



सत्यमेव जयते



एक कदम स्वच्छता की ओर

## Swachhta Pakhwada Campaign 16<sup>th</sup> – 31<sup>st</sup> October, 2018





# Waste to Wealth Technologies

**Jackfruit Waste Utilization**

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**Taste the Waste – Edible Plates from Jackfruit Waste**

**Onion Waste Utilization**

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**NewTriton – Reuse of Commercial Waste Streams**

**Millet Ice Cream Cones from Waste**

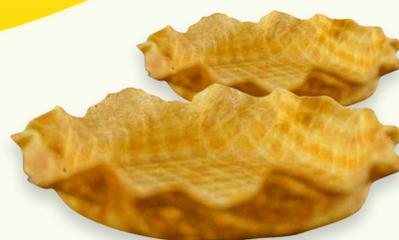
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**Value Addition of By-Products & Waste from Rice and Pulse Milling Industry**

**Mango Seed Waste Utilization**

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# Conversion of Jackfruit Waste into Products

## Production

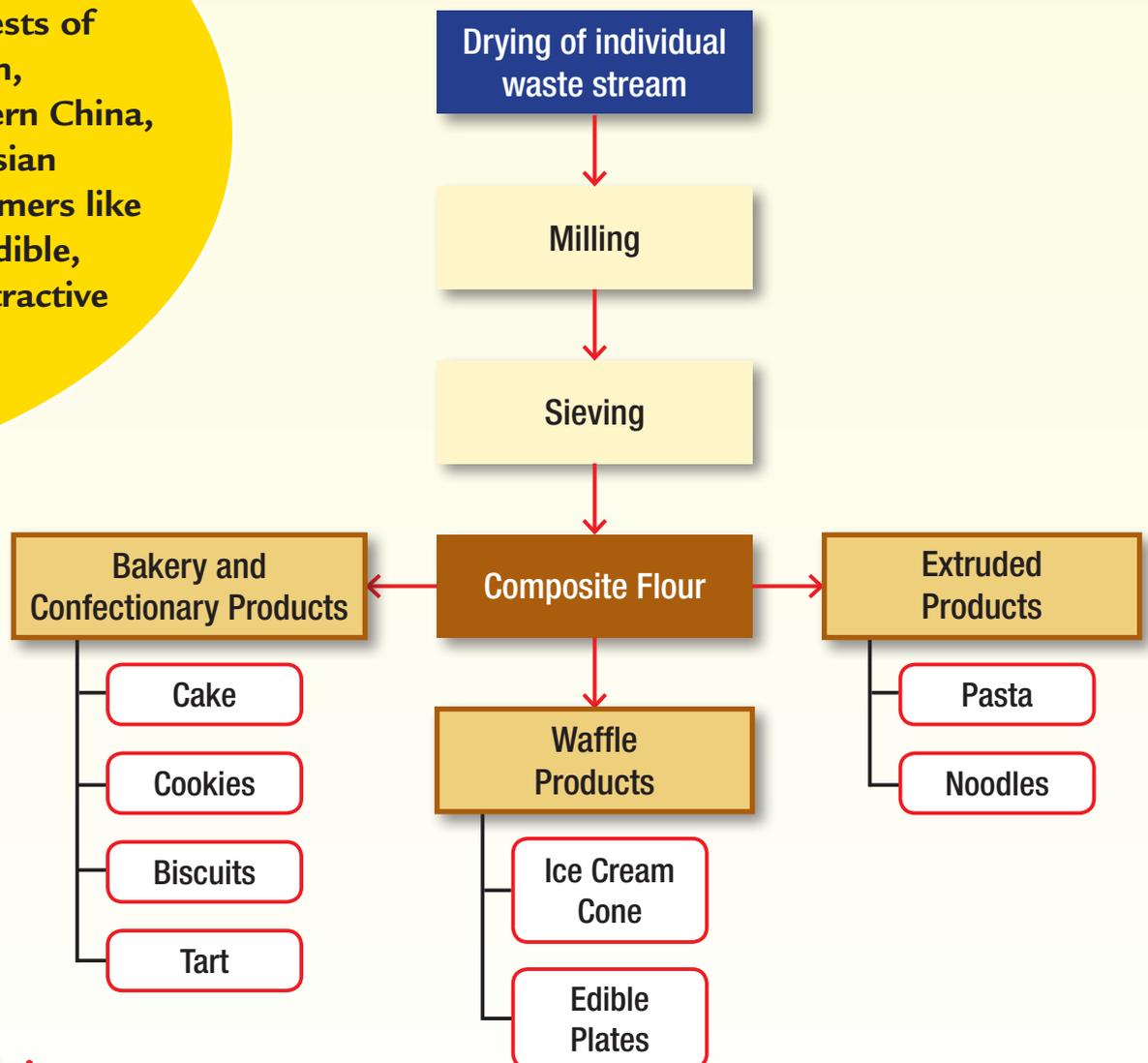
- 136 thousand tonnes in India

## Waste Generated Per Fruit

- 70% (rind, core and strand)

Jackfruit (*Artocarpus heterophyllus L.*) is a major tropical fruit grown in rainforests of India, Bangladesh, Sri Lanka, southern China, and Southeast Asian countries. Consumers like jackfruit for its edible, delicious, and attractive golden-yellow-colored ripe bulbs.

## Technology for Utilization



## Taste the Waste – Edible Plates from Jackfruit Waste



- The Jackfruit plates have good mechanical strength to hold ice cream, hot chocolate and salads
- Rich in fiber (12.93%) and protein (6.71%)
- Plates are edible
- Low cost technology
- No environmental pollution
- Additional income to farmer and processors



**Onion Peel  
Waste**

**Onion Stalk  
Waste**

**Onion Flower  
Waste**

**Onion Waste  
Powder**

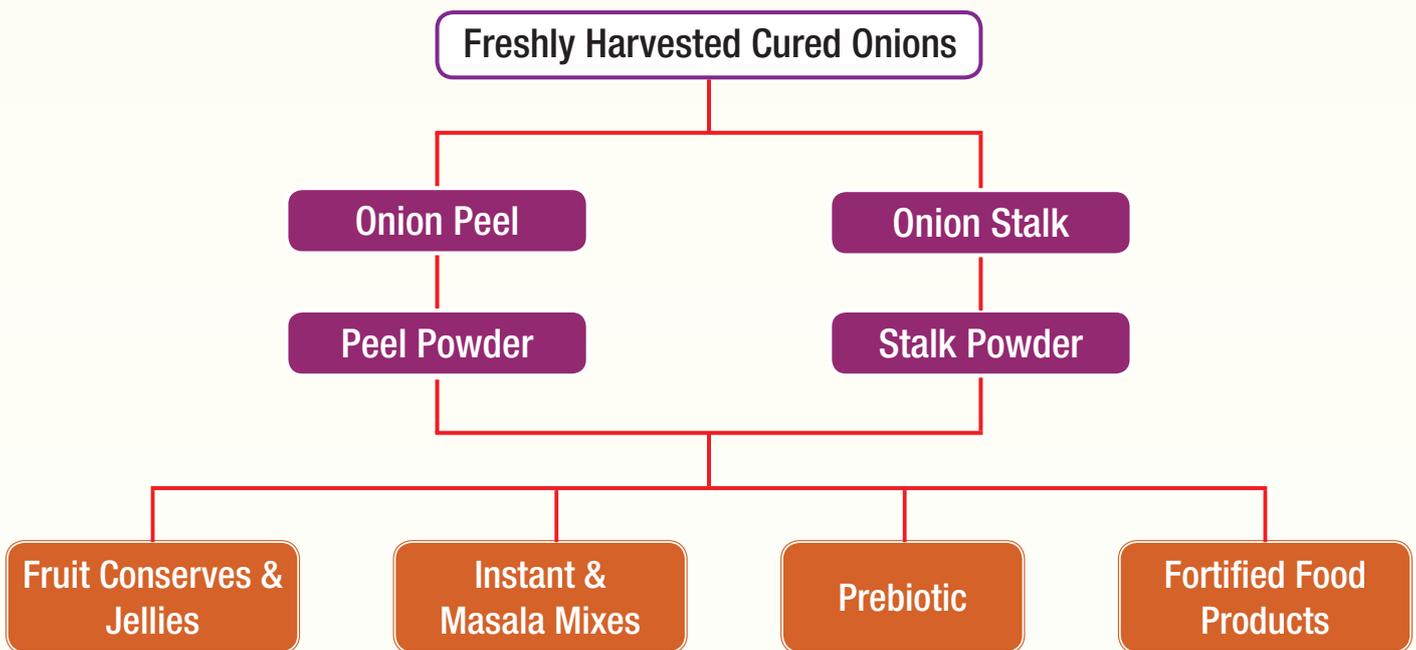


# Value Addition of Small Onion Waste

Onion (*Allium cepa* L.) is an important vegetable crop. The three leading countries in onion production are China, India and USA. The shallot is a type of small onion used in cooking in addition to being pickled. Finely sliced, deep-fried shallots are used as a condiment in Asian cuisine. As a species of *Allium*, shallots taste somewhat like a common onion, but have a milder flavor.

**1 Ton of Small Onion Generates 250 Kg Stalk (25%) and 100 Kg Peel (10%)**

## Technology for Utilization of Waste to Value Added Products



- Reduction in environmental impact of onion waste disposal by converting waste streams into useful products.
- 3 natural food additives (antioxidant, thickening agent and preservative)
- Industry ready technology for onion producers and processors by which their income can be doubled.

**Black gram milling industry waste (husk and powder)**

**Grape pomace waste**

**Potato fines and peel waste**

**Pomegranate seeds and peel waste**



**Cookies**

**Products**



**Chips**



**Twist**

## Collaborating Partners



PepsiCo International Ltd., UK



University of Nottingham, UK

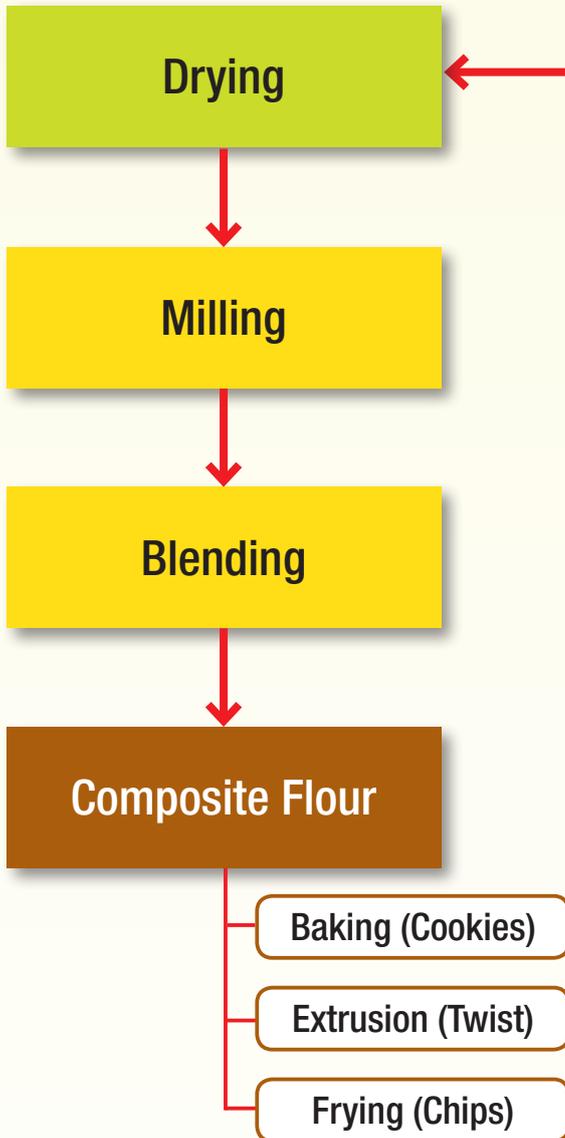


Indian Institute of Food Processing Technology, Thanjavur



Siddharth Starch Pvt. Ltd., Pune

# Commercial Waste Streams to Nutritious Products



## Potato

- 493 lakh MT in India
- 12-20% wastage (peel & fines)

## Pomegranate

- 745 MT in India
- 60-67% wastage (peel & seed)

## Grapes

- 1878 thousand MT in India
- 25% wastage (pomace)

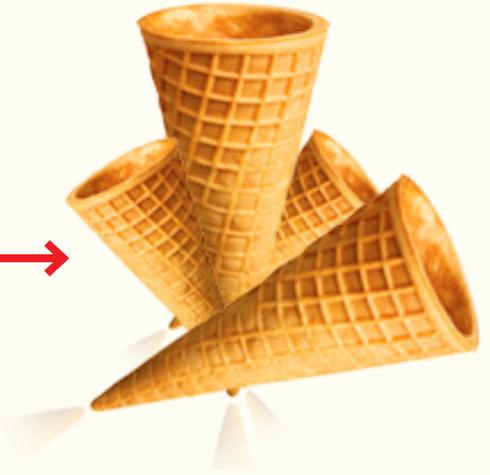
## Blackgram

- 2.8 MT in India
- 25% wastage (brokens, powder & husk)

Extraction of specific high value compounds from individual waste streams and incorporation for development of nutritious and low cost snack foods



# Millet Ice Cream Cones from Waste



**Micronutrient Enriched  
Lactose-Free  
Low Fat**

**Rich** in **Folic Acid  
Vitamin B1**

*Approximately 65 percent of the human population has a reduced ability to digest lactose after infancy making them “Lactose Intolerant”*

## Nutrition Facts

### NON-DAIRY MILLET ICE CREAM

<b>Energy</b> 182.8 kcal	<b>CHO</b> 35.7%	<b>Protein</b> 3.1%	<b>Fat</b> 9.1%	<b>Crude Fibre</b> 0.6%	<b>Ash</b> 0.9%	<b>Moisture</b> 53.3%
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Docosahexaenoic acid  
Eicosapentaenoic acid

44.8 mg



alpha-Linolenic acid 101.74 mg

## Nutrition Facts

### ICE CREAM CONE PREPARED FROM WASTE



Parameters	Quantity (%)
Carbohydrate	65.79
Protein	7.74
Fat	8.19
Fiber	12.93
Moisture	7.42



**PADDY**



**RICE BROKEN**



**RICE BRAN**



**PULSES BROKEN**



**PULSES HUSK**



**PULSES POWDER**



**PULSES**



**MUFFINS**



**BISCUITS**



**BREAD**



**PROTEIN ISOLATE**



**EXTRUDED PRODUCTS**



**RICE MILK**



**RICE LADDU**



**RICE FRYUMS**



**PULSE RICE BRAN MASALA MIX**



# Waste Utilization of Rice and Pulses Milling Industry

## Rice

### Production

- 103 MT in India

### Waste and By-products

- 20% husk
- 10-13% bran
- 1-17% brokens

## Pulses

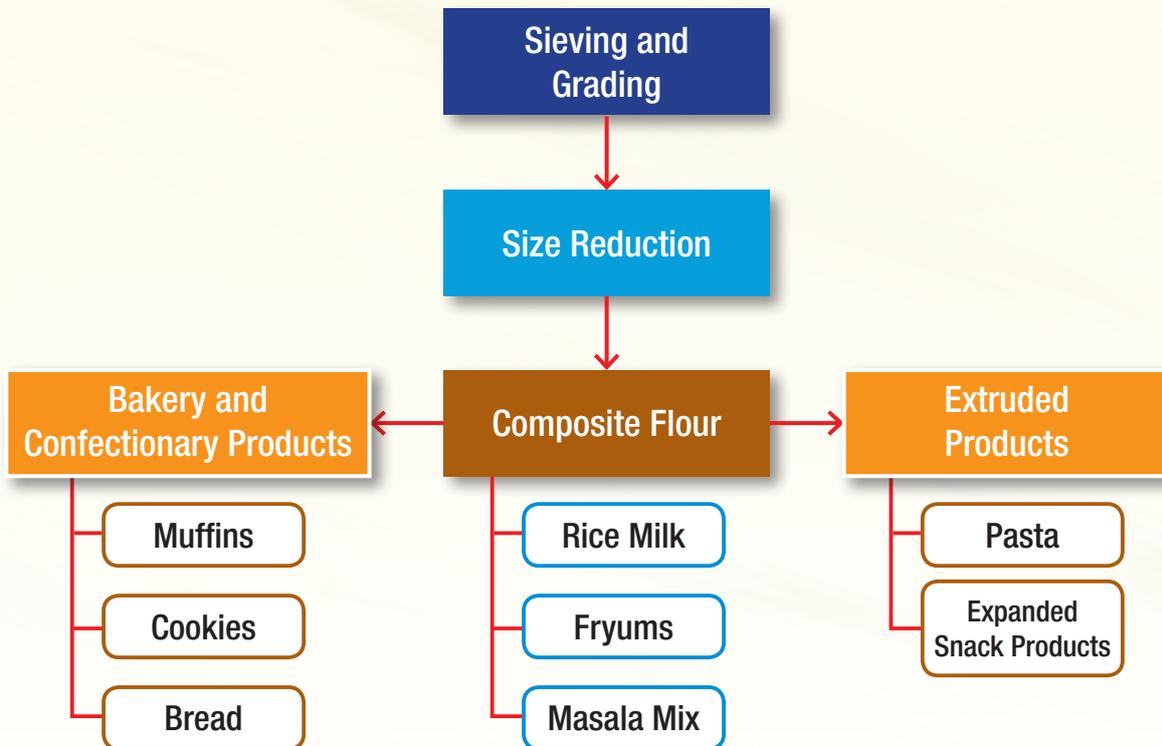
### Production

- 28 MT in India

### Waste and By-products

- 32% (husk, powder and brokens)

## Technology for Conversion



- India ranks first among world's mango producing countries accounting for about 50% of the world's mango production.
- Seed represents from 10% to 25% of the whole fruit weight.
- The kernel inside the seed represents from 45% to 75% of the seed and about 20% of the whole fruit.
- More than 1 million tonnes of mango seeds are being annually produced as wastes.
- Depending on their variety, mango seed kernels contain on a dry weight average 6.0% protein, 11% fat, 77% carbohydrate, 2.0% crude fiber and 2.0% ash.
- Mango seed kernels were shown to be a good source of polyphenols, phytosterols as campesterol,  $\beta$ -sitosterol and tocopherols.





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