Mechanized Millet Processing

Scale, Machines & Skill Requirements

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25th May 2020

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About the Know Millets Webinars

- Different aspects of millets
  - Ecology
  - Historical context
  - Sustainable food systems
  - Community centric
  - Nutrition & Socio - economics
  - Technology & Engineering

Sustainable food systems perspective

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Please note slide number for easy reference during Q&A
In this presentation

- Processing Objectives
- Scale of processing
- Machines for processing
  - Precleaning & Grading
  - Destoning
  - Dehusking & Cleaning
- Challenges
- Skill Development
- Summary
Processing Objectives

- Remove the husk
- Retain the bran
  - With minimum damage
- Using
  - Machines
  - Process
  - Facility
  - Trained people

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Scale of Processing

- **Community Scale**
  - Job shop – bring your own grains, take back the products
  - Pay for service

- **Small scale entrepreneur**
  - About 5 to 10 qts/day of input material
  - Purchase grains, process, sell the millets in different staple forms

- **Large scale / corporate**
  - Replace paddy with millets
Machines for processing

- Pre cleaning
- Grading by size
- Destoning
- Grading by density
- Dehusking
- Cleaning
  - By Size
  - By Density
Pre cleaning

- As received grains

- Principles
  - Differences
    - Density
    - Size

- Removed material
  - Coarse (larger) MOTG
    (Material other than grains)
  - Fine (smaller) MOTG
Grading

.pretty_numbers

- Pre cleaned grains

- Principles
  - Differences in
    - size and
    - density

- Bin grains
  - By Size
  - By Density
Destoning

- Graded grains
- Principles
  - Differences in density
- Removed material
  - Stones & pebbles
  - Seed grade grains
Dehusking / Hulling

- Huller ready grains
- Husk layer
  - Remove
- Bran layer
  - Retain
  - Minimize damage
Cleaning

- From Hulling machine o/p
- Remove
  - unhulled grains
  - Grits & flour
- Minimize
  - Bran loss
  - Bran damage

Nutritional content in 100 gms of dry Grain

- FOXTAIL
- LITTLE
- KODO
- PROSO
- BARNYARD
- BROWN TOP
- SORGHUM
- PEARL
- FINGER
- PADDY RICE
- WHEAT
- QUINOA

Compiler: [National Institute for Nutrition, Hyderabad and other sources for Kodo and Brown top millet]

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Challenges in Millet Processing – 1

- Variation in grain characteristics
  - Size
  - Brittleness of the husk
  - Kernel cracking force
  - Bran characteristics

- Causes
  - Variety
  - Season
  - Cultivation practices

- Steps to overcome
  - Flexibility in
    - Machines & Tools
    - Process
    - Skill Development

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Challenges in Millet Processing – 2

- Bran layer
  - retaining it
    - Simple testing
  - Minimizing damage
    - Hard to test
- Appropriate design
  - Machines & Tools
  - Process
- Skill Development

<table>
<thead>
<tr>
<th>Hulling force</th>
<th>Hulling efficiency</th>
<th>Shattering &amp; bran damage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Too high</td>
<td>↑</td>
<td>↑</td>
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<tr>
<td>Too low</td>
<td>↓</td>
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</tbody>
</table>
Challenges in Millet Processing – 3

△ Pest Management
  ✤ Nutritious for all species!
  ✤ Infestation probability maximum at processing unit

△ Appropriate design
  ✤ Processing space
  ✤ Machines & Tools
  ✤ Process

△ Skill Development

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Skill Requirements

🔹 At each stage of processing
  ✪ Observe material
  ✪ Repeat or next machine

🔹 Machine operations
  ✪ Screen selection
  ✪ Machine settings

🔹 Maintenance & Hygiene
  ✪ Facility
  ✪ Machines

🔹 Planning & people skills
  ✪ Multi machine process
  ✪ Optimization of resource use
  ✪ Community resource

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Summary

- Machines are available
- Needs some tinkering to improve performance
- Conscious Operations
- Hygiene through maintenance
- Shorter & tighter supply chain
- Informed consumers

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Thank you!

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