Asian and Pacific Workshop on Whole-Process Mechanization of Potato Production

Whole Process Mechanization of Root Crop Production in the Philippines

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27-28 June 2016, Kunming, China

UNITED NATIONS ESCAP Economic and Social Commission for Asia and the Pacific

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OUTLINE OF THE PRESENTATION:

- Overview of root crop production in the Philippines
- Current status of root crop value chains
- Status of mechanization of root crop production and processing
- Need assessment of root crop production and post production (mechanizeable operations)
- Challenges and constraints in the mechanization of root crops
- Suggestions for regional cooperation in the mechanization of root crops
- Conclusion

Overview: Why root crops?

- Important complement for staple food crops; staple food in some areas
- Nutrient rich food that grows in diverse agro-climatic conditions
- Could be an important food source in the light of climate change
- Good economic potential for processed goods and for industry

Root Crop Production in the Philippines:

Table 1. Production volume and area planted of various root crops.

Year	Cassava		Sweet Potato		Potato		Yam	
	Tons	Ha	Tons	Ha	Tons	Ha	Tons	Ha
2005	1,677,564	204,784	574,629	120,638	70,160	5,497	29,256	5,890
2006	1,756,856	204, 578	566,773	118,829	69,461	5,450	30,074	5,999
2007	1,871,138	209,633	573,734	117,584	118,497	7,939	29,265	5,839
2008	1,941,575	211,657	572,655	116,465	121,311	7,994	24,185	5,212
2009	2,043,719	215,933	560,516	114,380	119,159	7,904	22,567	4,929
2010	2,101,454	217,622	541,265	109,438	124,671	8,129	21,906	4,744
2011	2,209,684	221,235	516,338	103,704	120,574	8,171	17,844	2,974
2012	2,223,182	217,259	516,907	101,087	119,570	8,096	16,429	2,688
2013	2,362,561	217,146	528,250	94,844	117,722	7,890	14,770	2,621
2014	2,540,254	216, 775	519,855	88,968	119,140	7,868	15,260	2,616

Area Planted and Harvested for White Potato in the Philippines

Table 2. Area Planted/Harvested for white potato, Geolocation and Year in hectares

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
CAR	3,502.00	3,456.00	5,900.00	5,932.00	5,824.00	6,068.50	6,115.50	6,083.00	5,892.00	5,884.90
ILOCOS REGION	..	..	..	..	..	..	..	..	..	..
CAGAYAN VALLEY	75.00	75.00	78.00	76.00	79.00	70.00	69.00	66.00	64.00	64.00
CENTRAL LUZON	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	..	..
CALABARZON	..	..	..	..	..	..	..	..	..	..
MIMAROPA	..	..	..	..	..	..	..	..	..	..
BICOL REGION	1.00	1.00	1.00	1.00	..	..	..	..	..	..
WESTERN VISAYAS	..	..	..	..	..	..	..	..	..	..
CENTRAL VISAYAS	19.00	19.00	22.00	20.40	19.30	20.80	21.00	18.00	12.50	3.00
EASTERN VISAYAS	..	..	..	..	..	..	..	..	..	..
ZAMBOANGA PENINSULA	..	..	..	..	..	..	..	..	..	..
NORTHERN MINDANAO	531.00	548.00	556.00	562.00	573.00	568.00	560.00	550.00	543.00	537.00
DAVAO REGION	1,293.00	1,280.00	1,310.00	1,322.00	1,329.00	1,329.00	1,330.00	1,303.00	1,300.00	1,300.00
SOCCSKSARGEN	75.00	70.50	71.25	79.25	78.75	72.10	74.45	74.78	78.03	78.85
CARAGA	..	..	..	..	..	..	..	..	..	..
ARMM	..	..	..	..	..	..	..	..	..	..

Note: .. Data not available
(Source: PSA)

Volume of Production in Specific Production Areas in the Philippines:

Table 3. Volume of Production for white potato, Geolocation and Year in metric tons.

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
CAR	53,069.00	52,204.54	100,752.49	103,303.09	101,060.68	107,181.98	103,135.41	102,433.67	100,758.09	102,255.24
ILOCOS REGION	..	..	..	..	..	..	..	..	..	..
CAGAYAN VALLEY	284.21	447.87	528.09	521.33	536.16	440.87	443.05	421.39	427.25	448.25
CENTRAL LUZON	2.49	2.50	2.57	2.61	2.65	2.64	2.62	2.63	..	..
CALABARZON	..	..	..	..	..	..	..	..	..	..
MIMAROPA	..	..	..	..	..	..	..	..	..	..
BICOL REGION	0.56	0.14	0.14	0.13	..	..	..	..	..	..
WESTERN VISAYAS	..	..	..	..	..	..	..	..	..	..
CENTRAL VISAYAS	52.46	62.05	58.29	56.55	51.94	55.87	57.52	54.90	33.68	7.21
EASTERN VISAYAS	..	..	..	..	..	..	..	..	..	..
ZAMBOANGA PENINSULA	..	..	..	..	..	..	..	..	..	..
NORTHERN MINDANAO	6,662.50	6,744.89	6,778.01	6,945.00	7,025.00	6,870.00	6,745.00	6,550.00	6,355.00	6,145.00
DAVAO REGION	9,476.96	9,436.48	9,811.21	9,841.47	9,859.42	9,557.85	9,601.08	9,512.70	9,511.42	9,633.77
SOCCSKSARGEN	612.00	562.25	566.36	641.31	623.50	561.97	589.05	594.55	636.20	650.55
CARAGA	..	..	..	..	..	..	..	..	..	..
ARMM	..	..	..	..	..	..	..	..	..	..

Note: .. Data not available
(Source: PSA)

Table 4. Rootcrops: Supply Utilization Accounts by Commodity, Year and Item

	SU Production	SU Imports	SU Gross Supply	UT Exports	UT Feeds and Waste	UT Processing
White Potato						
2005	70,160	10,579	80,739	0	3,508	17,540
2006	69,461	7,742	77,203	0	3,473	17,365
2007	118,497	5,257	123,754	0	5,925	29,624
2008	121,311	5,459	126,770	0	6,066	30,328
2009	119,159	1,758	120,917	0	5,958	29,790
2010	124,671	6,276	130,947	0	6,234	31,168
2011	120,574	8,176	128,750	0	6,029	30,144
2012	119,570	6,299	125,869	0	5,979	29,893
2013	117,722	4,362	122,084	0	5,886	29,431
2014	119,140	1,337	120,477	0	5,957	29,785

Current Status of Root Crops Value Chain

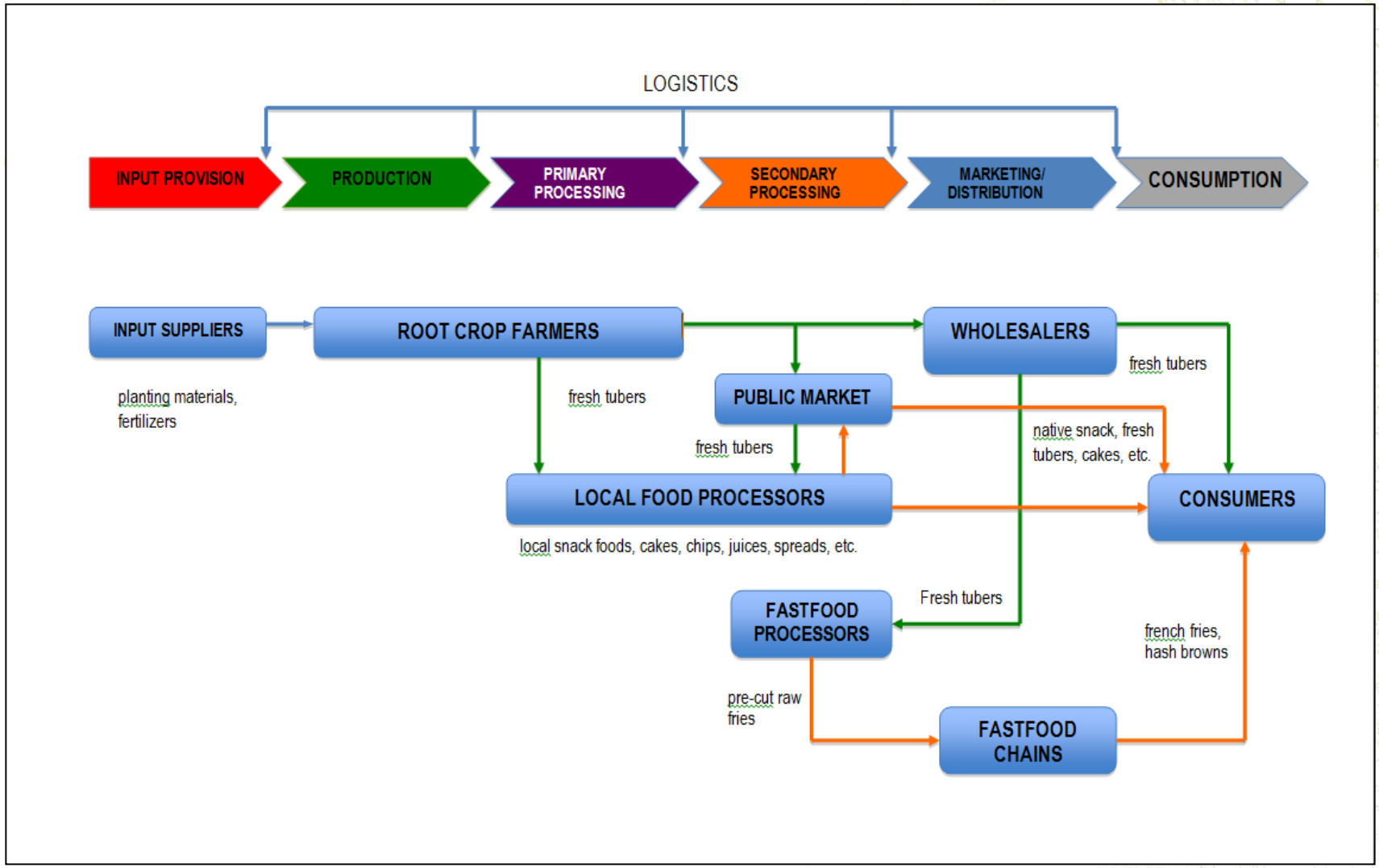


Figure 1. Typical value chain of potato, sweet potato and yams

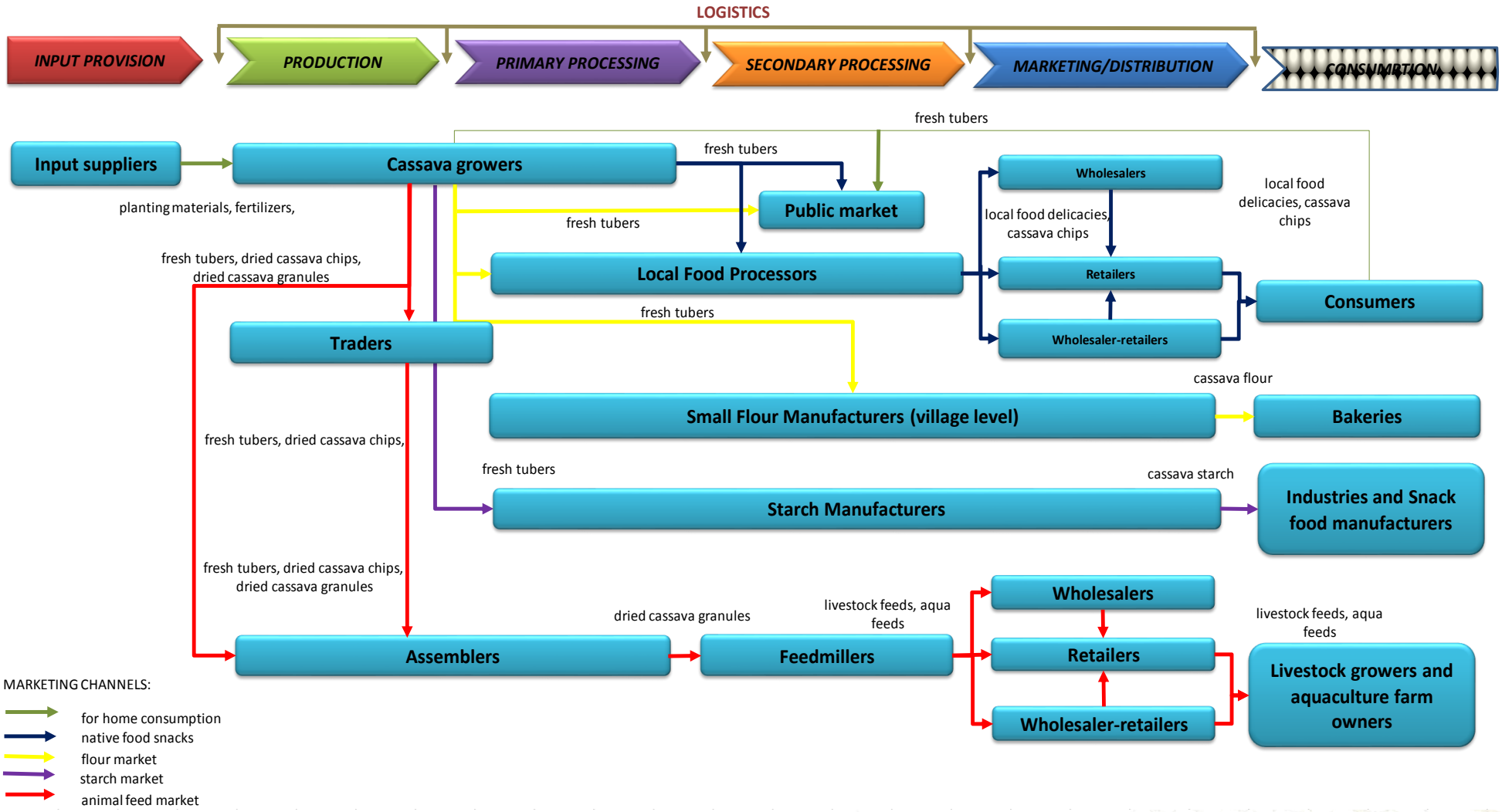


Figure 2. Cassava value chain in the country

Status of Mechanization of Production and Post Production of Root Crops

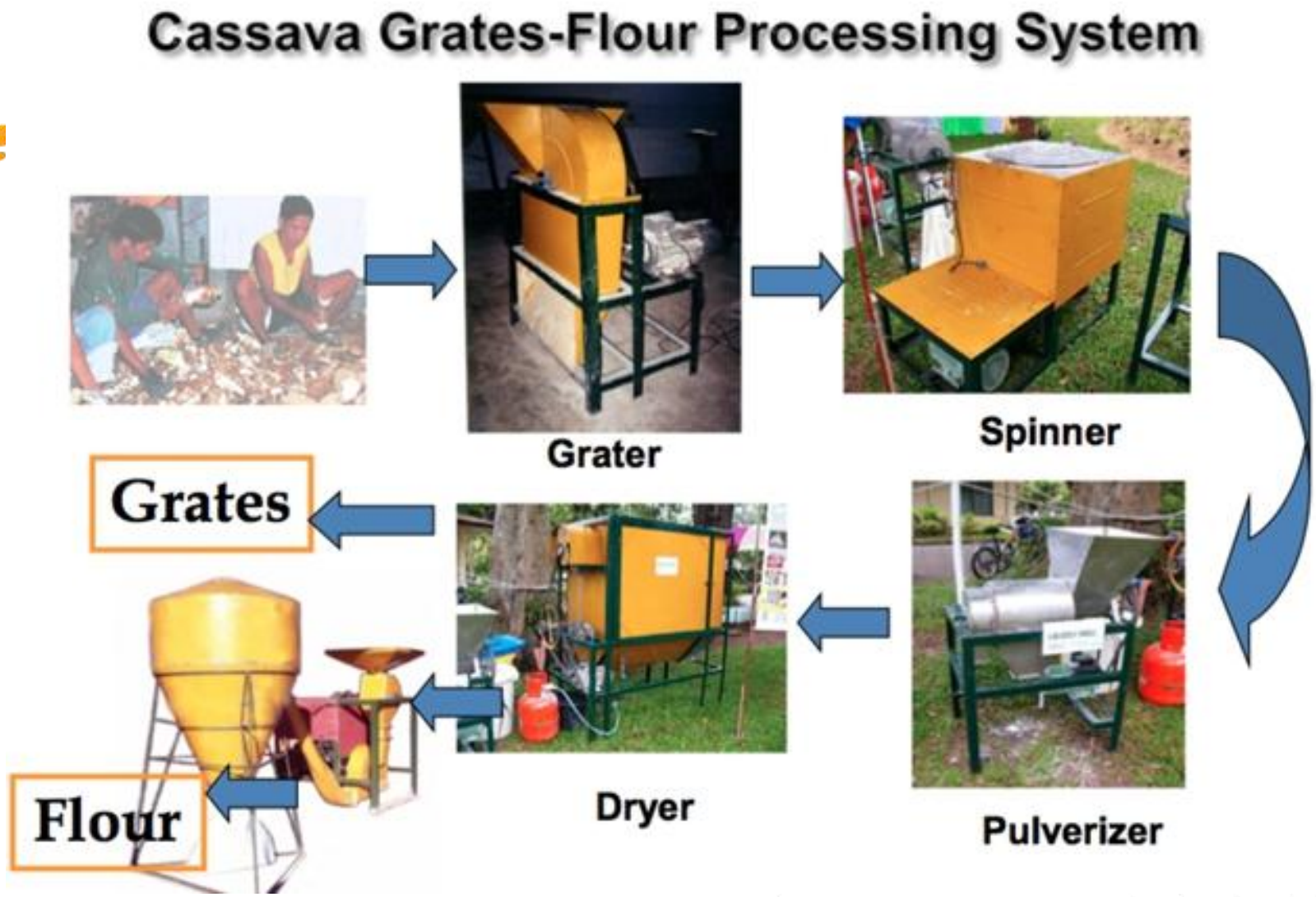
Table 2. Status of mechanization of production and post production operations of major root crops in the Philippines.

Farm Operation	Mode of Operation			
	Potato	Sweet Potato	Yams	Cassava
Land Preparation				
Plowing	Man-Animal/Manual	Man-Animal/Manual	Man-Animal/Manual	Man/Animal/Machine
Harrowing	Man-Animal/Manual	Man-Animal/Manual	Man-Animal/Manual	Man/Animal/Machine
Furrowing	Man-Animal/Manual	Man-Animal/Manual	Man-Animal/Manual	Man/Animal/Machine
Planting	Manual	Manual	Manual	Manual
Fertilizer Application	Manual (Hand tools)	Manual (Hand tools)	Manual (Hand tools)	Man-Animal/Machine
Weeding	Manual (Hand tools)	Manual (Hand tools)	Manual (Hand tools)	Manual (Herbicides)
Cultivation	Man-Animal/Manual	Man-Animal/Manual	Man-Animal/Manual	Man-Animal/Manual
Chemical Application				Manual (Sprayers)
Irrigation	Rainfed	Rainfed	Rainfed	Rainfed
Harvesting	Manual (Hand tools)	Manual (Hand tools)	Manual (Hand tools)	Manual (Hand tools)/Mechanical
Bagging/Transport	Man-Animal/Mechanical	Man-Animal/Mechanical	Man-Animal/Mechanical	Man-Animal/Mechanical
Peeling	Manual	Manual	Manual	Manual/Mechanical
Chipping		Manual/Mechanical	Manual/Mechanical	Manual/Mechanical
Drying		Sun-drying/Mechanical	Sun-drying/Mechanical	Sun-drying/Mechanical
Granulation				Manual/Mechanical
Milling		Mechanical	Mechanical	Mechanical
Logistics	Man-Animal/Mechanical	Man-Animal/Mechanical	Man-Animal/Mechanical	Man-Animal/Mechanical

Common production practices:

Commonly used mechanization technology for root crops in the country

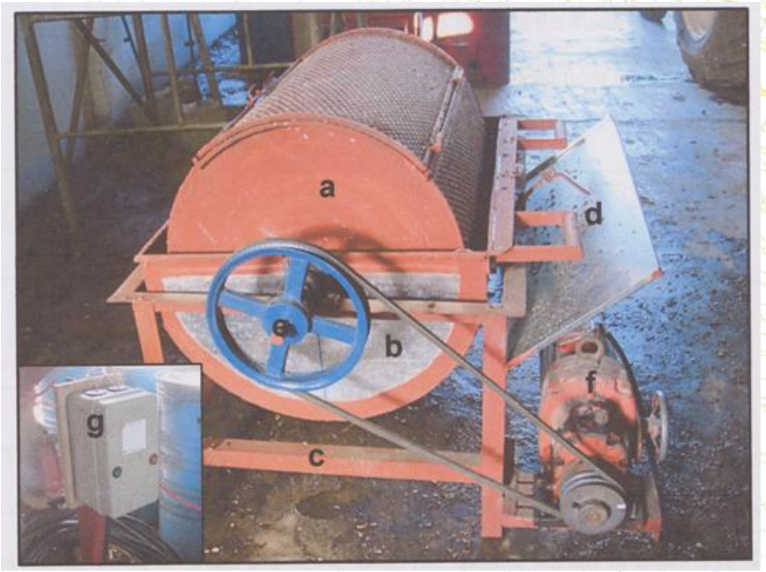
Some developed machines for root crops

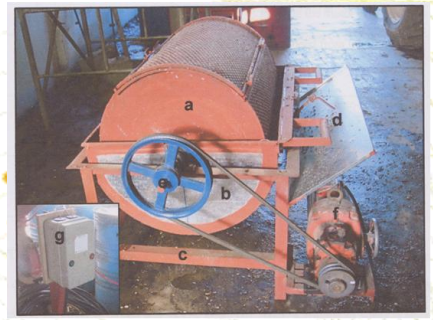


The need assessment of the mechanization of root crop production and processing:

- Fertilizer application (spreaders)
- Planting (combine with bed preparation and fertilizer applicator)
- Harvesting (topper; root cleaner)
- Packing (combine with grading and washing)
- Cassava peeling
- Dryers (for improvement)

Machines to address mechanization needs

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Challenges and constraints to the mechanization of root crop production and processing:

- Low priority among food and industrial crops in the country (low investments)
- Mostly planted in marginal and hilly areas with higher poverty incidences
- Scale of production is currently small and production areas are fragmented except for cassava
- Presence of available low cost labor in production areas

Suggestions for regional cooperation in the mechanization of roots crops:

- Workshops and dialogues
- Information sharing and research collaboration
- Mutual exchange of prototype for adaptive testing and modification
- Linking regional value chains

Conclusions:

- Current scale of production for potato, sweet potato and yams only allow mostly manual operations except for land preparation
- Abundance of labor in the production area of most root crops prevent the adoption of mechanized technology
- There are available mechanization technologies especially for cassava that has the most developed supply chain among the root crops
- Cooperation in RD&E activities is vital among CSAM member countries

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