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EGYPTIAN AGRICULTURAL MECHANIZATION PROJECT

Contract Number 263-0031-HHC-01

ACTIVITIY REPORT NUMBER 13

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Submitted by

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1.0 SUMMARY

The Project's outgoing/expended category (figure 1.1) is meeting its financial schedule as budgeted for this year: The budget projected that this category would reach the 80 percent level by June 30, which the Project exceeded having attained nearly 83 percent. Although the Project attained its physical expenditure goals, the Project fell behind in the committed/expended category: The budget anticipated a 62 percent level for this category, but the Project only achieved 47 percent.

Thus, the Project successfully brought more funds into the outgoing side of the pipeline, but it was not as successful in translating these monies into legally committed and physical expenditures.

The deficit of $6,014,118 in the committed/expended category was due primarily to three factors in the committed category:

1. Foreign currency commodity procurement ($3,564,435): Bid awards approved but legal commitment is still in-process. Consequently, these funds could not be moved to the legally committed category.

2. Service Center Fund ($1,087,523): The slow processing of loans at the banks has put the service center behind its anticipated schedule.

3. Local currency commodity procurement ($661,932): The bid awarding process has slowed the rate of commitment.

Thus, the deficiencies in these three categories accounts for 88 percent of the $6 million deficit when compared to the budget.

Figure 1.2 summarizes the credit funds: 1) The Service Center Fund is oversubscribed by $610,630 if all existing applicants are processed, 2) The original Waterlifting Fund has been increased to $2.0 to $3.0 million, and 3) The Machine Introduction Fund is 42 percent expended.

During this period, participated on the Egyptian/USAID Sectoral Planning Committee: Inputs included the development of comprehensive economic mechanization packages for wheat and rice to augment the productivity effects of biological inputs developed by other USAID projects (Annex B).

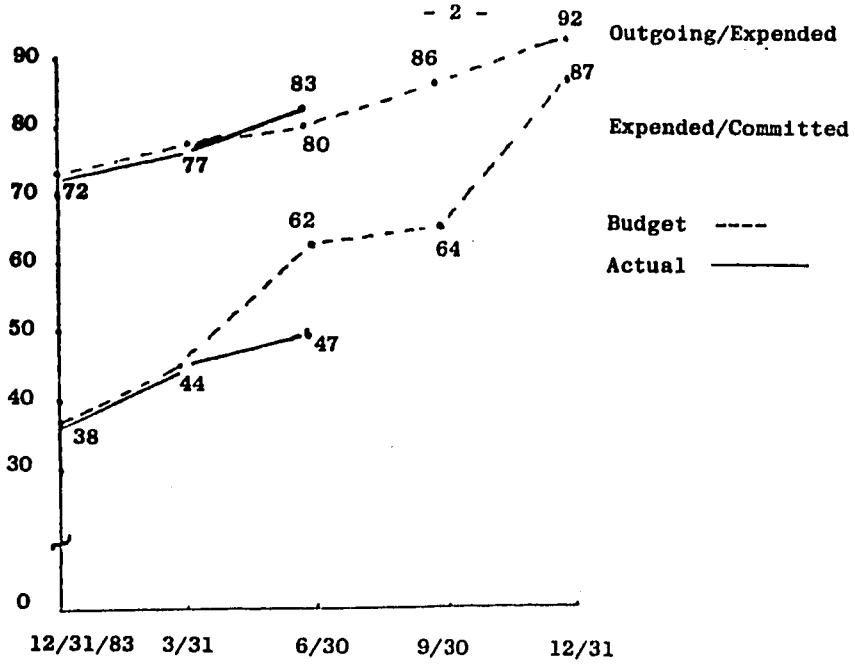
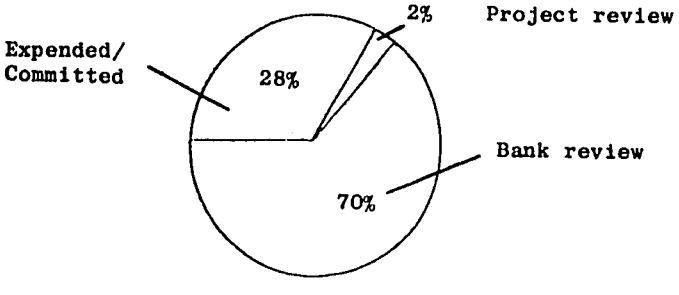
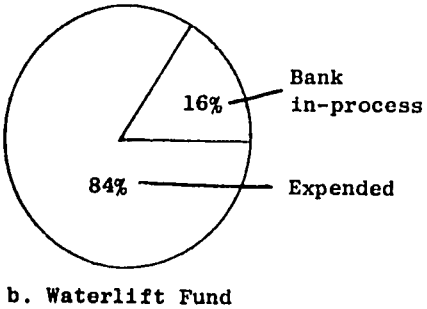


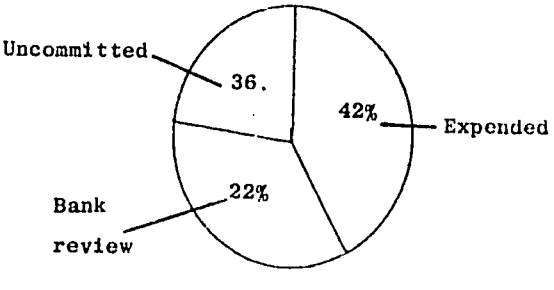
Figure 1.1 Project Expenditures, 1984



a. Service Center Fund



b. Waterlift Fund



c. Machine Introduction Fund

Figure 1.2 Credit Fund Status, June 30,1984

Briefly, activity highlights were:

1. Research and Development

a. Designed standard and sweep for a field cultivator and conducted field cultivator tests at Sakha (Annex F):

1) Objective: Design and test an implement that will breakup the surface layer of soil in one pass with less energy and that can be manufactured locally.

2) Results: 1) Compared to the Behera chisel, the Tractor Testing Station (TTS) implement required only 60 percent as much draft at 13 cm depth three test speeds (3.4, 6.4, and 8.8 km/hr) 2) The degree of soil breakup increased as the speed increased, and 3) the TTSimplement should be operated at a minimum speed of 5 - 6 km/hr.

3) Conclusion: The TTS implement shows high promise as an improvement over the Behera chisel: the TTS will breakup the entire soil surface with one pass and with less draft.

b. Conducted field tests with the Behera thresher, Deutz-Fahr 980 combine, and the Fortschritt combine (Annex G).

2. Extension/Training

a. Extension field courses totalled 149, covered 2,517 feddans, and involved 2,377 trainees.

b. 1984 Training Plan completed, approved by MOA, and sent to USAID.

c. The new Demonstration/Training Equipment Maintenance Unit was fully formalized with: a staff to deal with severe maintenance problems, maintenance equipment, and spare parts inventory.

3. Service Center/Village Workshop Subproject

a. The Project is involved with 84 Village Workshops at various stages of development: 23 have been completed, 47 are under investigation at the banks, and 14 are in-process at the Project-level.

b. At this time, three service centers are in the development process: contracts with the PBDAC have been signed and monies advanced.

c. Seventy percent of the Fund ($5.0 million) is under review at the banks.

4. Land Improvement Subproject

a. Demonstration program: 310 feddans were precisioned land-leveled.

b. Of this total,the Project landlevelled 150 feddans at Abyuha in support of the Egyptian Water Use and Management Project (EWUP) program in the Abyuha area of El Minia governate.

5.Local Mnaufacturing Program

a. Presented ASAE paper no. 84-5003 in cooperation with Drs. A.F. El Sahrigi and R.E. Garrett: This paper develops a system for committing locally invented, or adapted, machinery to rational and economic manufacturing. The discussion utilizes the thresher-winnower developed by the Project as a case study (Annex H).

b. Completed preliminary design investigation for enclosing the cleaning system and adding a tailings return elevator.

c. Inspected subcontractors engaged in producing manufacturing prototypes of the thresher and started thresher tooling.

6. Planning and Evaluation

a. Published Project Working Paper No. 15: "Egyptian Cotton Production Economics and Farmer Response to Government Price Intervention and Meat Import Policies", which indicated the following impact from mechanization:

> For every Egyptian pound that the surveyed farmers invested in mechanized seedbed and waterlifting devices, they received LE 3.73 in additional income.

b. Prepared "Perspectives on Agricultural Mechanization in Egypt" for an FAO conference in Egypt that examines the influence of three factors on farm mechanization: 1) Labor productivity and cost, 2) Escalating opportunity cost of animal labor, and 3) Declining output of major crops (Annex C).

c. Prepared Machinery Demonstration Evaluation Series No.3 pertaining to rice cultivation: planting dates (early and late planting), weed management, grain drills, and combine harvesters (Annex D):

1) Farmers shifted from handbroadcasting to a nursery/transplanting system as recently as 10 years ago to conserve water during the initial thirty to forty-five days and to achieve better weed control.

2) The reaction of farmers to the grain drill was generally positive.

3) Farmers reacted positively to the combine even though there was not a straw recovery system, such as a baler, which reflects the lower value of rice straw as compared to wheat straw.

d. Assited in the development of a paper entitled "Agricultural Labor and Wages in the Villages of the Agricultural Mechanization Project", which focuses on the interregional in-season and out-of-season agricultural wage variation (Annex E).

Implementation issues closely paralleled the issues of the last quarter: 1) The slow process of procurement, beyond the control of the Project, has limited the range of the extension demonstration activities; 2) The inability of the banks to process the submitted loan requests has greatly delayed the expenditure of the Service Center credit fund; 3) The lack of candidates with English language proficiency has slowed the development of the participant training program, and 4) Poor dealer support has slowed both the Extension and Land Improvement programs.

2.0 PROJECT ACCOMPLISHMENTS

2.1 Planning and Evaluation

2.1.1 Planning and Financial Unit

1. Published Project Working Paper No. 15: "Egyptian Cotton Production Economics and Farmer Response to Government Price Intervention and Meat Import Policies". Highlights indicate the following:

   a. Cotton production has been declining over the past decade because of escalating labor costs and low output prices.

   b. Farmers using mechanical seedbed preparation, on average, increased yields 1.25 kintars per feddan as compared to farmers who planted directly without seedbed preparation.

   c. Farmers using pumps for irrigation increased yields of 0.74 kintars per feddan as compared to farmers not using pumps.

   d. The marginal rate of return for farmers, who partially mechanized,i.e., seedbed preparation and waterlifting, was found to be 376 percent, as compared to farmers using traditional practises; or otherwise stated: For every Egyptian pound that the surveyed farmers invested in mechanized seedbed and waterlifting devices, they received LE 3.73 in additional income.

   e. A partial solution to this pervasive problem is the development of appropriate cotton harvesting technology to ease the labor constraint during harvest.

2. During this period, Dr. Shepley participated as the mechanization representative on the Egyptian/USAID Sectoral Planning Committee. Inputs included the development of comprehensive economic mechanization packages for wheat and rice to augment the productivity effects of biological inputs developed by other USAID projects. Annex B summarizes these results.

3. With Dr. A.F. El Sahrigi, prepared a paper entitled "Perspectives on Agricultural Mechanization in Egypt". This paper was for an FAO conference in Egypt and examines the influence of three factors on farm mechanization: 1) Labor productivity and cost, 2) Escalating opportunity cost of animal labor, and 3) Declining output of major crops (Annex C).

4. In collaboration with Dr. Abou Toueb Yamani, developed a questionaire pertaining to the economics of rice transplanting to be conducted during July, August, and September.

5. Prepared cash needs statement and expenditure report for Project funds, and with the Extension unit, participated in procurement including Project invitation to bid documents.

2.1.2 Evaluation Unit

1. Prepared Machinery Demonstration Evaluation Series No.3 pertaining to rice cultivation: planting dates (early and late planting), weed management, grain drills, and combine harvesters (Annex D):

   a. Farmers shifted from handbroadcasting to a nursery/transplanting system as recently as 10 years ago. They appear to have been motivated by water and weed concerns: The nursery/transplant system has enabled farmers to conserve water during the initial thirty to forty-five days; and, weed control has been better.

   b. The reaction of farmers to the grain drill was generally positive: Some said that the stand was superior to handbroadcasting and equaled transplanting.The greatest dissatisfaction was with the time needed for germination, an increase of one week as compared to handbroadcasting. The use of grain drills need to be inconjunction with a weed management program.

   c. An issue is raised regarding the timeliness of planting rice with a grain drill following a winter wheat crop: Rice cannot be planted until the wheat crop is harvested so this extends for 30 days the development of the rice plant where as, with the nursery/transplant method, the rice plant is 30 days along in its development when it is transplanted following the wheat crop.

   d. Farmers reacted positively to the combine even though there was not a straw recovery system, such as a baler, which reflects the lower value of rice straw as compared to wheat straw.

2. Assited in the development of a paper entitled "Agricultural Labor and Wages in the Villages of the Agricultural Mechanization Project" for presentation at the Annual Conference of the Agricultural Research Institute, Cairo. This paper focuses on the interregional in-season and out-of-season agricultural wage variation (Annex E).

   a. Both demand factors (emigration, population density, landless labor, and small farmers of less than one feddan) and supply factors (level of field mechanization and cropping intensity) are important determinants of agricultural wages.

   b. The labor demand variables (percent of vegetable crop area and availability of tractors) are more salient in explaining the interregional variation of in-season agricultural wages than are the supply variables (level of emigration, man-land ratio, and percentage of landless laborers in the population).

   c. The varaibles that reflect labor availablity (man-land ratio and emigration rate) are more salient in explaining the interregional out-of-season agricultural wages than the variables that reflect labor demand (percentage of vegetables and level of mechanization).

   d. For both in-season and out-of-season agricultural wages, availablilty of tractors has a greater impact than mechanization index (tractor,plow, and thresher), the man-land ratio has a greater impact than percentage of landless laborer, and emigration rate is of greater importance in explaining out-of-season wages than it is in explaining in-season wages.

2.2 Research and Development Subproject

1. During this period, the research part of the program was handled through the TDY efforts of Dr. Carl A. Reaves whose major responsibilities included the following activities:

   a. Designed standard and sweep for a field cultivator and conducted field cultivator tests at Sakha.

   b. Evaluated the Duetz 980 combine in wheat.

   c. Evaluated the Fortschritt combine in wheat.

d. Finalized Project Working Papers Nos. 13 and 14: "A Survey of the Suitability of Egyptian Soils for Mechanized Agriculture" and "Project Research Investigations: Tillage Experiments with Cotton, Maize, and Peanuts".

e. Evaluated experimental plot design for several crops using the grain drill.

f. Conducted field tests with the Behera thresher in wheat.

2. Field cultivator tests at Sakha (Annex F):

a. Objective: Design and test an implement that will breakup the surface layer of soil in one pass with less energy and that can be manufactured locally.

b. Test plan involved examining three machines: 1) field cultivator designed at the Tractor Test Station (TTS), 2) field cultivator designed at Alexandria University (AU), and 3) the Behera chisel. This test maintained a constant depth (13 cm) at three speeds (3.4, 6.4, and 8.8 km/hr).

c. Experimental design: complete random block design of one depth and these three speeds replicated 10 times.

d. Results: 1) There was no great difference in soil aggregates between the three implements, 2) Compared to the Behera chisel, the TTS implement required only 60 percent as much draft at all three speeds while the AU implement required only 79, 72, and 70 percent as much draft at the above speeds respectively, 3) The degree of soil breakup increased for all three implements as the speed increased, and 4) the TTS implement should be operated at a minimum speed of 5 - 6 km/hr.

e. Conclusion: The TTS implement shows high promise as an improvement over the Behera chisel: the TTS will breakup the entire soil surface with one pass and with less draft.

3. Behera thresher tests in wheat at Sakha: 1) average rate of hand- cutting per 10 - 12 year old child was 0.13 fed/hr, 2) average rate of piling per 10 - 12 year old child was 0.09 fed/hr, 3) thresher output was 1,000 kg/hr with one large and two small boys, 4) winnowing output with hand powered machine was 475 kg/hr, with one man and three women, 5) threshing-winnowing losses were 9.6 percent. Test variety was Giza 157. (See AnnexG) .

4. Deutz Fahr 980 combine loss tests: the average loss was 13.77 percent at 10 percent moisture for Giza 155.(AnnexG).

5. Fortschritt combine wheat loss tests: On a very small sample (7), grain losses averaged 10.4 percent at 9.68 percent moisture for Giza 155. (Annex G).

6. Although most machine development activity was in conjunction with the thresher and the local manufacturing program, some development work had been done relative to the conversion of the Camon winrower to meet local conditions:

   a. Conversion parts had been made, installed, and tested June 16 in 110 cm tall wheat.

   b. The results indicated that the conversion needed an extended sickle, higher drums, and a retracting finger reel.

   c. Adjustments were made and an additional test performed July 7 which concluded: "the improvement of the plant arrangement in the windrow, when using the drums, is not worth the cost, the trouble during running, and the loss in machine output".

2.3 Extension/Training Subproject

2.3.1 Overall Activities

1. Equipment procurement: stateside

   a. IFB 83/02: Project village demonstration/training equipment -- bids evaluated, legal commitment in process. Bid value: $3.663 million.

   b. IFB 84/03: Crop-specific demonstration/training equipment. Bid opening completed; bids under review. Estimated value: $4.4 million.

   c. IFB-01: awaiting parts delivery.

2. Equipment procurement: local

   a. Group 5: Hay balers -- Equipment and parts received. Bid value: LE 88,000 ($105,810).

   b. Group 7: Joint bid with Small Farmer Production Project: bid cancelled - no responsive bids.

c. Group 10: Village maintenance equipment. Equipment arriving. Estimated value: LE 534,000 ($642,000).

d. IFB Group 11: Research, demonstration/training equipment -- Bid advertisement under preparation. Estimated value: LE 1.24 million ($1.49 million).

e. Group 12: rebid from group 7; bid under review.

2.3.2 Extension Unit

1. Extension field courses totalled 149, covered 2,517 feddans, and involved 2,377 trainees.

2. Last quarter's emphasis on field equipment maintenance continued with the assistance of the three extension specialists.

3. The new Demonstration/Training Equipment Maintenance Unit was fully formalized with: a staff to deal with severe maintenance problems, maintenance equipment, and spare parts inventory.

4. Demonstration/training equipment continued to be ordered and delivered to field sites. However, failure of dealers to meet their delivery commitments, provide maintenance and spare parts, and to assist the Project with field support has hampered the full development of this program as originally planned and scheduled.

5. Demonstrated a belt-driven, drum-type mower for grain harvesting. Although shattering seemed high, the unit performed well, and there should be an application for this unit in cotton stalk cutting as it also windrows the material.

2.3.3 Training Unit

1. 1984 Training Plan completed. approved by MOA, and sent to USAID.

2. In addition to the 2,377 participants in the Project's village extension/training field activities, there were involved 63 participants at Training Centers and another 50 at other locations.

3. This quarter six trainees attended six new and continuing programs as a part of the Participant Training activities:

   a. Technical training: instrumentation (2) and soil science (1).

   b. Academic training: agricultural economics (3) and agricultural production (1).

2.3.4 Extension Information Unit

1. Prepared and started distribution of 15,000 pamphlets on mechanized wheat, maize, and cotton farming.

2. Completed and started distribution of 500 copies of the agricultural almanac.

3. Arranged and attended the conference on Appropriate Technology.

2.3.5 Demonstration/Training Unit

The unit continued to use the three laser units located at Gabel Asfar: approximately 15 feddans out of a 50 feddan field have been leveled. But numerous equipment problems with the poorly local-assembled Ford tractors and laser units has slowed this operation considerably.

2.4 Service Center/Village Workshop Subproject

Table 2.1 summarizes the status of the Service Center-Village Workshop Fund:

1. Of the first tranch ($1,500,000), 94 percent is in the expended/committed category and a second tranch has been ordered from USAID (An addditional $2.0 million).

2. Of the total fund ($5,000,000), 28 percent is in the expended/committed category.

3. Seventy percent of the total fund is under review by the banks.

4. If all commitments and funds in-process are approved, the Fund would be overdrawn by $610,630.

5. This represents total Project involvement with 84 village workshops and 12 area service centers.

TABLE 2.1 SERVICE CENTER/VILLAGE WORKSHOP LOANS IN-PROCESS AT GOVERNATE BANKS AND AT THE PROJECT LEVEL,6/30/84.

CATEGORY	UNITS	EXPENDED	COMMITTED	LOAN VALUE
A.COMMITTED/EXPENDED				
1.SERVICE CENTERS	3	294000	343600	637600
2.VILLAGE WORKSHOPS	23	537129	0	537129
3.SUBTOTAL (LE)	26	831129	343600	1174729
B.LOANS IN-PROCESS AT THE BANKS				
1.SERVICE CENTERS	8			1747000
2.VILLAGE WORKSHOPS	47			1257520
3.SUBTOTAL (LE)	55	0	0	3004520
C.LOANS IN-PROCESS AT THE PROJECT				
1.SERVICE CENTERS	1			250000
2.VILLAGE WORKSHOPS	14			237000
3.SUBTOTAL (LE)	15	0	0	487000
D.LOAN ACTIVITY				
1.SERVICE CENTERS	12			2634600
2.VILLAGE WORKSHOPS	84			2031649
3.OVERALL TOTAL (LE)	96			4666249
(US$ EQUIVALENT)	.83168			5610630

2.5 Land Improvement Subproject

1. Startup problems with the introduction of the new demonstration landleveling units, especially the compatability of the tractor hydraulics and the laser units, severely limited the performance of this unit. In addition, the assembly of the Ford tractors left much to be desired: e.g., loose bolts and studs leading to drawbars and fenders falling off.

2. To address this problem, a machinery specialist has been added to the expatriate staff and is stationed at Minia.

3. Demonstration program: 310 feddans were precisioned landleveled. This was only a third of what had been projected in the last activity report. But with the startup period behind us, even though all problems have not been completely resolved, this group should be at a much higher level of productivity.

4. The Project landlevelled 150 feddans at Abyuha in support of the Egyptian Water Use and Management Project (EWUP) program in the Abyuha area of El Minia governate.

5. The Land Improvment unit selected a village site in Beni Suef for landleveling demonstration activity commencing in the next quarter.

2.6 Local Manufacturing Program

1. Drafted ASAE paper no. 84-5003 in cooperation with Drs. A.F. El Sahrigi and R.E. Garrett: This paper develops a system for committing locally invented, or adapted, machinery to rational and economic manufacturing. The discussion utilizes the thresher-winnower developed by the Project as a case study (Annex H).

2. Completed preliminary design investigation for enclosing the cleaning system and adding a tailings return elevator.

3. Proposed a side-mounted windrow pickup unit for the thresher to allow in-field combining which includes a patentable helical slat or apron conveyor.

4. Inspected subcontractors engaged in producing manufacturing prototypes of the thresher:

   a. Behera Company: Quality of work is improving and drawings are being adhered to; but the progress is slow and only on one machine.

   b. Egyptian Iron and Steel Co.: One frame is assembled and the parts are as designed; the company shows promise of economically producing some good prototypes.

5. Thresher tooling: 1) One-quarter of the wood patterns have been completed, and 2) Finished a sample heavy-duty toggle clamp that will be used to make frame welding jigs for assembly line production.

3.0 FINANCIAL AND TECHNICAL LEVEL OF EFFORT

3.1 Financial Level of Effort

Table 3.1 summarizes the Project's expenditure position as of June 30, 1984. In this table, the definition of the money flows are as follows:

1. Grant Agreement (column 1): Total Grant Agreement line item funding, as may be amended.

2. Line Item Balance (column 2): Uncommitted line item funds, assumes In-coming/Available funds are committed.

3. Funds In-coming/Available (column 3): Funds coming into the Project from USAID and/or cash on-hand.

4. Outgoing Funds (column 4): Funds in the process of expenditure either by USAID, MOA, or PBDAC.

5. Funds Committed (column 5): Funds committed by contract or bid award.

6. Outgoing Pipeline (column 6): All funds on the outgoing side of the pipeline, columns 4 plus 5.

7. Funds Expended (column 7): Funds physically expended.

8. Outgoing Pipeline/Expended (column 8): The summation of outgoing and expended funds, columns 6 plus 7.

The Project's outgoing/expended category is meeting its financial schedule as budgeted for this year: The budget projected that this category would reach the 82 percent level by June 30, which the Project exceeded having attained nearly 83 percent. Although the Project attained its physical expenditure goals, the Project fell behind in the committed/expended category: the budget anticipated a 64 percent level for this category, but it only achieved 47 percent.

Thus, the Project successfully brought more funds into the outgoing side of the pipeline, but it was not as successful in translating these monies into legally committed and physical expenditures.

TABLE 3.1. FINANCIAL LEVEL OF EFFORT: FOREIGN AND LOCAL CURRENCIES FROM 15 SEPTEMBER 1980 - 30 JUNE 1984, IN US DOLLARS.

LINE ITEMS	(1) GRANT AGREEMENT	(2) LINE ITEM BALANCE (1-3-8)	(3) FUNDS IN-COMING/ AVAILABLE	(4) OUTGOING (AID,MOA, PBDAC)	(5) FUNDS COMMITTED	(6) OUTGOING PIPELINE (4+5)	(7) FUNDS EXPENDED	(8) OUTGOING PIPELINE EXPENDED
A. FOREIGN CURRENCY								
1.TECHNICAL ASSISTANCE	6424000	468382	0	100911	1719601	1820512	4135106	5955618
2.COMMODITIES	9133000	-360501	0	7964435	105979	8070414	1423087	9493501
3.TRAINING	2023000	984186	0	636575	37281	673856	364958	1038814
4.RESEARCH SUPPORT	1005000	798437	0	0	0	0	206563	206563
5.SPECIAL STUDIES/ EVALUATION	215000	117548	0	85000	0	85000	12452	97452
6.SUBTOTAL	18800000	2008052	0	8786921	1862861	10649782	6142166	16791948
B. LOCAL CURRENCY (US$)								
1.TECHNICAL ASSISTANCE	2302000	587102	0	95590	498842	594432	1120466	1714898
2.COMMODITIES	4000000	-953472	555424	1504184	207236	1711420	2686628	4398049
3.TRAINING	1000000	89866	405304	0	0	0	504830	504830
4.VEHICLE OPERATING EXP	100000	48217	9778	0	0	0	42005	42005
5.FACILITIES	70000	70000	0	0	0	0	0	0
6.CREDIT FUNDS								
A.SERVICE CENTER	5000000	-112591	87523	3612591	413140	4025731	999337	5025068
B.WATERLIFT	3000000	0	475123	0	0	0	2524877	2524877
C.MACHINE INTRO	2000000	0	723968	436039	0	436039	839993	1276032
D.UNCOMMITTED	1000000	1000000	0	0	0	0	0	0
7.RESEARCH SUPPORT	2000000	1177146	22954		327226	327226	472675	799901
8.SPECIAL STUDIES/ EVALUATION	728000	701894	438	0	0	0	25669	25669
9.SUBTOTAL	21200000	2608162	2280511	5648404	1446444	7094848	9216479	16311328
C. PROJECT TOTAL	40000000	4616214	2280511	14435325	3309305	17744630	15358645	33103276
PERCENT COMMITTED/EXPENDED		11.54			8.27	44.36	38.40	82.76
								46.67

The budget projected an accumulated commited/expended level of $24,682,068 while actually achieving $18,667,950. The deficit of $6,014,118 was due primarily to three factors in the committed category:

1. Foreign currency commodity procurement ($3,564,435): Bid awards approved but legal commitment is still in-process. Consequenly, these funds could not be moved from the outgoing category to the legally committed category.

2. Service Center Fund ($1,087,523): The slow processing of loans at the banks has put the service center behind its anticipated schedule.

3. Local currency commodity procurement ($661,932): The bid awarding process has slowed the rate of commitment.

Thus, the deficiencies in these three categories accounts for 88 percent of the $6 million deficit when compared to the budget.

3.2 Technical Assistamce Level of Effort

Table 3.2 compares the anticipated level of effort (column 2) with the projected level of effort (column 3). The latter is based upon the Inception Report, Project action and subsequent contract amendments. The Project is slightly lagging in man-months, but this mainly reflects later expatriate starting dates than originally anticipated. Most of these man-months are recoverable, if the current positions remain filled. To date the man-month contribution totalled 500 as compared to a projected 520.

The Evaluation Advisor's position was vacated as of June 6. Three TDY's started this period to assist with the Extension program. And one TDY completed an assignment with the R/D program. Also, the vacant Land Improvement slot is now filled.

TABLE 3.2 LEVEL OF EFFORT: TECHNICAL STAFF FROM SEPTEMBER 15, 1980 THROUGH JUNE 30, 1983, IN MAN-MONTHS.

POSITION	(1) STARTING DATE DAY/MO/YR	(2) EFFORT TO DATE	(3) PROJECTED EFFORT	(4) CONTRACT EFFORT	(5) DIFFERENCE (2-3)
1.TEAM LEADER	4/10/80	45	45	60	0
2.PLANNING/FINANCIAL ADVISOR	9/15/80	45	45	60	0
3.RESEARCH DIRECTOR	3/11/80	38	38	38	0
4.EVALUATION ADVISOR	7/12/80	43	43	58	0
5.EXTENSION ADVISOR	4/2/81	30	30	30	0
6.FARM MANAGEMENT ADVISOR	15/4/81	35	36	36	-1
7.SERVICE CENTER ADVISOR	9/4/81	39	35	48	4
8.EQUIPMENT ADVISOR	7/5/81	38	38	48	0
9.SOIL IMPROVEMENT ADVISOR	13/7/81	31.5	33	36	-1.5
10.TRAINING ADVISOR	9/9/81	34	35	36	-1
11.MACHINERY DEVELOPMENT ADVISOR	5/1/82	19	30	36	-11
12.LOCAL MANUFACTURING ADVISOR	3/2/82	29	27	36	2
13.SI IRRIGATION ENGINEER	1/4/82	27	34	36	-7
14.SENIOR ACCOUNTING ADVISOR	1/11/82	16	20	36	-4
15.SHORT-TERM TECHNICAL ASSISTANCE		31	31	36	0
TOTAL		500.5	520	630	-19.5

4.0 IMPLEMENTATION

Milestone implementation schedules for the six months to June, 1984 are shown for extension, research and development, and land improvement in figures 4.1, 4.2, and 4.3 respectively. The R/D program is being implemented through the Egyptian side with TDY support from Dr. Reaves.

A summary of implementation during this past period is as follows:

1. Extension (figure 4.1):

   a. IFB 83/02: bid evaluation completed, and legal commitment is progressing.

   b. IFB 84/03: bids under MOA review;

   c. Group 5 completed as scheduled.

   d. Group 7 was on schedule but had to cancel because of nonresponsive bids; rebidding will result in places these equipment items being behind schedule.

   e. Group 10 is on schedule.

   f. Group 11 is behind schedule since it is only now being advertised rather than being evaluated and awarded.

   8. VILLAGE PROGRAMS: Demonstration/training equipment continued to be ordered and delivered to field sites. However, failure of dealers to meet their delivery commitments, provide maintenance and spare parts, and to assist the Project with field support has hampered the full development of this program as originally planned and scheduled.

2. Research and Development (figure 4.2): In-house research is behind its new schedule, and applied research contracts are progressing, although not as fast as originally intended.

   a. Saka tests on wheat planting and residual tillage effect from last year's cotton tillage trials completed.

   b. Minimum tillage experiments not established because of lack of equipment.

3. Land Improvement (figure 4.3): Startup problems with the introduction of the new demonstration landleveling units, especially the compatability of the tractor hydraulics and the laser units, severely limited the performance of this unit. In addition, the assembly of the Ford tractors left much to be desired: e.g., loose bolts and studs leading to drawbars and fenders falling off.

   Although the unit participated in all of the scheduled activities. it did not achieve its quarterly objectives.

4. Planning and Evaluation: The Farm Management data analysis is proceeding well with crop reports issued after completion of each data set. The evaluation of Project activities is proceeding with specific subproject reports rather than a Project-wide evaluation.

5. Training: The in-country training program is developing as anticipated in terms of participants but lags in expenditures. As has been the problem throughout the Project's life, the US training is behind schedule because of the lack of qualified candidates with the necessary level of English language capability.

6. Service Center/Village Workshop: At the Project-level, the program is on schedule but at the Bank-level it is sadly behind schedule. It is hoped that this bottleneck can be resolved through a review and clarification of the Letter of Understanding with the PBDAC, which is currently in progress through the Egyptian side.

7. Local Manufacturing: Although behind its original schedule, the development of a full set of plans for manufacturing the thresher has been completed and awards made for the production of manufacturing prototypes.

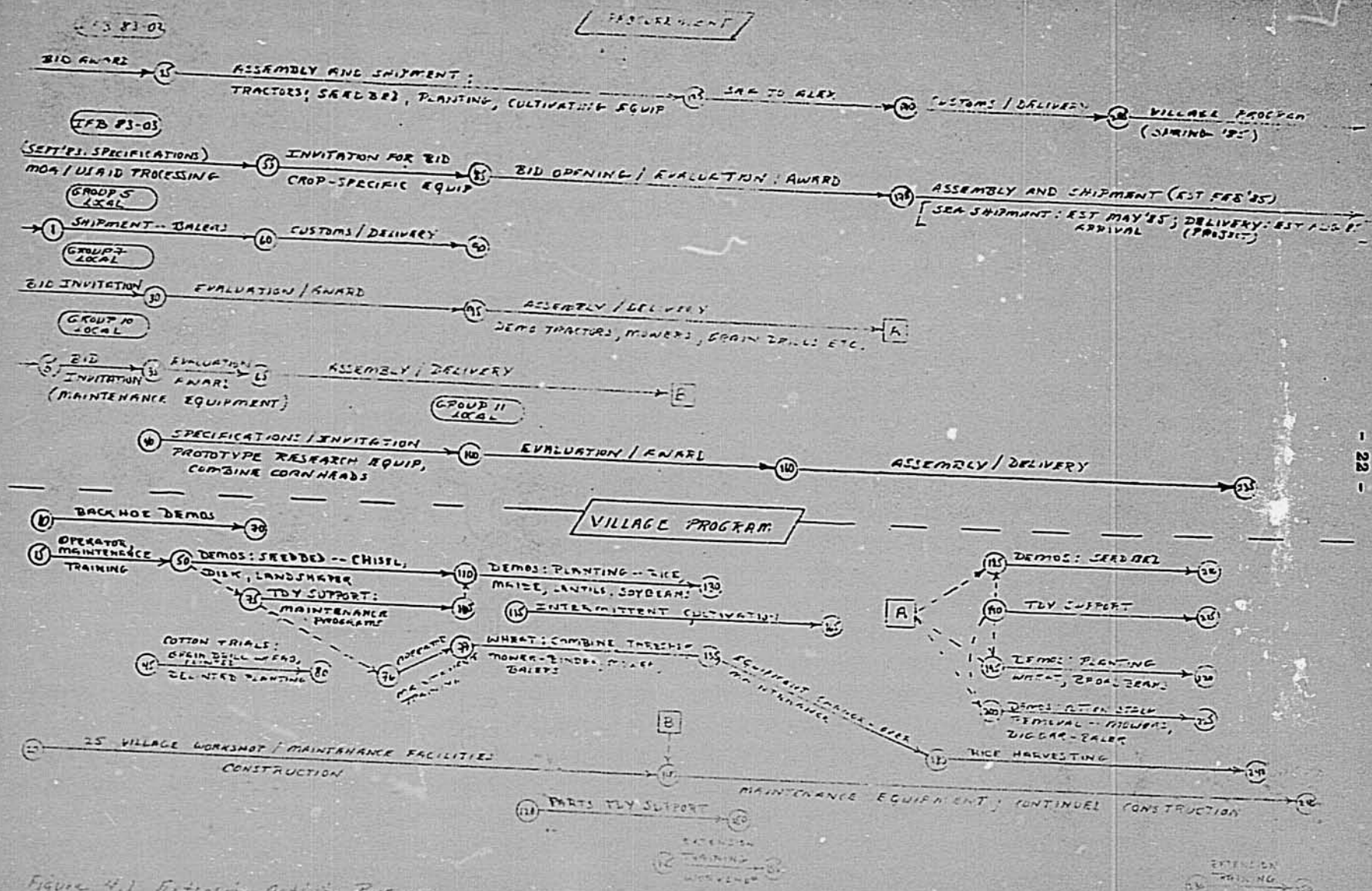
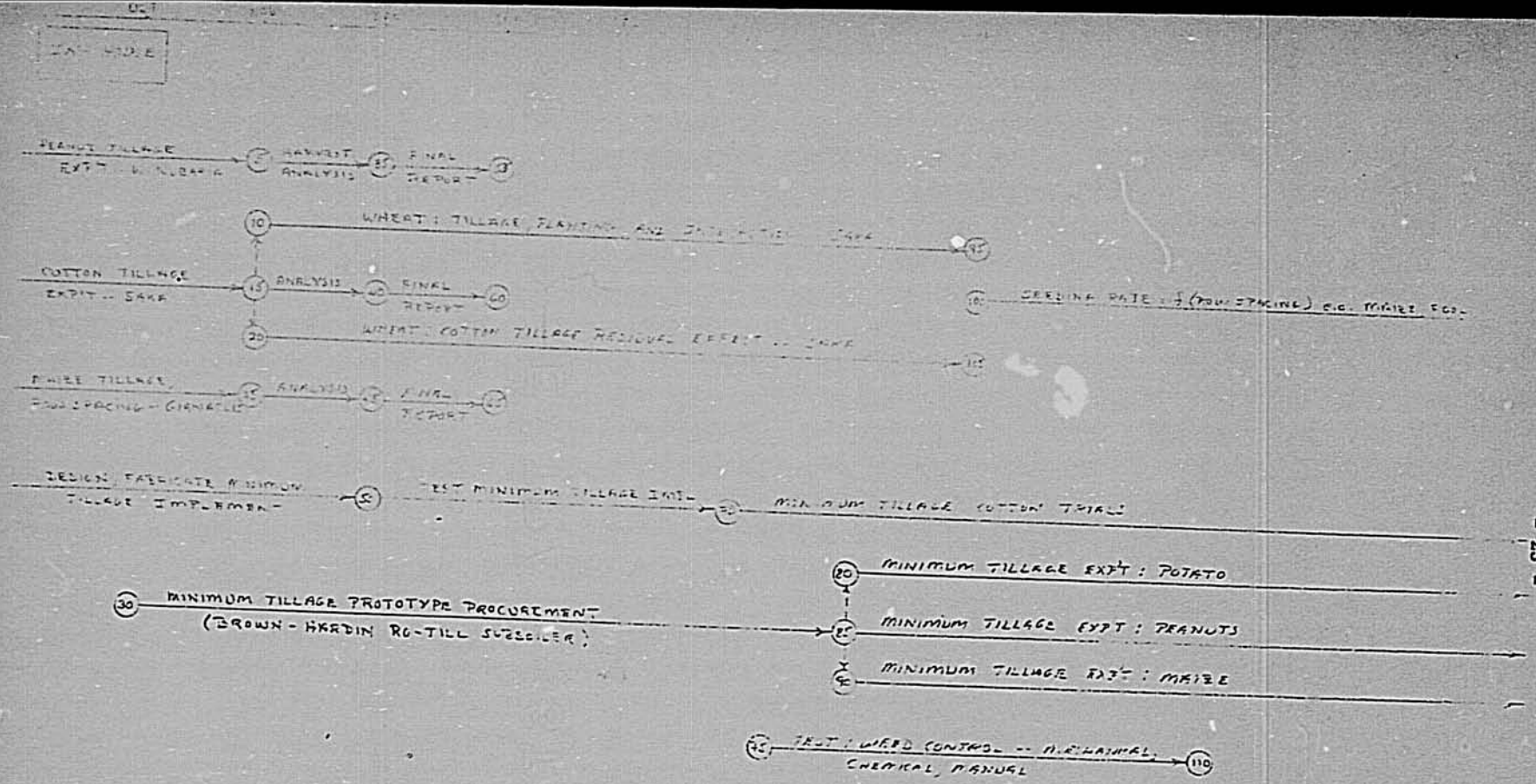


Figure 4.1 Extension Activity Program



Best Available Document

Figure 4.2 Research Activity Program.

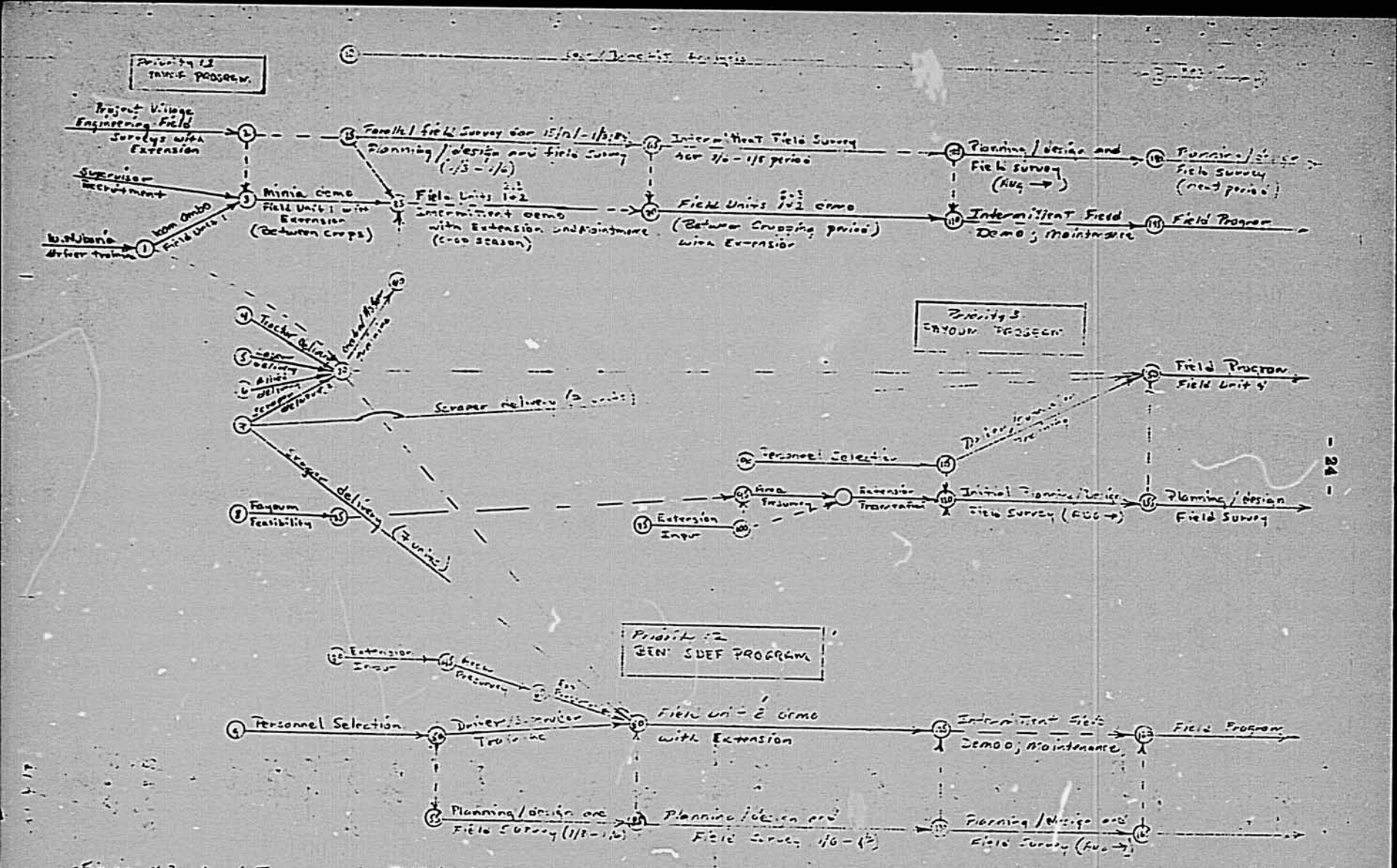


Figure 4.3 Land Improvement Activity Program

5.0 NEXT QUARTER'S OBJECTIVES

5.1 Overall Objectives

1. Machine Introduction Fund ($2.0 million): Reach a 50 percent expenditure level.
2. Water Lifting Fund ($3.0 million): Expend the remaining funds and add an additional $4.0 million to the Fund.
3. IFB 83/02: Bids to be committed.
4. IFB 84/03: Bids to be awarded.
5. Attain the 64 percent level in the Project's committed/expended category.

5.2 Planning and Evaluation

1. Staff preparation of production function data for wheat, maize, and rice.
2. Staff preparation of farm management data and develops individual farm budgets.

5.3 Extension/Training

1. Complete 1984 Training Plan and draft 1985 Training Plan.
2. Start local procurement of Group 12 to replace Group 7, which was nonresponsive.
3. Complete Group 10 procurement.

5.4 Service Centers/Village Workshops

1. Develop two service centers.
2. Develop eight village workshops.
3. Complete liquidation of the first tranch of the Service Center Fund and reach the 35 percent level in the committed/expended category.

5.5 Land Improvement

1. Start a pretest operation in Beni Suef.
2. Integration of Land Improvement and Extension activities in the Project villages in Minia.
3. Continue with a data collection plan for monitoring land-leveling costs and benefits.

5.6 Local Manufacturing

1. Assist subcontractor's with production of manufacturing protypes and continue with the tooling required.
2. Complete drawings for optional thresher equipment.
3. Commence with development of a local manufacturing feasibility study.

ANNEX A

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A.1 Planning and Evaluation

A.1.1 Planning and Financial Unit

A.1.2 Evaluation Unit

Activity Report
Period: April, May, and June 1984
Prepared by: Dr.Steven C. Shepley
Mr Nour El Din Nasr
Mr Mohammed Shoukry

Summary

Work completed during the period included publication of a project working paper on "Egyptian Cotton Production Economics and Farmer Response to Government Price Intervention and Meat Import Policies" mechanization support "packages" for the Egypt/USAID sector plan, a survey questionnaire for the evaluation of mechanical rice transplanting technologies, and a paper presented to an FAO conference on May 1-4 at the Cairo Marriot Hotel. The title of this paper is " Perspectives on Agricultural Mechanization in Egypt". The papers have been attached as appendices to this report. The Cotton paner has been previously distributed.

Cotton Production Paper

Cotton production has been declining over the past decade because of escalating labor costs and shortages during peak periods and low output prices.

In spite of these unfavorable trends, farmers have shown their willingness to adopt new technologies when marginal rates of return on invested capital exceed 200 percent. A two hundred and fifty farm survey conducted in Behera, Gharbia, Qalubia and Sharkia Governorates has shown a high incidence of mechanized tillage (£0 percent of the sample) and mechanical water lifting (50 percent). An analysis of mechanization costs and benefits revealed a marginal rate of return of 376 percent, meaning that farmers using mechanized tillage and water lifting receive £E 3.76 for every Egyptian pound invested in the new technologies.

Compared with other, competing crops, returns from cotton (gross margins) are lowest. The gross margin per man-day of labor for cotton is £E 1.09, while for berseem and wheat straw, the figures are significantly higher £E 3.56 and £E 4.38, respectively.

The profitability of animal feeds has been enhanced by supply shortfalls relative to demand for red meats in the domestic market. This distortion has propelled meat prices to levels twice as high as imported meats and created a demand pull affect on limited supplies of feeds, whose prices have also escalated to levels higher than world market prices.

Government price controls on cotton, with a nominal economic protection coefficient of 0.58, have resulted in an implicit tax of 42 percent on cotton producers who transfer almost half of their incomes to the state in direct transfer payments.

Escalating feed costs and unfavorable gross margins from cotton production have combined to motivate farmers to transfer some production resources out of cotton and into feeds (principally berseem) and to postpone planting operations (reducing cotton yields) in favor of taking more berseem cuttings in rotations where berseem preceeds cotton. A simulation model of cotton losses developed from yield/planting date correlation data from research and from planting date ferquencies of the farm survey showed production losses ranging between 0.40 and 5.00 per feddan with a mean loss of 2.25 kintar per feddan (worth £E 232 at export parity prices) These losses result from late plantings and could be recovered through changes in the cropping schedule without any additional input factor costs.

The paper evaluates the effects of alternative government cotton price and meat import policies on farmer response to cotton production. The quantitative analysis was made through a production response simulation model where empirical data from the farm survey and Ministry of Agriculture records were developed into a set of statistical linkages. The government allows cotton prices to rise, increases meat imports, thereby decreasing meat and fodder prices and increasing cotton profitability relative to feeds.

The analysis presents the compartive advantage of cotton production over meat and input fodder production. One Egyptian pound of input factor value transferred from domestic meat to cotton production generates £ 2.73 in additional economic income. This is true because Egypt has limited low opportunity cost range land and must support its animal population on high opportunity cost agricultural land, thereby making meat production under the test of gains from import substitution not economically justifiable. The analysis shows that Egypt can import meat at lower cost than producing this commodity domestically and that the gains from increasing meat imports to restore equilibrium in meat supply and demand can benefit the national economy by expanding cotton production where it has the most favorable comparative advantage.

Low prices and inadequate technology will prevent further mechanization of Egyptian cotton production. The most critical need in agricultural mechanization is to find a suitable mechanical means to harvest cotton. This operation is highly labor intensive and very costly. Some 550 person-hours per feddan are required and labor input costs are the highest of the agricultural season because cotton harvesting needs must compete in a limited factor market with the labor requirements for maize and rice harvesting.

The solution to this intractable problem lies in a two phased effort to develop and test appropriate technology and to promote enlightened cotton price and meat import policies. This effort will provide farmers with both the technical and financial means to solve their most pressing production constraint.

The analysis revealed that cotton prices would have to rise to at least £E 76 per kintar (from the survey mean of £E 59) for farmers to advance their planting date from the average of April 7th to March 2nd . In making this adjustment, farmers would realize a net income gain to £E 16.24 per feddan after subtracting the opportunity cost of the third short berseem cutting that would be forfeited. This scenario assumes no changes in berseem prices.

Under the second scenario, also assuming no change in berseem prices, Farmers abandon the second berseem cutting and plant their cotton crops on the empirically derived optimal date of Februray 18th. They obtain a net benefit of seven to thirty Egyptian pounds per feddan when cotton farm gate prices rise to between £E 85 and £E 90 per kintar (the export parity price equals £E 102.96).

Finally, the third scenario shows the combined effects of cotton price and meat import policies. Here total meat supply is increased by ten percent through an additional import of 64,000 tons (costing £E 154 million). The interaction of supply and demand causes meat prices to fall from the current £E 5.20 per kilogram to £ 4.66. Berseem prices drop from from £E 19.36 to £E 17.54 per metric ton. When farmers are offered at least £E 94 per kintar for their cotton under this scenario, they realize a net benefit of of £E 79 per feddan through planting an additional 22 thousand feddans to cotton and planting on February 18th. Total cotton output is increased by 3 million kintar (worth £E 213 million at net export parity prices). The net economic benefit under this, the most favorable scenario, is £E 59 million after subtracting the cost of the marginal meat imports.

Mechanization Package for Sector Plan

During the reporting period, Dr Shepley participated as the mechanization planning representative on the Egypt/USAID Sectoral Planning Committee chaired by Dr Ahmed Gueli. Inputs made included the development of comprehensive mechanization packages for wheat and rice to augment the productivity effects of biological input packages développed by other USAID projects. The details of this program are attached.

Perspectives on Agricultural Mechanization

This paper was prepared for an FAO conference given at the Cairo Mariott Hotel on May 1 - May 4th. The paper analyzed production contraints generating the need for agricultural mechanization in Egypt, and provided an analysis of the current state of mechanization adoption and critical factors which facilitate the adoption process in Egyptian agriculture. The final sections of the report provided a description of Egypt's agricultural mechanization strategy and a description of planned future mechanization extension programs. This paper is also attached.

Rice Mechanization Questionnaire

In collaboration with Dr Abou Toueb Yamani, the Planning and Evaluation Unit developed a survey questionnaire to be used in a survey of rice transplanting economics. This survey will be conducted during the months of July, August, and September and will generate data for further quantitative analysis of rice mechanization

Governorate_____ Village_____

Economic Evaluation of Rice
Mechanical Transplanting

1. Objective: To collect data for a comparatice cost analysis of mechanical transplanting methods as a pre-requisit to identifying the most appropriate technology

2. Sample Size: The method used to determine the required sample size is based on the formula:

$$S = \frac{(1.96)^2 \sigma^2}{H^2}$$

where:

S= required sample size

1.96= is the confidence coefficient for the 95% confidence interval

σ^2= is the Farm Management Survey variance

H^2= is the desired confidence interval half-width. Herein, this is defined ± 5% from the farm management survey mean.

Farm management survey variables with the greatest dispersion about the mean have been selected for sample size determination.

- harvesting labor input in man-hour equivalents/feddan
- harvesting labor input cost per man-hour equivalent
- nitrogen fertilization rate in kgs/feddan
- phosphate fertilization rate

Table 1 summarizes the Farm Management Survey means and variances:

Table 1

Farm Management Survey Means and Sample Sizes

Variable	H	$\bar{X}$	σ^2	S
nitrogen	2.21	44.21	428	354
phosphate	0.5645	11.29	135	422
Harvest Labor	2.30	45.96	196	143
Harvest Labor Cost	0.026	0.52	0.0841	462

From this analysis a sample size of 500 rice plots would appear to give the required confidence interval for all of the main variables.

3. Study Area:

Four major governorates of the rice zone:

- Behera
- Kafr El Sheikh
- Gharbia
- Dakahlia

4. Personnel Requirements

Assuming that one enumerator will be able to survey 20 farmers, a total of 20 enumerators will be needed, or five per governorate.

5. Cost

It is proposed to pay each enumerator a total of £E 150, plus £E 50 for transportation for a total survey budget of £E 4,000.

6. Survey Method

The farmers shall be randomly selected from the agricultural roles, which constitute the sampling fram. The survey methodology shall be the on-site interview technique using the following simple questionnaire.

Survey Questionnaire

1. Previous crop_____

2. Harvesting date of the previous crop_____

3. Unit farm gate price of the previous crop (main product)

   (bi-product)

4. Yield of the previous crop (main product)

   (bi-product)

5. Area planted to previous crop_____

6. Inputs used in nursery preparation

   -chemical fertilizer (type, quantity and unit cost)

   -organic fertilizer (type, quantity and unit cost)

   -seeds (quantity and unit cost)

7. Area planted to rice _____

8. Labor Input (hours and unit cost)

Labor Budget

Operation	Animal Labor		Human Labor		Machine Labor		Date
	Hours	Price	Hours	Price	Hours	Price	

Technical Information Concerning Mechanical Transplanters Used

Make _____

Country of Origin _____

Capacity (rows) _____

Year of Manufacture _____

Price (in£E) _____

Number of trays _____

Tray cost (in £E) _____

Seedlings used (number) _____

Human labor used (hours: 1 man-hour equivalent = 2 woman/child hours) _____

Rice yield (kgs/feddan) _____

Rice straw yields (tons per feddan) _____

Rice grain farm gate price _____

Rice straw price _____

Variety of rice planted _____

Method of irrigation (sakia or pump or both) _____

A.2 Research and Development

بسم الله الرحمن الرحيم

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704364 - 707247

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الدور الخامس - مبنى الجمعية العامة للاصلاح الزراعى
صندوق بريد ٢٥٦ - الدقى - جيزة ج ٠م ٠ع
٧٠٤٦٦٠ - ٧٠٤٧٢٠
٧٠٤٣٦٤ - ٧٠٧٢٤٧

DATE July 12,1984 التاريخ

UTO : Dr.David Gaiser
Team Leader

FROM : Carl Reaves

SUBJECT: TDY from April 16- June 25,1984

A. Activities Accomplished

1. Attended five R.D Executive Committee meetings in Alex.
2. Visited four contract research projects, Korayem and Samir Younis in Alex, [illegible] on Cotton Mechanization in the Nile Valley, and the cotton stalk puller project in Menufia. Rewrote one sugar cane proposed contract research project.
3. Evaluated the results of some previously run tests on 2 different small German Tractors.
4. Wrote introductions for Trouse's and for research reports from Alex.
5. Designed the standard and sweep for a field cultivator type machine to be tested with the Behera chisel and one other field cult, type implement that was designed at Agri-Eng. Dept. at Alex U. made these tests in Sakha and gave Steve a copy of the completed test report. These tools were designed for primary tillage at a max 15 cm depth of operation.
6. Adel was back in Alex from the 6 months US Training at th- Nat'l Tillage Mach. lab on instrumentation. Spent a lot of time with him on specifications of instruments in hopes that we could get some dynamometers designed and some recorders ordered. But his back in the States on a lyear Peace Fellowship.
7. Alex has test projects started on several crops to evaluate the rate of seeding with a grain drill. Went over these projects with individual engineers assigned as team leader for each project. Most of the projects are laid out on a simple randomised complete block and it was too late to make changes. All and all the plans are pretty good especially since the main objective is to evaluate the effectiveness. of the grain drill. Visited most of these projects.

8. One Eng. has some Egyptian cotton planted to evaluate the John Deere two row pickers that were on the Mechanization Farm in West Nubaria. He has two of these pickers in Alex now. Spent a lot of time alerting him to procedures, potential problems, etc and in general the cotton picker.

9. Came to Cairo on May 15 to evaluate some wheat harvesting machinery. Ran into many small problems but did get some information on 1 Deutz Fahr M980 combine and 1 Fortsehritt combine. Left a copy of a completed test report of each combine with Steve.

10 Conducted some tests with wheat on the Beheira Thresher. These tests were conducted in Sakha during Ramadan and the little problems were frightening.

11 Hence I've left Steve a copy of 4 different field test reports. Nagwa Alex has the originals of all but the Deutz Fahr which was written and typed in Cairo, had to wait for some photographs to be printed.

12 I spent i day with Fred and Roger on a trip to Sheikh Ahmad to observe a Deutz Fahr drum type mower cutting and windrowing wheat. It is performed better than any other machine that I've seen in Egypt. The same day Roger set up new J.D.Planter for maize.

B. Activities Left Hanging

1 I promissed Alex that I would try to get back to help with the J.D. cotton pickers.

2. Understand that 2 of the Brown Harden machines have been ordered. If they are delivered in time extensive tests should be started in the fall probably(Oct-Nov) on minimum tillage. I think it is important to go from primary tillage with the rotary tiller, mold-board plow, etc plus various degree of tillage with the Brown-Harden unit. The least tillage would be the B-H chisel operating 10 cm deep directly in the crop row. These tests will be with row crops. It will require a lot po. of modifications and adapting sprayers but chemical versus mechanical. cult should be incorporated in these tests. I think a minimum of three weeks in Sakha and probably 50 feddans will be required to install these tests. If they are attempted at all a large effort should be given.

3 I was very disappointed with the small quantity of good data that I was able to get on wheat harvesting equipment. I gave it a good effort but there were so many unforseen little problems that took a big effort to solve plus the thresher test was during Ramadan. More work will have to be done, but before they are attempted good equipment, scales, tapes, stakes, etc. must be obtained. Better arrangements must be made with the farm manager to the extent that he is willing to slow the harvesting process down so all the measurements can be carefully made. We must have complete control of the machine operations and considerable money for laborer incentives.

4 The field cultivator that I designed in Alex showed very good potential compared to the Behera chisel and the other unit also. In order to get the tools built quickly and tested welding was substituted for bolts. Tests revealed several small changes that should be made that I have discussed with Alex and Dr Zakaria . I included two options(sketches) for complete implements with the test reports These small changes need to be completed and further field tests need to be conducted.

The only consulting work that I have planned now is a possible 2 weeks, the 1st 2 weeks in August, in Columbia. I plan to spend the month of December in the USA . other than for these times I would be willing to consider a proposal for coming back to Egypt.

A.3 Extension and Training

بسم الله الرحمن الرحيم

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صندوق بريد ٢٥٦ - الدقى - جيزة ج ٠ م ٠ ع
٧٠٤٦٦٠ - ٧٠٤٧٢٠
٧٠٤٣٦٤ - ٠٧٢٤٧

DATE ~~25 July 1984~~ التاريخ

To : Dr. Zakaria El Haddad - Project Coordinator
Dr. David Gaiser - Team Leader

From : The machinery Management Extension and Training Subproject Staff:

Fred Schantz	Roger Engstrom	Dr. Mamdouh El Baz
Ibrahim El Ghattas	Ahmed El Beheri	Gordon Stringer
Zaghloul S.El Sayed	Moh. A. Aziz	Paul Armstrong
Hussein Heiza	A. Hamid Soiden	Maher Iskander
Salah Bakar	Abd Moniem Mohamed	
Moh. Abd El Wahab	Essam Wasif	

Subject : Quarterly Report for April/May/June 1984

The following is a summary of the Machinery Management Extension and Training staff activities for the April/May/June 1984 period. For detailed information annixes A.1 through A.8 are attached.

I. Summary

A. Extension Unit Activities

1. Demonstration/training field activities continued during the quarter as the harvesting of wheat and planting of spring crops such as maize and peanuts was completed. A list of project areas extension/training sessions is presented in Annex 6 (field courses). A total of 149 sessions were held for 2377 participants.

2. Demonstration/training equipment continued to be ordered and delivered to field sites. Numerous problems with local dealers failure to deliver equipment on time as promised, provide critically needed maintenance and parts support and respond to ongoing request for field assistance continues to plagne the field equipment extension demonstration effort. One extrewe example is the local dealer for Massey Ferguson equipment who was given an order last year for eight seed planters and six ridgers and has not yet delivered this equipment to the project.

3. Two papers previously prepared on extension and maintenance were presented at the 2nd Annual Mechanization Conference in Cairo where various workshops were held. Recommendations were formulated and forwarded to the Minister's Office.

4. Discussion continued on the folding of the lank improvement effort in Minia into the existing extension demonstration/training program recently developed there. Plans are being prepared to closely coordinate these efforts in the future.

5. A demonstration of a belt-driver drum-type mower was attended in the field. Although the two row unit worked well, a great deal of grain shettering occurred in wheat harvesting this unit is very promising for cotton stock mowing as it windrows the cut material well.

6. Considerable time was spent with a project evaluation team from the program Corparation, a USAID contractor assigned for one month to review the project. Meetings and field trips were carried out with several of the subproject's staff.

7. A field trip was made to El Fayoum to examine the demonstration training unit developing there. One tractor and one drag scraper was smoothing a small area which has a severe grade. Plans are made to locate an incoming elevator scraper, motor grader and bulldozer there to allow for field activities like those developed at the Gabel Asphar farm.

8. Work on the demonstration/training equipment village sheds continued although at a noteable slower pace due to various logistical problems and the month of June being Ramadan when fewer hours were required by all staff.

9. A new Demonstration/Training Equipment Maintenance Unit was fully formalized during this quarter with a staff to deal with the severe maintenance problems facing the newly acquired, large quantities of field machinery, maintenance equipment and spare parts inventory. Systems are being developed to handle these items and required are several seasonal temporary duty maintenance specialists which have been formally requested in writing during the quarter.

10. Demonstration/training Equipment Procurements

A majorety of the extension and training coordinator's time - as well as many of the subproject's staff - was spent on ordering, evaluating and approving equipment. The fo-lowing shows the status of the outstanding orders:

No.	Group Order No.	Status as of 30 June 1984
1.	IFB 83/02	Bid awaids completed; equip. arriving
2.	IFB 84/03	Bid opening completed; bids under review
3.	Group 5	Equipment and parts delivered
4.	Group 7(joint)	Local IFB cancelled - No responsive bids
5.	Group 10	Equipment arriving
6.	Group 11	Bid advertisements under preparation
7.	Group 12	Rebid from Group 7; bid underreview
8.	Group B (Gabel Ashar)	Awaiting spare parts delivery
9.	Group 2	" " " "
10.	IFB 82/01 (land improvement)	" " " "

11. The Extension Information Unit Continued its activities as follows:

    a) Received and began distribution of 15,000 extension pa (cotton, wheat, maize) and 500 copies of the agricultural alwanc

    b) Arranged/attended the final conference for Appropriate Technology.

12. The Demonstration/Training Unit continued to use three of the four lazers located of the Gabel Asphar farm. About 15 feddans have been leveled out of a 50 feddan field. Numerous equipment problems with the poorly assembled (locally) Ford tractors and lazer unit operations slowed these activities considerably.

13. The Land Improvement Extension Unit Continue their operations with special attention on the maintenance problems of their Ford tractors and organization of their large number of equipment in various operations sites.

14. The Machinery Introduction and Water Lifting Credit Funds Continue to be disbursed at an increasing rate (annex 5)

B. In-Country Training Activities

1. During the quarter a total of 2483 trainees attended 159 new and continuing training center and field courses/sessions (Annex 6) summary and 6a,b,c).

2. The 1984 Training Plan was completed during the quarter, approved by the MOA, and sent to USAID for approval.

3. Due to the month of Ramadan (June) when familys stay near home, no training courses were held at training centers.

4. A training field visit was taken to El Fayoum to examine a field tractor operator's course at the district office for the land improvement subproject. Although a training subproject supervisor and a land improvement training officer (Hassan El Banna) were continually maintoring the coursem it was found to be almost completely the artical with each trainee spending less than two hours per week on the one tractor provided for 19 trainees. Consequently, a written recomendation was made to project management to conduct all tractor operator. Courses at a qualified training center such as the Maamoura Farm Machinery Center in Alexandaria. Tractor driving field courses were recommended which requires intensive practical training on simple tractor driving procedures.

C. Participant Training Activities

1. During the quarter 7 participant trainees attended 6 new and continuing programs (Annex 7 a,b,c).

2. During the quarter project management issued a decision to stop the processing of all new academic training programs and concentrate efforts on short term technical training programs. This was necessary due to the shortage of time before the project ends which will not allow financing of new academic programs past the end of the project completion date.

II. DURING THE QUARTER

The primary issues this quarter were obtaining approvals for the second foreign currency procurement (IFB 83/02) and dealing with the large excess of participant training funds which have not been programmed due to the absence of qualified candidates. Decisions were mode on both issues which are being acted on.

III. PROBLEMS

A. Ongoing fuel and vehicle limitations

IV. PLANS FOR NEXT QUARTER

1. Continue Extension/training activities
2. Complete bid evaluation and award bids of IFB 84/03, Group 12 and Group 11 equipment.
3. Draft the 1985 Training Plan.

Note: The extension advisor Mr. Roger Engstrom will be on leave from July until mid August and the extension and training coordinator Mr. Fred Schantz from the 5-28 August.

بسم الله الرحمن الرحيم

AGRICULTURAL MECHANIZATION PROJECT
A. I. D. Proj. NO. 263 - 0031
EGYPTIAN MOA/USAID
5 th. Floor - Building of the
General Society For Land Reform
P. O. B. 256 Dokki - Giza, ARE.
☎ 704660 - 704720
704364 - 707247

مشروع الميكنة الزراعية
وزارة الزراعة المصرية - وكالة التنمية الامريكية
الدور الخامس - مبنى الجمعية العامة للاصلاح الزراعى
صندوق بريد ٢٥٦ - الدقى - جيزة ج ٠م ٠ع
٧٠٤٦٦٠ - ٧٠٤٧٢٠
٧٠٤٣٦٤ - ٧٠٧٢٤٧

DATE 4 June 1984 التاريخ

TO: Dr. David Gaiser / Dr. Zakaria El Haddad
Team Leader Project Coordinator

FROM: Fred Schantz, Machinery Management Extension and Training Subproject Coordinator
Roger Engstrom, Extension Advisor

UBJECT: STATUS SUMMARY of the Extension and Training Activities

The following is a status report of the Extension and Training Subproject activities. It has been prepared by the subproject staff and includes the following:

PAGE	SECTION	SUBJECT
1.	I.	General Summary
4.	II.	Detailed Subproject Information
6.	III.	1980-1985 Training Activities (planned and thus far completed)
11.	IV.	A Detailed Summary of the Project Demonstration/Training Equipment Already On-Site and In-Process
20.	V.	Conclusions and Recommendations

cc: Stephen Shepley
Roger Engstrom
Ahmed El Beheri
Dr. Mamdouh El Baz
Ibrahim El Gatas
Mousa Shafik
file

A GENERAL SUMMARY of the Machinery Management Extension and Training Subproject Activities

BRIEF OVERVIEW

The Machinery Management Extension and Training Subproject was formulated in June 1982 during the second year of the project. Before then the extension unit was separate from the training unit following the Inception Report design. Once the project began to be implemented, and in order to allow the training unit to serve both the extension as well as the participant (off-shore) training needs of all project components, they were combined. This also allowed for a closer coordinated effort between project management, the extension and demostration activities and other subprojects' local and foreign training needs.

HIGHLIGHTS

Some of the major highlights of the subproject which are detailed in the 1982 Annual Report of the MMEx and Trng Subproject, as well as in the monthly and quarterly reports of the subproject, are as follows:

A. MACHINERY MANAGEMENT EXTENSION UNIT

1. All four Conditions Precedent required by the Project Paper were met in 1982 including the MMEx program which is the basis for the subproject's activities,
2. FIFTY ONE mechanization extension specialists have been selected trained and appointed to project areas to carry out the objectives of the project; when the project is completed, these mechanization extension subject matter specialists will remain in the field to carry on the efforts begun by the project,
3. Annual extension/training/demonstration programs were prepared by the specialists for 1982/3 and 1983/4 with assistance from the project staff and are being implemented accordingly,
4. Funding for extension activities including the water lifting credit fund, machinery introduction credit fund and demonstration training equipment procurements were put in place and have been almost depleted; As detailed below in Section IV, as of June 1984 a total of 383 pieces of equipment of demonstration/training-farming equipment has been placed in project areas. A total of 1322 units are to be put in the field before the project ends in Sept 1985.
5. In addition to the field extension unit, a project extension information unit was established. It has produced thousands of pamphlets on mechanized agriculture and numerour television and radio programs in Arabic for the public.
6. A Ministry of Agricultural mechanizated farming system unit was established at the Gabel Asphar farm where workshop and mechanized farming practices are taught. A full line of farming equipment has been located for training purposes.
7. A total of 1196 in-field extension training activities have been conducted from the beginning of the project (Sept 1980) until the present (June 1984). Also an additional 1497 sessions are planned for the remaining period of the project (see detailed list below in Section III)

B. TRAINING UNIT

1. Annual training plans have been submitted to the MOA and USAID to meet the USAID Condition Precedent for the release of funds for local and participant (off-shore) training activities.
2. A total of 1382 courses for 12868 trainees have been conducted (including the extension field site courses) from Sept 1980 until the present (June 1984). An additional 1676 courses are planned for the remaining year of the project (see detailed list below in Section III).

BENEFICERIES

The benefits of the achievements of the extension and training subproject have reached several groups including:

1. Farming populations who have been the receipients of most of the subproject's activities. This includes not only in-field and training center education but also off-shore training for several in developing countries.
2. Government staff has also benefited through participation in the extension and training activities.
3. The General Public has also received a great deal of information via the media on mechanized farming, including the positive and negative aspects of it.

SUBPROJECT CONSTRAINTS

The major constraints on the subproject include:

1. Insufficient vocational agricultural institutions with a practical orientation for training and upgrading agricultural workers and staff,
2. Bureaucratic and administrative procedures which have delayed or prevented timely execution of seasonal extension activities,
3. Inadequate working facilities and transportation means necessary to effect the extension and training activities,
4. Insufficient qualified staff to carry out local training activities and centra financial processing of cash need statements,;
5. A high level of compentency in the English language required for foreign training programs has resulted in a severely limited success of the participant training programs necessary to establish the project's objectives within the MOA,
6. Additional constraints are:
   a) Absence of sufficient tractors for in-field demonstrations
   b) Spare parts to keep equipment going
   c) Spare parts storage and inventory systems
   d) Servic/repair capability at the working site
   e) Land leveling completed prior to row-crop operations not completely satisfactory in most cases
   f) Poor communications between units and personnel causing time delays
   g) The size of the areas to be covered spread over a vast area make it very difficult to be effective

MOST IMPORTANT PROBLEMS SOLVED

Some of the most important problems solved included:

1. Completing the Condition Precedents for the subprojects,
2. Establishing a cadre of mechanization extension specialists within the MOA,
3. Placing a group of demonstration/training equipment in the field for practical training on mechanized agricultural practices,
4. Gaining approvals to order sufficient tractors to use with the other demonstration/training equipment

ADOPTION RATE OF PRACTICES

The adoption rate of mechanized agricultural practices has been astonishing. In most areas where appropriate agricultural equipment had been demonstrated farmers have usually been intent on using the equipment on their land. This is primarily due , they say, to the high cost of labor and unreliability of a work forde during peak seasons. It is important to point out that while most farmers seem eager to adopt a small mower, grain drill or drag scraper to work their land, few can afford to finance these units since the average holding is about 2 feddans.

Adoption rate is directly related to whether or not a suitable machine for a particular operation is placed in the field on time during a season. It is of critical importance to have a good tractor to carry out the demonstration which can ruin (and has) an otherwise successful demonstration. An important rule of thumb used by the extension staff has been to never demonstrate a unit which has not yet been researched. Due to the general absence of sufficient research data

on most of the equipment put into the field, the pretest village of Shiek Ahmed served a very useful purpose of carrying out applied research prior to trying in in front of critical farming populations. Also when a unit proved well, training and orientation was also carried out at the pre-test area to familiarize the new extension staff on how to use and demonstrate it.

Some specific units which have generally been accepted include the silage mower, mower binder, new chisel plow, drag scraper, seed drill and the disc plow to some extent. The backhoe for cleaning ditches has also been readily accepted for improving the flow of water in tertiary canals. Cultivators have created a great amount of interest but farmers are reluctant to allow tractors into the fields once the crop is up. This is primarily due to the absence of a turning area for the tractor at the end of the field. This problem is still being dealt with and ways to cultivate without damaging much of the crop is under study. The use of incoming high-crop tractors hold some promise to resolving this condition.

Cotton stalk removal and the large subject of mechanical harvesting of cotton is still under applied research. Silage mowers have served as a stop-gap method to remove the laborious and expensive task of removing the stalks from the fields but have not completely solved the problem. Root blade equipment is being tested and evaluated at the present time. Effective control of ground water and soil moisture indicate complete plant removal is possible but ways to determine the right soil moisture for the blade to work properly are still under study.

Fertilization and machine storage/maintenance is making progress but the results are only now beginning to be realized. Considerable time is required to complete the research/implementation of these items.

Grain threshing is receiving a great deal of attention since it is one of the most pressing problems for the Egyptian farmer. The project's Berky thresher is now being produced following the completion of the the working drawings this year. In the meantime the Turkish and local thresher are serving the growing need in the field.

An important factor in the general progress of the extension unit is its conscious effort to contact and work with other organizations in Egypt including the Agrarian Reform Dept. of the MOA, MOA state farms, the MOA agricultural research centers, research stations, livestock production units, the National Academy of Science, USAID agricultural projects such as EMCIP and the Small Farmers Production Project, the FAO research stations, and others directly involved in agricultural development in Egypt.

MOST IMPORTANT PROBLEMS FACING THE SUBPROJECT

These include:

1. The lack of trained mechanical personnel for equipment maintenance, repair, spare parts and administrative processing and maintenance scheduling. Although these courses are available and several attempts have been made to locate indi viduals for these tasks, only a few of the project villages have been able to establish this infrastructural staff,

2. Over 380 pieces of equipment have been placed in project villages and another 1049 are now on order and are due to arrive the last year of the project (see Section IV below). Receiving, settling and completing the training sessions on this equipment will be a monumentous task, if not impossible, to complete in a nine month period,

3. When the project ends and incentives also end, the chances are good that some of past efforts will be lost unless at least some of the staff engaged in the present programs are maintained for at least two more years,

4. Considerable time has been and will continue to be taken from the extension and training coordinator in advising on equipment procurements which seriously affects the completion of extension and training responsibilities supporting the field effort.

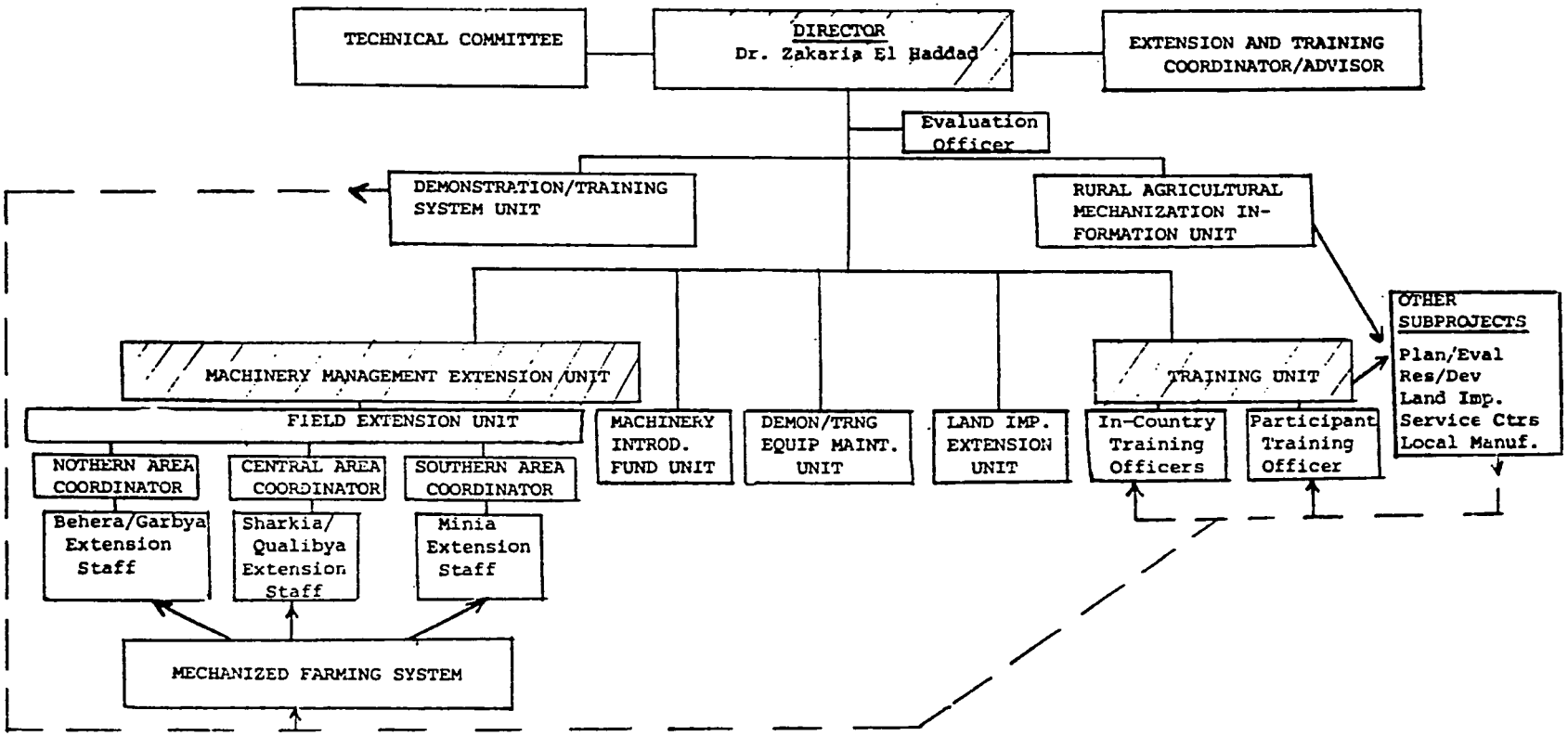
Detailed Subproject Information

SUBPROJECT ORGANIZATION

The subproject organization chart (see Figure 1) shows the Project Coordinator as the Subproject Director who is advised by the Extension and Training Coordinator. The Director conducts weekly meetings in Cairo where plans and activities are discussed and decided upon. Directly reporting to the Director are the heads of seven different parts of the extension and training subproject including (1) the rural agricultural mechanization information unit, (2) the demonstration training system unit, (3) the field extension unit, (4) the machinery introduction fund unit, (5) the demonstration/training equipment maintenance unit, (6) the land improvement extension unit, and (7) the training unit which has the in-country and participant training subunits under one head. The total number of staff involved numbers 73 of which fifty one are field extension mechanization specialists who report directly to their area extension officers but work directly with the regional (governorate) coordinators who act as a link between the project and the field efforts. One full-time extension advisor and seasonally needed short term temporary duty (TDY) technical specialists act as advisors to this staff as well as the extension and training coordinator who acts as liason between the various units in addition to developing annual training plans for all subprojects as their needs require.

EXTENSION AND TRAINING SUBPROJECT

19 June 1984



Organization Chart of the
Machinery Management Extension and Training Subproject

FIGURE 1

EGYPTIAN AGRICULTURAL MECHANIZATION PROJECT

(June 1984)

Training Activities Summary for 1980-1985

NO.	COURSE TITLE	NUMBER OF COURSES: Completed: (Sept 1980-June 1984)	NUMBER OF COURSES: (Estimated) (July 1984-Sept 1985)	NUMBER OF TRAINEES: Completed: (Sept 1980-June 1984)	NUMBER OF TRAINEES: (Estimated) (July 1984-Sept 1985)	DURATION (in weeks) OF COURSE	LOCATION OF ACTIVITY
I.	IN-COUNTRY COURSES held at:						
A.	Training Centers:						
1.	Mechanization Extension Specialist	4	2	49	30	13	Sakha
2.	Hay Baler Systems	2	2		40	1	Maamoura
3.	Tractor Operator	12	10	130	100	6	"
4.	Mechanic: Level I	8	5	108	80	8	"
5.	Mechanic: Level II	4	3	35	45	16	"
6.	Mechanic: Level III	2	2	15	20	4	"
7.	Welder	3	4	22	40	4	"
8.	Machinist	2	4	13	40	10	Nubaria
9.	Rice Transplanting	1[illegible]	10	250	100	10 days	Kafr Shiek
10.	Agri. Mechanization Theory and Practices for KEY FARMERS	10	12	337	400	1-2	Sidi Beshr
11.	Local Manufacturing Techniques	13	6	12	25	9-30	Behera Co.
12.	English Language	16	10	137	100	8	Cairo Am. Coll
13.	Typing and Filing Secretary	3	2	3	2	2-24	Cairo
14.	Audio/Visual Equipment Use	1	2	28	10	1	Sidi Beshr
15.	Combine harvester: theory and use	2	4	42	40	2	Maamoura
16.	Workshop: Mechanization Extension (Dec 1983 included motorcycle operation and maintenance)	2	4	85	250	1	Sidi Beshr
17.	Tractor operator instructor	2	2	23	30	4	Maamoura
18.	Mechanization Short Course:	1	2	14	40	4	Maamoura
	Irrigation/Water pump sets			4		1	
19.	Soil survey and analysis	1					Field/G-A
20.	Farm structures	2	30	15	300	4	Field/G-A
21.	Machinery management	1	4	2	40	24	Cairo
22.	Cotton seed drilling techniques	10	4	125	40	4	Nawai (Minia)
23.	Basic surveying		2		20	4	
24.	Spare parts administration		15		30	4	Gabel Asphar
25.	Service administration		15		30	4	Gabel Asphar
26.	Office computer operation	6	10	24	20	6	Cairo
27.	Manager/supervisor		5		50	4	Barrage (Cairo)
28.	Fesibility study techniques		1		5	6 mts.	Cairo
29.	Cairo International Fair	5	5	81	100	2 days	Cairo
30.	Evaluation Methodology Workshop	1	1	15	5	1	Sidi Beshr
31.	Tractor Survey Analysis	1	1	15	15	1	Fayum

B. Field Sites:

	NUMBER OF COURSES (Completed)	NUMBER OF COURSES (Estimated)	NUMBER OF TRAINEES (Completed)	NUMBER OF TRAINEES (Estimated)	DURATION (in weeks)	LOCATION
1. Agri. backhoe op/maint	249	50	2006	200	2 days	field sites
2. Lazer unit op/maint	6	6	40	40	1	" "
3. Land leveler/scraper op/maint	246	50	1728	200	2 days	" "
4. Seed planting:peanuts	1	50	12	200	"	" "
5. Mower/binder op/maint(wheat)	34	50	310	200	"	" "
6. Combine harvesting op/maint(wheat)	21	50	200	200	"	" "
7. Berky thresher op/maint (wheat)	2	50	150	200	"	" "
8. Haybaler op/maint (wheat)	1	50	6	200	"	" "
9. Seed planting:maize	1	50	12	200	"	" "
10. Grain drilling: rice	64	50	650	200	"	" "
11. Grain drilling: wheat	184	50	1771	200	2 days	" "
12. Bulldozer op/maint	2	2	23	4	"	Gabel Asphar
13. Silage mowing: cotton stalks	248	50	3515	200	"	field sites
14. Tractor driving/maint	18	50	190	200	1-6	Shiek Ahmed
15. Combine harvesting op/maint (rice)	28	50	249	200	2 days	field sites
16. Machinery assembly	2	50	16	200	4	Gabel Asphar
17. Disc plowing	4	5	70	50	2 days	field sites
18. Disc harrowing	17	50	145	500	"	" "
19. Cultivator op/maint		50		500	"	" "
20. Ridger/bedder op/maint		50		500	"	" "
21. Spike tooth harrow op/maint		50		500	"	" "
22. Manure spreader op/maint		50		500	"	" "
23. Ring roller op/maint		50		500	"	" "
24. Roller harrow op/maint		50		500	"	" "
25. Elevator scraper op/maint		2		4	"	" "
26. Motor grader op/maint		2		4	"	" "
27. Chemical fertilizer spreader op/maint		25		250	"	" "
28. Liquid spray rig op/maint		50		500	"	" "
29. Rear mounted tractor blade op/maint		50		500	"	" "
30. Subsoiler op/maint		25		250	"	" "
31. Backhoe/loader op/maint		10		50	2 days	" "
32. Mobile workshop op/maint		25		200	1	" "
33. Toolbar/furrower op/maint		10		50	1	" "
34. Mole drainer op/maint		10		50	1	" "
35. Rotary Ditcher op/maint		10		50	1	" "
36. Peanut digger op/maint	3	6	29	25	1	(Ismalia)
37. Peanut combine op/maint		6		25	1	" "
38. Incorporator op/maint		6		25	1	" "

	NUMBER OF COURSES (Completed) (Sept 1980-June 1984)	NUMBER OF COURSES (Estimated)	NUMBER OF TRAINEES (Completed) (Sept 1980-June 1984)	NUMBER OF TRAINEES (Estimated)	DURATION (in weeks)	LOCATION
39. Sugar beet harvester op/maint		6		25	1	Field site
40. Rotary mower op/maint		20		100	1	" "
41. Garden wagon op/maint		20		100	1	" "
42. Orchard prunning equip. op/maint		20		100	1	" "
43. Plateless planter op/maint		4		20	1	" "
44. Vegetable transplanter op/maint		4		20	1	" "
45. Ditcher op/maint		50		500	1	" "
46. Soil analysis kit op/maint		2		20	1	" "
47. Sugar beet thinner op/maint		6		25	1	" "
48. Underrow chisel op/maint		10		100	1	" "
49. Lazer survey unit op/maint		6		30	1	" "
50. Mechanization short course		10		500	1	" "
51. Cotton seed drilling (with a grain drill)	4	25	125	250	2 days	" "
52. Grain thresher development	1	1		4	12	BeheraCo.
53. Chisel plowing	50		4	200	2 days	Field Site
IN-COUNTRY TOTALS:	1310 plus	1663 = 2973	12835 plus	12418 = 25253		

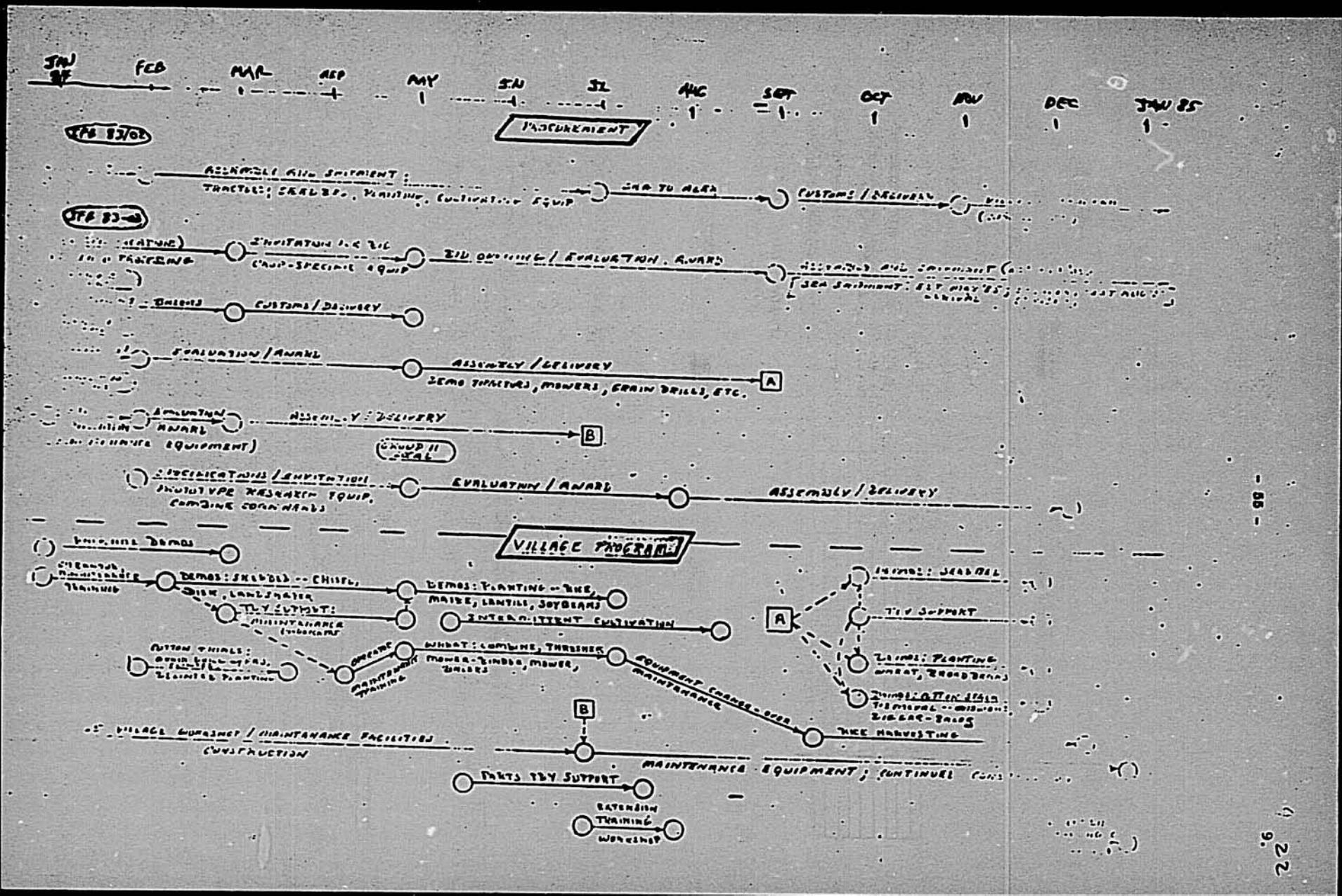
PARTICIPANT (off-shore) COURSES:

A. Academic Degree Programs:

1. Agricultural Economics	3	(IN PROGRESS)	3		2 years	USA
2. Agricultural Production	1		1		"	"
3. Soil Science		1		1	"	"
4. Agricultural Education				1	"	"
	4	2	4	2		

B. Technical Training Courses:

1. Agricultural Mechanization	1		2		4	USA
2. Instrumentation	1		1		6 mts	"
3. Soil Science	1		1		6 mts	"
4. Agricultural Extension(mechanization)	6		57		6	USA;Phill/Thai
5. Land/Soil Improvement	2	1	3	4	4/3mts	USA
6. Economic Evaluation		1			3 mts	"
7. Machinery Testing		1		1	3 mts	USA
8. Service Center/Workshop Owners		1		1	"	"
9. Local Manufacturing Technology		1		1	"	"
10. Est. Data base for Econ Dec.		1		4	"	"
11. Farm Management	2	1	2	4	"	"
12. Project Design and Eval Methods		1		4	"	"
13. Research Methodology		1		4	"	"
14. Agri. Mech. Maint and Repair Systems		1		4	"	"
15. Agri. Mech. Training Systems		1		4	"	"
PARTICIPANT TRAINING TOTALS:	17 plus	13 = 30	72 plus	33 = 105		


JAN 85
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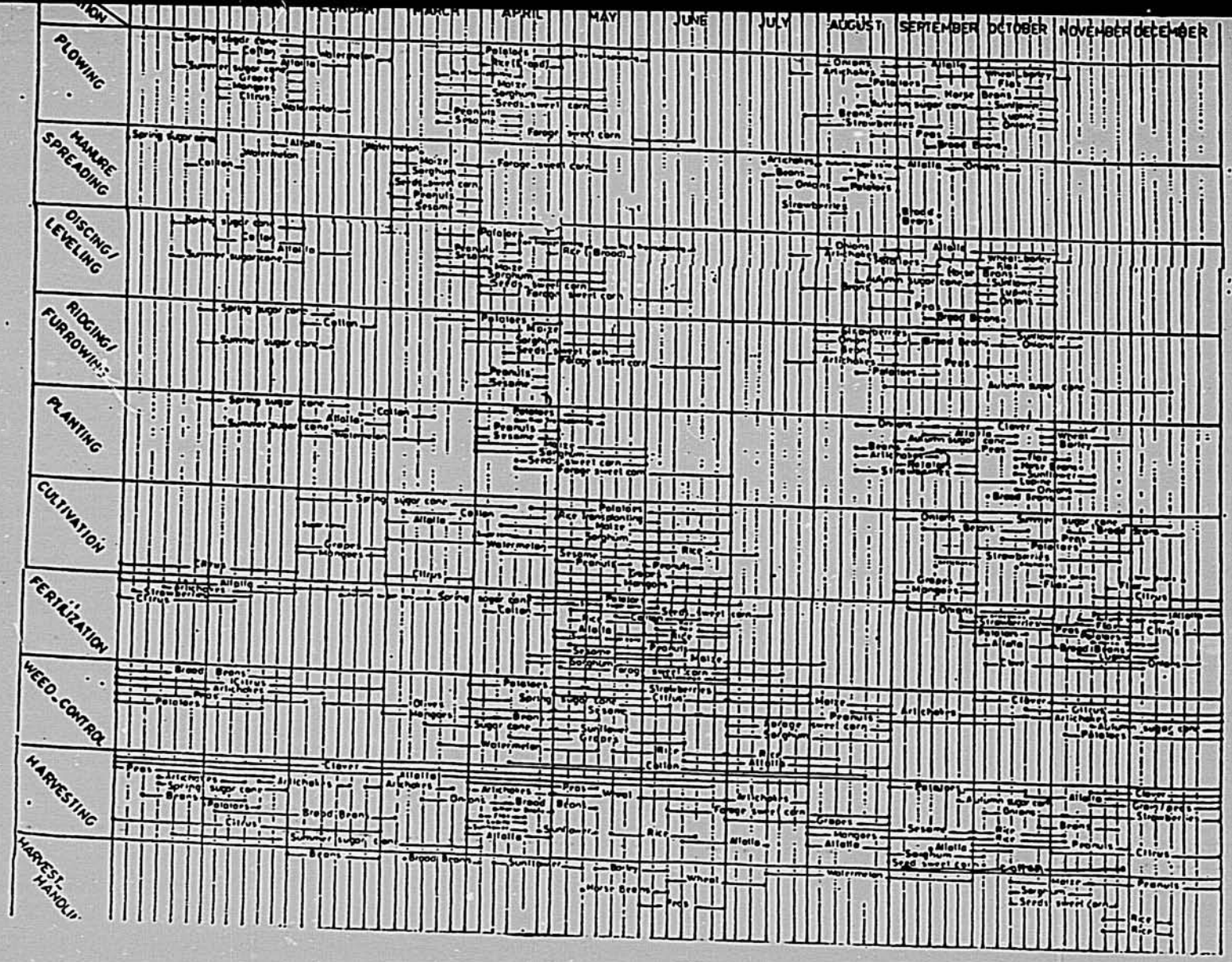
JAN 85
PROCUREMENT
CUSTOMS / DELIVERY
EVALUATION / AWARD
ASSEMBLY / DELIVERY
SEMI TRACTORS, MOWERS, GRAIN DRILLS, ETC.
A
B
EVALUATION / AWARD
ASSEMBLY / DELIVERY
VILLAGE PROGRAM
DEMOS: PLANTING -- RICE, MAIZE, LENTILS, SOYBEANS
INTERMITTENT CULTIVATION
WHEAT: COMBINE, THRESHER, MOWER-BINDER, MOWER, BINDERS
EQUIPMENT CHANGE-OVER MAINTENANCE
RICE HARVESTING
VILLAGE WORKSHOP / MAINTENANCE FACILITIES CONSTRUCTION
MAINTENANCE EQUIPMENT; CONTINUED
PARTS TRY SUPPORT
EXTENSION TRAINING WORKSHOP

22 9.

MINISTRY OF AGRICULTURE
1976-1977

RECOMMENDED TIMING FOR THE EXECUTION OF THE AGRICULTURAL OPERATIONS



10.

27

SUMMARY OF PROJECT DEMONSTRATION/TRAINING EQUIPMENT

TYPE OF EQUIPMENT	NUMBER OF UNITS On-Site June-1984	NUMBER OF UNITS Total Units by Sept 1985
A. GENERAL EQUIPMENT	75	341
B. SEED BED PREPARATION	77	293
C. PLANTING	52	185
D. CULTIVATION	7	52
E. FERTILIZATION	1	18
F. INSECT/WEED CONTROL	1	57
G. HARVESTING	72	160
H. POST-HARVESTING	14	53
I. MAINTENANCE (plus spare parts for all units)	84	163
TOTAL:	383	1322

See attached lists for detailed equipment lists

LOCATION: ON-SITE

MONTH: JUNE 1984

EL MINIA GOV. — QUALIDYA GOV.

	SAKHA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	El Hamal	Paltar	Kafr ...	Hamol	Shimit	El Gosh	Zefta	Seadin	[illegible]	[illegible]	Kom El Naqar	Kom ...	Sheblid El Hoss	Waked	Debagu...	Daryiwa	El Gom	Ezab ...	Debya	Sheik Atwa
TRACTOR (60-80 HP/4x2) جرار ٦٠-٨٠ حصان (٢ x ٢)																										1
TRACTOR (80-90 HP/4x2/HiCrop) جرار ٨٠-٩٠ح ٢x٢ للخدمة المحصول النامي																										
TRACTOR (105-120 HP/4x4) جرار ١٠٥ - ١٢٠ حصان ٤ x ٤																										
MOTORCYCLE موتوسيكل		1	1	2	1	2	1	1	1	1	1	1	2	1	1	1	1	1	1	1	2	1	1	2	1	5
TRAILER مقطورة																										
WATER PUMP SET مجموعة رى																										5
AGRI. BACKHOE حفار زراعى		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2
TRACTOR BLADE (mounted) حلاوم تسوية خلفى (معلق)																										
DITCHER آلة شق قنوات																										
ORCHARD PRUNING EQUIP. SET معدات تقليم بساتين																										
POST HOLE DIGGER																										
B. SEED BED PREPARATION																										
CHISEL PLOW محرات حفار				1				1					1					1			1					1
LAND LEVELER (SMOOTHER/SCRAPER) قصابية (آلة تسوية)		1	1	1	1	1	1	2		1	2	2	1	1	2	1	2	1	1		1	1	1	1	1	2
DISC HARROW مشط قرصى						1		1				1		1	1	2	1	2		1			1		2	1
RIDGER/BEDDER خطاط								2	1				1	1	1	1	1	1				1	1	1	1	1
ROTATILLER عزاقة دورانية																										
MOLDBOARD PLOW محرات مطرحى	1																									
DISC PLOW محرات قرصى																										2
SPIKE TOOTH HARROW آلة تنعيم ذات اسنان																										1
MANURE SPREADER آلة نشر سماد بلدى																										
RING ROLLER آلة تنعيم حلقية																										
ROLLER HARROW																										

A. ... FARM EQUIPMENT

25

12.

LOCATION مواقع المشروع

ON-SITE — MACHINE الآلات

JUNE 1984

MONTH: 19

Column headers (partly legible): Sakha; El Matana; Antan; Matai; Magol; Shamill; El Gezil; Talkha; Sandis; Gharbia Gov.; Nagar El Bira; Kom El Naggar; Koni El Baserie; Sherbin El Reis; Beheira Gov.; Waked; Demsou-nna; Daravia; El Gorn; Ezab Rakkai; Debya; Sheikh Ahmed; Gabal Abed

Equipment	Entries (as printed, left to right)
B. (cont'd) SEED BED PREPARATION	
SUBSOILER محراث تحت التربة	
DISC RIDGER خطاط قرصي	
INCORPORATOR الة متعددة الاغراض	
LAZER UNIT وحدة ليزر	
CULTIPACKER	
DISC RIDGER	
POWER MULCHER-BEDDER	
C. PLANTING EQUIPMENT	
SEED PLANTER (row crop) آلة زراعة في خطوط	1, 3
GRAIN DRILL الة تسطير حبوب	2, 1, 2, 2, 2, 2, 2, 1, 1, 2, 1, 1, 1, 1, 1, 1, 1, 1, 2, 1, 1, 2, 1, 2
RICE TRANSPLANTER الة شتل الارز	
POTATOE PLANTER آلة زراعة بطاطس	
PLATELESS PLANTER الة زراعة حبوب بدون قرصية	
VEGETABLE TRANSPLANTER الة شتل خضروات	
D. CULTIVATION EQUIPMENT	
CULTIVATOR (row-crop) الة عزيق بين خطوط	1, 1, 1, 1, 1, 1
SUGAR BEET THINNER الة خف بنجر السكر	1

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LOCATION: ON-SITE

MACHINE

MONTH: JUNE 1984

19

E. FERTILIZATION																											
CHEMICAL FERTILIZER SPREADER الة نثر اسمدة كيماوية																											
F. INSECT/WEED CONTROL																											
LIQUID SPRAY RIG مجموعة رش مبيدات																											
G. HARVESTING EQUIPMENT																											
MOWER/BINDER الة قم وتربيط			2	2	2	2	2	1	1	1	2		1	1	1	2	1	2	2	1		1	1	1	1	1	1
FLAIL CHOPPER الة تقطيع اعلاف																											
SILAGE MOWER الة حش اعلاف			1	1	1	1	1		1	2	2	1	1	2	1	1	1	1		1		1	1	1	1	1	1
COMBINE HARVESTER الة قم ودراس وتذرية (كومباين)	2	4			1							1	1								1						1
PEANUT DIGGER الة تقليع فول سوداني																											
ROOT BLADE الة تقليع جذور قرشية													1														1
PEANUT COMBINE الة حصاد فول سوداني																											
SUGAR BEET HARVESTER الة حصاد بنجر																											
FORAGE HARVESTER																											
FORAGE WAGON																											

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27

61

LOCATION: ON-SITE

MONTH: JUNE 1984

LOCATION	H. CHOPPER/GRINDER	H. BALER	H. ROTARY MOWER	H. WHEEL RAKE	I. SERVICE TRUCK	I. MOBILE WORKSHOP	I. HAND TOOL SET	I. ARCH WELDING SET	I. GAS WELDING SET	I. FUEL BOWSER TANK	I. AIR COMPRESSOR	I. LUBRICATION EQUIPMENT SET	I. MISC FARM AND SHOP ITEMS	I. SPARE PARTS	I. SMALL TOOLS
SAKHA															
El Ffri							1						1		
Mcultan							1						1		
Reni Jhalt							1	1				1	1		
Spala El Karnya							1						1		
El Itlat							1	1				1	1		
El Hoseh							1						1		
Holtan							1	1				1	1		
Kafr El Hosmia							1						1		
Haool							1	1				1	1		
Shamut							1						1		
MANSHE															
El Gosal							1					1	1		
Telline							1	1				1	1		
Seadin							1	1				1	1		
SINAUHA															
Arlet							1						1		
Elna							1	1				1	1		
Kom El Haggar							1	1				1	1		
Konisat Dimshit							1						1		
Shaprhid El Resr							1	1				1	1		
AKHMORIS															
Maked							1						1		
Nesgou-neu							1					1	1		
Harawia							1						1		
El Gorn							1						1		
Ezab Bo sentwaly							1					1	1		
Debye							1						1		
Shiet Ahmed / Grabet Afghat		11					1	3					1		
		1	1	1			1	1							

(for 23 villages)

H. POST-HARVESTING EQUIPMENT

I. MAINTENANCE EQUIPMENT

15.

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								QALUBIYA GOV.					SHARKIA GOV.				GHARBIA GOV.					BEHEIRA GOV.							LOCATION 1/4
								Toukh			Benha						Kafr Zaiat			Santa		Kom Hamada		Abou Hommos		Mahmudiya			TOTAL PLANNED BY SEPT 1985
			SHARKIA	[illegible]	[illegible]	[illegible]	[illegible]	El Nmoob	Helten	Kafr El Hossa	Magol	Shamit	TAMSHEE	El Gosi	Zeline	Saadiin / Shrawah	[illegible]	El Tina	Kom El Nagar	Koni..t Danasir	Shehid El Ness	Wahed	Deashu..ng	Darawla	El Gorn	Ezab [illegible]	Dafya	Shak Atwa	MONTH: 19
1	1	1	2	2	1	1	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	(1) 3	A. GENERAL EQUIPMENT — TRACTOR (60-80 HP/4x2) -54- جرار ٦٠-٨٠ حصان (٢ x ٤)
1	1	1			1	1	1		1		1			1	1			1	1	1	1	1	1			1		1	TRACTOR (80-90 HP/4x2/HiCrop) -18-
1	1	1			1	1	1		1		1			1	1			1	1	1	1	1	1			1		1 (2)	TRACTOR (105-120 HP/4x4) -20- جرار ١٠٥ - ١٢٠ حصان ٤ x ٤
			(1)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(1)	(1)		(1)	(2)	(1)	(1)	(2)	(1)	(1)	(2)	(1)	(2)	(1)	(1)	(2)	(1)	(2) (3)	MOTORCYCLE -37- موتوسيكل
							1	4	4	4	4	4			1			1					1					1	TRAILER -25- مقطورة
					(1)				(1)						(1)					(1)								(1) (1)	WATER PUMP SET -6- مجموعة رى
			(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)		(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)		AGRI. BACKHOE -24- حفار زراعى
			1	1	2	1	2	1	2	1	1	1		1	2	1	1	1	1	1	2	1	1	1	1	1	1	1	TRACTOR BLADE (mounted) -31-
				1	1		1		1		1			1	1	1		1	1	1	1	1	1	1		1	1	1	DITCHER -19- آله شق قنوات
							1	4	4	4	4	4			1			1					1					1	ORCHARD PRUNING EQUIP. SET -26- معدات تقليم بساتين
			2	2	2	2	3	6	6	6	6	6		2	3	2	2	3	2	2	2	2	3	2	2	2	2	3	TRACTOR (13-30 HP-pto) -75-
																													BULLDOZER -1-
																													MOTOR GRADER -1-
																													ELEVATOR SCRAPER -1-
																													MISC UNITS -3-
					(1)				(1)						(1)						(1)		(1)					(1)	B. SEED BED PREPARATION — CHISEL PLOW -6- محرات حفار
			3	3	3	3	3	3	3	3	3	3		3	3	3	(2) 3	(1) 3	(2) 3	(1) 3	3 (1)	3	(1) 3	(1) 3	(1) 3	(1) 3	(1) 3	(2) 4	LAND LEVELER (SMOOTHER/SCRAPER) -78-
1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	DISC HARROW -30- مشط قرصى
2	2	2	2	2	3	2	3	2	2	2	2	2		2	3	2	2	2	3	2	2	2	3	2	2	3	3	3	RIDGER/BEDDER -66- خطاط
																													ROTATILLER -0- عزاقة دورانية
																													MOLDBOARD PLOW -1- محرات مطرحى
		1																										1	DISC PLOW -2- محرات قرصى
			1	1	1	1	2	1	2	1	1	1		1	1 2	1	1	1	1	1	2	1	1	1	1	1	1	2	SPIKE TOOTH HARROW -31-
			1	1	1	1	2	1	1	1	1	1		1	2	1	1	1	1	1	1	2	2	1	1	1	1	2	MANURE SPREADER -30-
				1	1		1		1		1			1	1			1	1		1	1	1			1	1	1	RING ROLLER -15- الة تنعيم حلقية
				/	/		/		/		/			/	/			/	/		/	/	/			/	/	/	ROLLER HARROW -15- الة تنعيم دورانية

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LOCATION:

TOTAL PLANNED BY [redacted]EPT 1985

MONTH: 19

B. SEED BED PREPARATION																													
SUBSOILER -16- سحرات تحت التربة						1		1		1		1		1	1	1			1	1	1	1	1			1	1	1	
DISC RIDGER -1- خطاط قرصى																													
INCORPORATOR -4- اله متعددة الاغراض	1	1	1																										
LAZER UNIT -4- وحدة ليـــــزر	1	1	1																									1	
C. PLANTING EQUIPMENT																													
SEED PLANTER (row crop) -51- آلة زراعة فى خطوط	1	1	1	1	2	2	2	2	2	2	1	1	2	2	2	2	1	2	2	2	-2	2	2	2	2	2	2	2	2
GRAIN DRILL -119- اله تسطير حبـــوب	4	4	4	4	4	4	4	5	4	5	4	4	4	4	5	4	4	4	4	4	5	4	4	4	4	4	4	5	2
RICE TRANSPLANTER -/0- اله شتل الارز																													
POTATOE PLANTER -1- اله زراعة بطاطس			1																										
PLATELESS PLANTER -2- الة زراعة حبوب غير قرصية		1	1																										
VEGETABLE TRANSPLANTER -2- اله شتل خضـــروات		1	1																										
D. CULTIVATION EQUIPMENT																													
CULTIVATOR (row-crop) -49- اله عزيق بين خطوط	1	1	1	2	2	2	2	2	1	2	1	2	1	2	2	2	1	1	2	2	2	2	2	1	2	2	2	2	
SUGAR BEET THINNER -3- اله خف بنجر السكر	1	1	1																										

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3/4

موقع المشروع

TOTAL PLANNED BY [redacted] MACH
SEPT 1985 [redacted]

MONTH: 19

E. FERTILIZATION

Equipment	Planned quantities by village (left to right as printed)
CHEMICAL FERTILIZER SPREADER -18- ال نثر اسمدة كيماوية	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

F. INSECT/WEED CONTROL

Equipment	Planned quantities by village (left to right as printed)
LIQUID SPRAY RIG -57- مجموعة رش مبيدات	1 1 1 2 2 3 2 2 2 2 2 2 2 3 2 2 2 2 2 2 2 2 2 2 2 2 2 3
	1

-84-

G. HARVESTING EQUIPMENT

Equipment	Planned quantities by village (left to right as printed)
MOWER/BINDER -30- اله ضم وتربيط	1 1 1 1 1 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2
FLAIL CHOPPER -1- اله تقطيع اعلاف	
SILAGE MOWER -105- اله حش اعلاف	3 3 3 4 3 4 4 4 3 3 3 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
COMBINE HARVESTER -12- اله ضم وضراس وتذرية (كومباين)	2 2 2 1 1 1 1 1
PEANUT DIGGER -4- اله تقليع فول سوداني	1 1 1 1
ROOT BLADE -2- اله تقليع جذور فرنساوى	1 1
PEANUT COMBINE -3- اله حصاد فول سوداني	1 1 1
SUGAR BEET HARVESTER -3- اله حصاد بنجر	1 1 1

TOTAL PLANNED BY MACHINE
SEPT 1985
[redacted]

MONTH: 19

Column headings (partly legible): SAKHA … Shamit … MANSHEEZ … El Gosali … Tellis … SINQUAH … Kom El … Table … Wakred … El Gorn … Ezab … Nesya … Shiek … 4/4

H. POST-HARVESTING EQUIPMENT

Item	Entries (left to right)
CHOPPER/GRINDER -5- الة طحن مخلفات	1, 1, 1, 1, 1
BALER -14- الة كبس قش	2, 2, 2, 1, 2, 1, 1, 2, 1
ROTARY MOWER -27- الة حش دورانية	1, 4, 4, 4, 4, 4, 1, 1, 1, 1
HAMMERMILL -5-	1, 1, 1, 1, 1
FORAGE HARVESTER -1-	1
FORAGE WAGON -1-	1

I. MAINTENANCE EQUIPMENT

Item	Entries (left to right)
SERVICE TRUCK -0- سيارة ورشة الصيانة	
MOBILE WORKSHOP -43- سيارة ورشة للاصلاح	1, 1, 1, 1, 2, 2, 2, 2, 1, 2, 1, 1, 1, 2, 2, 1, 1, 1, 2, 2, 2, 2, 2, 1, 1, 1, 2, 2, 1
HAND TOOL SET -31- مجموعة عدد يدوية	1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 3
ARCH WELDING SET -21- ماكينة لحام كهربا	1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1
GAS WELDING SET ماكينة لحام اكسجين	(on mobile workshops)
FUEL BOWSER TANK -3- خزان وقود	1, 1, 1
AIR COMPRESSOR -32- كمبرسور هواء	1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1
LUBRICATION EQUIPMENT SET -29-	1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1
MISC FARM AND SHOP ITEMS -3- معدات ورش المزارع العملية	1, 1, 1, 1
SPARE PARTS قطع غيار	provided for all units — 20 % fast moving spare parts
SMALL TOOLS -4 sets معدات ورش	1, 1, 1, 1

Conclusions and Recommendations

In conclusion and based upon the initial planned objectives of the extension and training units, the subproject has progressed as planned in most areas, exceeded expectations in the in-country training activities, developed a practical field extension system through the use of demonstration/training equipment, and faltered in the participant training effort.

Concerning the research effort is has become apparent that there were not sufficient research data available during the project which weakened all extension activities. The use of the pre-test village at Shiek Ahmed as an applied research station served to provide the extension effort with substantial enough information which was used to establish and expand the extension/training efforts throughout the project areas. Had the extension effort followed a body of research which had been developed some years before the project began,the effort would undoubtable been much more appropriate and successful than it has been. As it were, the ad-hoc applied research method paid off as the anxious farmers facing severe labor shortages encouraged and supported whatever efforts were put foward to assist them in their farm operations. The success of the effort is now evidenced in the increasing numbers of equipment being purchased by farmers in addition to increasing inventories being developed by several of the major agricultural equipment dealers.

RECOMMENDATIONS FOR FUTURE PROJECTS:

1. Research on appropriate equipment must be carried out years before an active extension and training effort is begun,

2. Adequate logistical, transportation and administrative support should be well planned and established in order to allow the project to be fully realized,

3. If a participant training component is added to future projects, the high level of English language required before a candidate can travel overseas should be reviewed and revised and/or the students should be al. wed to study their English lessons full time if the standards are maintained. Otherwise the critically needed staff which will carry on the project activities after the projects ends will not be in place.

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Extension and Training Staff Meetings for Ap/May/June 84

Chaired by Dr. Zakaria El Haddad, Project Coordinator

8 April

1. Maintenance : all areas (5 governornments) to have governorate level maintenance coordinators at meeting on 1 st Sunday of each month
2. Tool and Equipment status discussed; Only a few sheds now completed, several cement floors put in but Ministry staff slow to install the overhead structure
3. Some feddans of cotton drilled with a grain drill; results fair to good
4. Maintenance posters needed in all villages coops--will be prepared
The short-term maintenance consultants (Carlisle and Gerwig) can help on this
5. Storekeeper problem in all areas discussed

15 April

1. Discussion of Gaspardo linted cotton planter--strong or weak?
2. Mita Dima research farm: visit on rice mechanization--training people to use Japanese, other equipment; Ibrahim to arrange field day/ sessions
3. Try to determine the loss of cotton in turn around areas at heads of fields when cultivating mechanically

29 April

1. Discussion of storekeepers and government level staff; still lack storekeepers in key villages
2. One row cultivator is being developed in Alexandaria-Gerwig to see it with Dr. Zakaria on Thurs.
3. 40-80 cm planting of cotton recommended for extension
4. Discussion about maintenance materials developed by Jim Carlisle, Gerwig, Engstrom and Paul Armstrong; can develop a chart for each machine , maint enace points, pictures, preventative maintenance charts, parts needed periodically plus comments needed on equipment performances, specialists, etc.
5. Problem of chemicals for weeds in rice when planting with grain drills; Choose only a few feddans for trials of direct seeding of rice. Allos LE 20 per feddan to cooperating farmers for use of tractor, equipment and herbicides; we can use our own equipment as needed also
The village of Saadin has been deemphasized and the neighboring village of SINAWA has been added to the list of diffusion villages now coming into the project realm

19 May

1. Discussion abour village mechanics needs, equipment status, etc. Also parts needs
2. Discussion about wheat harvest now, combine use and where--not set--where are some of the 47 combine operators and mechanics trained last year? Apparently they were not paid incentives from the project or were not from the project villages and are not available, Will have to use new people again , untrained, to run the combines best as possible
3. Balers for the combines now in Shiek Ahmed village ready for servicing and delivery; they will arrive in most areas after the wheat has been taken off due to late dealer delivery

3 June

1. Deutz/Fahr balers ready, today for delivery from Shiek Ahmed; but this is the last week of wheat harvest in most villages!
2. Need to distribute air compressors and arc welders to selected district level villages which are waiting shipment from Shiek Ahmed village
3. Need to identify more areas who will be able to use more equipment since there is a large shipment due in soon; suggest using the diffusion villages already on our list
4. Discussed small tool lists; THE USAID evaluation team is here and will make site vis

NOTES on a Meeting with the Ministry of Irrigation's EWUP(Egyptian Water Use Project)

1. This meeting was held on 9 February 1984 at the Ministry of Irrigation and was attended by staff from the EWUP project as well as staff from the Ag. Mechanization Project including Dr. Ahmed F. El Sahirgi, Dr. David Gaiser and others
2. Discussed was the possibility of the two projects joining efforts in the field, especially in the village/area of Abuha village in the Minia area where the EWUP group has been for some time
3. The EWUP group is rehabilitating canals and the land and the Ag. Mechanizatio n Project is assisting in their effort with the use of its lazer leveling equipment which will be followed by some basic farming machines such as the rigder and perhaps a grain drill, planter or other equipment available from nearby project villages
4. Committees will be set up both in Minia and Cairo to discuss/plan on a monthly basis these activities; EWUP field staff will determine which farmers are receptive to these activities after which operations will be done in their areas

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Project Areas

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PROJECT AREAS (1985)

1. BEHERA GOVERNORATE

El Mahmoudia District (1)
1. Deseya
2. Ezab Besentwai

Abou Homos District (2)
3. El Gorn
4. El Darawah
5. Dessounes

27. Kofla
28. El Reza

Itay El Baroud District (12)
24. Shieh Ahmed

Kom Hamada District (13)
25. Waked

11. GHARBIA GOVERNORATE

Tanta District (3)
6. Shabshir El Hessa
7. Keniset Damshit

Bassyoun District (4)
8. Kom El Nagar

Kafr El Zaiat District (5)
9. Kafr Dima
10. Qalyb Abiar
26. Shobra Kas

29. Sinawah

III. SHARKIA GOVERNORATE

Minia El Kamh District (10)
11. El Saadyine
12. El Teline

Belbase District (11)
13. El Gosk

30. Manshez

IV. QALUBEA GOVERNORATE

Banha Distrcit (6)
14. El Shamout
15. Magoul

Toukh District (7)
16. Kafr El Hossafa
17. Beltan
18. El Hessah

V. MINIA GOVERNORATE

Matay District (8)
19. El Atlat
20. Seila El Gharbia

Abou Korkas District (9)
21. Beni Ibeid
22. Beni Moussa
23. El Birba El Kubra

31. Gamiza
32. Mida Diba
33. Sofi Kalal

34. Gabal Asfar
35. El Fayum

Agricultural Mechanization Project

MONTHLY ACTIVITIES OF THE Ext.
REPARED BY Ahmed El-Behery
For the Month of April 1984 Date 10/5/1984

A. SUMMARY:

1. I attended a conference in cambage in U.K. about Agricultural Machinery from 1-7 of April
2. I visited Zargosa Fair for Agriculture machinery in spain for 7 days.
3. Said seen in agriculture area in spain
4. Cotton cultivation in sharkia & Garbia in land Reform area.
5. Tractor and cultivator adjustment.
6. Accompanied the chines Experties for Rice Transplating.
7. We Chossen. 3 location for Rice Transplanting and Drilling for collecting data.
8. and arrange field day for farmer visites.

B. PROBLEMS:

1. Shortage of planters.
2. Shortage of Tractors.

C. PLANS FOR NEXT MONTH:

1. Cotton cultivation in different places
2. Helping specialist to put Maize demonstration fields.
3. Harvesting machines Adjustments.
4. Corn planter Adjustment. For Maize planting
5. Seed drill adjustment for Rice drilling
6. Arrang field day at the spots.

Agricultural Mechanization Project

Monthly Activities of the Extension Officer
Prepared By Ahmed El-Behery
For the Month of May/June 1984

A. SUMMARY:

1. Several visites to sharkia & Garbia to check the cotton stand.
2. We cultivated the cotton trail at Kom El Nagar by Tractor two Times.
3. We made most of the mower Binder adjustment in the Coop.
4. Two Trip to sakha to check cotton stand.
5. We adjusted Jhon Deer Planter for Maize and soyabean seasone: in Sharkia and Behera.
6. Two Trip to Sohag for cotton planting in land Coop.
7. Several visites to minia to coordinate the work with soil improvement people.
8. Harvesting Demonstration in Garbia by Disc mower.

B. PROBLEMS:

1. Shortage of planters.
2. Shortage of Tractor

C. PLANS FOR NEXT MONTH:

1. Maize Planting
2. Rice Transplanting
3. Machines service
4. Cotton cultivation

Monthly Report for Sharkia, Qalubia (April,1984)

SUMMARY:

- Land levelling 6 F. at Namod V.
- Cleaning 3 Km. at Namod V.
- Cleaning 2 Km. at El Hessa V.
- Planting 5 F. Sorghm drilling at Seenhoa.
- Harvesting 5 F clover at Tallen
- Cleanig 7 Km at El Gosk V.
- Extension meeting in 15-4 at El Gosk V.
- Field day 19-4 about cleaning at El Gosk

Sig

A.M. Soidan

Monthly Report for Sharkia, Qalubia May 1984.

SUMMARY:

- Harvesting 50 F. Wheat at Namod V.
- Cleaning 4.5 K. Namod V.
- Land levelling 5 F. Namod V.
- Cleaning 3 Km at El Hessa V.
- Wheat Harvesting 45 F. El Hessa V.
- Planting 19 F. Rice drilling at Talleen V.
- Harvesting 48 wheat. at Talleen V.
- Land levelling 15 F at Seenhoa.
- Planting 19 F Rice drilling "
- Extension meeting about Rice drilling at Talleen V.
- Training for 4 drivers with Mower.
- Field day about cleaning at El Gask.
- Training for 3 workers with BackHoe. Gosk
- Extension meeting 23-5 at Seenhoa.

Sig.

A.M.Soidan.

Annex 1.2 b

Monthly Report for Sharkia, Qalubia June 1984.

SUMMARY:

- Harvesting for 70 Feddans wheat , Barly at El Hessa V. with Combine.
- Harvesting 45 F. Wheat with mower Binder.
- Planting for 17 F. Corn with Planter at El Hessa V.
- Land levelling for 5 F at Beltan.
- Cleaning for 500 m " "
- Cleaning for 3.8 Km. at Namod V.
- Land levelling for 4 F. Namod V.
- Harvesting 20 F. Wheat at Magool V.
- Cleaning 250 m. at Magool V '
- Planting 22 Rice with Grain Drill al El Gosk V.
- Harvesting 85 F. Wheat at El Gosk V.
- " 15 F. Wheat by Combine. El Gosk.
- Cleaning 2 Km. at Gosk.
- Planting 33 F. Rice drilling at Tolleen V.
- " 21 F. Corn with planter at Talleen V.
- Cleaning 1 Km at Talleen.
- Harvesting for 66 F Wheat at Seenhoa V.
- Harvesting for 66 F wheat at Seenhoa V.
- Planting 30 F. Rice drilling at Seenhoa V.
- Land levelling 54 F.
- Extension meeting in 2-6 about Rice drilling at Seenhoa.

Field day about land levelling at Seenhoa V.

- Extension mmeting about Rice Herbsis at Talleen V.
- Field day about corn Planting.
- Training for one wilder at Alex. center also one driver from every village
- Field day about harvesting at magool V.
- Field day 4-6, 12-6 about combine harvesting.

Problems:

- No Tractors
- No Shelleter for machines in some villages.

Sig

A. M. Soidan

Agricultural Mechanization Project

Monthly Activities of the Sharkia/Qalubia Extension Officer
Prepared by Abdel Hamid Soidan
for the Month of Jan/Feb/Mech.

A. SUMMARY:

- Field day for planting cotton by Grain Drill at El Hessha.
- Training course for all villages officers at Minia about planting cotton with Grain Drill.
- Also the some course for many farmers.
- Visit for 20 Farmers from every village to Cairo Show.
- Ext. meeting at El Gosk about irrigation with Long Farows at cotton fields.

B. PROBLEMS:

Report of SALAH BAKAR OF

The Hay Soler Distribution

(June 1984)

Units	Area
2	Sharkia
1	Soft Koled
1	Souro (Dokolia)
1	Gima Meza
1	Minia
4	Kalin
1	Waked
11	

Annex 1.2 g

Report : Salah Bakar

Activities during the month of May 1984 at combines location:

1. Sharkia (Gosak)

   Install new belt and brakes, change of spare parts on May 3 and 8 with the company rep.

2. Sharkia (Saadieen)

   Repair of brakes, change of parts on May 6 with the company reprsentative and the German expret.

3. Kafr El Sheek, Behera

   Bringing spare parts by the German expret from saka on May 7. Delevery of new battery to Waked.

4. Repair the brakes, welding the chasee with the German expret.

5. Tahreer - Behera (Woked)

   Preparation for a training course on Combines maintenance with company representative May 13,14

6. Kafr El Sheek (Kelleen)

   May 15,16,17 Install new parts, change of fuel sycle

7. Sharkia

   May 19,20

   Transfer of combine according to project director to work in College Farm, Research station and College Farm in Shalakan.

8. Behera

   Change Chain May 21,22,23,24 delivery and testing of the compressor

9. Gemeza

   Checking the combine instaling and repairing parts. Testing the machine. Followup on compressor. Maintenance and repairs. Contact the company to reduce the combine spoker Price from 150 LE to 110 L.E. Contacts should continue to buy 2 spokers which are needed badely

10. All spare parts installed by the company free of charge and done by self efforts.

Agricultural Mechanization Project

Monthly Activities of the M. Management extension & information Unit
Prepared By Dr. A. Mamdouh El Baz
for the Month of April 1984

A. Receiving 5.000 copy from each of the following extension bulletins
- Mechanizing cotton cultivation
- " wheat "
- " Maize "

and start distributing it on project extension villages.

- Receiving 500 copy of the agricultural almanac, and start distributing it very wisely.
- Preparing for the Final seminar of appropriate technologies for the Egyptian countryside, results and achievements, which supposed to be held on 12, and 13 May.
- Contacting the extension Department for a joint work in drilling rice on 4000 Feddan.

B. PROBLEMS:

1- Transportation mean not always available.
2- No Safe storing place.

C. PLANS FOR NEXT MONTH:

- engaged with evaluation, team coming for the S.S.A.A. project.

Annex 2a

AGRICULTURAL MECHANIZATION PROJECT

Monthly Activities of The M.Management extension & information Unit.
Prepared By Dr. El Baz
For The Month of May/June 1984

SUMMARY:

- Holding the final conference of appropriate technologies for the Egyptian Farmer, on 12,13th May. This conference was attended by H.E. Dr Wali, Minister of Agriculture and Mr. Mickel stone USAID mission Direction Egypt, and remarkable number of specialists and interest people in this field, For the conference. I displayed 31 different piece invented and Fabricated and tested successfully by the S.S.A.A project.

- 5 Field trips with the american evaluation team of the farmer project to Qalybia, Monoufia, Sharkia, Giza and Fayoum governorates.
- 5 case studies were attended with the same team

PROBLEMS:

- Transportation mean is critically needed.

PLANS FOR NEXT MONTH:

Till 16th June, I'll be fully occuipied in smaller seminars with the evaluation team.

Annex 2 b,c

[illegible]

A. I. D. Proj. NO. 263 - 0031
EGYPTIAN MOA/USAID
[illegible] - Building of the
[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

- The equipment loan information has been [illegible] by the [illegible] period of 31/3/1980 as follows :

[illegible]	[illegible] Approved	Amt. Expended	Approved requests examined by Bar	Requests examined by Project
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	-	-
[illegible]	[illegible]	-	-	-
[illegible]	[illegible]			
[illegible]	[illegible]	[illegible]	314249	[illegible]

Best Available Document

ANNEX 5a

- Requests that submitted by governorates were examined as follows :

[illegible]

- The request submitted by Mohamed [illegible] Ibrahim of El Wafiel, Beba Markaz for the purchase of [illegible] harvester, Augusta [illegible] was approved.

- The request submitted by Mohamed [illegible] of Ibrahim, Beba Markaz for the purchase of a cut binder, [illegible] Hp. was approved.

- The request submitted by Mohamed Abdel [illegible] of Ashwa, Sohag Markaz and Mohamed Mohamed Ahmed El [illegible] of Tahta, Tema Markaz for the purchase of a Kopre Cultivator, 16 Hp. for each of them was approved.

- The [illegible] submitted by Sayed Mohamed Salem, and Abdel Ghafar [illegible] Nagi and Abdo Fodel Abd El Fatah, Mohamed [illegible] of Bagour, Tema Markaz for the purchase of [illegible] for each of them were approved.

[illegible]

- The request submitted by each of Mohamed El Manchary, [illegible] Mohamed Gadallah of Mahmal, Fafta Markaz, Zaki Hassan Mahmoud of [illegible] Abou Kafr for the purchase of a Grillio Cultivator 16 Hp. and its attachments for each of them was approved.

- The request submitted by Mahmoud Mohamed Abdel Rahman of Kafr Dema, Kafr El Zayat Markaz for the purchase of a Grillio 16 Hp cultivator was approved.

- The request submitted by Ahmed Abo Naema of Shebshir El Hesse, Tanta Markaz for the purchase of a scraper (Locally Manufactured) was approved.

EL SHARKIA GOVERNORATE

- The request submitted by Aly Mohamed El Gamal, Fathy El Sayed Ahmed of El Teleen, Minia El Kamh Markaz and Fathia Abdel Fattah Farahat of El Hamidia, Minia El Kamh Markaz for the purchase of a Grillio 16 Hp cultivator for each of them were approved.

- The request submitted by Mohamed Saber Abdel of El Hamidia, Minia El Kamh Markaz for the purchase of a thresher and winnower was approved, (Turkish made) also an Italian mower.

- The request submitted by Mohamed Hussein [illegible] of El Hamidia, Minia El Kamh Markaz, and Mustafa Mohamed Lotfy of Teleen, Minia El Kamh Markaz for the purchase of the Italian mower for each of them were approved.

Best Available Document

- The request submitted by the Agricultural Mechanization Cooperative [illegible] of El Tebesnaia for the purchase of the Ambrosio Tractor [illegible] was approved.

- The request submitted by Ali Abd Rabballer [illegible] Shorma of El Tebesnaia for Hamada Market for the purchase of the German made Bouzair, [illegible] was approved.

- The request submitted by Agricultural Mechanization Cooperative of [illegible] El Gharbia, Edco Market for the purchase of a disc harrow, [illegible] Farmer Tractor, Tractor [illegible], Fiat drill, [illegible] a seeder mower, [illegible] were approved; the request for the purchase of a fall cultivator, scraper Tamco was refused for not complying with the technical specifications.

- The request submitted by Ahmed Ahmed Salem [illegible], Fayya Ahmed Salem [illegible] El Tebesnaia, Hom Hamada Market for the purchase of a Tractor, [illegible] Board Plow for each of them was approved.

Best Available Document

- The request of Nagwit Abdel Ghany Abdel Dayem of Tanta, [illegible]

- [illegible]

[illegible]

[illegible]

SUMMARY

Quarterly Training Activities for April/May/June 1984

No.	Dates	Course No.	Course Title	Location	No.of Trainees
1.	31 Mar-4 Ap.	4EX22	Cotton Drilling	Nawai	15
2.	17 Mar-5 Ap.	4EX23	Welding	Maamours T.C	7
3.	17 Mar-10 May	4EX24	Tractor Op.Inst.	"	13
4.	17 Mar-19 Ap.	4EX25	Tractor Op.	"	12
5.	17 Ap-19 Ap.	4EX29	Hay balers		12
6.	24 Ap-26 Ap	4EX30	" "		12
7.	17 Ao-20 Ap	3PE8	Evaluation Work-shop	Sidi Beshr T.C	17
8.	April	4EX46	Farm Structures	Waked	9
9.	19 May-14 Jn	4Li	Tractor operator	Fayoum	13
10.	19 May-24 My	4EX46.1	Farm structures	Shieh Ahmed	6
		10	Courses for 106 trainees		106

II. FIELD COURSES

	No. Demos.	No. Feddans	No. Trainees
1. Ag. backhoe op/maint	10	10.2(kls)	50
2. Land smoothing	44	877	440
3. Mower/binder (wheat)	26	521	260
4. Grain drill (rice)	5	98	50
5. Ridging	5	102	50
6. Harrowing (discing)	14	267	140
7. Combine harvesting (wheat)	10	92	100
8. Chisel plow	15	75	150
9. Seed planting (maize)	10	102	100
10. Silage mowing (bersim)	10	118	100
11. Farmer night meetings	74	-	797
12. Irrigation (long furrow)	14	265	140
	149	2517	2377

Annex 6

III. PARTICIPANT TRAINING

A. Academic programs:

1. Aug 83 - Jan 85	MS degree, Ag.Economics (Atef)		1
2. Jan 84 - Aug 86	" " " (Zaki)		1
3. Jan 84 - Jan 86	MS degree: Ag. Production (Ayom)		1
4. March 84 - Feb.86	MS degee: Ag. Economics (Ali Kamel)		1
		Sub total	4

B. Technical Training

1. Sept 83 - June 84	Instrumentation (Nazak)	1
2. May 84 - July 84	Economic evaluation (Ismail,Rafat)	2
	Sub total:	3

Totals: 7 participants

In-Country Training Unit

Monthly Activities of the

Prepared By Zaghloul El Sayad

For the month of April 1984

	Machinary Management Extension & Training	No. Trainees
31 Mar- 4 Apr. 4EX22	Nawai Cotton Plant Mechanization	15
8 Apr- 11Apr. 4EX27	" " " "	7
17 Mar- 5 Apr. 4EX23	Mamoura Welding	6
17 Mar- 10May. 4EX24	" Local instentions	13
17 Mar- 19Apr. 4EX25	" Tractor operator	2
14 Apr- 16Apr. 4EX28	" Operating and manitening	12
17 Apr- 19Apr. 4EX29	" Strow Balers	12
24 Apr- 26Apr. 4EX30	" " "	12
17 Apr- 20Apr. 3PE8	Sidi Beshr evaluating work shop	17
31 Mar- 5Apr. 4EX46	Farm structures waked floor hardening for machines shelten	

B. BROBLEMS:

1- We haven't a car.

C. PLANS FOR NEXT MONTH:

4 EX 40.1	Waked Combine Harvesting wheat	5

Annex 6 a

Agricultural Mechanization Project

Monthly Activities of The In-Country Training Officer
Prepared By Zagloul / Ibrahim
For the month of May/June 1984

A. SUMMARY:	Machinary Management Extension & Training	No. Train
17 Mar - 10 May. 4 EX	Mamoura Local instentions	13
19 May - 14 June. 4Li	El Fayoum Tractor operation	13
18 May - 24 May 4 EX 46.1	El Shaikh Ahmed Carpentery	6

B. PROBLEMS:

1. We haven't a car

C. PLANS FOR NEXT MONTH:

This month is Ramadan then the Training Centers are does.

Annex 6 b,c

Agricultural Mechanization Project

Monthly Activities of the Participant Training Unit
Prepared by Hussein Heiza
For the month of April 1984

A. SUMMARY

1- Four Candidates for academic training in U.S.A

a- Atef Abdel-Razek	M.Sc Agr. economics (from, Aug 83-Jan 85)
b- Zaki ,Helmi	M.Sc Agr. economics (from Jan 5,84-Aug 86)
c- Ayman El-Mofty	M.Sc Agr. production(from Jan 5,1984-June 86)
d- Ali Kamel	M.Sc Agr. economics

2- Three candidates for M.Sc degree are in processing as follows:-

a- Nabil Helmy	M.Sc Agr. Education
b- Gouda El-Nagar	M.Sc Soil Science
c- Omar El-Sheik	M.Sc. Soil Science

3- One candidate for short term technical training M.S Nazk.A.G. stay another 3 months to receive full benefit from the program.

4- Three candidates for a short term technical participant for 3 months are in processing:

a. Mr. Mohamed El-Nagar	- on Tractor and Mach. Testing
b. Mr. Mohamed Ismail	Establishing Data Bases and analytical
c. Mr. Rafaat Amin	systems for Economic Decision - in Agriculture

5- One Trainees English Language training start at April,1984

6- 8 candidates will take test at April, 16,1984.

B. PROBLEMS:

C. PLANS FOR NEXT MONTH:

1- Complete the processing:

a- Mr. Nabil H.	
b- Mr. Gauda El-Nagar	Academic Training
c- Mr. Omar El-Sheik	
d- Mr. Mohamed El-Nagar	
e- Mr. Mohamed Ismail	Short term Technical participant
f- Mr. Rafaat Amin	

Agricultural Mechanization Project

Monthly Activities of the Participant Training Officer
Prepared by Hussein Heiza
For the mont of May/June 1984

A. SUMMARY:

1- Four candidates for academic training in U.S.A

a. Atef Abdel-Razek	M.Sc.Agr. economics	(from Aug 83-Jan 85)
b. Zaki Helmi	M.Sc Agr. economics	(from Jan 5,84-Aug 86)
c. Ayman El-Mofty	M.Sc Agr. Prouection	(from Jan 5,1984-June 86)
d. Ali Kamel	M.Sc Agr. economics	

2- Three candidates for M.Sc degree are in processing as follows:

a. Nabil Helmy	M.Sc Agr. Education
b. Gouda El-Nagar	M.Sc Soil Science
c. Omar El-Sheik	M.Sc Soil Science

3- One candidate for Short term technical training M.s Nazk A.G stay another 3 months to recive full benefit from the program.

4- Two candidates for short term technical training traveled in U.S.A on 20 May to attend the course.

5- One candidate for a short term technical participant for 3 months are in processing. Mr. Mohamed El-Nagar - on Tractor and Mech. Testing

USA may 19,1984

Dear Steve Shepley

I received your letter, but I didn't receive the cotton study. For my thesis I think I will be using data from here. I will start preparing the outline next week.

When I first came here they told me that I must get a B average in the four courses that I have to take in order to continue in the University. If I knew this in Cairo, I would have never came to the USA! But this was a challenge and you will never believe what I did; instead of getting a B average, I got an A average or an A in all four courses and am on the Dean's list!

You told me in your letter that you will be in Washington,D.C. by July 22. I am afraid that by that time I will not be there because the course ends on the July 27. I wish you could make it earlier so I can be able to meet with you.

My best regards to everybody in the project, especially Dr. Sahrigi, Dr. Zakaria and Dr. Gaiser.

I wish you all the best in the world.

I remain, Sincerely yours,

Zaki Helmy Wissa

for the [illegible] of April 1984

The following is a summary of the fiscal report No. ____ in Local Currency (L.E.) related to the referenced Training and Extension Subproject.

LINE ITEM	BUDGET	EXPENDITURE	BALANCE	[illegible] BALANCE
1. Instructors Fees		-0-		
2. Equipmental Rental		1336.300		
3. Petroleum, Oils, Lubricants		70.710		
4. Training Aids, Equipment		-0-		
5. Machine Operator Fees		-0-		
6. Room/Board		47.00		
7. Transportation		404.400		
8. Expendable Training Materials		1237.430		
9. Incidental Living Expenses		2125.00		
10. Training Center Fees		300.00		
11. Administrative Expenses		131.170		
TOTALS: (Receipts)		5651.310		
Outstanding Petty Cash/Checks:		42,780.000		
GRAND TOTAL:		48,431.310		

* *

DEMONSTRATION/TRAINING EQUIPMENT (COMMODITIES) :	[illegible]	5,726.00		

_______ (finance) [signature] _______ (date) 19

MINISTRY OF AGRICULTURE
ARAB REPUBLIC OF EGYPT

FISCAL REPORT
OF THE TRAINING AND EXTENSION SUBPROJECT
for the MONTH of May 1984

The following is a summary of the fiscal report No.____ in Local Currency (L.E.) related to the referenced Training and Extension Subproject.

LINE ITEM	BUDGET	EXPENDITURE	BALANCE	QUARTERLY BALANCE
1. Instructors Fees		270.000		
2. Equipmental Rental		198.500		
3. Petroleum, Oils, Lubricants		857.350		
4. Training Aids, Equipment		625.350		
5. Machine Operator Fees		-0-		
6. Room/Board		561.500		
7. Transportation		808.000		
8. Expendable Training Materials		3766.543		
9. Incidental Living Expenses		2010.000		
10. Training Center Fees		458.950		
11. Administrative Expenses		350.550		
TOTALS: (Receipts)		9906.733		
Outstanding Petty Cash/Checks:		44,190.000		
GRAND TOTAL:		54,096.733		
DEMONSTRATION/TRAINING EQUIPMENT (COMMODITIES)		130,207.057		

(finance) _____ 19 (date)

Ahmed

ANNEX 8b

FISCAL REPORT
OF THE TRAINING AND EXTENSION SUBPROJECT
for the MONTH of June 1984

The following is a summary of the fiscal report No.____ in Local Currency (L.E.) related to the referenced Training and Extension Subproject.

LINE ITEM	BUDGET	EXPENDITURE	BALANCE	QUARTERLY BALANCE
1. Instructors Fees		224.00		
2. Equipmental Rental		33.00		
3. Petroleum, Oils, Lubricants		35.60		
4. Training Aids, Equipment		20.00		
5. Machine Operator Fees		-0-		
6. Room/Board		2572.50		
7. Transportation		837.00		
8. Expendable Training Materials		4126.37		
9. Incidental Living Expenses		288.00		
10. Training Center Fees		3040.00		
11. Administrative Expenses		339.30		
TOTALS: (Receipts)		11,515.77		
Outstanding Petty Cash/Checks:		34,830.00		
GRAND TOTAL:		46,345.77		

* *

DEMONSTRATION/TRAINING EQUIPMENT (COMMODITIES)	[illegible]	72,678.485		

(finance) (date)

Annex 8.c

A.4 Service Center/Village Workshop

بسم الله الرحمن الرحيم

RICULTURAL MECHANIZATION PROJECT
A. I. D. Proj. NO. 263 - 0031
EGYPTIAN MOA/USAID
5 th. Floor - Building of the
General Society For Land Reform
P. O. B. 256 Dokki - Giza, ARE.
☎ 704660 - 704720
704364 - 707247

مشروع الميكنة الزراعية
وزارة الزراعة المصرية - وكالة التنمية الأمريكية
الدور الخامس - مبنى الجمعية العامة للاصلاح الزراعى
صندوق بريد ٢٥٦ - الدقى - جيزة ج ٠م ٠ع
٧٠٤٧٢٠ - ٧٠٤٦٦٠
٧٠٧٢٤٧ - ٧٠٤٣٦٤

DATE May. 6, 1984 التاريخ

TO : Dr. David Gaiser
FROM : R.E. Snyder R.E. Snyder
SUBJECT : Report, Monthly (April 1984)

We have begun doing business again this month. The banks approved two loans that they have been sitting on for several months, " Not exactly a break- through

The revision to our letter of understanding is still being refined so that it can be presented to USAID for approval.

We have had meetings with PBDAC representatives on two. Occasions. The end result has been that we are again able to do some business. So far I can't see that anything has changed, as relate to our method of operation.

It appears that there is an attempt to put nearly all of the responsibility for our loans on the banks. If it works, it will make our job much easier and of course insulate us from decision making and responsibility. A more likely scenario however, would be for us to feed all our loan data to the banks and then wait & wait. Only time will answer this question.

LOAN ACTIVITY

Disbursements thru Mar. 1984	415,109	L.E.
Disbursements for April 1984	49,500	"
Total disburements thru April 1984	464,609	"
Loans with bank approval	204,520	"
Loans at bank but not approved	944,500	"
Loans being reviewed in our office	335,000	"

Cairo at 1. May 1, 1984
Month of April

Small workshops

1. Developed workshops :

No	Name	Delivering date	Location	Value L.E
1	I. Ateya	18/1/83	Delingat - Behera	12636
2	H. Shalaby	15/3/83	Damanhour - "	18800
3	M. Kahla	9/3/83	Delingat - "	8815
4	I. Emarah	9/12/83	Itay El-Baraud - "	16649
5	S. El-Nashar	9/12/83	Abu Homes - "	11958.7
6	A. El-Shaek	29/3/84	Kafer El-Dawar - "	21139
7	M. El-Mahalawy	31/3/83	Banha - Qalulia	44000
8	M. El-Bagoury	31/3/83	" - "	37950
9	A. Afify	16/5/83	Toukh - "	10000
10	A. Hafez	16/5/83	Banha - "	38780
11	M. Yousef	11/9/83	Toukh - "	27000
12	M. Zaky	13/10/83	El-Kanater - "	20000
13	H. Gaafer	25/11/83	" - "	9323
14	M. Selim	30/10/83	Kafa El-Zayat Gharbia	50000
*15	B. El-Hadary	22/12/83	Bassioun - "	17743.3
16	A. Abu Kahla	31/10/83	" - "	35000
17	A. Abu Hamer	19/4/84	" - "	25000
18	A. Ahmed	28/8/83	El-Minia - Minia	8916
19	S. Ateya	1/9/83	" - "	15000
20	R. Mohamed	3/11/83	Samalout - "	11322
21	A. Negib	2/4/84	Abu Korkas - "	24500
			Total	464,605

* Mr. El-Hadary didn't deliver all of his machines yet, he still has a machine with a value of 2040 L.E.

April 2

2- Loans approved by the bank.

No	Name	Approval date	Location	Value L.E
1	A- EL- Bassiony	23/2/83	Shibin EL-Kanater Qalubia	5000
2	H- EL- Gamal	6/11/83	~ - ~	2500
3	A- Adly	12/10/83	Hosch Essa - Behera	7000
4	M- Abd EL- Motagaly	26/1/84	Abu Korkas - Minia	50000
5	M- Abd EL- Malak	13/3/84	Samalout - ~	2450
6	T- Mekael	13/3/84	~ - ~	24500
7	A- Ahmed	1/4/84	~ - ~	23520
			Total	204520

April 3

3- Loans under investigation at the bank

No	Name	Delivering date	Location	Value L.E
1	S. Selem	5/7/1983	Malawy - Minia	40000
2	G. Suliman	5/7/83	Edwa - "	20000
3	M. Dawood	24/3/84	Malawy - "	30000
4	L. Fahmy	24/3/84	Samalout - "	25000
5	F. Mahmoud	15/4/84	Malawy - "	15000
6	G. Garawany	2/8/83	Tanta - Gharbia	20000
7	A. El-Beyaly	15/11/83	El-Mahala - "	20000
8	A. Shalash	8/11/83	Kafar El-Zayat - "	25000
9	Y. El-Tanayhy	18/1/84	Samanod - "	25000
10	R. Keshasha	18/1/84	" - "	25000
11	S. Atta	18/1/84	Kafar El-Zayat - "	25000
12	B. El-Mowafy	18/1/84	Zefta - "	5000
13	G. El-Samat	1/6/83	Abu El-Matamer - Behera	15000
14	T. Okbba	12/10/83	Kom Hamada - "	15000
15	E. El-Deeb	12/10/83	" - "	45000
16	A. El-Razik	12/10/83	Abu El-Matamer - "	12000
17	S. Sakr	17/1/84	Abu Homes - "	18000
18	M. Kohla	17/1/84	El-Delengat - "	4000
19	N. Mersy	17/1/84	Kafar El-Dawar - "	25000
20	M. El-Anany	17/1/84	Hosch Essa - "	25000
21	A. Mahmoud	17/1/84	Itay El-Baroud - "	50000
22	A. Zaky	2/4/84	Abu Homes - "	50000
23	A. Abd El-Gany	2/4/84	" - "	10000
24	M. Abd El-Gany	2/4/84	Kom Hamada - "	12000
25	E. Haddad	2/4/84	Delengat - "	12000
26	A. Ahmed	2/4/84	" - "	20000
27	H. Aly	29/11/83	Giza - Giza	50000

April 4

28	E - Aly	17/1/84	Osem - Giza	350
29	S. Omar	17/1/84	" - "	1500
30	S - Abu Hamra	17/1/84	Mansouria - "	1500
31	M - Hemeda	7/2/84	Marutain - "	5000
32	F - Magrash	7/2/84	Kombera - "	2500
33	H - Mahdy	5/4/84	Embaba - "	1800
34	A - Abd Alla	19/10/83	Kafer shukr - Qalubia	40000
35	S - Abd EL Wahab	29/11/83	Ghazka - "	1200
36	S - Saad	8/2/83	Dyarb Negm - Sharkia	2000
37	M - Abd EL Gany	23/8/83	" - "	2500
38	S - EL Said	29/11/83	Hosynia - "	50000
39	A - Said	15/2/84	Belbes - "	15000
40	E - Ragb	15/2/84	" - "	15000
			Total	94450

April 5

4- Loans at the Project Level

No	Name	Application date	Location	Value L.E
1	H- El-Magdoub	3/10/83	Damshet - Gharbia	—
2	M- El-Kabany	17/5/83	Samanod - "	25000
3	M- El-Boraey	17/5/83	Zefta - "	18000
4	A- Alg	11/8/83	Zagazig - Sharkia	22000
5	A- Gazy	25/10/83	Abu Homas - Behera	50000
6	H- Abd El-Salam	8/11/83	Kafar El-Dawar - "	15000
	M- Sheref	15/11/83	Kom Hamada - "	—
	M- El-Aghory	15/12/83	Mahmodia - "	15000
	A- Ghaled	25/12/83	Kom Hamada - "	50000
	A- Metwaly	29/3/84	Kafar El-Dawar - "	25000
	M- E- El-Mahy	1/3/84	Hosch Essa - "	50000
	S- E- Refaey	19/3/84	Rashed - "	25000
	F- Abd El-Hakim	14/2/84	Melawy - Minia	25000
	J- Ahmed	19/4/84	Osem - Giza	15000
			total	335000

Grand total of small workshopes :- 1948 629 L.E

بسم الله الرحمن الرحيم

AGRICULTURAL MECHANIZATION PROJECT
A. I. D. Proj. NO. 263 - 0031
EGYPTIAN MOA/USAID
5 th. Floor - Building of the
General Society For Land Reform
P. O. B. 256 Dokki - Giza, ARE.
704660 - 704720
704364 - 707247

مشروع الميكنة الزراعية
وزارة الزراعة المصرية - وكالة التنمية الأمريكية
الدور الخامس - مبنى الجمعية العامة للاصلاح الزراعى
صندوق بريد ٢٥٦ - الدقى - جيزة ج ٠م ٠ع
٧٠٤٦٦٠ - ٧٠٤٧٢٠
٧٠٤٣٦٤ - ٧٠٧٢٤٧

DATE July 24,1984 التاريخ

TO : Dr.David Gaiser
Team Leader

FROM : Robert Snyder R.E. Snyder

SUBJECT: Monthly Report(May 1984)

GENERAL

Meetings with the PBDAC bank representative and our management staff seems to have solved some of the problems we have been having in processing loans. The banks have recently began to approve and process loans at a faster rate than previously.

The loans distribution has been rather evenly divided throughout the governorates. With 6 loans in Behera, 4 in Gharbia, 7 in Qalubia and 6 in Minia. To this date Sharkia bank has still not approved a loan.

The recruiting of the new Letter of Understanding has not been completed. This means in effect that we are working a set of rules that have not yet been approved by USAID.

There are two elements of our work that consume far more time that I feel is necessary

1. Inspecting Machinery at the time of delivery. It has been made painfully clear that someone from our staff must be present at the time machinery is delivered from a supplier to our client. The items delivered must be checked against what was offered. Bank documents and inspection documents must be filled out and signed and serial and model No's recorded.

1.A I feel that our staff should be increased to include an engineer competent to do this task.

2. Processing Bids and doing the Bid/Offers evaluation and Technical Report. It goes without saying that these are necessary tasks.

2-A Again I feel however that if we had a competent engineer in the office, he could perform this and the Inspections, allowing myself and my counterpart more time in the field.

LOAN ACTIVITY

Disbursements thru April 1984	464,609
Disbursements for May 1984	72,520
Total disbursements thru May 1984	537,129
Loans with bank approval	101,000
Loans at banks but not approved	1,024,500
Loans being reviewed in our office	380,000

For details of the above loan activity see" attachment-A- of this report.

Minia 6
Behera 6
Gharb 4
Giza 7
Shark
Giza

Cairo at June 1, 1984
Month of May 1

Small workshops

1. Developed workshops

No	Name	Delivering date	Location	Value L.E
1	J. Ateya	18/1/83	Delingat - Behera	12636
2	H. Shalaby	15/3/83	Damanhour - "	18800
3	M. Kohla	9/3/83	Delingat - "	8815
4	J. Emarah	9/12/83	Ray El-Barud - "	16649
5	S. El-Nasher	9/12/83	Abu Homos - "	11958.7
6	A. El-Shaek	29/3/84	Kafer El-Dawar - "	21139
7	M. El-Mahalawy	31/3/83	Banha - Qalubia	44000
8	M. El-Bagoury	31/3/83	" - "	37950
9	A. Afify	16/5/83	Toukh - "	10000
10	A. Hafez	16/5/83	Banha - "	38780
11	M. Yousef	18/9/83	Toukh - "	27000
12	M. Zaky	13/10/83	El-Kanater - "	20000
13	H. Gafer	25/11/83	" - "	9323
14	M. Selim	30/10/83	Kafer El-Zayat - Gharbia	50000
15	J. El-Hadary	22/12/83	Bassioun - "	15703.3
16	A. Abu Kohla	31/10/83	" - "	35000
17	A. Abu Hamer	19/4/84	" - "	25000
18	A. Ahmed	28/8/83	El-Minia - Minia	8916
19	S. Ateya	1/9/83	" - "	15000
20	R. Mohamed	3/11/83	Samalout - "	11399
21	A. Nagib	2/4/84	Abu Korkas - "	24500
22	M. Abd El-Metagaly	2/5/84	" - "	49000
23	A. Ahmed	31/5/84	Samalout - "	23520
			Total 22,520	535089

May 2

2- Loans approved by the bank

No	Name	Approval date	Location	Value L.E
1	A- Adly	12/10/83	Hosch Essa - Behera	7000
2	A - Mohamed	3/5/84	El-Delengat - "	20000
3	A- Shalash	16/5/84	Kafer El-Zayat - Gharbia	25000
4	M- Abd El-Malak	13/3/84	Samalout - Minia	24500
5	T. Me Khael	13/3/84	" - "	24500
			Total	101000

May 3

3- Loans under investigation at the bank

No	Name	Delivering date	Location	Value L.E
1	S. Selem	5/7/83	Malawy - Minia	40000
2	M. Dawoud	24/3/84	" - "	30000
3	L. Fahmy	24/3/84	Samalaut - "	25000
4	F. Mahmoud	15/4/84	Malawy - "	15000
5	Y. EL. Tanayhy	18/1/84	Samanod - Gharbia	25000
6	R. Keshasha	18/1/84	" - "	25000
7	S. Atta	18/1/84	Kafer EL-Zayt - "	25000
8	I. EL. Samat	1/6/83	Abu EL-Matamer - Behera	15000
9	T. O Khba	12/10/83	Kom Hamada - "	15000
10	E. EL-Deeb	12/10/83	" - "	45000
11	A. EL. Razik	12/10/83	Abu EL-Matamer - "	12000
12	S. Sokr	17/1/84	Abu Hamas - "	18000
13	M. Kahla	17/1/84	EL. Delengat - "	4000
14	N. Morsey	17/1/84	Kafer EL-Dawar - "	25000
15	M. EL. Amany	17/1/84	Hosch Essa - "	25000
16	A. Mahmoud	17/1/84	Itay EL-Baroud - "	50000
17	A. Zaky	2/4/84	Abu Homos - "	50000
18	A. Abd EL. Ghany	2/4/84	" - "	10000
19	M. Abd EL. Ghany	2/4/84	Kom Hamada - "	15000
20	E. Haddad	2/4/84	EL-Delengat - "	12000
21	A. Metwaly	7/5/84	Kafer EL-Dawar - "	25000
22	M. Saliman	7/5/84	Hosch Essa - "	50000
23	S. EL. Ghanam	7/5/84	Rashed - "	25000
24	H. Aly	29/11/83	Giza - Giza	50000
25	E. Aly	17/1/84	Osem - "	3500
26	S. Omar	17/1/84	" - "	15000
27	S. Abu Hamrah	17/1/84	" - "	15000

May 4

28	M. Hemeda	7/2/84	Marutega - Giza	5000
29	F. Magrash	7/2/84	Combera - ~	2500
30	H. Mahdy	5/4/84	Embaba - ~	1800
31	W. Tadrous	30/5/84	El-Manashy - ~	5000
32	F. El-Kharsah	30/5/84	Osem - ~	1500
33	A. Abd Allah	19/10/83	Kafer Shoukr - Qalubia	4000
34	S. Abd El-Wahab	29/11/83	El-Khanka - ~	1200
35	H. El-Gamal	17/8/83	Sheben El-Kanata - ~	2500
36	S. Saad	8/2/83	Dyab Negm - Sharkia	2000
37	M. Abd El-Ghany	23/8/83	~ - ~	2500
38	S. El-Said	29/11/83	Hosanya - ~	5000
39	A. Said	15/2/84	Belbes - ~	15000
40	E. Ragib	15/2/84	~ - ~	15000
			Total	1029

May 5

4- Loans at the project level

Name	Application date	Location	Value L.E
H - EL-Magdoub	3/10/83	Damshet - Gharbia	—
M- EL-Kabany	17/5/83	Samanod - "	25000
M- EL-Boraey	17/5/83	Zefta - "	18000
M- Aly	29/5/84	Tanta - "	50000
A- EL-Shahat	28/5/84	Zefta - "	25000
A- Abd EL-Rahman	29/5/84	Samanod - "	25000
A- Aly	11/8/83	Zagazik - Sharkia	22000
A- Gazy	25/10/83	Abu Homos - Behera	50000
H- Abd EL-Salam	1/11/83	Kafer EL-Dawar - "	15000
M- Sherif	15/11/83	Kom Hamada - "	—
M- EL-Aghoury	15/12/83	Mahmoudia - "	15000
A- Khaled	25/12/83	Kom Hamada - "	50000
S- Edres	29/3/84	Abu Homos - "	20000
F- EL-Haken	14/2/84	Malawy - Minia	25000
A- Ahmed	24/5/84	" - "	15000
E- Atty	24/5/84	" - "	25000
		Total	380000

Grand total of small workshops: 2040589 L.E

بسم الله الرحمن الرحيم

AGRICULTURAL MECHANIZATION PROJECT
A. I. D. Proj. NO. 263 - 0031
EGYPTIAN MOA/USAID
5 th. Floor - Building of the
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P. O. B. 256 Dokki - Giza, ARE.
704660 - 704720
704364 - 707247

مشروع الميكنة الزراعية
وزارة الزراعة المصرية - وكالة التنمية الأمريكية
الدور الخامس - مبنى الجمعية العامة للاصلاح الزراعى
صندوق بريد ٢٥٦ - الدقى - جيزة ج ٠م ٠ع
٧٠٤٧٢٠ - ٧٠٤٦٦٠
٧٠٧٢٤٧ - ٧٠٤٣٦٤

DATE June, 4 ,1984 التاريخ

TO : Dr. David Gaiser

FROM : R.E. Snyder

SUBJECT : Report, Monthly (June/1984)

GENERAL

June was the month of Ramadan. We didn't expect to break any records this month but neither did we expect it to be a total loss.

We made trips to Qalubia, Garbia and Behera to visit new clients and follow up with some we had previously contacted.

We had one machinery delivery scheduled on 14 June for a client from Minia. This involves coordinating the client, the bank, the supplier and our staff. Of course we never did get the cutire group together at one time so it had to be delayed until July.

LOAN ACTIVITY

Loan activity for the month is as follows

Disbersements thru May 1984	537,129
Disbersements for June 1984	- 0 -
Total Disbersements thru June 1984	537,129
Loans with banks approval	176,020
Loans at banks, but not approved	1,081,500
Loans being reviewed in our office	237,000

For details of the above see "Attachment -A- " of this report.

Month of ~~July~~ June 1984

Small workshops

1- Developed workshops

Name	Delivering date	Location	
J. Ateya	18/1/83	Delingat - Behera	12[illegible]
H. Shalaby	15/3/83	Damanhour - ~	18500
M. Kohla	9/3/83	Delingat - ~	8815
J. Emarah	9/12/83	Itay El-Barud - ~	16649
S. EL-Nasher	9/12/83	Abu Homos - ~	11958.[illegible]
A. EL-Shaek	29/3/84	Kafer El-Dawar - ~	21139
M. El-Mahalawy	31/3/83	Banha - Qalubia	44000
M. EL-Bagoury	31/3/83	~ - ~	37950
A. Afify	16/5/83	Toukh - ~	10000
A. Hafez	16/5/83	Banha - ~	35750
M. Yousef	11/9/83	Toukh - ~	27000
M. Zaky	13/10/83	EL-Kanater - ~	20000
H. Gaafer	25/11/83	~ - ~	9323
M. Selim	30/10/83	Kafer El-Zayat - Gharbia	50000
J. EL-Hadury	22/12/83	Bassioun - ~	15703.3
A. Abu Kohla	31/10/83	~ - ~	35000
A. Abu Hamer	19/4/84	~ - ~	25000
A. Ahmed	28/8/83	EL-Minia - Minia	8916
S. Ateya	1/9/83	~ - ~	15000
R. Mohamed	3/11/83	Samalout - ~	11399
A. Nagib	2/4/84	Abu Korkas - ~	24500
M. Abd El-Motagaly	2/5/84	~ - ~	49000
A. Ahmed	31/5/84	Samalout - ~	23520
		Total 72,520	535089

June 2

2- Loans approved by the bank

No	Name	Approved date	Location	Valu. L.
1	A. Adly	12/10/83	Hosch Essa - Behera	700
2	A. Saad	3/5/84	Delengat - "	2000
3	A. Shalash	16/5/84	Kafer EL-Zayat - Gharbia	2500
4	M. Abd EL-Malik	13/3/84	Samalout - Minia	245
5	T. Mekhael	13/3/84	" - "	245
6	M. Abd EL-Ghany	5/6/84	Kom Hamada - Behera	1500
7	L. Fahmy	10/6/84	Samalout - Minia	245
8	M. Dawood	11/6/84	Malawi - "	23.52
9	H. Mahdy	9/6/84	Embaba - Giza	12000
			Total	1760

Table 3

3 - Loans under investigation at the bank

No.	Name	Delivering date	Location	Value L.E
1	S. Selem	5/7/84	Malawy - Minia	15000
2	F. Mahmoud	15/4/84	" - "	15000
3	Y. El-Tanyahy	18/1/84	Samanod - Gharbia	25000
4	R. Keshasha	18/1/84	" - "	25000
5	S. Atta	18/1/84	Kafer El-zayat - "	25000
6	A. El-Daltany	3/4/84	Kotor - "	50000
7	M. Mansour	12/6/84	Tanta - "	50000
8	A. Abd El-Rahman	12/6/84	Samanod - "	25000
9	A. EL-Shahat	12/6/84	Zefta - "	25000
10	A. EL-Samat	1/6/83	Abu El-Matamer - Behera	15000
11	T. OKba	12/10/83	Kom Hamada - "	15000
12	E. EL-Deeb	12/10/83	" - "	45000
13	A. Abd El-Razik	12/10/83	Abu El-Matamer - "	12000
14	S. Saken	17/1/84	Abu Homos - "	18000
15	M. Kohla	17/1/84	El-Delengat - "	4000
16	N. Morsy	17/1/84	Kafer El-Dawar - "	25000
17	M. El-Anany	17/1/84	Hosch Essa - "	25000
18	A. Mahmoud	17/1/84	Etay El-Baroud - "	80000
19	A. Zaky	2/4/84	Abu Homos - "	50000
20	A. Abd El-Ghany	2/4/84	" - "	10000
21	E. Ahmed	2/4/84	El-Delengat - "	12000
22	A. Metwaly	7/5/84	Kafer El-Dawar - "	25000
23	M. Soliman	7/5/84	Hosch Essa - "	50000
24	S. EL-Garam	7/5/84	Rashid - "	25000
25	S. Edress	12/6/84	Abu Homos - "	20000
26	H. Aly	29/11/83	Giza - Giza	50000

No	Name	Delivering date	Location	Value L.E
27	E - Aly	17/1/84	Osem - Giza	3500
28	S - Omar	17/1/84	~ - ~	15000
29	S - Abu Hamer	17/1/84	Mansouria - ~	15000
30	M - Hemeda	7/2/84	Marutaya - ~	50000
31	F - Magrash	7/2/84	Kombara - ~	25000
32	W - Tadrous	30/5/84	El-Manashy - ~	50000
33	F - El-Kharsa	30/5/84	Osem - ~	15000
34	A - Abd Allah	19/10/84	Kafr Shoukr - Qalubia	40000
35	S - Abd El-Wahab	29/11/84	Khanka - ~	12000
36	H - El-Gamal	17/8/83	Sheben El-Kanater - ~	25000
37	S - Saad	8/2/83	Dyrb Negm - Sharkia	20000
38	M - Abd El-Ghany	23/8/83	~ - ~	25000
39	S - El-Said	29/11/83	Hosania - ~	50000
40	A - Said	15/2/84	Belbes - ~	15000
41	E - Hamafy	15/2/84	~ - ~	15000
42				
			Total	108/500

4- Loans at the project level June 4

No	Name	Application date	Location	Value L.E
1	H - El. Magdoub	3/10/83	Damshet - Gharbia	—
2	A - Ghazy	25/10/83	Abu Homos - Behera	50000
3	H - Abd El-Salam	1/11/83	Kafer El-dawar - "	15000
4	A - Ahmed	29/3/84	Malawy - Minia	15000
5	E - Abd El-Hakam	19/2/84	" - "	25000
6	F - Atty	24/5/84	" - "	25000
7	A - El-Said	12/6/84	Minya El-Kamh - Sharkia	12000
8	M - Abd El-Rahman	17/6/84	Abu Hamad - "	20000
9	M - Abd Rabouh	17/6/84	Abu Keber - "	25000
10	A - Ashraf	6/6/84	Minya El-Kamh - Sharkia	25000
11	A - Sheded	10/6/84	Tanta - Gharbia	25000
			Total	237000

Grand total of small workshops: 2029609 L.E

Monthly Report.

Service Centre Subproject.

Submitted by;Graham G Sparrow.(Tech. Advisor).

There has been no activity of the credit fund for the past three months as the letter of understanding has been under revision, this was finalized at the end of March,and a loan committee was established which sat twice this month.

Ther still appears to be differences of opinion between the regional banks and the PEDAC in Cairo on the legal requirements, which is causing further delays on certain applications, however, given time this should be resolved. Under the new proceedures the banks are taking a more decisive role in the operation, it has been noted that the bank is now revalueing the estimated cost of developing Service Centres, including reducing the amount of money made available for the offer of building construction work, we have received a layout plan (official) drawn by the banks engineer which the project has been asked to approve although it differs in size and content to the plan submitted to the bank inthe application file approved by the project, at this time I wish to go on record that I'm not happy about the proceedures adopted for one of our clients, however, I will continue to process this application as instructed.

We have also noticed a growing unrest or dissatisfaction among some of our clients, we can only hope that this is a temperary situation and will not cause them to have secaond thoughts. On the brighter side of things we have been informed that the bank has approved Mr.Zoomer's loan although reduced for his service centre in Giza area,that CEC should receive approval for theirs early next month, at the present time we have two centres underconstruction, one approved with two or three approvals very close to being finalised.

Monthly Report June/July 84.

Service Centre Subproject

Submitted by Graham G Sparrow.(Tech. Advisor)

Ramadan fell in June this year so very little was accomplished, although during the first part of the month we had the project evaluation team visit us, so with making trips to small workshops and service centres in upper Egypt and the Delta and furnishing them with information that they requested, we were kept on the hop so to say.

We did make a visit to Mr Zoomers location(service centre) on the 7th June at Imbaba and saw that the foundations had been dug and the base concrete poured, also the brickwork was well under way on the existing concrete structure which will be the parts store and office building.

On the 26th June I left Egypt for my annual holiday, on my return at the end of July I learnt that Mr Baraket (CEC) had signed a contact with the bank in Damanhor for his loan.

The bank in Dakalia has agreed to the loan for Diabex and has sent the documentation to the PBDAC in Cairo for their approval.

Mr Said Aguizy sent a letter to the project management requesting permission to lodge a letter of guarranty while his application of land registration is being completed,so as to enable him to proceed with the development of his service centre,this request is to be submitted to the next sitting of the Loan committee meeting for their decision.(early August)

On July 8th Mr Mohammed Fattah from Bilbas, Sharkia come to the office to inform us that he was continuing with the registration process with regards to his land, which he hoped would be completed in about one month.

Monthly Report. May 1984.

Service Centre Subproject.

Submitted by Graham G Sparrow.(Tech Advisor).

There has been an increase of activity by the banks this month, some of the results could be classified as good while others are not .

As mentioned in last months report Mr Zoomer of Giza, has received bank approval and has this month been awarded L.E.35,000 as the first payment towards the construction costs of the service centre.

Mr Baraket (G.E.C) has received the banks approval for his loan, but the bank has attached conditions which I believe are unacceptable, firstly, he must spend his contribution which willthen be estimated by the bank before any loan money is issued, regardless of any receipts he may present to the bank and, secondly no money will be advanced for machinery until the building is fully completed to the banks satisfaction, which is unreasonable in the light that the bank will own everything plus the guarranties of the client and a pure waste of time to the client.

Hammamies application is yet again going to and fro between the regional bank in Damanhour and the banks head office in Cairo, maybe one day some final decision will be made and acted upon. I think it is a case of who will break down first, in the mean time the client is becoming most frustrated.

We visited Mr Raghaa in Beni Suef at the location of his Service Centre and found that construction had started in that the foundation concrete was being poured, this is being financed from the clients own funds before the approval of his loan by the bank. The loan was approved later in the loan committee by the bank after some changes to the application, namely, that the bank considered the power supply to the building to be transferred to the machinery content of the loan, as the transformer which is necessary is termed as machinery by the bank, atthe same time bank agreed for their engineer to review the estimated costings that he submitted as it was incomplete. the final approval was objected to very strongly in principle by the client.

Momoudia Motors have run out of money which the bank released against the security of his house, originally, I understand that the bank agreed to make a second payment to keep the construction work going, if Abdu Khir Alla got a letter from the land reform office stating that he had paid the full price of the land in Sept.1983. and that the land reform office was proceeding to process the contract of transferring ownership,

since starting construction the bank has backed down and now insists on the land being registered in Momoudia Motors name before making any further payments and, that could take another four or five months.

The bank in Monsoura, Dakalia informed us on a recent visit that they had told Diabex Co. that their application was approved pending their submission of guarranties to the bank and, that they should start work on the construction from their own funds(their contributions), we then visitedthe location of the service centre and found a large amount of sand and gravel had been delivered.

The main supply of electricity has been completed to Azmy's service centre in Beni Mazar, Minia, also the machinery has been checked and tested by the suppliers. The technical manager has just completed his three month training programmee and the planned official opening date is to be early in August 1984.

Also this month we made two visits in the governorate of Dakalia to clients wishing to develop service centres, both are good prospects, but whether we have U.S.AID's approval to extend our working area is not known, although management say's it's O.K. Ihave not seen anything in writing at the present time and still remember the five to six months that were wasted earlier, when we were instructed to work outside the agreed project area.

Mr Shoukry submitted a list of machinery with offers which was approved technically by the project, these items will be purchased from his own funds and not the project loan fund money.

A.5 Land Improvement

SECOND QUARTERLY REPORT 1984
April, May and June

LAND IMPROVEMENT SUB-PROJECT

Submitted by: Dr. N. Saif El Yasl
Mr. J.A. McClung

I. ACTIVITY DURING THE QUARTER

1. Demonstration Program: During the period of April-June 1984, the land leveling demonstration program began to implement the planned spring program in Seila El Garbia Village and at the Abyuha site of the EWUP. The program began following the harvest of foul bean and garlic crops and continued through wheat and berseem harvests. The early harvest, garlic and fould, were in areas to be planted with cotton which necessitated terminating activities in those lands by May 7, 1984. This was done to ensure that low crop yields were not gotten due to late planting. The field units shifted to other areas after some delays for harvest. The demonstration program continued through June as per the plans presented in the First Quarterly Report. Table 1 following summarizes the areas where land leveling was carried out.

Table 1: Areas Precision Land Leveled
(April-June 1984)

Site	Area Covered	Land Use
Abyuha (EWUP)	150	Field Crops
Seila El Garbia (Matai)	160	Field Crops

Additional analysis which presents number of hours worked, number of farmers, etc., will be presented in the following quarterly report.

It is relevant at this point to compare the results of the season's program with the planned areas. The First Quarterly Report estimated that 953 feddan would be leveled in Seila El Garbia and 800 feddan would be leveled at the EWUP site.. While whithin the confines of a demonstration program, the total number of feddans covered is not of particular importance, but it is important from the point of view of project planning. Furthermore, project planning is of critical importance in the project's relationship with farmers. At some point, meetings are held with farmers and promises are made which should be kept in order not to lose their confidence.

Table 2 summarizes the results of the sub-project's work against the planned program.

Table 2: Summary of Planned versus Leveled Areas in Matai Markaz

Phase	Village	Area Planned	Area Leveled
I	Seila	218	107
II	El Atlat	182	-
III	Seila	185	53
IV	Seila	149	-
V	El Atlat	219	-
		953	160

In the case of the Abyuha work, a total of 150 feddan were leveled against an estimated 800 feddan.

The work program in both locations was curtailed due to the start-up and operation of the new Ford tractors and other IFB-01 procurements. Problems were initially perceived and later clarified or solved with respect to the installation of the laser control equipment onto the tractors. The details of these discussions and/or problems are set forward in two memoranda dated June 5 and June 7 which are included in this report for reference. Additional problems were encountered with respect to the tractor start-up.

These centered around poor pre-delivery work by the supplier. Tractors were deliverd with loose bolts and studs and in some instances, with inferior quality materials (bolts, etc.) being used in place of genuine parts. These items which were nearly impossible to catch in delivery inspections resulted in program delays. Among the parts critical to these delays were drawbar frames and fenders falling off. Because in some cases drawbar frames came off and striped the threads out of the casing, repairs have been time consuming.

Projections for the season's program have also been high due to differences in earthwork configurations from those expected. The attached memorandum dated May 20 elucidates many of the problems encountered at Abyuha. Here, the work carried out by contractors removing topsoil for meska construction resulted in more earthworks than initially estimated. In particular, low areas in the fields tended to be along side meskas in the tractors' turning areas. Differences in earthworks also occurred in Seila El Garbia Village due to long haul distances and cut depths much greater than expected. In both cases, the over-estimation of land that could be completed could have been avoided if planning & design had been carried out according to the recommended procedures presented in the Appendices of Activity Report No. 6. Unfortunately, this has been impossible due to lack of survey equipment and other constraints. A Status Report dated May 27 is attached in reference to many of the constraints limiting the program.

Driver training and equipment management as well as maintenance were major constraints to the Spring 1984 demonstration program. These issues were discussed in the First Quarterly Report as well as in some of the attached memoranda. With the addition of Mr. Fred Hodgson, an equipment management and maintenance expert, to the staff, it is expected that equipment maintenance will improve in the future.

In summary, considering that:

1) a four, rather than a six day work week was used
2) four rather than seven tractors with scrapers were available on any given day
3) chisel plows and tractors were not available until late in the program, if at all, and
4) long haul distances and large cut depths were encountered,

the project was able to carry out a reasonable amount of work. In the future, the LISP should not have to encounter the same problems, and should be able to plan around constraints which cannot be eliminated.

2. Beni Suef and Fayoum Demonstration Programs: A village site was selected in Beni Suef for the initial demonstration program. Unfortunately, no equipment was available du r the start-up constraints previously described. This program will start in the Third Quarter with the availability of equipment.

3. Equipment Procurements: A limited amount of the support and maintenance equipment required has begun to be received in the field. The sub-project has begun the procurement process for more survey equipment. Items which are intended for the Land Improvement Program are included in IFB-03 and are expected to be evaluated in the Third Quarter.

4. Survey, Design and Planning: No activities for survey, design and planning were undertaken. Details regarding this shortcoming are detailed in the attached Status Report.

5. Training and Extension: A driver training course was undertaken in El Fayoum Governorate. This course was held by the project in conjunction with Governorate officials and the Training and Extension Sub-project. The course appears to have had many of the limitations of other driver training courses in that insufficient time was spent in actual driving. This should be remedied in the follow-on training in laser equipment and land leveling operations. Furthermore, on-the-job training will be the only way to circumvent this problem.

The training course for Land Improvement and On-farm Irrigation is under preparation. A curriculum has been prepared and lecture materials and instructors are being selected.

II. PLANNED ACTIVITIES

The sub-project will continue land leveling demonstrations on an ah-hoc basis into the beginning of the Third Quarter. Plans detailing the Fall 1984 work program will be prepared during the period of July-August for implementation in the last quarter of 1984 following the harvest of summer crops.

Key to developing these plans will be the integration of evaluation programs as discussed in the attached memoranda. Integration of land improvement and extension activities will also be key elements of the proposed plan.

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٧٠٤٦٦٠ - ٧٠٤٧٢٠
٧٠٤٣٦٤ - ٧٠٧٢٤٧

DATE May 27, 1984 التاريخ

TO: Dr. A. El Sahrigi - Project Director
Dr. Z. El Haddad - Project Coordinator
Dr. D. Gaiser - Project Technical Director

FROM: J. McClung

SUBJECT: Status Report - Land Improvement Sub-project

With the arrival of the IFB equipment on the field and a partial season work with this new equipment, it is relevant to review the sub-project's progress and to propose relevant plans as may be required to fulfill the sub-project's goals. Up to the present time, it has concentrated on land leveling, however, as the project progresses, a larger focus onto land improvement will have to be adopted. The constraints so far identified in the implementation of the program center around

1. institutionalization
2. management
3. finance
4. transport
5. equipment procurement

The organization and a de-facto reorganization of the project are presented. Similarly, the general LISP work schedule/plan and an amended version are presented.

The sub-project was set out to operate as a combination of a custom type operator and as a data collection/analysis and design institution. As such, the sub-project was organized as shown in Figure 1. The institutionalization aspect of the project was amended from the project paper to fit in to the Mechanization Institute. To date, it was envisioned that the sub-project would follow the activity program shown in Figure 2. Due to delays in equipment delivery and assembly, the dates shown in Fig. 2 are not accurate. To be more precise, due to a variety of reasons, the work program is more than 5 months behind schedule. Within the work plan the sub-project has been able to only maintain a limited amount of field activities in El Minya Governorate.

Only once in its lifetime, the sub-project has been able to work according to plan. Topographic surveys were carried out in late 1982 and planned activities were undertaken in 1983 following extensive extension activities. In the cases of these two basins, a good job was done and farmer response was generally positive. Work done late in 1983 was not done on time due to activities in other areas. As a result, farmers were unhappy with the results.

In 1984, the sub-project technical section formulated a work plan on the basis of reported crop distribution. Although plans were made to meet farmers and to undertake surveys, the relevant sub-project staff were not in Minya to undertake the necessary steps. In fact, the one meeting held with farmers appears to have offered them much more than the project is able to provide. In the other villages, farmers were so disgusted with the failure of the sub-project staff to attend scheduled meetings that they complained in writing to Extension officers and have little confidence in the project's desire to implement programs.

While remedies for this program may be found in the future, the failure of trained staff to perform has delayed the proper implementation of the program until the spring season of 1985.

In the areas of Abyuha, in conjunction with EWUP project, activities are progressing more smoothly. Scheduling of work areas and farmer contacts have remained the responsibility of EWUP personnel. While the program has not created problems, it has been behind schedule due to a mixture of problems including staff training, equipment, finance and transport. Details on problems encountered on site have been presented in a separate memorandum.

The actual operation of the field units has been constrained in two major ways. The delays in assembly and delivery of equipment are still not entirely finished. The continuing delay in receiving support equipment which was ordered separately may have serious implications with respect yo maintenance of existing equipment. The most shocking delay however, exists due to driver training. The drivers were trained through a set of three courses as follows:

1. Driver Training (1 week) *
2. Operator Training (5 weeks) *
3. Laser Equipment Operator Training (3 weeks)

During recent visits to sub-project sites with members of the extension sub-project and Ford representatives, a shocking amount of negligence has been observed. It was pointed out by the Ford representative that anyone who received a six to seven week course in tractor operations should be capable of carrying out basic checks which are required. For example wheel bolts were noticed about to fall off; both engineers and drivers did not make the necessary effort to stop simple oil leaks which would be minimized with simple hand tools available. Supervisory engineers sent to a two-week course offered by Ford did not act in a responsible fashion with respect to maintenance of equipment. Although long hours have been spent on training, the results are disappointing. The sub-project is presently in the situation that it must re-train or recruit experienced tractor drivers to fulfill more than hald of its staff requirements.

It appears that these two courses offered under the auspices of the Training sub-project and the various training centers, have little to offer.

Given that the program is 5 months behind schedule in Minya, what is the situation in other areas? The sub-project has not been able to initiate any activities in either Beni Suef or Fayoum due to lack of transport and to a lesser degree, to lack to trained staff.

A new project activity program has been proposed until the end of 1984 at which point the original system of work program will come on line. However, the resolution of the five sub-project problems must occure before any progress will be made. If the project is to institutionalize the activity of land improvement and land leveling in the Mechanization Institute, the institute must set up a reasonably decentralized operation in each governorate. The current system of assigning engineers who do not reside in the are is impractical. Farmer resentment is high at seeing equipment standing still while staff does not appear. Recruitment of appropriate local staff and the establishment of a reasonable local administrative capacity should begin immediately. It is still relevant to have certain staff on a commuting basis during the start-up period.

The issues of salary payment and overtime are also important. Work 12 hours per day and 7 days a week is required during the peak season between crops. In order to do this, finances must be in place and drivers, supervisors, and mechanics must be confident that they will be rewarded for overtime. Additionally, bonuses based on completing work of a high standard and ahead of schedule shold be paid.

The issue of institutional aspects highlights the high management ability required. At pr-sent, no staff member appears to take his responsibility seriously or has the coordinating and management skills required. Adequate training programs should be undertaken and job responsibilities clearly defined and checked by the highest of Egyptian project management.

The matter of transport has reached the critical stage. Procurement of vehicles has been blocked and the governorates are unable to provide transport. With an estimated 30 vehicles on the project, each of the five sub-projects can reasonably expect to be assigned 5-6 vehciles. The LISP currently has 3 vehicles in its program and cannot expand its activities to reflect the available equipment without at least 6 vehicles.

In conclusion, the proj-ct must take the relevant actions to bring the sub-project back on track. Failure to take action will result in continued embarrassment, discrediting of a project activity which has demonstrated a great deal of potential in both the fields of land improvement and mechanization.

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DATE JUNE 5,1984 التاريخ

TO : Dr.Ahmad F.El Sahrigi
Project Director

FROM : J.McClung
Irrigation Engineer-Land Improvement Subproject

SUBJECT: Assembly of IFB

This memorandum is to state the status of the installation of laser control systems on the Ford 7610 tractors. Over the last month the representatives of Ford Motor Company of Mrs John Halloway and Peter Fowles) and of Spectra Physics Egyptian Representatives(Mr.Ahmad Hammami and Mr Hassan Kadry) have spent a great deal of time in finalizing the assembly and in assisting the project in the start up use of the equipment.

Initially a number of problems with respect to oil leaks-both in the hydraulic systems of the tractors and of the laser hydraulic control systems were encountered. The causes of these oil leaks were identified to be certain manufacturing defects in ford pipe work and normal tigthening up needed on the laser installation. Additionally one tractor had a faulty laser connection which has since been connected.

Initially there was some trepedation on the part of the Ford Representatives with respect to the sophistication of the laser hydraulic installation. This was further complicated by the fact that the filter indicator was running in the red, in the by-passing modes . This fact was brought to the attention of the Spectra Physics Staff by simply removing the composite filter element let the system run in the green. This indicates that the hydraulic system is operating properly however, the filter element is not passing the fluid. The filter element has been identified as a 10 micron element which should pass Ponnex T-12 in the 0-100°C the hydraulic range transmission oil re-

commended by Ford. The Spectra Physics representative has assured the project that the equipment may be used safely without the filter element until a 20 micron filter is made available. Further testing with respect to this filter element is being carried out to identify the exact cause of the failure of the first 10 micron element. Ford Motor Company has similarly stated that the hydraulic system operated of the auxiliary engine mounted hydraulic pump and installed by Spectra Physics is satisfactory tp protect their system. (See attached correspondence , Ford - ECC and Spectra.

One tractor in Gabal Asfar has shown some signs of becoming hot in the hydraulic systems. Reports from staff at Gabal Asfar are unclear as to how hot the systems are becoming and exactly where they are becoming hot. Mr Paul Armstrong has suggested wisely that these units be periodically checked and indicated excessive heat seemed to buld up on only one tractor. Mr Hassan Kady of EEC and myself visited the site on June 2,1984 and identified several spots which were noticed to heat excessively. Mr Hammami(EEC) and Mr Hollawy(Ford will visit the site on June 6,1984 to evaluate any problem that exists. At present it appears to be as isolated problem as tractors in El Minia do not appear to be heating excessively in the laser system.

A question which has been posed by Ford representatives and several project advisors is why did Spectra Physics choose to install such a complex hydraulic package on the auxillary engine mounted pump. In reviewing the relevant documents the following facts have been identified.

1. The procurment bid, document(IFB) was finalized and dated August 15,1982 while bids were due October 19,1982. A review of the Technical Specifications indicates that no specifications exist for the hydraulic package beyond" Hydraulic Installation kit.

2. The offer by Spectra Physics through Egyptian Computer and Electronics Company (EEC) dated September 27,1982 offered a hydraulic installation package including:

   - Cable set
   - Hose set
   - Flow divider and
   - Electro Hydraulic valve.

The whole hydraulic package for a tractor with an open center hydraulic unit would include: a flow control valve, a relief valve a filter and a solinoid valve. This offer was accepted without material modification.

3. The Spectra Physics bid was awareded officially in the project letter to USAID dated

4 Ford Motor Company specified its offer dated that the Ford 7610 tractor used an open center hydraulic circuit.

5. Ford Motor Company(USA) sent one Ford model 7610 tractor to Spectra Physics(USA) for assembly of one prototype model. This work is evidenced through the pamphlet published by Spectra Physics regarding the complete installation of e Spectra Physics land leveling control system on a Ford 7610 tractor.

6. Upon arrival in Egypt and following assembly of a 7610 tractor a 2nd prototype was assemb-ed in Ragabs Alexandria Factory following the guidelines set out in the pamphlet mentioned above in 5 above. The pamphlet for cutting a metal pipe and inserting a hose connector section,ECC chose to replace the whole pipe with a hose.Upon completion this system showed back pressure building up in the system. At this point ECC stopped assembly of the prototype unit to avoid conflicts with Ragab.

7. When the first group of tractors were delivered to the project in Minia, Spectra Physics developed a second prototype which differed from the USA pamphlet in several ways:

   a) Flexible hydraulic hoses were used throughout the systems.

   b) All flow was returned to the transmission case reservoir, rather than returning flow from the flow divider to the priority valve pack.

   c) Flow was returned to the reservoir through the put for the Ford deluxe package hydraulic remotes. This installation was completed and has been servicible on all tractors with the exception that the hydraulic filter is running in the red-by passing mode.

8. A number of oil leaks were found and stopped as per the attached letters.

It is evident that Spectra Physics has provided and installed the system it offered in its bid. The system could be simplified by using the closed hydraulics provided by the deluxer remote outlets pprovided on the Ford 7610. Unfortunately their literature was not clear on the fact that the remotes are of a closed center type while the main hydraulic system is of an open center type. Such a closed center system requires only a flow divider and a solenoid pack to operate a laser control system. Additionally such a system can be fitted directly to the hydraulic remote outlets rather than being inserted in the auxillary hydraulic pump.

Tn retrospect it would have been wise for the project to have sent someone to the USA to inspect the installation as is provided for in page 2-14 item 2.15 of the bid documents. Item 2.15 Inspection and tests provide for an independent inspection company financed by USAID Project Grant No 263-0031. Furthermore care should be taken by the procurment committee to ensure equipment material changes from offers be considered when required

cc: Dr.Z.El Haddad
Mr.Maher Iskander
Mr.Paul Armstrong
HQ, Louis Berger Int'l
John Holloway-FMC.
Mr.Hamami - Egyptian E.C.
Files

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٧٠٤٣٦٤ - ٧٠٧٢٤٧

DATE June 7,1984 التاريخ

To:Dr.Zachariah El Haddad-Project Coordinator

Dr.David Gaiser -Team Leader

From:Mr.J Mcclung-Irrigation Engineer
Mr.F. Hodgson-Equipment Advisor

Subject:Laser Systems on Ford Tractors at Gabal Asfar

On June 6 we accompanied Spectra Physics and Ford Representatives to Gabal Asfar to investigate the overheating problems reported to exist on the laser hydraulic package run off the engine mounted pump.The tractor was run for 1.45 hours to deterimine if excessive heat was building up.Although the system became hot to the touch it was not considered to be over heating by either the Ford or Spectra Physics representatives.The laser units in Minya have been measured for temperature and are running at 65°c after 4-5 hours operation.Each of the companies is preparing a letter indicating a maximum operating temperature for their system,They verbally informed us this would be in the range of 90°c which would be far too hot to touch.The indication for overheating of the laser hydraulic components would be discoloration and / or blistering of the paintwork.

In the meantime the tractors are availible for use in land leveling or appropriate farming operations.It was noted that ballast should be placed in tires and optimal tire pressures maintained,neither which is the case at present.

ccMr F. Schantz
Eng. Maher Iskander
Mr.Paul Armstrong
Lisp
Files

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٧٠٤٣٦٤ - ٧٠٧٢٤٧

DATE May 20, 1984 التاريخ

TO: FILES

FROM: J. McClung

SUBJECT: Land leveling and Meska Construction in EWUP Abyuha Area

A preliminary observation of the land leveling in the Abyuha areas where a bulldozer has removed top soil for meska construction indicates that a large effort will be required to return lands to acceptable topographic levels. No system of grade control is being used by the bulldozer operator. The result if ~~shea~~ end areas near meskas tend to be gouged out by 5 to 10 centimeter depths. Furthermore, ong swaths may be gouged out of various parts of the field. From the irrigator's point of view this is particularly unfortunate as a high rise occurs in the middle of the field. In precision land leveling, this cutting in the end areas is a problem because the end areas are turning areas and a constraint to use drag scrapers not to mention land planes. Depth of cut and lack of uniformity of cuts will also result in a good deal of surface roughness even after land leveling due to settling of fill areas after irrigation. This problem is evident in some of the areas which were dozed and leveld last year by EWUP and re-leveled this year by EAMP.

The fact that dozer cuts may be substantially deeper than surrounding areas means they cannot be leveled properly without concurrent use of a chisel plow during leveling.

The EAMP activity to date has been less than optimal due to several problems. A prime one is the lack of chisel plows on site. This problem should be eliminated with the arrival of plowing units shortly. Similarly start-up problems with the Ford tractors and the laser equipment have been a constraint. With a second transmitter and a larger equipment fleet over the next few weeks, more productivity may be expected. To date, about 150 feddan have been leveled.

It is recommended that careful surveys be made of the bulldozed areas. EWUP should also undertake to provide more grade control with the dozer operation. At present, it will take 1 to 2 years to return areas to precision level standards. One suggestion for such meska renovation is the laser controls on the dozer. This will not eliminate the need for precision but would reduce the time required to bring land to PIL standards.

Another area which requires attention is that of planning and scheduling operations. Areas of 1-2 feddan have been dozed and leveled while other adjacent areas of 3-4 feddan are out of production but no work is being done. Perhaps these are farmers who chose not to cooperate. However, if the meskas are to be elevated, this is not a plausible reason. Farmers are de-facto obligated to give up some of their top soil for meska renovation. A certain amount of piecemeal participation due to crops planted and harvest dates may be acceptable.

In conclusion, these two problems shluld be considered and minimized in the cooperation between the projects.

cc: Dr. Sahrigi
Dr. Gaiser
EWUP

A.6 Local Manufacturing

Monthly Progress / Activity Report - For April 1984

Submitted by : Richard K. Berky
Local Manufacturing Advisor

1. Drafting an ASAE paper on the development and premanufacture phases of the thresher program for the review and collaboration of Dr. El-Sahrigi. Exhibit "B".

2. Reviewed the project activities in harvesting re. ultimate local manufacturing feasibility and concluded that additional work needed to be done to flesh out a system at least between windrowing and threshing.

3. Completed preliminary design investigation for enclosing cleaning system, adding tailings elevator and a side mounted windrow pickup to allow field combining from a windrow with continuous bagging of grain and chopped straw. Exhibit "A".

4. Probably includes patentable helical slat or apron conveyor which is ideally suited to Egyptian conditions of heavy total crop and consequent high shattering losses because of the gentil handling and tight " floor ".

5. Began programing for Local Manufacturing Feasibility Study.

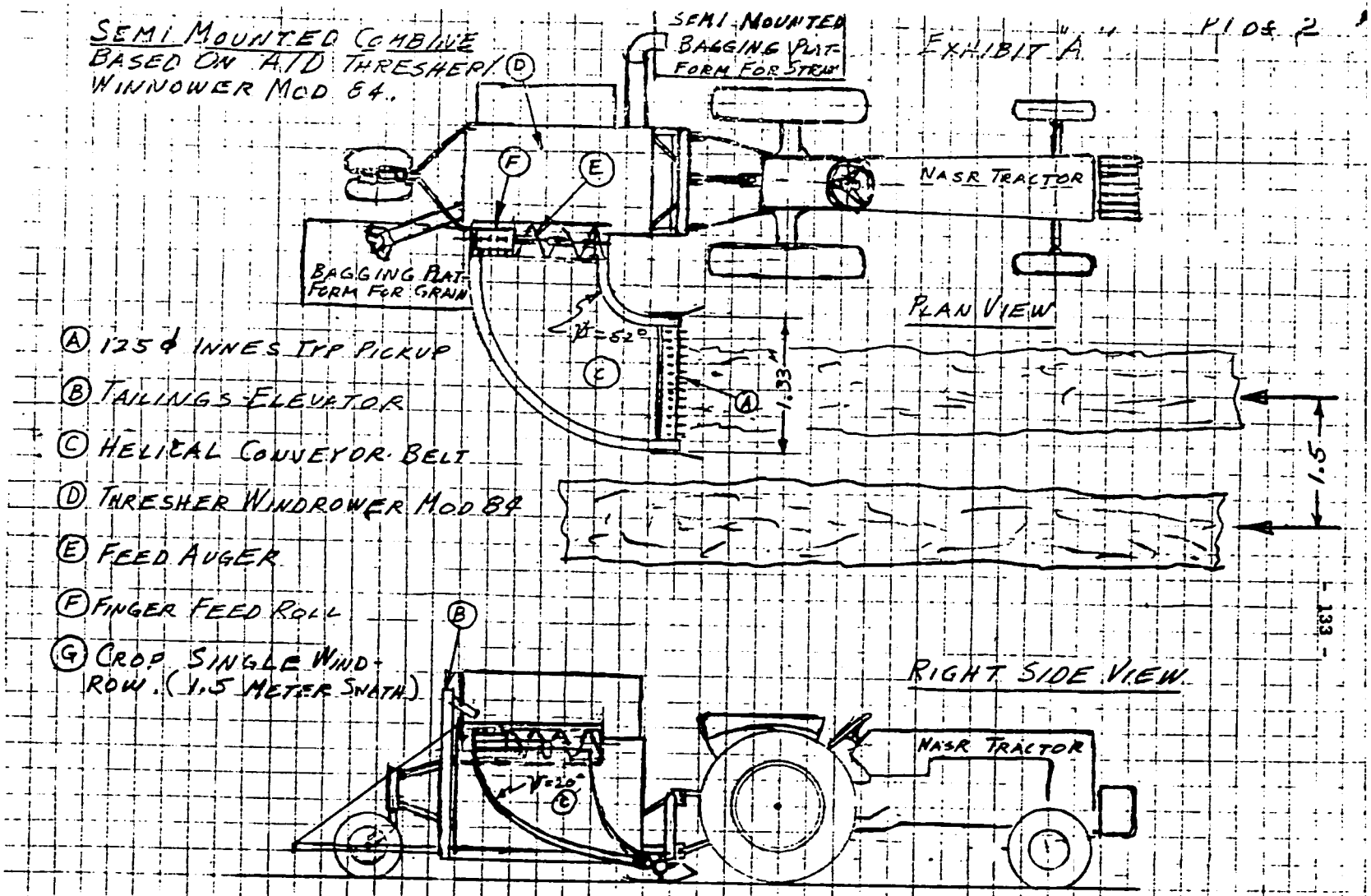
6. Developing Feasibility Study for Local Manufacture program to include recommendations incorporating observations and experiences to date.

Conclusions :

A semi-mounted combine with a patentable feed apron would be exportable into Africa and Middle East and could be the basis for a viable private sector investment.

SEMI MOUNTED COMBINE
BASED ON ATD THRESHER/WINNOWER MOD 84.

EXHIBIT "A" PIOS 2



(A) 125 ϕ INNES TYP PICKUP

(B) TAILINGS ELEVATOR

(C) HELICAL CONVEYOR BELT

(D) THRESHER WINDROWER MOD 84

(E) FEED AUGER

(F) FINGER FEED ROLL

(G) CROP SINGLE WINDROW. (1.5 METER SWATH)

SCALE $\frac{1}{50} = 1$

A. Burka 15/4/88

EXHIBIT A

SEMI MOUNTED COMBINE

P2 of 2

BACKGROUND & SPECIFICATIONS

BACKGROUND

In order to encourage harvesting systems resulting in less handling & field fallow time the Mod 84 Thresher Winnower was designed as use either a stationary unit or for on the go combining in the field. Comparison with L2003 indicates the modifications required. Since they were anticipated they are minor.

The major differences required compared to the semi-mounted thresher winnower, are complete closure and added tailings return, bagging platform for straw & grain, plus windrow pickup & feed attachment.

Specifications (ESTIMATED For Design Purposes)

1. Proprietary helical apron feeder.
2. Detachable lunes type pickup.
3. ONE FEDDAN PER HOUR @ 2.7 KM/HR.
4. UP TO 2.5 tons grain per hr.
5. UP TO 6 " straw " ".

Conclusions

1. Retrofit live PTO/live hydraulic system is practically req'd.
2. " axle clutch system a good solution.
3. For heavy crop conditions either a retrofit axle clutch, underdrive system or reduced swath in one windrow are required.
   Design of
4. A retrofit axle clutch combined with a direct and underdrive axle flash shift transmission would be an excellent objective for an observation tour to the U.S. with TDY follow up in Egypt.

Monthly Progress / Activity Report - For May 1984

Submitted by : Richard K. Berky
Local Manufacturing Advisor

1. Review and inspection of manufacture under subcontract:

(a) Behera is progressing slowly on one machine using one (usually) worker. The quality of the work has greatly improved and there is much better adherence to the drawings. The cleaning fans are completed with good results. Also the grain schute, wind board, most hitch and frame parts. Drawing errors so far have been negligable and obvious.

(b) Egyptian Iron and Steel has assembled one frame. The parts all assembled as designed with promise of leading to low production costs. The only problem besides time so far was the use of old drawing which should have been replaced.

2. Tooling :

(a) Wood patterns have been completed covering about ¼ of the thresher requirement. These were made under subontract in the market rapidly and at reasonable cost. Only one redundant drawing error was detected and corrected by the pattern maker.

Patterns are made double shrink and aluminium match plates and core boxes are nearly completed along with a new standard flask design. This will be the first mass production pattern equipment we have seen used in Egypt. Exhibit "A".

(b) Jigs :

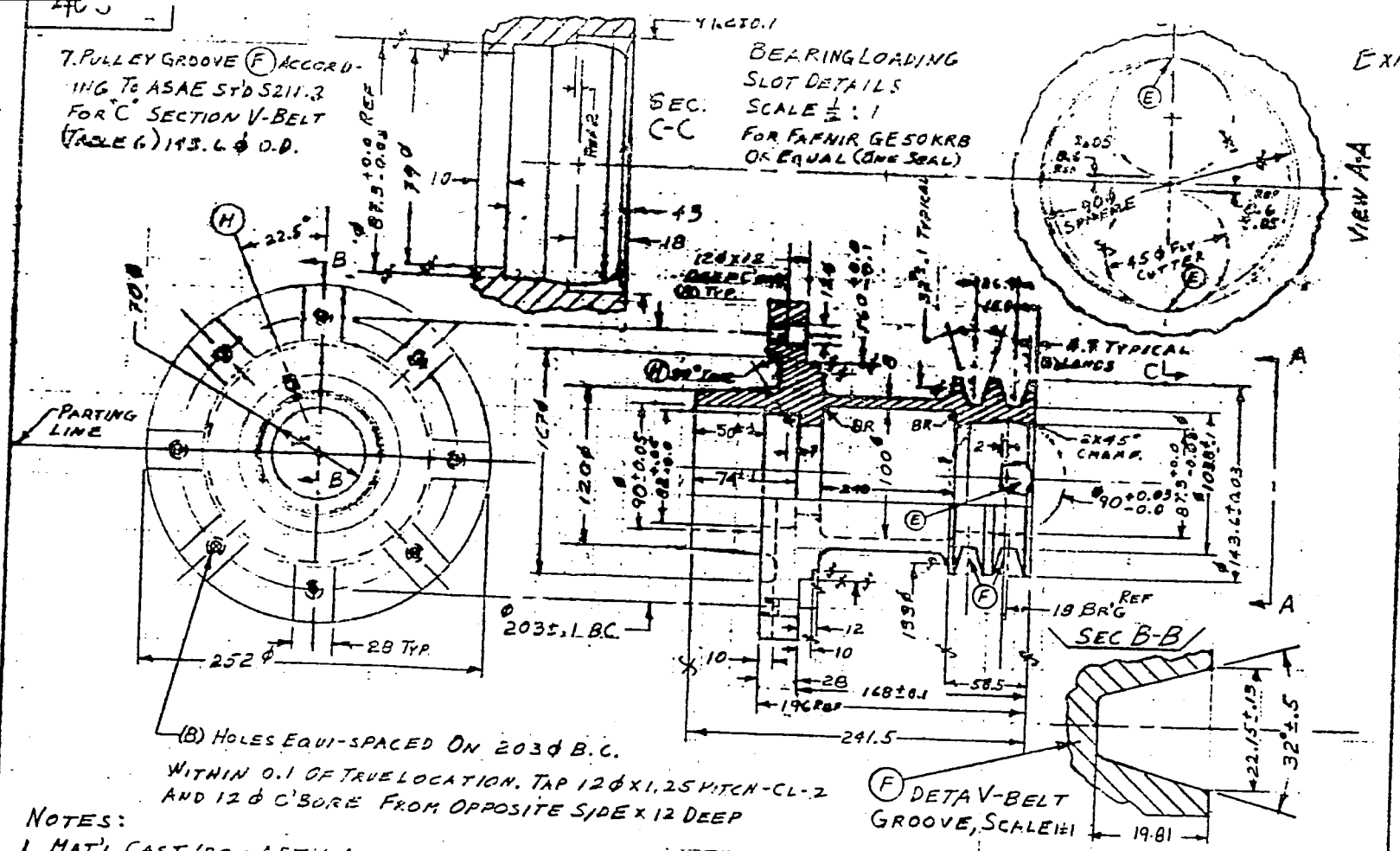
We have completed a sample (Exhibit B) heavy duty toggle clamp in the market and are proceeding with 50 of them to be

con't

manufactured at the Bacos Research Center. These will be used to produce complete production frame weld jigs for the thresher after return from vacation.

June : Vacation in U.S. along with procurement pipe line establishment for U-joint drive lines.

EXHIBIT A.



NOTES:

1. MAT'L CAST IRON ASTM A-48, CL 30
2. ROUGH CASTING WT. = 18 KG (EST.)
3. ALL DRAFT 3°
4. REMOVE ALL BURRS AND SHARP CORNERS
5. INSIDE MOLDED RADII 5 R UNLESS OTHERWISE SPEC.
6. 3 ϕ LUB PASSAGE THRU., TAPPED 1/8-27 NPT BETWEEN BOSSES, 30° INCLINED TO PLANE OF ROTATION AND BREAKOUT 7 FROM REAR OF BUSHING POCKET (H)

MINISTRY OF AGRICULTURE
MECHANIZED AGRICULTURAL RESEARCH INSTITUTE

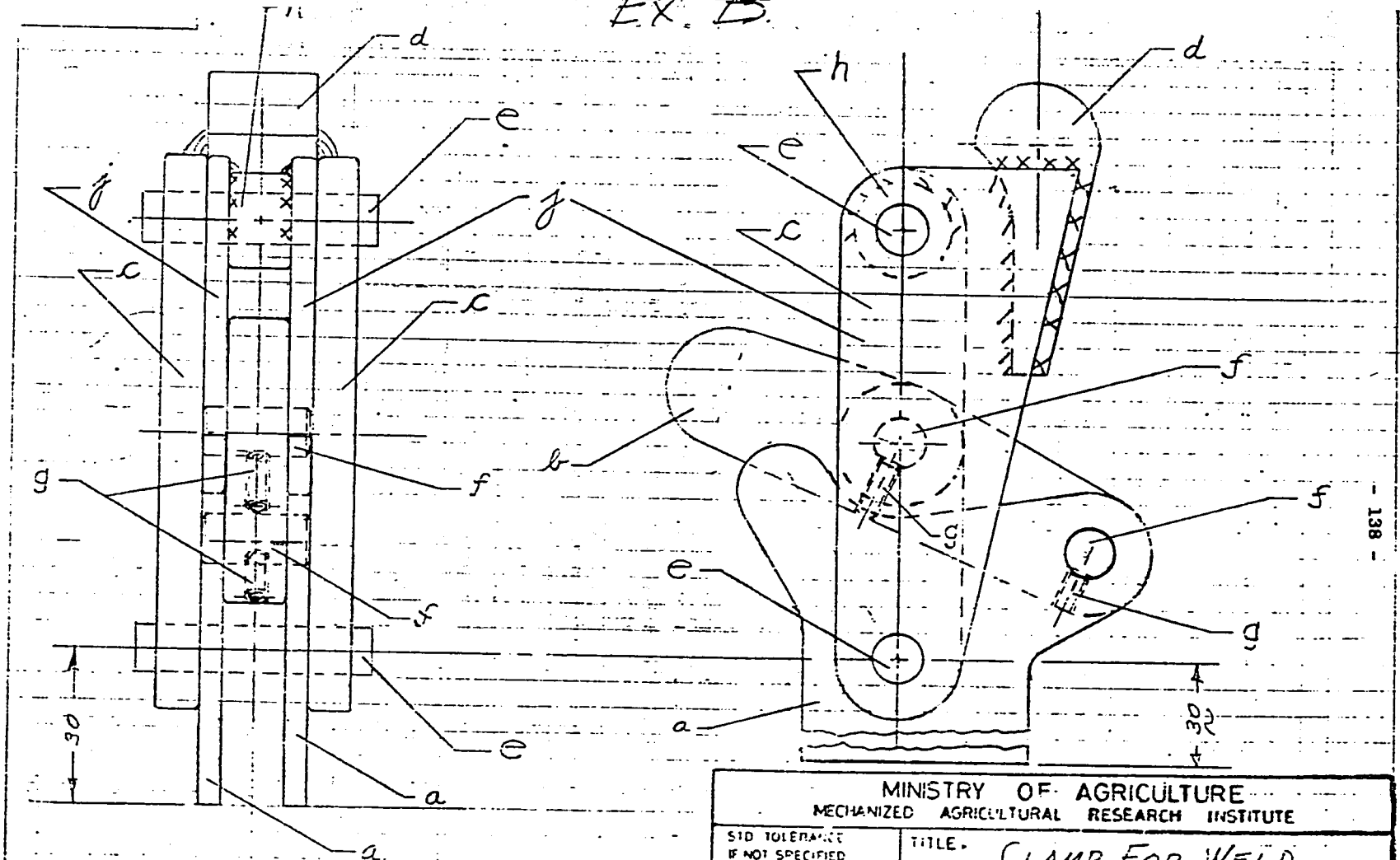
STD TOLERANCE IF NOT SPECIFIED
MILLIMETER ±0
ANGULAR ±0.5°
DRILLED HOLES +0.2 −0.1

TITLE: FAN HUB (CASTING)

BY: RKB DATE: 10-15-63 SCALE: 1/4 = 1

CHECKED: RKB 9-15-63 USED IN: 402A

EX. D.



1. DRAWING MAY BE SCALED.
2. MAT'L LOW CARBON.
3. CHECK FOR FUNCTION, DISASSEMBLE & CYANIDE HARDEN.

MINISTRY OF AGRICULTURE
MECHANIZED AGRICULTURAL RESEARCH INSTITUTE

STD TOLERANCE IF NOT SPECIFIED
MILLIMETER ±10
ANGULAR ±05
DRILLED HOLES +02 _ 01

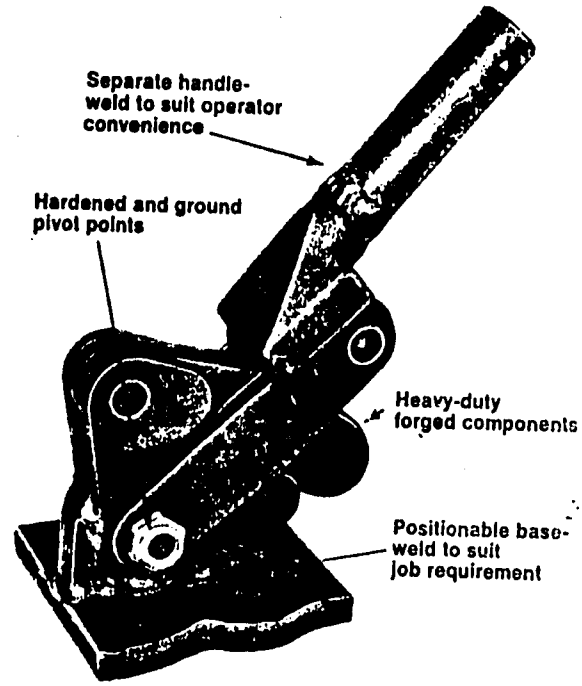
TITLE: CLAMP FOR WELD JIG ETC.

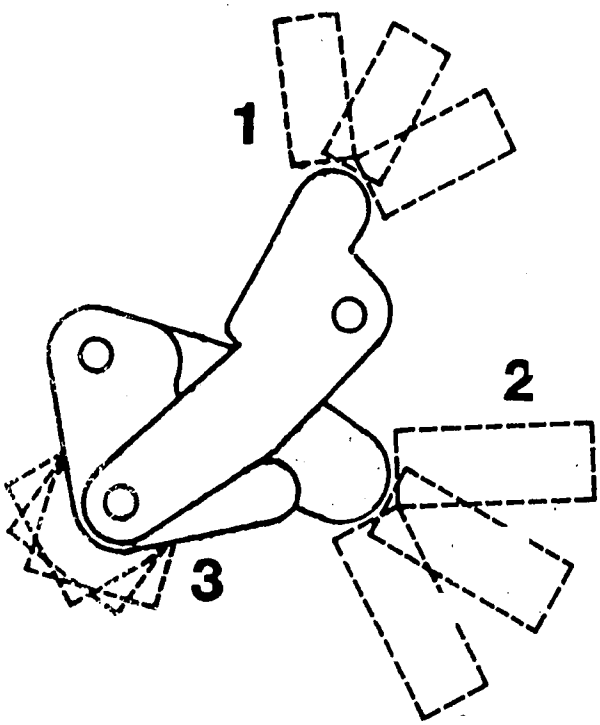
CHANGE	DATE	INITIALS			
			DWN BY:	DATE:	SCALE: FULL
			CHKD BY:		USED IN:
			CONCEP:		
			DESIGN:		DWG NO: T101
			APPR:		

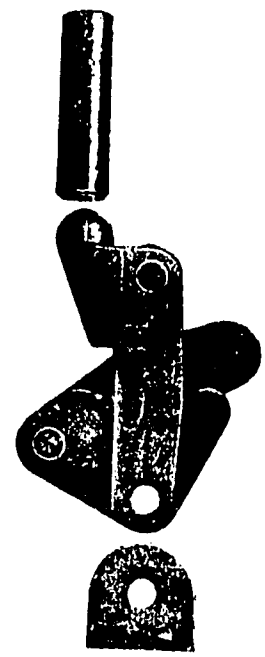
 EXD

the completely versatile Toggle Clamp

- Designed for heavy-duty and high production automotive-type applications
- Close tolerances for accurate repeatability
- Compact design
- Three sizes
- Extremely versatile — you adapt to suit application
- Opens full 210 degrees
- Guided bar feature
- Optional hold open device







1. Position the handle to suit operator and application
2. Add your own bar
3. Position the base to suit

Annex B: Egyptian/USAID Planning Committee: Mechanization Economic Analyses for Wheat, Maize, and Rice.

RICE MECHANIZATION

1). Transplanting:

Machine: IRRI designed hand operated transplanter

COST: £E 250

LABOR
COST: $\frac{\text{2 men x 8 hours}}{\text{2 Feddans}}$ x £E 0.52 per hour = £E 4.16 per feddan

Traditional
Labor Cost: 43.21 hours x 0.52 = £E 22.47 per feddan

Interest: $\left(\frac{250 + 25}{2,500}\right) .12$ = £E 0.013 per hour x 8 hours per feddan
= £E 0.01 per feddan

Depreciation: $\frac{250-25}{2,500}$ = £E 0.09 per hour x 8 hours per feddan
= £E 0.72 per feddan

Analysis

	Costs	Benefits
Interest	0.55	
Depreciation	0.72	
Labor	4.16	
Labor Cost Savings		22.47
Total	4.99	

Marginal return (financial) = 450 %

2. Harvesting

Machine: Self-propelled mower (Olympia type), four wheeled, 15 HP

COST : £E 3,000

Labor
Cost: 1.13 hours x £E 1.00 = £E 1.13

Traditional
Labor Cost : 45.97 hours x £E 0.52 = £E 23.90 per hour x 1.13
= £E 27.01 per feddan.

Energy: £E 0.06 per hour x 1.13 = £E 0.07 per feddan

Lubricants: £E 0.04 per hours x 1.13= £E 0.045 per feddan

Maintenance:£E 1.21 per hour x 1.13 = £E 1.21 per feddan

Interest: $\left(\frac{3,000 + 300}{2,000}\right) .12$ = £E 0.20 per hours x 1.13
= £E 0.226 per feddan

Depreciation: $\frac{3,000-300}{2,000}$ = £E 1.35 per hour x 1.13
= £E 1.53 per feddan

Analysis
(£E 1984/Fed.)

	Costs	Benefits
Interest	0.226	
Depreciation	1.530	
Energy	0.070 (0.58)*	
Lubricants	0.045	
Maintenance	1.210	
Labor	1.130	
Labor Cost Savings		27.01
	4.21	

Marginal Return (financial) = 642%

* Energy shadow price

3) Threshing

Machine: Staionary drum thresher- Behera- IRRI Type[6] with winnower
Cost: £E 1,500 (PTO take off from tractor)

Labor Cost: 2,200 kgs per feddan/ 750 kgs per hour x £E 0.52 = 1.53

Traditional
Labor Cost : threshing (32.40 hours x 0.52 = £E 16.85 per feddan)
winnowing (14.32 hours x 0.52 = £E 7.45 per feddan)

Interest: $\left(\frac{1,500+150}{2,000}\right)$ x .12 = £E 0.10 per hour x 2.93 hours (Thresher)
= £E 2.93 per feddan

Interest $\left(\frac{6,500+650}{4,000}\right)$ x .12= £E 0.21 per hour x 2.93 hours (Tractor)
= £E 0.62 per feddan

Depreciation: $\left(\frac{1,500-150}{2,000}\right)$ = £E 0.68 per hour x 2.93 hours (Thresher)
= £E 1.99 per feddan

Depreciation: $\left(\frac{6,500-650}{4.000}\right)$ = £E 1.46 per hour x 2.93 hours (Tractor)
= £E 4.28 per hour

Energy : £E 0.31 per hour x 2.93 hours = £E0.91 per feddan
Lubricants : £E 0.20 per hour x 2.93 hours = £E0.59 per feddan
Maintenance: £E 0.90 per hour x 2.93 hours = £E2.64 per feddan

Analysis

(£E 1984/Fed.)

	Costs	Benefits
Interest	3.55	
Depreciation	6.27	
Energy	0.91 (*7.58)	
Maintenance	2.64	
Lubricants	0.59	
Labor	1.53	
Labor Cost Savings		23.30
	15.49	23.30

Marginal Return 150% (Financial)

*Shadow Price

4) Irrigation Water Lifting

Machine: 5 to 7½ HP diesel pumping unit (Kiloskar or equivalent)
Cost : £E 1,100
Labor Cost: 35.23 hours x 0.52 per hour= £E 18.32 per feddan
Traditional
Labor Cost: 157 hours (sakia) x 0.20 per hour = £E 31.4 per feddan
Meat Recovery: £E 0.106 per hour x 157 = £E 16.64 per feddan /
Milk Recovery: £E 0.151 per hour x 157 = £E 23.71 per feddan /(Animal Labor
Calf Recovery: £E 0.04 per hour x 157 = £E 6.38 per hour /Opportunity Costs)

Interest: $\left(\frac{1,100+110}{5,000}\right)$ x .12 = 0.03 per hour x 35.23 hours= 1.06 per feddan

Depreciation $\frac{(1,100-110)}{5,000}$ = £E0.20 per hour x 35.23 = £E7.05 per feddan

Energy: £E0.0421 per hour x 35.23 = £E 1.48 per feddan
Lubricants:£E0.0554 per hour x 35.23 = 1.95 per feddan
Maintenance:£E 0.0325 per hour x 35.23=£E 1.14 per feddan

Analysis

(£E1984/Fed)

	Costs	Benefits
Interest	1.06	
Depreciation	7.05	
Energy	1.48 (*12.33)	
Lubricants	1.95	
Maintenance	1.14	
Labor	18.32	
	31.0	78.13
		78.13

Marginal Return(Financial)= 352%

*Shadow Price

WHEAT MECHANIZATION

1) Planting:

Machine: Grain Drill Galignani Model 1125 or similar(Tractor drawn)

Cost: £E 3,650

Labor Cost: 1.5 hours x 1.00 per hour= £E1.50 per feddan

Traditional
Labor Cost : 5.38 hours x 0.52= £E 2.80 per feddan

Increase in
Grain Output: 3.9 ardab x £E 10.48 = £E40.87 per feddan

Increase in
Straw Output: 1.17 tons x £E 79 = £E 92.43

Seed Recovery: 33.37 kilograms x 0.10 = £E 3.37 per feddan

Interest: $(\frac{3,650+365}{2,500})$ x .12 =£E 0.20 per hour x 1.5 hours (Drill)
=£E 0.30 per feddan

Interest: $(\frac{6,500+650}{4,000})$ x.12= £E0.21 per hour x 1.5= (Tractor)
= £E0.32 per feddan

Depreciation: $(\frac{6,500-650}{4,000})$ = £E1.46 per hour x 1.5= (Tractor)
= £E2.19 per feddan

Depreciation: $(\frac{3,650-365}{2,500})$ = £E1.31 per hour x 1.5 (Drill)
= £E1.97 per feddan

Energy: £E0.31 per hour x 1.5 =
£E0.47 per feddan

Lubricants: £E0.20 per hour x 1.5 =
£E0.30 per feddan

Maintenance: £E0.90 per hour x 1.5=
£E1.35 per hour

Analysis
(£E 1984/Fed.)

	Cost	Benefit
Interest	0.62	
Depreciation	4.16	
Energy	0.47(*3.92)	
Maintenance	1.35	
Labor	1.50	
Lubricants	0.30	
Grain		40.87
Straw		92.43
Labor Savings		2.80
	8.400	136.10

Marginal Return (Financial 1620%.

*Shadow Cost

2. Harvesting

Machine: Self-propelled mower (Olympia type), four-wheeled, 15 HP

Cost: £E 3,000

Labor Cost: 1.5 hours x £E1.00 = £E 1.50

Traditional
Labor Cost: 55.87 hours x 0.52 = £E 29.05

Energy: £E0.06 x 1.5 = £E 0.09 per feddan

Lubricants: £E0.04 per hour x 1.5 = £E0.06 per feddan

Maintenance: £E1.21 per hour x 1.5 = £E1.82 per feddan

Interest: $(\frac{3,000+300}{2,000})$ x .12= £E 0.20 x 1.5= £E0.30 per feddan

Depreciation: $(\frac{3,000-300}{2,000})$ =£E 1.35 per hour x 1.5=£E1.82 per feddan

Analysis

(£E 1984 per Fed.)

	Cost	Benefit
Interest	0.30	
Depreciation	1.82	
Energy	0.09(*0.75)	
Lubricants	0.06	
Maintenance	1.82	
Labor	1.50	
Labor Cost Savings		29.05
	5.59	29.05

Marginal Return (Financial): 529 %

*Shadow Cost

3. Threshing and Winnowing

Machine: Stationary drum thresher-Behera-IRRI Type with winnower

Cost: £E 1,500 (PTO take off from tractor)

Labor Cost: 2,510 kgs/1,000 kgs/hour = 2.51 hours x o.52
= £E 1.31 per feddan

Traditional Labor Cost : (Threshing: 19.44 hours x 0.52= £E 10.11)
(Winnowing: 19.15 hours x 0.52= £E 9.96)

Interest: $(\frac{1,500+150}{2,000})$ x .12 =£E 0.10 per hour x 2.51 = £E 2.51 per feddan (Thresher

Interest: $(\frac{6,500+650}{4,000})$ x .12= £E 0.21 per hour x 2.51 = £E 0.53 per feddan (Tractor)

Depreciation: $(\frac{6,500-650}{4,000})$ = £E 1.46 per hour x 2.51 (Tractor)
= £E 3.66 per feddan

Depreciation: $(\frac{1,500-150}{2,000})$ =£E 0.68 per hour x 2.51 hours (Thresher).
=£E 1.71 per feddan

Energy: £E 0.31 per hour x 2.51 hours= £E 0.78 per feddan.
Lubricants: £E 0.20 per hour x 2.51 hours= £E 0.5 per feddan
Mainrenance £E 0.90 per hour x hours= £E 2.23per feddan

Analysis

(£E 1984/Fed.)

	Costs	Benefits
Interest	3.04	
Depreciation	5.37	
Energy	0.78(*6.50)	
Lubricants	0.50	
Maintenance	2.23	
Labor	1.31	
Labor Costs Savings		20.07
	13.23	20.07

Marginal Return (Financial): 152 %

4) Irrigation Water Lifting

Machine: 5 to 7½ HP diesel pumping unit (Kiloskar or equivalent)
Cost: £E 1,100
Labor Cost: 5.95 hours x £E 0.52 per hour = £E 3.09 per feddan

Traditional
Labor Cost: 26.50 hours x 0.20 per hour = £E 5.30 per feddan

Meat Recovery: £E 0.106 per hour x 26.50 =£E 2.81 per feddan / Animal Labor
Milk Recovery: £E 0.151 per hour x 26.50 =£E 4.00 per hour / Opportunity
Calf Reovery: £E 0.04 per hour x 26.50 = £E 1.06 per feddan / Costs

Interest: $(\frac{1,100+110}{5,000})$ x .12 = £E 0.03 per hour x 5.95 = £E0.18 per hour

Depreciation: $(\frac{1,100-110}{5,000})$ =£E 0.20 per hour x 1.19 per feddan

Energy: £E 0.0421 per hour x 5.95 = £E 0.25 per feddan

Lubricants: £E 0.0554 per hour x 5.95 = £E 0.33 per feddan

Maintenance:£E0.0325 per hour x 5.95 =£E 0.19 per feddan

Analysis

	Costs	Benefits
Interest	0.18	
Depreciation	1.19	
Energy	0.25(*2.08)	
Lubricants	0.33	
Maintenance	0.19	
Labor	3.09	
Labor Costs Savings		5.00
Animal Product Recovery		7.87
	5.23	13.17

Marginal Return (Financial): 252 %

TABLE----

SUMMARY FINANCIAL AND ECONOMIC RETURNS FOR ALL CROPS: WITH AND WITHOUT SMALL SCALE MECHANIZATION (PER FEDDAN)

	FINANCIAL			ECONOMIC		
	INCREMNETAL COSTS (LE)	INCREMENTAL BENEFITS (LE)	RATE OF RETURN	INCREMENTAL COSTS (LE)	INCREMENTAL BENEFITS (LE)	RATE OF RETURN
WHEAT						
WITHOUT SMALL SCALE MECHANIZATION	55.92	76.50	0.37	85.87	127.83	0.49
WITH SMALL SCALE MECHANIZATION	7.92	243.78	29.78	50.31	314.79	5.25
MAIZE						
WITHOUT SMALL SCALE MECHANIZATION	55.31	90.69	0.64	89.14	125.86	0.41
WITH SMALL SCALE MECHANIZATION	14.87	108.09	6.27	50.68	139.52	1.75
RICE						
WITHOUT SMALL SCALE MECHANIZATION	-10.34	166.56	(1)	1.10	311.34	283.07
WITH SMALL SCALE MECHANIZATION	-90.99	208.56	(1)	-77.29	344.31	(1)

NOTE: INCREMENTAL COSTS AND BENEFITS WITHOUT SMALL SCALE MECHANIZATION ARE DRAWN DIRECTLY FROM ACCOMPANYING TABLES, "FARM LEVEL ANALYSIS" FOR WHEAT, MAIZE AND RICE.
INCREMENTAL COSTS WITH SMALL SCALE MECHANIZATION ARE COMPUTED BY ADDING INCREASED COSTS AND SUBTRACTING REDUCED COSTS COMPUTED IN ACCOMPANYING TABLES "FARM LEVEL INCREMENTAL ANALYSIS OF SMALL MECHANIZATION".
INCREMENTAL BENEFITS ARE COMPUTED BY ADDING INCREASED BENEFITS COMPUTED IN THE SAME TABLES.
RATE OF RETURN TO FARM RESOURCES ENGAGED IS INCREMENTAL BENEFIT DIVIDED BY INCREMENTAL COST.

(1) NOT APPLICABLE, AS INCREMENTAL COST IS NEGATIVE.

TABLE 1
FARM LEVEL ANALYSIS: WHEAT
(PER FEDDAN)

	UNIT	VALUE PER UNIT (LE)	WITHOUT PROJECT NUMBER OF UNITS	WITHOUT PROJECT INCOME OR COST (LE)	WITH PROJECT NUMBER OF UNITS	WITH PROJECT INCOME OR COST (LE)	INCREMENTAL FINANCIAL BENEFIT OR COST (LE)	INCREMENTAL ECONOMIC BENEFIT OR COST (LE)
INCOME								
GRAIN	MT	82.30	1.51	140.98	2.50	233.25	92.27	155.46
STRAW	MT	87.00	2.25	200.25	2.70	240.30	40.05	33.04
TOTAL INCOME				341.13		473.55	132.42	218.49
COSTS								
LAND PREPARATION								
LEVELING	TRACT. HOUR	3.00	0.00	0.00	3.00	9.00	9.00	20.07
PLOWING	TRACT. HOUR	3.00	3.00	9.00	4.00	12.00	3.00	3.00
LABOR	MHE	0.40	4.50	1.80	5.50	2.20	0.40	0.40
PLANTING								
SEED	KG	0.09	70.00	6.30	84.00	15.12	8.82	15.44
LABOR	MHE	0.40	5.50	2.20	5.50	2.20	0.00	0.00
IRRIGATION								
LIFTING	SAKIA HOUR	0.50	27.00	13.50	35.00	17.50	4.00	4.00
LABOR	MHE	0.40	25.00	10.00	35.00	14.00	4.00	4.00
FERTILIZATION								
UREA (47%)	KG	0.13	100.00	13.00	150.00	19.50	6.50	10.20
FOOS	KG	0.04	0.00	0.00	15.00	0.60	0.60	0.24
LABOR	MHE	0.40	1.50	0.60	2.00	0.80	0.20	0.20
WEED CONTROL								
HERBICIDE	LITRE	5.00	0.00	0.00	1.00	5.00	5.00	10.00
LABOR	MHE	0.40	0.00	0.00	3.00	1.20	1.20	1.20
SPRAYER	HOUR	0.50	0.00	0.00	3.00	1.50	1.50	1.50
PEST CONTROL								
INSECTISIDE	LITRE	3.00	0.00	0.00	1.00	3.00	3.00	6.00
LABOR	MHE	0.40	0.00	0.00	3.00	1.20	1.20	1.20
SPRAYER	HOUR	0.50	0.00	0.00	3.00	1.50	1.50	1.50
HARVEST (INC. THRESH.)								
LABOR	MHE	0.40	95.00	38.00	110.00	44.00	6.00	6.00
TOTAL COSTS (LE)				94.40		150.32	55.92	85.87
FARM NET BENEFITS				246.73		323.23	76.50	132.62
RATE OF RETURN TO FARM RESOURCES ENGAGED							0.37	0.39

NOTE: MHE= MAN HOUR EQUIVALENT= 2 WOMEN/CHILD HOURS. COST OF IMPROVED SEED WITH PROJECT IS LE 0.18 /KG. INCREMENTAL ECONOMIC BENEFITS OR COSTS COMPUTED BY MULTIPLYING INCREMENTAL FINANCIAL BENEFITS OR COSTS BY ACCOUNTING RATIOS IN ACCOMPANYING TABLE, "FACTORS USED TO CONVERT FINANCIAL TO ECONOMIC VALUES". RATE OF RETURN IS THE INCREMENTAL NET BENEFIT DIVIDED BY INCREMENTAL NET COST. BASED UPON DATA FROM FMCIP, EWUP AND MECHANIZATION PROJECTS.

TABLE ---

FARM LEVEL INCREMENTAL ANALYSIS OF SMALL SCALE MECHANIZATION: WHEAT
(PER FEDDAN)

	UNIT	VALUE PER UNIT (LE)	NUMBER OF UNITS	FINANCIAL INCREASED COSTS (LE)	FINANCIAL REDUCED COSTS (LE)	FINANCIAL INCREASED BENEFITS (LE)	ECONOMIC INCREASED COSTS (LE)	ECONOMIC REDUCED COSTS (LE)	ECONOMIC INCREASED BENEFITS (LE)
SEED DRILL, TRACTOR DRAWN									
LABOR (BY HAND)	MHE	0.40	5.00	0.00	2.00	0.00	0.00	2.00	0.00
LABOR (BY SEED DRILL)	MHE	0.40	1.50	0.60	0.00	0.00	0.60	0.00	0.00
NET YIELD INCREASE (GRAIN)	KG	0.09	585.00	0.00	0.00	52.65	0.00	0.00	105.83
NET YIELD INCREASE (STRAW)	MT	89.00	1.17	0.00	0.00	104.13	0.00	0.00	72.89
NET SEED RECOVERY	KG	0.18	33.37	0.00	6.01	0.00	0.00	10.51	0.00
DEPRECIATION (DRILL)	HOUR	1.31	1.50	1.97	0.0	0.00	1.97	0.00	0.00
INTEREST (DRILL)	HOUR	0.20	1.50	0.30	0.0	0.00	0.00	0.00	0.00
TRACTOR	TRACT.HOUR	3.00	1.50	4.50	0.0	0.00	10.04	0.00	0.00
SUB-TOTAL				7.37	8.01	156.78	12.60	12.51	178.72
SELF PROPELLED MOWER, 4 WHEELS, 15 HP(OLYMPIA TYPE)									
LABOR (MOWER)	MHE	0.40	56.00	0.00	22.40	0.00	0.00	22.40	0.00
LABOR (BY HAND)	MHE	0.40	1.50	0.60	0.00	0.00	0.60	0.00	0.00
DEPRECIATION	HOUR	1.35	1.50	2.03	0.00	0.00	2.03	0.00	0.00
INTEREST	HOUR	0.12	1.50	0.18	0.00	0.00	0.00	0.00	0.00
ENERGY	HOUR	0.06	1.50	0.09	0.00	0.00	0.63	0.00	0.00
LUBRICANTS	HOUR	0.04	1.50	0.06	0.00	0.00	0.18	0.00	0.00
MAINTENANCE	HOUR	1.21	1.50	1.82	0.00	0.00	1.82	0.00	0.00
SUB-TOTAL				4.77	22.40	0.00	5.25	22.40	0.00
STATIONARY DRUM THRESHER, IRRI TYPE WITH WINNOWER(TRACTOR-POWERD)									
LABOR (BY HAND)	MHE	0.40	38.60	0.00	15.44	0.00	0.00	15.44	0.00
LABOR (DRUM)	MHE	0.40	2.51	1.00	0.00	0.00	1.00	0.00	0.00
DEPRECIATION	HOUR	1.46	2.51	3.66	0.00	0.00	3.66	0.00	0.00
INTEREST	HOUR	0.10	2.51	0.25	0.00	0.00	0.00	0.00	0.00
TRACTOR	TRACT.HOUR	3.08	2.51	7.73	0.00	0.00	17.23	0.00	0.00
SUB-TOTAL				12.65	15.44	0.00	21.91	15.44	0.00
IRRIGATION WATER PUMP, 5-7 HP DIESEL									
ANIMAL LIFTING	SAKIA HOUR	0.50	35.00	0.00	17.50	0.00	0.00	17.50	0.00
LABOR (BY HAND)	MHE	0.40	35.00	0.00	14.00	0.00	0.00	14.00	0.00
LABOR (PUMP)	HOUR	0.40	6.00	2.40	0.00	0.00	2.40	0.00	0.00
MEAT RECOVERY	HOUR	0.11	35.00	0.00	0.00	3.85	0.00	0.00	3.27
MILK RECOVERY	HOUR	0.15	35.00	0.00	0.00	5.25	0.00	0.00	3.78
CALF RECOVERY	HOUR	0.04	35.00	0.00	0.00	1.40	0.00	0.00	1.19
DEPRECIATION	HOUR	0.20	6.00	1.20	0.00	0.00	1.20	0.00	0.00
INTEREST	HOUR	0.03	6.00	0.18	0.00	0.00	0.00	0.00	0.00
ENERGY	HOUR	0.04	6.00	0.24	0.00	0.00	1.68	0.00	0.00
LUBRICANTS	HOUR	0.06	6.00	0.36	0.00	0.00	1.08	0.00	0.00
MAINTENANCE	HOUR	0.03	6.00	0.18	0.00	0.00	0.18	0.00	0.00
SUB-TOTAL				4.56	31.50	10.50	6.54	31.50	8.24
GRAND TOTAL				29.35	77.35	167.28	46.30	81.85	186.96

TABLE 3
FARM LEVEL ANALYSIS: MAIZE
(PER FEDDAN)

	UNIT	VALUE PER UNIT (LE)	WITHOUT PROJECT NUMBER OF UNITS	WITHOUT PROJECT INCOME OR COST (LE)	WITH PROJECT NUMBER OF UNITS	WITH PROJECT INCOME OR COST (LE)	INCREMENTAL FINANCIAL BENEFIT OR COST (LE)	INCREMENTAL ECONOMIC BENEFIT COST (LE)
INCOME								
GRAIN	MT	100.00	1.82	182.00	3.20	320.00	138.00	207.[illegible]
STOVER	MT	10.00	1.80	18.00	2.60	26.00	8.00	8.[illegible]
TOTAL INCOME				200.00		346.00	146.00	21[illegible]
COSTS								
LAND PREPARATION								
LEVELING	TRACT. HOUR	3.00	0.00	0.00	1.80	5.40	5.40	12.[illegible]
PLOWING	TRACT. HOUR	2.00	3.00	6.00	4.00	8.00	2.00	2.[illegible]
LABOR	MHE	0.40	3.00	1.20	4.80	1.92	0.72	0.7[illegible]
PLANTING								
SEED	KG	0.09	30.00	2.70	60.00	12.00	9.30	16.2[illegible]
LABOR	MHE	0.40	1.00	0.40	1.10	0.44	0.04	0.0[illegible]
IRRIGATION								
LIFTING	SAKIA HOUR	0.50	~~58.00~~ 29.00	29.00	58.00	29.00	0.00	0.0[illegible]
LABOR	MHE	0.40	~~40.00~~ 36	16.00	40.00	16.00	0.00	0.0[illegible]
FERTILIZATION								
UREA(47%)	KG	0.13	150.00	19.50	225.00	29.25	9.75	15.6[illegible]
P2O5	KG	0.04	15.00	0.60	30.00	1.20	0.60	0.9[illegible]
LABOR	MHE	0.40	1.00	0.40	2.00	0.80	0.40	0.4[illegible]
WEED CONTROL								
HERBICIDE	LITRE	8.00	0.00	0.00	1.00	8.00	8.00	16.0[illegible]
LABOR	MHE	0.40	0.00	0.00	3.00	1.20	1.20	1.2[illegible]
SPRAYER	HOUR	0.50	0.00	0.00	0.00	0.00	0.00	0.0[illegible]
PEST CONTROL								
INSECTICIDES	LITRE	3.00	0.00	0.00	2.00	6.00	6.00	12.0[illegible]
LABOR	MHE	0.40	0.00	0.00	3.00	1.20	1.20	1.2[illegible]
SPRAYER	HOUR	0.50	0.00	0.00	3.00	1.50	1.50	1.5[illegible]
HARVEST								
LABOR	MHE	0.40	46.00	18.40	69.00	27.60	9.20	9.2[illegible]
TOTAL COSTS (LE)				94.20		149.51	55.31	99.1[illegible]
FARM NET BENEFITS				105.80		196.49	90.69	125.9[illegible]
RATE OF RETURN TO FARM RESOURCES ENGAGED							0.64	0.41

NOTE: COST OF IMPROVED SEED WITH PROJECT IS LE 0.20/KG. SEE ADDITIONAL NOTES TO ACCOMPANYING TABLE, "FARM LEVEL ANALYSIS: RICE ". BASED UPON DATA FROM EMCIP. EWUP AND MECHANIZATION PROJECTS.

TABLE ---
FARM LEVEL INCREMENTAL ANALYSIS OF SMALL SCALE MECHANIZATION: MAIZE
(PER FEDDAN)

				FINANCIAL			ECONOMIC		
	UNIT	VALUE PER UNIT (LE)	NUMBER OF UNITS	INCREASED COSTS (LE)	REDUCED COSTS (LE)	INCREASED BENEFITS (LE)	INCREASED COSTS (LE)	REDUCED COSTS (LE)	INCREASED BENEFITS (LE)
IRRIGATION WATER PUMP, 5-7 HP DIESEL									
ANIMAL LIFTING	SAKIA HOUR	0.50	58.00	0.00	29.00	0.00	0.00	29.00	0.00
LABOR (BY HAND)	MHE	0.40	40.00	0.00	16.00	0.00	0.00	16.00	0.00
LABOR (PUMP)	HOUR	0.40	6.00	2.40	0.00	0.00	2.40	0.00	0.00
MEAT RECOVERY	HOUR	0.11	58.00	0.00	0.00	6.38	0.00	0.00	5.42
MILK RECOVERY	HOUR	0.15	58.00	0.00	0.00	8.70	0.00	0.00	6.26
CALF RECOVERY	HOUR	0.04	58.00	0.00	0.00	2.32	0.00	0.00	1.97
DEPRECIATION	HOUR	0.20	6.00	1.20	0.00	0.00	1.20	0.00	0.00
INTEREST	HOUR	0.03	6.00	0.18	0.00	0.00	0.00	0.00	0.00
ENERGY	HOUR	0.04	6.00	0.24	0.00	0.00	1.68	0.00	0.00
LUBRICANTS	HOUR	0.06	6.00	0.36	0.00	0.00	1.08	0.00	0.00
MAINTENANCE	HOUR	0.03	6.00	0.18	0.00	0.00	0.18	0.00	0.00
TOTAL				4.56	45.00	17.40	6.54	45.00	17.44

TABLE 2
FARM LEVEL ANALYSIS: RICE
(PER FEDDAN)

	UNIT	VALUE PER UNIT (LE)	WITHOUT PROJECT NUMBER OF UNITS	WITHOUT PROJECT INCOME OR COST (LE)	WITH PROJECT NUMBER OF UNITS	WITH PROJECT INCOME OR COST (LE)	INCREMENTAL FINANCIAL BENEFIT OR COST (LE)	INCREMEN ECONOMIC BENEFIT COST (LE)
INCOME								
GRAIN (FREE MARKET)		146.00	0.93	135.78	2.00	292.00	156.22	312.
(QUOTA)	MT	105.00	1.50	157.50	1.50	157.50	0.00	0.
STRAW	MT	24.00	3.00	72.00	3.00	72.00	0.00	0.
TOTAL INCOME				365.28		521.50	156.22	312.
COSTS								
LAND PREPARATION								
PLOWING	TRACT. HOUR	3.00	1.40	4.20	2.00	6.00	1.80	1.
PUDDLER	HOUR	1.50	2.80	4.20	2.80	4.20	0.00	0.
LABOR	MHE	0.40	10.00	4.00	10.00	4.00	0.00	0.
PLANTING								
SEED	KG	0.15	60.00	9.00	50.00	15.00	6.00	10.
LABOR	MHE	0.40	43.00	17.20	43.00	17.20	0.00	0.
IRRIGATION								
LIFTING	SAKIA HOUR	0.50	156.00	78.00	140.00	70.00	-8.00	-8.
LABOR	MHE	0.40	140.00	56.00	80.00	32.00	-24.00	-24.
FERTILIZATION								
P2O5	KG	0.04	100.00	4.00	1.50	0.06	-3.94	-6.
UREA (47)	KG	0.13	100.00	13.00	50.00	6.50	-6.50	-10.
ZNSO4	KG	4.00	0.00	0.00	2.50	10.00	10.00	10.
LABOR	MHE	0.40	4.00	1.60	2.00	0.80	-0.80	-0.
WEED CONTROL								
HERBICIDE	LITRE	6.00	0.00	0.00	2.20	13.20	13.20	26.
LABOR	MHE	0.40	25.00	10.00	3.00	1.20	-8.80	-8.
SPRAYER	HOUR	0.50	0.00	0.00	3.00	1.50	1.50	1.
HARVEST								
LABOR	MHE	0.40	58.00	23.20	81.00	32.40	9.20	9.
TOTAL COSTS (LE)				224.40		214.06	-10.34	1.
FARM NET BENEFIT				140.88		307.44*	166.56	311.
RATE OF RETURN TO FARM RESOURCES ENGAGED							(1)	283.

(1) NOT APPLICABLE, AS INCREMENTAL COST IS NEGATIVE.

NOTE: COST OF IMPROVED SEED WITH PROJECT IS LE 0.30/KG. SEE ADDITIONAL NOTES TO ACCOMPANYING TABLE, "FARM LEVEL ANALYSIS: WHEAT". BASED UPON DATA FROM RTT, EWRP AND MECHANIZATION PROJECTS.

TABLE ---

FARM LEVEL INCREMENTAL ANALYSIS OF SMALL SCALE MECHANIZATION: RICE
(PER FEDDAN)

				FINANCIAL			ECONOMIC		
	UNIT	VALUE PER UNIT (LE)	NUMBER OF UNITS	INCREASED COSTS (LE)	REDUCED COSTS (LE)	INCREASED BENEFITS (LE)	INCREASED COSTS (LE)	REDUCED COSTS (LE)	INCREASED BENEFITS (LE)
HAND-OPERATED TRANSPLANTER, IRRI-TYPE									
LABOR (BY HAND)	MHE	0.40	43.00	0.00	17.20	0.00	0.00	17.20	0.00
LABOR (TRANSPLANTER)	MHE	0.40	8.00	3.20	0.00	0.00	3.20	0.00	0.00
DEPRECIATION	HOUR	0.09	8.00	0.72	0.00	0.00	0.72	0.00	0.00
INTEREST	HOUR	0.01	8.00	0.08	0.00	0.00	0.00	0.00	0.00
SUB-TOTAL				4.00	17.20	0.00	3.92	17.20	0.00
SELF-PROPELLED MOWER, 4 WHEELS, 15 HP(OLYMPIA-TYPE)									
LABOR (BY HAND)	MHE	0.40	46.00	0.00	18.40	0.00	0.00	18.40	0.00
LABOR (MOWER)	MHE	0.40	1.13	0.45	0.00	0.00	0.45	0.00	0.00
DEPRECIATION	HOUR	1.35	1.13	1.53	0.00	0.00	1.53	0.00	0.00
INTEREST	HOUR	0.12	1.13	0.14	0.00	0.00	0.00	0.00	0.00
ENERGY	HOUR	0.06	1.13	0.07	0.00	0.00	0.47	0.00	0.00
LUBRICANTS	HOUR	0.04	1.13	0.05	0.00	0.00	0.14	0.00	0.00
MAINTENANCE	HOUR	1.21	1.13	1.37	0.00	0.00	1.37	0.00	0.00
SUB-TOTAL				3.59	18.40	0.00	3.96	18.40	0.00
STATIONARY DRUM THRESHER, IRRI-TYPE WITH WINNOWER (TRACTOR POWERED)									
LABOR (BY HAND)	MHE	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LABOR (DRUM)	MHE	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DEPRECIATION (DRUM)	HOUR	1.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INTEREST (DRUM)	HOUR	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TRACTOR	TRACT.HOUR	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUB-TOTAL				0.00	0.00	0.00	0.00	0.00	0.00
IRRIGATION WATER PUMP, 5-7 HP DIESEL									
ANIMAL LIFTING	SAKIA HOUR	0.50	140.00 -157	0.00	70.00	0.00	0.00	70.00	0.00
LABOR (BY HAND)	MHE	0.40	80.00 80	0.00	32.00	0.00	0.00	32.00	0.00
LABOR (PUMP)	HOUR	0.40	118.00 118.23	47.20	0.00	0.00	47.20	0.00	0.00
MEAT RECOVERY	HOUR	0.11	140.00	0.00	0.00	15.40	0.00	0.00	13.09
MILK RECOVERY	HOUR	0.15	140.00	0.00	0.00	21.00	0.00	0.00	15.12
CALF RECOVERY	HOUR	0.04	140.00	0.00	0.00	5.60	0.00	0.00	4.76
DEPRECIATION	HOUR	0.20	6.00	1.20	0.00	0.00	1.20	0.00	0.00
INTEREST	HOUR	0.03	6.00	0.18	0.00	0.00	0.00	0.00	0.00
ENERGY	HOUR	0.04	6.00	0.24	0.00	0.00	1.68	0.00	0.00
LUBRICANTS	HOUR	0.06	6.00	0.36	0.00	0.00	1.08	0.00	0.00
MAINTENANCE	HOUR	0.03	6.00	0.18	0.00	0.00	0.18	0.00	0.00
SUB-TOTAL				49.36	102.00	42.00	51.34	102.00	32.97
GRAND TOTAL				56.95	137.60	42.00	59.22	137.60	32.97

TABLE 4

FACTORS USED TO CONVERT FINANCIAL TO ECONOMIC VALUES

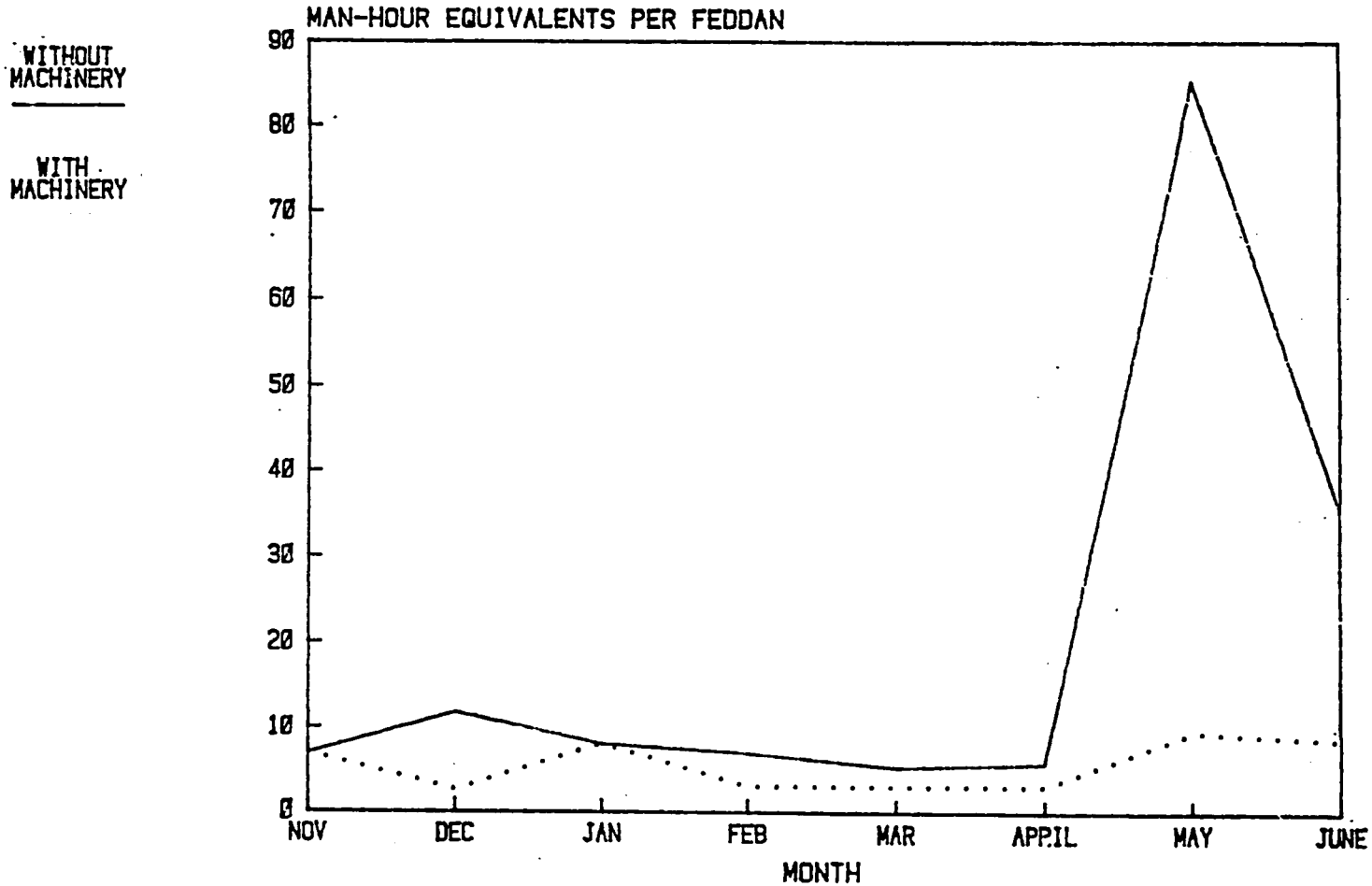
ITEM	CONVERSION FACTOR	
WHEAT	2.01	
MAIZE	1.50	
RICE (FREE MARKET)	2.00	
RICE (QUOTA)	2.78	
WHEAT STRAW	0.70	(1)
TRACTOR HOUR	2.23	(2)
SEED	1.75	
HERBICIDE	2.00	
PESTICIDES	2.00	
BULK FERTILIZER	1.60	
ENERGY (FUEL)	7.00	
LUBRICANTS	3.00	
INTEREST	0.00	
MILK	0.72	0.50
MEAT/CALF	0.85	

UNLESS OTHERWISE INDICATED, BASED UPON:
IBRD, ISSUES OF TRADE STRATEGY AND INVESTMENT PLANNING, JANUARY, 1983; IMF, INTERNATIONAL FINANCIAL STATISTICS, APRIL, 1984; AND IBRD, PRICE PROSPECTS FOR MAJOR COMMODITIES, JULY, 1982.

(1) USAID STAFF ESTIMATE.

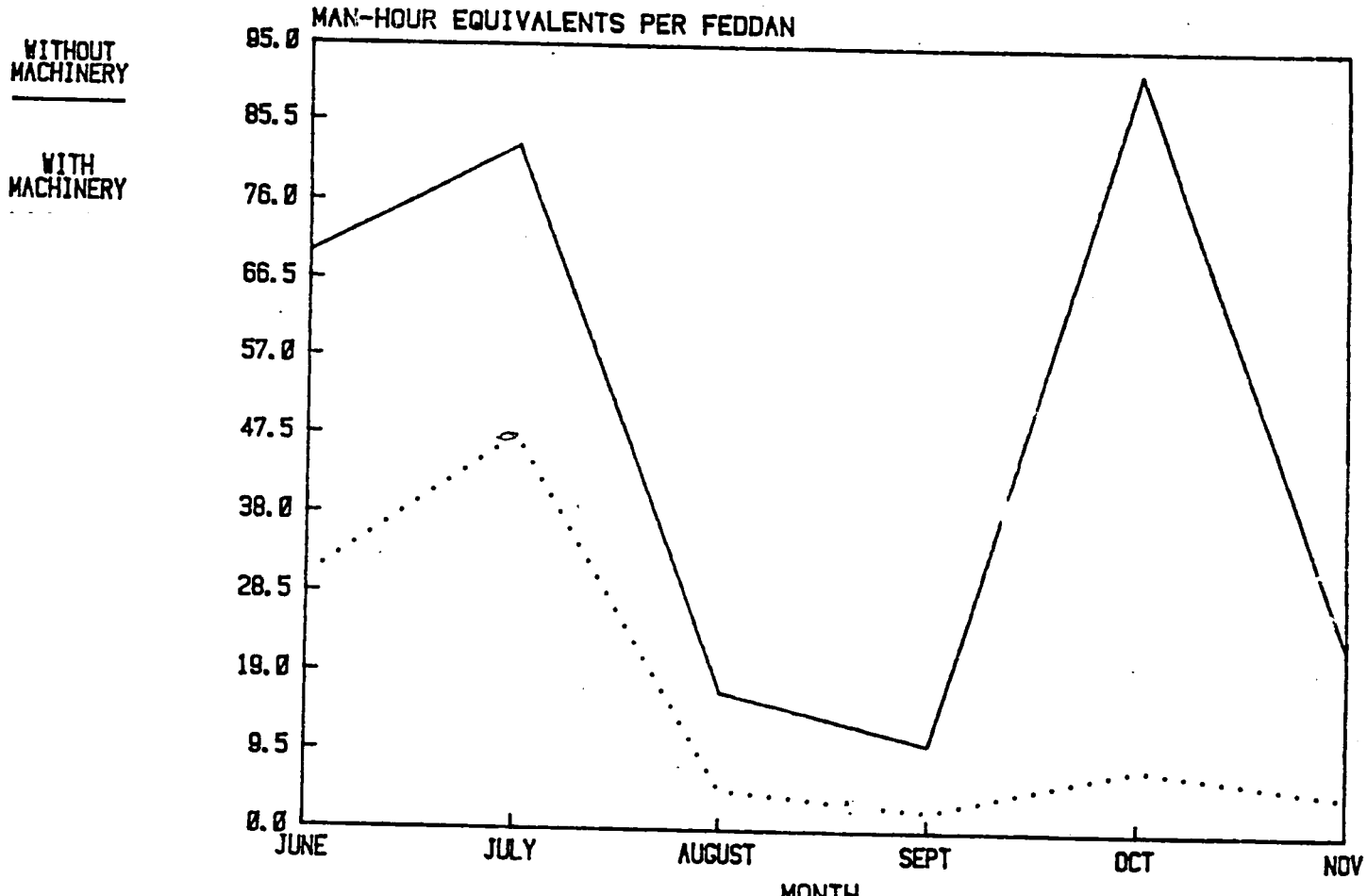
(2) AGRICULTURAL MECHANIZATION PROJECT PLANNING AND ANALYSIS UNIT.

WHEAT MONTHLY LABOR DISTRIBUTION



RICE MONTHLY LABOR DISTRIBUTION

MAN-HOUR EQUIVALENTS PER FEDDAN



Annex C: Perspectives on Agricultural Mechanization in Egypt.

FOOD AND AGRICULTURE IN EGYPT

From Development Strategies to Implementation

May 1 - 4, 1984

Cairo Marriot Hotel

PERSPECTIVES ON AGRICULTURAL MECHANIZATION IN EGYPT

by

Dr. Ahmad F.El Sahrigi
Mr. Steven C. Shepley
May 1,1984

PERSPECTIVES ON AGRICULTURAL MECHANIZATION IN EGYPT

1. Critical Factors and the Need for Farm Mechanization

There are three critical factors related to the agricultu production environment in Egypt which have made farm mechaniza tion not only desireable but mandatory.

A. Labor Productivity and Cost

During the past decade, there has been a steady outflow of labor from the rural sector, particularily an outflow of adult males. This migratory trend has been instigated, in part, by rapid escalation of the real consumer price index for rural areas relative to lower prices increases in the urban centers. Another factor influencing the emigration rate has been the growth of higher paying employment opportunities in the non-agricultural sectors and in neighboring oil exporting countries of the Persian Gulf.

Labor emigration has created shortages and upward pressure on wages during critical periods of the agricultural season which occur in May and during the fall months of September, October and November.

Seasonal labor shortages and high input cost has reduced farm income through increased costs of production in a labor intensive farming system and field losses from inadequate labor input levels.

B. Escalating Opportunity Costs of Animal Labor

High population growth rates and relatively static domestic production of animal products have accelerated inflationary price trends for meat and milk in the domestic market. The result of the changes in supply/demand and prices for animal outputs is that opportunity costs of animal labor, represented by forfeited production of meat and milk, have made animal draft, the traditional power source on Egyptian farms, unprofitable. The trends showing relative changes in input power costs are summarized in the following table.

Table 1

Relative Cost Shares of Human Labor, Animal Power and Mechanical Energy in Egyptian Agricultural Production 1960-1982
(As Percent of Total Costs)

Year	Human Labor (HL)	Animal Labor (AL)	Machine Labor (ML)	Ratio AL:HL	Ratio AL:ML	Ratio ML:HL
1960	23	23	0	1.00	0	0
1970	34	17	6	0.50	2.83	0.18
1977	35	9	23	0.26	0.39	0.66
1979	36	10	22	0.28	0.45	0.61
1982	38	8	27	0.24	0.30	0.71

Source: Computed from Ministry of Agricultural Data

As the relative cost of human and animal labor accelerates, financial incentives favoring mechanization have increased.

C. Low Output Growth of Major Crops

During the decate of the 1970's, output of major cereal and fiber crops has been relatively stagnant. Low rates of output growth are attributed to a number of internal and external factors related to biological as well as on-farm cultivation practices. Packages of biological inputs have been developed through various research efforts. Proven mechanical inputs are urgently needed to enhance the delivery efficiency of these yield increasing biological packages and to improve on-farm management efficiency of farming operations.

2. Categories of Mechanization Benefits

Mechanization benefits have been found to occur in the following categories.

A. Agronomic

Yields are increased through improved tillage and cultivation practices, including technological optimization of plowing and seedbed preparation, mechanized planting and cultivation, and soil improvement.

B. Cropping Calendar Optimization

Research conducted in Egypt and elsewhere had indicated significant increases in crop yields through timely planting and harvesting. Planting at the "correct" time permits plant growth stages to proceed in concert with optimal climatic conditions. Harvesting at the "correct" time reduces losses through crop recovery at optimal moisture content, reducing shattering incidence. Mechanization of labor intensive operations can reduce the time required for both harvesting and seedbed preparation for the subsequent crop, permitting the farmer to take advantage of seasonal periods that are most conducive to plant flowering, growth and improved yields. Shortening the farming operation will also affect cropping intensities (ratio of cropping area to cultivated area) by increasing the number of crops grown in an agricultural cycle.

C. Animal Product Loss Recovery

It has been demonstrated through farm management surveys that draft animals consume more feed and produce less milk and meat than livestock not used for draft purposes. Increased mechanization will remove animals from plows and irrigation devices thereby generating increased output for home consumption and the domestic market.

D. Farm Labor Productivity Enhancement

Productivity enhancement will increase output per worker-hour, reduce on-farm labor costs, and recover production losses caused by labor shortages during peak periods.

3. Current State of Agricultural Mechanization in Egypt

During the past 10 years, Egyptian farmers have come to appreciate some of the benefits of mechanization as shown through their willingness to adopt appropriate technologies introduced and provided through extension efforts and private sector services. At present, the level of mechanization is partial. Most of the advances in mechanized agriculture have been mainly restricted to selected operations related to seedbed preparation, irrigation water lifting, threshing, farm-to-market and pest control. Table 2, following, summarizes mechanization levels by category of input.

Table 2

Current Mechanization Levels in Egyptian Agriculture (Units per 1,000 acres)

Type	Incidence	Units
Tractors	7.30	Machines
Plows	6.80	Machines
Sprayers	2.40	Machines
Threshers	1.50	Machines
Irrigation Pumps	163.90	Horsepower

Source: Egypt 5 Year Mechanization Plan

4. National Goals and Objectives

Through the on-going Egypt Agricultural Mechanization Project, the Ministry of Agriculture has formulated an agricultural systems development approach to solving on-farm production problems related to labor shortages, high animal opportunity costs and technological requirements to enhance productivity.

The systems approach is focused on quantifying and evaluating the interaction of technological and biological alternatives used in the production environment. In this multi-faceted analysis, positive, as well as negative, effects are examined in the light of sociological constraints and traditional farmer patterns of scarce resource allocation for income maximization and risk aversion.

The analysis of alternative machinery inputs to solve production problems is designed to determine the feasibility of technological applications from both the mechanical and economic perspectives, to identify sociological constraints to adoption and to make modifications as required until appropriate machinery input systems are identified which stand the tests of environmental, cultural and economic feasibility. This is an iterative process to identify methods which are: (1) techologically suitable under Egyptian environmental conditions; (2) financially and economically feasible with sufficient returns to investment to induce farmer adoption and are (3) consistent with prevailing cultural patterns and practices.

The ultimate goal of the Mechanization Project is to examine and evaluate alternative approaches to mechanization development in 23 randomly selected villages in lower and upper Egypt. From empirical data developed through the Project's experience

in the 23 villages, policy recommendations for long range mechanization strategies and programs are being formulated for consideration by senior decision makers. The Project is being implemented through an integrated set of activities centered around research and machinery prototype development, planning and evaluation, and comprehensive field extension and demonstrations. Supporting these operational arms of the Project, are farmer oriented credit programs to provide the financial means for acquisition of technological inputs that have been successfully developed, tested and extended. The planning and operational framework is schematized in Figure 1.

Upon completion of this pilot effort, the second phase of the government's efforts to promote further mechanization of Egyptian agriculture shall entail replicating the Project pilot programs in an area of some 500,000 acres during the coming 5 year period. This area shall be subdivided into discrete mechanization zones of 5,000 feddans each.

The Mechanization Plan provides an official assessment of mechanization extension requirements and addresses all anticipated needs for capital investments, support facilities, credit funds, maintenance and repair infrastructure, personnel requirements, operating costs and training installations. As such, the Plan is an integrated package of requirements designed to initiate comprehensive mechanization of agriculture throughout the cultivable land area of Egypt. Specific targets and objectives are cited in Section 2 of the Plan which is available to interested parties upon request.

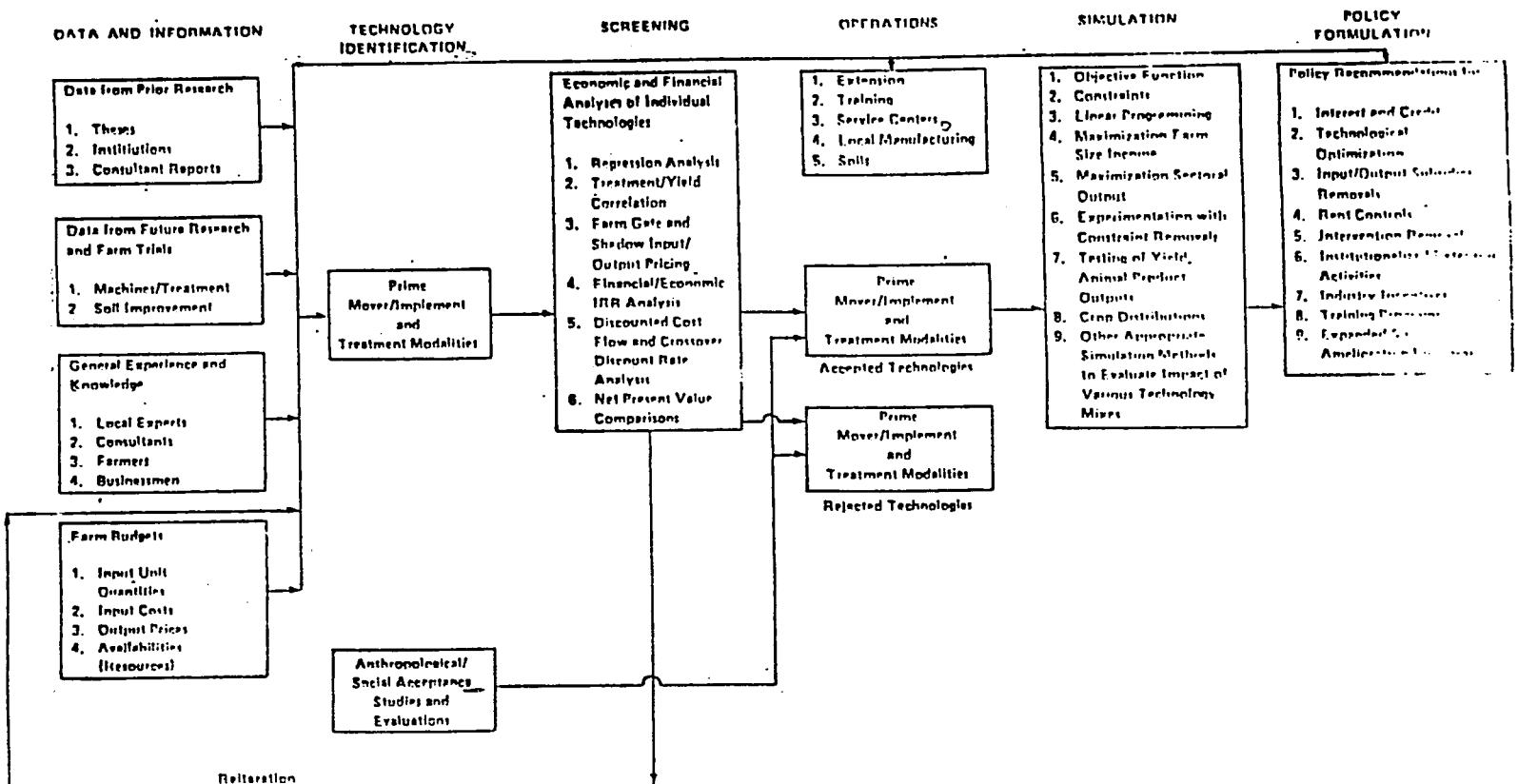
5. Financial Returns from Evaluated Mechanization Technologies

Through Mechanization Project research, field trials and surveys, a number of technologies have been evaluated and introduced at the farm level.

The basic tool for assessing financial and economic suitability of a particular machinery input, once technical and cultural feasibility have been determined, is marginal return analysis.

Figure S - 1

PROJECT DEVELOPMENT:
AGRICULTURAL MECHANIZATION PLANNING AND EVALUATION SYSTEM



This procedure compares costs and gross revenues resulting from a new technological adaptation with costs and gross revenues from crop production prior to the technological change. The procedure is formulated mathematically as:

$$M_r = \frac{R_m - R_t}{C_m - C_t}$$

where:

M_r = marginal return in output valued currency units for each currency unit of input.

R_m = gross returns per acre on farms using the mechanized input under study.

R_t = gross returns per acre for farms using traditional methods.

C_m = gross costs per acre for farms using the mechanical input.

C_t = gross costs per acre for farms using traditional methods.

This methodology quantifies the marginal, or additional return to the producer from one currency unit (Egyptian Pound) of investment in the new technology. To date, the following machine treatments have been evaluated:

1) Irrigation of clovet and cotton by mechanical pump.
2) Cutting cotton stalks by silage mower.
3) Planting wheat by seed drill.
4) Mechanized seedbed preparation for cotton and clover.
5) Harvesting wheat by mower-binder.
6) Harvesting wheat by combine.
7) Harvesting rice by self-propelled mower.
8) Harvesting rice by combine.
9) Mechanized tillage and irrigation of wheat

From the table of mechanization returns to the farmer (Table 3), mechanical water lifting in clover and cotton production, wheat planting by seed drill, and cotton stalk cutting by silage mower emerge as the most beneficial technologies examined. For each Egyptian Pound invested by the farmer in

mechanization, he can expect to receive L.E. 9 and L.E. 5 in increased income from replacement of animal powered irrigation means by mechanical pumps in cotton and clover production. About 50 percent of the participating farmers in the 23 villages have already adopted this technology.

Similarily, the farmer can expect to receive an additional L.E. 8 from planting wheat by grain drill and L.E. 6 from cutting cotton stalks by silage mower for each L.E. 1 of investment. Although these two treatments have only been recently introduced, they have received widespread acceptance among Project participants.

As a general rule, farmers in developing countries expect a return of at least two currency units of income for each one currency unit of investment (200 percent margin) in a new technology as a prerequisit to assuming the financial risk. Agricultural investment risks are high and farmers seek to maximize their returns within the constraints of minimizing risks.

Under this criterion, mechanized tillage of cotton, harvesting wheat by mower-binder and harvesting rice by self-propelled mower are also considered financially feasible within the Egyptian production environment while harvesting wheat and rice by combine do not appear feasible under prevailing conditions.

Mechanical tillage with hand broadcasting and water lifting in wheat production were also examined and found to have no significant impact on land productivity (through animal product recovery is significant in irrigation). This may be attributed to the fact that wheat has a low water required (1,310 cubic meters per acre) and seed is traditionally hand broadcast and usually preceeded by maize or cotton where there has been significant disturbance in stalk harvesting operations. Thus, it is understandable why the presence or absence of tillage and more efficient water delivery methods may not affect output for that crop.

Clover and cotton, on the other hand, have high water requirements (2,200 and 3,640 cubic meters per feddan). The significance of irrigation technology for these crops can be explaned by several factors. A sociological evaluation of the Agricultural Mechanization Project's Water Lifting Credit program showed that there is intense competition among animal powered

Table 3

On-Farm Returns from Agricultural Mechanization

(L.E. per Acre)

Technology	Animal Loss Recovery	Labor Costs Savings	Increased Production	Total Benefits	Total Costs	Net Benefits	Marginal Returns
1. Clover Irrigation by Pump	14.68	4.80	19.59 1/	39.25	4.28	34.97	9.17 *
2. Cotton Irrigation by Pump	48.58	4.68	43.87 2/	97.13	15.84	81.29	5.13 *
3. Cotton Stalk Cutting by Mower	-	13.23	-	13.23	4.27	8.96	6.13 *
4. Wheat Planting by Seed Drill	-	2.17	86.51 3/	88.68	10.99	77.69	8.07 *
5. Mechanical Tillage for Cotton	-	-	74.10 4/	74.10	29.93	44.17	[illegible].48 *
6. Wheat Harvesting by Mower	-	23.01	-	23.01	7.18	15.83	[illegible].20 *
7. Wheat Harvesting by Combine (prevailing conditions)	-	61.63 5/	-	61.63	55.37	6.26	1.11
8. Rice Harvesting by Mower	-	22.17	9.65 6/	31.82	8.65	23.17	3.68 *
9. Rice Harvesting by Combine (optimal conditions)	-	73.60 5/	26.21 6/	99.91	57.78	42.13	1.73
10. Rice Harvesting by Combine (prevailing conditions)	-	73.70 5/	-	73.70	57.78	15.92	1.28
11. Wheat Irrigation by Pump	14.86	6.16	-	21.02	6.60	14.42	2.19 *

1/ Yield increase of 1.03 tons per acre

2/ Yield increase of 117 kgs per acre.

3/ Grain yields increase by 585 kgs per acre. Straw yields increase by 1.17 tons per acre. Seeding rate is reduced 33 kgs per acre.

4/ Yield increase of 197 kgs per acre.

5/ Includes labor input cost savings and mechanical thresher cost savings.

6/ Rice grain loss recovery

* Financially feasible

Source: Egypt Agricultural Mechanization Project Farm Management Survey 1981-1982 Field Trials

water wheel cooperatives for use of the communal water wheel during single irrigation cycles. Farmers complained that they were unable to gain access to the equipment when needed. As a result, many farmers, although members of the cooperative, elected to purchase or rent diesel-powered water pumps. They said that access to the pumps gave them the freedom to irrigate when they felt necessary and allowed them to supply the right amount of water for high demand crops during periods of limited water availability from the government distribution system. Another factor which might also explain productivity gains from mechanized water lifting in clover and cotton is the inability of farmers using animal powered devices to exercise complete control over the rate of water flow. Although the animal powered lifting device has a fixed delivery capacity, its rate of discharge is governed by the rotation speed of the animal. Without constant and close supervision, the variances in water wheel rotation speed were found to be quite wide. The mechanical pumps, on the other hand, can be started and left unattended with assurance that a known quantity of water will be delivered at given discharges, heads and operating times. This could explain why high water demand crops are sensitive to the means of irrigation while low water requirements crops are not.

Mechanical tillage operations for cotton where found significant when compared with no tillage at all. Mechanization Project research has shown that the method of tillage is not important provided that there is some form of tillage prior to planting. Project research programs investigated alternative plowing technologies and depths and the results from these evaluations, together with an analysis of farm management survey data, have confirmed the hypothesis that tillage is required for optimal cotton yields and that the modality of the tillage input is insignificant. Thus, it appears to make no difference whether the farmer uses chisel, mouldboard, or disc plows pulled by tractor or wooden plows powered by animals provided that there is minimal soil disturbance preceeding planting. The explanation of the need for some form of tillage in cotton production is that the plant has a heavy root structure and requires loose and prepared soil for proper seed germination.

WHEAT YIELD FREQUENCIES

GRAIN

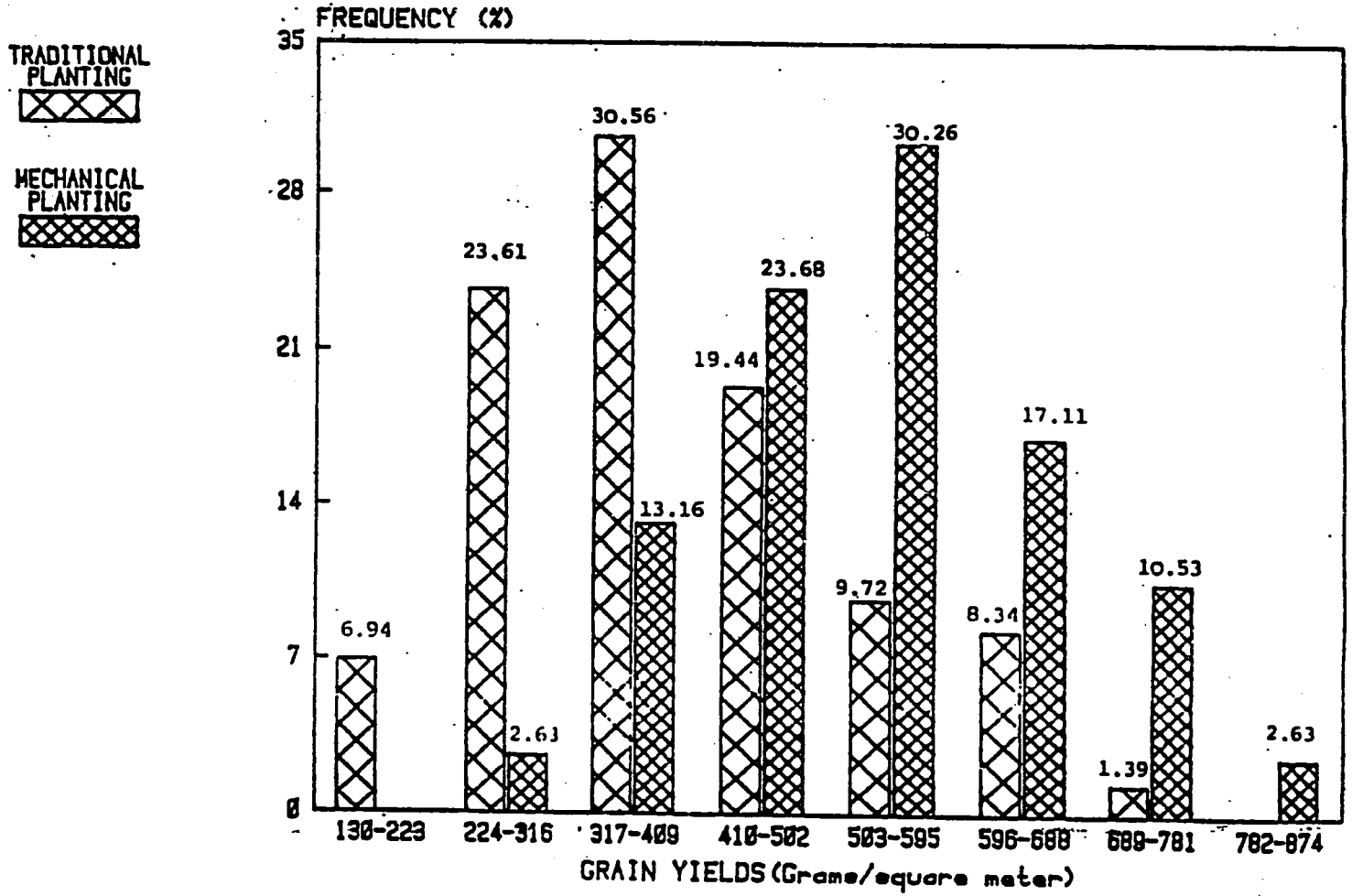
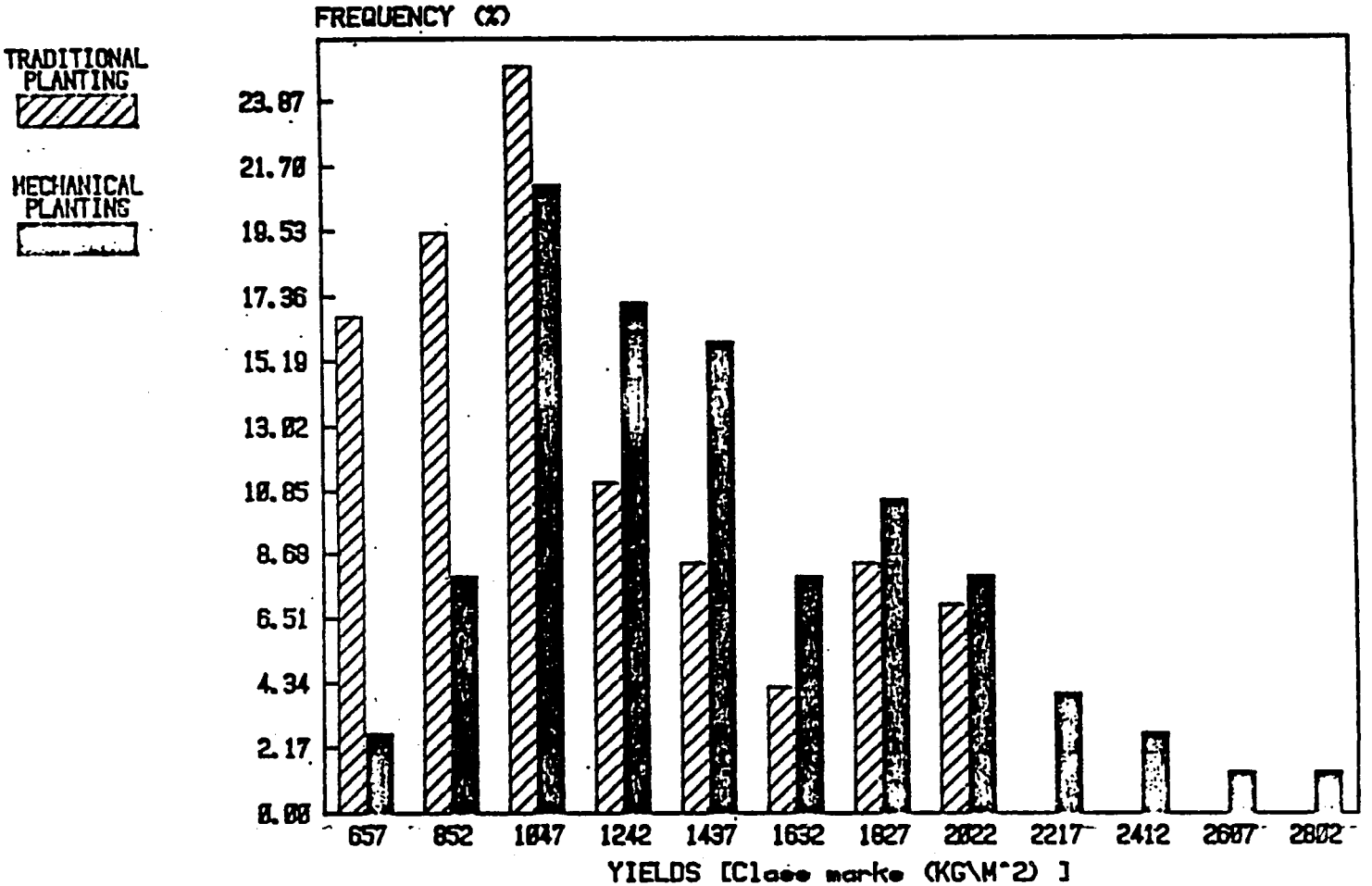


FIGURE 3

WHEAT YIELD FREQUENCIES

STRAW



The technology with the highest impact on increasing farm yields in the Mechanization Project trials is grain drilling of wheat. It was found that use of the mechanical drilling method in the pilot area increased grain yields by 20 percent and straw yields by 20 percent. The effects of changing the planting technology from hand broadcasting to grain drilling are shown in Figures 2 and 3. As shown, there is a pronounced rightward shift in grain and straw yield probability density functions from adoption of mechanized planting. Also, the shape of the grain yield function for the mechanical alternative approaches normality while the shape of the traditional planting function is skewed. This indicates that the mechanical method provides a more even distribution of seeds in the planting process. The more even seeding rate from mechanized planting plus the identified yield increase offers a number of significant opportunities for improving farmer and national income. In light of the success attained thus far from mechanized planting technologies in wheat, the Project shall conduct further research and field trials of this method for other grain crops.

In harvesting operations, three mechanized methods have been demonstrated and evaluated. These include using self-propelled mowers and combines in rice harvesting and use of mower-binders and combines in wheat.

It was found that the self-propelled mowers and the mower-binders generated acceptable marginal returns (L.E. 2 and above for every L.E. 1 invested) and that farmers have generally responded well to the demonstrations. The primary benefits resulting from these technological adaptation are in enhancing labor productivity and lowering costs and recovering some of the on-field harvesting losses. It would appear from these preliminary findings that mowers are appropriate to Egyptian conditions and show a high probability of adoption.

The results obtained from combine harvesting of wheat and rice have been disappointing. Although this harvesting method dramatically reduces the labor input for harvesting, threshing and winnowing and offsets existing machinery costs in threshing, high capital costs and rapid depreciation of the complex machinery inputs required make hourly operating and land area unit costs excessive in comparison to the returns from labor cost reduction and loss recovery under prevailing conditions.

Environmental factors constraining efficient use of combine technology include: (1) inadequately sized and dimensioned fields and (2) lack of skilled operators. Tests conducted by Deutz-Fahr and Mechanization Project field trials indicate that the combines do not reach maximum efficiency for fields of less than 15 feddans with lengths of less than 300 meters. The demonstrated combines were used in fields of 5 to 10 feddans with average lengths ranging from 100 to 200 meters.

As combine technology is relatively new to Egypt, most of the operators have received only two to four weeks training and have had only one year of field experience. Suppliers recommend at least three to four seasons of supervised on-the-job training before an operator can be considered skilled.

The effects of operational timeliness of maize and cotton yields were statistically evaluated from experimental and farm management survey data. In each instance, it was found that crop yields are heavily dependent on the dates of planting and that farm planting date variances for all three crops in the surveyed area were quite wide. The Table below summarizes the survey results quantifying losses from planting delays.

Table 4

Crop Losses from Delayed Plantings
(kgs per Acre)

Crop	Optimal Planting Date	Survey Mean Planting Dates	Mean Losses from late Planting
Maize	May 2nd	June 9th	865
Cotton	Feb.18th	April 7th	354

Source: Computed from Farm Management Survey and experimental data.

The preceeding example shows how mechanization inputs can reduce the variances in critical operational timeliness and improve productivity without any additional factor inputs or costs.

Future Programs and Activities

Upon arrival of a comprehensive mechanization package now under procurement, there shall be expanded and accelerated efforts to test and demonstrate all technologies needed in the agricultural production system. Table 5, below summarizes mechanization inputs to be tested and evaluated during the remainder of the Project schedule:

Table 5

Future Mechanization Trials

Operation/Machine	Crops			
	Cotton	Rice	Maize	Wheat
Seedbed Preparation				
1. Chisel Plowing	X	X	X	X
2. Land Levelling	X	X	X	X
3. Disc Harrowing	X	X	X	X
4. Bedding	X	X	X	
5. Spike Tooth Harrowing	X	X	X	X
6. Roller Harrowing	X	X	X	X
7. Subsoiling	X	X	X	
Planting				
1. Row Crop Planting	X			
2. Grain Drilling		X	X	X
3. Rice Transplanting		X		
4. Cotton Drilling	X			
Cultivating				
1. Row Crop Cultivating	X		X	
Fertilizing				
1. Chemical Fertilizing	X		X	X
2. Manure Spreading	X		X	X
Weed/Insect Control				
1. Liquid Spraying	X	X	X	X
Harvesting				
1. Mower-binder				X
2. Threshing		X	X	X
3. Combine Harvesting		X	X	X
Post Harvest				
1. Silage Mowing	X			X
2. Chopper Grinding	X	X		
3. Hay bailing		X		X

Source: Egypt Agricultural Mechanization Project Extension Demonstration Plan

As with previous demonstrations and trials, empirical data collected during the planned operations summarized above shall be subjected to the same rigorous evaluation as previous efforts according to the planning and evaluation methodology shown in Figure 1.

Annex D: Machinery Demonstration Evaluation Series No.3: Planting Dates, Weed Management, Grain Drills, and Combines in Rice.

MACHINERY DEMONSTRATION EVALUATION SERIES

NO. 3 RICE CULTIVATION: PLANTING DATES
WEED MANAGEMENT
SEED DRILLS
COMBINE HARVESTERS

Peter Reiss
Evaluation Advisor

May 1984

SUMMARY

Farmers in the rice-growing areas of the Delta repeatedly express an interest in expanding their cultivation of rice. It is an important part of their diet and a potential income earner. Although climatic conditions restrict where it can be grown, rice occupies nearly one-fifth if the cultivated area during the summer season nationwide. In the Agricultural Mechanization Project villages of Beheira and Gharbia which cultivate rice, it accounts for 25% to 50% of their area.

An increasingly important role for rice in Egyptian agriculture may be seen by the many current development efforts which are attempting to improve its cultivation by introducing high-yield varieties and expanding the mechanization of its operations. The work of the Agricultural Mechanization Project in rice cultivation has focused entirely on the demonstration of seed drills and combine harvesters on farmers' land. Gallignani 1125 seed drills and Deutz-Fahr 980 self-propelled combines were demonstrated during the 1983 summer season in Sharqia. In all, 700 feddans were drilled and 869 feddans combine harvested.

Until recently, rice has been one of the least mechanized crops in Egypt. Mechanization has focused on land preparation and irrigation, as with most crops. However, planting, transplanting, threshing and winnowing have largely used traditional methods. During 1982, a small area was directly drilled, and in 1983, with the assistance of the Egypt-Japan Mechanization Project, 4,500 feddans were transplanted in Kafr El Sheikh governorate.

Machinery demonstrations are expected to be held in all Project villages during the 1984 summer season The program is likely to involve twelve villages in four Delta governorates. In each, roughly twenty feddans in a single plot will be drilled and harvested.

The Evaluation Unit was asked by project management to examine why farmers apparently do not plant the optimal period and to investigate the weed management system of farmers. More timely planting is expected to improve yields and the use of seed drills is likely to exacerbate weeding problems which are already very problematic.

In its final design, this evaluation of the mechanization of the cultivation of rice includes the following points:

(1) the traditional methods of planting rice

(2) the factors determining planting dates

(3) the weed management system presently in use and attempts by farmers to coordinate weed management with seed drill use

(4) the water management system for growing rice

(5) the operation of the seed drills during the 1983 season

(6) the operation of the combine harvesters

(7) the selection of farmers for machinery demonstrations and its implications for project implementation

(8) the potential savings of labor and money with expanded mechanization of rice cultivation

This report is based on three extended field trips to eleven villages in March. These included project villages in Beheira, Gharbia, and Sharqia where machinery is expected to be demonstrated in the 1984 season and in non-project villages in Sharqia where seed drills and combine harvesters were used in 1983. In all, eighteen farmers were interviewed during these visits. In addition village monitors working in the Evaluation Unit interviewed twenty farmers in each of nine villages in order to learn their use of labor in order to project potential savings through expanded mechanization.

Farmers shifted from broadcasting to nursery/transplanting as recently as ten years ago. They seem to have been motivated by increased pressures on water and labor resources. It is not coincidental that this shift took place when there was a sharp increase in rural emigration. Furthermore, as the area of rice-growing expanded, farmers were fearful that there would not be enough water available for all users or a sufficient supply for the season. The nursery/transplant method has enabled farmers to conserve water during the initial thirty to forty-five days. It also allows for greater control over the weeds since the farmer has a much snaller area to care for. The weeds are said to have been a terrible problem when the rice was broadcast. Planting in nurseries also keeps the irrigated areas to small sites which are less hazardous to cotton, during a crucial period of insect infestation, and to wheat which is drying in the fields before being harvested.

The previous winter crop is certainly a most important factor in deciding planting and transplanting dates for rice. Wheat is likely to delay farmers considerably as is bersim left in the fields for seeds. Farmers have developed a strategy whereby they are able to begin growing rice while the longer-term winter crops still occupy the fields. They may take fewer cuttings of bers or plant a crop, such as potatoes, which has a shorter growing period. Weather conditions and irrigation requirements are other factors which play a role in determining planting and transplanting dates. Farmers insist that the entire Delta cannot be treated as a single environment. Some statistical treatment may be required to verify or reject this hypothesis. Restrictions on irrigation from late April make planting difficult and require coordination among farmers.

Using any method of planting rice, weeds continue to be one of the greatest problems facing farmers. Certainly, one of the strongest motivations for the shift from broadcasting is that weeds are more manageable with the latter method, at a time when agricultural wages were high and laborers were difficult to recruit. Even with the nursery/transplanting method, large teams must be recruited on at least two occasions, and commonly three, and may cost more than fifty pounds per feddan.

The introduction of herbicides has accompanied new high-yield rice varieties during only the past two years. However, they are sometimes difficult to obtain. Government subsidized prices (7 L.E. per liter Saturn) are significantly lower than the open market prices (20 L.E.) and have discouraged farmers from purchasing

them at the higher price. Where they have been used, farmers have not been given sufficient information about their appropriate application. As a result, there has been considerable experimentation by farmers, not always with successful results. From inproper use, some farmers have suffered terrible rice losses because of the virulence of the weeds or were forced to recruit large teams of workers to pull the weeds which were unaffected by the herbicides applied. These experiences suggest that the most important factor in herbicide use is timing: The herbicide must be applied early enough to kill the weeds when they are young or still germinating.

If rice is drilled in large areas, it may require some changes in water management. Drilling will require the immediate and almost flooding of the land for an additional thirty to forty-five days, the period when the seedlings were limited to a small area in a nursery. Farmers claim that one of the reasons for shifting to nurseries was the conservation of water. Many of the farmers who used the seed drill for planting rice during the past summer season have access to wells which they drew upon during this period. These were large farmers with the resources for this undertaking. Small farmers will, of course, be restricted to the canals and may increase their risks as a result.

The reaction of farmers to the seed drill was generally positive. They found it produced a good stand, with plants not too crowded or distant. Some said that the stand was like the one produced by transplanting and was far better than broadcasting. The greatest dissatisfaction concerned the time need for germination, an increase of one week as compared to broadcasting. Farmers also complained that the drills planted the seed too deeply. It is likely that planting the seed without soaking, unlike the traditional method, is the factor which has slowed germination. Yields have been high when herbicides were properly applied. Farmers claim to have yields of 3.8 tons when the average for Giza 171 and 172 is 2.5. The extent to which the yield increase may be attributed to the use of seed drill may have to be examined with controlled testing.

Although a baller was not used in conjunction with the combine harvesters, farmers reacted positively to its operation. This reaction, quite unlike the one encountered when wheat was harvested, reflects the lesser importance of rice straw. The combines were said to have been operated well, although spare parts were often not available and one combine in Sharqia was out of operation for ten days. Unfortunately, only one of the farmers interviewed had used both the seed drill and the combine harvester. A greater continuity in the providing of demonstrations would be preferable.

Costs for labor in rice cultivation sollicited from farmers in project villages suggest that they may realize a potential savings in an expansion of mechanization for planting and harvesting. Practically, the greatest savings will likely be felt in the mechanizing of planting and with use of herbicides. Because of the expense and maintenance requirements of combine harvesters, it is unlikely that they will ever become a realistic alternative.

Based on this report, the following recommendations are made:

(1) Using seed drills requires an accompanying carefully designed program of weed management. Therefore, farmers who agree to have their rice drilled must be provided with herbicides, either at their expense or from the project. A special arrangement with governorate agricultural directorates may be required to obtain the herbicides at their subsidized prices. No land should be drilled without available herbicides, and all mechanization extension agents ought to be fully informed of their appropriate application. The Egypt Rice Research and Training Project has developed an extension program, called Mabrouk 4, which sets forth eleven steps to be followed by farmers for better rice cultivation. Although the method of planting is nursery/transplanting, it can be easily adapted to drilling.

(2) Drilling rice may place an increased pressure on a village's water supply. It may be necessary to negotiate with responsible irrigation officials resulting in an increased quota.

(3) Farmers were pleased with the performance of the seed drill but found that germination was delayed by one week. They suggested soaking the seeds beforehand, but this is unsuited to the drill's operation. They also complained about the depth to which the seeds were planted. The Extension Component might wish to adjust the drills or design a program about the operation of the drill since farmers remained concerned after the first season of use.

(4) Most of the farmers who used the seed drill did not use the combine harvester as well, although many of them had expected to. It might be advisable to have greater continuity in the demonstrations by providing the same farmer with both pieces of equipment to show the full effects of mechanization.

(5) Farmers who have used project equipment in Sharqia Governorate continue to be almost exclusively large landholders. While there is nothing wrong with choosing large holders, it does reinforce the view in some quarters that the project is only for rich farmers. It might be advisable for the Cairo extension supervisors to oversee the selection of farmers for machinery demonstrations to see that the broad spectrum of holders is represented, particularly in Sharqia.

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1.0 INTRODUCTION

Farmers in the rice-growing areas of the Delta repeatedly express an interest in expanding their cultivation of rice. Many who were interviewed have petitioned their village agricultural cooperatives for permission to use more of their land for growing this crop. They praise rice as an important part of their diet and as a potential income earner. However, rice is one of the most labor intensive crops grown in Egypt, likely second only to cotton which is in widespread disfavor. Although climatic conditions restrict where it can be grown, rice occupies nearly one-fifth of the cultivated area during the summer season nationwide. In the Agricultural Mechanization Project villages of Beheira and Gharbia which cultivate rice, it accounts for 25% to 50% of their area.[1]

An increasingly important role for rice in Egyptian agriculture may be seen by the many current development efforts which are attempting to improve its cultivation by introducing high-yield varieties and expanding the mechanization of its operations. The Egypt-US Agricultural Mechanization Project, the Egypt-US Rice Research and Training Project, the Egypt-Japan Rice Mechanization Project, a World Bank supported extension project coordinated by Boston University, and Catholic Relief Services are all actively involved in aspects of rice growing. Unfortunately, there has been little coordination of their efforts.

The work of the Agricultural Mechanization Project in rice cultivation has focused entirely on the demonstration of seed drills and combine harvesters on farmers' land. As designed,

[1]Peter Reiss, Raafat Lutfi, Nour El Din Nasr, and Aiman El Tunsi. Agricultural Mechanization Project Villages Profile. Working Paper No. 6. Agricultural Mechanization Project. 1982:57a,b.

the Project does not have the capacity to introduce new seed varieties and, as such, has not been able to develop an integrated agronomic and mechanical package which would likely have the greatest impact on yields. Having been limited in scope to mechanizing operations, the Project activities in machinery demonstration may help to alleviate problems stemming from labor shortages, improve the timeliness of planting, and increase yields through new planting and harvesting methods.

Until very recently, because of the intervention of various development efforts, rice has been one of the least mechanized crops in Egypt. A survey conducted by the Agricultural Mechanization Project[2] in four governorates revealed that machinery for rice cultivation is limited to plowing (used by 98% of the 221 farmers who grew rice in the sample of 1000 farmers), levelling (89%), irrigation (57%), transportation (17%), threshing (90%), and winnowing (82%). Some of these figures are misleading and do not actually reflect the limited extent to which rice is mechanized. Farmers characterized their theshing and winnowing operations as mechanized because they use tractors in the process. However, the cut rice stalks are not put through a thresher/winnower. Rather, they are left on the ground and run over with a tractor; the method is not terribly far removed from the use of a nourag, an animal-drawn cart with metal wheels which performs the same function. By only the most liberal of definitions may the operations be thought to be truly mechanized. Only 2% of those growing rice had used a mechanical harvester.

One of the earliest attempts to plant rice mechanically appears to have been made by Ahmed El Beheiry when he was an Agrarian Reform cooperative extension agent working in Sheikh

[2]Nicholas Hopkins, Sohair Mehanna, and Bahgat Abdelmaksoud. The State of Agricultural Mechanization in Egypt. Results of a Survey: 1982. Agricultural Mechanization Project. 1982.

Ahmed village in Beheira Governorate. There, he demonstrated a seed drill in 1972. In 1982, twenty-eight feddans were drilled in a single plot in Dakahlia Governorate by members of the Extension Component of the Agricultural Mechanization Project. By 1983, the availability of multicrop and specialized machinery for rice cultivation had increased dramatically. Direct drilling and transplanting were both done with machinery in many parts of the Delta, both by development projects and by the local agricultural directorates. For example, in Kafr El Sheikh governorate, 4,500 feddans were transplanted by 105 machines purchased by local agricultural cooperatives and operated with the assistance of members of the Egypt-Japan Rice Mechanization Project.

The Agricultural Mechanization Project ran a trial program of direct drilling and combine harvesting with the cooperation of the agricultural directorate in Sharqia during the 1983 summer season. The Extension Component of the Project directly drilled 700 feddans in six Sharqia districts and combine harvested 510 feddans. In addition, the Sharqia extension service combine harvested 359 feddan. The following chart indicates the districts and areas worked by both seed drills and combines:

SHARQIA DISTRICTS AND AREAS MECHANIZED

District	Area in Feddans	
	Directly Drilled	Combine Harvested
Kafr El Saqr	250	160
Abu Kebir	200	20
Diarb Negma	116	239
Ouled Saqr	50	90
Minia El Qamha	50	100
Bilbeis	34	50
Ibrahimiyya	0	90
Zagazig	0	100
Faqus	0	20
Total	700	869

Machinery demonstrations are expected to be held in all Project villages where rice is grown during the 1984 summer season. This program is likely to involve twelve villages in four Delta governorates. In each, roughly twenty feddans in a single plot will be drilled and harvested. Recruitment of farmers and coordination of activities will follow similar efforts when silage mowers and seed drills were demonstrated for other crops.

Project Management asked the Evaluation Unit to undertake a study of mechanized cultivation as a result of two developments: the distribution of a report on improving rice yields by more timely planting and mechanizing harvesting[3] and from an increasing awareness that special weed management techniques are required when rice is drilled directly rather than transplanted. In the case of the report, it was found that the majority of farmers who grew rice and participated in the Project's Farm Management Survey did not plant during what was deemed to be the optimal period. In fact, 75% of the farmers planted earlier or later. No farm management survey, in fact, has an explanatory power. Project Management asked that the Evaluation Unit interview rice growers to determine the constraints they face in planting rice. Furthermore, experiences with using seed drills in summer 1983 revealed that extraordinary measures have to be taken to counteract the rapid growth and choking effect of weeds when seeds are directly drilled. Project Management also asked the Unit to examine the weed management system presently used by farmers, realizing that changes will have to be made as the use of the seed drill is expanded.

[3] Steven Shelpey, Zakaria El Haddad, and Nour El Din Nasr. Improving Rice Grain Yields and Income through Cropping Calendar Optimization and Mechanized Harvesting Methods: Simulation Models and Economic Analysis. Agricultural Mechanization Project. 1984.

In its final design, this evaluation of the mechanization of the cultivation of rice included the following points:

(1) the traditional methods of planting rice

(2) the factors determining planting dates

(3) the weed management system presently in use and attempts by farmers to coordinate weed management with seed drill use

(4) the water management system for growing rice

(5) the operation of the seed drills during the 1983 season

(6) the operation of the combine harvesters

(7) the selection of farmers for machinery demonstrations and its implications for project implementation

(8) the potential savings in labor and money with expanded mechanization of rice cultivation

Three extended field trips were made to eleven villages in March. These included Project villages in Beheira (Disia, Ezab Besentawai, and Desounes) and Gharbia (Konayiset Damsheet and Shabshir El Hesa) where machinery is expected to be demonstrated in the future, Damat in Gharbia to examine the efficacy of broadcasting rice, and one Project (El Saadine) and several non-Project villages (Mit Basha, Robaa Mia, Qarimla, and Shaghanba) in Sharqia where seed drills and combine harvesters were demonstrated in 1983. In all, eighteen farmers gave in-depth interviews in these villages. In addition, village monitors working in the Evaluation Unit have interviewed twenty farmers in each of nine villages in order to learn from a large, randomly sampled their use of household labor and their use and cost of hired labor in order to project potential savings through expanded mechanization.

2.0 THE TRADITIONAL METHODS OF PLANTING RICE

Although rarely done now, broadcasting was the usual method of planting rice as recently as ten years ago. Most of the farmers interviewed said that they shifted to growing rice in nurseries for later transplanting at about this time. Some, who are large landholders and claim to have been among the first to grow rice in their areas in the 1940s and 1950s, said they shifted to the nursery-transplant method within a few years of the introduction of the crop. A few of the farmers interviewed, who were deliberately sought out, have broadcasted rice during the past two years as a way of reducing labor costs or of compensating for unscheduled delays in planting. These last are in the minority.

The shift from broadcasting occurred for a number of reasons, frequently as a way of compensating for increased pressures on water and labor resources. It is not coincidental that this shift took place roughly a decade ago when there was a sharp increase in rural emigration. As has been pointed out elsewhere[4] dramatic shifts in cultivation methods occurred in the early 1970s.

When rice was first introduced, and for a considerable time thereafter, by farmers' accounts, it was not a significant crop. Although requiring large and frequent amounts of water, rice cultivation did not seriously tax a village's allotted supply. However, as its popularity increased and when it was institutionalized within the crop rotation system, its constant demand for water did pose a threat to the village as a whole. A recent study of water allocation in Egypt and its organizational

[4] Peter Reiss. Machinery Demonstration Series. No.2. Wheat Cultivation: Grain Drills, Mower-Binders, and Combines. Agricultural Mechanization Project. 1983:5.

implications suggests that for Delta farmers there is no fear of an absolute water shortage or resulting crop failure. Rather, temporary shortages or positional inequities may increase the cost of lifting water or make it more time-consuming.[5] However, farmers interviewed for this evaluation of rice machinery indicated that there was a widespread fear, at the time that rice cultivation was rapidly increasing in area, that there would not be enough water available for all users or a sufficient supply for the season.

Rice cultivation showed its greatest increase from the early 1950s to the early 1960s. In 1952-54, rice occupied only 9% of the land each summer season, while cotton covered 31% and 44% lay idle until cultivated with Nili maize (35%). By 1962-4 , the area cultivated with rice had grown to 17%. During the next fifteen years, the area cultivated with rice was stable. In 1972-74, rice covered 19% of the land and from 1977-79 18% of the land was cultivated with rice. Nationwide, this twenty-five period saw a decrease in cotton cultivation from 30% to 22%, a marked decrease in idle mid-summer lands from 44% to 11%, and a slight change in maize area from 35% to 32%.

This increase in rice growing most certainly effected the village's water supply. When broadcasted in planting, the entire growing area of the rice crop must be frequently irrigated throughout the summer season. The increase in rice area was accompanied by a shift to the nursery-transplant method, apparently, in part, to conserve the limited water resources of the village. The nursery-transplant method

[5] Sohair Mehanna, Richard Huntington, Rachad Antonius, Monira Fahim, and Mona El Kadi. Water Allocation among Egyptian Farmers: Irrigation Technology and Social Organization. Social Research Center, American University in Cairo. 1983:45.

restricts the amount of water required during the initial stages of cultivation by limiting the growing area for the first thirty to forty days to only a few qirats per feddam. Farmers themselves estimate that by starting the seedlings in a nursery, they use only one-twelfth the water required for direct broadcasting during the first month. While this savings may not compensate for an increased area during the whole growing season, it would appear that during the first critical period of germination and early growth, farmers have reduced the risk to the seedlings from possible water shortages.

Threatened water shortages did not alone necessitate a shift to nurseries as the predominant planting method. As has been mentioned, labor scarcity also played an important part. Although the nursery method created many additional labor needs, it also resulted in an more manageable field, easier to maintain and easier to harvest. Landholders say that they shifted from broadcasting to nurseries, in part, because of pressure from agricultural laborers who found the weeding and harvesting to be too arduous. Workers found that relatively systematic transplanting reduced the number of plants in a field which facilitated later operations.

With the increasing scarity of agricultural laborers came a rise in their wages. Although landholders tend to idealize the past in their accounts, it was the case that wages were very low and workers largely available. By shifting to nurseries and transplanting, farmers needed to pull, transport, and transplant the seedlings. They claim that the additional labor costs were compensated by savings in labor for weeding and subsequent increases in production. In fact, weeding the rice fields is still the single most costly activity in the cultivation of the crop.

The scarcity of agricultural laborers may have caused the shift to nurseries in another sense. The untimeliness of operations, particularly of planting and harvesting, seems to be endemic in Egyptian agriculture. Broadcasting rice requires that the entire area to be planted be cleared of its previous crop and be plowed and levelled. By farmers' accounts, such work takes between eight and ten days. Depending upon the previous crop, they may be forced to plant later than they would prefer or harvest earlier than wanted. Should wheat or bersim for seeds occupy the field, they may not have much flexibility. However, planting a small area designed as a nursery does give them an additional four weeks plus the time it takes to prepare the land for rice. Using nurseries may then be thought as a strategy to prolong the previous growing season without threatening the growth of the young rice plants.

The management of weeds will be discussed in detail in a later section of this report. However, some mention must be made here, since the problem of controlling weeds with broadcasting was certainly a decisive factor in the shift to planting first in nurseries. It was only during the past season that herbicides became available to any significant degree and used with any regularity in rice cultivation. Previously, all weeding was done by hand. Even now, the use of herbicides is a rarity and is commonly restricted to those villages in which high yield varieties have been introduced. None of the Project villages in Beheira or Gharbia have yet experimented with herbicides for rice. With broadcasting, the weeds grow more quickly than the rice, choking the young seedlings. It is a potentially disastrous situation which may threaten the entire crop. Planting in a nursery allows the farmer greater control over the weeds since he has a much smaller area to care for.

It may also be the case that pulling the seedlings and transplanting them to another location may retard or destroy some weed growth cycle.

Farmers speak of rice-growing as a cooperative activity, more so than with most other crops. While the nurseries are being planted and irrigated during the initial thirty to forty days, most of the rest of the village's agricultural land is no longer being irrigated. By law, most irrigation ceases in mid to late April because continued waterings threaten cotton plants through the movement of worms. Also, wheat is drying in the fields in preparation for harvesting. Rice-growing during this period is coordinated among neighbors so that damages do not occur. Farmers speak of an unwritten law that no one plants rice alone. Planting in nurseries would seem to keep the threat of damages to a minimum. A number of farmers interviewed mentioned that they would like to plant rice by broadcasting in the coming season, but their neighbors refused to permit them fearing spills onto their own land.

While there is an undeniable interest in the history of Egyptian agriculture, this discussion of the shift from broadcasting to nursery-transplanting for rice serves another purpose. By introducing seed drills for planting rice, the Project is actually seeking to mechanize a past and already rejected method of cultivation. In order to achieve the greatest acceptance of the drills, it is important to understand why broadcasting has largely ceased to be a preferred technique. This section points out that there were essentially five reasons for the change in method: pressure on the water supply, labor scarcity and labor costs, untimeliness of operations, problems with weed management, and threat of water spills onto neighbors' land once the nursery method became common.

It is then incumbent upon the Project to assure that these problems associated with broadcasting be rectified as much as possible for direct drilling, since their incidence is likely to be the same for both. One of these problems may be expected to be substantially reduced because of the use of machinery: labor scarcity and labor costs. While the contribution of machinery use to production costs may still be debated, it is now generally accepted that agricultural machinery, when properly used and maintained, will compensate for a shortage in field workers.

Other problems cited above are likely to required a more active involvement of the part of the Project for their resolution. Uncontrollable weeds which are certain to appear with the use of a seed drill may be manageable with a carefully designed herbicide program. Water spills need not necessarily pose a threat to neighbors' fields if large contiguous areas are drilled cooperatively and are distant enough from cotton and wheat fields. The present untimeliness of operations may also be resolved with an appropriate management system for agricultural machinery. Should the previous crop have been planted during its optimal period, rice may also be drilled earlier, obviating the need for a strategy to delay harvesting and land preparation.

However, even assuming the easy resolution of these problems, which is not likely, the increased pressure on a village's water supply remains. Its resolution may require negotiations with responsible irrigation officials resulting in an increased quota. Not to consider this and other problems associated with broadcasting with care and not to build their resolution into the machinery demonstration program would risk our repeating the mistakes of the past.

3.0 THE DETERMINANTS OF PLANTING DATES

A recently distributed report,[6] based on data from the farm management survey, indicates that participating farmers are likely to plant during other than the determined optimal seven-day period of 24-30 June and have a resulting yield loss. Of the 300 observations, 32% were planted earlier, from 2-23 June, and 44% planted later, from 1-28 July. As a result of this report, the Evaluation Unit was asked by project management to determine the reasons for these untimely plantings. The report suggests that planting times for rice are determined by the planting of the previous crop, usually bersim or wheat.

Our investigation in a number of Delta villages indicated that while the planting and harvesting dates of the previous crop are indeed important constraints, a number of other factors are also involved in determining when a farmer plants rice. It ought to be mentioned here that the dates referred to in the earlier report focus on the transplanting of the seedlings, rather than the planting of the nursery. This distinction, not readily apparent in that report, must be kept in mind, since the nursery/transplant method was the technique exclusively used by the farmers. As has been mentioned earlier, the dates for planting and transplanting are likely to be thirty to forty days apart.

Data provided by the Planning Unit on 175 observations of the transplantings reveal that the vast majority (77%) were done during the four-week period between 17 June and 14 July and that 45% were transplanted during the two-week period between 24 June and 7 July. A breakdown of transplanting dates for each preceding crop also indicates that for the three major crops (bersim, wheat,

[6] Shepley, El Haddad, Nasr. 1983:9.

and fuul), transplanting dates appear to have a relatively normal distribution, with the frequency of the activity peaking during the last week of June for wheat and fuul with long bersim falling on either side. Table 1 presents these data.

The data presented here, however, ought not to minimize the importance of the preceeding winter crop. Growing wheat or bersim for seeds may lock the farmers into a cropping schedule which does not allow them to transplant rice any earlier. While farmers growing bersim for fodder may be able to reduce the cuttings they obtain, bersim seed production requires that the crop remain on the land for an additional one and a half to two months, taking the crop through June. By their accounts, they require at least another eight days to prepare the land for rice transplanting. Farmers interviewed, however, do not always grow bersim for seeds, requiring them to forego the last cut. Depending upon the needs of their animals, they may continue to cut the bersim on some of their land. As a rough gauge, our interviews suggest that farmers growing larger areas of bersim (more than a couple of feddans) are likely to devote only part to bersim for seeds, while farmers with small areas are likely to use all of it for seeds, intending to sell some in the informal village marketplace.

Bersim-growing, however, does enable the farmer to prepare a small area for a rice nursery preceeding transplanting. Although he will have to lose one cutting, farmers appear to think that this loss is minimal. Wheat is, by far, the greater problem. The preferred variety, called variously hindi, baladi, and white, is harvested commonly at the very end of June. A recently introduced variety, known as mexique, Giza, and red,

TRANSPLANTING DATES FOR RICE IN SUMMER 1982 WITH REFERENCE TO PRECEEDING WINTER CROP

Transplanting Date	Winter Crop								
	Bersim	Wheat	Fuul	Wheat/Bersim	Wheat/Fuul	Veg.	Onions	Other	TOTAL
2-9 June	1	4	2	0	1	1	0	0	9
10-16 June	6	5	5	1	0	2	0	0	19
17-23 June	16	8	3	3	0	1	1	0	32
24-30 June	9	20	8	3	0	1	2	0	43
1-7 July	14	15	6	1	0	0	0	0	36
8-14 July	10	7	5	0	0	0	0	2	24
15-21 July	3	3	0	1	0	1	0	0	8
22-28 July	1	1	0	0	0	0	0	0	2
No date	0	2	0	0	0	0	0	0	2
TOTAL	60	65	29	9	1	6	3	2	175

has a two-week shorter growing period and is harvested in mid-June. However, as an earlier report[7] discloses, farmers are dissatisfied with its small straw production and texture in bread. Its selection would enable farmers to plant rice in the same area by the end of the month. However, our visits indicated that the only farmers likely to grow it were large landholders who sold it to the government and small Agrarian Reform holders who were so obliged. Not only is wheat-growing problematic for timeliness of transplanting. It presents problems to the farmers who must prepare a nursery area. Although surprising, a number of farmers were interviewed who said they, as a modus operandi, harvested wheat early, still green, in order to prepare the area for growing rice seedlings. Onions, according to farmers, present a similar problem.

As a result of the need to harvest small areas of their land for nursery preparation, many farmers plant one crop in the area in winter that is to be used later as the nursery which may be harvested earlier than what is planted in the larger field where the seedlings will be then transplanted. Farmers growing wheat were frequently found to have planted bersim in the designated nursery area, and one farmer planted potatoes in this location.

This discussion raises the point that if rice is drilled, the entire rice field must be planted at the same time. Should wheat have been the preceeding crop, farmers will not be able to get the early start they can with the nursery method. They will have to harvest earlier, possible in a small area although a yield loss is estimated to be 50%. However, in the full field, land preparation and planting will be quite late, no earlier than the end of June, putting them a month behind the nursery/transplant method. It should be surprising then to have found the farmers

[7]Reiss. Wheat Cultivation. 1983:9.

who took part in the machinery demonstration trials of the seed drills had planted bersim as the winter crop. They had made one to three cuttings of bersim, instead of the usual five. It may be the case that the seed drill for rice is not appropriate in all situations. This point will be explored in greater detail later in the report.

Weather conditions and irrigation requirements are other factors which appear to play a role in determining planting/ transplanting dates. Farmers insisted that the entire Delta rice growing area cannot be treated as a homogeneous environment. Some statistical treatment will be required of data covering the entire Delta to verify or reject this hypothesis. A cursory review of farm management survey data does seem to suggest that farmers in Beheira may transplant earlier than those in Gharbia, in which case one cannot recommend a single transplanting date for the area; the issue may need to be more subtley treated.

As mentioned earlier, farmers must coorinate their activities when growing rice. Restrictions on irrigation from late April may make earlier planting difficult. Although not necessarily the case, farmers in a village, will say, at least, that they plant and transplant at the same time. Therefore, such dates for rice also are determined by the simultaneous summer crops, particularly cotton, and distance from it.

Thus, the previous winter crop is certainly a most important factor in deciding planting and transplanting dates for rice. Yet tied to this are a number of related matters including the use of the winter crop, the handling of the nurseries and a determination to crop a special crop there, animal requirements, weather conditions, irrigation requirements, and farmer coordination. As such, one must consider the implications for this complex if the dates were to be changed.

4.0 WEED MANAGEMENT

Using any method of planting rice, weeds continue to be one of the greatest problems facing farmers. Certainly, one of the strongest motivations for the shift from broadcasting to the nursery method was that weeds were more manageable with the latter. Limiting the growth of rice to a small area allowed farmers to remove all weeds, plant the seedlings in fields systematically and hopefully reduce the weeds in the process. No doubt, fewer weeds do appear with the nursery/transplant method than with the broadcasting. Weed management ought to be a crucial concern of the project because weeds are certain to be prolific in drilled fields if proper control techniques are not employed.

Despite greater control, planting rice in nurseries has still required careful attention and the recruitment of sizeable labor teams to pull the weeds. While methods vary significantly, it appears that commonly farmers will hire as many as twenty children to pull in the weeds in a nursery on two occasions: ten days after planting and seven days after that. Larger teams are recruited to weed on at least two more occasions after the seedlings have been transplanted: thirty days after transplanting and fifteen days after that. For one feddan, the total costs have been estimated to be approaching

During the past two years, with the introduction of the high-yielding Philippino rice (IR28), herbicides have also become available in the markets or through the local agricultural offices. Farmers in the Delta who had to grow this new variety were also sold a herbicide at a subsidized rate. Most often, the herbicide was Saturn. In areas where Giza 171 and 172 are grown, herbicide use is less common; it must be purchased from

private distributors at market prices. The difference is significant: While the government-supplied herbicide costs 7 L.E. per liter, on the open market it is 20 L.E.

Farmers have sometimes used herbicides, particularly for wheat and cotton, but its use for rice is a relatively new innovation. Particularly striking is the degree of experimentation going on the villages among farmers, trying to determine the most effective way of using them. The variety of methods encountered suggests that an acceptable one has not been made available to them by village extension agents. As a result, some farmers have suffered terrible rice losses because of the virulence of the weeds or were forced to recruit large teams of workers to pull the weeds which were unaffected by the herbicides applied.

As used by farmers, the herbicide is applied in a medium of gypsum or soil, and in one enterprising case it was put in an incesticide sprayer and diluted with several hundred liters of water.

Determining the timing of application seems to be the point of most concern. When used with the nursery method, it is applied twice. With drilling, it is most often applied three weeks after planting. However, by this point, the weeds may be in the 3-4 leaf stage and so too large for the herbicide to be really effective. It would be much more effective to determine the time of application by the size of the weeds, applying it when the weeds are in the 2-3 leaf stage.[8] Farmers, however, tend to wait too long, afraid that they will harm the rice seedlings, which is not the case. Two liters of Saturn per feddan are recommended.

Farmers who allowed the project to demonstrate the seed drill on their land had various experiences. One who applied it three

[8]Personal communication with Jack Swagerty, Deputy Director, Egypt Rice Research and Training Project, 1984.

weeks after drilling said the herbicide was ineffective and had to hire children to pull the weeds. He had mixed two liters with gypsum for each feddan. He still is uncertain whether it was his timing or his method. Another farmer, this one from El Saadine, has used herbicides two years running. In 1982, he mixed two liters of Saturn with 2 shikara of super for each feddan and applied it to wet land. The small weeds were killed but not the large, and he said that the result was a thick weed growth which was choking his rice which had been broadcast. He was forced to bring in a large team of workers to pull the weeds, costing him 150 L.E. per feddan for their labor. Even so, his yield was only one half ton per feddan, 20% of the usual production. In 1983, with the seed drill, he used two liters of Saturn, applied with a sprayer after having drained the land. After applying the herbicide, he left the land to dry for one more day and then irrigated. All of the weeds were killed within ten days and no more appeared for the rest of the season. Another in Qarimla applied the Saturn with soil thirty days after drilling and said that the weeds were so thick he could not see the rice. He had to bring in a labor team three times; the last was two months before harvesting. He claims to have spent 1,600 L.E. for the labor for his 20 feddans.

Finally, a farmer in Shaghanba said he had great success with the hebicides. After the drilling he flooded the land for fourteen days, allowing it to dry out for one day. He then applied the herbicide by filling a 600 liter motor sprayer with water and two liters of Saturn for his two feddans. The land was then left to dry for four days before it was irrigated again.

These cases appear to corroborate the position of the Rice Research and Training Project that the crucial element is timing, that the herbicide must be applied early enough to kill the weeds

when they very young or still germinating. As with the last case, timely herbicide application resulted in the total absence of weeds for the season.

Farmers have not much experience with herbicides, in general, and regale the visitor with a series of stories about how an unwitting neighbor has destroyed his entire crop by applying an inappropriate herbicide or one at the wrong time or in the wrong amount. This indicates a discomfort which will have to be set right with a concerted effort of the Extension Component and its village mechanization agents. They appear not to have offered much assistance this past summer. Farmers claim to have been told by others in the village or independent invention. Those using the seed drill for the first time fear that they will lose their rice to the weeds because they remember the problems they have had when rice was broadcast.

If farmers are to be asked to use the drill, they must be provided with herbicides, either at their cost or the cost of the project. It is unlikely, however, they will wish to pay the unsubsidized price. A special arrangement with the governorate agricultural directorate in order to secure the herbicide shall likely be necessary. No land ought to be drilled without available herbicides and the agents ought to be fully informed in the appropriate application. The Rice Research and Training Project has developed an extension program, called Mabrouk 4, which sets forth an 11 step plan to be followed by farmers. Although the method of planting is nursery, it can be easily adapted to the drilling method.

5.0 WATER MANAGEMENT

The implications of using the seed drill for planting rice as already been discussed in the introduction to this report. Briefly, drilling will require the immediate and almost constant flooding of the land for an additional thirty to forty-five days, the period when the seedlings were limited to roughly one-twelfth the area in a nursery. They also fear that the increased use of water, given its availability, may be dangerous to the cotton and to the wheat which is drying. Farmers claim that one of the reasons for shifting to nurseries from broadcasting was that as the area of rice-growing increased in the villages during the past two decades, the nurseries were able to conserve this resource.

It is interesting that many of the farmers who used the seed drill for planting rice this past season had access to wells which they drew upon during this period and through the summer. Farmers are not totally restricted to the irrigation canals for their water. Many large farmers have dug wells for additional water. Small farmers, of course, have not the resources for such an undertaking and are limited to the government-supplied water.

Any large program of seed drill use will have to take into consideration the availability of water and the subsequent lengthening of the full irrigation cycle for the crop.

6.0 OPERATION OF THE SEED DRILL

The reaction of farmers to the operation of the seed drill was frequently quite positive. These responses were very similar to those given when the seed drills were used for planting wheat. Farmers found the drills to have produced a good stand, where plants were not too crowded or too distant. Some said that the stand was like the one produced by transplanting and was certainly better than broadcasting.

The greatest dissatisfaction concerned the time required for germination. With other methods, the seeds are soaked for two or three days before planting and usally germinate in one week. With the seed drill, with seeds planted dry without previous soaking, all of the farmers interviewed found that it took two weeks for the seeds to germinate. While some farmers complained that the drills planted the seeds too deep, it may be that they are planted without soaking which is the most important factor for the slow germination.

In any case, with proper herbicide application, production was high. Farmers claim to have yields of as many as 3.8 tons when 2.5 is the average for Giza 171 and 172. The extent to which the increase is attributable to the seed drills will require some controlled tests should such an exact determination be thought to be necessary.

7.0 OPERATION OF THE COMBINE HARVESTER

Although a bailer was still not used in conjunction with the combine harvesters, farmers reacted positively to its operation. In contrast, when used for wheat harvester, the absence of a bailer aroused much hostility among farmers. This must reflect the lesser importance of rice straw. It is rarely burned in the fields, as some project extension agents have suggested. Rather, it is most commonly mixed with the first and second cuttings of bersim and fed to animals.

The combines themselves were said to have operated well. However, farmers complained that spare parts were not available so that one used in Sharqia was out of operation for ten days becuase there was no filter.

Unfortunately, only one of the farmers interviewed had used both the seed drill and the combine harvster. A greater continuity in the providing of demonstrations would be preferable.

8.0 THE SELECTION OF FARMERS FOR DEMONSTRATIONS

Interviews with many of the farmers who used the seed drills and combine harvesters in Sharqia and an examination of the list of additional users revealed that almost all of them are large landholders. This selection of large, influential landholders was also found to be the case in Sharqia when equipment for wheat cultivation was evaluated for an earlier report.

While there is nothing particularly wrong with choosing large landholders (sometimes called key farmers), their exclusive selection is a disturbing point. It can only reinforce the view in some quarters that the project is only for rich villagers, as expressed by a group of farmers in a project village.

There is no reason why small holders cannot also be chosen. It might be advisable for the Cairo extension supervisors the selection of farmers for machinery demonstrations, particularly Sharqia.

9.0 POTENTIAL SAVINGS THROUGH MECHANIZATION

Farmers have the potential of realizing significant savings through a reduced dependency on hired labor should the cultivation of rice be mechanized. These savings will be even greater if a careful herbicide program is instituted in conjunction with the use of machinery. Certainly, rice is one of the most labor intensive crops to grow; farmers estimate that hired labor per feddan for nursery preparation through winnowing is roughly 200 L.E. The following table indicates the activity, labor requirement, and maximum cost using only hired labor.

HIRED LABOR REQUIREMENTS AND COSTS FOR RICE

Activity		Cost/worker	No. workers	Total
Nursery:	land prep. levelling	2	1	2
	weeding	1.50	5	7.50
	pulling seedl.	1½-2	[illegible]	6-8
	transp. seedl.	2	3	6
Field:	prep. land	2	1 x 2 days	4
	transplanting	2	8	16
	1st weeding	1.50	15	22.50
	2nd weeding	1.50	10	15
	harvesting	3	12	36
	tying stalks	3	4	12
	transp.	3	2	6
	(camel trans.)			25
	threshing	2	4	8
	shaking seeds	2.50	10	25
Total			L.E.	191

Practically, the greatest savings will likely be felt in the mechanizing of planting and the use of herbicides.

The use and maintenance of the seed drill appear to be within the limits of ability of village operators. Its purchase price is not prohibitive. However, real savings to be gained from mechanizing harvesting are probably not going to be realized because of the expense of the combine harvester and its requirements for maintenance. If foreign projects have difficulty keeping the machinery in working order, will government offices have more success and, more importantly, will private operators invest their capital in such equipment?

The protential that farmers have in realizing savings by mechanizing may, alas, not be enjoyed because of managerial and investment constraints. Still, it seems likely that the seed drills do have a positive impact on production and may increase income through greater earnings.

10.0 RECOMMENDATIONS

(1) Using seed drills requires an accompanying carefully designed program of weed management. Therefore, farmers who agree to have their rice drilled must be provided with herbicides, either at their expense or from the project. A special arrangement with governorate agricultural directorates may be required to obtain the herbicides at their subsidized prices. No land ought to be drilled without available herbicides, and all mechanization extension agents ought to be fully informed of their appropriate application. The Egypt Rice Research and Training Project has developed an extension program, called Mabrouk 4, which sets forth eleven steps to be followed by farmers for better rice cultivation. Although the method of planting is nursery/transplanting, it can be easily adapted to drilling.

(2) Drilling rice may place an increased pressure on a village's water supply. It may be necessary to negotiate with responsible irrigation officials resulting in an increased quota.

(3) Farmers were pleased with the performance of the seed drills but found that germination was delayed by one week. They suggested soaking the seeds beforehand, but this is unsuited to the drill's operation. They also complained about the depth to which the seeds were planted. The Extension Component might wish to adjust the drills or design an extension program about the operation of the drill since farmers remain concerned.

(4) Most of the farmers who used the seed drill did not use the combine harvester as well, although many of them had expected to. It might be advisable to have greater continuity in the demonstrations by providing the same farmer with both pieces of equipment to show the full effects of mechanization.

(5) Farmers who have used project equipment in Sharqia Governorate continue to be almost exclusively large landholders. While there is nothing wrong with choosing large holders, it does reinforce the view in some quarters that the project is only for rich farmers. There is no reason why small holders should not also be chosen. It might be advisable for the Cairo extension supervisors to oversee the selection of farmers for machinery demonstrations to see that the broad spectrum of holders is represented, particularly in Sharqia.

Annex E: Agricultural Labor and Wages in the Villages of the Agricultural Mechanization Project.

AGRICULTURAL LABOR AND WAGES IN THE VILLAGES OF THE AGRICULTURAL MECHANIZATION PROJECT

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INTRODUCTION

Wage rates reflect many factors in the agricultural sector. They provide an indication of the rural worker's welfare, particularly of the landless laborer since he depends almost entirely on wage labor for his income. Wages also are an important crop and livestock cost of production. In addition, wages provide an indication of labor availability, as well as of labor demand.

OBJECTIVE

No studies in Egypt have yet paid attention to prevailing interregional differences in wages, emigration, and other factors which are thought to affect labor availability and labor requirements. Those few studies which have focused on agricultural wages (Richards and Martin 1981a, 1981b) have looked either at a particular governorate or the nation as a whole. The objective of this study is to examine the interregional variations in both in-season (IS) and out-of-season (OS) agricultural wages and explain the reasons for such variations.

The major thesis developed in this study is that factors on the supply side such as emigration, population density, and the extent of participation of landless laborers and small holders in the agricultural work force constitute important determinants of wages. It is also believed that factors on the demand side, such as the level of mechanization and cropping intensity, may have some effect on the level of wages.

METHODOLOGY

To test the above argument, we have made use of the available data on in-season and out-of-season wages and on other variables at the village level. The data used here were collected by the Evaluation Unit of the Ministry of Agriculture-U.S.A.I.D. Agricultural Mechanization Project. During 1981 and 1982, there was a project monitor working full-time in each of the Project's twenty-three villages in the five governorates of Beheira, Gharbia, Qalubia, Sharqia, and Minia. Data on village characteristics were collected in February 1982 (cf. Reiss, Lutfi, Nasr, and El Tunsi 1982). Data on agricultural wages were collected in April 1982 (cf. Reiss, El Haddad, El Yamany, and Lutfi 1983). Data on village characteristics were obtained from key informants and on agricultural wages from twenty landholders and twenty landless laborers in each of the twenty-three villages. In addition, twenty emigrants or members of their families in each village were also interviewed.

Utilizing this village level data, it is possible to make a statistical analysis of the relationship between the in-season and out-of-season agricultural wage levels and a number of other factors which are expected to have some impact on wages.

For the analysis, the following explanatory variables were computed:

1. Extent of emigration (% of emigrants in the total population
2. % of landless laborers and small holders (with less than one feddan) in the total number of holders. The landless laborers and small holders are assumed to be the main source of wage laborers.

3. Man-land ratio

4. % of village land in vegetables

5. % of village land in labor intensive winter crops

6. % of village land in labor intensive summer crops

7. Index of mechanization level (a composite index of tractor, plow, and thresher availability)

8. Feddans/Tractor

In addition, two indicators of agricultural wages were used: in-season wage mode and out-of-season wage mode, that is, those values with the greatest frequency of occurrence. A simple correlation matrix was computed among the study variables. A high correlation coefficient was observed between the availability of tractors and the agricultural mechanization index, both of which measure the level of mechanization. It was decided that only one of these variables be used in a single regression analysis. Likewise, a high correlation was observed between the man-land ratio and the percentage of landless laborers and small holders in the villages. Therefore, it was decided to include only one of these measures in a single regression.

Several multiple linear regression equations were computed for each of the two measures of agricultural wages. One-tailed t-tests were used to test the significance of partial regression coefficients. Two levels of significance were considered: .1 and .05 levels. The results of the study will be presented for each measure of agricultural wages separately.

The regression and correlation results are shown in Tabels 1 and 2.

THE FINDINGS

Since two measures of agricultural wages are [illegible] ed in this study, the results pertaining to each will [illegible] presented separately. The results of in-season wages will be presented first. This will be followed by an examination of the out-of-season wages. Finally, some comments will be made concerning a comparison of these results.

Theoretically, one might expect a positive relationship between the percentage of land planted with vegetables, the percentage of land planted with labor intensive winter crops and with labor intensive summer crops, and the extent of emigration and in-season agricultural wages.

On the other hand, a negative relationship is expected between the availability of tractors and the availability of labor (as indicated by the percentage of landless laborers and small holders or man-land ratio) and in-season agricultural wages. The correlation coefficients show that the only two independent variables that correlate significantly with in-season wages are the percentage of land in vegetables (.47) and the man-land ratio (.33). However, while the first correlation coefficient is in the expect direction, the second is not. The other independent variables do not correlate significantly.

In the first linear function of in-season wages, six independent variables are included. These are percentage of vegetables, percentage of labor-intensive winter crops, percentage of labor-intensive summer crops, availability of tractors, emigration rates, and man-land ratio. The coefficient of multiple determination obtained amounted to .517 which is statistically significant. This indicates that the six

variables combined explain more than half the variance in in-season wages. Examination of the partial regression coefficients shows that percentage of vegetables and man-land ratio make significant unique contributions at the .05 level. It also shows that availability of tractors makes a significant contribution at the .1 level. The other variables do not make any significant unique contribution. The standardized partial regression coefficients indicate that percentage of vegetables makes the greatest uniques contribution followed by man-land ratio and availability of tractors, in that order. The signs of partial regression coefficients show that the influence of the percentage of vegetables and availability of tractors are in the expected direction. However, the impact of man-land ratio is not in the expected direction. This may be due to the nature of the measure that does not exclude the dependents and the non-agricultural portions of the population.

In the second linear function of the variable concerning in-season wages, the percentage of landless was substituted for the man-land ratio as a measure of the availability of manpower with the other variables remaining the same. The results indicate that the coefficient of multiple determination dropped to .445. This means that the six independent variables combined to explain 44% of the variance in the in-season wages. Percentage of vegetables and availability of tractors are the only two variables with significant regression coefficients. Percentage of the landless does not have any significant effect.

When the mechanization index was used to substitute for the tractor/feddan ratio, with other variables held constant,

a multiple determination coefficient of 146 was obtained. Percentage of vegetables and man-land ratio are the only variables that make a significant impact.

In a fourth multiple linear function, percentage of vegetables, availability of tractors, emigration level, and man-land ratio were included. In this case, each of the four variables could be ordered on the basis of the standardized partial regression coefficient, as follows: percentage of vagetables, emigration level, man-land ratio, and availability of tractors. The four variables combined to explain roughly 46% of the variance in in-season wages. When the mechanization index is substituted for availability of tractors, the proportion of explained varianece dropped to 41%. In addition, the mechanization index does not have any significant impact.

The results of these multiple linear functions indicate that the independent variable % of land in vegetables has the strongest impact on in-season wages. Emigration level has a marginal effect on the variable, although it does reach the .05 level of significance when the number of predictive variables is reduced. It is also clear that the availability of tractors as a measure of mechanization level has a greater predictive value than the mechanization index. This may be due to the key multipurpose role of tractors in agriculture. Likewise, man-land ratio as a measure of the availability of labor is of greater utility in predicting in-season wages that is the percentage of the landless. However, the direction of the relationship between man-land rati and in-season wages is not always in the same direction. This may be due to the availability of the other work opportunities in the heavilty populated villages and/or the crude nature

of themeasure. The percentage of labor-intensive field crops in winter and summer does not influence in-season wages to any appreciable degree. However, the percentage of labor-intensive summer crops has a consistently larger partial regression coefficient than the percentage of labor-intensive winter crops. When the two measures were eliminated from the function, the expalined variance cropped from 51.7% (in the first function) to 46.6% (in the fourth). The greatest explanatory power is attained in the first equation where the percentage of vegetable area, percentage of labor-intensive summer crops and of labor-intensive winter crops, availability of tractors, emigration rate, and man-land ratio were used as predictive variables.

One may conclude that the labor demand side variables (represented by percentage of vegetable crop area and the availability of tractors) are more salient in explaining the interregional variation in in-season wages than are the supply side variables (represented by the level of emigration, man-land ratio, an the percentage of landless in the population).

We now turn to an analysis of the out-of-season wage determinants. As stated earier, it is expected that there will be a positive relationship between percentage of vegetable area, percentage of labor-intensive summer crops, percentage of labor-intensive winter crops, and emigration level and out-of-season wages (or low season wages). On the other hand, a negative relationship is expected between level of mechanization, percentage of landless and man-land ration and out-of-season wages. The computed simple correlation coefficients show that percentage of vegetable area, availability of tractors and mechanization

index correlate significantly with out-of-season wages in the expected direction. The other variables do not correlate significantly with out-of-season wages. The direction of the correlation coefficients is similar to those obtained for in-season wages mentioned earlier. Man-land ratio correlates highest with out-of-season wages followed by percentage of vegetable area, mechanization index, availability of tractors, and percentage of landless laborers, in that order.

When a multiple linear function of out-of-season wages is made (using percentage of vegetable area, percentage of labor-intensive summer and of winter crops, availability of tractors, emigration rate, and man-land ratio as predictive variables), a multiple determination coefficient of .628 is obtained. This means that these six variables explain 62.8% of the variance in out-of-season wages. Partial regression coefficients show that the three variables of availability of tractors, emigration rate, and man-land ratio have their impact on out-of-season wages which is significant at the .05 level. Percentage of vegetable area makes a contribution that is significant at the .1 level. The direction of the partial regression coefficients is in the expected direction, expect for man-land ration. Man-land ratio makes the greatest impact, followed by emigration rate, availability of tractors, and percentage of vegetable area. This indicates that the variables that reflect the availability of labor are more salient in explaining out-of-season wages, compared with the labor demand variables.

In the second multiple linear function, man-land ratio was substituted with the percentage of landless with the remaining variables held constant. The results show that

the coefficient of multiple determination is .48 and that the availability of tractors makes a contribution that is significant at the .05 level. Percentage of vegetable area and emigration rate make contributions that are significant at the .1 level. Thus, substituting the percentage of landless for the man-land ratio resulted in a loss of the explanatory power of the equation.

In the third multiple linear function, mechanization index was used instead of the availability of tractors. In this case, the six independent variables explained 58.8% of the variance in out-of-season wages. Mechanization index, emigration rate, and man-land ratio had significant influence. Man-land ration has the greatest influcence followed by emigration rateand mechanization index. The direction of the partial regression coefficient of man-land ratio is in the opposite direction. Thus, substituting machanization index for availability of tractors yields slightly less explained variance and caused the effect of the percentage of vegetable area to diminish.

In the fourth function, percentage of vegetables, availability of tractors, emigration rate, and man-land ratio were used as independent variables. The coefficient of multiple determination in this case is 611 which is very close to that obtained in the first function above. Each of the four independent variables has a significant influence. Man-land ration makes the greatest contribution followed by emigration rate, availability of tractors, and percentage of vegetable area.

When mechanization index is substituted for availability of tractors (as afifth function), the coefficient of multiple determiantion dropped to .559, but the rank of the

independent variables was not altered.

The results of the five multiple linear functions illustrate that the best explanatory power is attained when the four variables of percentage of vegetable area, availability of tractors, emigration rate, and man-land ratio are used. It is also clear that the man-land ratio is of a better value in explaining out-of-season wages that is the percentage of landless laborers. Both measures of level of mechanization are important in explaining out-of-season wages, but the availability of tractors seems to give a higher explanatory power. It also appears that the variables that reflect labor availability (man-land ratio and emigration rate) are more salient in expalining out-of-season wages than the variabels that reflect labor demand (percentage of vegetable area, level of mechanization). The most problematic finding that runs across functions is the postiive relationship between man-land ratio and out-of-season wages. This may be because the measure is rather crude and/or the availability of non-agricultural work in the heavily populated villages.

CONCLUSIONS

1. An examination of the percentage of explained variance in the various functions reveals that the out-of-season wages are more responsive to changes in the independent variables than are the in-season wages. The percentage of variance explained in any multiple linear function of out-of-season wages is greater than its counterpart in in-season wages.

2. The partial regression coefficients show that the relative impact of the independent variables on the two measures of agricultural wages differ. Thus, while the independent variables

that reflect labor demand are more salient in explaining in-season wages, the indepedent variables that reflect labor availability are more salient in explaining out-of season wages.

3. For both in-season wages and out-of-season wages, availability of tractors has a grater impact then mechanization index as measures of the level of mechanization. Likewise, man-land ratio has a greater impact than percentage of landless in both cases. On the other hand, emigration rate is of greater importance in explaining out-of-season wages than it is in explaining in-season wages.

Table 1 THE RELATIONSHIP BETWEEN LABOR REQUIREMENTS AND LABOR AVAILABILITY AND IN-SEASON WAGES

Variable	r	Partial Regression Coefficients (1)				
		1st Func.	2nd Func.	3rd Func.	4th Func.	5th Func.
% of Vegetable Area	.47**	.087** (.604)	.0875** (.61)	.073** (.506)	.068** (.474)	.055** (.38)
% Labor-intensive Summer Crops	-.04	.0122 (.31)	.0104 (.26)	.0118 (.30)	-	-
%Labor-intensive Winter Crops	-.16	-.0036 (.04)	.0002 (.002)	-.007 (.07)	-	-
Feddans/Tractor	-.22	-.0081* (.330)	-.0082 (.332)	-	-.0086** (.347)	-
Mechanized Index	-.26	-	-	-.0585 (.17)	-	-.0786 (.23)
%Emigrants	.04	.0035 (.315)	.003 (.296)	.0029 (.286)	.0047** (.46)	.004** (.40)
%Landless and Small Holders	.24	-	.0171 (.29)	-	-	-
Man-land Ratio	.33*	1.877** (.43)	-	2.034** (.464)	1.698** (.387)	1.788** (.41)
Constant term		1.168	1.034	.6166	1.778**	.996
R^2		.517	.445	.4597	.466	.41

(1) Figures in parentheses are the standardized partial regression coef.
* significance at .1 level
** significance at .05 level

Table 2 THE RELATIONSHIP BETWEEN LABOR REQUIREMENTS AND LABOR AVAILABILITY AND OUT-OF-SEASON WAGES

Variable	r	Partial Regression Coefficients (1)				
		1st Func.	2nd Func.	3rd Func.	4th Func.	5th Func.
% of Vegetable Area	.43**	.039** (.32)	.045* (.35)	.0199 (.162)	.0500** (.41)	.035** (.29)
% of Labor-intensive Summer Crops	-.34	-.006 (-.181)	-.0076 (-.231)	-.007 (.21)		
%of Labor-intensive Winter Crops	-.18	-.004 (-.05)	-.0003 (.0035)	-.0075 (.091)		
Feddans/Tractor	.38*	-.0095** (-.451)	-.01** (-.471)		-.0096** (.451)	
Mechanized Index	.43**			-.1098** (.371)		-.109* (-.371)
% of Emigrants	.04	.0045** (.521)	.0038* (.441)	.0042** (.485)	.0039** (.45)	.0034** (.313)
% of Landless and Small Holders	.330*		.014 (.28)			
Man-land Ratio	.513**	2.027** (.541)		2.136** (.571)	2.055** (.551)	2.15** (.574)
Constant term		1.621**	1.731*	.941	1.247*	.038
R^2		.628	.481	.588	.611	.559

(1) Figures in parentheses are the standardized partial regression coefficients
* significance at .1 level
** significance at .05 level

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Annex F: Evaluation of Field Cultivators.

FIELD CULTIVATOR TESTS IN SAKHA

JUNE, 1984

I. Introduction

A large per cent of the primary tillage conducted in Egypt in the past few years has been accomplished with a chisel implement that was manufactured by the Behera Company or one with a very similar design. This implement does an acceptable job of tilling the surface 10-15 cm of soil with two or three passes in different directions. If mechanical planters are to be employed secondary tillage is required to reduce the size of soil clods left by this chisel implement in order to obtain satisfactory coverage of crop seed. It is recognized that the draft required by this chisel implement is rather high, and if the implement is not used for at least three different passes all of the surface soil will probably not be broken up and as a result all of the existing weeds will not be killed. It has been known through past experience and/or review of research literature that changes in the design of this chisel implement can result in an implement that will require less energy and fewer passes of the implement to accomplish an equivalent or better job of tilling soil.

Two different implements were designed and constructed in an effort to develop one that will do at least as good or a better job than the commonly available chisel implement. An Attempt was made

to design an implement that will breakup all of the surface layer of soil in one pass with less energy and that can be manufactured locally. One of these new implements hereafter referred to as the " Moustafa " was designed by staff members of the Alexandria University Agricultural Engineering Department. The other one hereafter referred to as the " TTS " was designed at the Ministry of Agriculture Tractor Test Station in Alexandria. Both of these implements were designed with wings or wider points than are commonly considered a chisel and therefore more nearly fit the description of a field cultivator. For this reason throughout the remainder of this report they will be referred to as a field cultivators. Both implements were fabricated in the Tractor Station machine shop.

In an effort to evaluate the effectiveness of these two new implements field tests were planned to compare their performance with that of the Behera chisel. A fourth implement, imported from England, that shows high promise of fitting the needs of Egypt in primary tillage was included in the planned tests. This implement consists of springtines that are spaced close enough that it also is called a field cultivator. Manufacturers of this type of implement claim that an additional factor to soil breakup is added through the coil springs that produce additional oscillations due to differences in soil strength. The Sakha Experiment Station was selected for the test location because it contains some of the more difficult soils.

II. Test Objective

To collect valid test data that will perhaps be used as a basis to select the field cultivator that is most suitable for Egytian conditions and that can be manufactured locally.

III. Test Plans

Two series of tests have been planned - one series will maintain a constant depth of operation at different speeds of operation and the other series will maintain a constant speed at different depths of operation. Different speeds selected were 3, 6, and 9 km/hr while operating at a 15 cm depth. The different depths selected were 10, 13, and 16 cm while operating at a speed of 6 km/hr. Drawbar pull will be measured wich a hydraulic dynamometer located between two tractors. Ten replications will be run for each test. Soil bulk density and moisture samples will be taken before tillage at 10 randomly selected locations across the test area, and at each location samples will be taken at three different depths, surface, 10, and 20 cm. Resistance to penetration of a cone penetrometer before tillage will be measured at 20 randomly selected locations throughout the test area. As a measure of change in soil volume due to tillage 10 surface elevations across a pass tilled at 6 km/hr will be measured relatively to the original soil surface. Then all soil that has been disturbed by the implement will be removed to determine the contour of soil at depth of tillage and to determine the exact area of soil disturbed by each implement. To determine the effectiveness of each

implement with respect to soil breakup a photograph will be taken of a 10 cm square grid placed on the tilled surface; one photograph of each implement operating at 6 km/hr will be taken in each replication, or 40 photographs.

IV. Experimental Design

A randomly complete block design will be used for implement force measurements on 10 blocks or replications. A complete test will consist of one pass of an implement for a distance of approximately 150 meters. This 150 meters will be divided into three equal parts for the three different speeds of operation which will be randomly located within the three parts, Fig. 1.

V. Test Procedure

Forty plots were staked out for Series 1 tests (constant depth of operation at three different speeds of operation). Width of each test plot was three meters and the length was more than 100 meters which was quite adequate for conducting the tests. Due to a very dry condition in the surface 10 - 12 cm of soil it was impossible for a person to push the Soil Test Penetrometer at a constant rate so these measurements were not made. Also due to a dry-hard surface soil condition it was very difficult to take accurate samples for bulk density and moisture content so only five samples were taken randomly located across the test area. All four implements are three-point hitch mounted. The hydralic drawbar dynamometer used for measuring

draft required that it be mounted between two tractors. A Ford 4600 was used to mount the implements on and this system was connected to the drawbar of a Ford TW 30 by the dynamometer and chains. The Ford TW 30 had sufficient power and weight that wheel slippage was very low which permitted close control of speed of operation.

Before tests with each implement were initiated the implement was mounted on the Ford 4600 and carefully adjusted for normal operating orientation in all directions. Due to soil conditions it was decided that a 13 cm depth of operation would be more appropriate than 15 cm. Each implement then was positioned on a plane surface and the depth wheels were adjusted for the 13 cm depth. Unfortunately depth wheels were not available for the British cultivator and the Ford 4600 depth control system was not adequate to maintain constant depth so data for this implement will not be included in the report. On an area of soil adjacent to the test area the team of two tractor drivers and dynamometer reader similated test runs until a good coordination of procedures was developed. Then the TW 30 tractor was calibrated to operate at 3.4, 6.4, and 8.8 km/hr for convenience rather than 3, 6, and 9 km/hr.

The randomized tests were then conducted according to the plan in Fig. 1. There were only two implement failures during the entire test, one bolt was sheared on the Moustafa unit and one set of sweep wings on the Tractor Test Station unit closed to a certain extent in a very hard soil condition. All three sweep units were carried to a local shop which welded a rectangular steel bar between the wings

and this proved adequate during the remainder of tests. It is believed that a better quality steel of the same dimension as the present wings would be adequate without the added steel support bar. Approximately 90 kg of weight had to be added to the Behera inplement in order to maintain depth of operation.

Photographs with the grid were taken to determine size of soil clods on the surface. Resistance to penetration with a drop type cone penetrometer were taken on two replications of each tool to a 25 cm depth before and after tillage to determine if the implements caused any soil compaction below the depth of tillage. Plot stakes were inadvertently removed before distrubed soil contours could be measured. Several irrigation drainage ditches between some of the plots made accurately re-establishing these plot stakes questable so these measurements were not taken.

All of the available land area was used for this first series of tests that were proposed with depth held constant for three different speeds of operation. The procedure of these test once they were initiated went smoothly and there was no reason to not expect that the data were valid and would accurately classify the implements. Due to the time required to located another area of soil and to conduct tests of the proposed second series it was decided to postpone this work until a later date.

VI. Discussion of Data

Table I contains actual readings obtained from the dynamometer dial indicator as tests were run. The soil surface was very hard and dry so the value for rolling resistance that was read from the dial indicator was only 50. This reading was valid for all implements within the accuracy of reading the dial. The dynamometer calibration factor is 1.76. Hence, implement draft = (dynamometer reading - 50) 1.76. Table II contains the same data as Table I but the data are arranged in a different order for better visual comparison. It is noted that with the exception of a few wild values data variations between replications are normal for a heavy clay soil. One note of interest is that at all three speeds of operation data for tool II tended to be rather high for the last four replications. There was no obvious reason for this during tests so there is no explanation since this did not occur with implements I and III.

Table III contains data of Table II except the dynamometer readings are converted to draft by the equation " Draft = 1.76 (Dynamometer Reading - 50). Further, since the implements were not the same width these data were calculated on the basis of 1 meter width of tillage so they can be compared directly. Table IV shows the average draft per meter width of implement for the 10 replications at the three speeds of operation. The Behera implement (I) is widely used in Egypt and draft requirements for it will be used as a basis to compare implements II and III. Table V is presented for easy comparison, and the draft requirements for implement I is considered to be 100%. Numbers for implements II and III are ratios of their respective draft to that

for implement I at the three different speeds.

Figure 2 is a photograph of the area before tests. Figures 3 and 4 are photographs of a 10 cm grid placed on tilled soil for the three implements. It was thought based on visual observations during tests that there was very little difference in soil breakup for implements II and III, especially at the two higher speeds of operation. Further, in certain replications implement I appeared to do a little more breaking up of clods than II and III but this cannot be seen in the photographs of Figures 3 and 4. This is a montmorillonitic soil and it was in a very dry state within the surface 10 cm. During a drying cycle of this type of soil high stresses are created due to shrinkage which forms cracks and develops various sizes of very hard clods. Tillage tools of the type used in these tests that cause soil structural failure primarily by compressive forces are limited in ability to break down soil clods of this nature. In general there were no great differences in soil pulverization caused by the three implements when operating at 6.4 and at 8.8 km/hr. When operating at 3.4 km/hr implement I did a better job of breaking up soil than did implements II and III because of a greater approach angle of the part of the tool that contacts the soil. Implement III should be operated at a minimum speed of 5 - 6 km/hr. All three implements did a better job of breaking up soil clods at the higher speeds but this was accompanied with an increase in draft, Table IV. Hence, if tractor power is available to operate at the higher speeds consideration should be given to the relative economics. Soil tilled by either of the three implements will require secondary tillage but higher speeds will reduce

the amount. Higher speeds will reduce cost of labor but will increase the quantity of required fuel. Another factor to consider is that implement I required considerably higher draft plus it must be used two or three times to break up all of the soil layer.

VII. Conclusions

1. In general there were no great differences in ability to break up the soil clods between the three implements, especially at 6.4 and 8.8 km/hr.
2. The TTS implement III required 60% as much draft force as did the Behera implement I.
3. The Moustafa implement II required 79, 72, and 70% as much draft force as did the Behera Implement I at operating speeds of 3.4, 6.4, and 8.8 km/hr respectively.
4. Degree of soil breakup increased with speed for all three implements but the draft also increased with speed. Increase in speed from 3.4 to 6.4 km/hr required 14, 5, and 11% increase in draft for Implements I, II, and III respectively.
5. When soil is as dry and as hard as in these tests the operating speed of 8.8 km/hr was excessive for continuous field operation but all implements performed well at 6.4 km/hr.
6. The TTS implement III should be operated at a minimum speed of 5 - 6 km/hr.
7. The TTS implement III shows high promise that it can be developed to give considerable advantage over those of the common chisel implement. The TTS will breakup the entire soil surface with one pass and with less draft.

8. One development that is needed but not necessary is to use a better quality steel such as a 1020 or 1040 series that can be heat treated to a hardness of Rockwell C 40-44. Alternatives available are make the tool smaller, use thicker steel, or use a lateral brace between the wings.

9. Another development opportunity is to use different configurations of the implement so sketches of two different possibilities are attached. Sketch I offers several advantages such as any implement should be designed to keep tractor wheels off of tilled soil, the sweep units are smaller so local steel can be used, and the entire implement can be manufactured locally.

It should be noted that the present unit is not constructed as it was originally designed. The wings and chisel point are supposed to be bolted to the standard so they can be replaced when worn out, and the standard shape is more complicated than need be. Also the standard should be attached to the toolbar with shear bolts.

Plot No	Tool No	Speed - km/hr Dir. of Travel →	Plot No	Tool No	Speed - km/hr Dir. of Travel →
1	1*	3 9 6	21	1	3 9 6
2	4	3 9 6	22	2	9 6 3
3	3	9 3 6	23	4	9 6 3
4	2	9 3 6	24	3	9 6 3
5	1	3 6 9	25	3	9 6 3
6	4	3 9 6	26	1	3 6 9
7	3	6 3 9	27	4	3 6 9
8	2	9 3 6	28	2	6 9 3
9	4	9 6 3	29	2	3 6 9
10	2	9 3 6	30	4	3 6 9
11	3	3 6 9	31	3	3 9 6
12	1	3 9 6	32	1	3 6 9
13	4	3 9 6	33	1	9 3 6
14	1	3 6 9	34	3	9 3 6
15	3	9 3 6	35	2	6 3 9
16	2	6 9 3	36	4	6 9 3
17	4	9 3 6	37	1	6 3 9
18	2	9 6 3	38	2	9 6 3
19	1	3 6 9	39	3	6 3 9
20	3	6 9 3	40	4	9 3 6

* Tool number designations are as follows : Behera 9 Tine Chisel I, Moustafa II, TTS - III, British Springtine IV.

Fig. 1. Randomization chart for test layout with three different speeds of operation.

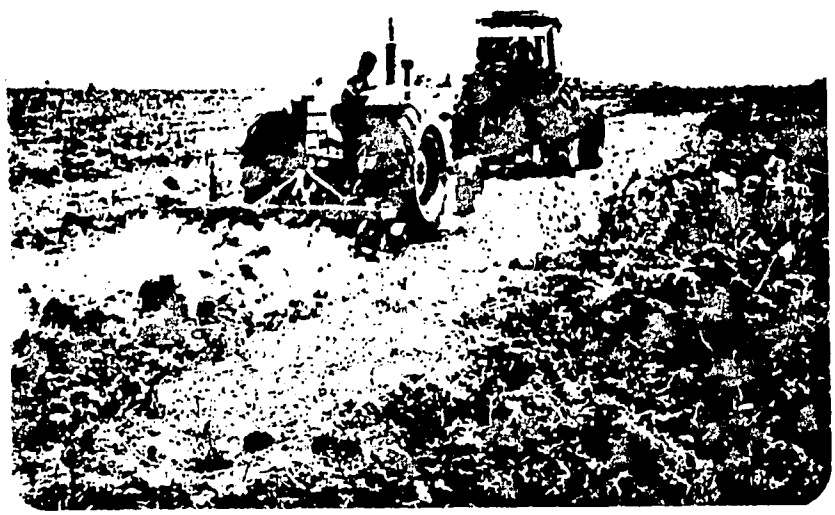
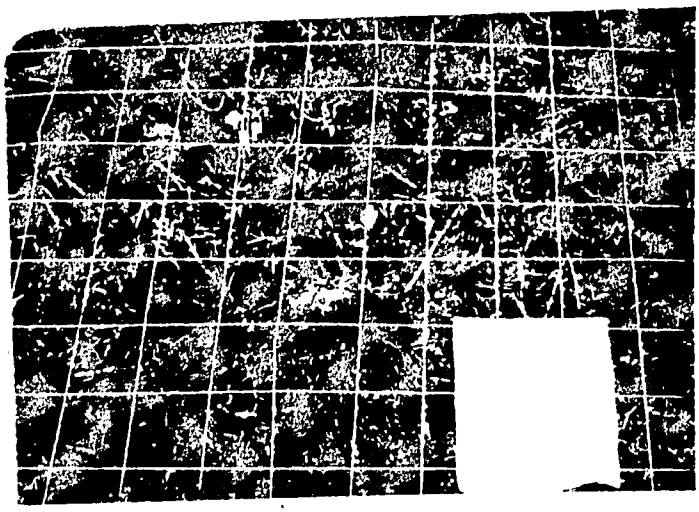


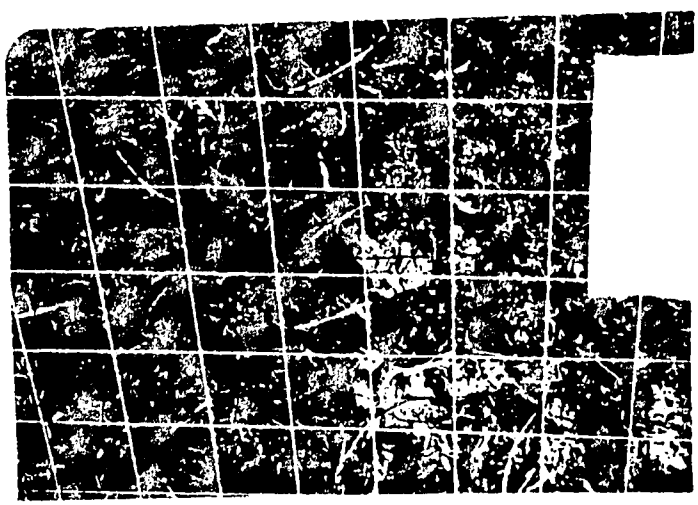
Fig. 2. Surface condition of the area in Sakha before field cultivator tests - June, 1984.

Average Measurements of Soil Condition.

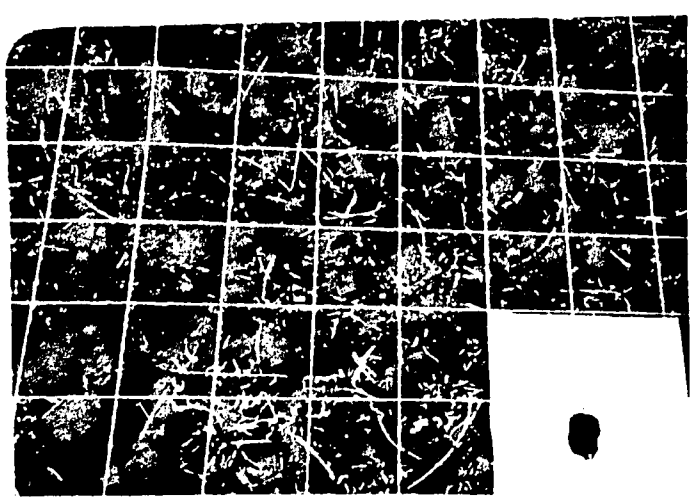
Depth, cm	M.C.	B.D., gm/cc
0 - 10	7.7	1.44
10 - 20	21.0	1.31
20 - 30	25.4	1.30



Behera 9-tine chisel,
Implement I.

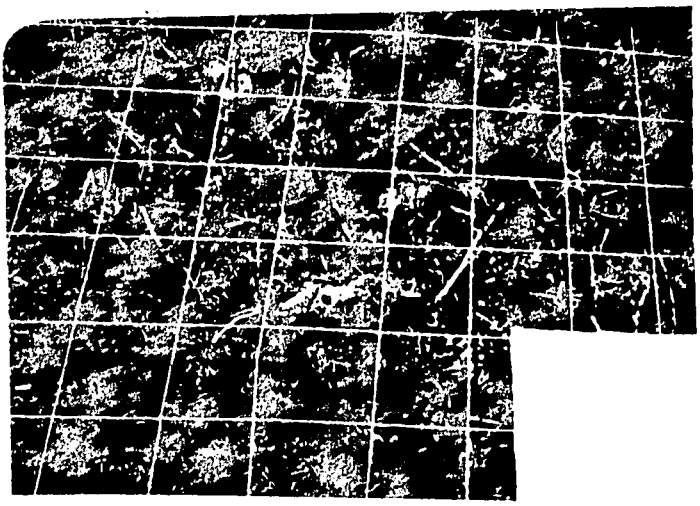


Moustafa field cultivator,
Implement II.

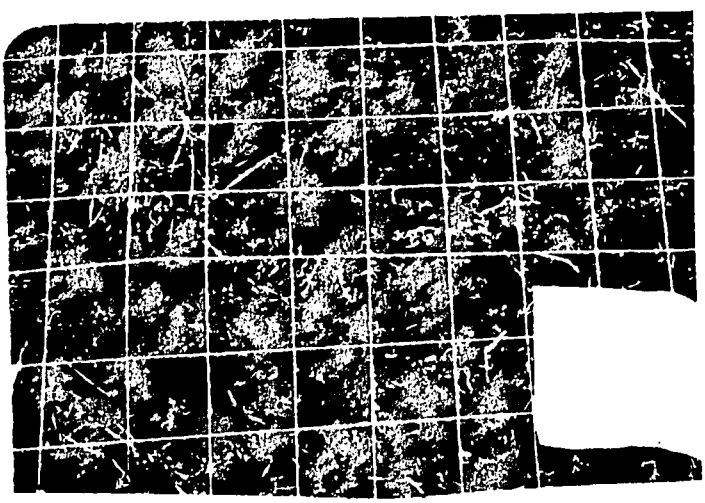


TTS Field cultivator,
Implement III.

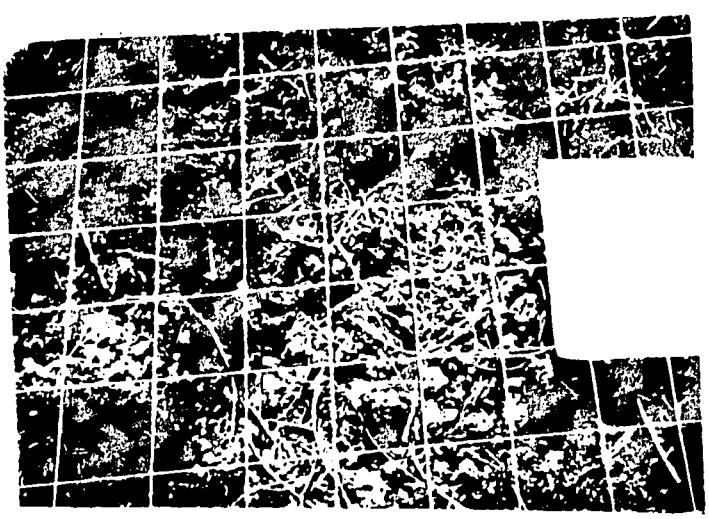
Fig. 3. Photographs of a 10 cm grid to show soil clods after field cultivator tests in Sakha, June 1984.



Behera 9-tine chisel, Implement I.



Moustafa field cultivator, Imlement II.



'TTS Field cultivator, Implement III.

Fig. 4. Photographs of a 10 cm grid to show soil clods after field cultivator tests in Sakha, June, 1984.

Table I

Field Cultivator Tests in Sakha - June 1984

Data sheet for measured Dyn. Readings*

Behera Chisel I; Moustafa II; TTS III; British IV**.

Plot No	Tool No.	Dyn. Read. 3.4 km/hr	6.4 km/hr	8.8 km/hr	Plot No.	Tool No.	Dyn. Read. 3.4Km/hr	6.4Km/hr	8.8Km/hr
1	1	700	900	900	21	1	1100	1250	1300
2					22	2	--	400	450
3	3	560	600	750	23				
4	2	650	660	700	24	3	600	550	500
5	1	1000	1100	1150	25	3	500	550	600
6					26	1	1050	1250	1350
7	3	500	550	600	27				
8	2	500	600	700	28	2	800	950	1000
9					29	2	800	850	900
10	2	650	650	700	30				
11	3	500	650	650	31	3	650	750	750
12	1	1050	1200	1200	32	1	1050	1100	1300
13					33	1	1100	1200	1350
14	1	1100	1250	1300	34	3	500	600	650
15	3	500	600	650	35	2	800	850	950
16	2	450	550	600	36				
17					37	1	1100	1250	1350
18	2	600	650	650	38	2	750	800	850
19	1	1050	1200	1750	39	3	450	500	650
20	3	550	500	600	40				

* Rolling resistance of a dynamometer reading of 50 was constant for all tests. Actual draft required to rupture the soil was = (Dyn. reading - 50) 1.76.

** There were no depth wheels for this implement so tests were canceled.

Table II

Field Cultivator Tests in Sakha - June 1984*.

Dynamometer Readings **.

Rep.	3.4 km/hr - Dyn. Read.			Rep.	6.4 km/hr - Dyn. Read.		
	I	II	III		I	II	III
1	700	650	560	1	900	660	600
2	1000	500	500	2	1100	600	550
3	1050	650	500	3	1200	650	650
4	1100	450	500	4	1250	550	600
5	1050	600	550	5	1200	650	500
6	1100	--	600	6	1250	400	550
7	1050	800	500	7	1250	950	550
8	1050	800	650	8	1100	850	750
9	1100	800	500	9	1200	850	600
10	1100	750	450	10	1250	800	500
Ave.	1030	667	531	Ave.	1170	696	585

Rep.	8.8 km/hr - Dyn. Read.		
	I	II	III
1	900	700	750
2	1150	700	600
3	1200	700	650
4	1300	600	650
5	1750	650	600
6	1300	450	500
7	1350	1000	600
8	1300	900	750
9	1350	950	650
10	1350	850	650
Ave.	1295	750	640

* There were no depth wheels for the British implement (II) and tests had to be canceled.

** Width of implements were :

Behera I = 2.0 meter

Moustafa II= 1.6 meter

TTS III = 1.6 meters

Draft = (Dyn. Read - 50) 1.76 where 50 is measured rolling resistance and 1.76 is the calibration factor.

Table III

Field Cultivator Tests in Sakha - June 1984 *.

Draft (kg/m width) - Implement Operating at a Depth of 13 cm **.

Rep. No.	3.4 km/hr Speed I	II	III	Rep. No.	6.4 km / hr Speed I	II	III
1	572	660	561	1	748	660	605
2	836	495	495	2	924	605	550
3	880	660	495	3	1012	660	660
4	924	440	495	4	1056	550	605
5	880	605	550	5	1012	660	495
6	924	--	605	6	1056	385	550
7	880	825	495	7	1056	990	550
8	880	825	660	8	924	880	770
9	924	825	495	9	1012	880	605
10	924	770	440	10	1056	825	495
Ave.	862	678	529	Ave.	986	710	588

Rep. No.	8.8 km/hr Speed I	II	III
1	748	715	770
2	968	715	605
3	1012	715	660
4	1100	605	660
5	1496	660	605
6	1100	440	495
7	1144	1045	605
8	1100	935	770
9	1144	990	660
10	1144	880	660
Ave.	1096	770	649

* There were no depth wheels for the British implement (IV) and tests had to be canceled.

** Width of implements were :

Behera I = 2.0 meters

Moustafa II = 1.6 meters

TTS III = 1.6 meters.

Draft = (Dyn. Read - 50) 1.76 where 50 is the rolling resistance and 1.76 is the calibration factor.

Table IV

Field Cultivator Tests in Sakha - June 1984.

Average Draft, kg per m width at 13 cm depth of operation, for 10 replications.

Implement Name & No.	Speed of Operation Km / hr		
	3.4	6.4	8.8
Behera - I	862	986	1096
Moustafa - II	678	710	770
TTS - III	529	588	649

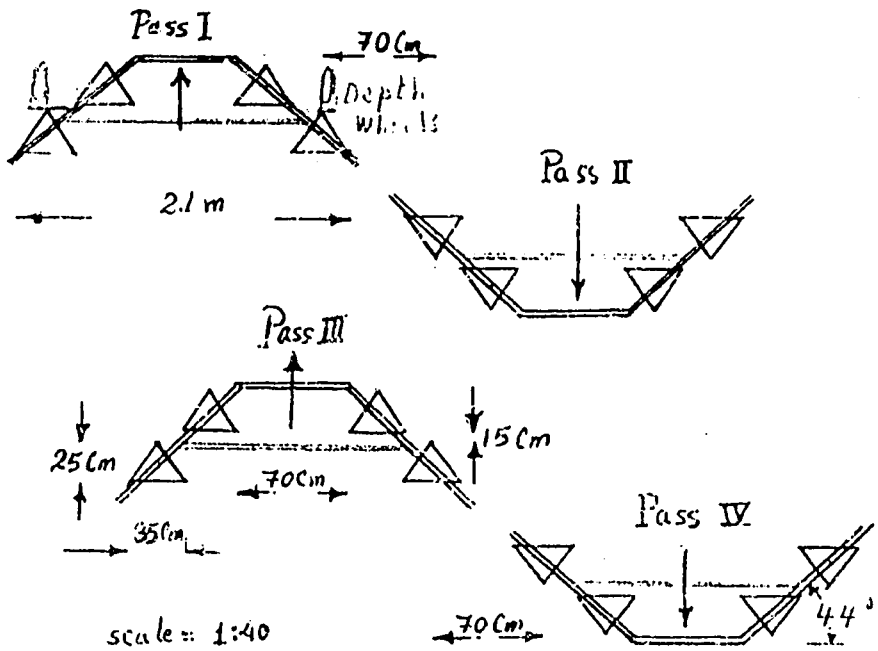
Table V

Field Cultivator Tests in Sakha - June 1984

Ratios of Draft Requirements for implements II and III Based on that for Implement I.

Implement Name & No.	Speed of Operation - Km / hr		
	3.4	6.4	8.8
I	100	100	100
II	0.79	0.72	0.70
III	0.61	0.60	0.59

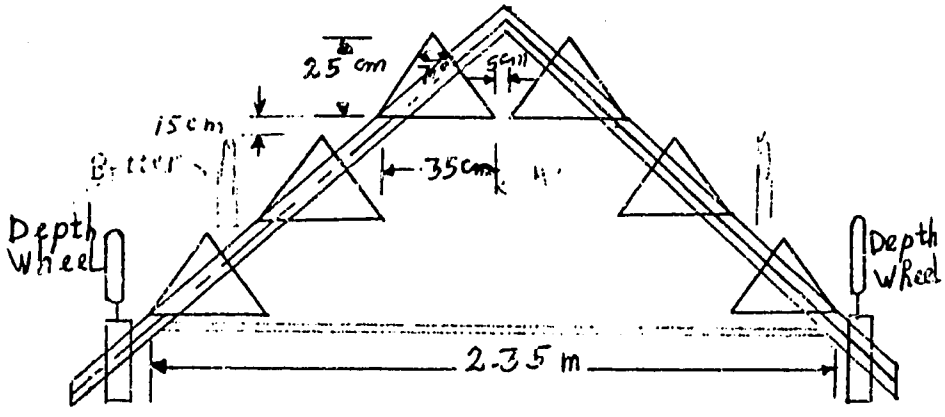
Proposed TTS Field Cultivator I - 60 hp Tractor , June 1984.



NOTES :

1. Maximum depth of operation = 15 cm.
2. Optimum speed of operation = 5-6 km/hr
3. Recommended tractor = 60 hp
4. The above sketches represent a complete cycle which is repeated until a field has been completely tilled.
5. This pattern of tillage was selected to prevent tractor tires from recompacting tilled soil.

Proposed TTS Field Cultivator II - 80 hp tractor, June 1984.



scale: 1:20

NOTES :

1. Recommended Tractor = 80 hp
2. For 60 hp Tractor remove 2 front sweeps.
3. Maximum depth of operation = 15 cm.
4. Optimum speed of operation = 5-6 km/hr
5. One objection of 6 sweeps is that in heavy weeds the 2 front sweeps may clog up.

Annex G: Wheat Threshing Evaluation: Behera Thresher, Deutz-Fahr 980 Combine, and Fortschritt Combine.

1. Behera thresher
2. Duetz-Fahr 980 combine
3. Fortschritt combine

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٧٠٤٣٦٤ - ٧٠٧٢٤٧

DATE _____ التاريخ

TESTS WITH A DEUTZ FAHR M980 COMBINE IN GIZA 155 WHEAT ON THE SAFT KHALED STATE FARM MAY 1984

I. INTRODUCTION

One of the Mechanization Project owned Deutz Fahr combines was operating in Giza 155 wheat on the the Saft Khaled State Farm near Etay El Baroud. The wheat was hand planted, approximately 120 cm high, had made a good yield, and there was very little lodging. There were few needs present except on the irrigation ditches and harvesting conditions were good except the grain moisture content was rather low, 10%. The combine operator was reasonably good and had had 11 months experience.

II OBJECTIVE

To determine the total grain loss from combining and bagging the harvested grain under normal farm conditions. It was hoped that a baler would be made available so that straw losses could be measured but this did not materlialize.

III. TEST PROCEDURE

1. The combine cut one or more passes around the field edges so that area harvested for each sample could be measured accurately.

2. Twenty $1m^2$ samples were taken at random locations over the field. A wooden frame was used and care was taken in sample location to insure that the entire field would be represented. A small laborer hand cut each sample close to the ground and placeed each sample in a different grain bag to prevent losses during transporting. All of the samples were taken to the central grain bagging area and weighed. A small laborer hand threshed and hand winnowed each sample. Finally the clean grain of each sample was weighed. The data were examined that right at the hotel and it was realized that something was wrong because the losses were too high. Upon checking the scales the next morning it was determined that the movements were dragging and not weighing properly. It was later determined in a shop that one of the knife edges was not properly placed. Unfortunately that grain samples had been destroyed, but fortunately approximately one fourth of the field had not been combined so more samples were collected, threshed, winnowed and carried to Cairo to be weighed.

3. For each sample of the first 19 the combine harvested four passes across the field and then travelled to the central bagging and weighing station to unload.

4. A normal farm crew was used to catch the grain in bags as it was discharged from the combine. After the grain had been unloaded this same crew weighed the grain into bags of 104kg. Care was taken to collect grain for each sample that was accidentally spilled onto a canvas located under the combine discharge chute.

5. During the time that the combine was unloading two people measured the area of wheat that had been harvested for that sample.

6. A total of 19 samples were harvested from this area.
7. An additional four samples of approximately one-half feddan each were harvested from the adjacent area. The same procedures that were used to collect the first 19 samples were repeated to collect these four.

IV. DISCUSSION OF DATA

Table I contains data for the $1m^2$ samples that were taken to determine grain yield before harvest. Note that there was more than 100% variation between the lightest and heaviest samples in the columns for grain plus straw and also for grain. The seed were planted by hand and considerable variation is to be expected but not this much. Plant population varied widely from area to area but visual observation did not reveal such a large variation in yield as did the measurements. The average calculated yield for grain per feddan was 2,020kg. Moisture content was rather low at 9.86%

Table II contains data for grain actually harvested by combine for 23 different samples, over an area of 7.8 feddans. The lowest yield harvested was 1424.1 and the highest was 2112.8 kg/feddans. Hence, the highest yield was 48% greater that the lowest. When flood irrigation is used it is common to consider that 1 fed=$4,000m^2$ and this value was used in all calculations. Again the differences in yield were greater than was obvious by visual observation. Base on the yield calculated in Table I from the $1m^2$ samples grain losses varied from a-4.6 to + 29.5%. It is difficult to pinpoint the reason for such large variations unless it was due to plant population. The combine operator, weighing crew and all other personnel used to make measurements were the same for all tests. Adjustments on the combine appeared to be good. If there were errors in measurements the most likely source was due to the very low quality of scales

available. The $1m^2$ samples were weighed with new set of butcher type of scales and the large bags of grain were weighed on a well used set of platform beam type scales furnished by the farmer. Before tests were started each set of scales was carefully balanced and they seemed to be operating properly, so if they were in error the error should have been consistently high or low but not alternating high and low as the data do.

Although values in the grain loss column may vary widely they do not vary more than the $1m^2$ samples do. The average loss of 13.77% is a little higher than it was expected to be from visual observations. One might sugges that more $1m^2$ samples would improve the quality of data bu this is not necessarily so since there is so much variatio between the $1m^2$ samples and also the combined samples, the only way that more yield data could improve the results would be to take sufficient $1m^2$ within each combined sampl area. That is , relate the yield of each combined sample to that of $1m^2$ samples taken within that area only. It is in general thought that the average loss grain of 13.77% is too high. Harvesting conditions were good.

Table I

1 meter Square Samples to Determine yield Before Harvest Tests with a deutz tahr combine in Giza 155 wheat on the

Sample No	G raint straw-kg	Grain kg	Yield per Fed - kg	Moisture Cont. - 070
1	3.0	.485	1940	10.0
2	3.1	.429	1716	9.0
3	3.4	.665	2660	10.2
4	3.9	.505	2020	10.0
5	3.4	.681	2724	10.2
6	2.5	.329	1316	9.9
7	2.0	.420	1680	10.2
8	3.1	.408	1632	11.0
9	3.3	.541	2164	10.0
10	2.5	.584	2336	10.8
11	3.1	.650	2600	10.0
12	4.0	.305	1220	9.5
13	3.5	.364	1456	10.0
14	4.5	.528	2112	8.5
15	5.3	.392	1568	10.5
16	2.5	.595	2380	9.5
17	3.7	.634	2536	9.8
18	3.0	.493	1972	9.5
19	3.3	.603	2412	9.5
20	3.2	.489	1956	9.2
Are	2.88	.505	2020	9.86

* with flood irrigation 4,000 m^2 = 1 feddan of usable land

** The scales were determined to be weighing inaccurately on the last 10 samples, and anadjust ment faetor was calculated from the first 10 samples All samples came from the same field

Table

Gain Harrested By the Deutz Fahr M 980 Combine

Giza 155 wheat on the saft kaled state Farm, May 1984

Sample No	Area Harrested m2	Grain Harrested-kg		Grain loss 070	Moisture content 070
		Area of sample	perfeddan		
1	1442.1	660	1830.7	9.4	10.5
2	1462.8	668	1826.6	9.6	10.0
3	1340.3	650	1939.9	4.0	9.8
4	1394.1	609	1747.4	13.5	9.8
5	1342.0	515	1535.0	24.0	9.5
6	1386.2	507	1463.0	27.6	10.2
7	1245.9	535	1717.6	15.0	9.5
8	1157.2	412	1424.1	29.5	9.8
9	1224.6	504	1646.2	18.5	9.5
10	1117.0	590	2112.8	4.[illegible]	9.0
11	1117.4	554	1983.2	1.8	9.5
12	1076.1	512	1903.2	5.8	10.0
13	1024.7	515	2010.3	0.5	9.5
14	1007.6	452	1834.1	9.2	9.5
15	980.8	427	1741.4	13.8	10.5
16	929.0	450	1937.6	4.1	11.0
17	871.5	329	1510.0	25.2	11.2
18	832.9	348	1671.3	17.3	11.0
19	1218.8	560	1837.9	9.0	10.5
20	2232.9	933	1671.4	17.2	10.5
21	1644.5	631	1534.8	24.0	10.0
22	2228.3	894	1604.8	20.6	9.5
23	2907.9	1148	1579.1	21.8	10.0
Are	7.8 feddans		1741.8	13.77	10.0

* Based on yield anerage befor harvest in 7 able I and cons dering that 1 faddan = 4 000 m^2.

FIELD TESTS WITH THE FORTSCHRITT COMBINE IN WHEAT ON THE SAFT KALED STATE FARM, MAY 1984

I. INTRODUCTION

One Mech. Project Duetz-Fahrr unit was combining in the same area as the Fortschritt. It was believed that both units could be evaluated in four days and the Fortschritt was more convenient so tests were initiated on it. This was an unfortunate decision because the combine required maintenance a large per cent of the time. The machine did not appear to have been used a large amount but it was in need of considerable preventive maintenance such as most of the drive belts obviously needed replacing and the conveyor chains either needed adjustments or replacing. Hand tools on the machine and in the shop were quite inadequate.

We were told during discussions with station personnel that combining would begin between 9-9:30 A.M. each day but the earliest it began was 11:30. We started collecting data about 1 P.M. on May 20 but due to the lack of accuracy in measuring the area actually combined for each sample all data collected this first day had to be discarded. An effort was made to insure that more care was taken in making all test measurements and more data was collected on May 21.

Six combine samples were measured but two of these proved to be greater yields than the yield measured by m^2 samples before combining Hence, there were still gross errors in measurements. May 22 proved fruitless because the combine cut approximately 100 m before requiring maintenance. After one hour the combine started again but before a complete sample could be collected the machine required further maintenance and this procedure continued for the entire day. At this time we did not have enough data to evaluate the machine and the maintenance required each time were small items so we kept hoping to collect data and stayed in the field until about 5 P.M. The farm drastically needs trained maintenance personnel and better shop equipment. The combine was finally operational about 12 noon on May 23 and an area of approximately three feddans was divided into five test plots. To insure that valid data were collected I helped measure the area combined for each sample. Three samples were harvested without any problem but the combine failed again on the fourth test area. We waited in the field untill 5 P.M. when the combine was transferred to the shop for repair. The effort seemed somewhat hopeless so tests were discontinued on this machine.

This experience has again emphasized a dire need to have test area of 100, or better 200, feddans under complete Project control. All plans and operations from tillage through harvest plus all equipment must be prepared and operated by Project personnel in order to obtain valid test and research data at a reasonable rate. A full-time Agr. Engr. farm manager living on site will be required to insure that tasks required by various machinery testers, developers, researchers,

etc are performed timely with an acceptable level of accuracy.

II. Test Procedures

A discussion was held with the Saft Kated farm managing personnel on the test details to get an agreement for cooperation. I'm not sure how many of the details were communicated but the farm management did agree to let us make the tests as follows :

1. One meter square samples were manually taken at random locations across the area to be harvested to represent the crop yield before harvesting. At first it was thought that 5 carefully taken samples would give a good representation of yield but preliminary data indicated that 10 samples would be required. A small wooden frame exactly 1 m square inside was used for this purpose. One engineer carefully selected sample locations and then supervised hand cutting of the wheat close to the soil. As each sample was harvested the wheat was put into a grain bag to insure that there were no losses during carrying them to the central weighing and threshing area. The total weight of grain plus straw was obtained for each sample, close supervision was given as a small boy or girl threshed and winnowed each sample, and then the clean grain was weighed.
2. The combine cut one pass across the ends of the fields to provide a definite point for measuring the area of wheat harvested into each tank. Then the combine grain tank was completely emptied.

3. The combine harvested a certain area, at first a full tank but this was later changed to approximately one-half feddan to expedite collection of data, and then traveled to a central location to unload the grain.
4. During the time that the combine was unloading, the exact area of wheat harvested for that sample was measured.
5. During the time the combine was harvesting another sample the preceding sample was weighed into bags of 104 kg each and the total weight of grain was determined. At the same time grain moisture content was measured.
6. Data measurements on each sample were assembled into the form: Grain loss = yield-combined.
7. Miscellaneous data were collected such as :
   (a) Name and location of farm, Saft Kaled State Farm
   (b) Variety of wheat - Giza 155
   (c) Specifications of the combine - Fortschritt, 4.6 m cut
   (d) Combine operational parameters - 1st gear with full throttle

III. Discussion of Data

All of the wheat harvested was very dry, 9-10% moisture content, probably because the Saft Kaled State Farm grows wheat for seed and wants to make sure that high moisture content does not cause damage to the grain during storage. A large portion of the original test plans had to be canceled because of local conditions and inexperienced personnel. For example there were still 300 of the total 400 feddans still to be harvested and the harvesting was already late. Hence,

a time and motion study of the combine was sacrificed due to the extra time required plus the operator was very inexperienced and the machine motions were erratic. It was difficult to get the combine operator to follow simple instructions on procedures so that valid measurements could be made for the area included in a sample. Small sample areas to expedite collection of enough data seemed to upset farm personnel because it slowed the harvest rate. For the same reason an effort to evaluate the different sources of grain loss was not attempted. Some Deutz Fahr bailers were delivered to Sheikh Ahmed at this time, and it was hoped that one could be assembled and made available to conduct a study of straw loss but this did not materialize.

The wheat was Giza 155 and the height of plant averaged approximately 120 cm. Plant population was medium and the grain yield was generally good. Most of the areas had only a small amount of lodging and harvesting conditions were good. There was one exception for the samples harvested on May 23 and notes of this condition are included with respective data table. Although the grain moisture content was rather low the crop harvested with very little shadder. The combine was operated in 1st gear at full throttle and had a width of cut equal to 4.6 m.

Table I shows the grain yield before harvest as determined with 10 samples of 1 m^2 each that were collected by hand. Although the yield for four of these samples seem rather high there is no reason to suspect data accuracy because planting was by hand and plant population could have been high. Data in Table II show the quantity of grain

actually harvested by the combine and bagged for storage. These data are highly suspect because grain for 2 of the 6 samples exceeded the yield before harvest data by more than 12%. The less for two other samples was less than 3% which is not reasonable. Hence, these data should be discarded.

Tables III and IV contain data obtained on a different field of wheat. Although the number of samples is very small due to combine failure the data are realistic, perhaps because results of the previous work stressed the necessity of more accurate data measurements. Data for the 1 m^2 samples to determine crop yield before harvest are contained in Table III. These yields vary considerably but this is to be expected because the seed were hand planted which results in large local differences of plant population. Also note the low yield for sample No.1. This field was next to a village that had ducks and geese on the irrigation canal. The first feddan was not included in the tests because crop damage by the fowls was obvious, and apparently some damage was present in the first sample or so. This effect is also reflected in data of Table IV. Note the 15.4% grain loss for sample No.1 and this was obvious during combining due to severe lodging of approximately a third of the wheat. Also there was 15-20% of the plants badly lodged in sample No.2 which caused a high loss, but a more experienced operator could have saved some of these losses. Unfortunately there was no choice available of the field to be harvested. The wheat in sample No. 3 was in an ideal harvesting

IV Conclusions

It was concluded that this four days of hard effort was almost a total loss, primarily because of combine failures and an inexperienced operator. Our team did gain some experience of test procedures, so we prepared ourselves to conduct a more fruitful series of similar tests with one of the Project's Deutz Fahr combines. These results are contained in another report.

Table I

One meter Square Samples to Determine Wheat Yield on the Saft Kaled State Farm. May 21, 1984.

Sample No.	Grain & Straw kg.	Grain per m^2 kg	Grain per fed. kg	Moisture * Content %
1	1.7	0.435	1827	10.0
2	1.5	0.320	1344	10.0
3	1.4	0.385	1617	10.0
4	1.4	0.340	1428	9.5
5	1.5	0.420	1764	10.0
6	1.5	0.620	2604	9.5
7	1.1	0.400	1680	9.0
8	1.6	0.570	2394	10.0
9	1.4	0.480	2016	10.2
10	2.0	0.655	2751	10.2
Ave.	1.51	0.4265	1942.5	9.8

Table II

Fortschritt Combine in Wheat on the Saft Kaled State Farm.

May 21, 1984.

Sample No	Combined Area m^2	Combined Grain kg	Combined per fed.* kg	Yield from Table 1 kg	Grain Loss %
1	1549	741	1913	1942	1.5
2	1826	1080	2366	1942	--
3	1826	745	1632	1942	16.0
4	1826	864	1893	1942	2.5
5	1826	997	2184	1942	--
6	4582	1831	1598	1942	17.7
Ave.	2239	1043	1931	1942	9.42

* One Feddan = 4,000 m^2 because of surface irrigation.

NOTES : There are several reasons to believe that this data should be discarded :

1. Area combined measurements are suspect because four are the same and this is unlikely with an expert operator where there are irrigation ditches, etc.
2. For two samples of the six, or one-third of the samples, grain combined exceed crop yield by more than 12%.
3. The entire crew were not familiar with these tests procedures and perhaps were not aware of the accuracy required in measurements.

Table III

One Meter Square Samples to Determine Wheat Yield on the Saft Kaled State Farm. May 23, 1984.

Sample No	Grain & Straw/m^2 kg	Grain per m^2 kg	Grain per fed. kg	Moisture* Content %
1	2.0	0.330	1320	10.0
2	2.5	o.410	1640	9.0
3	2.2	0.515	2060	10.0
4	2.3	0.550	2200	9.0
5	2.0	0.375	1500	9.5
6	1.9	0.420	1680	10.0
7	1.7	0.460	1840	10.5
8	1.9	0.670	2680	10.0
9	2.0	0.815	3260	10.0
10	1.5	0.460	1840	8.8
Ave.	2.0	0.5005	2002	9.68

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Table IV

Fortschritt Combine in Wheat on the Saft Kaled State Farm.

May 23, 1984.

Sample No.	Combined Area m^2	Combined Grain kg	Combined per fed* kg	Yield from Table III kg	Grain Loss %
1	3076	1302	1693	2002	15.4
2	2592	1142	1762	2002	12.0
3	2750	1273	1852	2002	7.5
	Combine failed again so discontinued testing				
Ave	2806	1239	1769	2002	11.6

One feddan = 4,000 m^2 because of surface irrigation.

NOTES: These data are considered to be valid although the number of samples is so small. Tests were started from one edge of a field and lodging varied across the area. Sample 1 contained approximately 30% severely lodged, sample 2 contained 15-20% badly lodged, and sample 3 contained very little lodged and was in a good combining condition.

BEHERA THRESHER TESTS WITH WHEAT IN SAKHA

JUNE , 1984

I. Introduction

The Egyptian-USAID Agricultural Mechanization Project was initated in the summer of 1980, and the primary objective was to develop a complete system of mechanization. In order to measure any progress made by the Project there must be established a status of the methods commonly used in 1980 for each phase of mechanization. These tests are an effort to determine the status of the most advanced wheat harvesting methods employed by farmers at the time the Project was initiated.

II. Objective

To collect test data that will be used as a basis to establish the status of the most advanced mechanization system used by farmers for harvesting wheat during the 1980 harvesting season. The primary effort made will be to determine time and costs of harvest plus grain and straw losses during harvest.

III Test Plans

1. Select a 2.5 feddan area of wheat and divide it into 20 test plot of 1/8 feddan each.
2. Hand cut, thresh, and winnow five 1 m^2 samples randomly located across each test plot to determine grain and straw yield before harvest.
3. Hand cut and transport to a central clean area by hand or donkey cart the wheat on each 1/8 feddan.
4. Weigh grain plus straw and mechanically thresh the crop from each test plot.
5. Machine winnow, either hand or engine powered, and weigh the cleaned grain.
6. Moisture content of the grain will be measured with a field meter
7. The Behera thresher was selected because it was perhaps the most readily available to farmers in 1980.

Local farm labor will be used where possible and they will work in a usual farm manner. Time and number of laborers required to perform each task will be determined. Cutting, threshing, and winnowing operations for each test plot will be performed as continuous as possible to avoid any mistakes of mixing the crop from different plots.

IV. Test Procedures

An area of wheat on the Sakha Experimental Farm was selected for tests, in fact it was in the same field as the residual tillage

tests. The variety was Giza 157 with a rather light plant population, and plant height was an average 90 cm with no lodging. Giza 155 would have been perferred for tests because of the larger plant but this was not available. There were very few large weeds present, except on the irrigation ditches, so harvesting conditions were ideal.

One full day was spent with farmers and laborer managers to try to arrange for the required local labor and to coordinate the different operations of cutting, transporting, weighing, threshing, winnowing, bagging, etc. It was finally concluded that coordinating the operations to run continuously as suggested in the test plans was impossible and that sacrifices would have to be made. Because of the situation during Ramadan the people were willing to work only 3 or 4 hours per day. Laborer managers insisted that it would only be possible to cut the wheat one day then transport it the next day and so on. Hence it was agreed that labour be supplied to cut one day and to transport it to a clean area the second day and then to arrange for threshing and winnowing later. Twelve girls and 8 boys between the ages 10 and 12 years did cut the 1.33 feddans of wheat in one day, 3.5 hours. During this day we consulted with the laborer managers and I understood that they were to furnish laborers and donkey carts and next day to transport the wheat to a given area about 1 km. away. In the meantime things developed, not known to me, that the area selected was on another farm and we could not use it plus the fact that we were supposed to supply a tractor and wagon for transporting the wheat. Also arrangements were made for an engine powered winnower to be made available the second day so threshing and cleaning

could in fact be accomplished the same day as transporting.

The second day 10 girls and 5 boys between the ages 10 and 12 years showed up for work at six o'clock but the deal for the winnower was not honored. The thresher was still on the only available wagon so I got up at 3:30 A.M., drove a tractor out to the farm, pulled the wagon back to town, spent two hours getting a fork lift to unload the thresher, and then drove the tractor and wagon back to the wheat field by eight o'clock. Fortunately the laborers were still on hand. At this point things had become impossible and I had to sacrifice keeping the wheat divided into 1/8 feddan samples. The wagon was loaded with wheat and after driving it around for about one hour to locate a clean area for threshing and cleaning on the same farm it was decided that there was not one available within a reasonable distance that had acceptable access roads.

At this point it was decided that the only alternative was to thresh in the field. We managed to borrow one canvas that was large enough to place both the thresher and cleaner on. The 10 girls and 5 boys piled all of the 1.33 feddans of cut wheat at the selected thresher site in 1 hr and 45 minutes. In the meantime a hand powered cleaner was located and the owner promised to deliver it plus laborers within one hour. The thresher was set up and one sample was threshed but the cleaner was not delivered that day. On the third day the cleaner was delivered and the laborers showed up so we were ready to start the tests. I had two young engineers, Hamza Abdel Aziz and Ahmed Mohamed Ramadan Doma available to supervise

the operations and to record data. At first, communications were difficult due to a language problem but once the engineers understood what was required they did an excellent job.

At this time all of the 1.33 feddans of cut wheat was in one pile. In an effort to collect some information on rate of accomplishing the different operations it was decided to use a sample size of 100 kg which would require from 5-10 minutes to thresh. The procedure was to weigh a sample, measure time required to thresh it, then measure time required to clean the grain, and then weigh the grain. The ten 1 m^2 samples for determining yield before harvest were collected at 10 randomly selected locations over the 1.33 feddan area before the crop was cut. Grain plus straw for each of these samples were weighed, each sample was hand threshed in a closed bag, and then the grain was hand separated and weighed. Two full days were required to process all of the 1.33 feddans of wheat and then the last sample had to be large, 757 kg.

V. Discussion of Data

Moisture content of the grain ranged from 9-10%. Table I contains data for the 1 m^2 samples that were taken to determine the crop yield before harvest. The fact that weights of the different samples are quite variable is not alarming because this particular area of land badly needs leveling and is very difficult to irrigate. This was noted last year during the tillage tests for a cotton crop. With this much variation in land conditions a larger number of samples would be desir-

able, but it is believed that the average value accurately represents the true crop yield. Sample locations were carefully selected randomly to cover the entire 1.33 feddans harvested. From Table I it is seen that the yield of grain was 232.5 gms/m^2. With flood irrigation it is common to consider 4,000 m^2 per feddan of crop land, hence the grain yield before harvest was 930 kg/feddan which is rather low. In fact the straw yield was also low at 1,390 kg/feddan.

Table II contains the results of 26 samples of wheat that were threshed with the Behera machine. The thresher was manned by one large boy to feed and two small boys to help weigh samples of grain plus straw and then to place the crop in reach of the feeder before threshing was started. A 4600 Ford tractor was used to drive the thresher at 900 r.p.m. so the available power was more than adequate. A Behera Company representative said the recommended speed of operation was 800-1,00 r.p.m. All of the wheat was threshed in 3.7 hours actual operating time or the rate of production was 907 kg/hr. Note that it required threshing seven samples to get the crew coordinated and working at a normal rate. If samples 8-26 are considered the rate of threshing was 958 kg/hr which still was influenced a little by starting and stopping each sample. Hence, with continuous operation and normal threshing the capacity of this machine is roughly 1,000 kg/hr.

The winnower or cleaner used was a hand powered type that was rather old but it was in good operating condition. No one knew the

the manufacturer's name but the cleaner was produced in Egypt. One grown man powered the machine and three grown women fed material into the cleaner and hand sieved out the small chaff. This was a well experienced family crew so the data should be representative. Time required to clean the 3,357 kgs was 8.13 hrs or the rate of work was 413 kg/hr. This time was influenced by starting, stopping, and cleaning up the scattered material after each sample, so the large sample 26 is a good measure of the normal on the farm operating machine capacity, 473 kg/hr. Hence, this machine and crew cleaned the grain at one-half the rate that the Behera machine threshed it. No measurements were made of the time to weigh and bag the cleaned grain because we didn't have adequate facilities plus the fact that each sample was small. Also we wanted to keep each sample seperate until we were sure of the correct weight. No measurements were made of straw weight because the only parameter for loss under these conditions was how well the straw would be cleaned up after each sample, and time involved in the tests was already excessive. Thresher and cleaner were placed less than two meters apart on one canvas and the dust was so bad that cleaning was not started until threshing of each sample had been completed.

The total grain cleaned per feddan, Table II, was 841.4 kg Total yield of grain per feddan, Table I, was 930 kg. Therefor

$$\text{Total grain loss} = \frac{930 - 841}{930} \times 100 = 9.6\%$$

During harvesting it was felt that the loss would be higher than this but these are the best actually obtainable data with the quality of equipment that was available. A set of farmer type platform scales

was used for large samples and a butcher type balance was used for the 1 m^2 samples.

Note in Tables I and II that the total straw plus grain weight of the mechanically harvested samples was 8.8% greater than that for the 1 m^2 samples :

$$\frac{2524 - 2320}{2320} \times 100 = 8.8\%$$

There are two possible explanations for this. Firstly, a greater number of 1 m^2 samples may have given a better value for crop yield before harvest. This is not likely because the 10 one meter square samples were carefully distributed over the entire 1.33 feddan area, and there was a fair degree of confidence in weighing these samples. The most probable source of the discrepancy was in weighing the 100 kg samples. As much loose wheat as possible was piled on the farmer type platform scales and balanced by a small boy for each of the several weighings required per 100 kg. Although the small boy was continously cautioned on the proper procedures it is possible that he got tired and added weight to the sample by slightly pushing down. Another fact is that knife edges on this set of scales were well worn and may have influenced the results.

VI. Summary

Following is a summary of useful information that was gained from these tests :

1. The average rate of hand cutting wheat per 10-12 year old boy or girl was 0.13 feddan per hr. This crop was 90 cm high with a

rather light plant population and with no lodged plants.

2. The average rate of piling the cut wheat in the center of the 1.33 feddan area per 10-12 year old boy or girl was 0.09 fed/hr. Again this was rather a light crop and the maximum distance moved may have been less than normal.

3. The normal farm rate of production with the Behera thresher is 1,440 kg/hr of grain plus straw from a stackpile with a crew of 1 large and 2 small boys.

4. The normal farm rate of production with a standard or commonly available hand powered winnower is 475 kg/hr with an experienced crew of one man to power the machine and three ladies to feed and to hand screen the small chaff.

5. The maximum total grain loss to be expected with this system of harvesting is 9.8%. This figure does not include any estimated loss due to birds, rodents, etc before harvest starts, although there was very little visible evidence of such losses in this case.

VII. Suggestions for Further Tests

1. Tests should not be attempted during periods of Ramadan because the work habits of laborers are not typical.
2. Laborers should be employed by the hour and not by a given task.
3. A good quality of equipment, especially for weighing, should be used.
4. A reasonable practice session should be used for all laborers before collecting data so that each will thoroughly understand his responsibility and the different teams can develop a coordinated system of procedures.

Table I

Behera Thresher Tests with Wheat in Sakha, 1 m^2 Samples to Determine Yield Before Harvest. Moisture content ranged from 9-10%. June,1984.

Sample No	Grain & Stray gm/m^2	Grain gm/m^2	Straw gm/m^2
1	450	158	292
2	510	192	318
3	485	157	328
4	625	255	370
5	560	225	335
6	850	365	485
7	740	294	446
8	480	229	251
9	460	182	278
10	640	268	372
Ave	580	232.5	347.5

Grain & Straw = 2,320 kg/fed

Grain = 920 kg/fed

Straw = 1,390 kg/fed

Table II

Behera Thresher Tests with Wheat in Sakha - June, 1984
Times Required to Thresh and to Clean Grain from 1.33 fed.

Sample No	Wt.of Grain Plus straw kg	Time Required - min. - Thresh	Clean	Wt of Clean Grain kg
1	200	14.35	51.00	86
2	100	8.50	26.67	70
3	100	8.80	17.33	35
4	100	7.25	16.17	41
5	100	8.80	15.75	36
6	100	6.17	17.83	36
7	100	7.92	13.17	31
8	100	5.50	11.25	21
9	100	6.00	12.73	24
10	100	6.75	15.33	34
11	100	6.42	15.00	26
12	100	6.00	14.38	26
13	100	5.25	14.00	28
14	100	6.50	12.33	30
15	100	5.33	10.67	34
16	100	5.50	10.83	34
17	100	6.47	15.17	35
18	100	6.00	12.25	33
19	100	5.00	11.25	28
20	100	6.50	12.58	34
21	100	5.50	11.75	35
22	100	6.83	12.33	34
23	100	6.92	13.58	33
24	100	6.50	13.42	32
25	100	5.83	12.50	33
26	757	51.33	98.50	230
Total	3357	221.92	487.77	1119
Per feddan	2524	166.74	366.74	841.4

Annex H: Machinery Manufacturing Introduction to Promote Mechanization of Egyptian Agriculture.

PAPER NO. 84-5003

MACHINERY MANUFACTURING INTRODUCTION TO PROMOTE MECHANIZATION OF EGYPTIAN AGRICULTURE

by

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June 24-27, 1984

SUMMARY:

An Attempt was made to develop a system for committing locally invented or adapted machinery to rational economic local manufacture. A thresher-winnower was used as a learn by doing case study, covering experiences and suggesting future approaches for study. Experiences with the case study are presented.

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INTRODUCTION :

In the Egyptian Agricultural Mechanization Project, AID Contract No 263-0031-HHC-001, a small budget was included for a study of the feasibility of manufacturing farm machinery in Egypt with the idea that local manufacturing would extend foreign exchange, provide the farmers with more appropriate machinery and technology and stimulate infrastructure development in the manufacturing sector.

In preparation for making this feasibility study and recommendations for stimulating local manufacture to support mechanization, several case studies in adaptation of known machinery to suit the present or near future economic and social environments of Egypt were undertaken.

A review of literature indicated (4) general problem areas to be addressed.

1. Local ability to accomplish the modifications and adaptations of known machinery and technology to suit the Egyptian socio-economic environment expected in 1987.
2. Need to preempt further manufacturing and import of farm machinery into appropriate directions to promote a healthy development of decentralized agro-support businesses. That is, conserve and extend locally generated investment.
3. Potential manufacturing sector and its ability to absorb and regenerate investment capital for continuous state of art advance and catch up.
4. Technical and practical constraints to manufacturability in Egypt.

A survey of the existing manufacturing of farm machinery has indicated the following points :

1. The manufactured implements are of the simple type e.g. chisel plows, ridger, agricultural trailers and a hammer mill used for threshing.

2. Manufacturing of these machines was started in a public sector company where there was a defined system of production and then spread to the private sector workshops where there is no defined production system as such, except copying the public sector machine and in most cases manufacturing without prior preparation of engineering drawings or the use of appropriate materials
3. It is safe to say that until now there are no standard specifications for these products and the utilization of existing supplier industries is very limited.
4. Little basis exists for predicting future demand, price elasticity equations.
5. Import policy, irresponsible advertising, shortage of competent sales and application engineers combine to make rational decisions as to what agro-systems to modify and which components to build or buy extremely difficult.
6. Accurate knowledge of rural income distribution systems is not extant, re local investments, multiplier effects, etc.
7. Existing potential of excess manufacturing capacity suitable to agricultural machinery production ranges from job shop layout to blacksmithy. This allows little potential for achieving economies of scale, standardization, sales and service network support, new product development or personnel training which could lead to inter-industry personnel mobility and rapid transfer to technology.
8. Centralization of basic raw and semi-finished materials manufacture into urban areas and consequent " rationing " of vital manufacturing inputs to rural areas tends to limit vital farmer input in building sales, service and on the spot new product development.

In view of these factors it has been decided to develop a system for modernizing farm equipment manufacturing capability in Egypt. To achieve this an all crop thresher/winnower was chosen as the first case study.

A formalized critical path network (CPM format) was designed to show the discrete activities of new product development. Since

this was produced partially after the fact, it has been used partially to justify history and partially as a guide as the exercise has become more complex. The network is displayed as Figure 1. 1.

Because of expediency brought on by overall project timing problems and prior history, events 1, 2 and 4 were originally assumed as given and 6 and 9 skipped. Therefore we started at 5 and have made numerous loops from 5 through 13 concerning both machine function, cost and manufacturability. We have completed three loops to event 20 and proceeded on to event 24. We have also made some excursions and touched base up to event 32. Several or more things have become evident : First, CPM format usually assumes that times can be estimated reasonably well, which is not the case. Second, a substantial training component in field and laboratory test must be inserted as events 33a and 39a. Third, the catch up manufacturing training requirement will in the early stages require major effort and facilities.

The magnitude of the disciplines is illustrated in Figure 1.I. This volume of training can only be accomplished by resorting to a large measure of on the job training. The case study has obtained extensive experience in this area.

As previously noted, the only farm machinery manufacturer featuring production levels of interest for training purposes is a public sector enterprise whose agricultural manufacturing represents only a small part of its income. In the short run it has not proven a good place for in plant training of future managers and entrepreneurs for farm tool manufacturing.

To close the gap the MOA is constructing a Mechanization Institute and developing cooperation with the Ministry of Industries Design Center which has closer ties with industry.

Because of time constraints the case study will in the future proceed along the lines of designing and projecting the social and economic impact of a turnkey, one a day threshing machine manufacturing plant. Hopefully this will be the subject of a future ASAE paper.

In retrospect the project activities followed the proposed network quite well so far. Some overlapping occurred because of delays encountered in the critical path and consequent slack time development. As the case study enters the manufacturing shakedown stage the added complexities of multiple manufacturers and time uncertainties probably indicate a need to shift from CPM format to PERT format for easier evaluation and project control. The method is not important but the productivity of labor in Egypt can only be corrected by the use of more sophisticated methods of evaluation and control. Fortunately the investment costs for their introduction is modest and the educational benefits and probable transfer of technology to other problem areas is high.

In this paper, experiences with the all crop thresher winnower and reactions to the combined industrial agricultural research program are presented.

The paper also presents information about the specifications, design and field testing of the machine. The main object of this case study is to develop a sound system for manufacturing farm machinery.

CASE STUDY: MACHINE SELECTION :

The all crop thresher/winnower was chosen as a case study for three reasons :

A) agricultural demand B) industrial upgrading considerations.
C) illustration of potential economic benefits.

A) Agricultural demand

Reviewing the mechanization problems of the Egyptian Agricultura it was found that :

i. The traditional system of threshing and winnowing for the two major crops, i.e. wheat and rice costs 70* and 51* L.E./ feddan respectively, (El Sahrigi and El Haddad). Existing harvesting methods keep the farmers busy from 30 to 45 days. This is

* These represent the average cost of 1982

especially true in the wheat season, evidenced by queuing for cutting, transport, threshing, winnowing and consequent development of patronage system which interferes with rational mechanization development.

ii. Replacing this system by importing combines is costly for small size conbines (90 - 120 L.E./feddan) whereas for medium size combines (over 3 mt width: 50 - 70 L.E./feddan). Niether is suitable for most of the cultivated area (about 60% of the area is less than 5 feddans).

iii. Imported thresher/winnower machines have proven inadequate for farmers needs.

iv. IRRI thresher/winnower types produced in Egypt by the Catholic Relief Service and El Behera Company have very limited capacity (250 - 300 kg/hr) and therefore one feddan wheat (2.2 tons production) needs 12 hours of continuous work and does not chop the straw. Chopped wheat and barley straw traded for L.E. 69 per ton, i.e. the straw is worth 3.5 times as much as the grain per feddan. (Straw/Grain ratio = 2.5:1).

B) Industrial upgrading considerations :

This type of machine represents a sophisticated level of farm machinery manufacturing technology ;

i. Many moving parts operating at various speeds.

ii. A reasonable level of production accuracy is needed.

iii. The machine involves application of many industrial techniques, i.e. sheet metal work, forging, casting machining, etc.

iv. The machine will increase the volume of manufacturing opportunities in Egypt.

v. The production of such a machine requires the use of a reasonable number of jigs and fixtures in order that it may be manufactured with an acceptable level of workmanship and reasonable cost.

vi. Because it is semi-mounted it would increase demand for and usage of locally produced tractors.

C) Illustration of potential economic benefits to be realized through local manufacture

Wheat reaches maturity in about 120 days and thereafter decreases in total economic value. Delays in harvest result in gradually higher losses during cutting, handling and threshing of both straw and grain. There are additional losses due to parasites, biological transformation lodging, etc. The total is believed to be about 1% per day penalty for late harvest. Production and harvest costs will remain nearly fixed regardless of delay. At the same time, there occur avoidable productivity losses due to land fallow time. If late harvest can be reduced from 37 days average down to four days through mechanization and the economic value of the following crop is assumed to be 2/3 that of wheat, it follows that losses of 33% can be avoided, or 155 L.E. per feddan and above this the bonus for early planting of the following crop amounts to 2/3 X533.4X 29/120 which equals 86 L.E. for a total of 241 L.E. per feddan. To realize this 33 days savings with fixed harvesting cost, the farmer must invest in a threshing machine with a windrow pickup attachment at about 5000 L.E. and a windrower /mower at 4000 L.E. and another 2500 L.E. for a bagging & transport system for both grain and straw. The investment payback would therefore occur at less than 50* feddans harvested.

In addition, side benefits such as the release of land for planting in crops yielding greater economic return, plus 185 kg per feddan of extra beef production per year could be realized at a micro economic level.

Reliable estimates for Egypt indicate average grain losses at about 30% with 28% avoidable. In discussing field tests and demonstrations with village leaders and the wealthy land owners it was discovered that they were at the head of the queue for co-op owned equipment, labor, in process storage, etc. This means that the people able to afford the investment in machinery had a disincentive to mechanization since the people with small holdings and no access to investment are the ones who would receive the maximum benefits, partly at the expense of present leaders.

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* 11500 ÷ 240.6 = 48 feddan, fig. 1.2.

The logical solution is of course the establishment, with bank assistance, of custom operators similar to the U.S. 1944 " harvest brigade " concept.* This would provide the government with necessary leverage to control the rate and direction of mechanization and to replace the subsistance agriculture syndrome with a business sense based on maximizing profits. It would also provide advertising and performance feed back to the manufacturers and business experience to the small farmers.

DESIGN CONCEPT

Reviewing local publications concerning similar production and knowing the existing situation, the following guidelines were developed :

1. TYPE: a) Axial flow cylinder and concave system
   b) Combination spikes and helical rasp bar with replaceable spikes or bars for special conditions.
2. Three point hitch mounted, standard 540 RPM-PTO driven, trailing (caster wheel) for stability at tractor road speeds and ease of converting into a semi-mounted field combine.
3. Threshing and separation of all major cereal crops, seeds and beans for year around utility.
4. Optional recutter for dry wheat or barley straw
   a) Max. length of cut straw 8 cm (average conditions)
   b) Average length of cut straw 4 cm (average conditions)
5. Helical threshing bar design to promote axial flow threshing across concaves.
6. Fully adjustable concave clearance, independent front to rear. (From 2 cm to 5 cm).
7. Easily replaceable three piece concave with optional opening sizes and shelling bar design to accomodate varied crop conditions and facilitate repairs.
8. Replaceable grain screens for various crop conditions.

MACHINE DESCRIPTION

As a main goal of the present work is to be establishing a manufacturing system, only a brief description of the machine is outlined here. Full description and field performance will be published in a seperate paper.

* Self propelled combine teams which harvested wheat progressively starting in Texas in May and ending in Canada in September, thus releasing hand labor for military service.

Power Required

The machine normally requires at least a 40 PTO horsepower tractor with 540 RPM. ASAE PTO shaft and category No. 2, (3) point hitch.

Drive System

Main drive consists of a universal joint shaft and (4) "C" section Vee-belts. Cleaner drive requires (1) "C" section Vee-belt and Auger drive (1) "B" section Vee-belt.

Belt Adjustment System

Main drive, matched belts with shaft take up adjustment. Other belts adjustable for take up using ball bearing idlers pulleys.

Grain Conveyor

150 mm (nominal auger Ø), speed 200 to 300 RPM (infinite speed adjustment).

Bearings

Relubricatable ball bearings with eccentric locking collars

Power Feed Apron System

Roller chain and slat conveyor with auger type stuffer driven by mule drive belt from cylinder shaft.

Mounting/Transport

Three-point hitch mounted. Adjustable castored dual trailing wheel system with castor and camber. 5.50 X 13 rims and tires are standard.

Threshing Unit

Hybrid, spike tooth/spiral rasp bar system. 737 Ø X 1245 mm., long cylinder. Speed 500 - 1000 RPM. Axial flow operation.

Concave System

Made in three easily replaceable (with cylinder in place) sections of perforated screen construction with spiral shelling bars. (axial flow promoting, type). Concave consists of primary, secondary & tertiary separation areas. Cylinder to concave clearance adjustment variable from 10 - 50 mm.

Separation System

Counter oscilating primary and secondary sieves with adjustable speed. Adjustable inlet orifice type fan. Total cleaning area 3.25 m^2.

Frame

Constructed of 5 mm high strength rolled angle, structural grade tubing and plate, all jig welded for accuracy.

Dimensions etc.

Length : 2.59 m

Transport width : 1.85 m

Height over all : 2 m

Weight (estimated) : 900 kg

Feeding table hight : 1-1.25 m

Optional Equipment Available* or (Proposed)

1. Bagging attachment for grain and / or straw*
2. Power feeding system for crop*
3. Extension spout for truck loading of chopped straw*
4. Special grain screens*
5. (Tailings return auger)
6. (Fines separation screen)
7. (Axial tongue adaption kit)
8. (Chaff saver)
9. (Windrow pickup attachment for field combining)
10. (PTO and governor kit for use of truck for power source)

MACHINE PERFORMANCE

Four prototypes were built and tested for wheat and rice. In short run tests the machine has a normal capacity of 1000 - 1500 kg/hr of grain for wheat and rice respectively, and has shown sustained outputs of 700 and 1000 kg of grain for both crops respectively. Detailed description of these tests is not the subject of this work. Use of recutter increases power requirement by 60% for same capacity.

ECONOMIC SPECIFICATIONS

1. Locally manufactured content

   (a) By weight 98%

   (b) By value 90%

   (c) Only belts and bearings are imported

2. Estimated manufacturers break even cost if manufactured at 300 units per year rate = 1700 L.E.

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* Already tested

3. Minimum operating crew required if bagging grain and loading straw continuously : 4 persons.
4. Six year obsolescence estimated.
5. Capacity is limited by tractor power, cleaning capacity and ability to feed uniformly.

PROPOSED SYSTEM DESCRIPTION:

After the research development machine's performance has proven satisfactory the entire thresher premanufacture design (drawings, engineering specifications, calculations, tooling design, machinery requirement, manufacturing cost breakdown, field test report and assumptions) is assembled in logical order to be ready for competitive subcontracting with quality control and learning based on :

1. Chain product manufacturing
2. Horizontally integrated manufacture
3. Vertically integrated manufacture
4. Appropriate combination of 2 and 3

This approach is clearly in line with the stated policy of the MOA as reviewed in the paper titled Promotion of Agricultural Manufacture in Egypt (El-Sahrigi and El-Hossary 1982) and extracted from " Guidelines for Agricultural Mechanization National Plan " (El-Sahrigi and El-Haddad 1982). This approach will clearly and instantly :

1. Encourage interdependence and subcontracting.
2. Involve more persons in promotion of local products
3. Promote the cost benefits of quality control, interchangeability and standardization of implements and components
4. Provide and excellent vehicle for channeling prototypes of new capital equipment, underwrite tooling prototype case studies etc., without a requirement for special direct incentives (except for prototypes) for Small Scale Industry.
5. Provide the basis for industrial extension to make local manufacture competitive with import and thus get more " milage " from end user incentives through an increased multiplier effect..
6. Encourage decentralized manufacturing sales & service network development.

HISTORICAL APPROACH VIZ A VIZ THRESHER DEVELOPMENT CASE STUDY

Refering to Figure I and noting that this was to be a case study for institutionalizing local manufacture and that extensive efforts had been made covering all steps from I through 14 at least three times during the past 20 years with disappointing results and noting further that the axial flow threshing system was probably invented in Egypt and elaborated by IRRI, we started from point 5 in an attempt to find out step by step why what appeared to be appropriate technology in 1965 did not serve as a spring board for local manufacturing.

We considered four approaches to the harvesting problem namely: (1) Binder / Thresher / Winnower (2) Combine/baler (3) Seed harvester/ Mower/baler system and decided that approach (1) had the best chance of providing a useful case study.

The machine selected as a starting point was the IRRI axial flow thresher winnower concept. It was believed to have the desired impacts in Egypt i.e.

1. Increased capacity.
2. Adaptability to serial production with standardized parts and standard methodology.
3. Ability to handle crops with very high straw to grain ratio.
4. All crop harvesting capability alternating on a day to day basis.
5. Capability of stationary or on the go field combining alternating on a day to day basis.
6. Semi-mounting to support increased rational use of existing tractor inventory.
7. Eliminate the added first cost and the maintenance responsibilities inherent in the introduction of lightly used new power units.
8. Promote ease of incorporation into a good custom operator system by means of known imported equipment which would be subsequently suited to local adaptation and manufacture.

CASE STUDY METHODOLOGY BREAKDOWN

1. Identify and quantify problems
2. Define objectives
3. Establish priority solution

4. Propose the top priority solution
5. Select a machine for remodeling or redesign
6. Redesign
7. Prototype manufacture
8. Field evaluation
9. Investigation of availability of prerequisite manufacturing inputs
10. Preparation of cost of manufacturing projections
11. Projections of demand
12. Comparison with alternative options, i.e. import, reiteration, delayed production based on total crop capacity, performance, flexibility for all crops, breakage, maximizing tractor use, minimum straw loss, ability to cut straw etc.
13. Analysis of prerequisits to low cost local manufacture
14. Propose possible system for local manufacture
15. Define a possible system to carry out the specified work program for manufacturing the selected machine.
16. Identify customers
17. Determine customer acceptance
18. Prepare operator manuals and parts list.
19. Undertake demonstrations and training programs for farmers and manufacturers

DESCRIPTION OF PREMANUFACTURING ACTIVITIES. (Events 32 through 40 in Figure I)

After research prototypes have been built, as well as field and market evaluated - redesign for improved performance, ease of field service, adjustability, manufacturability and lowered cost is undertaken. Upon completion of this phase, comprehensive drawings, bills of material, detailed cost analysis, process sheets, time projections, and tooling design estimates are prepared. Manufacture is broken down according to " department " and logical progression from purchasing, cutting parts, subassemblies, assemblies, final assembly, packaging for shipping etc., is designed, including preparation of detailed operators manual and spare parts list.

The bill of material outlines the required precendence, quality, flow or work and materials required to produce a certain rate of final assembly. It is designed in format to be contained as a logical unit in a word processor program so that it can continually be updated and reissued to reflect the need and requirements of the users.

The bill of material is keyed to the requirements of the non practicing engineers, e.g. purchasing agents, transportation and storage agents etc. However, it is also closely keyed to the engineering drawings each of which serves as a system decision point. Each drawing refers to the next higher assembly which will be the basis for inspecting and accepting or rejecting the part. Therefore, each drawing presents all the information required for inspection and where desired, the process, machinery and tooling to be used. The desired process is chosen with goal-appropriate technology in 1987 rather than tomorrow. Wherever appropriate, information on required jigs fixtures and gages are specified on the drawings. It will thus be possible to procure competitively, tooling and manufacturing information as MOA property. This can then be loaned or given to other contractors and used for similar projects at a later date.

To illustrate this feature, a portion of the thresher bill of material and the corresponding drawings illustrating how each subcontractor becomes at once a tool designer, and inspector, a purchasing agent and

a fabricator are appended (appendix I). All this is being conducted in a cooperative learning situation within which limited responsibility and limited but adequate authority are assigned. At every step of the system network, the problems encountered will contribute to learning and to record through drawing changes and the learning together experiences of the participants.

From the above discussion it is obvious that both the bill of material and the keyed drawings must be kept up to date and all changes recorded and updated. Bill of materials pages and updated drawing copies must be re-issued on a need to know basis along with the faithful destruction of obsolete file copies. For these reasons it will be important to restrict the number of need to know files and devote much effort into experimenting and improving the filing subsystem until such a time as the volume of changes becomes small.

SUMMARY

The " All Crop Thresher/Winnower/Chopper " case study has uncovered a requirement for certain changes in the Egyptian farm machinery manufacturing system if the goals of the MOA are to be met on reasonable schedule.

The Agricultural Mechanization Institute may be considered as the proper vehicle for upgrading and providing the flexibility to deal quickly and efficiently directly with the subcontractors, thus providing flexibility and relieving the MOA from some of its adminstrative load. However, any qualified manufacturing body may assume the responsibility in place of Agricultural Mechanization Research Institute.

Thus it appears that the " All Crop Thresher/Winnower/Chopper " will be useful first economically to the farmer and secondly to manufacturers as a model for studying and modernizing operations. It should be pointed out that the modernization will be automatic, non arbitrary and productive regardless of success or failure of the machine (economically) or parts of the system model.

APPENDIX

The attached bill of material, prints and cost sheet are samples* of MOA Mechanized Agricultural Research Institute's system to be used for tooling cost analysis and manufacturing. The main frame is one of several major components which can be sub-contracted and later assembled along with other components into a complete prototype machine.

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figs. 1.3. through 1.7.

Fig. 1.1.

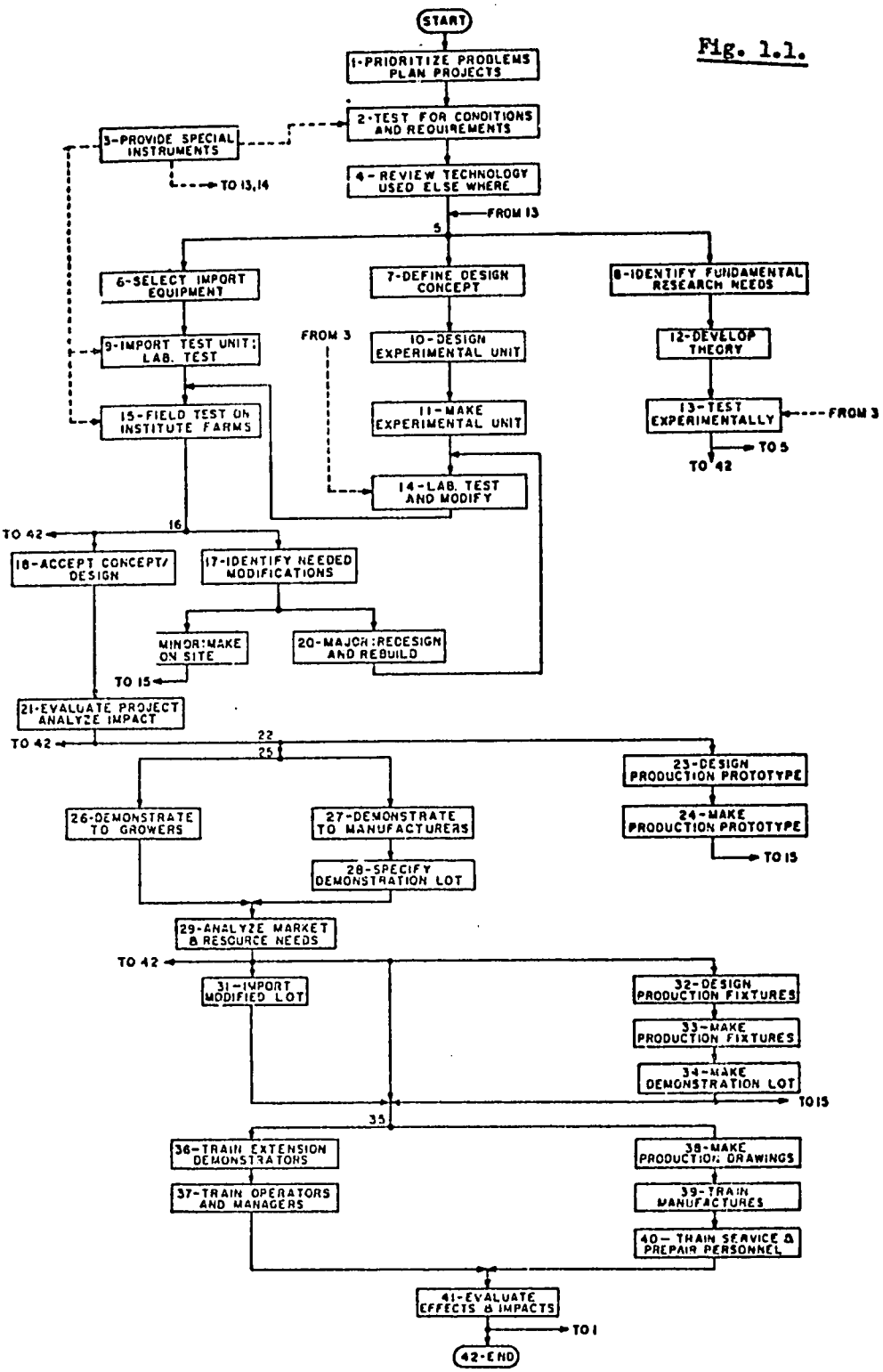

START
1-PRIORITIZE PROBLEMS PLAN PROJECTS
2-TEST FOR CONDITIONS AND REQUIREMENTS
3-PROVIDE SPECIAL INSTRUMENTS
TO 13,14
4-REVIEW TECHNOLOGY USED ELSE WHERE
FROM 13
5
6-SELECT IMPORT EQUIPMENT
7-DEFINE DESIGN CONCEPT
8-IDENTIFY FUNDAMENTAL RESEARCH NEEDS
9-IMPORT TEST UNIT; LAB. TEST
FROM 3
10-DESIGN EXPERIMENTAL UNIT
12-DEVELOP THEORY
15-FIELD TEST ON INSTITUTE FARMS
11-MAKE EXPERIMENTAL UNIT
13-TEST EXPERIMENTALLY
FROM 3
TO 5
TO 42
14-LAB. TEST AND MODIFY
16
TO 42
18-ACCEPT CONCEPT/ DESIGN
17-IDENTIFY NEEDED MODIFICATIONS
MINOR: MAKE ON SITE
20-MAJOR: REDESIGN AND REBUILD
TO 15
21-EVALUATE PROJECT ANALYZE IMPACT
TO 42
22
25
23-DESIGN PRODUCTION PROTOTYPE
26-DEMONSTRATE TO GROWERS
27-DEMONSTRATE TO MANUFACTURERS
24-MAKE PRODUCTION PROTOTYPE
TO 15
28-SPECIFY DEMONSTRATION LOT
29-ANALYZE MARKET & RESOURCE NEEDS
TO 42
31-IMPORT MODIFIED LOT
32-DESIGN PRODUCTION FIXTURES
33-MAKE PRODUCTION FIXTURES
34-MAKE DEMONSTRATION LOT
TO 15
35
36-TRAIN EXTENSION DEMONSTRATORS
38-MAKE PRODUCTION DRAWINGS
37-TRAIN OPERATORS AND MANAGERS
39-TRAIN MANUFACTURES
40-TRAIN SERVICE & REPAIR PERSONNEL
41-EVALUATE EFFECTS & IMPACTS
TO 1
42-END

Fig. 1.2.

Traditional 1 feddan wheat Harvest 37 days after maturity	Mechanical 1 feddan wheat Harvest 4 days after maturity
1. Economic loss of grain = 50.8 L.E. (33% X 2.2 tons X 70 L.E./ton)	1. Loss of grain = 6.16 L.E. (4% X 2.2 tons X 70 L.E./ton) Savings = 44.64 L.E.
2. Economic loss of straw = 125.2 L.E. (33% X 5.5 tons X 69 L.E./ton)	2. Economic loss of straw = 15.18 L.E. (4% X 5.5 tons X 69 L.E./ ton) Savings = 110.02 L.E.
	Sub total 1 + 2 = 154.66 L.E.
3. Land follow losses = 97.8 L.E. (3 ÷ 120 days X 2/3 (5.5 X 69 + 2.2 X 70)	3. Land follow losses = 11.86 L.E. (4 ÷ 120 days X 2/3 (5.5 X 69 + 2.2 X 70) Savings = 85.94 L.E.
	Total Savings per feddan = 240.6 L.E.

Fig. 1.3.

MINISTRY OF AGRICULTURE - MECHANIZED AGRICULTURAL RESEARCH INSTITUTE - THRESHER - DEC. 83

LINE ITEM	PART NO	NAME	MATERIAL & NOTES	REQ'D NEXT ASS'Y	TOTAL REQ'D (MACH.)
2.	99 W	Main frame W. A.		1	1
3	124 W	Left side fram W.A.		1	1
17	111 W	Right side frame W.A.		1	1
41	140 W	Frame rear W.A.		1	1
35	135 W	Frame front W.A.		1	1
47	100 W	Botton frame W.A.		1	1
61	51 W	Bench W.A. Front		1	1
62	52	Bench angle front		1	1
63	53	Support angle front		1	1
66	54 W	Bench W.A. rear		1	1
67	55	Bench angle rear		1	1
68	56	Support angle rear		1	1

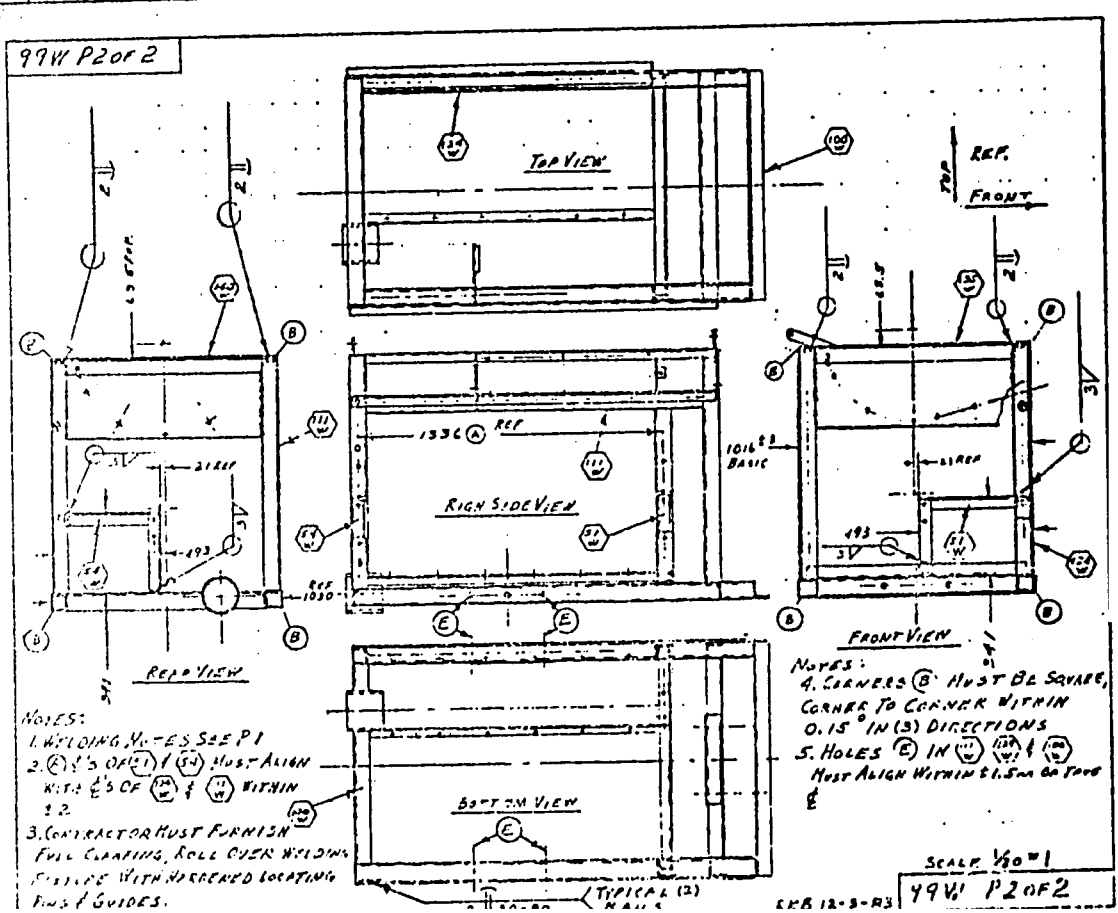


Fig. 1.4.

MINISTRY OF AGRICULTURE - MECHANIZED AGRICULTURAL RESEARCH INSTITUTE - THRESHER - DEC. 83

NE EM	PART NO.	NAME	MATERIAL & NOTES	REQ'D NEXT ASS'Y	TOTAL REQ'D (MACH.)
17	111 W	Right side frame weld ass'y	Full clamping weld jig&check gages req'd next ass'y 99W	1	1
18	112 W	Feed opening side weld ass'y	Clamp & jig	1	1
19	122	Feed Deflictor sheet	M: HR sheet 2X249X273X 1 kg.	1	1
20	123	Feed side BRK'T	M: HR. Plate 6X45X189X0.4 kg	1	1
23	113	Grain cut-off support BRK'T	M: HR. plate 6X70X279X0.9 kg.	1	1
24	114	Bracket ear	M:Hr. Plate 5X44X44X0.07 kg	1	1
25	115	Right front post	M: HR. L 70X70X5X1030X5.2 kg.	1	1
26	116	Blower bearing front post	M: HR. L70X70X5X756X3.85 kg.	1	1
27	117	Auger support BRK'T	M: HR. L 40X40X5X1262X3.5 kg.	1	1
28	118	Right wall frame	M: HR. L 70X70X5X1486X7.6 kg.	1	1
29	119	Feed Lower brace	M: HR. L 40X40X5C1616X4.4 kg.	1	1
30	120	Feed upper brace	M: HR. L 40X40X5X1072X2.9 kg.	1	1
31	121	Right rear post	M: HR. L 70X70X5X1030X5.25 kg.	1	1
32	105	Bottom angle R.H. frame	M: HR. L 70 X 70 X 5 X 1775 X 9 kg.	1	2

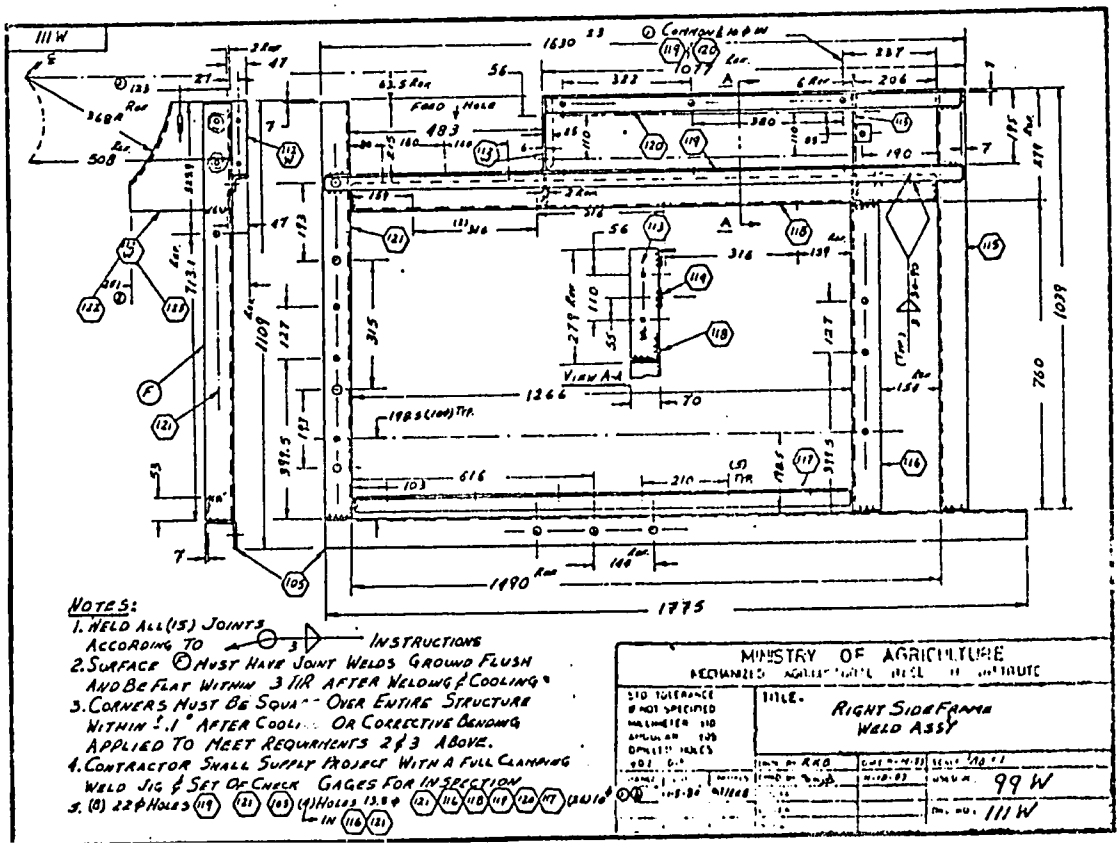
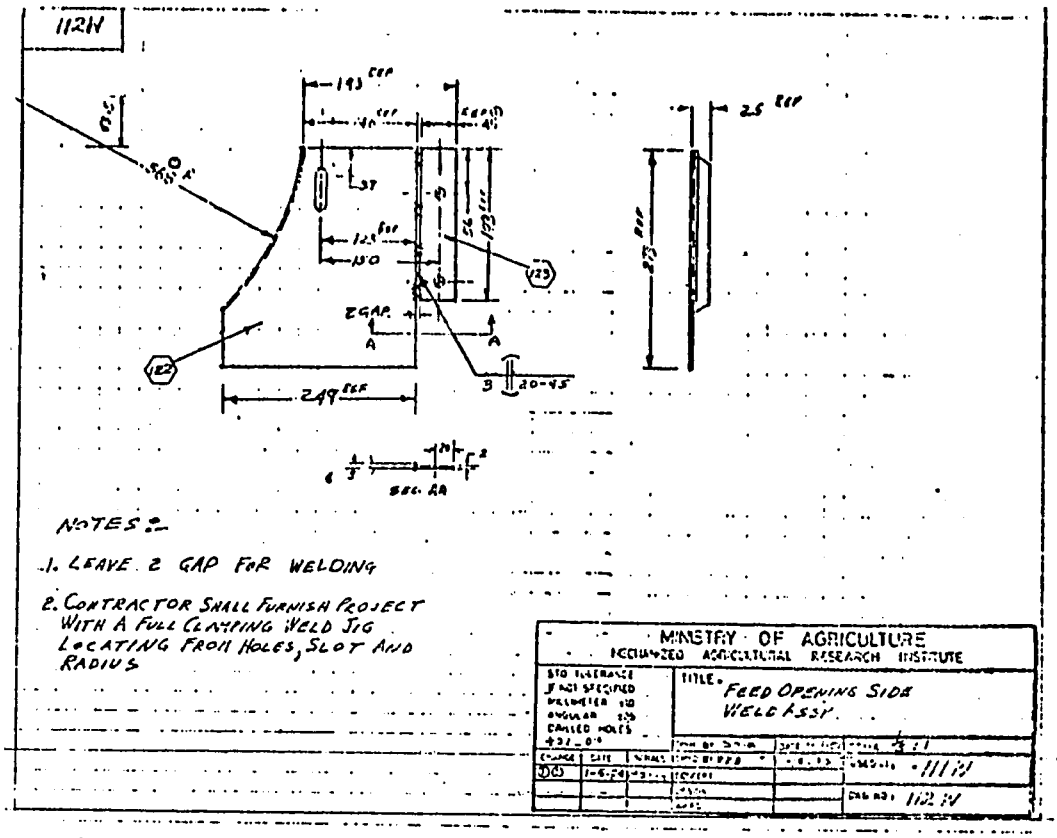


Fig. 1.5.


112H
193 REF
140 REF
40 REF
25 REF
37
125 REF
150
56
173 REF
2 GAP
A
A
B
20-45
249 REF
SEC. AA
NOTES:-
1. LEAVE 2 GAP FOR WELDING
2. CONTRACTOR SHALL FURNISH PROJECT WITH A FULL CLAMPING WELD JIG LOCATING FROM HOLES, SLOT AND RADIUS
MINISTRY OF AGRICULTURE
MECHANIZED AGRICULTURAL RESEARCH INSTITUTE
TITLE. FEED OPENING SIDE WELD ASSY.
111H
112H

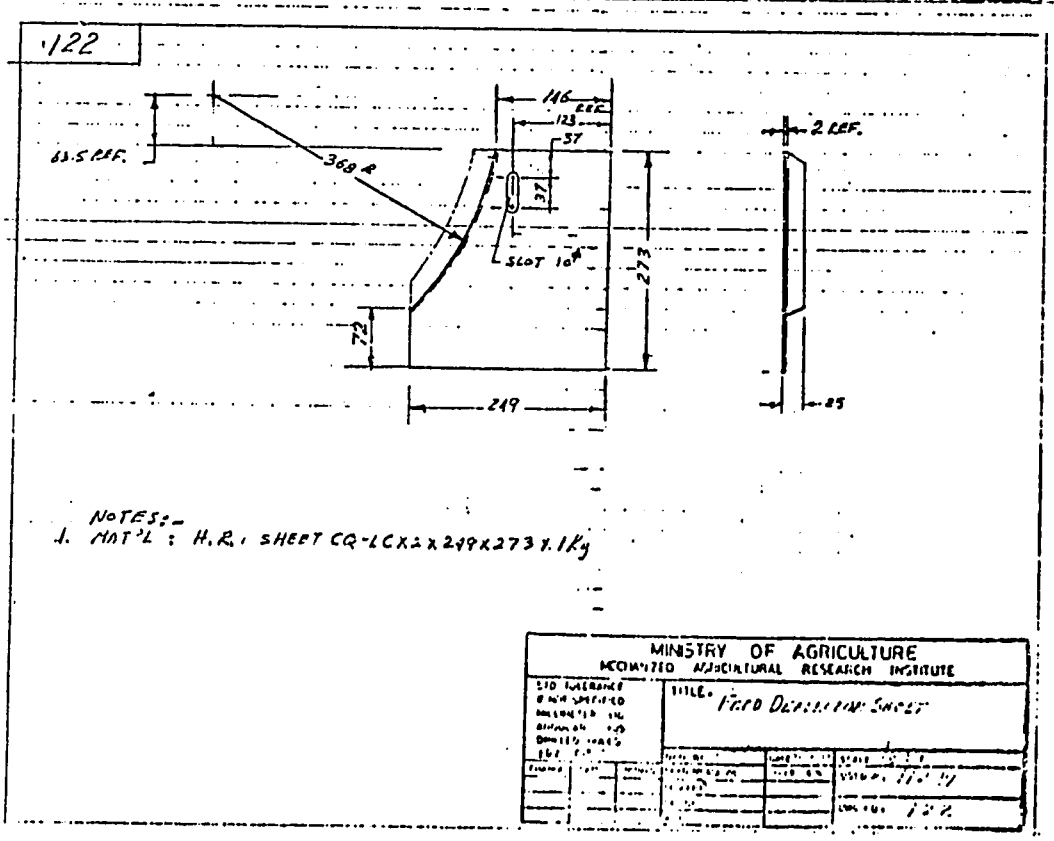

122
146 REF
125
37
63.5 REF.
368 R
37
SLOT 10
273
72
249
2 REF.
25
NOTES:-
1. MAT'L : H.R. SHEET CQ-LCX2x249x273x.1Kg
MINISTRY OF AGRICULTURE
MECHANIZED AGRICULTURAL RESEARCH INSTITUTE
TITLE. FEED DEFLECTOR SHEET

Fig. 1.6.

PART OR ASS'Y PRODUCTION COSTS

E : 2-28-84 | ST'D COST 7.09 L.E. | SHEET 1 OF 1

T NAME : Right Side Frame Weld Ass'y | PART NO. 111 W in 99 W

K SEASONAL REQUIREMENTS (2) UNIT PER Day PROCESS BASED ON (25) UNITS PER MO. MIN SIZE 100 UNIT WT. 44kg

ER. O.	OPERATION	TOOL NO.	TOOLING & SPEC. EQUIPMENT	EST. HR'LY CAP	MANNING REQ.	DIRECT ST'D HR	DIRECT LABOR COST	BURDEN FOR OVER-HEAD	LABOR PLUS O'HEAD	SETUP COSTS	SPEC. TOOL-ING & PER-ISHABLE	OPERATION TOTAL COST L.E.
	quision to IPS for component parts. Parts 112 W, 114, 113 in one tote box											
	lande of parts are pre bundled (banded) (according to part) and come in on											
	) skid pallets. Requisition (2) plywood & steel clamping jigs from tool											
	crage, 60 kg Ea. Crew consists of (2) welders & (3) helpers. (3) Stations,											
	e loading and unloading jig, 2 jig weld .06 jigs, (3) free well back side.											.06
	) helpers service (2) welders .35.											.35
	Rate determined by welding time + electrode change time + jig change											
	time (2) meters of weld (1) for each operator (6) rod changes each 10 sec.											
	(12) changes of position @ 10 sec ea. M = 12 rods @ .02 kg @ 1.5 L.E./kg											.36
-1	Bring components	6	Fork Truck	100	Driver	-	.0133				Skids & tote	
	to weld station		(1) tote Box								box	
			(4) Skids				.0133	.047	.06		.08	.08
-1		21	250 A.AC welder	3.67	2 welders	(6) rods					820/2400	
				.272X1.33	3 helpers	.20 L.E.	1.27	4.447	5.716	.123	.342	6.18
-2	Remove Spatter	22	1HP hand disc									
			Grinder								.06	.06
											Total	7.09

AT'L HANDLING 5 - SHEARING 10 - PRESS 15 - MACHINING 20 - WELDING 25

Labor Class	Specialist	Operator	Helper
Dir Hr'ly Cost		1,00	.50

RENT ST'D HR. 45 MINUTES PER HOUR CURRENT BURDEN FOR OVERHEAD 350%

T DESIGNED RKB 2-19-84 COST ANALYSIS BY RKB

PART OR ASS'Y PRODUCTION COSTS

E : 3-6-84 | ST'D COST 1.779 | SHEET 1 OF 1

T NAME : Feed Lower Brace M: 40^2 X 5 X 1616 X 4.4 kg | PART NO. 119

K SEASONAL REQUIREMENTS 50 UNIT PER MO. PROCESS BASED ON 25 UNITS PER MO MIN SIZE 100 UNIT WT. 4.4 kg

ER. O.	OPERATION	TOOL NO.	TOOLING & SPEC. EQUIPMENT	EST. HR'LY CAP	MANNING REQ.	DIRECT ST'D HR	DIRECT LABOR COST	BURDEN FOR OVER-HEAD	LABOR PLUS O'HEAD	SETUP COSTS	SPEC. TOOL-ING & PER-ISHABLE	OPERATION TOTAL COST L.E.
	Assume distributed yield of 90% (for frame parts) & lower weight sheets .). Effective M cost											
	of .339 based on part wt.											M= 1.492
	(14) Pc per 1 7 2 X 5 sheet						(8) sheets/run					
1	Bring (8) sheets	6	Fork lift truck	200	Op. + hlp	.0076	.01	.035	.045		ch'g o'head	.045
	M storage to											
	Shear storage											
-1	Set up & load	11	Shear & dolly	400	Op + hlp	.0033	.005	.0175	.023		ch'g o'head	.023
	dolly											
-2	Sheet break-	11	Shear	420	Op+(3)hlp	.0032	.0079	.0277	.036		"	.036
	down											
-3	Hop shear	11	Shear	420	"	.0032	.0079	.0277	.036		"	.036
-4	(6) 100 pa	16	Metal worker	100	" +(1) "	.0177	.0266	.093	.09		"	.12
2	Form L	17	Press break	240	" +(1) "	.0056	.0003	.029	.0375		"	.0375
	Bundle 100 Pc	7	Banding Tool	1500								.01
	Bundle 100 L's	7	Banding Tool	1500								.01
												1.829
												.432 L.E./kg

'L HANDLING 5 - SHEARING 10 - PRESS 15 - MACHINING 20 - WELDING 25

Labor Class	Specialist	Operator	Helper
Dir Hr'ly Cost	-	1,00	.50

ST'D HR. 45 MINUTES PER HOUR CURRENT BURDEN FOR OVERHEAD 350%

DESIGNED RKB 2-19-84 Cost Analysis RKB

Fig. 1.7.

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3. Agricultural Mechanization Cost Model - Steven C. Shepley and Zaki Helmy Zaki Wissa for : Agricultural Mechnization Project. USAID / MOA Arab Republic of Egypt - Project No. 263-0031

4. Egyptian Agricultural Mechanization Five Year Development Plan. 82/83 - 86/1987, Dr. A. F. El-Sahrigi, Dr. A. A. El-Haddad.