Harvesting and Post-Harvest Mechanization
Pakistan Overview

By
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Facts About Pakistan Agriculture

- Population: 200 million
- Area:
  - Total: 79.61 m ha
  - Cultivated: 22.05 m ha
  - Irrigated: 18.92 m ha (86%)
  - Rain-fed: 3.13 m ha (14%)

- Predominantly an arid and semi-arid country with 68 m ha (85%) where rainfall is less than 300 mm
Agriculture: Contribution to GDP

GDP Share

Contributes 19.5 percent to GDP
Agriculture: Employment Share

- Agriculture/ Forestry/ Hunting & Fishing: 15.49%
- Manufacturing/Mining: 7.31%
- Construction: 14.64%
- Wholesale and Retail Trade: 7.31%
- Transport/ Storage & Communication: 6.49%
- Electricity& Gas Distribution: 15.49%

Employs 42.27% of the country’s labour force and 60% of rural population depends upon this sector for livelihood.
Agriculture: Exports Share

- Food and Agriculture: 65%
- Petroleum Industry: 18%
- Manufacturing: 8%
- Textile Industry: 6%
- All Others: 3%

Contributes around 65% to exports of the country
## Major Crops of Pakistan

<table>
<thead>
<tr>
<th>Crop</th>
<th>Area (000 ha)</th>
<th>Production (000 tones)</th>
<th>Yield (kg/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>9,052</td>
<td>25,750</td>
<td>2,845</td>
</tr>
<tr>
<td>Cotton</td>
<td>2,489</td>
<td>10,671</td>
<td>730</td>
</tr>
<tr>
<td>Rice</td>
<td>2,724</td>
<td>6,849</td>
<td>2,514</td>
</tr>
<tr>
<td>Sugarcane</td>
<td>1,217</td>
<td>73,607</td>
<td>60,428</td>
</tr>
<tr>
<td>Crop</td>
<td>Land Preparation</td>
<td>Sowing</td>
<td>Irrigation</td>
</tr>
<tr>
<td>-------------</td>
<td>------------------</td>
<td>----------</td>
<td>------------</td>
</tr>
<tr>
<td>Wheat</td>
<td>Highly mechanized</td>
<td>Low</td>
<td>Semi-</td>
</tr>
<tr>
<td>Cotton</td>
<td>Highly mechanized</td>
<td>Semi-</td>
<td>Semi-</td>
</tr>
<tr>
<td>Rice</td>
<td>Highly</td>
<td>Nil</td>
<td>Semi-</td>
</tr>
<tr>
<td>Sugarcane</td>
<td>Highly mechanized</td>
<td>Semi-</td>
<td>Semi-</td>
</tr>
<tr>
<td>Potato</td>
<td>Highly mechanized</td>
<td>Semi-</td>
<td>Semi-</td>
</tr>
</tbody>
</table>
## Power Available for Agricultural Operations

<table>
<thead>
<tr>
<th>Power Source</th>
<th>Numbers</th>
<th>kW/Unit</th>
<th>Power Available (million kW)</th>
<th>Share of Each Source (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural Labor Force (Million)</td>
<td>27.54</td>
<td>0.075</td>
<td>2.07</td>
<td>5.82</td>
</tr>
<tr>
<td>Work Animal (Million)</td>
<td>2.42</td>
<td>0.4</td>
<td>0.97</td>
<td>2.73</td>
</tr>
<tr>
<td>Medium size Tractors – 80% of total population</td>
<td>4,56,320</td>
<td>37</td>
<td>16.88</td>
<td>47.48</td>
</tr>
<tr>
<td>Large size tractors – 20% of total population</td>
<td>1,14,080</td>
<td>51</td>
<td>5.82</td>
<td>16.37</td>
</tr>
<tr>
<td>Tube wells (Diesel, electric, others)</td>
<td>13,15,000</td>
<td>7.457</td>
<td>9.81</td>
<td>27.60</td>
</tr>
<tr>
<td>Total Power (million kW)</td>
<td></td>
<td></td>
<td>35.55</td>
<td></td>
</tr>
<tr>
<td>Total cultivated area (million ha)</td>
<td></td>
<td></td>
<td>22.01</td>
<td></td>
</tr>
<tr>
<td>Power available (kW/ha)</td>
<td></td>
<td></td>
<td>1.53</td>
<td></td>
</tr>
</tbody>
</table>
Pakistan Land Holding Statistics

- 5.35 million farms cover less than 5 acre land which is 65% of the total farming community. These subsistence farmers occupy 10.18 million acres which is 19% of the total cultivated area.

- 2.05 million farms cover 5-12.5 acre of land which is 25% of the total farming community. These subsistence farmers occupy 15.24 million acres which is 29% of the total cultivated area.

- 0.87 million farms cover more than 12.5 acre land which is 10.31% of the total farming community. These medium to large farmers occupy 27.49 million acres which is 52% of the total cultivated area.
Rice Crop Mechanization

Rice Thresher

Rice Thresher

Rice Thresher
Fruit Orchards Mechanization

Pole pruner

Fruit clipper
Vegetable Mechanization

Potato planter

Vegetable ridger

Rotary potato digger

Potato digger
Fodder Harvesting
Crop Residue Management

Wheat Straw Chopper Blower  Mobile Hay Baler
Machinery Needed for Adaptation and Demonstration

- Potato production and harvesting machinery
- Post-harvest handling and processing (fruits and vegetables)
- Fruit harvesting machinery (Apple, citrus, olives and berries)
- Cotton harvesting machinery
- Sugarcane harvesting machinery
- Pulses harvesting and processing machinery
- Alternate energy technologies for value addition
Technologies Developed/Commercialized by PARC

- Reaper-windrower
- Zero-till Drill
- Wheat Straw Chopper
- Paddy Thresher
- Fertilizer Band Placement Drill
- Mango Picking Machine
- Mobile Flat-bed Dryer
- Olive Oil Extraction Unit
- Milking Machine for Buffaloes

- Solar-cum-Gas Fired Dates Dryer
- Solar Tunnel Dates Dryer
- Mobile Seed Processing Unit
- Seeder For Combined Harvested Paddy Fields
- Onion Seed Planter
- Psyllium processing technologies
- Wood chipper shredder
Post-harvest losses in Pakistan
## Fruits Post-harvest losses in Pakistan

<table>
<thead>
<tr>
<th>Fruit</th>
<th>Postharvest Losses (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Citrus</td>
<td>14.6</td>
</tr>
<tr>
<td>Mango</td>
<td>25.2</td>
</tr>
<tr>
<td>Date</td>
<td>34.6</td>
</tr>
<tr>
<td>Guava</td>
<td>34.5</td>
</tr>
<tr>
<td>Banana</td>
<td>32.1</td>
</tr>
<tr>
<td>Apple</td>
<td>13.6</td>
</tr>
<tr>
<td>Others</td>
<td>24</td>
</tr>
</tbody>
</table>
### Crops* Post-harvest Losses at Different Stages in Pakistan

<table>
<thead>
<tr>
<th>Stage</th>
<th>Losses (%)</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harvest</td>
<td></td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Handling</td>
<td></td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>Threshing</td>
<td></td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Drying</td>
<td></td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Storage</td>
<td></td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Transport</td>
<td></td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>10</td>
<td>37</td>
</tr>
</tbody>
</table>

*Crops: Wheat, Rice, Corn
Improving crop productivity is generally not enough to pull out small farmers out of poverty. Farmers must also add value to their primary production and diversify their range of income-earning activities, both on and off the farm. Surpluses must therefore be stored temporarily, but processed into more stable products.

Processing of agricultural produce has tremendous benefits. It helps to improve postharvest handling, reduce postharvest losses, increase income and improve the livelihoods of small farmers as well as those of the agro-processors. Agricultural processing also helps to prevent products from spoilage and improve their shelf life. It helps to retain nutritive value of products and ensure availability of products all the year round.
PARC Initiatives in Post Harvest Processing/Mechanization Research
PARC Initiatives in Post Harvest Processing Research (Cont.)

- On-farm drying of Sunflower:
PARC Initiatives in Post Harvest Processing Research (Cont.)

- On-farm drying of Canola
PARC Initiatives in Post Harvest Processing Research (Cont.)

- On-farm drying of Ear-Corn:
On-farm drying of dates:

- Solar-cum-gas fired date dryer
- Solar tunnel dryer
PARC Initiatives in Post Harvest Processing Research
(Cont.)

Banana value addition:
- Banana Fig
- Banana Chips
- Banana Powder
- Banana Flour
PARC Initiatives in Post Harvest Processing Research (Cont.)

➢ In-Bin Seed Drying & Storage Technology
Issue: A considerable amount of seed of various crops is wasted during storage

➢ Design Capacity: 1.5 tons
➢ Moisture Content: from 22% to 12%
➢ Time: 2-3 days
➢ Cost of drying / ton: Rs 1,600 (US$ 14)
GoP is emphasizing on olive production in Pakistan as oilseed crop.

Due to unavailability of mechanical olive oil extraction facility, a significant amount of olive fruit is wasted.

PARC identified and imported a community based olive oil extraction unit, and indigenized it.

Its processing capacity is about 40 kg/h.

The operational cost of fresh olive fruit processing was about Rs 9.5 /kg (US$ 0.1/kg).
Pysullium processing technologies

Psyllium Thresher
Psyllium De-husker
Psyllium Seed Cleaner
Psyllium Husk Classifier
Psyllium Seed
Psyllium Husk
Tremendous potential exists in post harvest processing of agricultural produce. The key low cost technologies needed are as follows:

- Seed/grain drying, aeration and storage technologies
- Efficient and safe pulses processing technology
- Vegetable seed processing technologies
- Fruit drying and processing technology
- Modified Atmosphere (MA) technology for fruits and vegetables
- Pre-cooling technology for fruit and vegetables
- Cool stores for potatoes, citrus, and apples
- Fruit and vegetables cleaning, grading, and packing technology
Thank you for your kind attention