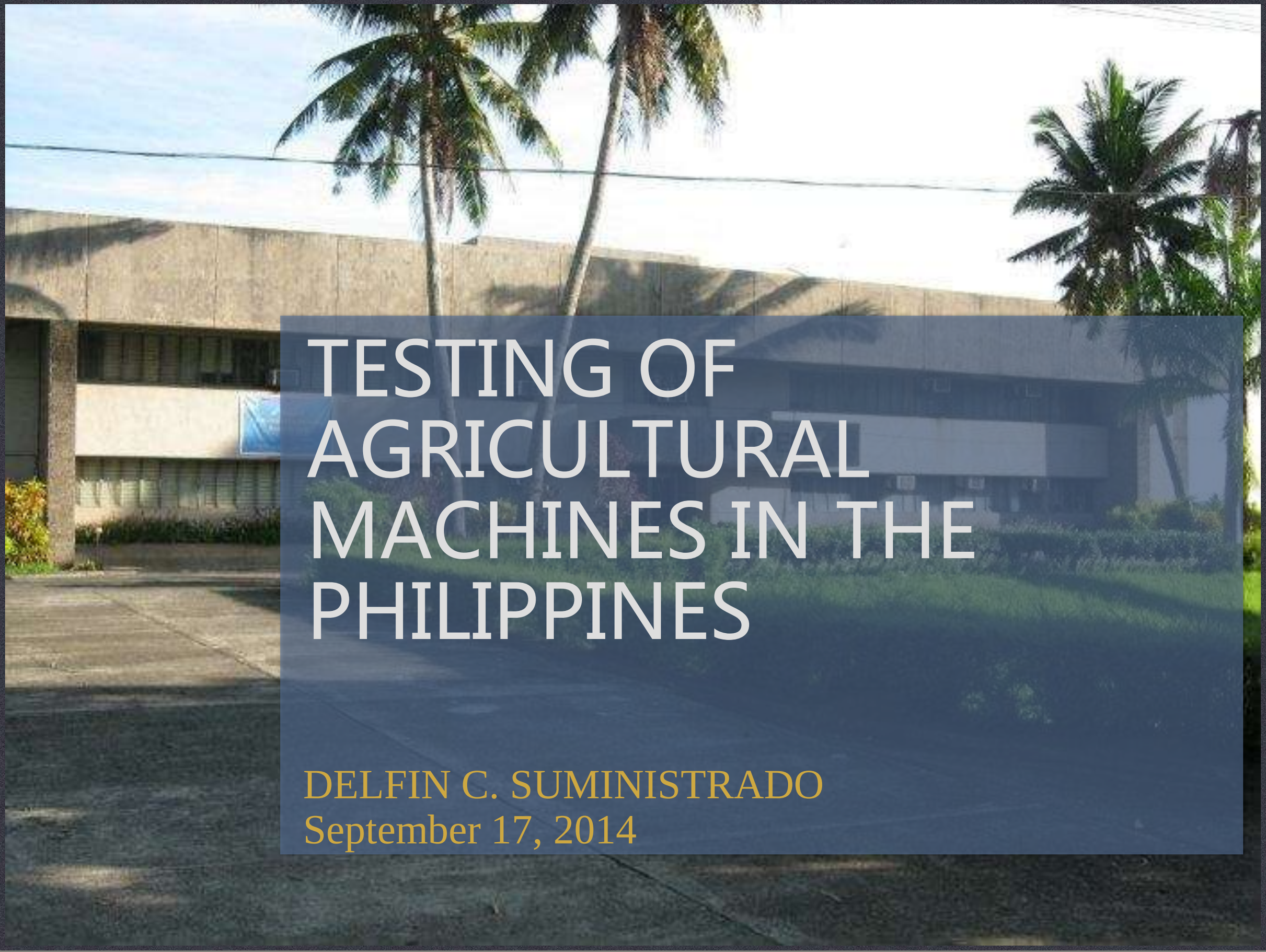


TESTING OF AGRICULTURAL MACHINES IN THE PHILIPPINES

DELFIN C. SUMINISTRADO

September 17, 2014

The Philippines

Land area: 30 million hectares

Agricultural: 9.7 million hectares

Crops :

Rice, Corn, Coconut,

Sugar Cane, Banana,

Pineapple, Cassava, Rubber,

Mango, Vegetables

Average landholding: less than 2 ha/farmer

Total irrigable area : 3.126 million ha

Climate: March to May, dry, hot season

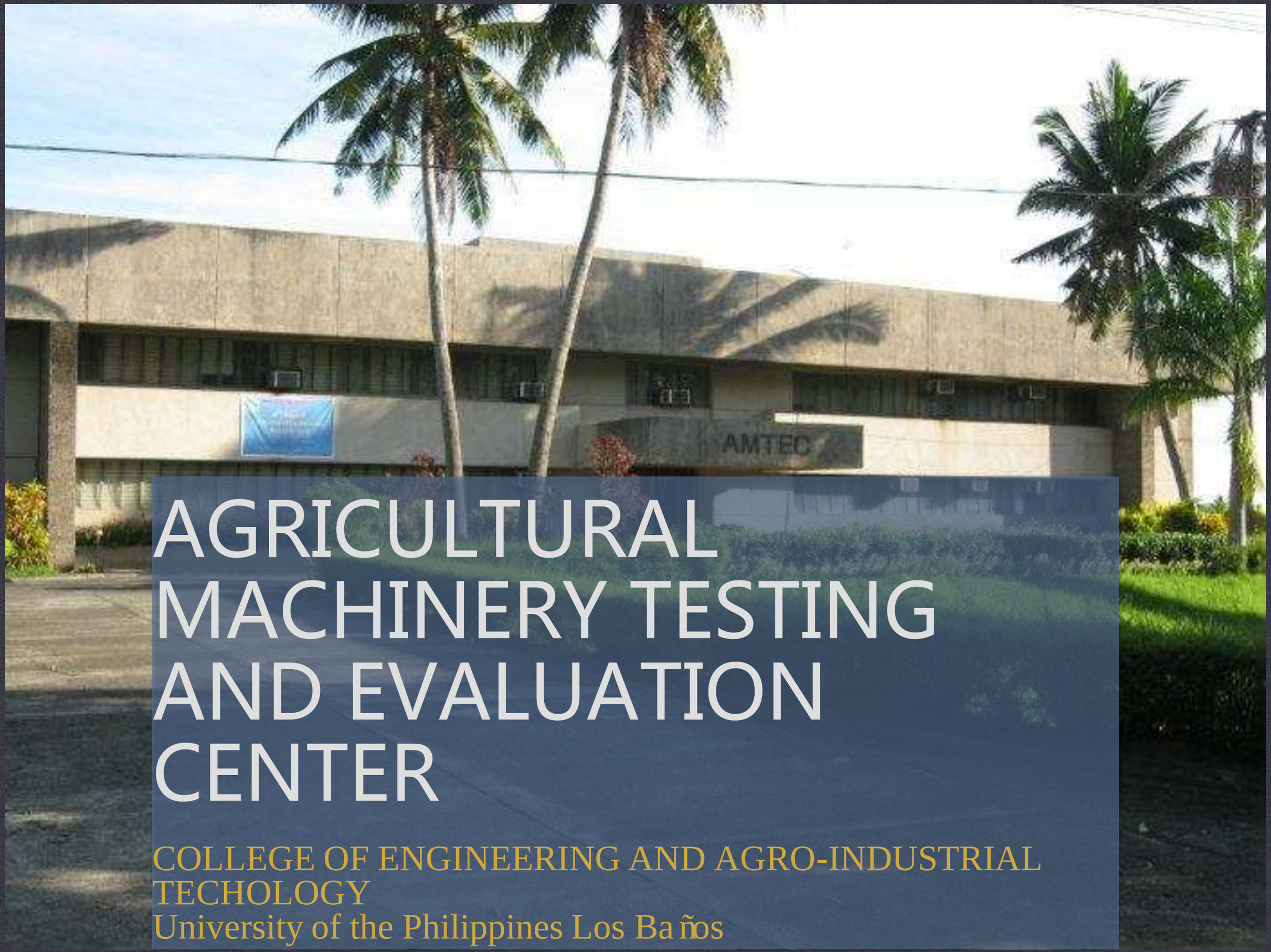
June to October, wet season

November to February, cool and

fair weather

Mechanization of various crops

Operation	Rice/Corn	Vegetable, legumes & rootcrops	Coconut/Fruits /Fiber crops	Sugarcane
Land preparation	Intermediate to high	Low		Intermediate to high
Planting/ transplanting	Low	Low	Low	Low to intermediate
Crop care/cultivation	Low	Low	Low	Low to high
Harvesting	Low	Low	Low	Low
Threshing/ shelling	Intermediate to high	Low (legumes)		
Cleaning		Low		
Drying	Low	Low (legumes)	Low	
Milling/ village leve processing	High	Low	Low	



AGRICULTURAL MACHINERY TESTING AND EVALUATION CENTER

COLLEGE OF ENGINEERING AND AGRO-INDUSTRIAL TECHOLOGY
University of the Philippines Los Baños

BACKGROUND

- AMTEC was created in response to the need for an official testing agency for agricultural machinery to guide stakeholders in determining suitability of agricultural machinery under Philippine conditions.

- AMTEC was established in **1977** through a Memorandum of Agreement (MOA) between the Department of Agriculture (DA) and University of the Philippines at Los Baños (UPLB).

- AMTEC is administered by UPLB through the College of Engineering and Agro-Industrial Technology (CEAT).

"The AMTEC shall be the
testing and evaluation arm of the DA.
All agriculture and fisheries machinery to be
acquired under the various programs
and projects of the DA
shall pass through testing by the AMTEC"

–Administrative Order No. 11, Series of 2001 of the DA

AFMech Law 2013 (RA 10601)

- Article 5, Section 18 of the AFMech Law stipulates that ‘Agricultural and fisheries machinery and equipment to be sold in the market shall pass through testing and evaluation by AMTEC…’

MANDATES

PRIMARY

- **To establish standard specifications, test procedures and performance indices for agricultural machinery.**
- **To conduct testing and evaluation of agricultural machinery under established standards.**

MANDATES

SECONDARY

- **To assess after-sales service capabilities of firms engaged in sales of agricultural machinery.**
- **To publish and disseminate standards and test results.**
- **To train students, technicians, engineers on standards development and testing of agricultural machinery.**

OBJECTIVES OF TESTING

- To establish performance characteristics of agricultural and fishery machines
- To establish the general status and trend of the performance of the agricultural and fishery machines

METHODOLOGY OF TESTING

AMTEC conducts tests based on the PAES

Philippine Agricultural Engineering Standards

- Adopted by Board of Agricultural Engineering of PRC
- Adopted by DA

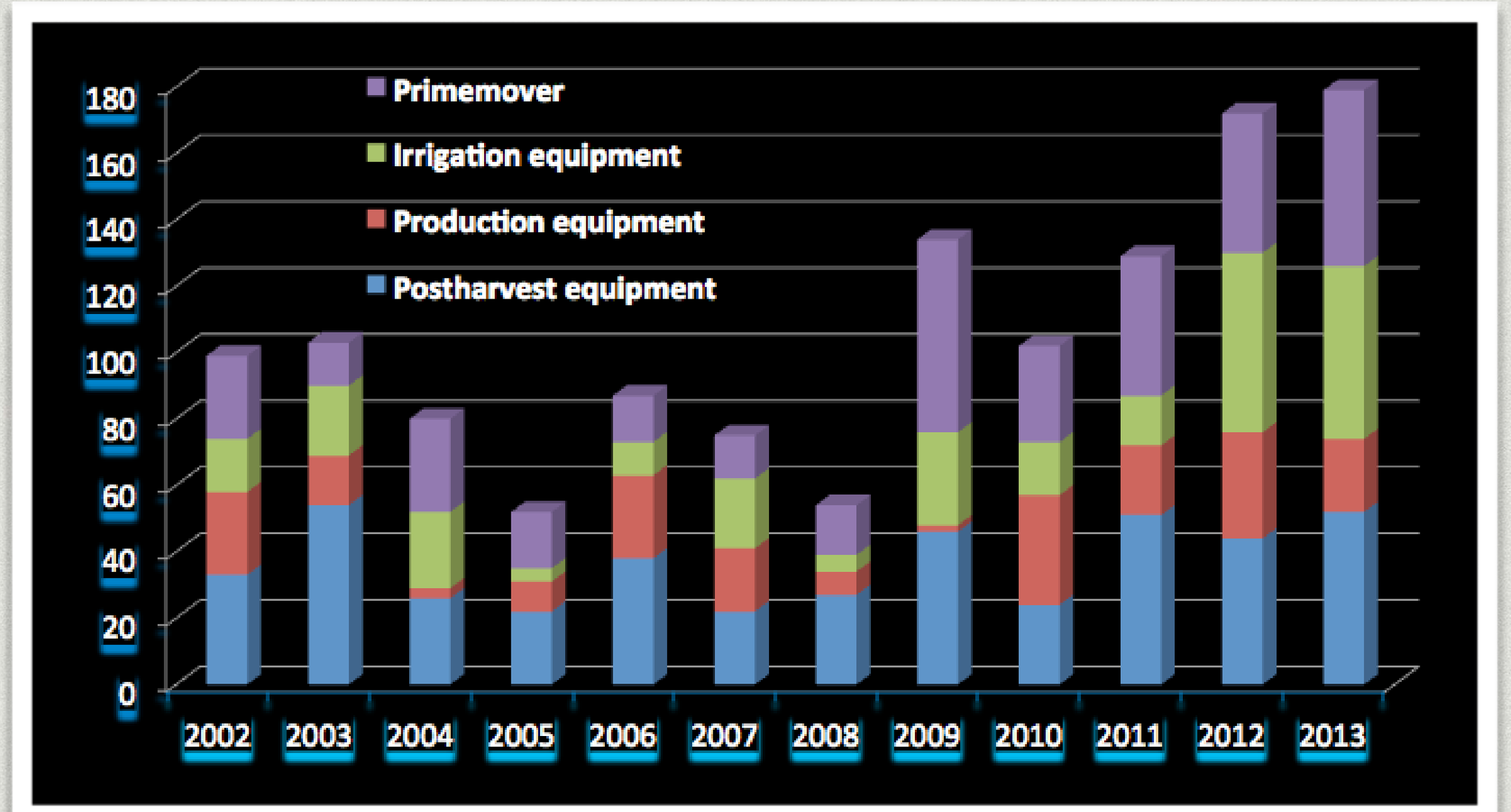
PAES

Classification	
General	3
Production machinery	68
Postharvest machinery	60
Engineering materials	68
Agricultural structures	24
Slaughterhouse equipment	12
Total	209

MACHINES TESTED

MACHINES	MACHINES TESTED (July 1977- October 2013)
Prime Movers	820
Irrigation Equipment	543
Production Machinery	297
Postharvest Equipment	673
Grain Moisture Testers	15
Electric Generator Set	2
TOTAL	2350

MACHINES TESTED

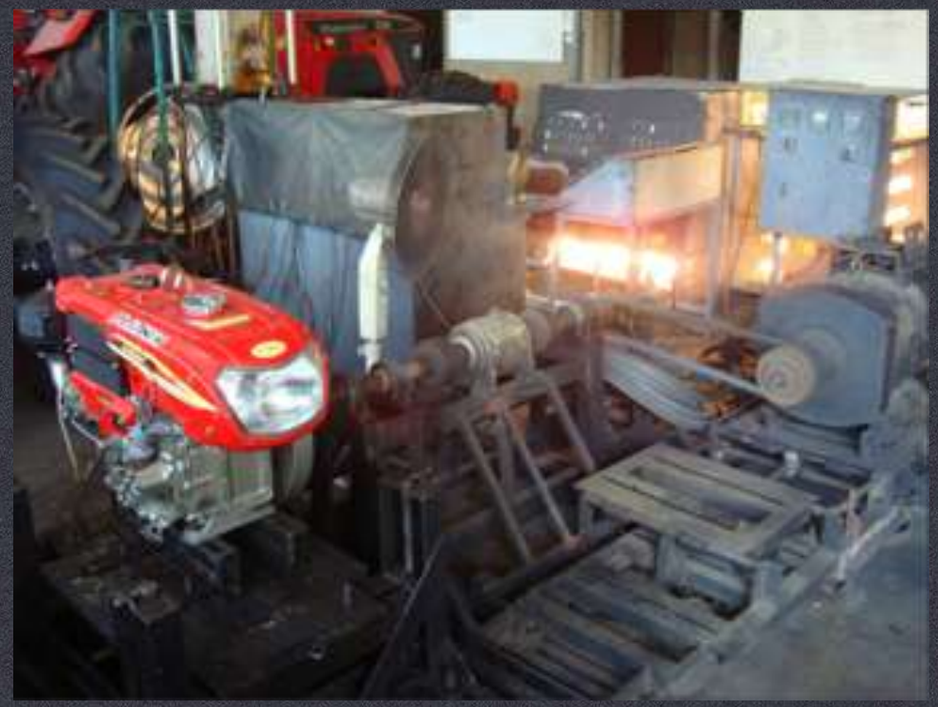


MACHINES TESTED

List of frequently tested machines by AMTEC
Source: AMTEC Test Reports (2008 to 2014)

1. Engines (Diesel and Gasoline)	7. Rice Mills
2. Pumps and Pumpsets	8. Combine Harvesters
3. 4-Wheel Tractors	9. Biomass Shredders
4. Hand Tractors	10. Biomass Furnace
5. Corn Sheller/Huskers	11. Dryers
6. Threshers	

4W TRACTOR



ENGINE

PUMPS/ PUMPSETS

TESTING ACTIVITIES

HAND TRACTORS

THRESHERS

CORN SHELLERS/ HUSKERS

RICE MILLS

TESTING ACTIVITIES

COMBINE HARVESTERS

BIOMASS SHREDDERS

BIOMASS FURNACE

TESTING ACTIVITIES

RECIRCULATING DRYERS

FLAT BED DRYERS

TESTING ACTIVITIES

RESULTS

- Engines

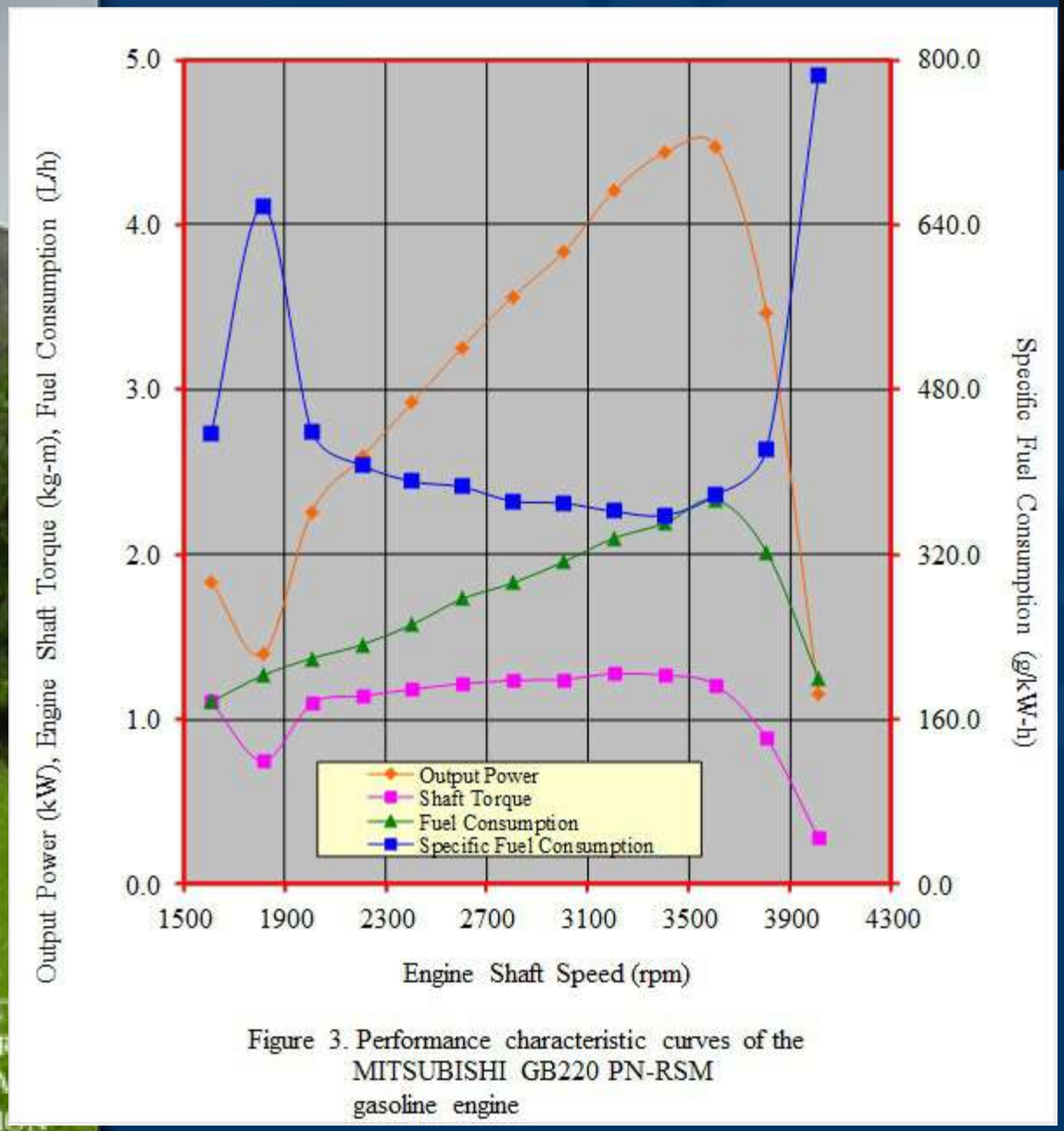


Figure 3. Performance characteristic curves of the MITSUBISHI GB220 PN-RSM gasoline engine

RESULTS

- Engines

Engines	Excellent	Passing	Fail	Breakdown	Total
Gasoline Engines	55 (32.7%)	58 (34.5%)	48 (28.6%)	7 (4.17%)	168
Air-cooled Diesel	38 (47.5%)	24 (30.0%)	16 (20.0%)	2 (2.50%)	80
Water-cooled Diesel	140 (61.4%)	61 (26.8%)	13 (5.70%0	14 (6.14%)	228
Total	233	143	77	23	476

AGRICULTURAL MACHINERY TESTING AND EVALUATION CENTER

RESULTS

- Engines

Water-cooled diesel engines comparatively performed better than air-cooled diesel engines
and gasoline engines.

RESULTS

- Pumps

- Based on construction, the non-self-priming centrifugal pumps had higher efficiencies compared to self-priming.

- The size of pumps is not related to efficiency.

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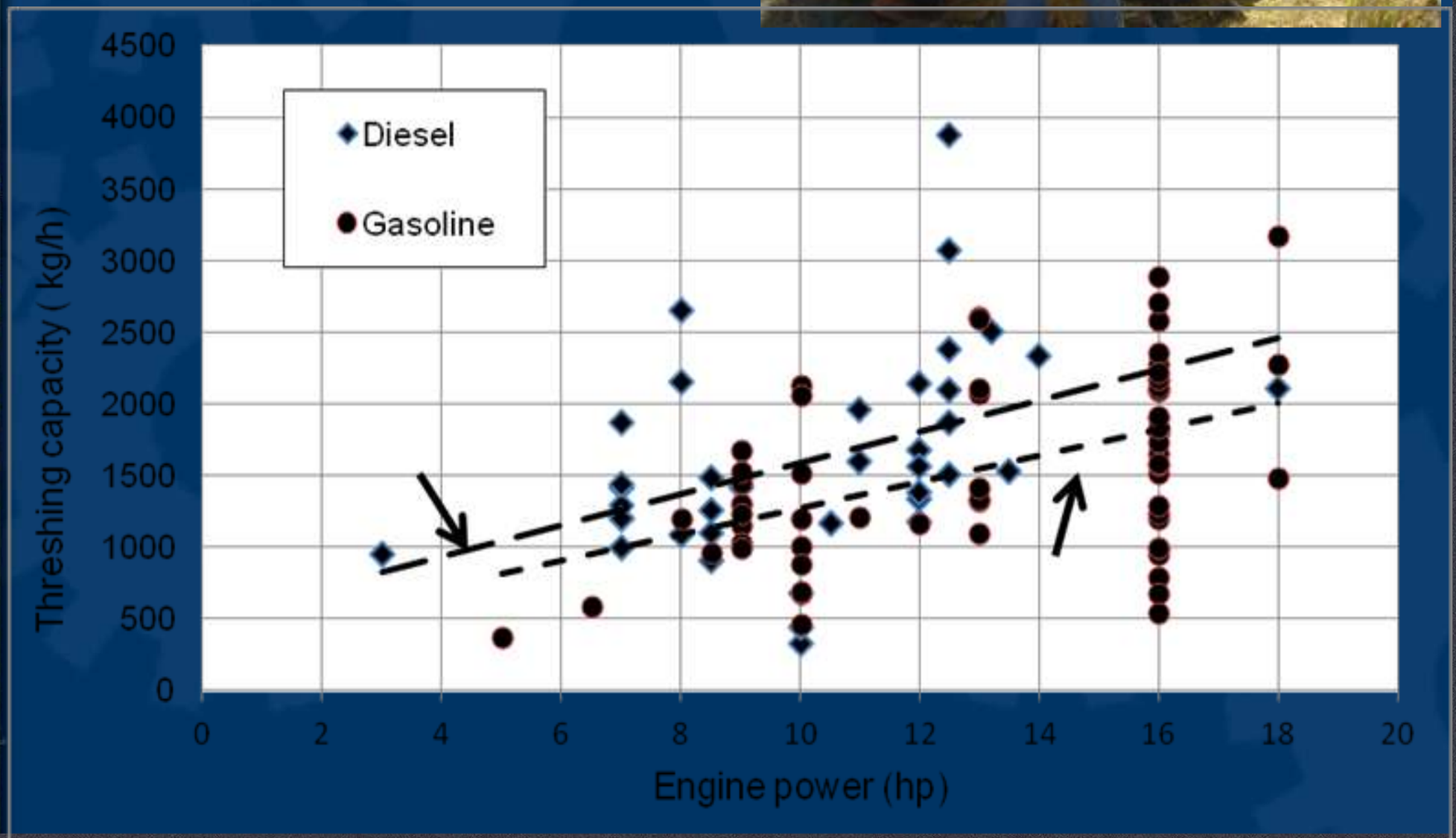
RESULTS

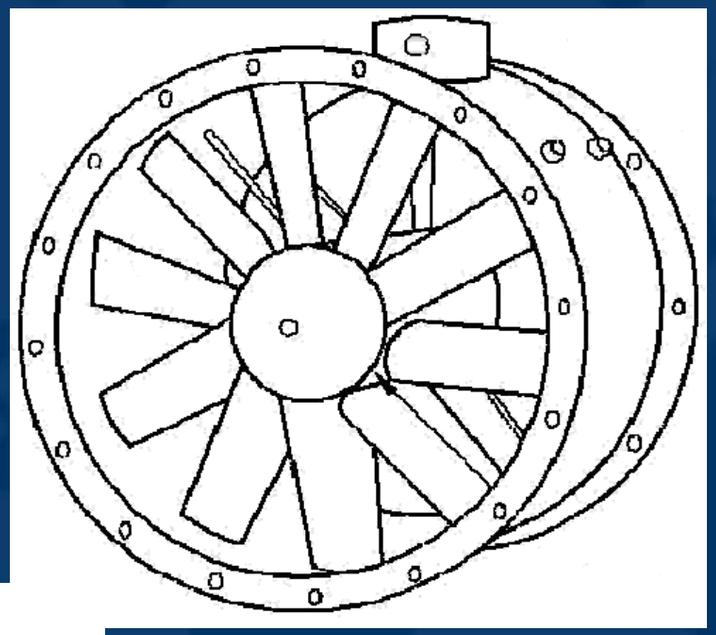
- Rice threshers

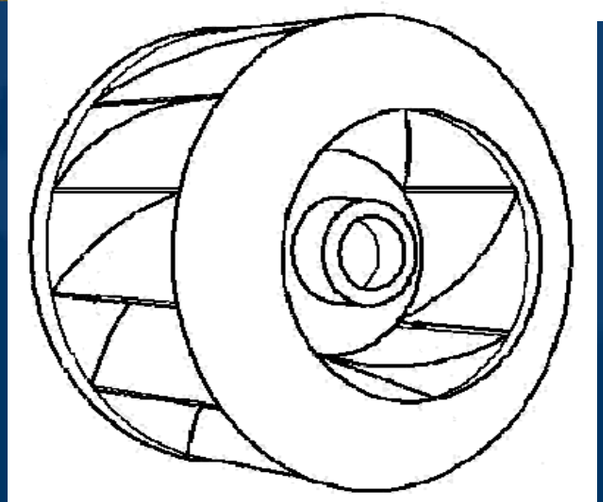


AGRICULTURAL MACHINERY TESTING AND EVALUATION CENTER

RESULTS

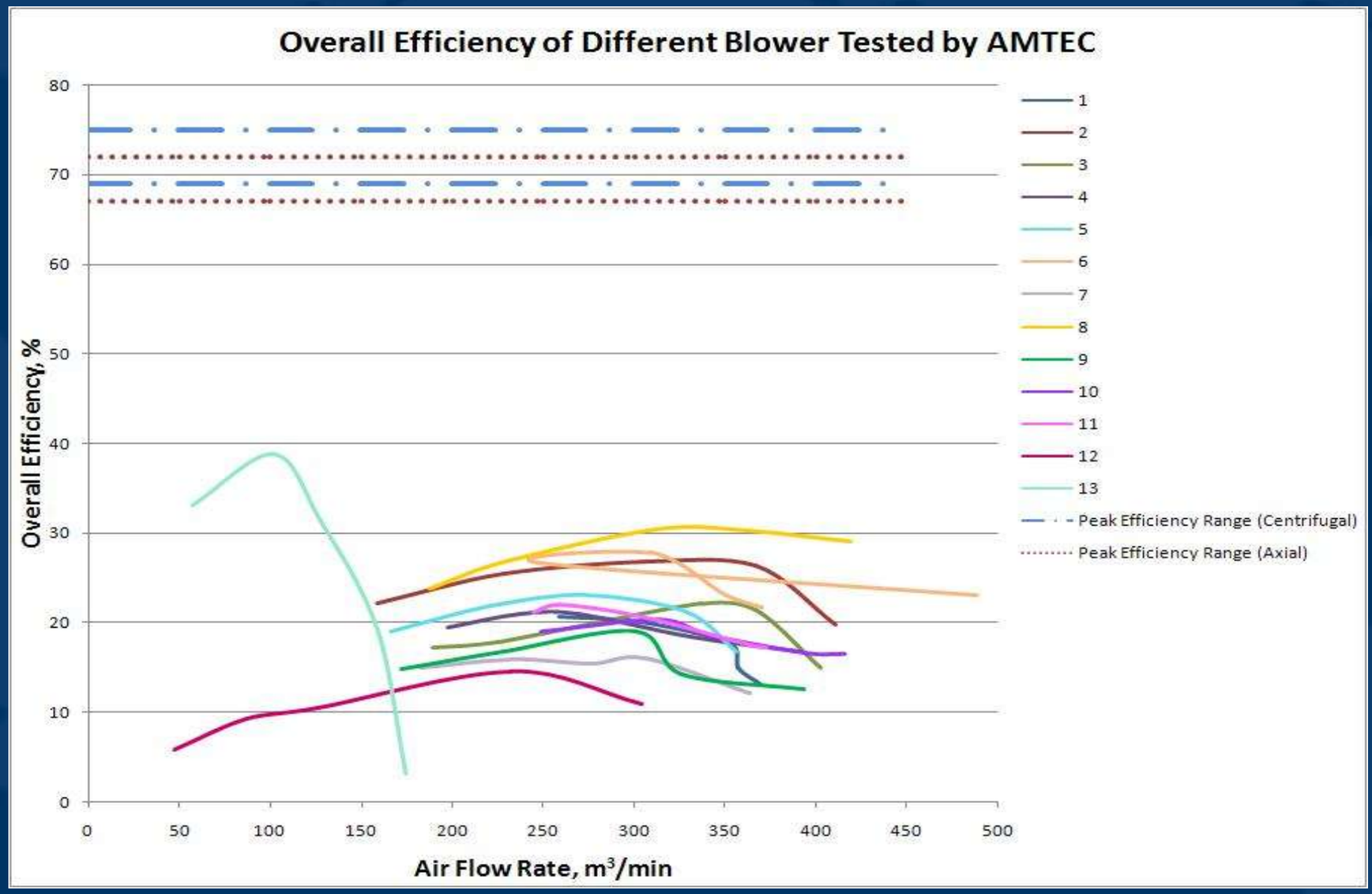
- Fans and blowers





RESULTS

- Fans and blowers



RESULTS

- Fans and blowers

Peak efficiency range of axial flow fan is between 67%-72% but AMTEC test results showed that no axial flow fan performed higher than 25% peak efficiency.

The centrifugal fan also performed badly at 38% peak efficiency while the industrial fan data showed peak efficiency range of 69-75%.

RESULTS

- 6-ton flat bed dry er

RESULTS

- 6-ton flat bed dryer
  - Based on findings, further improvement of dryer design based on blower configuration, materials used, capacity, flexibility, and usability of the machine to the intended user are essential.
  - In addition, there is also a necessity for the retooling and retraining of operators.

SIGNIFICANCE

THE TESTING ACTIVITY

- **Gives objective and systematic assessment of the actual machine performance.**
- **Serves as requirement in procurement process of DA and DAR.**
- **Safeguards interest of farmers.**
- **Improves machine supplied to the market.**

INFO DISSEMINATION

- **Presentations of scientific papers on meetings, conferences, and conventions**
- **Publications of technical papers in popular journals**
- **Trainings on testing and evaluation of agricultural and fishery machines**

PROBLEMS

- Lack of permanent technical staff
- Old laboratory and field test equipment
- Increasing workload

..and proposed solutions

- Strengthening of AMTEC:
  - Recruitment of new staff
  - Acquisition of new equipment
  - Work towards obtaining competency level (ISO 17025)

..and proposed solutions

- Establishment of satellite testing centers

CONCLUSION

- The Government recognizes the importance of agricultural and fishery machinery testing, thus, AFMech Law (RA 10601) of 2013 stipulates the strengthening of AMTEC and supports the establishment of satellite testing centers.

CONCLUSION

- As member of Asia Pacific Network for Testing of Agricultural Machinery (ANTAM), AMTEC takes part in the harmonization of the testing codes and ~~standards of~~ agricultural and fishery machineries.


Thank you