

# **Market opportunities for value added products of underutilized fruits and vegetables**

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# Underutilized fruits and vegetables (UUFV)

- We define under-utilized Fruit and Vegetable as plant species that are used traditionally for our food, fibre, fodder, oil or medicinal properties.
- They have an under-exploited potential to contribute to food security, nutrition, health, income generation and environmental services

# Underutilized fruits and vegetables (UUFV)

- **Underutilized vegetables**

*Moringa oleifera* – Drumstick

*Lasia spinosa* – Kohila

*Solanum indium* – Thibbatu

*Nelumbo nucifera* – Lotus root

*Momordica charantia* – Bitter gourd

*Vigna marina* – Lima bean

*Solanum molongena* – Bringal

# Underutilized vegetables (UUV)



# Underutilized Fruit (UUF)



# Underutilized fruits and vegetables (UUFV)

## Underutilized fruits

*Artocarpus heterophyllus* – Jack fruit

*Artocarpus altilis* – Bread fruit

*Mangifera indica* – Mango (cooking)

*Spondias pinnata* – Indian hog plum

*Elaeocarpus serratus* – Ceylon olive (unripe)

*Limonia acidissima* - Wood apple

*Passiflora edulis sims* –Passion fruit

*Benincasa hispida* – Ash pumpkin

*Citrus aurantifolia* - Lime

*Sechium edule* - Chaw-chaw

*Tamarindus indica* -Tamarind

# **Underutilized fruits and vegetables (UUFV)**

- **Advantages**
  - **Taste**
  - **Nutritive components**
  - **high in fibre**
  - **Phenolic compounds antioxidants**
- **Disadvantages**
  - **seasonal availability**
  - **difficulties in harvesting**
  - **Non climacteric**
  - **Perishable**
  - **Do not last long when ripe**
  - **Difficulties in cleaning**
  - **Processing problems**

# Objectives

- **The objective of this study was to analyze the market opportunities of certain value-added products from UUFV**

# Materials & Methods

- Araliya Exporter Private Limited started producing preparations from UUFV. They succeeded as an innovative venture, focused on Asian communities abroad.
- Udadeepa Professionals for Food made an attempt to develop 10 varieties of Ready – to-serve natural fruit drinks (RTS) from local under-utilized fruits,

# Preparation of UUFV Products

- UUFV were purchased at wholesale price in season. UUFV products were jams, preserves, cream, chutney, pickles, curries, fried dishes and fresh form in brine etc. and prepared in accordance with norms of the Sri Lanka Standard Institution (SLSI).

# Preparation of RTS

- Ten UUF used :
  - Limonia acidissima* - Woodapple,
  - Flacourtia intermis* – Mauritius plum,
  - Elaeocarpus serratus* – Ceylon olive
  - Cucumis sativus* – Seeni kekiri (local name)
  - Passiflora edulis sims* – Passion fruit
  - Citrallus lanatus* – Water melon
  - Tamarindus indica* – Tamarind
  - Mangifera indica* – Mango (non-commercial, under-utilized varieties – ripe and green fruit),
  - Zingiber officinale* - Ginger (considered as a fruit in fruit industry)

# Preparation of RTS

- Heat-extraction method had been used and colour/ aroma/ flavour of fruit were extracted into sugar solution at the boiling point.
- Whole fruit, pieces or chopped was used as suitable. In case of Seeni-kekiri and Tamarind, only orange coloured mucilage and the dried fruit respectively were used.

# Preparation of RTS

- The fruits/ pieces had either been removed or let to be deposited. Extraction was filtered and hot-filled into sterilized glass bottles Sealed bottles were pasteurized in steam.
- The RTS were produced in accordance with the hygienic aspects and standards of SLSI. Chemical colours, flavours or preservatives had not been added.

# Testing, Evaluation and Marketing of RTS

- RTS were tested for physical/ chemical/ micro-biological parameters and nutritive components at Food Research Unit of the Department of Agriculture, Sri Lanka (FRU-DOA/SL). Sensory evaluation of RTS was done by trained and untrained panels at FRU-DOA/SL.

# Testing, Evaluation and Marketing of RTS

- RTS were offered to different community groups to check the acceptance and preference of the drinks by general public.
- RTS were sold under trade name “Kushya” in small food parlours, snack bars, boutiques and food stalls/ trade fairs organized by Government/ others.

# RESULTS AND DISCUSSION

- **UUFV Products**

Unit cost of almost all UUFV became approximately 1- 1.5 times costly after cleaning for processing compared with the crop available at market.

- The crops as Thibbatu and Lotus root are sold at high cost due to rareness and difficulties in harvesting. These crops also demanded more labour and accordingly the cost of the ready-for processing product and the end –product (350 gm in brine) was very high.

# RESULTS AND DISCUSSION

## RTS of UUF

- **It could be noted that colours, aroma and taste of RTS in sealed, returnable glass bottles were almost similar to natural colour, aroma and taste of the fruit used for preparation.**

# Sensory Evaluation of RTS

- Results of the sensory evaluation done by trained and untrained panels
- Trained taste panel had reacted positively towards almost all RTS tested.
- New RTS like Mauritius plum, Ceylon olive and Seeni Kekiri which had been introduced for the first time in Sri Lanka, had received high acceptance on taste. None of the panelists had felt off odour in any RTS. Overall acceptability of the drinks had been determined as very good.

# Sensory Evaluation of RTS

- Untrained taste panel members also had accepted the RTS positively, specially RTS of Mauritius plum, most probably due to attractive red colour and strong – pleasant flavour. RTS of Ceylon olive and Seeni-kekiri had received preference. RTS from Water melon was the last preference as it had very light colour and mild flavour. Panelists had accepted the RTS of Ginger as natural, therapeutic beverage.

# **Sales of UUF RTS**

- **The sales of RTS at national Food/ Trade Fairs held during the new year times of 03 year period were considered.**
- **The highest sales were on essence-based beverages.**
- **The higher sales of RTS of imported fruit pulps & RTS of external colours, flavours and chemical preservatives**
- **The UUF RTS under trade name “Kushya” was not in wide market circulation and many RTS had been just introduced and was in sale for the first time in the country. Nevertheless the sales were quite satisfactory.**

# Cost of Production and Profitability of UUF RTS

- UUF RTS which could be prepared from different UUF varied.
- Fruits with strong flavour and sourness usually gave higher quantities of RTS.
- Nevertheless cost of the produced RTS became high due to the necessity of more sugar.
- When the fresh fruit is costly in the market, fruit needed more labour and its edible portion is less, the cost of the RTS was high.

# Cost of Production and Profitability of UUF RTS

- Average profits that could be earned from the RTS are considerable. It can be noted that fruits such as Tamarind, Ginger, Mauritius plum could give higher profits.
- Though one unit created a considerable profit, due to small scale production and accordingly small scale marketing obviously did not make much money out of sales.

# CONCLUSIONS

- UUFV could successfully be used for preparation of long shelf-life processed foods of consumer acceptance.
- Final products from limited and seasonal commodities, crops which need more time/labour on harvesting and/ or cleaning for processing and FV with less edible portion were costly.

# CONCLUSIONS

- **UUF could successfully be used for production of RTS of required parameters and excellent quality. Attractive natural colours, aroma and taste of UUF could be taken into RTS and preserved for considerably long periods. This could be done without addition of artificial colours, flavours or preservatives.**
- **RTS of UUF prepared by heat extraction method to have the 2.5-6.0 percent of fruit by mass in it could contain acceptable quantities of main nutritive components of the fruit. Vitamin A could be conserved.**

# CONCLUSIONS



# Recommendations

- Awareness on UUFV should be created
- Relevant and competent people should promote UUFV
- Availability of UUFV should be increased by cultivation, collection, harvesting and transporting
- Year round product availability of UUFV should be met by processing
- Processing centers of UUFV should preferable be established in regions where crops grow to reduce costs
- Funds should be available on UUFV processing
- Government should enforce on restrictions on importation of FV.

# Thanks are due

- **ICUC**
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