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Mechanizing Philippine Agriculture for Food Sufficiency

presented by

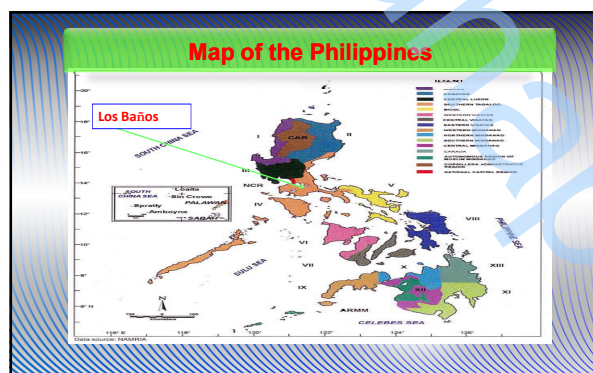

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Outline of Presentation

- Background
- Current trends in Agricultural Production
- Present Farming Conditions
- Present Situation of Agricultural Mechanization
 - Levels of Mechanization
 - Distribution of Farm Machinery
 - Machinery Manufacturing
 - Machinery Testing & Evaluation
 - Maintenance & Repair System
 - Cooperative & Financing System
 - Enacted Laws supporting Agricultural Mechanization
 - Government Efforts Towards Food Sufficiency
- Problems & Constraints of Agricultural Mechanization
- Recommendations

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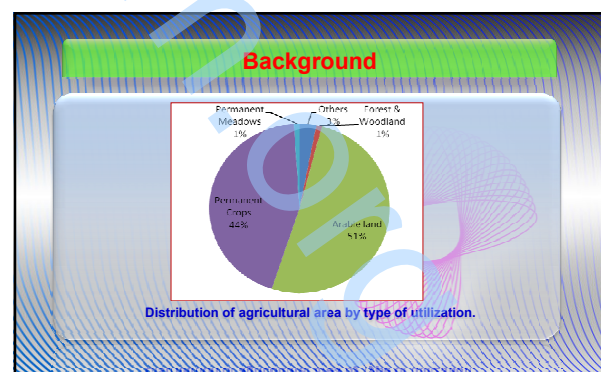
Background

Item		Data
Geographical conditions	Latitude : NL	4.7 ° N
	: SL	21.5 ° N
	Longitude: EL	117 ° E
Agricultural Conditions	: WL	127 ° E
	Total Land Area	29,817,000 ha
	Agricultural Land	9,566,000 ha
Meteorological conditions	Forest & Fields	6,000,000 ha
	Staple foods	Rice & Corn
	Temperature	Min: 26.1 ° C Max: 38.4 ° C
	Annual Precipitation	2000 mm/year

Background

Agriculture Situation

- The Philippines remains as agricultural based country
- It has abundant raw materials that can be used to produce a wide spectrum of products for food, feed, and industrial applications.
- About 32% (9.56 M has) of the land area of 29.817 million hectares is under intensive cultivation.



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Agricultural production of the Philippines, 2009.

(Year 2009) Crop	Area (Has)	Value (Million PhP)
Palay	4,532,310	238,353.57
Corn	2,683,896	76,952.29
Coconut	3,401,500	64,663.12
Sugarcane	404,034	29,906.86
Fruits	714,245	118,759.70
Rootcrops	330,373	17,068.40
Legumes	66,893	1,831.62
Vegetables	65,387	12,321.80
Fiber	135,081	2,355.04
Coffee	122,645	5,528.91
Cacao	9,538	-
Tobacco	26,104	3,057.74
Rubber	128,337	13,227.92

Background

Population

- Present population of the country is 94.01 million and with a growth rate of 2.04%.
- Projected population is 118 million by 2025
- About 86% of the population live in the rural areas.
- About 75% of those living in the rural areas depend on agriculture for employment and income.

Background

Contribution to Economy

- Together with fishery and forestry, agriculture contributes about 12% of the gross domestic product (GDP)
- This accounts for about 8% of the country's export revenues.
- The present condition of agriculture to the export market can be improved and expanded to include non-traditional products and processed products.

Background

With the new government intensified effort from the agricultural sector can reduce the dependence of the country on importing basic food products and expanding its capacity to export agricultural products.

In 2010, around PhP 185 billion FOB agricultural products were exported, which accounted to 8% of the total export.

Background

Top agricultural products exported

- coconut oil (31%)
- tuna (9%)
- banana fresh (8%)
- pineapple and products (6%)

Top agricultural products imported

- rice (22%),
- milk and cream and products (8%)
- wheat (7%)
- soybean oil/cake meal (5%)

Farming Conditions

Type I: Two pronounced seasons with maximum rain period from June to September and a dry season which lasts from three to six or seven months usually occurs from November to April or May.

Type II: No dry season with a very pronounced maximum rain period from December to February.

Type III: No pronounced maximum rain period with a short dry season lasting only from one to three months, relatively dry from November to April.

Type IV: Rainfall more or less evenly distributed throughout the year.

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Farming Conditions

Soil Conditions:

The Philippines has 15 regions with different soil characteristics which are as follows:

- Well drained High fertility soil: Region 4
- Well drained, generally acidic, high fertility volcanic soils: parts of Region 4
- Well drained, deep, low fertility soils: most of Regions 1,2,3-5, 8-15
- Poorly drained, flood prone soils: parts of regions 2-4, 6, 10-12
- Poorly drained, high to moderate fertility soils: parts of Regions 3, 5, 6, 11, 12
- Heavy textured soil with shrink-swell potential: parts of Regions 1-4, 6, 11, 12
- Droughty, low fertility sandy soils: Parts of Regions 3 and 6

Farming Conditions

Irrigation and Drainage

- 2M farms (41.1 percent of the total farms in the country) with a total area of 2.9 million hectares were supplied with water, or 30.3 % of the total farm area of the country.
- IS-660.8 thousand farms with an irrigated area of one million hectares.
- NIS administer by (NIA) - 774.7 thousand hectares.
- CIS - 581.5 thousand hectares of farm
- other systems of irrigation such as water fetching, waterwheels, etc., - 522.8 thousand farms with area of 573.6 thousand hectares

Farming Conditions

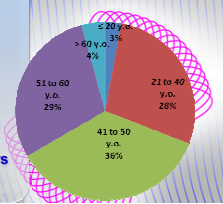
Cultivation System

- average landholding - around 2 hectares with plot sizes ranging from 500 to 10,000 sq. m
- around two cropping seasons implemented with rice as the main crop and some cash crops or leguminous crops as second crop.
- In areas where water is abundant throughout the year, three croppings are being observed

Farming Conditions

Labor

- the available labor in the farm has been decreasing over the years
- Aging farm workers- average of 57 years old.
- In CALABARZON Region, 65% of farmers has an age range of 41 years old and above



Age distribution of farmers in CALABARZON region.
Source: Amango, 2011

Present Agricultural Mechanization

Levels of Mechanization (UPLB-BAR, 2001)

- Low mechanization** which means that the operations are done with the use of non-mechanical power source such as man and animal.
- Intermediate mechanization** which means that the operations are done with the use of non-mechanical power source in combination with the use of a mechanical power source operated by man.

Present Agricultural Mechanization

Levels of Mechanization (UPLB-BAR, 2001)

- High mechanization** which means that the operations are done solely with the use of mechanical power source operated by man.
- A fourth level considered is **full mechanization**, which means that the operations are done with the use of mechanical power source with limited human intervention such as computerized machines or robots.

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Present Agricultural Mechanization

Levels of Mechanization (UPLB-BAR, 2001)

- In spite of the various advancements in mechanization technologies, the level of agricultural mechanization in the Philippines in terms of available mechanical power in the farm is still low at 1.68 hp/ha (Rodulfo & Amongo, 1994) compared to other Asian countries such as Japan, Korea and China.

Levels of Mechanization

Levels of Mechanization (UPLB-BAR, 2001)

Operation	Rice & Corn	Vegetables Legumes & Root crops	Coconut	Sugarcane	Fruits	Fiber Crops
Land Prep	Intermediate to High	Low		Intermediate to High	Low	Low
Planting/ Transplanting	Low	Low	Low	Low to Intermediate	Low	Low
Crop care cultivation	Low	Low	Low	Low to High	Low	Low
Harvesting	Low	Low	Low	Low		Low
Threshing/ dchusking/ shelling	Intermediate to High	Low (Legumes)	Low	Low		
Cleaning		Low				
Drying	Low	Low (Legumes & Rootcrops)	Low			Low
Milling/Village level processing	High	Low	Low		Low	Low

Distribution of Farm Machinery

Distribution of Farm Machinery (2010)

Farm Machinery	Number of Units
Plow	2,723,850
Harrows	1,643,325
Sprayers	1,941,050
Hand Tractor	1,526,557

Agricultural Mechanization Technologies

Land Preparation



Power Tiller



Floating Tiller



UPLB Hand Tractor



Mini Garden Tractor

Crop Establishment Machinery



Rice Transplanter

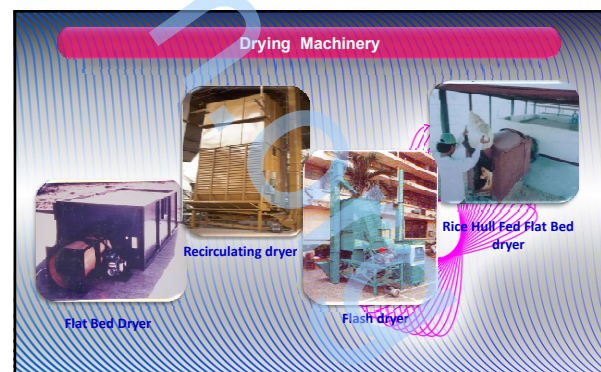
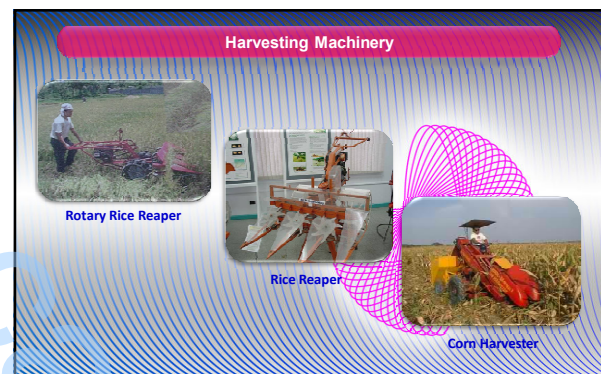
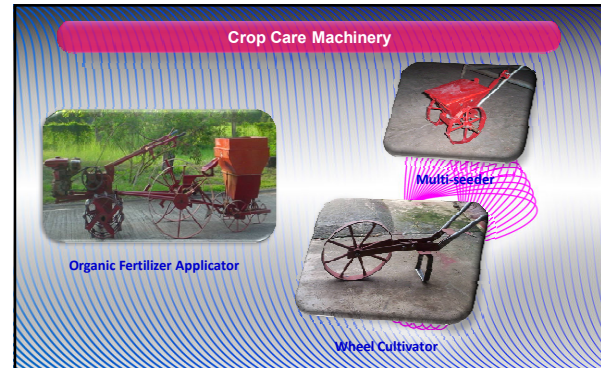


Rice Drum Seeder

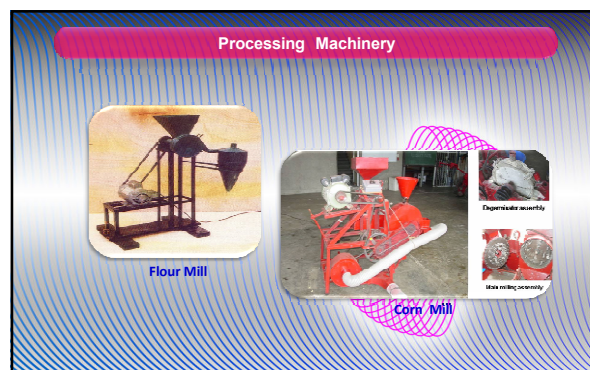


Corn Jabber

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Farm Machinery Manufacturing

• Distribution of agricultural machinery manufacturers and dealers

REGION	NUMBER	PERCENT
Luzon: I	18	5.1
II	22	6.2
III	35	9.9
NCR	113	31.9
IV	29	8.2
V	27	7.6
Visayas: VI	30	8.5
VII	2	0.6
VIII	7	1.9
Mindanao: IX	13	3.7
X	18	5.1
XI	19	5.4
XII	21	5.9
TOTAL	354	100

Farm Machinery Manufacturing

- Sales of agricultural machinery by AMMDA

MACHINE	Brand	YEAR				Total
		2006	2007	2008	2009	
Tractors						
Standard (>32 hp/ 23.87kW)	John Deere, Valtra,	195	242	182	10	629
Compact (≤ 32 hp/ 23.87kW)	Kubota, Daedong,		1	10	2	13
Combined Standard & Compact Tractors	Massey, New Holland, Same, and Eurostar	195	243	192	12	642
Two-wheel Tractors						
Pull Type	Fieldstar	1608	552	485	28	2673
Floating	Orec	314	49	44	4	411
With rotary	Kuliglig Kato		75			

Farm Machinery Manufacturing

- Sales of agricultural machinery by AMMDA

MACHINE	Brand	YEAR				Total
		2006	2007	2008	2009	
Postharvest/ Structures and Farm Processing Equipment						
Reaper		2	100			102
Rice Thresher		1020	8	45	18	1091
Corn Sheller		6	9			15
Farm Trailer				55		55
Rice Mill		71	61	207	6	345
Dryer						
Flatbed Type	Fix, Casareno, KOLBI, Kuliglig, Kaneko, ACT	7	1	5		13
BPRE Type	PADISCOR	7	1	3		11

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Farm Machinery Manufacturing

Agricultural Machinery Testing and Evaluation

The Agricultural Machinery Testing and Evaluation Center (AMTEC) was established in 1977 to ensure the standard quality of agricultural machineries being distributed in the country.



Its main job is to establish technical standards and test the machines to meet these standards.

Philippine Agricultural Engineering Standards

Standards	PAES I (2001)	PAES II (2003)	PAES III (2003)	PAES IV (2005)	PAES V (2007)	PAES VI (2009)	PAES VII (2009)	PNS/PAES VIII (2010)	Total
General					3				3
Prodn Mach	15	8	7	10	6			10	46
Post Harvest Mach	11			11	8		8	10	38
Egg Materials	6	7	7						20
Agri Structures	3	10	8						21
Meat Processing							24		24
Farm to Market Rd.						1			1
Total	35	25	22	21	17	1	32	20	153

Promotion of AMTs

- AMDP established 1979 in response to the project of UNDP ESCAP--- RNAM and now APCAEM
 - to promote TCDC for the advancement of agricultural mechanization in Asia and the Pacific.
 - serves RDE arm of CEAT which conducts policy formulation, research and extension of agricultural mechanization technologies.

AMDP – U.P. Los Baños

VISION

A progressive and globally competitive Philippine agriculture transformed by integrated research and development systems, technology transfer mechanisms and holistic policy environment responsive to the challenges of climate change and global free trade.

MISSION

Provide innovative agricultural and bio-systems engineering technology through cutting edge research, strategic extension delivery methods, synergistic networking, and responsive policy advocacies towards environment-friendly, gender sensitive and sustainable agriculture and fisheries modernization.

AMDP – U.P. Los Baños

R&D: Technology: generation
Hardware
Software
Extension:
Technology dissemination
Publication materials
Training
Policy advocacy:
Researches
Policy recommendations



Support Systems

- Maintenance and Repair System (Aftersales services)
 - Machinery dealers/ manufacturers
 - Government Institutions
- Cooperatives and Financing system
 - Cooperative Development Authority
 - Government Banks
 - Private Lenders

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Support Systems

Enacted Laws that Support the Advancement of Agricultural Mechanization

- Comprehensive Agrarian Reform Law (CARP) of 1988
- Agriculture and Fishery Modernization Act (AFMA) of 1997
- Biofuels Act of 2006
- Agricultural Mechanization Bill (Pending –Senate)

Support Systems

- recent worldwide problem on food, energy and environment has led to different scenarios
- importation of rice from other countries like Vietnam, Thailand and the United States
- Implementation of FIELDS-- F for fertilizer, I for irrigation and infrastructure, E for extension and education, L for loans and insurance, D for dryers and other post-harvest facilities, and S for seeds

Support Systems

Current Efforts of the Government in support to Food Sufficiency


Agri-Pinoy - Food Staple Sufficiency (FSS) Program
Department of Agriculture



Support Systems

Focus on

- Rice
- Corn
- Rootcrops
- Plantain



Support Systems




FSS program considers self-sufficiency to include policies that drive a wedge between the domestic and the world price of rice.

Support Systems

FSS program include

- the generation, rehabilitation, restoration, and modernization of irrigation facilities;
- promote access of farmers to quality inbred or hybrid seeds;
- promote R&D activities through Location Specific Technology Development (LSTD) and Impact Assessment and Policy Researches;



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Support Systems

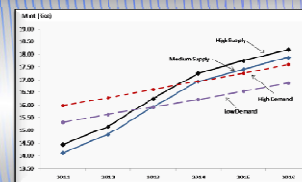
ensure timely farm operations and reduce labor cost thru on-farm mechanization (tillers, transplanters, harvester-threshers);

minimize losses in the drying and milling operations using mechanical dryers and modern rice mills

market reforms by strengthening the price support and procurement policy

strengthen its credit and insurance facilities for farmers

Support Systems



Rice supply and demand estimates, 2011-2016

Support Systems

Philippine Center for Postharvest Development and Mechanization (PhilMech)



-Takes the lead role in implementing the different plans and programs of the government in mechanizing the agricultural sector to increase yield and to attain food sufficiency.

Support Systems

PhilMech Goals:

- to enable rice farmers to increase their access and use of appropriate production and postproduction systems;
- to be able to realize added income for farmers of at least 15% from efficient production activities, drying and milling operations.

Support Systems

To achieve rice self-sufficiency:

expansion of production area and irrigated land

improvement of productivity (yield) through provisions of HYVs, fertilizer, mechanization, etc.

reduction of postharvest losses.

Support Systems

Farm Machinery	Total
Primary	
Hand Tractor	31,000
4-Wheel Tractor	500
Thresher	10,333
Secondary	
Seed Cleaner	1,800
Drum Seeder	4,000
Reaper	3,000
Combine Harvester	80
Mini Combine	80
Postharvest Facilities	
Mechanical dryers	3,253
Multi purpose drying pavements	3,577
Rice mills for farmers	329
Rice mills for private millers	125
TOTAL	58,076



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Support Systems

National Food Authority (NFA)


NFA Grains Highway to improve the postharvest situation and reduce production and postharvest losses.

Grains highway - the supply chain that links production, post harvest and marketing activities in both the major rice/corn production and consumption areas.

This include support infrastructure for the efficient delivery and timely movement of quality grains and cereals from the farmers to ultimate consumers."

Support Systems

The Philippine Grains Postproduction Consortium (PGPC)



IRRI
PHILMECH (BPPE)
NFA
PhilRice
UPLB
NAFC


Problems, Issues and Constraints in Agricultural Mechanizations

- Absence of a comprehensive national program for agricultural mechanization development.
- Inadequate coordination of agricultural mechanization R&D activities.
- Small farm sizes
- Inadequate extension program and technology transfer mechanisms
- Inadequate support services


Recommendations Mechanization Strategies

A. Implementation of Land Consolidation

- Small farm sizes (averaging 2 hectares/farmer)
- Large machines is not viable in small farms



"Before"



"After"

Recommendations Mechanization Strategies

- B. Formation of cooperatives/associations
- C. Establishment of custom machinery services for farmers' access to agricultural machinery
- C. Establishment of village-level processing plants to enhance rural enterprises and commercialization
- D. Establishment of joint-venture agreements with manufacturing companies (local and foreign) for local manufacture of critical machines

Recommendations Mechanization Strategies

- F. Exchange of prototypes
- G. Establishment of a National Agri-Fisheries Machinery Manufacturers, Distributors and Dealers Accreditation and Classification Board
- H. Establish a centralized information service for agricultural mechanization for
- I. Collaboration of research institutions involved in agricultural mechanization

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