Status of Characterization of Sri Lankan Fruits

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Training workshop on Characterisation of Fresh and Processed Fruit Quality, organised by the CUC, University of Southampton and the Nong Lam University, Vietnam funded by Leverhulme Trust, UK. Dated: 23-25 July, 2012

Indigenous (or Underutilized?) Fruits: Communicating with Different Audience

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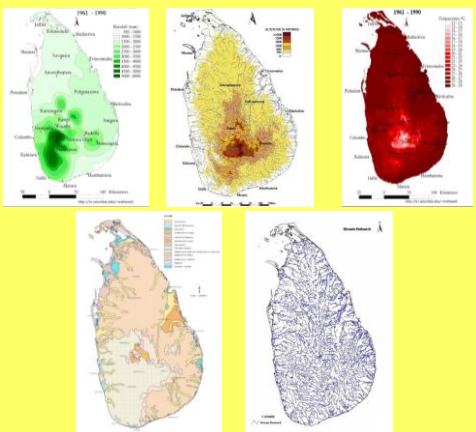
Sri Lanka

Institutes Involved

1. *Industrial Development Institute (ITI), Colombo*
2. *Institute of Postharvest Technology, Anuradhapura (Mr. Chaminda Gunawardena)*
3. *Food Research Unit, Department of Agriculture, Peradeniya (Dr. KH Sarananda)*
4. *Universities (Peradeniya, Ruhuna, Jayawardenapura, Wayamba etc), Food Science and Technology Degrees (Prof. DKNG Pushpakumara and DAN Dharmasena)*
5. *Institute of Fundamental Studies (IFS), Kandy*
6. *Sri Lanka Standards Institute (Cambodia workshop)*
7. *Private Sector Organizations (Sri Lanka Workshop)*

Sub Class	No of Orders in the world	No of Orders in Sri Lanka	%	No of Families in the world	No of Families in Sri Lanka	%
Magnoliidae	8	8	**100**	38	18	47.4
Hamamelidae	11	2	18.2	24	4	16.7
Caryophyllidae	3	3	**100**	14	12	85.7
Dilleniidae	13	10	76.9	78	34	43.6
Rosidae	18	17	94.4	112	57	50.9
Asteridae	11	10	90.9	47	30	63.8
Alismatidae	4	4	**100**	16	7	43.8
Arecidae	4	3	75	5	4	80
Commelinidae	7	6	85.7	16	8	50
Zingiberidae	2	2	**100**	8	5	62.5
Liliidae	2	2	**100**	19	10	52.6
	83	67	80.7	377	189	50.1



Sri Lanka is diverse and unique

Diversity of Fruit Trees

Over 230 species from over 57 families

High genetic variation in many species

Many are underutilized

..\..\..\CARP-ICRAF PROJECT\fruit trees data.xls

- most developing countries fall way short of minimum of 200g.

•*Sri Lanka is one country in the world whose people consumed little quantity of fruits per year .....*

•*41.8 kg/year (FAO Statistics)*

•*Actual 2.5 – 21.8 kg*

	Consumption * fruit g/day	Consumption * vege g/day	Total
Oceania (developing)	293	187	480
EU	288	341	629
N. America	286	344	630
Developed countries	209	311	521
Latin America	194	141	335
Eastern Europe	150	326	476
World	132	305	437
Developing countries	111	303	414
Asia (developing)	99	362	461
Western Africa	90	132	222
Southern Africa	89	62	152
Central Africa	40	64	105
East Africa	36	56	91

Domestication of Fruit Trees

Germplasm Collection Status by Crop Groups at PGRC

(Marambe *et al.*, 2006)

Crop Group	No of Acc.	Wild Species	Landraces/ old varieties	Breeding lines/new varieties
Cereals				
1.Rice (*Oryza*)	4,004	1	75	24
2. Maize (*Zea*)	697	1	35	64
3.Millets Sorghum etc	602	1	76	23
Food Legumes				
1.Cowpea (*Vigna*)	324	1	93	6
2. Green gram (*Vigna*)	509	1	24	75
3.Black gram (Vigna)	62	6	70	23
4.Soyabean (Glycine)	249	-	9	91
5.Ground nut (Arachis)	193	1	14	85
Vegetables				
1.Tomato (*Lycopersicon*)	230	3	30	67
2. Chilli (Capsicum)	546	18	27	55
3.Pumpkin (Cucurbita)	251	2	92	5
4.Okra (Abelmoschus)	296	3	73	24
5.Bitgourd (Momordica)	108	8	85	7
6.Onion (Allium)	26	-	4	95
Fruits				
1.Water melon (Citrullus)	36	-	70	30
2.Melon (Cucumis)	28	-	1	2
3.Banana (Musa)	200	2	92	6

Characterization of Sri Lankan Fruits
Morphological Characterization

Based on IPGRI Descriptor Lists

Characterization of Sri Lankan Fruits

1. Morphological Characterization

2. Genetic Characterization

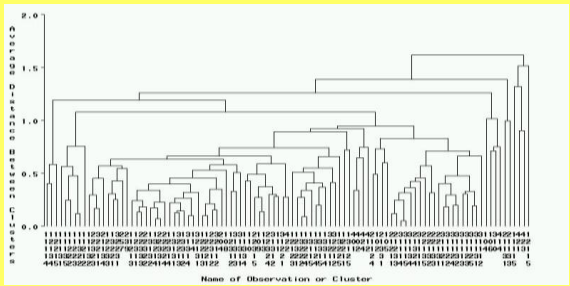
3. Chemical Characterization

Fruit Shape of *Citrus maxima*

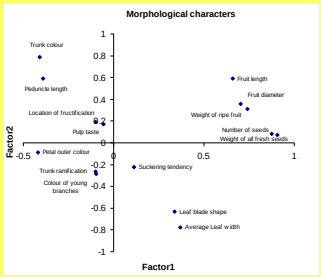
Annex 1: Identified plant descriptors and their variability observed for Nelli.

Characters	Variability
Fruit characters	
Fruit diameter (mm)	14.7-43
Fruit weight (g)	2.9-27.5
Shape of fruit cross-section	Elliptic, Circular, Irregular
Sweetness of pulp	Low, Intermediate, High
Seed size	Small, Intermediate, Large
Seed shape	Spheroid, Broadly ovate, Oblate, Conical, Ellipsoid, Oblong, Irregular
Number of seeds/fruit	1-8
Seed weight (g)	0.26-2.3
Flesh weight (g)	1.6-22
Flesh thickness (mm)	3-15
Astringency	High, Medium, Low
Brix value of flesh	8-13
Flesh/Seed ratio	0.5-0.9
Fruit yield (kg of fruit/plant)	2 – 29

Characterization of Sri Lankan Fruits
Morphological Characterization



Characterization of Sri Lankan Fruits
Morphological Characterization



Characterization of Sri Lankan Fruits
Genetic Characterization

Based on Molecular Markers

Experimental Procedure (Methodology)

Extraction of Genomic DNA

↓

Restriction digestion & Adaptor ligation

↓

Pre amplification

↓

Selective amplification

↓

Ethanol precipitation & Purification

↓

Eletrophoretic separation of Fragments

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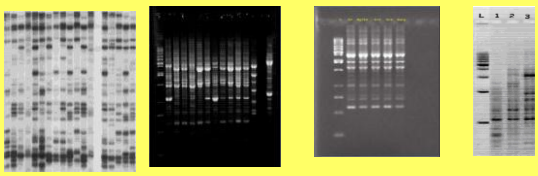
AFLP data analysis

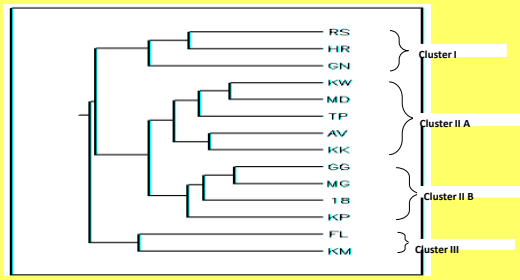
Characterization of Sri Lankan Fruits
Genetic Characterization

Based on Molecular Markers



Characterization of Sri Lankan Fruits
Genetic Characterization

Based on Molecular Markers



Characterization of Sri Lankan Fruits
Chemical Characterization

Based on Chemicals of Fresh and Processed Products

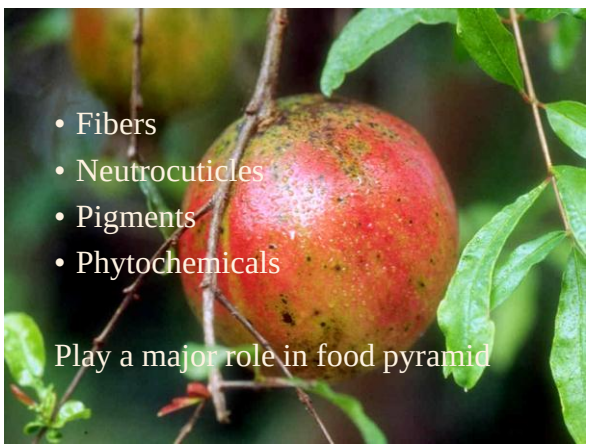
Weakly developed aspect

Know chemical composition only in some species ?
Quality of Fresh and Processed Products ???
Sensory Evaluations ???
Anti-oxidant content in some fruits ???
Some phyto-chemicals ???
Medicinal properties ???

Importance of Fruits

Source of micro nutrients (per 100g of fruit)

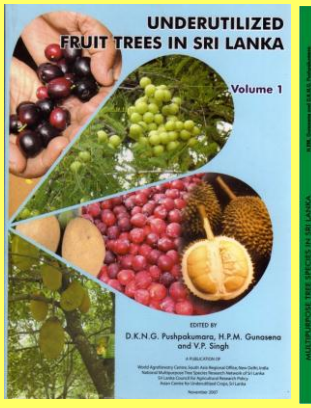
Fruit	Cal	Proteins (g)	Ca (mg)	Fe (mg)	Vit A IU	Thiamin (mg)	Vit C (mg)
Banana	116	1.0	7.0	0.5	100	0.05	10
Mango	63	0.5	10.0	0.5	600	0.03	30
Pineapple	57	0.4	20.0	0.5	100	0.08	30
Papaya	39	0.6	20	0.5	1000	0.03	50
Cashew nut	590	20	50	5	-	0.06	-
Avocado	165	1.5	10	1	200	0.07	15

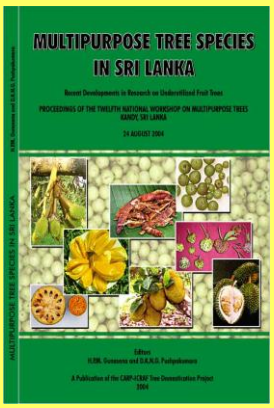


Indian Rhyme

"Eat amla a day and keep doctor at bay"

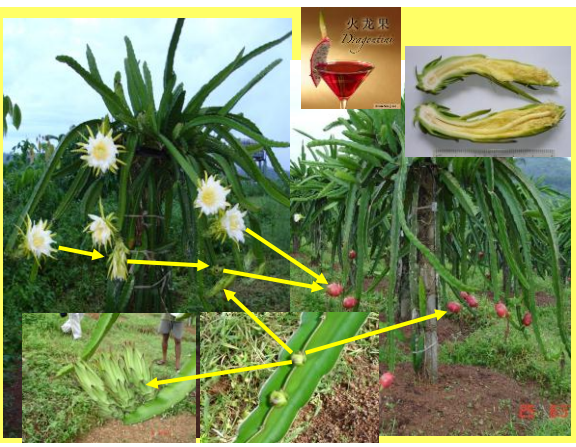
Chemical Characterization ????



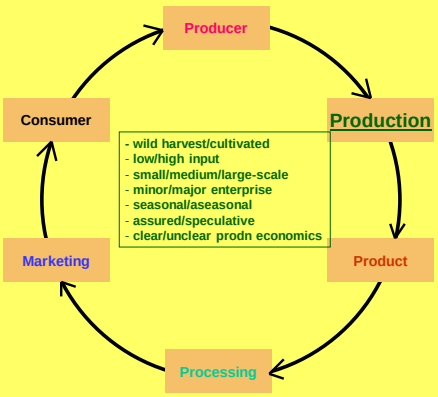


Research Gaps

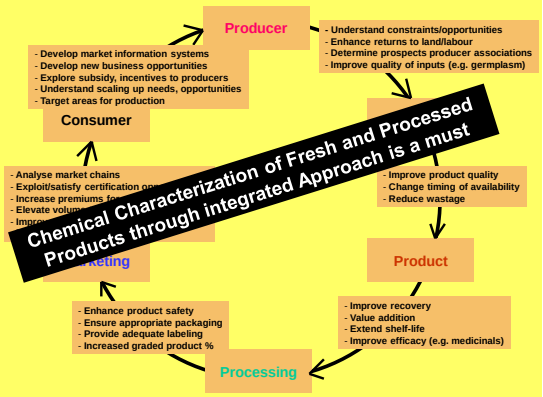
Future Prespectives



Necessary to Understand Typology of Production of Fruits



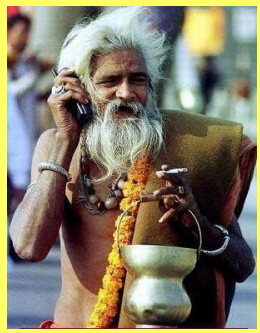
Production Cycle



Will the Indigenous Fruits make it to wider audience (market)?

ONLY WITH BETTER SCIENCE (& TECHNOLOGY), COMMUNICATION AND POLICY (INTEGRATED) APPROACH

Shri Ram Shehkar, President
INDIAN Beggars Association
(Registered)



Use of modern technology is no longer an option.

It is a necessity.

...for everybody.