

## EDITORIAL

This second issue of the 6th Volume of International Journal of Tea Science (IJTS 6:2) is rather slim but brings to you some very un-usual information. Two Original Research Reports record investigations on the fundamentals: one on the mode of action of tea constituents at molecular level on an important human affliction Alzheimer and another on the metabolic pathways involved in biosynthesis of most bioactive constituent of tea flavanols. A new section has been introduced to carry short reports on items of interest which are not generally found in public domain. We have selected a relatively small tea growing country Vietnam which is characteristic in its diversification of production, processing and exports and another is a report on the initiation of a green field project on introducing tea in Pakistan. These are summarized below.

### **Basis of the Effect of Tea on Alzheimer**

Alzheimer disease is the most common cause of dementia in the elderly. Two chapters by Unno and Kakuda in IJTS 2006-published book 2--Protective Effects of Tea on Human Health published by CABI (refer back inside cover), describe in detail the beneficial effects of green tea on age related brain degenerative neurological diseases. In this issue, an Original Research Report by Ayoub and Melzhig from Free Berlin University reports the results of an investigation at cellular level to elucidate the mechanism involved in the neuro-protective effect of green tea against age related Alzheimer and brain degenerative diseases.

Pathologically Alzheimer is characterized by accumulation of amyloid Beta peptides as senile plaques in the brain. These metalloid peptides are degenerated by two enzymes NEP and ACE. Tea constituents cause upregulation of NEP which prevents development of Alzheimer disease, while the metabolic activity of the other protective enzyme ACE is not influenced by green tea. The results demonstrate *in vitro* at cellular level, that green tea enhances the specific activity of NEP on green tea neuro-protective effect which is correlated with the activity of this degradation enzyme. The paper concludes that : daily consumption of green tea diminishes the risk of Alzheimer disease and age related dementia by increasing the degeneration of the deposit of the (causal) amyloid peptides. It would be interesting to know which one of the green tea constituents is more effective than others in protecting against age-related degenerative diseases.

### **Flavonoid Biosynthesis**

Flavonoids are correlated with quality (cup characters) and are the basis of pharmaceutical prowess of tea. Lignins increase fiber content and depress tea quality but are essential protection against pests and pathogens. That the highest quality resides in bud, followed by successive leaves in the tea shoot and is maximized in the second flush, is well known. What is less well known is that both the constituents are alternate biosynthesis products of the same metabolic pathway and are the result of diverting the photosynthates from one product to the other, through activity of different enzymes systems. Venkatesh *et al.* have investigated the cause and effect relationship between enzyme systems of the pathways for biosynthesis of catechins and lignin. The results show that upregulation of CHS enzyme during second flush enhances the biosynthesis of catechins and down-regulation of C4H enzymes, results in diverting the metabolites away from lignin biosynthesis. Attempt was also made to determine the genetic basis of quality-enzyme relationship which showed the parallelism between CHS activity of a tea

variety with its catechin content. However, the 2<sup>nd</sup> flush effect was dominant across the variations between genetically different varieties and locations in North and South India.

This study throws up a number of questions and possibilities. Does the order of flush or the weather condition manifest this difference? Whether CHS-C4H enzyme system can be regulated in favor of biosynthesis of flavonoids at the cost of lignin formation? If so, is it only gene dependant (by breeding) or can be achieved through physiologic regulation with PGRs? Can this knowledge help the tea industry to harness CHS-C4H metabolic pathway during off-quality season like rains-flush? A systematic study of the metabolism involved will help solve these riddles towards improving the quality of tea even in low quality seasons.

### **Short Communications:**

This is a new introduction to the format of the International Journal of Tea Science because some manuscripts were received which contained new and useful information for the general readers but had neither detailed enough information nor structured like scientific papers complete with literature review and references. They were more or less like sharing personal information with the readers. However, these could not be rejected because to do so would have meant throwing away the opportunity to have new or interesting information on a subject, which is not available in the public domain. We selected two short communications for this issue, one providing information on tea in Vietnam which is the exporter of a large variety of teas to cater to different tastes and the other a green-field tea- introduction paper on Pakistan which is one of the largest importers of tea.

#### **(i) Tea in Vietnam:**

Tea is grown and consumed in Vietnam for the last 2000 years. The French Colonial Power set up tea plantations at the end of the 19<sup>th</sup> century (we would like to know more about the plant material, whys and hows of starting tea plantations) with large scale commercialization in 1910. Wars had a ruinous impact on Vietnam tea industry. During the French war ( 1945-1954) most tea plantations were abandoned. The industry received another set back during the Iraq war in 2003. The plantations are old and in need of rejuvenation and replantation. In 2006, tea production in Vietnam was estimated at 126,000 tons and is projected to reach 214,000 tons in 2010, through public-private partnership.

Emphasis of the Vietnam tea industry is on generation of employment and meeting the varied needs of the 39 importing countries. Tea in Vietnam is necessarily a small and diversified business. Tea is currently cultivated by 400,000 smallholder households who process it in 10,000 small processing units, manufactured into marketable tea by 600 commercial factories and its export handled by 160 operators. With doubling of production in 2010, creation of a million jobs is projected. Vietnam exported 105,000 tons tea in 2006 which amounts to 83% of its tea production. It offers a basket of tea for export. It produces green tea suited to the traditional markets of Afghanistan & North Africa/Middle East and new markets of Taiwan, Japan and even EU. However, 2/3 rd of its exports are black teas while the rest of the export market is shared by green tea and specialty oolong tea.

More information on organization of tea industry, research support to the growers, technical linkages, and agro-technology of tea in Vietnam would have been useful information which, we hope will be published in due course in our forthcoming book on Tea Growing Countries.

## **(ii) Tea in Pakistan**

Pakistan has a strong tradition of drinking tea which it shares with the populations of adjacent India and Afghanistan, consuming an average of one kilo tea per person per year. With de-linking of tea growing East Pakistan in 1972, the country started importing tea and became the 3<sup>rd</sup> largest tea importer after Russia and U.K. Detailed data on import of tea were published in this journal's first year of publication by Hamid Janoo (IJTS Vol 1:4. 2002). Today Pakistan imports 110,000 tons of tea at a cost of Rupees 12 billion which is the 8th largest import item with almost 2% share of imports. However, there is a very important transformation in the tastes of the Pakistani consumer. Its preference of gutty teas with cup character, has changed to bright liquoring teas from Kenya, which contributes to 2/3<sup>rd</sup> of the total imported teas while the remaining 1/3<sup>rd</sup> tea import is shared by 18 other exporting producers. Detailed tables are given, which provide authentic data on various aspects of tea imports in Pakistan

In 1973, Pakistan started a green-field tea project in NWFP (North Western Frontier Province) with 20 hectare land which was converted to a full fledged Tea research Institute in 1996. With the assistance of Chinese engineers it set up a manufacturing facility of one ton made tea per day. Other technical support is also provided by the Chinese scientists. Experiments to generate information on agrotechnological aspects have been taken up. The Institute has also helped plant tea on 550 acres of farmers' fields. Meanwhile private players like Unilever are investing in tea R & D, having established a research unit in 1986 and planting tea on >1000 acres of farmers' land.

The readers of IJTS wish Pakistan well in setting up a productive tea research Institute and join the company of tea researchers, as well as establish a flourishing tea industry. The ISTS would like to keep informed of the developments on research and industry in the country.

### **Tea Science abstracts**

Tea scientific abstracts carry their usual set of information which seems to have become lesser than usual in volume, which involved a lot of hard work to sort out duplicates.

The ISTS hopes that this slimmer issue will set the pace for more informative and useful publication, culling information which is generally not available in the public domain. In the next issue the ISTS proposes to compile the abstracts of all the scientific papers which will be presented at the International Conference OCHA 2007 that will be held at Shizuoka Japan November 2-4, 2007. We hope that this will be largest collection of useful information which also records the changing trends in world research on tea.

The ISTS editors are currently working on finalizing the manuscripts of the book 3 "Economic Crisis in Tea Industry: Strategies of Scientific Management" of the series Global Advances in Tea Science. which we hope will be published before the appearance of the next issue of the IJTS. (Please refer to page viii of this issue for details of this proposed book.)

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(N.K. Jain)

Resident Editor