

# Harvesting and Post-Harvest Mechanization Pakistan Overview

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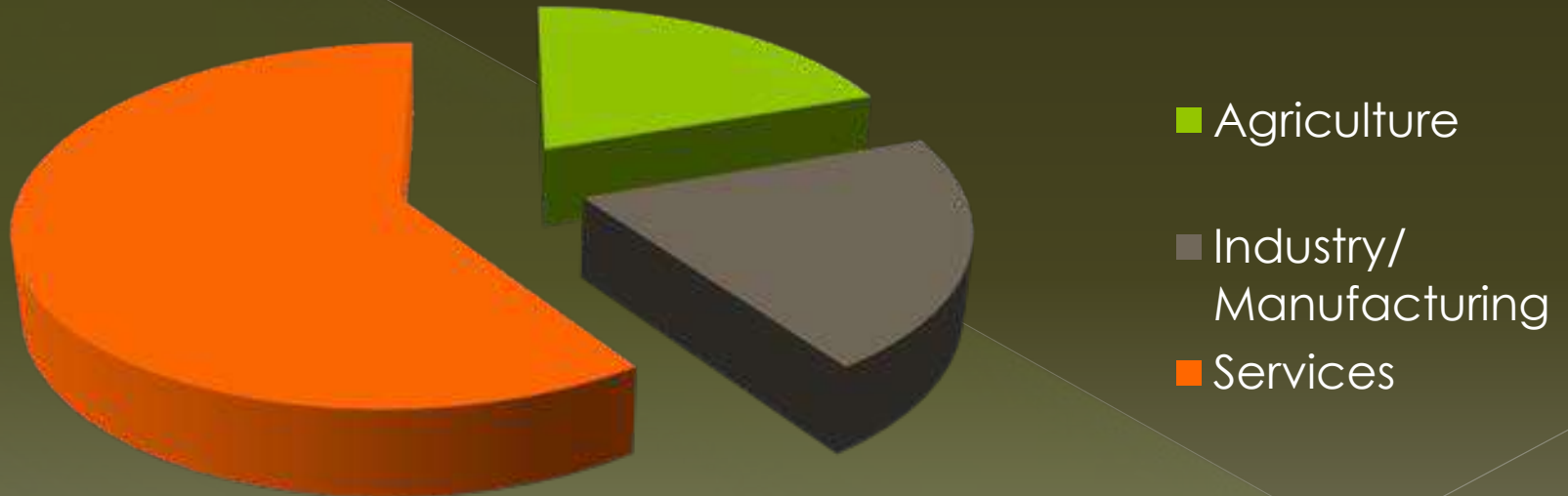
# Facts About Pakistan Agriculture

- 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



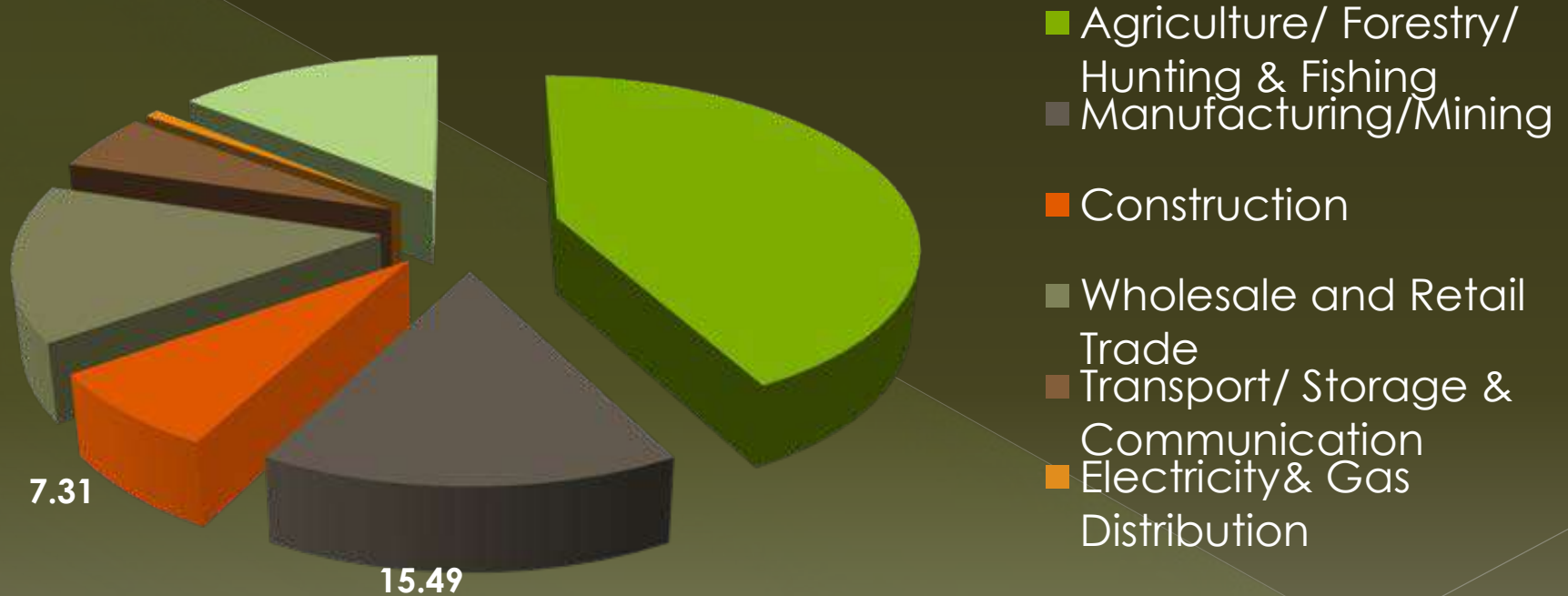
# Agriculture: Contribution to GDP

## GDP Share



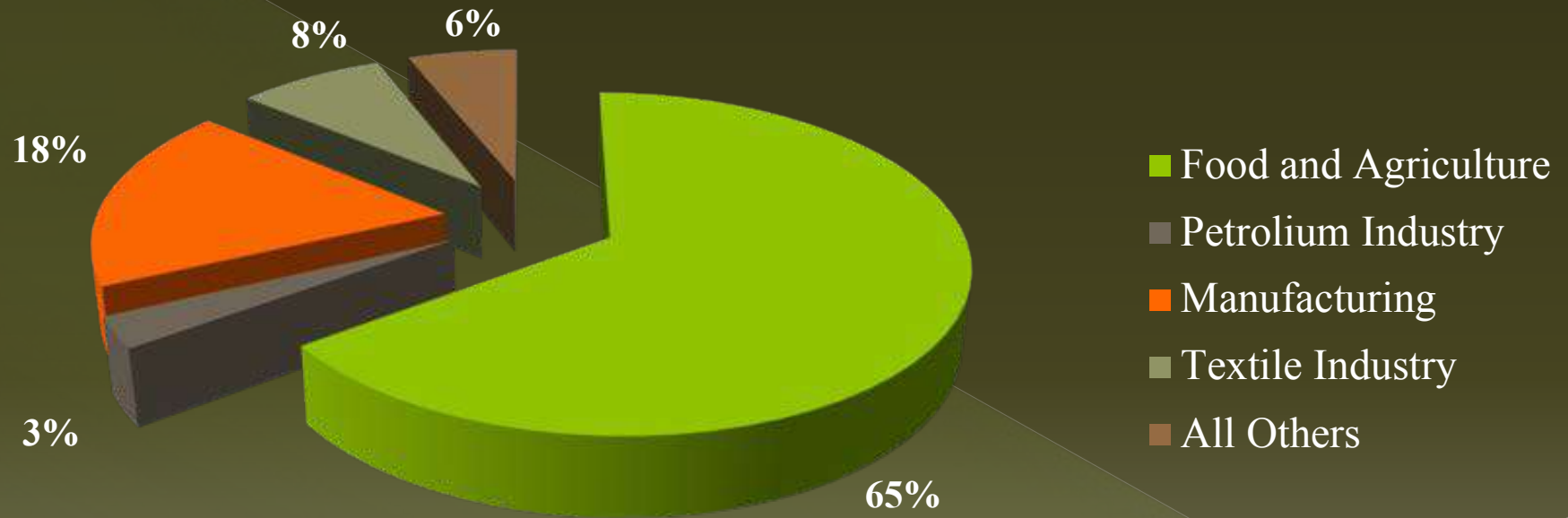
**Contributes 19.5 percent to GDP**

# Agriculture: Employment Share



**Employs 42.27% of the country's labour force and 60% of rural population depends upon this sector for livelihood**

# Agriculture: Exports Share



**Contributes around 65% to exports of the country**

# Major Crops of Pakistan

<b>Crop</b>	<b>Area ( 000 ha)</b>	<b>Production ( 000 tones)</b>	<b>Yield (kg/ha)</b>
Wheat	9,052	25,750	2,845
Cotton	2,489	10,671	730
Rice	2,724	6,849	2,514
Sugarcane	1,217	73,607	60,428

# Mechanization Extent of Crop Production Operations

Crop	Land Preparation	Sowing	Irrigation	Spraying	Inter-culture	Harvesting	Threshing
Wheat	Highly mechanized	Low mechanized	Semi-mechanized	Low mechanized	Nil	Semi-mechanized	Highly mechanized
Cotton	Highly mechanized	Semi-mechanized	Semi-mechanized	Highly mechanized	Highly mechanized	Nil	-
Rice	Highly Mechanized	Nil	Semi-mechanized	Low mechanized	-	Semi-mechanized	Semi-mechanized
Sugarcane	Highly mechanized	Simi-mechanized	Semi-mechanized	Semi-mechanized	Semi-mechanized	Nil	-
Potato	Highly mechanized	Semi-mechanized	Semi-mechanized	Highly mechanized	Highly mechanized	Semi-mechanized	-

# Power Available for Agricultural Operations

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



# 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.

# Wheat Crop Mechanization



Wheat Drill



Multi crop reaper



Wheat thresher



Combine Harvester

# 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

<b>Fruit</b>	<b>Postharvest Losses (%)</b>
Citrus	14.6
Mango	25.2
Date	34.6
Guava	34.5
Banana	32.1
Apple	13.6
Others	24

# Crops\* Post-harvest Losses at Different Stages in Pakistan

Stage	Losses (%)	
	Min.	Max.
Harvest	1	3
Handling	2	7
Threshing	2	6
Drying	1	5
Storage	2	6
Transport	2	10
Total	10	37

\*Crops: Wheat, Rice, Corn

# Role of Post-harvest Processing in Food Security

- 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

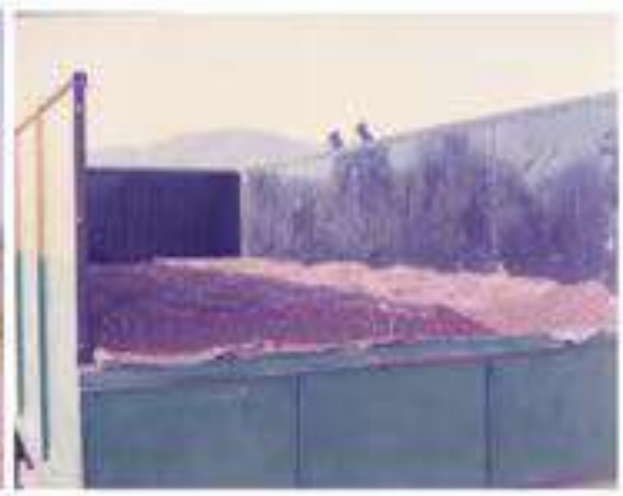
# PARC Initiatives in Post Harvest Processing Research (Cont,)

- 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:



# PARC Initiatives in Post Harvest Processing Research (Cont,)



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)

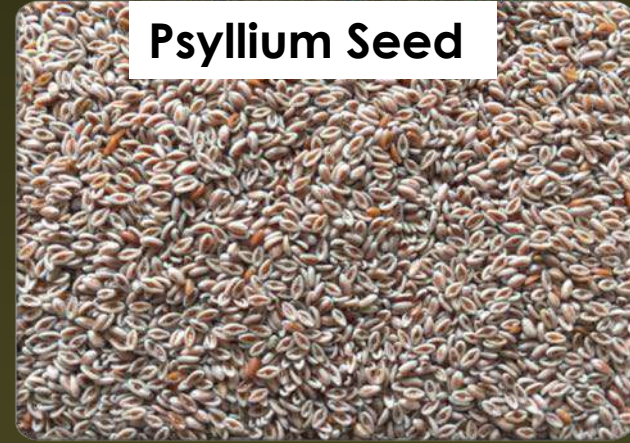
# PARC Initiatives in Post Harvest Processing Research (Cont.)

## ➤ Olive Oil Extraction Unit



- 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).

# Psyllium processing technologies



# Future Prospects of Post-Harvest Processing

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