SUSTAINABLE AGRICULTURAL MECHANIZATION IN MALAYSIA

Presented by

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PRESENTATION OUTLINE

- Introduction of Malaysia
- Malaysian Agricultural Scenario and Policy & Strategies
- Action Plan Of Mechanization And Automation In Agro Food (2013-2020)
- Constraints and challenges in Malaysian Agriculture
- How we solve the challenges through Mechanization

Introduction: Country Background

Southeastern Asia, peninsula bordering Thailand and northern one-third of the island of Borneo, bordering Indonesia, Brunei, and the South China Sea, south of Vietnam

- Consist of 13 states and 3 federal territories
- Total land mass 330,803 square kilometres (127,720 sq mi)

Introduction: Location & Climate

- Malaysia is located in South East Asia.
- Latitudes : 0^0 to 7^0 N
- Longitudes : 111^0 to 122^0 E
- Distance bet Eastern and Western regions: 322 km
- Humidity: above 80%
- Equatorial climate: uniform temperatures
- Range from 23 ^{0}C (night) to 33 ^{0}C (day) at coastal area
- Average rainfall: 2500 mm per annum, monthly rainfall distribution depending on the monsoons

Introduction: Social & Economy

- Total Population: 31 million (2016)
- Urban population: 70% (Cities & Towns)
- Rural Population : 30%
- Population involved in Industries: 28%
- Population involved in Agriculture : 16%
- Main exported goods: Electronic Equipment, Petroleum and Liquefied Natural Gas, Wood & Wood-based Products, Oil Palm, Rubber, Textiles and Chemicals
- Major agriculture commodities: Oil Palm, Natural Rubber, Timber & Rice

Malaysia Agriculture Scenario

- Total land area - 33 million ha
- Agricultural area – 7.5 million ha
- Agriculture in Malaysia is divided into two sectors namely **industrial crops** and **agrofood**.
- **Industrial crops** - Oil palm, rubber, cocoa, tobacco & pepper (86% of total agricultural land)
- **Agrofood**– Paddy, fruits, vegetables & coconut (14% of total agricultural land)

Malaysia Agriculture Scenario : Paddy

- Rice is staple diet for all Malaysian
- Top priority crop in agricultural production
- Set the self-sufficient level of rice production of not less than **75%** to meet local consumption
- Paddy is the only crop in Malaysia that received government assistance in the forms of irrigation & drainage facilities, seeds, fertilizers and other financial aids

Malaysia Agriculture Scenario : Paddy

- In Malaysia, water source for rice cultivation:

  -Rainfall – Main (52%)

  -Irrigation – additional (48%)

  - Storage dam (28%)
  - Surface runoff (20%)

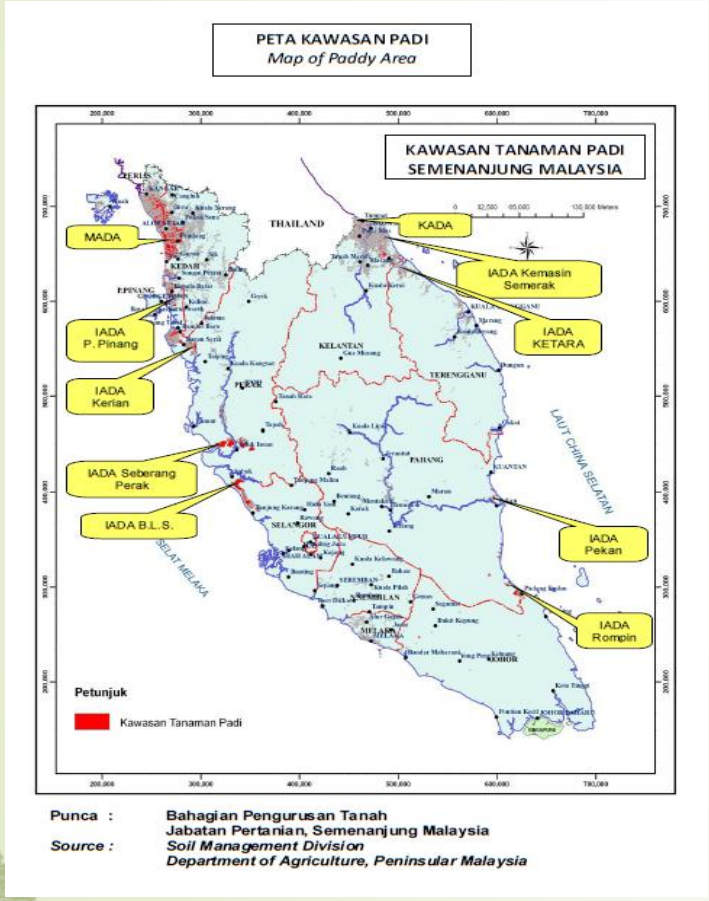
  -Ground water – less

  -Water recycling pond - less

Malaysia Agriculture Scenario : Paddy

- In Malaysia, had 2 types of condition which were **wetland paddy** and **dryland paddy**.
- ***Wetland Paddy*** *refers to paddy planted on water-logged field during it's growing stage.*
- ***Dryland Paddy*** *refers to paddy planted on dry areas whether on upland or lowland and depends purely on rainfall for it's water requirements*

Malaysia Agriculture Scenario : Paddy



- Total planted paddy area in 2015 – **681,559 ha**
- Wetland Paddy area : 619,132 ha (91%)
  - ✓ 521,425 ha of Peninsular Malaysia
  - ✓ 32,582 ha of Sabah
  - ✓ 65,125 ha of Sarawak
- Dryland Paddy area 62,427 ha (9%)
  - ✓ 6,105 ha of Sabah
  - ✓ 56,322 ha of Sarawak

*source from Department of Agricultural Malaysia, (2015)

Malaysia Agriculture Scenario : Paddy

Hectareage of Planted Area For Wetland Paddy By State, Malaysia, 2005 – 2015

*source from Department of Agricultural Malaysia, (2015)

HEKTAR/Hectares

NEGERI *State*	TAHUN *Year*										
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
JOHOR	2,885	2,405	2,639	2,154	2,561	2,918	3,022	2,934	2,960	2,976	3,010
KEDAH	210,036	210,824	211,644	211,044	213,895	213,193	215,930	213,378	210,327	212,401	215,065
KELANTAN	66,411	72,268	73,514	68,598	74,842	70,964	70,939	63,714	56,280	69,412	72,389
MELAKA	1,095	1,769	2,032	1,731	2,126	2,156	2,228	2,556	2,783	2,608	2,734
N.SEMBILAN	1,684	1,495	1,105	1,196	1,974	2,203	2,016	2,126	1,986	2,070	2,017
PAHANG	6,561	7,762	7,415	6,331	7,442	7,467	8,351	10,487	10,357	11,872	12,410
PERAK	82,085	82,286	81,027	80,724	81,188	81,489	82,150	82,142	81,636	81,503	81,714
PERLIS	49,203	51,905	52,188	52,180	52,120	51,988	52,075	52,111	52,085	52,088	52,072
P.PINANG	25,344	25,564	25,513	25,564	25,564	25,564	25,564	25,564	25,564	25,564	25,564
SELANGOR	37,180	37,473	37,135	37,221	37,258	37,472	37,460	37,835	37,833	37,842	38,114
TERENGGANU	17,004	16,538	17,277	16,547	16,687	17,196	17,851	17,759	16,994	16,045	16,336
SEM. MALAYSIA *Pen. Malaysia*	499,488	510,289	511,489	503,290	515,657	512,610	517,586	510,606	498,805	514,381	521,425
SABAH	35,298	34,689	35,976	33,979	34,594	35,363	36,621	37,976	32,660	34,953	32,582
SARAWAK	61,103	62,069	58,478	58,666	58,274	60,964	62,821	65,219	72,439	66,373	65,125
MALAYSIA	595,889	607,047	605,943	595,935	608,525	608,937	617,028	613,801	603,904	615,707	619,132

Malaysia Agriculture Scenario : Paddy

Hectareage of Planted Area For Dryland Paddy (Upland and Lowland) by State, Malaysia, 2006 – 2015

*source from Department of Agricultural Malaysia, (2015)

HEKTAR/Hectares

NEGERI *State*	TAHUN *Year*										
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
JOHOR	-	-	-	-	-	-	-	-	-	-	-
KEDAH	-	-	-	-	-	-	-	-	-	-	-
KELANTAN	-	-	-	-	-	-	-	-	-	-	-
MELAKA	-	-	-	-	-	-	-	-	-	-	-
N.SEMBILAN	-	-	-	-	-	-	-	-	-	-	-
PAHANG	-	-	-	-	-	-	-	-	-	-	-
PERAK	-	-	-	-	-	-	-	-	-	-	-
PERLIS	-	-	-	-	-	-	-	-	-	-	-
P.PINANG	-	-	-	-	-	-	-	-	-	-	-
SELANGOR	-	-	-	-	-	-	-	-	-	-	-
TERENGGANU	-	-	-	-	-	-	-	-	-	-	-
SEM. MALAYSIA *Pen. Malaysia*	-	-	-	-	-	-	-	-	-	-	-
SABAH	4,819	3,809	5,467	3,468	5,758	7,990	6,710	6,926	5,954	6,434	6,105
SARAWAK	66,058	65,178	64,701	57,199	60,645	60,957	64,202	63,818	61,821	57,098	56,322
MALAYSIA	70,877	68,987	70,168	60,667	66,403	68,947	70,912	70,744	67,775	63,532	62,427

Malaysia Agriculture Scenario : Paddy

Average Yield of Wetland Paddy By State, Malaysia, 2006 – 2015

*source from Department of Agricultural Malaysia, (2015)

KG/HA

NEGERI *State*	TAHUN *Year*									
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
JOHOR	2,386	3,494	3,773	3,772	3,847	3,798	3,954	4,527	4,321	4,030
KEDAH	3,683	4,306	4,110	4,318	3,920	4,068	4,013	4,228	4,878	4,440
KELANTAN	3,299	3,393	3,387	3,545	3,823	3,846	3,929	3,825	4,035	4,081
MELAKA	4,884	3,556	2,403	2,611	2,352	3,368	2,999	3,578	3,271	3,659
N.SEMBILAN	4,591	4,607	4,546	3,693	4,008	3,198	3,981	4,242	4,510	4,239
PAHANG	2,871	3,058	3,378	4,042	3,390	3,246	3,299	3,039	2,973	3,094
PERAK	2,843	3,197	3,472	3,832	3,617	3,937	4,483	4,411	4,330	4,201
PERLIS	3,286	3,794	4,468	4,522	4,287	4,468	4,740	4,828	5,116	4,747
P.PINANG	4,479	4,715	4,697	5,205	5,572	5,657	5,584	5,677	5,872	5,866
SELANGOR	4,718	5,034	4,767	5,439	5,612	5,908	5,989	6,280	6,403	6,305
TERENGGANU	3,608	3,603	3,837	4,170	4,359	4,358	4,364	4,228	4,895	4,856
SEM. MALAYSIA *Pen. Malaysia*	3,555	3,972	4,000	4,254	4,102	4,257	4,369	4,478	4,807	4,563
SABAH	3,659	3,427	3,703	3,402	3,636	3,193	2,992	3,139	3,503	3,387
SARAWAK	3,066	2,747	2,829	2,434	2,796	3,107	2,975	2,846	2,898	3,070
MALAYSIA	3,511	3,821	3,868	4,031	3,944	4,077	4,136	4,210	4,527	4,345

Malaysia Agriculture Scenario : Paddy

Average Yield of Dryland Paddy (Upland and Lowland) By State, Malaysia, 2006 – 2015

*source from Department of Agricultural Malaysia, (2015)

KG/HA

NEGERI *State*	TAHUN *Year*									
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
JOHOR	-	-	-	-	-	-	-	-	-	-
KEDAH	-	-	-	-	-	-	-	-	-	-
KELANTAN	-	-	-	-	-	-	-	-	-	-
MELAKA	-	-	-	-	-	-	-	-	-	-
N.SEMBILAN	-	-	-	-	-	-	-	-	-	-
PAHANG	-	-	-	-	-	-	-	-	-	-
PERAK	-	-	-	-	-	-	-	-	-	-
PERLIS	-	-	-	-	-	-	-	-	-	-
P.PINANG	-	-	-	-	-	-	-	-	-	-
SELANGOR	-	-	-	-	-	-	-	-	-	-
TERENGGANU	-	-	-	-	-	-	-	-	-	-
SEM. MALAYSIA *Pen. Malaysia*	-	-	-	-	-	-	-	-	-	-
SABAH	1,824	2,027	2,109	2,433	2,374	2,285	1,897	2,277	2,762	1,509
SARAWAK	759	758	713	723	725	740	747	770	758	752
MALAYSIA	818	857	793	871	916	886	860	902	961	826

Malaysia Agriculture Scenario: Policy

- Agricultural Policy is a set of laws and procedures established by a government to achieve specific goals.
- Malaysian government established a series of National Agricultural Policies since 1984.
- There are three agricultural policies established by the government, namely **National Agricultural Policy** 1(1984-1991), 2 (1992-2010) and 3 (1998-2010).
- The current one is the **National Agrofood Policy** (NAP) which was developed in 2010. This policy covers the period of 2011-2020.

Malaysia Agriculture Scenario: Policy

NATIONAL AGRO-FOOD POLICY (NAP) 2011-2020

- The National Agro-food Policy (NAP) was developed in 2010 and approved for implementation on 28 September, 2011.
- The focus of this policy is to improve the efficiency of agro-food industry in Malaysia in terms of driving productivity and competitiveness across the industry value chain.
- **Challenges faced by the agricultural sector** ; competition of land use with other sectors, short of labor, increase of cost production, increase of world population, climate change and the demand of better quality & affordable by the majority of people, which requires a new set of strategic and direction

Malaysia Agriculture Scenario: Policy

- Objectives of National Agro-Food Policy:
  i. To ensure adequate food supply and food safety;
  ii. To develop the agro food industry into a competitive and sustainable industry; and
  iii. To increase the income level of agricultural entrepreneurs

Malaysia Agriculture Scenario: Policy

- NAP introduced seven strategic directions as follows:
  i. Ensure national food security;
  ii. Increase the contribution of the agro-food industry to GDP;
  iii. Complete the value chain;
  iv. Strengthen human capital;
  v. Strengthen R&D activities, innovation and technology use;
  vi. Create private sector led business; and
  vii. Strengthen the service delivery system

Malaysia Agriculture Scenario: Policy

- The emphasis of the NAP is on agricultural development that focuses on production of agricultural products based on **market demand and potential**, and **consumer preferences**.
- The focus is on **15 industries** that include paddy and rice, capture fisheries, livestock, vegetables, fruits, coconut, edible birds nest, aquaculture, ornamental fish, seaweed, herbs and spices, floriculture, mushroom, agrobased food and agrotourism.
- The strategies provide **specific action plans**, programs and KPI that are monitored by the Ministry of Agriculture and Agrobased Industry.

Malaysia Agriculture Scenario: Policy

- To strengthen the **paddy and rice** industry through six strategies along its value chains;
  i. To increase productivity and rice quality
  ii. To increase efficiency mechanization and automation
  iii. Intensifying the use of by-products from rice
  iv. Strengthening rice stockpile management
  v. Restructuring the incentive and subsidy for rice
  vi. Strengthening the institutional management of paddy and rice.

Action Plan of Mechanization and Automation in Agro Food (2013-2020)

i. Establish the pathway and coordination in Mechanization and Automation

ii. Strengthen Research & Development Program/Activity

iii. Increase Ownership of Agricultural Mechanization

iv. Establish the involvement of Private Partnership/Institutional of Farmer

v. Increase Capacity in Manufacture and Distribution of Affordable Machinery

vi. Human Resource Capacity Development and Capabilities in Mechanization and Automation

vii. Control Pest & Disease

CONSTRAINTS AND CHALLENGES IN AGRICULTURAL SECTOR

Constraints and challenges of CA

- **Unavailability of suitable technology locally**

Dealers in agricultural and food machinery, for example, are reluctant to supply specialized machinery that are not commonly and widely used in this country due to the uncertainties involved and the high cost of stocking spare parts. Under such situation, it would be impossible to obtain and utilize the most economically optimum agricultural engineering technology packages.

- **Import duty on machinery and equipment is high**

Machinery parts and components that can be used for both agricultural and non-agricultural purposes tend to be categorized under non-agricultural purposes. Hence tax exemption is denied and this makes their use in agriculture costly and non-viable

Constraints and challenges of CA

- **Research and development contribution urgently needed**

Agricultural engineering technologies in general are still in middle stage. The development of sufficient research facilities and training of more skilled personnel including exposure to the latest technologies that are available overseas are urgently needed to accelerate research and development efforts in the generation of innovation technologies to solve the immediate problems besetting the agriculture sector.

Constraints and challenges of CA

- **Inadequate and poor quality agricultural land**

Due to climate change and poor infrastructures & management, Malaysia received more excessive of rainfall and sometimes become drought. The unpredictable weather conditions and short dry period has become a soft soil problems. Many hectares of paddy fields has been abandoned due to soft soil problems. Soft soils problem are growing and this situation is very worrying because it could affect the production of rice cultivation. Soft soil retarded the trafficability of machinery, especially when the process of land preparation and harvesting.

Constraints and challenges of CA

- **High and increasing cost of production**

Malaysian agriculture is operating under competitive global environment and is losing grounds due to increasing costs of production especially labour, machinery use and water control. They are related to the high costs of imported technology of agricultural machinery and irrigation equipment.

- **Competition from other sector**

The input and utilization of agricultural engineering technologies is highly capital intensive investment, requiring long term commitment in the terms of resources such as finance and full management support. In such a situation, the agricultural sector has to compete for the resources with other sectors of economy.

SOLUTION THROUGH MECHANIZATION IN AGRICULTURAL SECTOR

Solution: Utilizing ICT in Agriculture

- Using precision farming technology in paddy production
- Using VRT to apply the seed, fertilization, and pesticide needed systematically

Solution: Rice Precision Farming

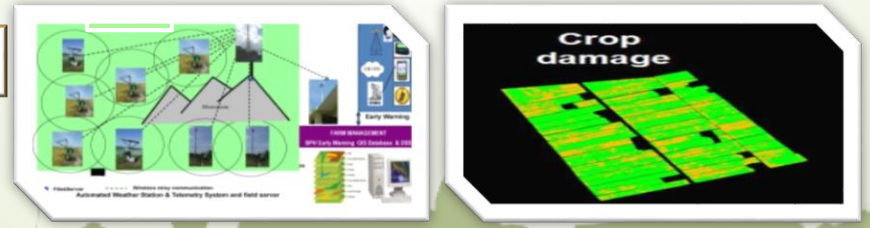
CROP ESTABLISHMENT

1 Land Levelling System & Variable Rate Seeding (VRT)

NUTRIENT MANAGEMENT

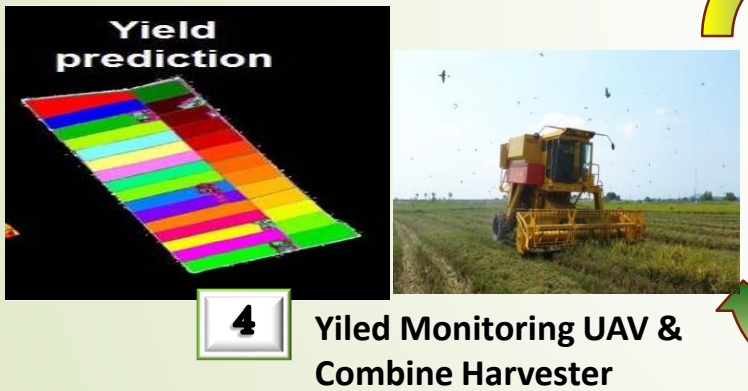
2 VRT For Fertilizer Application

CROP CARE



3 EWS – Early Warning System

YIELD MONITORING



4 Yiled Monitoring UAV & Combine Harvester

FARM MANAGEMENT SYSTEM

SMS – Amaran & Penjadualan
Web Portal – Aktiviti & Database

AGRICULTURE 4.0

Solution: Standardize the machinery according to SOP

- Establish the standard operating procedure (SOP) for every post-harvest handling operation
- Standardize the equipment and machinery according to the SOP

Solution: Controlled Agricultural

- Develop a controlled agricultural environment system

Solution: Suitable Machinery

- Development of 4 half-track tractors

➡ **Advantage: can be operated well in soft soil**

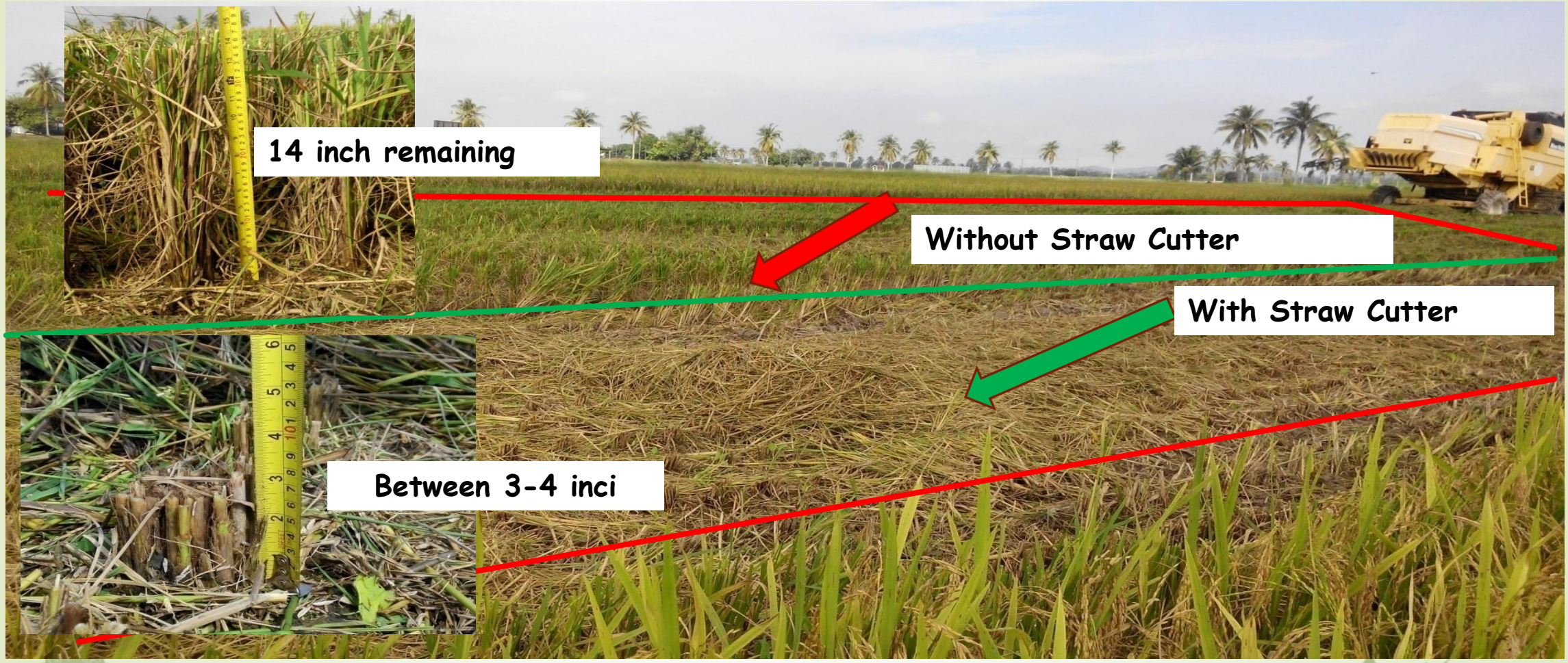
Solution: Suitable Machinery

- Development of 4 half-track combine harvester

➡ **Advantages: adapted well in soft soil**

Solution: Straw Cutter Mounted on Combine Harvester

Result of testing



Comparison of harvesting without and with straw cutter attachment

Conclusion

- The use of mechanization and automation should be intensified to reduce production costs, increase agricultural production, reduce post harvest losses, reduce import of agricultural products to meet current needs and ensure national food sovereignty.
- Malaysia looks forward to collaborating with agencies, private organizations local & international to increase knowledge exchange on Mechanization and Automation in Agriculture.

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THANK YOU