

**Agricultural Machinery Education R & D and Manufacturing
in Pakistan**

STATUS REPORT

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PREFACE

The report was prepared after short visits to selected agricultural engineering research and educational institutions, private agricultural machinery enterprises, senior government officials selected progressive farmers.

The objectives of these visits were:

1. **Agricultural Engineering Faculties.**
 - a. To assess current syllabi/curricula particularly in relation to farm machinery component and suggest possible improvements.
 - b. To learn about the utilization of recently qualified engineers returned from abroad, and comment on future training needs.
 - c. Identification of active engineers/group leaders for handling potential research and development projects.
 - d. Assessment of current facilities and capabilities to absorb further resource allocation, and to interact with agricultural service industry and farming community.
2. **Private Agricultural Machinery Enterprises.**
 - a. To learn about the status i.e. product development, quality control, capabilities, turn over & services of selected machinery enterprises.
 - b. To identify potential areas of collaboration between these enterprises, R & D institution and funding/loan agencies.
3. **Progressive Farmers**
 - i. To visit and assess their current farming practices and diagnose particular constraints to production.
 - ii. To suggest farm machinery technology "Packages" for current major farm operations or other alternatives.
 - iii. To identify potential area of collaboration between progressive farmers, technology development institutions and the service industry.

In keeping with the stated objectives data/information were collected through short visit and interviews. However, because of lack or limitations of data and information provided by the respondents, only limited conclusions could be drawn.

DR. M. A. CHOUDHARY

A. EDUCATIONAL INSTITUTIONS

The following Universities were visited in connection with the assessment of agricultural engineering curriculum and to ascertain particular priority requirements of the faculties/depts. of agricultural engineering at these universities:

- I. University of Agriculture, Faisalabad
- II. NWFP University of Agriculture, Peshawar
- III. NWFP University of Engineering and Technology, Peshawar
- IV. Sind Agricultural University, Tandojam

I. UNIVERSITY OF AGRICULTURE, FAISALABAD:

The University has five faculties, one of which is the Faculty of Agricultural Engineering and Technology.

The faculty has five departments viz:

- i. Basic Engineering
- ii. Farm Machinery and Power
- iii. Irrigation and Drainage
- iv. Fibre Technology
- vi. Food Technology

Facilities:

All the aforementioned departments have basic laboratory facilities while the department of Farm Machinery and Power also has an engineering workshop attached to it. However, most of the facilities in these laboratories need major updating of equipment. Following the establishment of the faculty, there has been little replacements in the machinery and equipment installed in the laboratories.

Curricula:

It was reported that the agricultural engineering curriculum for undergraduate level was recently revised. The Academic Council of the university has approved the revised curriculum for first and second semesters, while approval for third to eighth semesters is awaited.

Student Strength:

Since the start of the bachelors degree in agricultural engineering in 1963, 21 batches of agricultural engineering student have graduated. This year's final year class has 98 students, while there are 50 students enrolled in the MSc (hons) agricultural engineering programme. At present there is no Ph.D. course being offered in agricultural engineering, although some discussions has been going on for over two years for starting this degree, but no concrete proposal have been approved yet.

II. NWFP UNIVERSITY OF AGRICULTURE, PESHAWAR:

This university has started over recent years. Besides other main departments, a new department known as the Department of Farm Mechanisation and Water Management has been established. A total of 5 student have graduated from this department. However there were no students to graduate this year.

The TIPAN project of the USAID is assisting the Farm Mechanisation Section of the department, while the Dutch Aid Program is involved in the development of Water Management section.

Large amount of agricultural machinery has been brought in under TIPAN for use in the University research farms.

Since the university is currently following the land grant university system, the machinery staff is also expected to get involved in the research and development. We were informed that sugarbeet planters and sunflower threshers were required to be developed and promoted in the area.

III. NWFP UNIVERSITY OF ENGINEERING & TECHNOLOGY, PESHAWAR:

The Department of Agricultural Engineering under this university is responsible for training agricultural engineers in the province. The total strength of undergraduate students in the department is approximately 80.

It is worth noting that both universities within a stone throw's distance from each other virtually have competitive educational programmes.

IV. SIND AGRICULTURAL UNIVERSITY, TANDOJAM:

The Faculty of Agricultural Engineering in this university has six departments viz:

1. Farm Power and Machinery
2. Irrigation and Drainage
3. Land and Water Management
4. Farm Building and Structures
5. Basic Engineering
6. Agropolytechnic.

The education curriculum at the faculty has not been revised since 1972. The Dean of the faculty indicated that Pakistan Engineering Council has recently set up committees to develop uniformity in courses of agricultural, mechanical, civil and electrical engineering throughout the country. The faculty has embarked on an ambitious Ph.D. training programme in agricultural engineering.

This programme basically allows student from other research institution/organisation to register for the degree but the conduct their research work at their respective stations. There is no residency requirement or course work plans for the Ph.D programme. It is also interesting to note that there is no Master Level Educational Program in Agric. Engineering at this faculty.

Conclusions:

1. The agricultural engineering courses taught at the three universities are outdated and need major updating. Practical orientation is lacking.
2. There is no uniformity in courses being taught at the three faculties/departments.
3. The supporting facilities such as laboratories and workshop facilities need refurbishing.
4. There are no apparent linkages between teaching, research and inter-varsity linkages are also apparently missing.
5. The validity and the functions of various departments in the faculties of agricultural engineering need careful evaluation for their relevance to changing needs of industry and other employment sectors.

6. There appeared to be a consensus among the senior faculty visited, to hold one to two day workshop to assess the status of agricultural engineering education in the country in its broadest sense.

Recommendations:

1. It is highly recommended that senior educationist, R&D and industry representative should be brought together to look into agri. engineering curricula, its practical application to country's needs. This workshop could be convened either in Islamabad or Faisalabad.
2. There is a need for updating research and teaching facilities at the universities, more so, in the form of computers, laboratory equipment and sophisticated teaching aids and selected farm equipment.
3. There is strong need to institute onfarm/factory practical training of 6-12 months before degrees should be awarded.

B. AGRICULTURAL MACHINERY MANUFACTURERS AND DEALERS:

1. Naeem & Company (Regd)
2. Rachna Industries (Regd).
3. Danishmand and Company
4. Sayyed Machinery Ltd.,
5. United Agro Engineers
6. Mughal Farm Machinery Manufacturing Co.
7. Greenland Engineers
8. Millat Tractors Ltd.
9. Farm Development Industries
10. Javed Engineering Company
11. Zarkhez Agro Services (Pvt) Ltd.,
12. Sargroh Farm Aids (Pvt.) Ltd.,
13. Pakistan Zaraee Industries.
14. Al-Badr Engineering Works.
15. Haji Samar Gul Engg. Works.
16. Hand Tools Manufacturers.
17. Lahore Auto Store.

NAEEM & COMPANY (Regd).
Sammundri Road, Faisalabad.

Contact Person: Mirza Mohammad Akeel
Chief Executive

The company is engaged in the production of agricultural machinery since 1959. Its primary products are:

1. Seed Drill
2. Wheat Thresher
3. Ridger
4. Maize Sheller
5. Land Leveller

The company is also in the process of developing land planer, sunflower thresher, rotavator and disc harrows.

The company has been involved in technical collaboration with FMI, BARD, Millat Tractors, Arid Zone Research Institute, Quetta and Rafhan Maize Products, for development and popularization of machinery pertinent to the requirements of each of these organisations.

The company has 30 skilled and 10 unskilled workers, 8 persons are in the management cadre, while 4 are support staff. The company does not employ any graduate engineer. It has a dealer network of 20 throughout the country.

The company has its facilities scattered at 4 places on the Sammundri Road, which pose operational problems. The other constraints to further development indicated by the management were:

1. Working capital scarcity
2. Lack of Technical expertise in future planning of strategies.
3. No new designs are forthcoming.
4. Availability of appropriate raw material in peak times.

The company was resentful that FMI after having long and tedious dialogue with them had eventually awarded the seed drill development project to another manufacturer which had absolutely no previous experience of agricultural machinery manufacturing.

The sales proceeds from agricultural machinery manufactured by this company is indicated

as below:

1.	1987	Rs.50,25307.00
2.	1986	Rs. 500,000.00
3.	1985	Rs. 250,000.00

RACHNA INDUSTRIES (Regd)
Sammundri Road,
Faisalabad.

Contact Person: Nawaz Ibrahim Yawary
Managing Director Ph: 40261-3
43123

The company is engaged in the manufacturing of wheat thresher, FMI-tractor front mounted reaper-windrowers, cultivator, ridger, cane-crusher, fodder-chopper etc, since 1979.

During the 1989 wheat harvest the company reportedly sold 50 wheat thresher, and 25 FMI-reaper-windrowers.

The company in technical collaboration with CIMMYT and NARC Wheat Programme have also developed a Kiwi Seed Drill, but the drill has not been promoted to farmers, as there does not exist sufficient demand at present to produce it in large number, according to the company.

DANISHMAND & CO.

1-P, Narwala Road,
Mohammadpura, Faisalabad

Ph:30885

Proprietor: Ahmad Raza Khan

This company is located in Mohammadabad away from the main agricultural machinery industrial area producing agricultural machinery and implements since 1948. The company has a show room at the Sammundri Road. It's main products are:

1. Seed drill (both the tractor and animal-drawn)
2. Ridger
3. Cultivator
4. Chisel Plough
5. Lawn Mower

This year approx. 50 seed drills were sold to farmers. The company has been receiving technical assistance from expatriates, working for development projects in the 1960's and 1970's. The owner of this company is apparently not much interested in further development.

SAYYED MACHINERY LTD:

The company, a sister company of the Sayyed Engineers Ltd. producers of quality ball point pens in Pakistan, is engaged in the production of agricultural machinery since 1982. The company started its agricultural operation on the encouragement of FMI for the production of tractor- front mounted reaper-windrowers. During its early years when it was working closely with the FMI, it made an impact by producing quality reaper-windrowers. Later the company was confronted with management problems at the highest level, and could not market its products on a regular basis.

Lately however Sayyed Machinery Ltd., is involved in the development and promotion of FMI-AFRC Whole Crop Harvester (WCH), for the last five years. A few prototypes have been produced and tested in collaboration with FMI and AFRC engineers.

The company is planning to further its activities on WCH but is faced with financial constraints for venturing into production of WCH on regular basis. The WCH is still in a pre-production stage and would require further extensive testing to sort out its Straw (Bhoosa) management problem in particular, and leaking of grains when using it as a stationary thresher for small seed crops.

The company managed to sell 125 FMI reaper-windrowers, this year from its backlog of 1987-88 production.

UNITED AGRO ENGINEERS:

This company is a collaborating manufacturer of FMI and received technical assistance in the production and promotion of FMI-developed reaper-windrower. It has been consistent in the sale of reaper-windrowers and threshers, resulting in the establishment of another facility exclusively for the manufacture of FMI-reaper-windrowers. The company sold 150 reapers in 1989, 162 in 1988 and 97 in 1987. It is now making reapers with chain-sprocket conveying mechanism, and is priced at Rs.20,000/-. This system has its own advantages

in harvesting more dense crops, even at slightly early stage of maturity. A reaper averages 200 acres per season of wheat harvesting.

With the recent split in partnership, the company is faced with financial constraints in spreading its activities country-wide. The company has also shown keen interest in manufacturing of rotavators and has sought the assistance of FMI in planning this activity. The company is gradually improving its marketing of reaper-windrowers in Sind, as at present there is not a single manufacturer engaged in the production of the popular FMI-reaper-windrower in that part of country. A good guesstimate suggested that 700-800 reapers were sold in Daska during 1989 wheat harvest. This is despite the presence of combine harvesters, which charged Rs.350 per acre. But straw requirement forced the farmers to use reapers and stationary thresher system.

MUGHAL FARM MACHINERY MANUFACTURING CO:

The company is one of the first ones to collaborate with FMI in the development and production of FMI-Multicrop Thresher. The company has recently produced some sunflower threshers for the Ghee Corporation (GCP). These were priced at Rs. 16,000/-. Other implements being made by this company are: Threshers (both conventional and multicrop including sunflower thresher) potato planters priced at Rs. 11,000 (of which 40 have been sold), FMI-reaper-windrower with belt-conveying mechanism priced at Rs. 14000/- (90 sold this year). The company has shown keen interest in the production of suitable seed drill.

GREEN LAND ENGINEERS:

A very enthusiastic manufacturer, who is manufacturing a wide range of products, which include FMI-reaper-windrower, potato machinery, tillage equipment and threshers.

The company sold 60 FMI-reaper-windrowers with chain-sprocket conveying mechanism. The company envisages growing demand for reapers. The company has been producing both types of reapers viz. Chain and belt types. The drawback in the chain type is that the chain lasts for maximum of 3 years and requires approx. Rs.7000/- for replacement of chains and sprockets.

The major constraints to manufacturing are the absence of quality and reasonably priced fast wearing parts. The company has shown interest in the development of groundnut

machinery, as its present products are mostly marketed in the rainfed (barani) areas of the Punjab where groundnut is commonly grown.

MILLAT TRACTORS LTD:

The company is the largest tractor manufacturer producing Massey Ferguson Tractors in Pakistan in the public sector. Commonly marketed tractor models are MF-240, 265 and 375. The company has been able to delete 80% of the components of the MF240 tractor, which in itself is a major breakthrough in the manufacture of tractors in Pakistan.

The company is also marketing a range of tractor drawn implements either imported directly or locally produced. Millat is facing considerable difficulty in selling implements, as its prices are not competitive. For example, according to this company the cropmate Drill should have its cost reduced, if it has to penetrate the market. The bottlenecks are: the raw material availability, material analysis and heat treatment facilities.

With the stopping of ADBP loans for the import of combines there are at present no sales of combine harvesters. Millat is now exploring the possibility of industrial use of tractors as well.

Furthermore the Millat are intested in rotavators and plan to have the machine manufactured under licence at their premises.

FARM DEVELOPMENT INDUSTRIES (FDI) LTD:

The company has been successful in locally producing rotavators based on Howard-design. FMI has also assisted the company with feasibility studies and in providing FDI with international expertise under RNAM, for the development of its heat treatment facilities.

The product range includes cultivators, mould board and disc ploughs and components. The company seeks assistance from FMI or any other agency for promotion of its products, specially FMI-assisted rotavators. The company vows that the import of rotavators should be stopped and requested FMI to assist in getting its rotavator marketed through Millat.

JAVED ENGINEERING COMPANY (JECO) (GUJRANWALA)

This company had been one of the earlier FMI contract manufacturers, have taken the initiative to produce limited quantity of multicrop threshers. Although, due to various factors this type of thresher didn't catch on with the farmers.

The company specializes in the manufacture of hydraulically operated tractor implements. The product range includes front blade, tipping trolley, front-end loader with one tonne capacity. The company had a turnover of 10 million rupees last year. It produces 700 blades per annum, a large quantity of these is supplied to Millat Tractors. One hundred front-end loaders were being made this year. The idea of using MF tractors for industrial purposes is being explored jointly by Millat and Jeco, for manufacturing the back-hoe etc.

The Allied Agro Industries a sister concern of JECO is producing cultivators. However, due to non-availability of proper grade of raw material the company has not been able to come up to the quality standards of Millat, according to their manager partner. The manufacturer of Fiber Glass tanks for sprayers are of interest to the company

ZARKHEZ AGRO SERVICES (Pvt) LTD:

This company is dealing in custom-hiring of combine harvesters since 1987. It maintains a fleet of ten self-propelled combines viz. Ford, New Holland and Fiat Trattori.

At least five combine were bought through ADBP loan. Initially the company had good business but this year because of frequent breakdowns in machinery, tough competition and farmer's indifferent attitude the hiring business has been slack. Because of the inability of the machine to make the straw (Bhoosa), farmers this season resorted to the use of tractor front-mounted FMI reaper wind-rowers.

It was reported that the reaper-thresher combination grain fetches from Rs. five to ten more than the grain harvested with the combine.

During paddy harvesting with the combine harvesters, grain breakage was reported particularly in the export varieties. Thus highlighting the need to ponder over factors responsible for the breakage.

With the advancing of ADBP loans to numerous parties, the majority of whom were unaware of the nature of work involved and familiarity with the machine, the major aim in acquiring the machines appears to have been quick monetary gains. This resulted in continuous operational problems.

SARGROH FARM AIDS (Pvt) LTD:

The company is one of the leading dealers of agricultural machinery and equipment. The

company is sole agents for the Ford and New Holland Combine harvesters in Pakistan and have todate managed to sell about 125 units. The company has also promoted kits for the harvesting of sunflower crop. Due to the expertise available within the company, the approach has proven to be of considerable success in the introduction of expensive wheat, cotton, groundnut machinery and equipment.

PAKISTAN ZARAEI INDUSTRIES (PZI)

National Highway, Hyderabad
P.O. Box 449

Ph: 30857, 30469

Contact Person/s : Naeem & Saleem Brothers

The company was established in 1982 and is engaged in the production of following agricultural machinery on regular basis:

1. Disc Plough
2. Reversible Moldboard Plough, Rs.18000/- (2 furrow)
3. Cultivators (9 & 11 tined) 50-60 units sold/annum
4. Trolleys
5. Disc Harrow

The PZI also has dealership of Massey Ferguson tractors from Millat Tractor Ltd., and is collaborating manufacturer of FMI. It has catered to the specific agricultural machinery needs of some of the projects in Sind in large numbers including.

1. South Rohri Fresh Water Project
2. Agricultural Research Institute, Tandojam

Plot wheat thresher with 350-400 kgs/hr output is also being manufactured by this company. The thresher has a 7.5 hp Chinese engine and is priced at Rs. 28000/-

Constraints: Skilled Labour

Uncertain political situation in Sind.

FMI-developed tractor rear-mounted sugarcane planter has also been tried by a farmer in the vicinity through PZI but it encountered breakdowns specifically in the plastic metering mechanism.

Comments:

1. The company management has a progressive attitude and are enthusiastic entrepreneurs.

2. One of the proprietor has received 9-months training in West Germany Under GTZ aid program through FMI.
3. The layout of the PZI workshop was not good; storage of raw material was not well organized despite lot of space being available.
4. The company participated in the Agricultural Machinery Exhibition held in February 1989 at Bangkok, through RNAM's programme of encouragement for manufacturers visits overseas.

LAHORE AUTO STORE: Charsadda, NWFP

The company is one of the major dealers of agricultural machinery in the area. It also has a show room in Swabi, NWFP. The company estimates total sales of 200 rotavators per annum in NWFP. It specializes in the Italian Maschio Rotavator having 60 inches working with 4 speed, chain sprocket mechanism priced at Rs. 45,000/-

Other equipment being sold by the dealer is; Ittifaq (Lahore) Reaper, high speed diesel engines, pumps, cultivators, front blade, sprayers.

The dealer managed to sell one reaper last year and was unable to sell any reaper during the current wheat harvest. The dealer complained that not much information flows-in to update the agricultural machinery dealers from the research institutes.

1. Haji Samar Gul, Sardheri, NWFP
Engineering Works.

The manufacturer is producing of the famous animal-drawn Sardheri Plough. He still sees demand for animal-drawn implements in the region.

2. Ahmad Shah; Sardheri, NWFP

The manufacturer is a dealer of Sardheri Plough. He sells it for range of Rs. 120-Rs.150/-
Hand tools manufacturers, Gujar Garhi.

Note: A number of other hand tools manufacturers were visited in the locality. A wide range of hand tools are being manufactured using age-old production techniques and methods. Some of the tools include spades, shovels, axes, gur-pans, stoves, rakes, wheel barrows etc.

Conclusions:

1. A broad range of agricultural machinery is being manufactured at Faisalabad.
2. In NWFP and Sind provinces an agricultural machinery manufacturing base is lacking.
3. Some of the constraints of ag. machinery manufacturers in Punjab are lack of working capital and new designs.
4. In Sind lack of skilled labour and technical expertise are the major bottlenecks.
5. The manufacturers need technical assistance on continuous basis to keep up with quality and standardization.

Recommendations:

1. Highly progressive and receptive manufacturers should be encouraged to become market leaders by involving them closely with the R & D process.
2. There is a strong need for the induction of professional engineers in the area of manufacturing technology.

C. AGRICULTURAL RESEARCH STATIONS.

1. Livestock Production Research Institute,
Bahadar Nagar, Okara
2. Fodder Research Institute, Sargodha
3. Adaptive Research Institute, Sargodha
4. Agricultural Training Institute, Sargodha
5. Sugar Crops Research Institute, Mardan
6. Cereal Crops Research Institute, Nowshera
7. Drainage Reclamation Institute of Pakistan,
Tandojam
8. Agricultural Research Institute, Tandojam

LIVESTOCK PRODUCTION RESEARCH INSTITUTE:

After meeting the Farming System Research (FSR) personnel at the Faculty of Animal Husbandry, it was brought to our notice that urea treatment of straw (Bhoosa) through mechanical means posed a problem and the FSR programme wished FMI to help further improve one of the system they were developing for this purpose.

Therefore the Livestock Production Research Institute, Bahadarnagar, Okara was visited on 22nd June 1989. The institute has a 1400 acre fodder farm with 1600 animal units. The daily consumption of green fodder at this institute is 80-85 tonnes. The institute has a budget allocation of Rs. 15 million including its station at Qadirabad.

There are 60 personnel staff, which includes vets, animal reproduction crop production personnel, but no agricultural engineers.

A large amount of oversized livestock and fodder production machinery and equipment is lying idle in the sheds. The institute had apparently made no serious efforts to operate those machines. Some of the machines which are fast turning into junk are:

Combine Harvester, 90 hp 4-WD tractors, Hay Conditioners, Rakes, Balers, Fodder Choppers, Fodder-Wagons, Feed Mill (being run under-capacity), Mowers, Cultivators, Rotavators, Miscellaneous machinery and equipment

The group had developed the liquid-urea spraying system mounted directly on the wheat thresher. The concept appeared to be good, but the apparatus had some in-built design problems limiting its operational use, and needed redesigning and economic analysis had to be carried out. Further studies are also warranted to ascertain the storage effects, and whether or not this treatment would give rise to microbial activity.

The concerned people indicated that they had funds available for further modifying the spraying mechanism.

Contact Person: Dr. Saleem

Livestock Production Research Institute
Bahadarnagar, Okara Ph: 3181, 3557

FODDER RESEARCH INSTITUTE, SARGODHA

Contact Person: Dr. A.R. Chaudhry, Director and Mr. Mukhtar Gill Botanist.

This institute is located alongwith other related departments on the campus. These included:

1. Cotton Research Substation
2. Horticultural Crops Research Substation
3. Adaptive Research Institute
4. Tractor Training School
5. Agriculture Training Institute
6. Water Management (being moved to the campus)

The Fodder Research Institute (FRI) is under the administrative control of Director General (Research) Punjab, and it is the only institute of its kind in the country. Therefore it also caters for selected seed fodder crops (maize, sorghum, pearl millet) production for other areas.

The FRI has substations at the following locations:

1. Livestock Research Section under the Ayub Agriculture Research Institute (ARI), Faisalabad.
2. Chhara Paani, Murree
3. Bahawalpur
4. Farooqabad, Lahore

The major research areas at the FRI, Sargodha and its substations are:

1. Potential Crops to overcome fodder scarcity
2. Crop residues
3. Rangelands.
 - i. Mazenta: It is a cross between maize (zea mays) and teosite (Luchalaena maxicana). Studies are being undertaken to verify the parentage of maize in these crops. It was reported that headway has been made in the seed production and it has been demonstrated to farmers and also given to research stations elsewhere in the country.
 - ii. Sadabahr: It is an inter specific hybrid. It regenerates repeatedly when planted in February/March and green fodder supply is assured upto the end of October/ November. The private sector is involved in its seed production, after having seen its importance.

- iii. **Multicut Bajra (Pearlmillet):** Bajra is an important summer fodder. It can grow well on slightly poor and sandy soils. The FRI has recently screened material and pin-pointed a cultivar which gives 2-3 green fodder cuts and then grain yield when planted in March.

Other fodder crops which are also being studied at the farm are: Cowpeas, guar, berseem, oats, lucerne.

The FRI indicated its interest to develop cooperative research activities with Farm Machinery Institute (FMI), NARC, on farm machinery related aspects. The FMI has also been requested to look into the possibility of developing or providing a plot thresher for berseem etc. The FRI has shown its willingness to provide funds for its development, and avail the technical expertise of FMI.

Other aspects of fodder production machinery will also be looked into, with a view to solve farmer problems which limit fodder production currently.

ADAPTIVE RESEARCH INSTITUTE: Sargodha.

Contact Person: Engr Rana Khalil Ahmad, Deputy Director Ph: 5677

This institute is located next to the Fodder Research Institute. It has a team comprising of an Agricultural Engineer, Agri. Economist, Crop Productionist and an Agronomist.

Some new ideas have been tried out by this institute, but apparently little has been done to extend these ideas/machines to local farmers thus limiting their acceptance. Some of the machines which were of immediate interest to FMI were:

1. **Hold-On Type Spiral Paddy Thresher**
(Some work on a similar machine was undertaken by FMI in late seventies)
2. **Inter-culture equipment for cotton**
3. **Manual Weeder for paddy.**

The Deputy Director Incharge of ARI, was willing to hand over the potential machines to FMI, for further development work and extension.

A tractor-mounted sprayer for orchards, carried interesting and workable solutions to some of the problems indicated to FMI engineers during their visits to Bahadarnagar, Okara and Chiniot.

AGRICULTURAL TRAINING INSTITUTE, Sargodha.

This institute is meant for the training of 150-200 field assistants per year. Applicants having minimum qualifications at matric level (science) are enrolled for a two-year course. More emphasis is on practical hands-on training during the course. The trainees are paid Rs. 100 per month as pocket allowance. The institute is also conducting courses for women in various areas of house hold interest and these participants are paid Rs. 300 per month. Mobile courses are conducted at selected villages in Sargodha Division for farmers, and such participants are paid Rs. 12/day for a two-day course.

The two-year certificate is awarded by the University of Agriculture, Faisalabad.

SUGAR CROPS RESEARCH INSTITUTE (SCRI), MARDAN, NWFP

The institute is engaged in research on Sugarcane and Sugarbeet. It is estimated that during 1987-88 98,000 ha of area was under Sugarcane while during the same period 1779 ha of land was under sugarbeet in NWFP. Some agronomic data for sugarbeet.

Sugarbeet is sown during October-November, the plant to plant distance is 20 cm, the plant population is 80,000/ha, while seed rate is 7-8 kg/ha. Most of the planting is on top of the ridges, water requirements are met through rain water and supplemented by canal irrigation. Inter-cropping of sugarcane and sugarbeet is also done. Planting by mechanical means is required alongwith inter-culture equipment.

Conclusion:

1. Planter with 45 cm row spacing is required.
2. Inter culture equipment is required, both animal-down and tractor-drawn.

Recommendation:

To develop and promote sugarcane and sugarbeet planters possibly jointly by FMI and SCRI.

CEREAL CROPS RESEARCH INSTITUTE. Pirsabak, Nowshera.

Contacts Person/s: Mr. Alauddin, Director Ph:0523/2521

Dr. M. Saleem, Maize Botanist

A large amount of agricultural machinery is lying in its machinery shed, some of it has been there since 1952. The major machinery and implements are:

1. Tractors 65-100 hp
2. Seed Drills (all types and sizes)
3. Grain Drier. (Italian, American) (unassembled)
4. Moldboard Plough
5. Cultivator
6. Fodder harvester (self-propelled)
7. Threshers
8. Combine harvester
9. Baler
10. Miscellaneous machinery and equipment

It was indicated that the Seed Industry is confronted with grain drying problems. A total of 120 tonnes of seed is stored at CCRI. However, there are no proper storage facility for storing of seeds.

DRAINAGE RECLAMATION INSTITUTE OF PAKISTAN (DRIP) TANDOJAM, SIND

The institute is engaged in drainage of water-logged soils since 1975. Besides engineering factors, agronomic factors are also being ascertained. The improved irrigation techniques like sprinkler and trickle irrigation are also being evaluated. DRIP has a 40 acre block under drainage where mainly tile drainage work is going on. The tile drainage system installation costs Rs. 10,000/acre, but farmers consider this expensive. In Khairpur 10 year old drainage is being monitored and the outfall is still there.

Mole drainage usage cannot be ascertained at this stage as the soil texture appears to be unstable for mole drainage. According to Soil Survey of Pakistan, 45% of soils are clayey while 35% are light textured soils in Pakistan.

AGRICULTURAL RESEARCH INSTITUTE, Tandojam, Sind.

The institute indicated their need for groundnut digger in Sind. Fertilizer broadcaster is also a requirement. Sunflower grain does not pose much drying problems in Sind because of favorable weather conditions prevalent there. There exists potential for increasing the sunflower yields through mechanized means. A seed rate of 1.50 kg/acre of sunflower is used in the area but achievement of proper spacing and plant population is constraint.

Conclusion:

1. Need for sunflower drill
2. Need for popularization of groundnut digger and thresher.

Recommendations:

FMI in collaboration with the Faculty of Ag. Engg. at Tandojam and manufacturers at Hyderabad and Nawabshah should encourage local manufacturing of groundnut machinery & equipment.

D. FARMERS

FARMER VISIT.

Farmer: Khawaja Altaf Hussain
Akbar Bagh, Salara Road,
Chiniot, Distt. Jhang

This farmer has 200 ha of irrigated land and is a major orchardist in the area. He grows variety of fruits including mangoes, citrus, lyches, almonds etc. He operates five tubewells for irrigation purposes at his farm. The farmer maintains a fleet of agricultural machinery which includes tractors, ploughs, harrows, sprayers etc. Some of the equipment have been modified to suit the particular requirements of the farmer.

The farmer has 100 buffalo heads and supplies milk to Faisalabad. At present manual milking of buffaloes is being carried out at his farm. He showed keen interest in the portable buffalo milking machine currently being evaluated by FMI at the Animal Sciences Institute, NARC. A further look into the practical aspects of such a trial is required.

A few FSR contact farmers were also visited near Hala, Sind. The farmers have adopted the mechanisation package promoted by the Farming Systems Research Group. Some of the farmers had planted wheat using zero-tillage technology during late season and had got higher yield.

E. OTHER RELATED CONTACTS

FARMING SYSTEMS RESEARCH

Punjab We met the local FSR scientist at the University of Agriculture, Faisalabad. They indicated that the absence of agricultural engineer in their programme was a hindering factor in the promotion of mechanisation packages. We were informed that efforts made hitherto could not be extended to the farmers because of design flaws in the machinery.

It is suggested that there is need for an Agricultural Engineer to be attached with the FSR.

NWFP The small farmers having 1-5 acres of land constitute 72% of farming community in NWFP with mechanisation problems. Some ideas on sugarbeet drill and sugarcane planter have been tried out at the Sugar Crops Research Institute. However, because of design problems these machines have not been successful so far.

Sind The seed drill with foam-pad metering mechanism had been used to sow wheat after onion crop as late as mid-December, and this had given yields of 3.5 tonnes/ha. The farmers encountered some operational difficulties with the drill. The need for tractor-front mounted reaper-windrowers, sugarcane planters and ridgers was highlighted and FMI was asked to assist in its efforts.

Conclusion:

1. The FSR lacks the services of experienced agricultural engineers to promote its mechanisation packages.
2. The FSR approach seems to be a successful approach although more publicity was required.

Recommendation:

1. Agricultural engineers should be inducted in the FSR teams at provincial level.
2. Effective use of information media is emphasized.

PUNJAB RESEARCH COORDINATION BOARD (PRCB)

Contact Person: Dr. Ali Mohammad Choudhary, Secretary PRCB.

The board is responsible for allocation of funds for projects forwarded to it, after initial scrutiny by the researchers. The board has on its panel specialists in each area of agriculture.

Research proposals from the University of Agriculture, Faisalabad are also forwarded to this board. At present the board has no farm machinery related project under consideration other than those under the Agricultural Machinery Research Institute, Multan.

TIPAN:

The TIPAN Project under the USAID programme is based at the NWFP Agricultural University, Peshawar and has been in existence for about four years now. The programme is involved in the infrastructure development as well as in the improvement of teaching, research and outreach activities.

The TIPAN people showed an interest in the evaluation of FMI portable milking machine for buffaloes.

VISITS WITH SECRETARY AGRICULTURE, DG FIELD, DG, ONFWM, PUNJAB.

The need for more coordination between AMRI and FMI was highlighted. The Director (Tech), FMI emphasized that drudgery at the farm has to be reduced so as to stop the migration of rural youth to urban areas. Machinery and equipment need to be designed and popularized to increase farm productivity and thus induce the rural youth back to the farms. The duplication in research needs to be avoided to achieve tangible results, as regards to agro-ecological zones. The secretary for Agriculture mentioned that an Agricultural Management School at Vehari, is expected to start classes from fall 1989. A need was indicated to devise the Syllabi for the school, in order to produce better managers for the present day needs.

Conclusion:

Duplication of research and development in farm machinery were resulting in waste of research.

Recommendation:

1. To setup Technical Advisory Committees of FMI and AMRI.
2. To put more resources into information dissemination of FMI.

PIONEER SEEDS COMPANY

The company is undertaking promotion of oilseed and fodder crops, such as maize, sunflower, alfalfa. The company emphasized the need for a suitable drill/planter for high value crops. The local drills used by the company in its seed promotion campaigns, have been found out to be prone to operational problems and it is very difficult to maintain the required seed rate and depth.

The row spacing required for maize is 65-75 cms and for alfalfa is 45 cms. There is a strong requirement for a seed drill to be made available to farmers at an affordable price.

CARGILL PAKISTAN SEEDS (Pvt) Ltd.

The company is engaged in the introduction of oilseed crops in Pakistan. It has got its own seed processing facility at Lahore, and a network of seed distribution centres throughout the major oilseed crop growing areas of the country. The constraints to sowing of oilseed crops, more specifically sunflower, are the maintaining of the following factors.

- (i) Plant Population (ii) Proper depth (iii) Proper seed rate.

The recommended practices for sowing of sunflower are: 50,000 plants/ha 75 cm row spacing and 18-22 cm plant to plant distance.

Cargill is currently hiring combines with sunflower kit @ Rs.300/acre for crop harvest. The efficiency is good only when the crop is relatively dry. A planter of West German origin bought locally priced at Rs. 100,000/- did an excellent job for planting sunflower and some of the more progressive farmers have shown an immediate interest in buying the machine.

The company has plans to sow sorghum at about 700 acres and 600 acres of hybrid sunflower are to be sown in Dipalpur, District Okara during 1-20 August 1989. This year many farmers refused to plant sunflower, because of procurement problems faced by them, resulting in sowing of only 70,000 acres as against target of 150,000.

GHEE CORPORATION OF PAKISTAN (GCP)

The Seed Division under the GCP is engaged in the promotion of sunflower production in

Pakistan. At present this division is working on the promotion of the oilseed crops i.e. Sunflower, Safflower and Soyabean.

Although the area under sunflower reduced considerably this year, because of the procurement problems faced by the farmers and non-existence of suitable machinery and equipment particularly sunflower threshers. GCP was still able to procure 7000 metric tons of sunflower seed from Gujranwala Division alone (Director Seed). Combine harvesters are currently being used for harvesting of sunflowers. Some of the machines with proper sunflower kit are doing a better job than the ones which are harvesting the crop with the wheat kit. Since proper sunflower planters are not available in the market, seeds are sown with conventional drills, which are quite inappropriate.

At present two sunflower crops are being grown viz. spring and autumn. The autumn crop is confronted with two problems; high moisture problem at harvest, while harvesting with combine harvester 30% losses have been observed. Stationary threshing is preferred and particular requirement exist for sunflower and soyabean threshers.

Seed cleaning and drying are other areas which require urgent attention by the farm machinery experts. The moisture content at the time of sunflower harvest is 25-35% while the desirable is 10-12%

The GCP intends to confine itself with the commercial aspects of the oilseed crops and would withdraw its support for the machinery promotion from the next fiscal year. Currently GCP has funds for procurement of fifty sunflower thresher, twenty soyabean threshers and miscellaneous machinery like seed drills, planters, driers, seed cleaners etc. The existing seed cleaners are installed at Kohinoor Oils and Pattoki Livestock Farm.

PAK-HOLLAND METAL PROJECT (PHMP):

This is a joint project of the governments of Pakistan and Holland, being executed under the Sarhad Small Industries Development Board (SIDB), for the promotion of metal workshop in NWFP. The project is expected to continue for another six years. According to a survey conducted by the PHMP, there are 45 agricultural machinery and implement manufacturers in NWFP, while approximately 3000 units are engaged in metal related jobs in the province. The trades being handled by PHMP are; welding, sheet metal, light

engineering works, turning, automotive repairs etc. A revolving fund of Rs. 2.5 million is maintained for short and long term loans. The short term loans amounting to Rs. 10,000/- are advanced for a maximum period of one year, with 14% interest rate, while long term loans upto a maximum of Rs. 200,000 are advanced for a period of three years (plus one year grace period) at 8% interest rate. Presently the recovery rate is 97%, but it is expected to go down when medium term loans are recovered.

The PHMP has now established zonal offices at Abbotabad and Dera Ismail Khan.

Conclusion:

1. FMI can cooperate with PHMP in the 45 common interest workshops.
2. PHMP is already working jointly with ALEP based in Mardan.

Recommendation:

FMI should coordinate with D.I. Khan Zonal office of PHMP, for developing agricultural machinery manufacturing base there.

Appendix—

VISIT DETAILS

Team: Dr. M. A. Choudhary, Director (Technical) FMI/Consultant MART/USAID and Irfan Saleem Ahmad, Senior Agricultural Engineer, FMI, NARC

June 1989

- 20 Departure for Faisalabad by PK 6557 at 1845, stay at University Rest House.
- 21 900 Meeting with Dr. A. Rahman, Vice Chancellor University of Agriculture, Faisalabad.
- 1100 Meeting with Dr. Haji Mohammad Chaudhry, Dean and Chairman of Deptt. of Faculty of Agricultural Engineering and Technology.
- 1200 Meeting with Dr. Akram Raja and Dr. Sadaqat Hanjra of FSR in the Faculty of Animal Husbandry.
- 1600 Visit to M/s Naeem & Company, Sammundri Road, Faisalabad. Meeting with the management of the company.
- 22 0830 Meeting with Dr. Ali Mohammad Chaudhry, Secretary, Punjab Research Coordination Board.
- 0930 Visits to Faculty of Agric. Engineering Laboratories and workshop.
- 1030 Series of Meetings with each Chairman of Deptts & senior staff.
to
1400 Dr. A. D. Chaudhry, Chairman, Farm Machinery
Dr. M. Rafiq Chaudhry, Acting Chairman, Irrigation & Drainage.
Prof. Dr. G.S. Sheikh, Deptt. of Basic Engineering
Dr. Jahangir K. Sial, Deptt of Basic Engineering
Dr. Malik Abid Hassain, Associate Professor,
Deptt of Agronomy
- 1430 Visit to M/s Danishmand & Company, Narwala Road, Faisalabad.
- 1500 Departure for Bahadurnagar (Okara) by road alongwith Dr. Akram Raja, FSR, Animal Husbandry.
- 1630 Visit to Livestock Production Research Institute, Bahadurnagar, Okara. Meeting and field visits alongwith Senior Scientists for exchange of views on livestock machinery development and crop production.
- 1845 Departure for Faisalabad.
- 23 Report writing.
Informal meetings at Rest House with Senior staff of Faculty of Agricultural Engineering and Technology.
- 24 0830 Series of meetings with junior staff of faculty of Agricultural Engineering & Technology.
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- 0930 Meeting with Dr. Amanat Ali Chaudhry, Chairman Deptt of Basic Engineering.
Seminar on Farm Mechanisation by Dr. M. A. Choudhary

- 1130 Discussion with Graduate Students of Ag. Engg. (Farm Machinery Group).
- 1500 Visit to M/s Rachna Industries (Regd) Sammundri Road, Faisalabad.
- 1600 Departure for Sargodha by road.
- 1630 Visit to Akbar Bagh Farm in Chiniot
Farmer: Khawaja Altaf Hussain.
- 2030 Informal meeting with Dr. A. R. Chaudhry,
Director, Fodder Research Institute, Sargodha.
25. 0730 Meeting with Dr. A. R. Chaudhry
Field visits to experimental area.
- 1130 Meeting with Engr. Rana Khalil
Acting Director, Adaptive Research Institute,
visit to Farm Machinery Shed and field demonstration of cotton interculture
equipment.
- 1230 Visit to Agriculture Training Institute
Meeting with Director Mr. Qamar Rana.
- 1400 Departure for Islamabad from Sargodha.
- 1830 Arrival at Islamabad.

July 1989

- 07 1500 Departure from Islamabad for Lahore by air.
1700 Departure from Lahore for Karachi by air.
- 08 0840 Departure from Karachi for Tandojam by road.
1115 Visit to Sind Agricultural University, Tandojam.
1130 Meeting with Dr. A.Q. Mughal,
Dean, Faculty of Agricultural Engineering.
1330 Meeting with Takumi Izuno, MART/USAID/FSR
- 09 0715 Visit to Jamotte Farm
0900 Visit to FSR sites at Hala.
1200 Visit to DRIP Field Experiments
Meeting with Dr. Bashir A. Chandio, DG
1330 Meeting with Dr. I.M. Bhatti,
Vice Chancellor, Sind Agri. University, Tandojam.
1400 Meeting with Mr. Altaf H. Chaudhry, Director, Agricultural Res. Institute,
Tandojam.
1830 Informal Meetings with
to Dr. A. Q. Mughal, Dean FAE
2200 Prof. Dr. Noor Nabi N. Ansari, Director Advanced Studies.
Mr. Naeem & Mr. Saleem, of M/s Pakistan Zaraee Industries, Hyderabad.
- 10 0800 Meeting with Dean and Chairman of Deptts of Faculty of Ag. Engg.
1000 Seminar on Tillage & Seeding by Dr. M. A. Choudhary.
1300 Visit to Atomic Energy Agricultural Research Station, Tandojam.
1400 Departure from Hyderabad for Karachi by road.
1630 Report writing
2245 Departure from Karachi for Islamabad by PK-360
0130 Arrival at Islamabad.

LAHORE

25th July, 1989

- 0815 Departure from Islamabad for Lahore by PK-385
- 0930 Meeting with Mr. Khalid Masud Butt, Managing Director, Sayyed Machinery Ltd.
- 1030 Meeting with Dr. A. Rahman Khan, General Manager, Cargill Pakistan Seeds (Pvt) Ltd.,
- 1330 Departure for Gujranwala by road.
- 1450 Meeting with Mirza M. Amin, Javaid Engg. (JECO)
- 1600 Departure from Gujranwala for Daska by road.
- 1630 Visit to United Agro. Engr. Mirza M. Younas
to Visit to Mughal Farm Machinery Manufacturing Co. Mirza M. Ismail.
- 1845 Visit to Greenland Engineers, M. Iqbal
- 2130 Departure from Daska for Lahore, Meeting with Engineer Huma Iqbal, Chief Executive, Zarkhez Agro Services (Pvt) Ltd.

26th July, 1989

- 0900 Meeting with Mr. M. A. Rajput, Director General (Field).
- 0945 Meeting with Mr. Sadiq Cheema, Director General, Water Management.
- 1100 Meeting with Director (Seed) Ghee Corp. of Pakistan.
- 1145 Meeting with Mr. Zahir Khan, General Manager Seed Div. GCP.
- 1240 Meeting with Mr. Khalid Sharif, Director Sargroh Farm Aids (Pvt) Ltd.,
- 1430 Meeting with Mr. Sikander M. Khan, Managing Director, Millat Tractors
Meeting with Mr. Bashir Chaudhry, Senior Manager, Farm Mechanisation.
- 1630 Visit to Farm Development Industries, Sheikhpura.

ORGANISATION AND SELECTED VIPS VISITED

Faisalabad.

1. University of Agriculture, Faisalabad Ph: 25911
 - (i) Dr. Abdur Rahman, Vice Chancellor
 - (ii) Dr. Haji Mohammad Chaudhry, Dean, Faculty of Agricultural Engineering and Technology.
 - (iii) Dr. A.D. Chaudhry, Chairman, Department of Farm Machinery and Power.
 - (iv) Dr. Amanat Ali Chaudhry, Chairman, Department of Basic Engineering.
 - (v) Dr. Mohammad Rafiq Chaudhry, Acting Chairman, Department of Irrigation and Drainage.
 - (vi) Prof. Dr. G.S. Sheikh, Department of Basic Engineering
 - (vii) Dr. Akram Raja, Faculty of Animal Husbandry - FSR
 - (viii) Dr. Sadaqat Hanjra, Faculty of Animal Husbandry - FSR
 - (ix) Dr. Shah Mohammad, Chairman, Department of Soil Science, Faculty of Agriculture.
 - (x) Mr. Qurban Ali Awan, Principal Investigator, Water Management Project.
2. Dr. Ali Mohammad Chaudhry, Secretary
Punjab Research Coordination Board (PRCB)
3. M/s Naeem & Company (Rgd),
Sammundri Road, Faisalabad.
Mirza Mohammad Akeel
Managing Partner.
4. M/s Rachna Industries (Regd).
Sammundri Road, Faisalabad.
5. M/s Danishmand and Company,
Narwala Road, Faisalabad.
6. Livestock Production Research Institute,
Bahadarnagar, Okara
Dr. M. Salim, Research Officer (Animal Nutrition).

Sargodha.

7. Fodder Research Institute, Sargodha
Dr. A. R. Chaudhry, Director.

8. Adaptive Research Institute, Sargodha
Engr. Rana Khalil, Acting Director.

Lahore:

9. M/s Sayyed Machinery Ltd,
65 Shakra-e- Quaid-e-Azam, Lahore Ph: 320131-5
10. M/s Sargroh Farm Aids (Pvt) Ltd.
72-P, Model Town Extension, Lahore.
Mr. Khalid Sharif Chaudhry, Director
11. M/s Zarkhez Agro Services (Pvt) Ltd.,
Engr. Huma Iqbal, Chief Executive.
12. M/s Millat Tractors Ltd.,
Shadra, Sheikhpura Road, Lahore.
 - i) Engr. Sikandar M. Khan, Managing Director
 - ii) Engr. Bashir A. Chaudhry, Senior Manager,
Farm Mechanization.
 - iii) Engr. Nadeem Ahmad, Deputy Manager, Farm Mechanization
13. Department of Agriculture, Government of Punjab.
 - i). Dr. Zafar Altaf, Secretary
 - ii). Mr. M.A. Rajput, Director General (Field)
 - iii). Mr. Sadiq Cheema, Director General (Water Management)
 - iv). Mr. Basharat Javaid, Deputy Director (Water Management)
14. M/s Cargill Pakistan Seeds (Pvt) Ltd.,
Dr. A. Rahman Khan, General Manager
15. M/s Pioneer Seeds
Mr. Shahid Iftikhar, Deputy Managing Director
16. Ghee Corporation of Pakistan
 - i) Director (Seeds)
 - ii) Mr. Zahir Khan, General Manager (Seed Division)
 - iii) Mr. Nabi Ahmad
17. Agricultural Development Bank of Pakistan
 - i) Mr. Asif Toor, Manager Model Branch
Shakra-e-Quaid-e-Azam, Lahore.
 - ii) Engr. Saleem Haider Zaidi,
Deputy Director
18. Mr. Sadiq Qureshi
Editor, Jadeed Zairat and
President, All Pakistan Agricultural Journalists Association.

Daska

19. M/s United Agro Engineers Ph: 2750
Circular Road, Daska
Mirza Mohammad Younas, Proprietor

20. M/s Mughal Farm Machinery Manufacturing Company,
Circular Road, Daska
Mirza Mohammad Ismail, Proprietor Ph: 2939
21. M/s Greenland Engineers, Circular Road, Daska
Mr. Mohammad Iqbal, Proprietor

Gujranwala:

22. M/s Javed Engineering Company (JECO), Climaxabad, Gujranawala
Mirza Mohammad Amin, Proprietor.

Sheikhupura

23. M/s Farm Development Industries, Pir Bahar Shah
Lahore Road, Sheikhupura.
Mr. Nazir Ahmad Alvi, Managing Director

Peshawar:

24. Mr. Tariq Aziz, Acting Head, Agric. Engineering Dept.
University of Engineering
25. Mr. Mohammad Tariq, Chairman, Agricultural Mechanization and Water
Management, Univ. of Agriculture, NWFP.
26. TIPAN Programme
27. Dr. Rauf Khattak, Director Outreach
28. Acting Vice Chancellor, Dean of Faculty of
Veterinary Sciences, Univ. of Agriculture, NWFP.

Mardan:

29. Director, Sugar Crops Research Institute
30. Mr. Amin, Senior Agronomist SCRI
31. Dr. M. Saleem, Maize Agronomist, CCRI, Pirsabak.

Tandojam/Hyderabad:

32. Dr. I. M. Bhatti, Vice Chancellor, Sind Agric. Univ.
33. Dr. A. Q. Mughal, Dean Faculty of Agri. Engineering.
34. Mr. Zulfiqar Ali Jamot, Sugarcane Farmer
35. Dr. Altaf Hussain Chaudhry, Director ARI
36. Dr. Bashir Ahmad Chandio. D.G. DRIP
37. Dr. Noor Nabi Ansari, Director, Advanced Studies,
Sind Agri. Univ.
38. Messrs Naeem and Saleem, Managing Partners,
Pakistan Zaree Industries.