



Training Manual on



Post Harvest Technology, Processing and Cold Chain Management

under the project entitled

**“The International Network on Preserving Safety and
Nutrition of Indigenous Fruits and their Derivatives”**

funded by



March 20-22, 2012

Dr. Susanta K.Roy
Dr. Neeru Dubey
Dr. Shailendra K. Dwivedi
Ms. N. Laxmi Raman
Ms. Nidhi Verma

Technical Editors: Dr.Susanta K. Roy and Sunil Saran

**Amity International Centre for Post Harvest
Technology & Cold Chain Management**

Amity University Uttar Pradesh

Sector-125, Expressway, Noida, U.P. India

Tel. No.:+91-120-4392182; Fax +91-120-4392502

www.amity.edu/aicpht



Training Manual on



Post Harvest Technology, Processing and Cold Chain Management

under the project entitled

**“The International Network on Preserving Safety and
Nutrition of Indigenous Fruits and their Derivatives”**

funded by



The Leverhulme Trust

March 20-22, 2012

Dr. Susanta K.Roy
Dr. Neeru Dubey
Dr. Shailendra K. Dwivedi
Ms. N.Laxmi Raman
Ms. NidhiVerma

Technical Editors: Dr.Susanta K. Roy and Sunil Saran

**Amity International Centre for Post Harvest
Technology & Cold Chain Management**

Amity University Uttar Pradesh

Sector-125, Expressway, Noida, U.P. India

Tel. No.:+91-120-4392182; Fax +91-120-4392502

www.amity.edu/aicpht



Message from the Founder President

We proudly proclaim that India is the second highest fruit and vegetable producer in the world but when we look at the percentage of appalling wastage in the agricultural commodities, our spirits are instantly dampened. A considerable amount of the valuable produce is lost due to improper post harvest management and inadequate processing facility leading to instability in the prices, losses to farmers as well as the processors. Thus, impoverished India loses 25-40% of the produce. The question is, how we can minimize the staggering losses. India, the “Land of Agriculture” with all of its cultivable land, all the seasons for production of all the varieties of fruits and vegetables, a well-set agribusiness system that works, must gear up to tackle the challenges posed by post harvest losses which severely impact the small and marginal farmers. The imperative step that needs to be pursued vigorously involves building of sustainable supply chains, which assist the growers in accessing the marketing and processing centres. Minimizing wastage would necessarily maximize profitable return which requires a stable integrated system encompassing post-harvest technology and cold chain management. Food safety and quality deserve special attention.

There is invariably a wide gap between the requirements and availability of trained manpower addressing such needs for the industry and other stakeholders. This requires inter-disciplinary and multi-dimensional approach, which must include scientific creativity, technological innovations, commercial entrepreneurship and institutions capable of inter-disciplinary research and development in an integrated manner so as to meet the developmental needs of the country.

Amity is currently a leading education provider in India, offering industry oriented professional courses with focus on cutting edge research and innovation. Amity University is deeply committed to nation building through quality teaching and research and is running several programmes of immense importance. The three-day training-workshop being organized by Amity International Centre for Postharvest Technology & Cold Chain Management is a major step in this direction. It is heartening to note that the project spear headed by Centre for Underutilized Crops, University of Southampton, and funded by Leverhulme Trust has participating partners from UK, France, Sri Lanka, Bangladesh, Vietnam and Cambodia besides our University focused on “International network on preserving safety and nutrition of indigenous fruits”.

We at Amity take genuine pride in welcoming the international partners of the project and the trainees coming from different parts of India.

I am glad to know that the training-workshop will cover post harvest technology and cold chain management, two vital components to minimize the losses of perishable horticultural produce.

I wish this important programme all success.

A handwritten signature in blue ink that reads "Ashok K Chauhan". The signature is written in a cursive style with a horizontal line underneath the name.

Ashok K Chauhan

Founder President

Ritnand Balved Education Foundation (RBEF)

(The Foundation of Amity Institutions and

Sponsoring body of Amity Universities)



PREFACE

Southeast Asia is home to more than 500 species of fruits. The Vavilovian Hindustan region of diversity represents 344 species of fruits having vast potential for adoption as new crops. This area has been the centre of origin of tropical and temperate fruit species, most of which are still growing in wild/semi-wild state. Many of the tropical and temperate fruits have still remained underutilized due to lack of awareness of their potential, market demand and low and erratic bearing in many cases. These species have multipurpose use as fruits, vegetables and also have therapeutic and medicinal properties.

The Centre for Underutilised Crops (CUC), University of Southampton has done pioneering work in this direction. The project entitled **“The International Network on Preserving safety and nutrition of indigenous fruits and their derivatives”** funded to CUC by Leverhulme Trust, UK is a laudable attempt to utilize the nutritive properties of underutilized indigenous fruits with emphasis on safety. The project has brought together, on one platform, partners in research from UK, France, Cambodia, Vietnam, Bangladesh and Sri Lanka.

The programme commenced with a networking workshop in Bangladesh, hosted by Bangladesh Agricultural Research Institute (BARI) which was a great success in respect of identifying the expertise of each participating partner.

Amity University is holding the second programme which is a 3-day training-workshop on Post Harvest Technology and Cold Chain Management. Twenty one trainees from different parts of India will be participating in the training workshop besides the partners in research from different countries.

A manual has been prepared based on the training to be provided. A few articles have been included in the manual which provides perspectives on the both post harvest technology and cold chain management.

I extend my hearty welcome to all participants and hope they will benefit from our training-workshop.

A handwritten signature in blue ink, appearing to read 'Sunil Saran'.

Sunil Saran

Chairman

Amity International Centre for Post Harvest Technology
and Cold Chain Management

OVERVIEW OF THE NETWORKING PROJECT

KATE SCHRECKENBERG



UNIVERSITY OF
Southampton

International network on preserving safety and nutrition of indigenous fruits and their derivatives:

Training Workshop on Post-Harvest Technology and Cold Chain Management

**20-22 March 2012
Amity University, India**

*Kate Schreckenber
Coordinator, Centre for Underutilised Crops*

Network partners

- Centre for Underutilised Crops, University of Southampton, UK
- Qualisud Dept, CIRAD, France
- Amity International Centre for Post-harvest Technology & Cold Chain Management, India
- Horticulture Research Centre, BARI, Bangladesh
- Faculty of Food Science and Technology Faculty, Nong Lam University, Vietnam
- Dept of Food Technology and Chemical Engineering, Institute of Technology, Cambodia
- World Agroforestry Centre country office, University of Peradeniya, Sri Lanka

Network aims

- To develop an interdisciplinary research network to promote technical innovation and cooperation in the production-to-consumption system of indigenous fruits in the Asian region as a new approach to linking sustainable agriculture with preventative nutrition

Why is the network interested in indigenous fruit?

- Important contribution to nutrition
 - Provide calories, vitamins, minerals, micro-nutrients
- Widely available
 - Management within traditional land use systems
 - Important for women and marginalised groups
 - Locally specific varieties increase resilience
- Many new market opportunities
- Engine for rural growth
- Contribution to national incomes

Constraints to better utilisation of indigenous fruit

- High spoilage because of seasonal gluts
- Poor market and transport infrastructure
- Lack of market information and entrepreneurial skills
- Poor fruit processing, insufficient range of products, lack of storage, poor packaging and quality assurance, poor knowledge of hygiene
- Lack of communication between researchers and end-users
- Lack of supportive and coherent policy and legislation (e.g. within and between countries)

Network objectives & activities

- Promote knowledge transfer and foster cooperation and development of human resources
 - Between partner countries
 - Between different types of organisation (research, NGO, private sector)
- 5 workshops
 - Knowledge mapping
 - Post-harvest and cold chain technology
 - Chemical and nutritional characterisation
 - Food safety standards
 - Uptake and dissemination
- Website: <http://www.fruits.soton.ac.uk/>

Network objectives & activities

- Establish national and regional research programmes related to providing safe, high quality and nutritious fruit derivatives
- Background mini-research projects
 - India: making fruit leathers from bael and aonla
 - Vietnam: better processing of cashew apple chips
 - Bangladesh: assessing jackfruit maturity
 - Cambodia: market potential of jackfruit, cashew apple and banana products
- Development of a major research proposal
 - Involving several countries and different types of organisations

Workshop objectives

1. To provide training in the latest techniques in post-harvest technology and cold chain management of indigenous fruit and their products, which help to maintain nutritional content.
2. To strengthen and extend the existing network.
3. To identify research gaps in the area of post-harvest technology and cold chain management of indigenous fruit.
4. To initiate development of research proposals in the area of post-harvest technology and cold chain management of indigenous fruit.

Thank you!



<http://www.fruits.soton.ac.uk/>