Status on Testing of Agricultural Machinery in India

Kanchan K. Singh
Assistant Director General (Engg.)

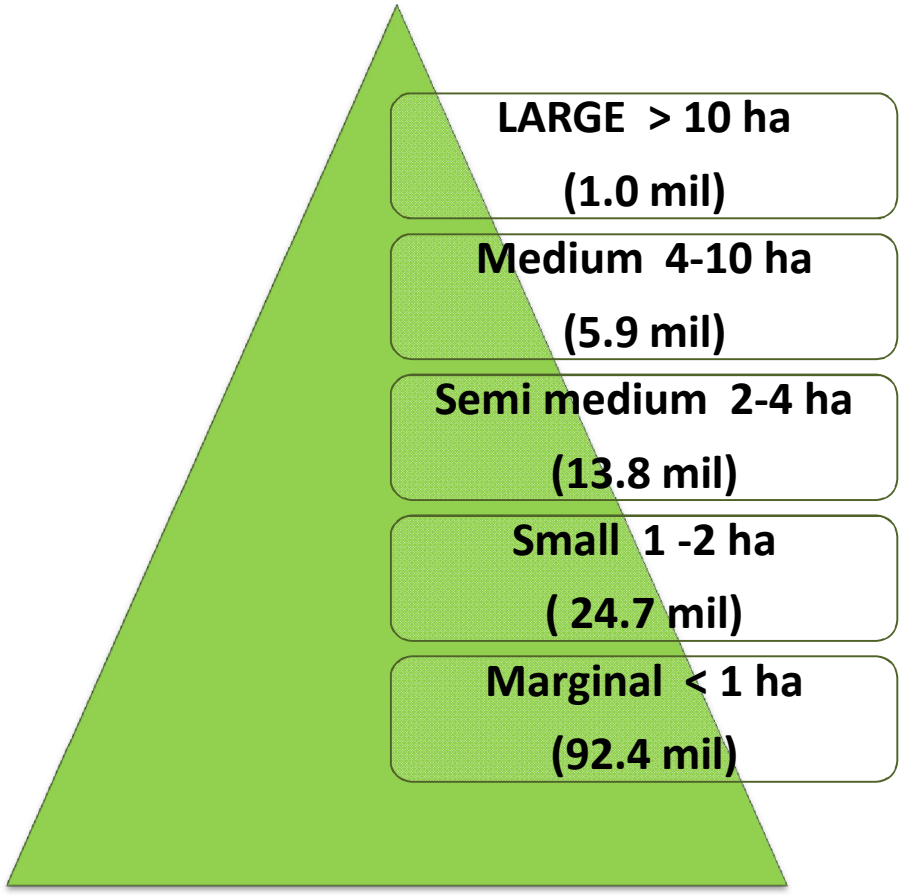
C R Mehta
Project Coordinator, AICRP on
Farm Implements and Machinery

Indian Council of Agricultural Research
New Delhi, India

Indian Agriculture

- Net sown area: 140 million ha (42.6%)
- Agricultural workers - 263 million
- Employs about 55% of the work force
- Provides livelihood to about 60% of the population
- Contributes 14% to the Gross Domestic Product (GDP)
- Yearly production
  - Food grains – 264 million tonne (2013-14)
  - Fruits – 81 million tonne (2012-13)
  - Vegetables – 162 million tonne (2012-13)
- No. of land holdings – 138 million

Indian Agriculture



Average land holding and no. of farmers

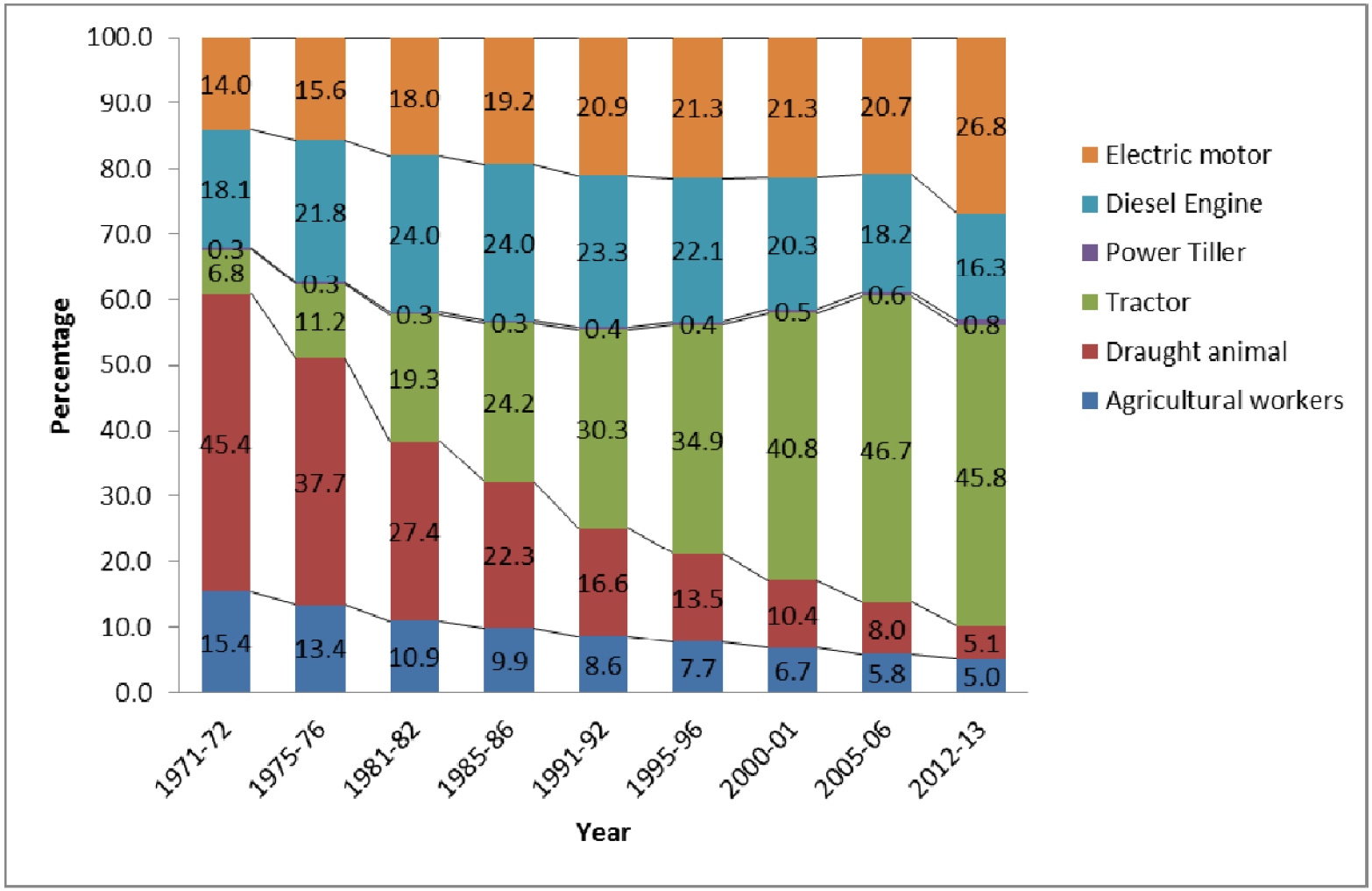
- **Highest arable land -** 47% of total land against Avg. 11% in the world
- **Round the year cultivation -** 20 Agro-climatic regions and 46 soil types suited for round the year cultivation
- **Ranks first** in production of Pulses, Sorghum, Jute and allied fibers
- **Second largest producer** of Wheat, Rice, Groundnut, Tea, Fruits and Vegetables, Sugarcane
- **Third largest producer** of Mustard, Potatoes, Cotton lint, etc.
- **137.8 million cultivators,** over 5.0% own > 4 ha. Avg farm land size <2 ha,

Bottom of Pyramid Country; Affordability, Equipment size are key to success. Emerging - Cooperative ownership model/custom hiring, use of high end equipment

Cropping Intensity and Power Availability on Indian Farms

Year	Cropping intensity, %	Productivity, t/ha	Power available, kW/ha	Power per unit production, kW/t	Net sown area per tractor, ha
1975-76	120	0.94	0.36	0.38	487
1985-86	127	1.18	0.58	0.49	174
1995-96	131	1.50	0.92	0.61	84
2005-06	132	1.65	1.50	0.91	47
2010-11	141	1.92	1.68	0.88	31
2012-13	141	2.06	1.84	0.89	30

Trend in Farm Power Availability



Share of agricultural worker & draught animals came down from 60.8% in 1971-72 to 10.1% in 2012-13

Sub Mission on Agricultural Mechanization

- Increasing the reach of farm mechanization to small and marginal farmers and to the regions where availability of farm power is low
- Offsetting adverse 'economies of scale' and 'higher cost of ownership' of high value farm equipment by promoting 'Custom Hiring Centre' for agricultural machinery
- Passing the benefit of hi-tech, high value and hi-productive agricultural machinery to farmers through creating hubs for such farm equipment.
- Promoting farm mechanization by creating awareness among stakeholders through demonstration and capacity building activities
- Ensuring quality control of newly developed agricultural machinery and equipment through performance evaluation and certifying them at designated testing centers located all over the country.

Sub-mission on Agricultural Mechanization

S. No.	Components
1	Promotion & strengthening of agricultural mechanisation through training, testing & demonstration
2	Post harvest technology and management
3	Financial assistance or procurement subsidy for selected agriculture machinery and equipment
4	Establishment of farm machinery banks for custom hiring by small and marginal farmers
5	Establishing hi-tech and high productive equipment hub for custom hiring
6	Enhancing farm productivity at village level by introducing appropriate farm mechanization in selected villages
7	Creating ownership of appropriate farm equipment among small and marginal farmers in the eastern/north eastern regions

Testing Network in India

1. CRFMT&TI, Budni, M.P
2. NRFMT&TI, Hisar, Haryana
3. SRFMT&TI, Garladinne, AP
4. NERFMT&TI, Biswanath Chariali, Assam

Other Institutions for Testing Agricultural Machinery in India

SAUs	-	25
ICAR Institutes	-	2
Central University	-	1
National Institute	-	1

Location of FMTTI'S

Northern Region Farm Machinery Training and Testing Institute, Hisar
(1963)

North-Eastern Region Farm Machinery Training and Testing Institute, Biswanath-Chariali
(1990)

Central Farm Machinery Training and Testing Institute, Budni
(1956)

Southern Region Farm Machinery Training and Testing Institute, Garladinne, Anantpur
(1983)

Objectives of Testing in India

- **Assessing functional suitability and performance**
- **Deciding the suitability of machine for Indian conditions for import, production and popularization**
- **Information to farmers and users to compare performance**
- **Recommendations to financial institutions for assistance to farmers and manufacturers**

Cont…

Objectives of Testing in India

- Feedback to manufacturers on design deficiencies, field complaints and after sales service
- Promoting mechanization in accordance with international standards
- Assisting Bureau of Indian Standards (BIS) in formulation of standards
- Input for R&D organizations in agricultural machinery and equipment

Purpose of Testing

- Maintaining proper standards in quality
- Adherence to safety aspects
- Certification for financial assistance
- Protection of interests of farmers

Types of Tests

Commercial Tests

- Initial test on machines ready for commercialization
- Batch test on commercial machines in regular manufacture
- Series test of large number of machines simultaneously under same conditions for comparative evaluation
- Survey for assessing general performance to get feedback

Confidential Tests

- Tests carried out for providing confidential information on the performance of the machine to manufacturer before commercialization

BIS Codes for Machinery

- Specifications of equipment
- Test codes for various machinery
- Safety and operational requirements
- Standards for raw materials used in the fabrication of agricultural machinery
- Code of practices for installation, operation and maintenance
- Nomenclature of equipment and glossary of terms

BIS Standards for Farm Machinery (237)

Tractors and Power tillers	: 76
Primary Tillage	: 16
Secondary Tillage	: 22
Sowing and Planting	: 29
Interculture and Weeding	: 11
Plant Protection	: 18
Harvesting	: 21
Threshing	: 18

CRFMTTI, Budni, M.P.

Mandated to test

- Tractors, power tillers, combine harvesters, and other self-propelled machines for performance.
- Tractors, power tillers, combine harvesters, agricultural trailers, engines for mass emission of exhaust gasses and other machines for compliance under CMVR

Visit of participants of 9th TC of CSAM to CFMTTI, Budni, India

NRFMTTI, Hisar, Haryana

Mandated to test

- Combine harvesters, plant protection equipment, irrigation pumps, diesel engines and other self propelled crop production equipment and machines.
- Combine harvesters for compliance under CMVR
- Engines having output capacity upto 700 kW

SRFMTTI, Garladinne, Andhra Pradesh

- Power tillers, self-propelled crop production machines/equipment, including power drawn agricultural machines and equipment

NERFMTTI, Biswanath-Chariali, Assam

- Power drawn agricultural machines and non-self propelled machinery to meet the requirements of manufacturers of Eastern and North Eastern region

Other ICAR/SAUs based centres (29)

- Non-self propelled agricultural equipment/ machinery

Load car for Drawbar test at *Budni*

Smoke test of power tiller at Anantapur

Rotavator testing at Hisar

Rice transplanter testing at Biswanath Chariali

Tests and Evaluations Performed on a Tractor

Checking of specifications
PTO performance test
Belt pulley test(optional)
Drawbar performance test
Power lift & hydraulic performance test
Brake test
Air cleaner oil pull over test
Noise measurement
Mechanical vibration measurement
Location of centre of gravity
Turning ability
Visibility

Field tests: - 50 h - for Initial commercial tests and
40 h - for batch test with plough, rotavator and puddling

Tests and Evaluations Performed on a Combine Harvester

Specification checking.
Engine performance test.
Turning ability test.
Location of centre of gravity test.
Visibility test.
Brake performance test.
Air cleaner oil pull over test.
Mechanical vibration test.
Noise measurement test.

Field tests: 200 h of field test on wheat and rice harvesting are performed. Testing on other crops carried out if recommended by manufacturer.

Tests and Evaluations Performed on a Power Tiller

Specification checking
Engine performance test
Rotary shaft performance test
Drawbar performance test
Parking brake test
Noise measurement
Air cleaner oil pull over test
Mechanical vibration measurement
Turning ability test
Chemical composition test and wear characteristics test of rotavator blades

Field tests: 75 h - for Initial commercial tests and
50 h - for batch test with mould board plough, dry rotavation and puddling.

Tests and Evaluations of Other Farm Machinery

Tillage & Sowing Implements

Tillage & sowing equipment are tested for material composition of soil engaging components and assessing field performance.

Rice transplanters

Transplanters evaluated for performance of engine & field performance to assess suitability and its output in the field.

Irrigation Pumps

Irrigation pumps are tested for power requirement, pressure discharge characteristics, efficiency etc. as per Indian Standards.

Power Units

Power units viz. engines under ISI mark certification scheme for different applications

Tractor Tyres

Drive wheel tyres tested for assessing the performance on drawbar work as well as wear of tyres on dimension and on mass basis per unit of time.


Thank You All