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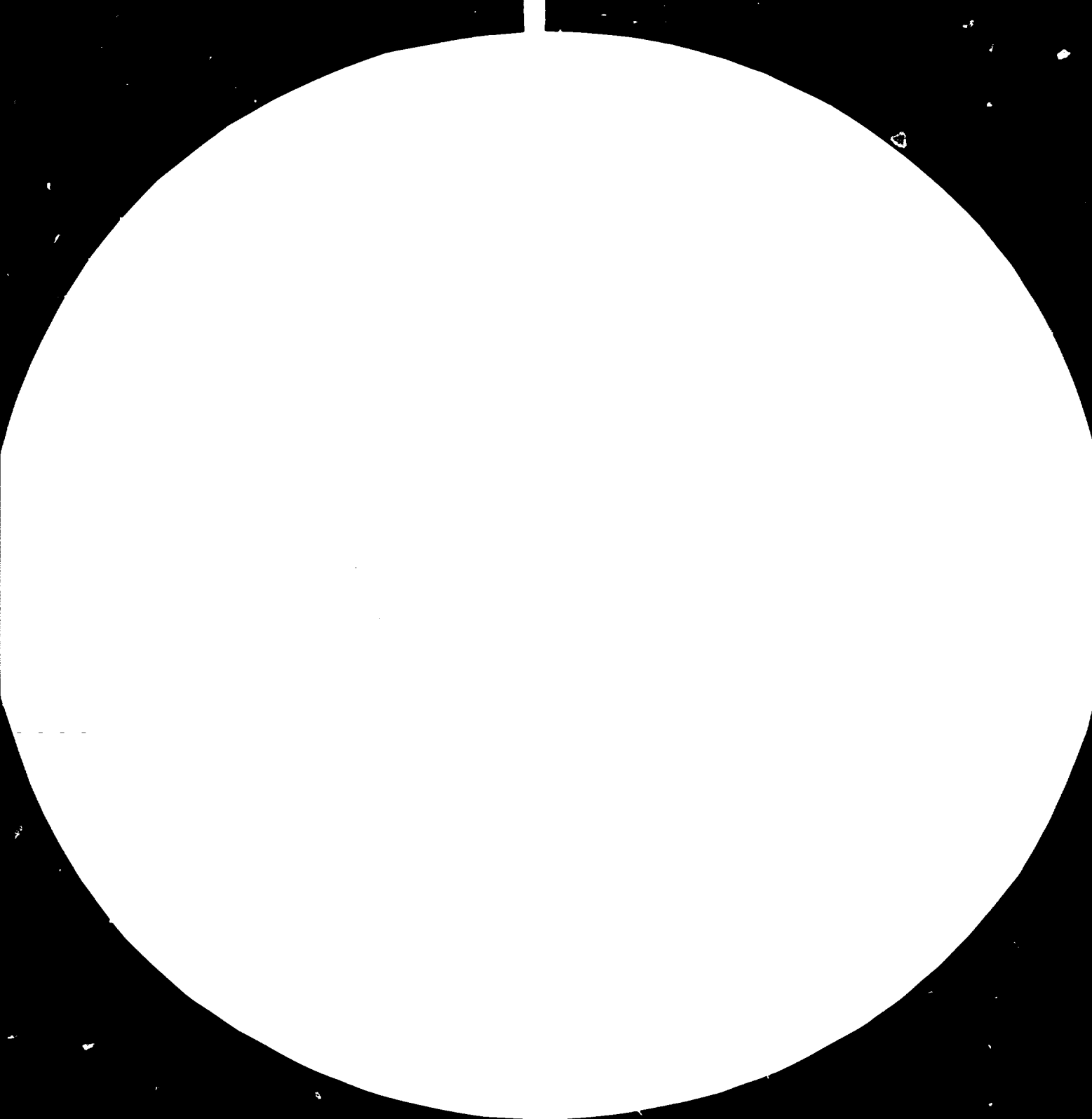
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Resolution Test Chart
1.0 1.1 1.25 1.4 1.6 1.8 2.0 2.2 2.5 2.8 3.2

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IRAN

FINAL REPORT

OF

AGRICULTURAL MACHINERY MANUFACTURE FEASIBILITY STUDY ^{1/}

(IS/IRA/71/807/11-01/01)

by

Stewart Barton
UNIDO Expert

22 October 1972 - 21 January 1973

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SUMMARY

1. Products to be manufactured (in suggested sequence for manufacture in Iran)

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How to manufacture them: 26

- | | |
|-------------------------|----------------------------|
| 1. Joint ventures | 3. Local private companies |
| 2. Licensing agreements | 4. Government factories |

1. Tabriz Tractor Factory 35

1. Establishment of product engineering departments
2. Improved quality control
3. Improvements to existing products
4. Consideration be given to model change in place of U650 and U651.

2. 5. Before any further investment is made in building a or plant a complete study of the economics of manufacture and marketing, both local and export, be made. The figure of 10,000 units per year is low for a fully integrated factory.

3. Agak Machine Building Factory

This factory appears to have decided against manufacturing complete farm machines but are prepared to manufacture component parts only. On the short term I question this decision. The plant is not fully loaded and in my opinion it is better to have some loading even if it is not the ideal product for which the factory is suited.

4. Karaj Machinery Centre

Expand the facilities as an industry orientated testing and development centre. This service to be available on a charged for basis to both Government parties and private sectors. The design and specification of the machines to remain the responsibility of the manufacturing factories.

5. Agricultural Engineering Society or Institution

The establishment of a Society or Institution of Agricultural Engineers in Iran to be open meeting orientated.

- (a) Stimulate interchange of information between interested persons and parties.
- (b) To stimulate recruitment into Agricultural Engineering as an occupation.
- (c) Stimulate education in Agricultural Engineering including operation, maintenance and repair of farm machinery.

6. Particular skills and trainings Required

The particular skills and trainings which are in short supply in Iran, and which will need to be provided by either local training or expatriates to enable the farm machinery industry to be developed are in the middle management area.

1. Draughtsmen -
 - (a) Product Design
 - (b) Production and Tool Design
 - (c) Detail Draughtsmen.
2. Product specification and scheduling personnel.
3. Production planning personnel.
4. Repair and maintenance personnel for tractors and farm machinery both at farm and district repair shop levels.
5. Tractor and Machinery Operators - there must be able to
 - (a) Adjust and set machines for correct performance.
 - (b) Diagnose and perform routine maintenance, greasing, oil changes, adjustment etc also report more serious needs for repair before they become critical problems.

7. Repair Facilities - Dealer and District

Although this service is being done with considerable skill and enthusiasm there is a need for better equipment and buildings, also more trained personnel.

8. Repair Parts

These are often not readily available away from the capital and other cities. The provision of stocks at dealer and district locations need to be improved.

9. Availability of Materials

Stimulation of local production. Where materials are imported it is essential that they are cleared through the ports and delivered to the factories with minimum delay. Materials comprise an important part of the costs of manufacture, duties and taxes, if levied, are part of these costs. The establishment of a profitable farm machinery industry in Iran may depend upon the rate of duty and taxes levied on materials.

10. Mechanization of Small Farms

I suggest the reduction of the number of very small size farms which are difficult to mechanize economically.

11. Stimulation of Market for Tractors and other Machinery

This could be done by:-

- (a) Guaranteed minimum prices for major crops.
- (b) Loans for the purchase of specific machines at attractive rates. This could be done through the commercial banks or other similar institutions. Funds for this to be made available from Central Government funds.

- 4 -

SUMMARY OF WORTHIER UNIDO ASSISTANCE SUGGESTED FOR IRAN

1. Assistance with a pilot plant to manufacture motorized knap-sack sprayer dusters
2. Assistance with on farm grain storage, entitled expert on the design and manufacture of "on farm grain storage"
3. Assistance to the Karaj Machinery Testing Centre for the selection and installation of new machinery and equipment, entitled expert on organization of a machinery testing centre
4. Assistance to Tabriz Tractor Factory, entitled experts team on all aspects of tractor manufacture and plant organization
5. Expert on organization of tractor and farming machinery repairs (private sector)

SUMMARY OF MAJOR MACHINES

Tractors

Existing Situation

<u>Make</u>	<u>Model</u>	<u>HP</u>	<u>Volume</u> <u>1351</u>	<u>Remarks</u>
Universal	650	65	4400	Assembled at Tabriz Approx. 98% imported
	651	65	500	
John Deere	920	41	60	Assembled at Arak Approx. 75% imported
	2120	76	110	
	3120	84	60	
	4020	113	90	
	4320	135	11	
B.M. Volvo	T650	80	400	Assembled by Zamyad, Tehran. Approx. 100% imported. (Zamyad Co. have extensive manufact- uring facilities includ- ing radiators, springs, pressed metal, machine shop.)
	T800	106	34	
	T810	130	12	
J.I. Case	970	109	30	
Allis Chalmers	Discontinued importing tractors			

Future

These companies should be able to provide the tractor requirements for Iran. The situation concerning the Tabriz tractor plant has been covered more fully in the report on this company. In my opinion it is in the interest of both the consumer and the country to preserve some state of competition in the supply of tractors at the same time encouraging an increasing volume of local content. A choice of at least two makes should be available in each HP range.

SUMMARY OF MAJOR MACHINES

Combines

Existing Situation

<u>Manufacturer</u>	<u>Model</u>	<u>HP</u>	<u>Volume (1351)</u>	<u>Remarks</u>
John Deere	630	97	116	) Special reinforced frame for Iran.) Some local manufacture) and assembly
B.M. Volvo	Did not import any combines this year; intends to import a small number in 1352			
J.I. Case	970	109	30	
Allis Chalmers	F	93	50	
	G	85	50	

Future

John Deere intend to increase the amount of local manufacture and assembly of their combine; in view of the relatively small annual requirement, this may prove economically difficult.

The irrigation practices in Iran by which the fields are divided by ridges causes strain on the frames. Combines marketed will need to be of sufficiently robust design to cope with this problem.

SUMMARY OF MAJOR MACHINES

Power Tillers

Existing Situation

<u>Make</u>	<u>Size</u>	<u>Volume (1351)</u>	<u>Remarks</u>
Ashtad Iran Mfg.-Ind. Co.Ltd.	4HP Diesel) 4.5HP Kerosene) 7HP Diesel) 7HP Kerosene) 8.5HP Diesel )	)4,000	Manufactured in Iran with large local content.

Future

Market is sufficiently large (estimate by FAO - approximately 6,000 per annum) to allow for more than one manufacturer. This will provide competition which in my opinion will be in the interest of both the consumer and the country.

SUMMARY OF MAJOR MACHINES

Soil Preparation and Tillage Implements

Existing Situation

Apart from some small local manufacturers most of these are imported - the majority from Eastern Bloc countries, at attractively low prices.

Future

The availability of tillage machines at attractively low prices has in my opinion acted as a brake on the development of an Iranian implement manufacturing industry. If the object "The Industrialization of Iran" and change from a rural farm subsistence type economy to an industrialized country with a smaller percentage of the population engaged in direct agriculture, in the short term this may result in the cost of items made in Iran being higher than imported products. Unfortunately this is one of the universal problems encountered in countries with small internal markets. If the object of industrialization is to be achieved, this cost penalty will have to be borne for the short term.

With the commencement of production by the Disk and Earth Engaging Tool Factory at Arak (McKay, Mechaval, IDRG), the production of soil preparation and tillage implements should be simplified and encouraged.

SUMMARY OF MAJOR MACHINES

Pumps for Agricultural Purposes

Existing Situation

<u>Manufacturer</u>	<u>Size</u>	<u>Type</u>	<u>Volume</u> <u>1351</u>	<u>Remarks</u>
Piemco	4" 6" 8"	Deep Well	500	Made in Iran
Peerless Iran	6" 12"	Deep Well	2000	"
Machine Building Factory, Tabriz	N/A	Centri- fugal	N/A	"

Future

With a small amount of expansion these companies should be able to provide the pump requirement for Iran, estimated at 3,000 Deep Well Pumps per annum. In my opinion it is in the interest of both the consumer and country to preserve a state of competition in supply of pumps, at the same time encouraging an increasing value of local content.

**Basic Thinking and Aspects used during the investigation
and compiling of the report**

- (1) To improve farm production, coupled with farm income and final consumption of products (reduction of waste through distribution and storage).
- (2) Industrialization of Iran. The change from a rural farm subsistence type economy to an industrialized country with a smaller percentage of the population engaged in direct agriculture. In the short term this may result in the cost of items made in Iran being higher than imported products. Unfortunately this is one of the universal problems encountered in Countries with small internal markets. If the object of industrialization is to be achieved this cost penalty will have to be borne for the short term.

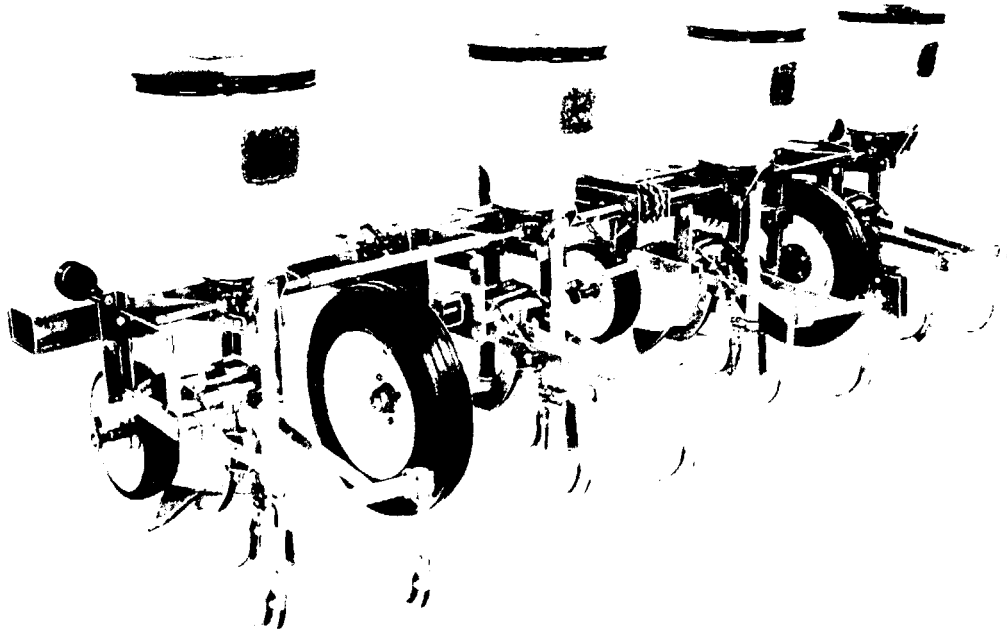
1. Products to be Manufactured

(a) Row Crop Planter

<u>Volume</u>	<u>First Year</u>	<u>Second Year</u>	<u>Third Year</u>
	200	1000	2000

Specification

Tractor mounted, units by row up to 5; suitable for delinted cotton, monogerm and pelleted sugar beet seed, also maize.

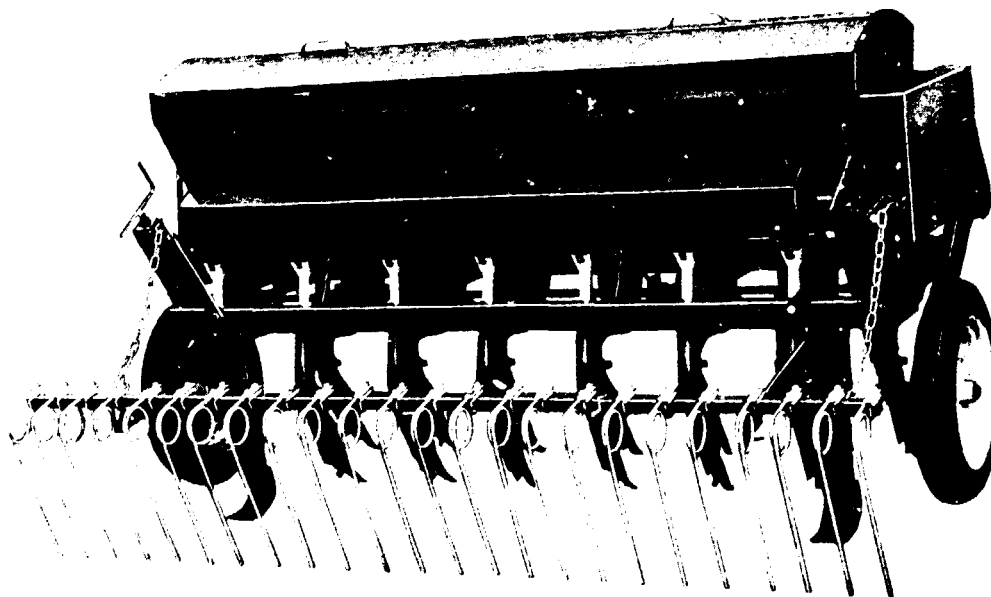


(b) Drill for Grain and Similar Seeds

	<u>First Year</u>	<u>Second Year</u>	<u>Third Year</u>
<u>Volume</u>	200	1000	2000

Specification

Tractor mounted with rear tool bar, suitable for attachment of irrigation corrugator.



Specifications:	2,10 m 6'11"
Number of coulter tines and seed tubes	14
Row spacing	6"
Tyres	6.00 x 16
Weight of machine	10 cwts.
markers	
rear harrow	83 lbs.
Height	4'3"
Width	8'2"
Length	3'5"

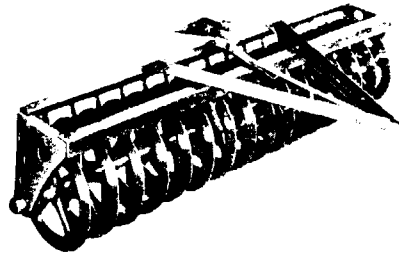
Adjustable wheel spindles provide the penetration desired.

(c) Culti-Packer for Secondary Seed Bed Preparation

	<u>First Year</u>	<u>Second Year</u>	<u>Third Year</u>
<u>Volume</u>	50	250	500

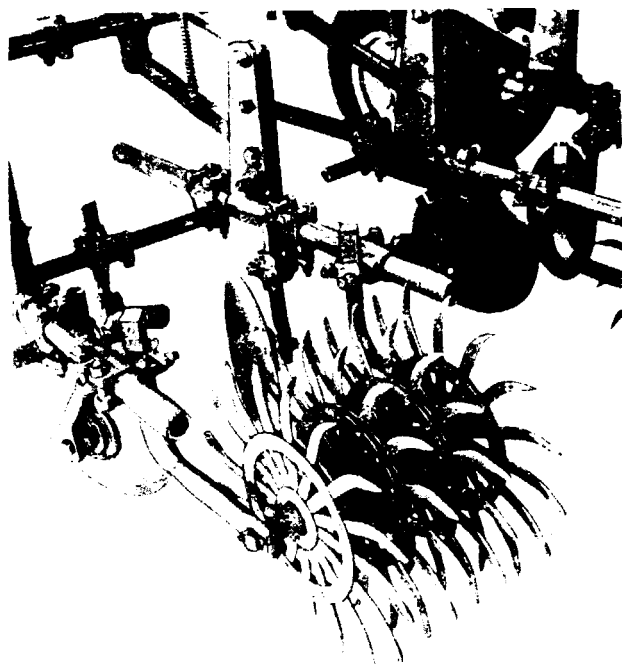
Specification

Suitable for attaching to Disc and Mould Board Ploughs.

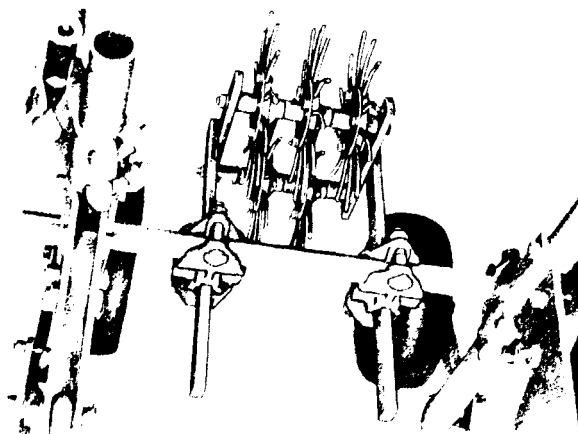


(d) Rotary Cultivator for Row Crop Weed Control

This machine will require evaluation under Iranian conditions; suggest procedure recommended by Mr. W. Giles, FAO Consultant, be followed; "Model to be secured for testing from Lilliston Imp. Co. of USA".



Rotary Hoe breaks up crust, springs out weeds, aerates the soil, and speeds plant growth when proper speeds are maintained.

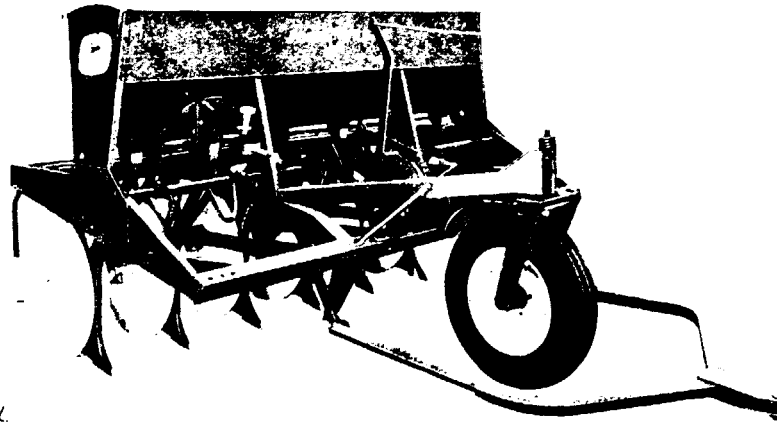


(e) Deep Furrow Drill for Placing Seed Deeply, also for Planting in Trashy Surface Conditions

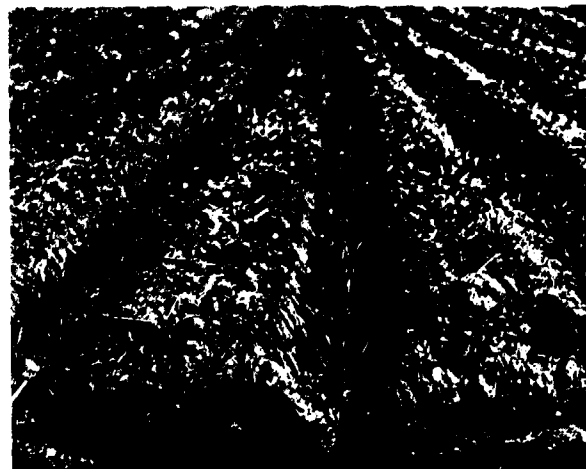
	<u>First Year</u>	<u>Second Year</u>	<u>Third Year</u>
<u>Volume</u>	50	150	500

Specification

Number of Openers	6
Openers Space	16 "
Drill Width	8 '
Weight	1,718 lbs.



Note the straw walkers on this ~~model~~. They clear trash common to stubble-mulch tillage and seeding practices.



(f) 3 Row Animal Drawn Drill

	<u>First Year</u>	<u>Second Year</u>	<u>Third Year</u>
<u>Volume</u>	100	400	1,000

Specification

3 rows - Suitable for cereal crops and rice; 20 cm row spacing;
5 cm planting depth.

(g) 1 Row Animal Drawn Planter with Fertilizer Placement Attachment

	<u>First Year</u>	<u>Second Year</u>	<u>Third Year</u>
<u>Volume</u>	50	150	300

Specification

Overall Dimensions

Length 1350 mm
Width 800 mm
Height 1050 mm

Fertilizer: All kinds.

Crops to be sown: Maize, Groundnut,
Cotton, Jowar,
Peas, Gram.

Draft: 50 to 80 kg depending on
depth of operation,
type of soil and moisture
content of the soil.

Weight: 80 kg

Labour Requirement: One man.

Power Requirement: One large size bullock or a pair of medium size
bullocks.

Rate of Planting: 0.8 hectares (2 acres) a day for 610 mm (24") row
distance.

Approximate Cost: Rs.350.00



Final prototype of one row planter in operation.

(h) Wooden Float for Secondary Seed Bed Preparation and Levelling

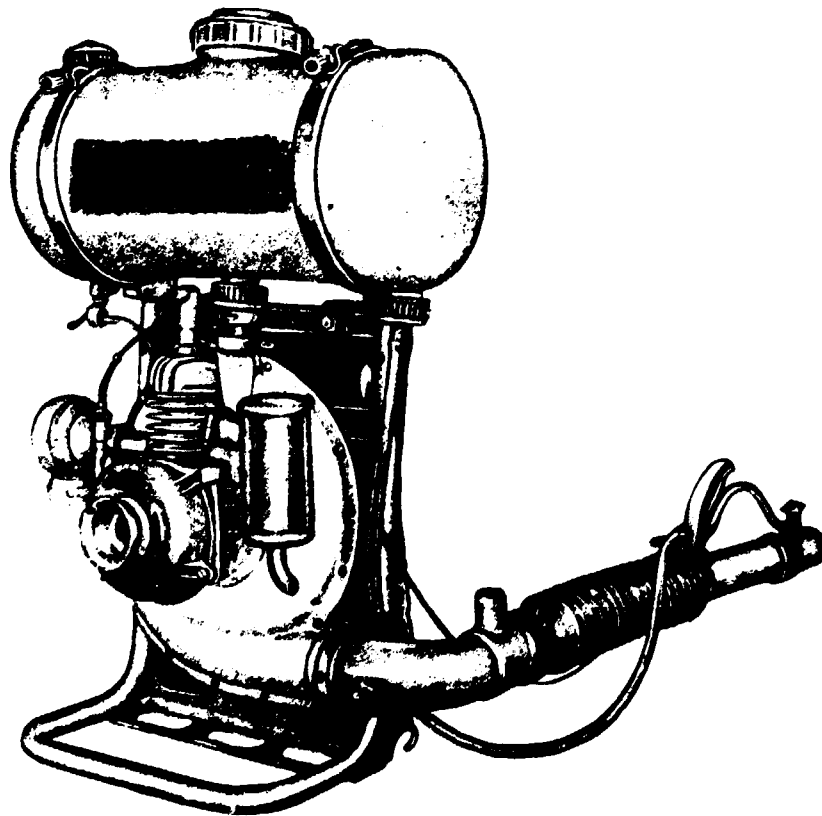
	<u>First Year</u>	<u>Second Year</u>	<u>Third Year</u>
<u>Volume</u>	50	500	1000
<u>Specification</u>			

This would be an ideal project for the Karaj Machinery Centre, and I suggest this project be given to them.

(i) Motorized Knapsack Sprayer Duster

	<u>First Year</u>	<u>Second Year</u>	<u>Third Year</u>	
<u>Volume</u>	500	1000	2000	
<u>Specification</u>				
<u>Tank Capacity</u>	<u>Weight</u>	<u>Air Velocity</u>	<u>Engine HP</u>	<u>Range</u>
10 litres	12 kgs	76 m/sec	1.2 @ 5500 RPM	8 m Horizontal 6 m Vertical

UNIDO assistance: a pilot plant to manufacture these items be established with UNIDO assistance.



TECHNICAL - DATA

UNIT		ENGINE	
	Height : 650 m.m.		Capacity... .. : 34 cc.
	Width : 450 m.m.		Output : 1.2 H.P. at 5500 r.p.m.
	Depth : 290 m.m.		Petrol consumption... .. : 817 cc/Hr.
	Chemical Tank Capacity : 10 Lit.		Petrol Oil : Petrol 28:1 Self Mixing oil
	Petrol Tank Capacity : 1.5 lit		Start : Rope Starter.
	Air Velocity ... : 249 ft/Sec. or 76 Metre Sec. or 170 Miles/Hr.		
	Air Output ... : 4.15 cft/Sec.		
	Volume : 0.117 cub. metre/Sec.		
	Weight : 11.3 Kg. Approx.		

Preliminary Calculations for a Pilot Plant to manufacture Motorized
Knapsack Sprayer Dusters

1. investment in-plant buildings and tools	US\$ 500,000
2. ex-factory sales	US\$1,000,000
3. employment	83
4. physical size	10,000 m ²
5. estimated time to turn over capital	2 ½ years
6. percentage of locally manufactured content	85 %

(j) Linkage Mounted Fertilizer Spin Spreader

	<u>First Year</u>	<u>Second Year</u>	<u>Third Year</u>
<u>Volume</u>	150	500	1000

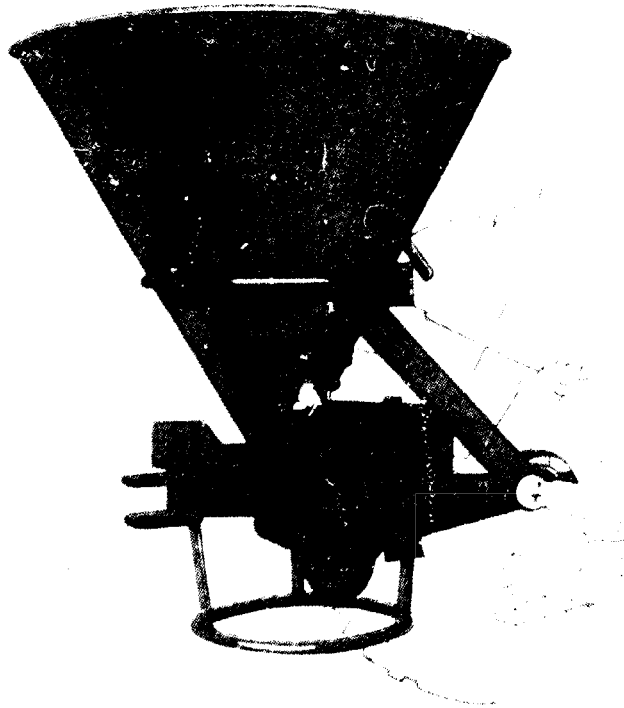
Specification

Hopper Capacity

200 Kgs

Application Rate

40 kgs per hectare up to
600 kgs per hectare



(k) Disc Harrows

	<u>First Year</u>	<u>Second Year</u>	<u>Third Year</u>
<u>Volume</u>	150	1000	1500
<u>Specification</u>	24, 28, 40 and 50 (with 20" discs)		



Width of work 2.60m (8' 6") with 22 discs.
Diameter of discs 609 mm (24"). cutaway on front and
plain on rear, or all cutaway. Discs spaced 288 mm
(9") apart.

(1) Ploughs - Disc and Mould Board

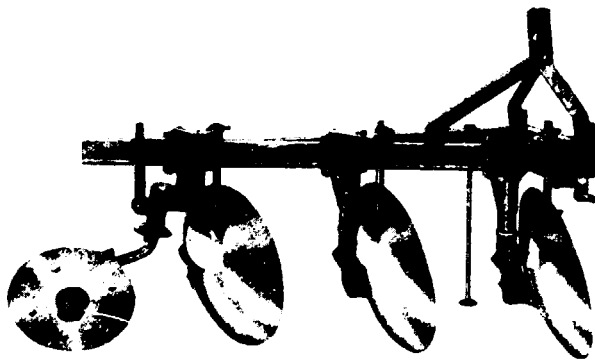
	<u>First Year</u>	<u>Second Year</u>	<u>Third Year</u>
<u>Volume - Disc</u>	150	500	1500
- Mould Board	150	750	2000

Specification

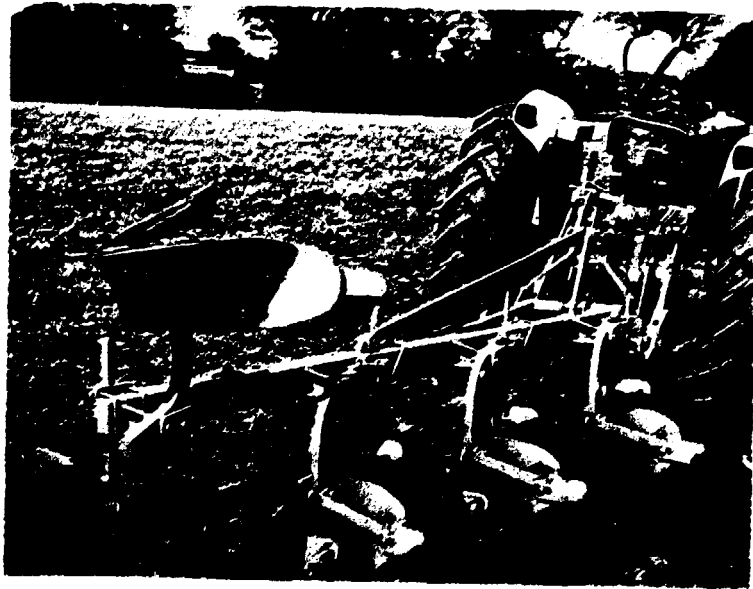
Disc: 2, 3* and 4

Mould Board: 3*, 4 and 5

*Reversible



3 and 2 furrow, adjustable for furrow widths 8 in., 9 in., 10 in. or 12 in. Underbeam clearance 26 in. (66 cm.)



Specifications

<u>Mod.</u>	<u>Furrow Width</u>	<u>Maximum Depth</u>	<u>Interbody Clearance</u>	<u>Underbeam Clearance</u>	<u>Linkage Category</u>	<u>Approx. weight</u>		<u>Approx. HP. Required</u>
						<u>lb.</u>	<u>kg.</u>	
2-f }	14 in	12 in	35½ in	25½ in	1 & 2	900	410	40/55
3-f }	355 mm	304 mm	900 mm	674 mm	2	1120	508	55/65
4-f }					2	1345	610	65/75

(m) On Farm Grain Storage Bins

The volume required would necessitate further UNIDO investigation.

Title: Expert on the design and manufacture of
"On Farm Grain Storage".

Duration: 2 months.

HOW TO MANUFACTURE THEM

Joint Ventures

This method appears very suitable for current Iranian conditions. It has the advantages of:

- (a) Providing technical knowledge.
- (b) Local Management and Finance.
- (c) Stimulating interest of all parties involved.

An example is the Disc and Earth Engaging Tool Factory to be established at Arak. This is comprised of:

- (a) Mecavarz Ltd., an Iranian company who have experience in marketing agricultural discs, earth engaging parts, etc., who will provide marketing organization, also local management.
- (b) R. MacKay Ltd., an Australian company and part of the Ingersoll Group, who will provide technical experience on the manufacture of Discs, also training of Iranian personnel.
- (c) IDRO, who will provide land, finance, some machinery and guidance.

Licensing Agreements

This has the advantage of making available to Iranian companies design, production, quality control and other experience not readily available locally in the period while these skills are being developed.

Local Private Companies

This relies on local enthusiasm to manufacture farm machinery. In many cases these companies would benefit by:-

- (a) Joint Ventures.
- (b) Licensing Agreements.
- (c) UNIDO assistance.

Government Factories

These are mainly large units similar to Tabriz Tractor Manufacturing Plant, where the capacity involved is not readily available from other sources. These organizations are endeavouring to do a good job under difficult situations. In the long term more satisfactory results will probably be achieved by:-

- (a) Joint ventures;
- (b) Licensing agreements;

eventually converting into public companies quoted on the Stock Exchange.

Agricultural Engineering Society or Institution

I regard the establishment of an Agricultural Engineering Society or Institution to be essential. This society should be open meeting oriented, i.e. hold meetings in both town and country areas which are open to members and other interested parties. Advertising of these meetings could be done by notices in newspapers and posters in places where machinery users are likely to see them, such as dealers' premises.

Objectives

- (a) To stimulate interchange of information between interested persons and parties.
- (b) To stimulate recruitment into agricultural engineering as an occupation.
- (c) To stimulate education in agricultural engineering, including operation, maintenance and repair of farm machinery.

How to Organize

A small grant to cover initial advertising and establishment costs, after which to be self-supporting by subscriptions from individual members, company membership, Government department membership, etc. Eventual management to be elected members. For establishment, some help may be required from Government departments, extension workers, or Department of Agriculture. Some affiliation or co-operation with overseas organizations such as the Australian Society of Agricultural Engineers, or American Society of Agricultural Engineers would be advantageous during the establishment period.

Meetings should be open to all interested persons and not restricted by occupation or educational standards. The main attitude to be "Progress through co-operative efforts". Subjects for meetings in both town and country areas should be interesting and educational.

Progress and development will depend upon the members themselves.

Report on Agricultural Machinery and Field Engineering Training Centre,
Karaj, Iran

Location: The village of Karaj is approximately 25 kms from Tehran, adjacent to the autobahn.

Existing Facilities: Land: 200 ha used for buildings, student training, farming, irrigation training and research.

Buildings and Equipment: (a) Student and staff accommodation, including excellent large general purpose hall used for lectures by visiting experts, etc. (this would be a good location for holding meetings of the suggested Agricultural Engineering Society).

(b) Teaching classrooms and workshops; these include large buildings for instruction on machines; sufficient access is provided for combine harvesters. Around two sides of the building are individual rooms for welding and blacksmith work, machine shop practices, electrical repairs, diesel pump repair, parts store; one room equipped with simple single cylinder engines - this is where the students gain their first training. They take the engines completely to pieces and reassemble them.

(c) Storage for tractors and machinery. These are currently being extended and appear adequate for present needs.

(d) New Buildings: (Currently being completed and having equipment installed). For tractor and implement testing. This includes classroom, large building in which are being installed horse power testing equipment, 2 dynamometers, 1 stationary sophisticated machine for testing both engines and tractors by PTO connection with a capacity of up to 140 HP; the other, a cheaper less accurate PTO portable type, mounted on wheels (this type of machine would be ideal for use testing tractors before despatch at the Tabriz factory). The sundry other machines are for investigation and testing of fertilizer distributors, spray equipment, etc.

Tractors and Implements: These appear sufficient for current needs. Upgrading and replacement will be required in the future.

Staff: The Karaj Centre appears to have an adequately qualified, conscientious and enthusiastic staff which comprises:

4 graduate engineers	)	Description given by Karaj.
2 technicians	)	(Employed 30% of the time on
4 workmen	)	student training)

Activities: (a) Training

- (i) Agricultural machinery at postgraduate level
- 15 students
 - (ii) Soil and water engineering at postgraduate level
- 15 students
 - (iii) Field engineering at diploma level - 20 students
- All courses are for a period of 10 months. Student intake includes both males and females (2 female students this year), and is not limited to Iranian nationals; there are currently students from Iran, Pakistan and Turkey, and last year's student intake also included two students from Afghanistan. English is the medium of instruction.

(b) Testing, Design Development and Adaptation

For Government organizations and private sector who make formal requests to have their machines tested and evaluated for performance under different conditions of soils and climate. This work has been undertaken for the following organizations: Tabriz Tractor Plant, Arak Machine Building Factory, Agricultural Development BONGAH.

(c) Soil and Water Engineering Research Activities

This includes research into water consumption requirements of different crops, different water application methods such as furrow irrigation and sprinkler irrigation are compared. The FAO expert on this joint project recommended corrugator irrigation. Research into this would appear an ideal project for Karaj to investigate under Iranian conditions.

Future Plans and Projects under consideration:

- (1) The establishment of quality control laboratory with standard measure/ equipment such as straining gauges, hardness testing, tensile strength testing, Izod and charpy machines.
- (2) Workshop with enough equipment to build prototype machines.
- (3) ECAFE Regional Research Institute: Karaj is one of the proposed locations for this project.
- (4) Staff: Increase to:

Graduate Agricultural Engineering	4 persons)	
Mechanical Engineering	2)	
Electrical Engineering	1	)	This
Gen. Agr. Specialist	1	)	description
Technicians	4	)	given by
Workmen	8	)	Karaj
)	
			10 persons

effective April 1973.

RECOMMENDATIONS

The thinking for the development of the Karaj Centre should be "controlled and Progressive" or "not too much too quickly". This includes the development as an industry oriented testing and development centre. The services should be available on a charged for basis to both the Government and the private sector (the design and specification of the machines to remain the responsibility of the manufacturing companies).

Suggestions on How to Organize This:

Object: Efficient use of resources, equipment, manpower, land and buildings.

Staff: The organization of each project to be the responsibility of one person with specialist help if required. That is liaison with the manufacturer, co-ordination, organization and supervision of

the design and development, testing and also writing of the report to be the responsibility of the one single person, with help from specialists if required.

Recruitment: Initial recruitment of one person for the situation described under staff, when required use the specialists already employed at Karaj or outside consultants. As the demand for this service increases, more staff would need to be recruited.

Buildings and Equipment: The new test building nearing completion should be adequate for this service. Some office space will be required and this should include provision for a drawing board at least A0 size.

The workshop and equipment at Karaj for modification and improvement to machines will need to be increased in order to adequately provide for the industry oriented testing and development service. Additions should include workshop of approximately 140 sq.m. located adjacent to the new building.

Equipment - 1 Lathe

1 Milling Machine

1 Drilling Machine

1 Power Hacksaw

1 Welding and Cutting Equipment (both gas and electric)

1 Benches and Hand Tools

1 Inspection Equipment, micrometers, verniers

Transport - 4-wheel drive vehicle of approximately 600 kgs capacity

Quality Control Laboratory: If the use of the proposed quality control laboratory at Karaj is to be limited to assistance with the current and planned activities such as teaching, design and development of machinery, I question the establishment of complete facilities. My reasons are:

(a) For efficient utilisation of a quality control laboratory a large manufacturing unit is required;

- (b) The use of these machines requires considerable training skill and experience. Also for effective results the persons performing these tests need continual work.
- (c) The occupations of the current students at Karaj do not appear to require experience in the use of quality control equipment.
- (d) The supply of this type of equipment in Iran is sufficient that most of it is very lightly loaded, thus any parts required to be tested could be sent out. There is good equipment at most Government factories - Tabriz and Arak - and also in the private sector.

I do recommend that strain gauge equipment be available at Karaj. This is a most useful and instructive type of equipment for the activities both current and proposed at Karaj.

The request by Karaj for quality control equipment to me is an indication of the need for an Iranian Association of testing facilities. This could be run similar to the Australian Association of Testing Authorities, by which system organizations with quality control equipment of all types make this available on a charged for basis. Equipment and respective companies are listed in a directory published annually. For example, if it is required to test a tractor battery to ensure that it is to the correct SAE specification, all that has to be done is to look in the directory, find an organization with battery testing equipment and send it along for test.

Additional UNIDO Assistance to Karaj

Assistance for the selection and installation of new machinery and equipment

Title: Expert on Organization of Machinery Testing Centres.

Duration: 2 months

REPAIR FACILITIES

This service is being done with considerable skill and enthusiasm, often under conditions of poor equipment and buildings. This part of the industry appears to be profitable, which is emphasized by reports from farmers, Government officers and others that repairs can be slow and expensive. In the Tabriz area Combine repairs were reported as a problem.

To solve this problem, I suggest:

- (a) Training facilities for more service technicians;
- (b) Encouragement for dealers to invest in buildings and equipment.

This part of the industry is one in which I did not have sufficient time to investigate completely. I suggest further UNIDO investigation is justified:

Title: Expert on Organization of Farm Tractor and Farm Machinery Repairs
(Private Sector).

Duration: 2 months.

COMPANY REPORT

2. Iran Tractor Plant, Tabriz

Location: Approximately 6 kms from the town of Tabriz.
Modern buildings comprising partially completed fully integrated tractor factory.

Present Status: Assembly Plant fully completed with conveyor, paint spray booth, storage for sub-assembly parts. Separate test building and track. Partially completed press and machine shop.

Assembling: U650 and U651 tractors at the rate of 16 to 17 per day by Phase II method - 98% imported parts. Locally manufactured parts - mainly front end weights.

<u>Future Plants:</u>	<u>U651</u>	<u>U650</u>	<u>U550</u>
1973-74 Production	1000	6000	100
1973 (end)	Press shop to be in operation (orders placed for machinery)		
1974 (end)	Machine shop to be in operation (orders not placed for machinery)		
<u>Model Changes Scheduled:</u>	1974	Production of U651 and U650 end	
	1974	Introduction of new models	

2.1 Suggestions to Improve Quality of Delivered Tractors and Speed Assembly

- (i) Dyno test the tractors before despatch; use P.T.O. simple type.
- (ii) Add cooling water conditioner or antifreeze, also cooling system leak sealant.
- (iii) Use pneumatic nut runners, improved pull up pattern and torque wrenches.
- (iv) More attention to packing at the Bulgarian end: rust preventive, moisture absorbent, etc., in particular for use with gear box oil filters.

Design Improvements

Dry type replaceable element air filter with pre-cleaner and screener. Fuel tank and low pressure fuel system to prevent leakage of fuel on to batteries. Remote hydraulic hoses and couplings. Steering system. Rockshaft housing.

Organization Improvements

Establishment of Product Engineering Department.

Duties

Selection of specification of tractors; responsibility for reliability of tractors, including minor design improvements; liaison with Rumanian factory for these two responsibilities.

Specification of local content - As component parts such as radiators, generators, starters, air cleaners, hoses, tubes, fittings, etc. are manufactured in Iran, these should be deleted at the Rumanian end and local components fitted in their place. The testing and approval of these parts should be the responsibility of the Engineering Department.

2.2 Improved quality control including:

- (a) Inspection and approval before despatch at the Rumanian end.
 - (b) Packaging for prevention of rust and other deterioration during transport, both before and after assembly at Tabriz.
- Dynamometer testing of tractors before despatch.

2.3 Improvements to Existing Products

Some of these are relatively simple such as correcting leakage problem on fuel tank and low pressure pipes and would have the advantage of providing experience for the proposed Product Engineering Department.

2.4 Model Changes in Place of U650 and U651

The Iranian market now requires improved type of tractors.

2.5 Consideration should be given to integrating the tractor factory with an engine manufacturing plant which could provide suitable engines for automotive, earth-moving, stationary, and other applications.

2.6 Before any further investment is made in buildings or plant, a complete study of the economics of manufacturing and marketing - both local and export - should be made. This should include consideration of 10,000 units per year for a fully integrated factory.

2.7 U.N.I.D.O. Assistance

The organization of the Tabriz Tractory Factory is so complicated that it would require further UNIDO investigation.

Title: Expert team on all aspects of tractor manufacture and plant organization.

Duration: 3 months

2.8 Record of Discussions with Users of Universal Tractors

Years of Service
of Tractor

3 months	Diesel fuel leaking on battery; appeared to be cap fitting problem.
1 year	Fuel leaks on battery; on initial delivery oil leaking at most gasket joints.
1½ years	New rock shaft housing; fuel leaking on battery.
1½ years	Steering not sufficiently accurate; appeared to be linkage problem.
2 years	Fuel leaks on battery; fuel pump leaks. Remote hydraulic quick couplers leak.
2 years	Fuel leaks on battery; fuel pump leaks. Remote hydraulic quick couplers leak.

COMPANY REPORT

Arak Machine Building Factory

Location: Approximately 4 kms from the city of Arak.

Facilities for heavy steel fabrication, machining, casting and assembling.

Large training centre for technicians but do not appear to be training sufficient persons for middle management area such as draughtsmen for:

- (a) Product design;
- (b) Production and tool design;

product specification and scheduling personnel and production planning personnel).

Product Mix:

Although this factory has adequate facilities to manufacture and assemble farm machinery, the product mix for year 1975/76 does not include complete machines. The emphasis is on boilers and similar more complicated products with an expected higher profitability. The company is however prepared to manufacture 2,500 tons of agricultural machinery, fabrications, pressings, forgings and castings during this year. In the short term, I question this decision. The plant is not fully loaded and in my opinion it is better to have some load even if it is not the ideal product for which the factory is suited.

COMPANY REPORT

Machine Tool Co., Tabriz

Location: Approximately 5 kms from the town of Tabriz.

Facilities for casting, fabricating and machining.
Excellent laboratory for foundry sand quality control.
Also Training Centre for technicians but do not appear to be training sufficient persons for middle management area such as draughtsmen for:

- (a) Product design;
- (b) Production and tool design;

product specification and scheduling personnel and production planning personnel.

Product
Mix:

This factory includes centrifugal pumps suitable for agricultural applications, also stationary diesel engines up to 40 HP.

COMPANY STUDY OF IRAN JOHN DEERE

Joint venture: John Deere 30%, remainder local capital, including 5% investment by IDRO. (Deere has Management Agreement for Arak Factory.)

Organization

Head Office and parts store (for industrial equipment only) located in Tehran.

Factory located in Arak. Sales are handled by T.C.C. Co., Hafez Avenue, Tehran. (This company stores all agricultural spare parts for Iran.) T.C.C. Co. have two branches and 8 sub-dealers.

Tehran Office and Parts Store

Located at: 15 Ave. Fariman, Tehran, Iran.

Area: Offices 200 M²
 Parts Store 100 M²

Personnel: Management 6 (includes 3 expatriates)
 Office 12
 Parts Depot 2

Service
Personnel: Service Manager 1 (expatriate)
 Service Mechanics for
 emergency service 2

Factory

Located at: Arak

Area:	Land	44 Hectares	350 M x 1.25 KM
	New Factory	14,000 M ²	
	New Offices	1,000 M ²	

Currently using a temporary building of approximately 2,000 M² which will be removed when the new factory is fully operational - due March/April 1973.

Personnel:	Management	4 (includes 2 expatriates)
	Office	21
	Works	45

Scope of Manufacture

Assembly and welding. Machine tools are being introduced progressively as completion of factory proceeds.

Current Activities

Assembling tractors imported: CKD from John Deere factories in Madrid, Spain and Waterloo, USA.

Local content: Wheel Weights, Tyres and Batteries, Mufflers* and Radiators*

Assembling combines imported: CKD from Zwibrucken, Germany.

Local content: Special reinforced frame, Tyres and Batteries.

Assembling 302 Spin Spreaders CKD from Arc-le-Gray, France.

Disc harrows and other implements CKD from various other John Deere factories.

*Samples being inspected for quality approval

PRODUCT RANGE

Tractors

<u>Model</u>	<u>HP</u>		<u>Production</u>		<u>Local</u>	<u>Remarks</u>	
	<u>Net</u>	<u>Flywheel</u>	<u>Quantities</u>				<u>Content</u>
	<u>SAE</u>	<u>Standard</u>	<u>1351</u>	<u>1352</u>			
920	41	55	60		Not currently available (Possibly available early Feb. 1973)	Wheel Weights Tyres Battery Front Weights Radiator* Mufflers* Paint and Assembly	Imported from Spain
2120	76		110		"	"	"
3120	84		60		"	"	"
4020	113		90		"	"	Imported from USA
4320	135		11		"	"	"

Combines

<u>Model</u>	<u>HP</u>	<u>Engine</u>	<u>Production</u>		<u>Table</u>	<u>Type</u>	<u>Remarks</u>	
			<u>Quantities</u>	<u>Quantities</u>				<u>Width</u>
			<u>1351</u>	<u>1352</u>				
630 (Combine made in Zwibrucken, Germany)	97	(Made by John Deere, France)	116		Not currently available (Possibly available early Feb. 1973)	35-16' 81-14'	Slat Slat	Special reinforced frame for Iran (Local content: Reinforced Frame Tyres Batteries)

*Samples being inspected for quality approval

Other Products

Spin Spreader	302 Trailed Model
Disc Harrows	8W Series 24, 28, 32, 40, 52 (20" Disks) 425 Series Offset 24" Disks
Ploughs	F135 - 5 Furrow Mould Board S3531 - 3) S3541 - 4) Disk Plows S3551 - 5) F35 Series - 3 Mould Board Plows (Integral) - 4 Mould Board Plows (")
Land Planes	Balers
Ditchers	Rakes
Blades	Cultivators
Planters	Forage Harvesters
Drills	

FUTURE PLANS

Industrial Equipment

Back Hoes

Front End Loaders

Agricultural Equipment

Increased rate of local manufacture less imported parts. Some sub-contract purchase of specialized items, earth engaging points, plough shears, etc.

Combines will be assembled locally with an increasing content of local sheet metal parts.

Increased rate of local content is delayed due to slow deliveries from sub-contractors*, delay in clearing materials and machine tools through ports.

*Quality control problems at supplier level.

Machine Tool List (Arak Factory)

Item

Due Delivery Date

Not currently available (Possibly available early February 1973)

Welding and Cutting Machine List

Due Delivery Date

Not currently available (Possibly available early February 1973)

Comments by the Works Manager

He is very pleased with the speed at which the Iranian workers have become familiar with the assembly work.

S.B. Dec.27, 1972

COMPANY REPORT

Zamyad (Includes Rena Co.)

Location: Office - 732 Ave. Saadi South, Tehran
Factory - Old Karaj Road, Tehran

This factory includes:-

1. Assembly of B.M. Volvo Tractors.
2. Assembly of Volvo Trucks (some local content).
3. Assembly of Nissan Pick-Ups (some local content).
4. Manufacture of Radiators.
5. Manufacture of Springs.

<u>Product</u>	<u>Model</u>	<u>HP</u>	<u>Volume</u>
<u>Mix:</u>			<u>1351</u>
B.M. Volvo Tractors	T650	80	400*
	T800	106	34
	T810	130	12

*Could sell more if available, quantity restricted by import licence.

Zamyad is also concerned with the importation and marketing of other implements which appear to function well under Iranian conditions; these include:-

- (a) Tillage Machines, Ploughs, Disk Harrows, Chisel Ploughs, Scarifiers and Rotary Cultivators.
- (b) Harvesting Machinery, Combines, Sugar Beet Harvesters, Potato Harvesters, Forager Harvesters, Hay Rakes and Balers.
- (c) Planting Machinery, Seed Drills for Cereals, Sugar Beet Planters, and Potato Planters.

This company carries out modifications and improvements to imported machines for efficient working under Iranian conditions. Although they have a licence for the manufacture of farm implements, no production has taken place.

COMPANY REPORT

Ashtad Iran Mfg.-Ind. Co.Ltd.

An Iranian company with licensing agreement with Mitsubishi Heavy Industries, Japan, for the manufacture of power tillers and small threshing machines.

Location: City Office - Vesal Shirazi Avenue, Tehran
Factory - Ghasvin Road, Karaj

Facilities: For fabrication, machining, casting and wood forming.

Staff: Includes 3 expatriates - Japanese - from Mitsubishi - production engineering consultants.

This factory appears to be well organized, producing a good quality product with a decreasing amount of imported components from Japan. These are mainly engines and difficult to manufacture castings.

Product Mix: Includes tillers, 4 HP diesel, 4.5 HP Kerosene, 7HP diesel, 7HP Kerosene, 8.5 HP diesel - 4,000 per annum.

Threshers - 8.5 HP diesel and 11 HP diesel - 4,500 per annum.

COMPANY REPORT

Peerless Iran Corporation

Joint Venture: FMC Co., California
Ministry of Power and Water
IMDBI + 2 private parties

Location: City office - 32 Sepah Street, Tehran
Factory - Old Karaj Road

Land: 45 ha
Factory: 1440 sq.m.
Machine Shop: 1980 sq.m.
Parts Warehouse: 700 sq.m.
Office: 500 sq.m.

Facilities: Foundry for bronze and cast iron; machine shop, including pipe threading.

Product Mix: 6" - 12" bowl deep well pumps, approximate capacity of 2,000 per annum.

Imported components include bronze ingots, precision cast bronze bushing stock, precision shaft, precision seam welded pipe, precision bevel gears, foundry supplies - core binder, etc.

Labour Force: Only one expatriate; majority of remaining labour is in plant trained persons who have little experience of factory work.

COMPANY REPORT

Piem Co.

A relatively well-organized Iranian company. Possibilities for improvement in planning and scheduling, labour and quality control.

Location: City Office - Lalezar Avenue, Tehran
Factory - Ghasvin Road, Karaj

Facilities: Modern factory with foundry for ferrous and non-ferrous metals.

Adequate machine tools including lathes, drilling machines and pipe threading facilities.

Staff: Apparently skilled operators' training for new entries is by on the job method.

Major Problems Reported by Company

Availability of materials - where materials are imported, considerable delay is encountered clearing these through port facilities. Speedy receipt of materials would make it easier to keep to promised delivery dates.

Product Deep well pumps for 4", 6" and 8" delivery pipes.
Mix:

COMPANY REPORT

Aluminium Smelting Co., Arak

Joint Venture: Reynolds Aluminium
Pakistan Government
IDRO

Location: Approximately 5 kms from the city of Arak.

Facilities: Converting of imported alumina into many types of aluminium ingots and bars.

Capacity: 45,000 tons per year which is currently above market requirements. The surplus could probably be absorbed into the manufacture of motorized knapsack sprayer dusters.

COMPANY REPORT

Dorman Diesels

Location: Approximately 5 kms from the city of Tabriz.

Facilities: Factory for assembly and manufacture of diesel engines 25 - 250 HP suitable for stationary applications, water pumping, etc.

(Unfortunately, schedule did not allow time to inspect this factory.)

COMPANY REPORT

MacKay, Mecavarz, IDRO, Disk and Earth Engaging Tool Manufacture Company

Joint Venture:

- (a) Mecavarz Ltd., an Iranian company who have experience in marketing agricultural discs, earth engaging parts, etc., who will provide marketing organization, also local management.
- (b) R. MacKay Ltd., an Australian company and part of the Ingersoll Group, who will provide technical experience on the manufacture of Discs, also training of Iranian personnel.
- (c) IDRO, who will provide land, finance, some machinery and guidance.

Location:

Factory approx. 4 km from city of Arak (site has been selected, no construction of building had started at 20 November 1972, although it is expected that production will commence in 1973.

SOME VISITS

COUNTRY Tabriz

- a) Universal Tractor Factory.
- b) Machine Tool Factory.
- c) Experimental Farm.
- d) Department of Agricultural Engineering.

Keraj

- a) Farm Machinery Centre.
- b) Seed Testing and Development Centre.
- c) Power Tiller Factory.

Arak

- a) Machine Building Factory.
- b) Iran John Deere Factory.
- c) Aluminium Factory.
- d) Sugar Beet Factory.
- e) PIEM Co. Factory.

Ahwaz and Dezful Khuzestan Province.

- a) Haft Tappeh Cane Sugar Project.
- b) Department of Agriculture Ahwaz
- c) Small Farms Visits.
- d) Pahlavi Dum and Irrigation System.
- e) Iran California
- f) K.W.P.A. experimental Farm.
- g) Iran Shell Cotts.

Shiraz and Esfahan

- a) Rastegar Farm Rasfijan
- b) Small Farms Visits.
- c) B.M. Volvo Dealer.
- d) Sugar Beat Farms.
- e) Department of Agriculture Esfahan.
- f) Department of Agriculture Shiraz.
- g) Small Farms Visits.
- h) Sugar Beat Farms.

- i) Department of Agriculture Machinery Repair and Hireing
Station.
- j) Farm Corporation. Percepolis.

SOME VISITS

TOWN Government Departments.

- a) Ministry of Agriculture.
- b) Ministry of Economy.
- c) Plan Organization.
- d) I.D.R.O.
- e) B.O.N.G.A.
- f) Department of Agriculture.

Private Sector

- a) Iran Chamber of Commerce Industries and Mines.
- b) Allis - Chalmers.
- c) Dorman Iran Diesels.
- d) British Embassy: 1) Agricultural attache.
2) Representative of the overseas development organization.
- e) Zamyad Co.
- f) B.M. Volvo Factory.

- g) Rena Co.
- h) Meckavar Co.
- i) Ralph Mc Kay Co.
- j) Iran - John Deere Sales Office.
- k) PIEM Co. - PUMP Co.
- l) J.I. Case
- 11) Allis - Chalmers.
- m) Peerless Iran Co.
- n) Leyland Motors Iran.

Request from the Government of the Empire of Iran

for Special Industrial Service

JOB DESCRIPTION

IS/IRA/71/807/11-01/01

POST TITLE	Expert in Agricultural Machinery Manufacture (Feasibility Study) Team Leader
DURATION	Three months with possibility of extension
DATE REQUIRED	As soon as possible
DUTY STATION	Tehran, with possible travel within the country
PURPOSE OF PROJECT	To analyse the status of agricultural mechanization, manufacturing feasibility, and the necessary allied elements such as adaptation, testing and maintenance, and to assist the Government in formulating a rational manufacturing programme through comprehensive recommendations.

DUTIES

The expert will be the Leader of a two man team, the other member being an expert in the agricultural mechanization feasibility study, from the Food and Agricultural Organization of the United Nations (FAO).

They will be expected to carry out jointly the following analysis in the agricultural machinery and implements field:

analysis of the existing pattern and future trends in agriculture, land development, irrigation extension, crop pattern and agricultural machinery usage, investigation of Government plans for mechanization and analysis of import, sale and production statistics of agricultural machinery and implements. Based on the above, identification of the present and future trends in the level of mechanization, designs and market potential. Analysis of the existing facilities for design, development, adaptation and testing and repair and maintenance and identification of the areas which require

further attention.

The above aspect of the assignment will be primarily carried out by the FAO expert.

The UNIDO expert will primarily be expected to:

1. identify suitable products for manufacture, analyse the need for re-design and adaptation, and establish project specification, product range and production volume;
2. formulate engineering and technical details for development and adaptation, quality control, testing and product performance;
3. evaluate and formulate technical and engineering specifications for an effective repair and maintenance programme;
4. study the status of existing agricultural machinery industries;
5. analyse the manufacturing feasibility and formulate preliminary pre-investment studies on selected

product ranges.

Based on the above two detailed analyses, prepare a comprehensive report on the various aspects of the agricultural machinery and implement sector, with major emphasis on:

a) the establishment of an "Agricultural Engineering Research Centre" for research, design, development, adaptation, prototype fabrication, material selection, laboratory and field testing, local personnel training and techno-economic service to the Government and manufacturing sector (demand analysis, product specification, quality control etc.) in the field of agricultural machinery and implements (project details, finances, duration, organization, work programme, physical facilities, training, experts needed, etc.)

b) the establishment of a manufacturing unit for crop protection equipment - sprayers and dusters. (Product specification, product range, demand, production volu-

me, preliminary details on investment, physical facilities, technical manpower etc.)

c) assistance to the Universal Tractor Manufacture and Assembly plant in Tabriz, and tractor implement and combine factory at Arak. (Nature of assistance, Job Description, duration, physical facilities etc)

Recommendations on the future line of action towards the establishment of such manufacturing units and other allied facilities.

Recommendations on the further assistance needed for the country by UNIDO and also jointly by UNIDO and FAO towards effective implementation of the above recommendations.

The above aspects of assignment will be carried out jointly by the UNIDO and FAO expert under the guidance of the team leader.

QUALIFICATIONS University degree or equivalent in Agricultural and/or Mechanical Engineering. Extensive experience in product identification, manufacturing feasibility studies and techno-

economic pre-investment analysis in agricultural machinery and implements sector.

LANGUAGE

English; (In case of French or Spanish mother tongue, a fair working knowledge of English is desirable).

BACKGROUND
INFORMATION

The Government of Iran has placed emphasis on agricultural mechanization and local manufacture of agricultural machinery and implements. The ECAFE-UNIDO Fact Finding Team on Industries Manufacturing Agricultural Machinery, which visited Iran in January 1969, identified important areas, such as design, development and testing, local manufacture of sprayers, pumps, small engines, combines and expansion of manufacturing facilities for power tillers and tractors, which require immediate attention. The team's estimation on demand by 1975 is as follows: (in units)

35,000 hand sprayers, 20,000 power sprayers, 25,000 gasoline engines of 1-2 HP, 10,000 power tillers and 10,000 tractors. The present demand for deep-well pumps is estimated to be around 3,000 units. The Government partici-

parted in the UNIDO Expert Group Meeting on Agricultural Machinery in August 1969 which stressed the necessity of sprayers and assisting the existing manufacturers in quality control. The UNIDO Long-Range Programming Mission which visited Iran in early 1970, recommended an "Agricultural Engineering Research Centre" through joint assistance from FAO and UNIDO. Based upon these recommendations and local requirements, the Ministry of Agriculture as well as the Ministry of Economy, requested UNIDO technical assistance in the establishment of a "Design Institute for Agricultural Machinery and Implements", including facilities for testing and product performance evaluation, establishment of a manufacturing unit for crop protection and assistance to the Universal Tractor Manufacture and Assembly plant at Tabriz, and the implements and combine factory in Arak (investment policy, quality control, and testing). In order to analyse the above factors and draft a rational technical assistance programme, the Government of Iran

requested the assistance of UNIDO for deputing a UNIDO-FAO

Manufacturing Feasibility Study Team at an early date.

LIST OF SOME PERSONS CONTACTED DURING WORK ON THIS PROJECT

1) Amir Yasdanian	Farm Corporations	Pahlavi Ave. Teheran
2) W.P. Stacey	Peerless Iran	Old Karaj Rd. Teheran
3) S.M. Banadi	" "	" " " "
4) Masud Kompani	Iranian Investment Corporation	Shah Ave. Teheran
5) John W. Phillips	Commercial Director Cargo & Shipping Co. Ltd.	Saadi Ave. Teheran
6) Walter Vogel	Manager Farm Machinery Centre	Shiraz
7) Sfaei General	Agricultural Engineering	Shiraz
8) R. Karimizadeh	Karaj Testing Centre	Karaj
9) Kianzad	" "	"
10) A. Nadersepahi	" "	"
11) N. Farzan	" "	"
12) M. Nazerian	K.W.P.A.	Andimeshk
13) H. Tabib	" Dez-Irrigation Project	Dezful
14) Nadovi	" " "	"
15) John R. Vaughn	" "	Andimeshk
16) Calhune	" "	Dezful
17) Davenport	Iran Shell Cotts	Dexful
18) A. Fitzherbet	" " "	"
19) Scott G.M.	" " "	Teheran
20) Emam	Dept. of Agriculture	Ahwaz
21) Rowani	" " "	"
22) Omid	Agricultural Engineering Department	"
23) Salamian Mahdavi	Plan Organization	Tehran

24) Norban	Plan Organization	Teheran
25) R. Farid	Training Centre	Arak
26) A. Borhan	Ministry of Agriculture & Natural Resources	Teheran
27) Farhang Ronaghi	Iranian Aluminium Co. IRALCO	Takhte Jamshid Teheran
28) Jack Schuh	" " "	" "
29) Hannes Kremkau	Iran Bohn Deere	Fariman Ave. Teheran
30) M. Kashanizadeh	Arak Machinery Centre	Arak
31) R.G. da Costa	Arak Machinery Factory	"
32) Sokhansanghd	Arak Machinery Factory	"
33) Dyson	Dorman Diesels	Teheran
34) Francugie	Aluminium Factory	Teheran
35) M. Khoje Nouri	PIEM Co.	Lalezar, Teheran
36) Ahishami	PIEM Co.	" "
37) G.M. Fouladin	Iran Tractor Manufacturing	Takhte Jamshid Teheran
38) K.R. Aidun	Ashtad Iran Ind Co.	V. Shirazi Teheran
40) T. Okui	Mitsubishi Heavy Ind. Co. Japan	
41) T. Hosono	" " "	
42) A. Nagaya	" " "	
43) Manoucher Taslimi	I.D.R.D.	Takhte Jamshid Teheran
44) Farrokh R. Moasser	Arak Factory	Takhte Jamshid Teheran
45) Touwisi Aryamehr	Farm Corporations Percifills	Shiraz
46) Hossein Kamaly	Ministry of Economy	Teheran
47) Hossein Qvoll Mafi	Agricultural & Natural Resources	Teheran
48) A. Vaccari	FAO Expert	Karaj

50) Meimarbaski	Gen Director of Agruculture	Isfahan
51) Resanian	Agriculture Engineering Dept.	"
52) M. Roy Harriman	Massey-Ferguson (Export) Limited	Coventry, England
53) M. Quentin Peck	" " "	" "
54) Ribhi Abu Elhaj	U.N.I.D.O. Project Manager	Teheran
55) Dick Leeuwrik	Ford Foundation, Institute	Karaj
56) Sharif	Pest & Disease Institute	Teheran
57) G. W. Giles	F.A.O. Agr. Eng. Service	Rome
58) Mrs. Sadizi	Ministry of Economy	Teheran
59) Javad Vafa	Ministry of Economy	Teheran
60) Bell	Lemland Motor	Teheran
61) B. Nozari	Ministry of Economy	Teheran
62) Zarand Saveh	Rastegar Farm Rasfijan Foinia	Teheran
63) Ghoddoussi	Volvo Iranian Co.	Teheran
64) Zamyad	" " "	"
65) Amirhesani	" " "	"
66) Fouladi	Zanyad Factory	South Karaj Rd. Teheran
68) J.O.M. Rowlands	University of Teheran	Teheran
69) Parviz Khazraee	Plan Organization	Teheran
70) Mrs. Nahvi	" "	"
71) C.V. Paul	Agr. Institute Allahabad	India
72) Lynn Hewitt	Varamin Gamsar Project	Teheran
73) P. Toutounchi	Iran Tractor Plant	Teheran
74) Badakhshan Ali	" " "	Tabriz
75) Riahi Akbar	" " "	"
76) Medghaltchi	" " "	"

77) Messooni	Tool Factory	Tabriz
78) J.G. Klug	Iran John Deere	Teheran
79) Jack Makeham	Ministry of Farm Cooperation	Teheran
80) Reza Saeidi	Dept. of Agriculture	Tabriz
81) Mahamed Ayatollahi	Mecauarz Ltd.	Teheran
82) John A. Faridy	International Department Iran Chamber of Commerce Industries & Mines	Teheran
83) Bonakdar Poor	" "	Teheran
84) Nikzad	I.D.R.O.	Teheran
85) Neil Ferguson	British Embassy Agricultural Attache	Teheran
86) Pepper	Over Seas Development Dept. British Fmbasay	Teheran
87) Fred Arbabian	Iran John Deere	Teheran
88) Mammodi	" "	"
89) Afkhami	" "	"
90) Mehrabi	" "	"
91) Housinie	" "	"
92) John Hepworth	Ralpm Mc Kay	Australia
93) R. Farid	Machine Training Centre	Arak
94) Maru Buchanan	American Motors Machine Tools	Teheran
95) Kia	Ministry of Agriculture	Teheran
96) N. Aristotelous	FAO Seed Production	Teheran
97) Khabiri	Allis Chalmers	Teheran
98) Sing	" "	Teheran
99) Tavakgli	J.I. Case	Teheran
100) J. Goodwin	Ministry of Agriculture	Teheran
101) Samsam	Hafft Tappeh Cane Sugar Project	Ahwaz

102) S. Majrasulima	Hafft Tappeh Cane Sugar Project	Ahwaz
103) Gorgine	" "	"
104) Morgan	" "	"
105) Mandavi	Plan Organization	Teheran
106) M.B. Kamaley	Plan Organization	Teheran
107) Marzeban	Agriculture Engineering Section	Tabriz
108) Khod Amez	Shain Hassan Research Station	Tabriz



