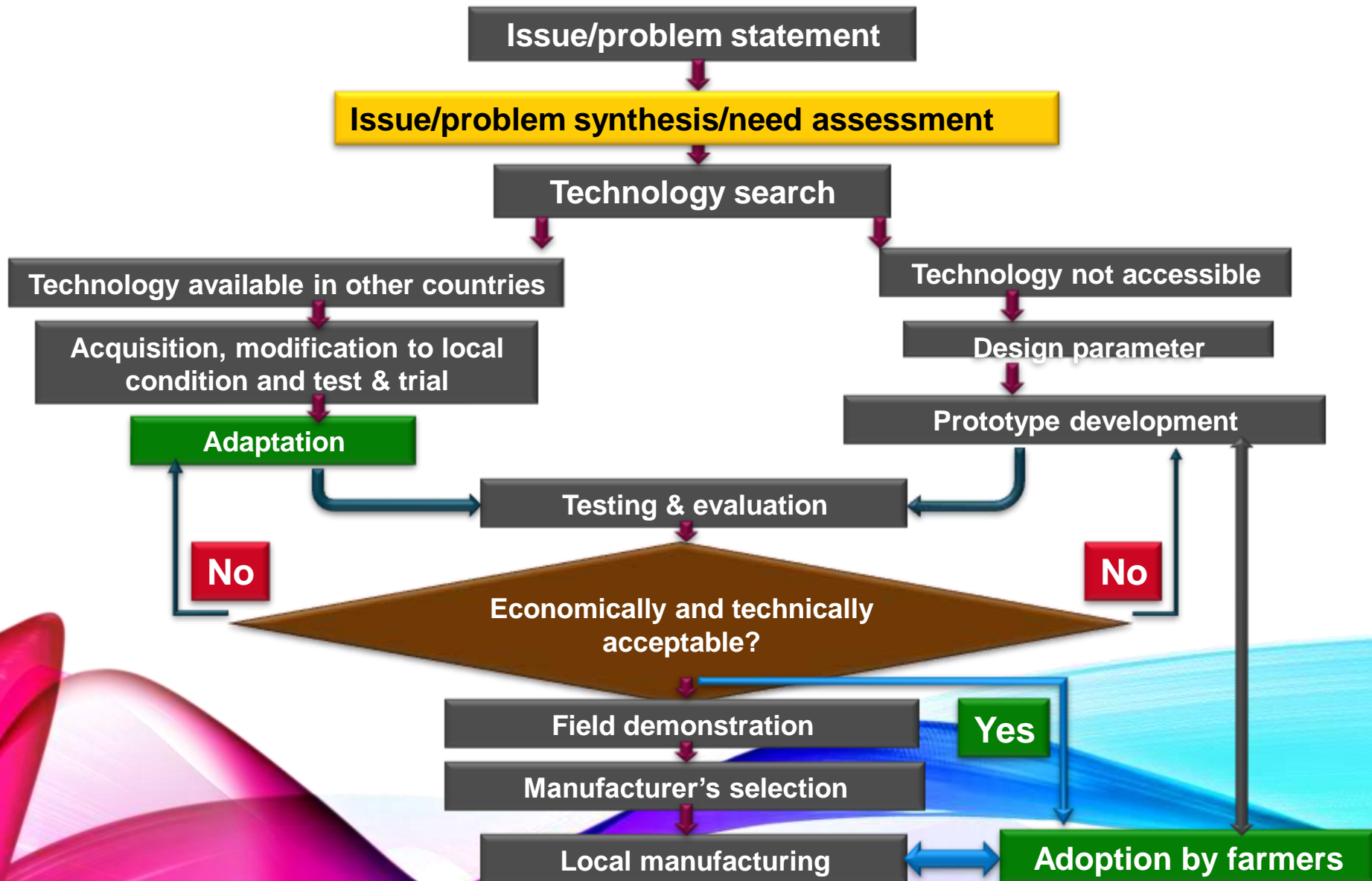




Research Institutions for promoting Agricultural Mechanization in Pakistan

Dr. Tanveer Ahmad
**Director Agricultural and Biological
Engineering Institute, NARC, Islamabad,
Pakistan**

FARM MACHINERY RESEARCH AND DEVELOPMENT PROCESS



RESEARCH & DEVELOPMENT (R&D)

- Confined in public sector
- Non-existent in private sector

R&D Institutes in Public Sector

- Agricultural and Biological Engineering Institute (ABEI), Islamabad
- Agricultural Mechanization Research Institute (AMRI), Multan
- Faculties of Agricultural Engineering, Universities of Agriculture, Faisalabad and Tandojam
- Agricultural Engineering Department, University of Engineering & Technology, Peshawar

SALIENT ACHIEVEMENT OF R&D INSTITUTIONS

Description	Agricultural & Biological Engineering Institute (ABEI), NARC, Islamabad	Agricultural Mechanization Research Institute (AMRI), Multan
Mechanization technologies developed and commercialized	Tractor front mounted reaper-windrower, groundnut digger, groundnut thresher, sunflower thresher, paddy thresher, pneumatic row crop planter, zero-till drill, fertilizer band placement wheat drill, canola thresher, wheat straw chopper-cum-blower, hand operated groundnut shellers, ABEI olive oil extractor, wood shredder, and Mobile seed processing unit.	Seed drills, planters, ridger, bed shaper, weeders, wheat thresher, rotary slasher, potato planter, groundnut digger, maize sheller, rotary tiller, boom sprayer, fertilizer spreader, axial flow pump, seed cleaner grader, hand dibbler, furrow bed/shaper planter, soil hard pan tester, bullock drawn implements, and mobile bhoosa chopper and baler.
Mechanization technologies being Commercialized	Pak seeder, PTO disk plough, vegetable planter, turmeric dryer, solar-cum- gas fired dryer, mini seed cleaner cum grader, flat bed dryer for canola, sunflower & maize, date dryer, mango picking & pre-cooling technology harvester and nursery raising plant, hot-water treatment plant for eradicating mango fruit fly infestation.	Power tiller, chain trencher, fodder cutter bar, sugarcane base cutter, pneumatic drill, rotary ditcher, ejector pump, maize cob harvester, cheaper biogas planter, vegetable nursery transplanter, groundnut sheller, rice thresher, seed- bed finisher, stubble shaver, and orchard sprayer.

RESEARCH INSTITUTIONS

Agricultural and Biological Engineering Institute
(ABEI)

Former

Farm Machinery Institute
(FMI)



Mission

Contribute to

- **food security**
- **poverty reduction**
- **environment protection**

by fostering sustainable enhancement in productivity of agricultural production resources

through farm machinery

- **Development/adaptation**
- **testing & standardization**
 - **commercialization**




MACHINE SYSTEMS ENGINEERING PROGRAM

- To design, develop and evaluate agricultural mechanization technologies especially for small holder mechanization
- To provide technical assistance to local agro-industry in commercialization and quality enhancement of agricultural mechanization technologies
- To develop precision farming technologies for optimal utilization of crop production inputs
- To undertake development activities related with agricultural machinery testing, standardization, mechanization informatics and capacity building

BIO-PROCESSING ENGINEERING

- To develop and evaluate agro-processing technologies for cereals, legumes, and medicinal plants
- To develop and evaluate technologies for processing of bio-wastes into useful products
- To develop and evaluate food processing technologies in order to add value to agricultural produce
- To develop image processing technologies and controls for applications in food processing
- To disseminate innovative bio-processing technologies among the end users



ENERGY SYSTEMS ENGINEERING

- To design, develop and evaluate innovative energy systems engineering technologies for drying and cooling of agricultural produce
- To develop technologies for on-farm production and utilization of biomass and bio-fuels energy, and solar energy
- To conduct energy conservation studies in order to optimize energy consumption for crop production
- To disseminate innovative energy and post-harvest technologies among the end users

Agricultural and Biological Engineering Institute

History

1976	IRRI-PAK Agricultural Machinery Program
1979	Agricultural Machinery Division (Dev.)
1982	Renamed as Farm Machinery Institute
1985	Converted to Non-Development side

Facilities

- **Design Office**
- **Machinery Testing Lab**
- **Prototype Workshop**

ACHIEVEMENTS

Testing & Evaluation - Machines Tested

- **Prototypes** **25**
- **Commercial/Local** **27**
- **Imported**
 - **Tractors** **20**
 - **Others** **35**

Standardization - Standards Developed

- **Farm machinery** **53**
- **Plant protection equipment** **10**
- **Earth moving machinery** **18**

ACHIEVEMENTS

Trainings Organized for:

- Engineers in testing & evaluation of farm machinery
- Extension Officers and farmers in operation, repair and maintenance of farm machinery

Technical Assistance:

- Provided to manufacturers in manufacture of FMI developed technologies

Policy Input:

- Input provided to Government in formulation of farm mechanization strategies for the country



MACHINES TESTED AND STANDARDS DEVELOPED¹³

Testing & Evaluation – Machines Tested

- Prototypes : 25
- Commercial/Local : 27
- Imported
 - Tractors: 20
 - Others: 35

Standardization – Standards Developed

- Farm Machinery: 53
- Plant Protection Equipment: 10
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RECENTLY COMPLETED RESEARCH PROJECTS

- Development of picking and pre-cooling technology for mangoes
- Adaptation and commercialization of a small scale olive oil extraction unit
- Interventions for the management of mycotoxins in maize and groundnut (Component-I: Adaptation of mobile flat-bed dryer for maize and groundnut)
- Development of milking machine for water buffaloes and indigenization of milking machine for cows
- Post Harvest process and Value Addition of Dates in Khairpur, Sindh
- Investigation of Factors Causing Low Head Rice Recovery
- Development and evaluation of a turmeric curing and drying technology
- Development of small Mango Hot Water Treatment Plant

RECENTLY COMPLETED PROJECTS

- Development and Evaluation of Power-Take-Off (PTO) Driven Disk Plow
- Up-gradation and rehabilitation of existing solar dates dryer in Khairpur, Sindh
- Development and Evaluation of a In-Bin Seed Drying, Aeration and Storage Technology
- Adaptation and commercialization of a Tractor PTO Operated Wood Chipper Shredder
- Development and Evaluation of Vegetable Planter and Transplanter
- Introduction of “Onion Autumn Crop through sets plantation” in Punjab
- Commercialization of wheat straw chopper in combine harvested wheat fields in southern Punjab



COMMERCIALIZED TECHNOLOGIES

Reaper
Units: 51000
Benefit: 103 billion



Zero tillage drill
Units: 7000
Benefit: 43 billion



Wheat straw chopper
Units: 3000
Benefit: 9 billion



Rice thresher
Units: 7000
Benefit: 33 billion



Seed processor
Units: 50
Benefit: 1.3 billion



Groundnut digger
Units: 2200
Benefit: 6 billion



Ground nut thresher
Units: 2200
Benefit: 7 billion



Planter
Units: 300
Benefit: 1 billion



Seed drill
Units: 8000
Benefit: 30 billion



قومی زرعی تحقیقاتی مرکز کی تیار کردہ
زرعی مشینری



Technologies Commercialized

1985: Reaper-windrower: 35,000 units



1995: Zero-till Drill: 7,000 units



2002: Wheat Straw Chopper: 5,000 units



2002: Paddy Thresher: 6,000 units



Technologies Commercialized

Fertilizer Band Placement Drill 2009 onward: 8,000 (Punjab Govt.)



Technologies Commercialized

Mobile Flat-bed Dryer



Olive Oil Extraction Unit



Milking Machine for Buffaloes



Mango Picking Machine



Technologies being Commercialized

Solar-cum-Gas Fired Dates Dryer



Solar House Dates Dryer



Mobile Seed Processing Unit



Seeder For Combined Harvested Paddy Fields



MACHINES BEING COMMERCIALIZED

Olive oil extraction unit



Milking machine



Current Projects

Development and Adaptation of Ispabghol Processing Technologies

Design and Development of Solar Dryer for Fruits and Vegetables

Design and Development of Sisal Decorticator

Introduction of “Onion Autumn Crop through sets plantation” in Punjab

Design and Development of Vegetables Planter

Design and Development of Kalongi and Onion Thresher

Development and adaption of farm scale agricultural technologies for sugarcane crushing, maize Stover harvester, maize dryer, and palm oil extractor

Development of Mechanized Multipurpose Nursery Raising Facility at NARC, Islamabad

Commercialization of Dates and Banana Processing Technologies in Sindh- a SARC Funded Project

ABEI Future Vision

- **Mechanization strategy formulation**
- **National Network of Agricultural Mechanization**
- **Testing Lab Accreditation**
- **Grain Drying & Storage**
- **Agro-Processing Machinery**
- **Livestock Mechanization**
- **Energy efficient & environment friendly technologies**
- **Mechanization Informatics**

Future Research Plans:

(1) Machinery for small-scale farming, (2) Processing technologies for agricultural produce, (3) Crop residue handling machinery, (4) Energy efficient tillage machinery, (5) Combine harvesting of paddy for quality grain, (6) Precision seeding/planting machinery, (7) Promotion of seed processing technology, (8) Livestock mechanization, (9) Vegetable production machinery (onion transplanting and threshing), (10) Fodder harvesting, (11) Canola harvesting and threshing, (12) Medicinal plants processing technologies, (13) Olive oil extraction, (14) Value addition in horticultural crops through cleaning, grading, drying/cooling and packaging, (15) Drying of autumn sunflower, autumn maize, canola and rice, (16) Low-cost bio-fuel production technology, (17) Gasification technology for energy production from crop residues, (18) On-farm low-cost storage and drying technologies for grain/seed, (19) Chickpea planting in moisture-deficit areas and pulses harvesting.



SISAL DECORTICATOR
DESIGNED AND DEVELOPED BY:
AGRI. & BIOLOGICAL ENGG. INSTITUTE,
NARC, PARC, ISLAMABAD
051-9255044-5

**MOBILE
SISAL DECORTICATOR**

فاسی ڈیکورٹیکیشن کے لیے موبائل
سیسال ڈیکورٹیکیشن













Olive Oil Extractor



IN-BIN SEED DRYING & STORAGE TECHNOLOGY

ISSUE: A CONSIDERABLE AMOUNT OF SEED OF VARIOUS CROPS IS WASTED DURING STORAGE OF SEED



Design Capacity: **15 tons**

Moisture Content: **from 22% to 12%**

Time: **2-3 days**

Cost of drying sample/ton: **Rs 1,600**

First prototype (storage bin cum seed drying technology) unit was developed under ALP funded project

HOT WATER TREATMENT UNIT

OBJECTIVE: TO KILL FRUIT-FLY LARVAE WITHIN PULP USING HOT WATER TREATMENT 45-48°C FOR 60-75 MINUTES AND PULP TEMPERATURE AT 47.6°C



Capacity: **150 kg/batch**

Price (Approx.): **Rs 200,000**

- Semi automatic unit based on **Philippine Design** was developed at ABEI, NARC Islamabad
- Demonstrated to mango growers in district Multan

TRACTOR PTO OPERATED WOOD CHIPPER SHREDDER

ISSUE: THE LOW GRADE BIOMASS WAS NOT UTILIZED EFFECTIVELY



Capacity: 2-3 tons/h

Chip size: 10-30 mm (adjustable)

Power required: 30 hp

Price: Rs 300,000

- Identified & imported one unit of wood chipper shredder.
- Installation of hydraulic kit on MF-240 tractor for running hydraulic motors of feeding system.

PEAS PLANTER

ISSUE: PLANTING OF PEAS AND OKRA TECHNOLOGY WAS NOT AVAILABLE



Capacity: **0.40 ha/h**

Operational Cost: **Rs 2000/ha**

Price (Approx): **Rs 120,000**

Saving: **60% seed saving**

Economic benefits: **Rs 30,000/ha**

- Developed a vegetable planter particularly for Peas and Okra.
- Field evaluated this machine at farmer's field for sowing of peas and okra.

POWERED DISK PLOW

ISSUE: SEED BED PREPARATION FOR WHEAT IN PADDY FIELDS



Capacity: **0.4 ha/h**

Operational Cost: **Rs 3000/ha**

Saving: **Rs 3500/ha**

Price (Approx): **Rs 140,000**

- Developed powered disk plow first time in the Country.
- Field evaluation refinement is in process.



SISAL DECORTICATOR





THANKS