Is the recent sharp increase in food prices due to speculation or is it being driven by real demand?**”

Others are better qualified to address the speculation side of the food price equation, but there are several factors that indicate that overall food demand will remain high in the coming decade.

Population: World population is expected to increase by 2.6 billion over the next 45 years, from 6.5 billion today to 9.1 billion in 2050. Almost all growth will take place in the less developed regions, where today's 5.3 billion population is expected to swell to 7.8 billion in 2050. The population of the more developed regions will remain mostly unchanged, at 1.2 billion.

According to the World Bank, just over 1 billion people live on one dollar or less per day and people in the poorest countries of the world spend 80% of their income on food. In the U.S., this situation is almost reversed, according to the USDA, only 10-15% of household budgets go to food items.

Although we may be noticing higher grocery prices, consumers in countries such as China and India (which spend 28% and 33%, respectively, of their income on food) are paying a higher burden with higher food prices.

Water and Arable Land Shortages: Both water and arable land are expected to become scarce in coming years. Freshwater is renewable resource, but rapid economic growth is depleting the ready supply, especially in dry regions. In China, water depletion is a serious problem and the problem is exacerbated by top soil erosion and poor fertility. In some countries of the Middle East, water depletion is a serious problem. Estimated recoverable water reserves are now less than 10 years and falling rapidly.

The total amount of arable land in the world is diminishing, primarily as a result of urbanization. In order to compensate for the reduced acreage, higher productivity levels are required. But higher yields require increased use of fertilizers which is not an option available to everyone given the price of oil.

Changing Diets: This factor is more problematic; since diet trends take years to appear and everyone has a right to change their diets. However, there are indications that Asia's growing middle classes are switching to meat-based diets. The trend to more meat-based diets means that greater amounts of grains are required to produce pork, beef, or poultry. For example, on average, it takes more than 8 kg of corn to produce each kg of beef.

Need for Research: Numerous predictions of global food shortages over the years have always been proven wrong. But as food technologists with global surplus of food, we may have become complacent. Now, we are suddenly faced with shortages of important food commodities. For example, even U.S. wheat inventories are now at the lowest level since 1948. Similar shortages of food staples have caused problems throughout the world. The World Bank predicts food riots may occur in more than 30 countries around the world in coming years.

It is clear that these worldwide shortages and demand factors point out the need for continuing and renewed efforts in appropriate areas of food science research.

Caffeinated coffee and cereal may cause blood glucose spike

A group of researchers from the University of Guelph have conducted a study that indicates drinking coffee before eating a low-sugar cereal breakfast can cause blood glucose levels to rise considerably.

According to the study, blood sugar levels in people who ate low-sugar cereal were 250% higher if they drank caffeinated coffee before or with breakfast, compared to decaf.

The researchers found that the ingestion of caffeinated coffee with either a high or low glycemic meal significantly impairs acute blood glucose management and insulin sensitivity compared with ingestion of decaffeinated coffee.

The group indicated that future investigations are warranted to determine whether caffeinated coffee is a risk factor for insulin resistance.

From: IFT Weekly Newsletters May 2008

Fi-India 2008 Conference on Novel Foods for Modern Consumers

Organised by **PFNDAI & CMP/UBM India**

Every year, Mumbai has been witnessing an international Food Ingredients Exhibition Fi-India and this year also the event is taking place during **October 3rd-4th, 2008 at Bombay Exhibition Centre, Goregaon** and PFNDAI is organising with organisers of Fi-India 2008, a **two-day Conference on Novel Foods for Modern Consumers** at the venue of the exhibition.

Modern consumers have many advantages and some disadvantages that were not there earlier. They have more purchasing power, they are more aware of what is available in other markets, they have developed newer and bolder tastes and more importantly, they have become quite aware of Food Quality, Safety and Nutrition. Hence they want foods that are different from the monotonous ones they were consuming before, that are more flavourful and tastier, that are also safe and more nutritious.

The modern consumers are also realising that they are not physically as active as their forefathers but they would still like to enjoy the life they can afford, so they would like their foods to do all their work to keep them healthy. This has put tremendous pressure on many food manufacturers. They can make the foods very tasty or very nutritious and healthy. It is very difficult to have both these attributes in the food products. Fortunately, many new ingredients are now available that will combine the nutrition with taste. Many nutrients and nutraceuticals are being used by food manufacturers in many countries very successfully to make the food products quite healthful without losing its sensory appeal. The conference would like to focus these aspects of developing New Foods for Modern Consumers.

The conference will include speakers who are leaders of companies producing new food products that are trying many new aspects discussed above. There will also be some new ideas of using some new ingredients to achieve this mix of nutrition and taste. Some of the topics that are planned in the conference are

Global Regulatory Scenario for New Foods & Ingredients

New Processed Foods to Suit New Tastes

Importance of Supply Chain in Modern Food Markets

Newer Trends in Bakery Products

Healthier Fat Products and Substitutes

Managing Supply Chain of Herbal Ingredients

Newer Ingredients for Health & Convenience

Incorporating Health & Wellness in Common Foods

Nutritional Advantages of Newer Ingredients

New Healthier Confectionery Products

Sugar free Sweets & their Role in Dental Health & Healthy Lifestyle

Traceability in Food Industry

Modern Trends in Snack Foods

Innovative Ingredients Applications for Making Snacks & Fun Foods Healthier

New Food Regulations in India

Since the Conference is jointly organised by PFNDAI, the members of Protein Foods & Nutrition Development Association of India will be getting special discount for attending the conference as below.

PFNDAI Members: Rs. 3,400

General Delegate Fee: Rs. 5,678

Kindly contact for more details and registration for conference:

Mr. Manish Tharwani

CMP India / UBM India P. Ltd., 611-617 Sagar Tech Plaza – A

Saki Naka, Andheri-Kurla Road, Andheri (E), Mumbai 400072

Tel: +91 22 6612 2600/2683, Fax: 66122626, Email: manisht@ubmindia.com, Website: www.fi-events.com

Coming Events

October 3-4, 2008

Fi-India 2008 Expo & Conference

Bombay Exhibition Centre

Goregaon, Mumbai

CMP/UBM India

Contact Expo: Ms. Deepali Mehta

Contact Conference: Mr. Manish Tharwani

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October 21-22, 2008

International Conference on

Current and Innovative Approaches to

Microbiological Food Safety Management

Hotel Intercontinental The Grand,

Barakhamba Road, New Delhi

Organisers: ILSI-India & Intl Comm. for

Microbiological Specifications in Foods

Symposium Secretariat, ILSI-India, Y-40 B,

Hauz Khas, New Delhi – 110 016,

Phone: 011-26523477, 26968752, Email: indiails@vsnl.net

November 13-15, 2008

Food & Bev Tech 2008

Confederation of Indian Industry

Mumbai

Phone: 022-6661 1689, 2493 1790

Email: anil.padwal@ciionline.org

January 23-25, 2008

XIX FAFAI Seminar on

Incredible India: the Journey of Aroma

Jaypee Palace Hotel, Agra

Fragrances & Flavours Association of India

Phone: 022-2209 2184, 2207 6075

Fax: 022-2200 5875, Email: fafai@mtnl.net.in