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**AGRICULTURAL DEVELOPMENT SYSTEMS**  
**EGYPT PROJECT**

**UNIVERSITY OF CALIFORNIA, DAVIS**

MECHANIZATION ISSUES IN EGYPTIAN AGRICULTURE

by

A. H. Abou-Sabe

Ministry of Planning, Egypt

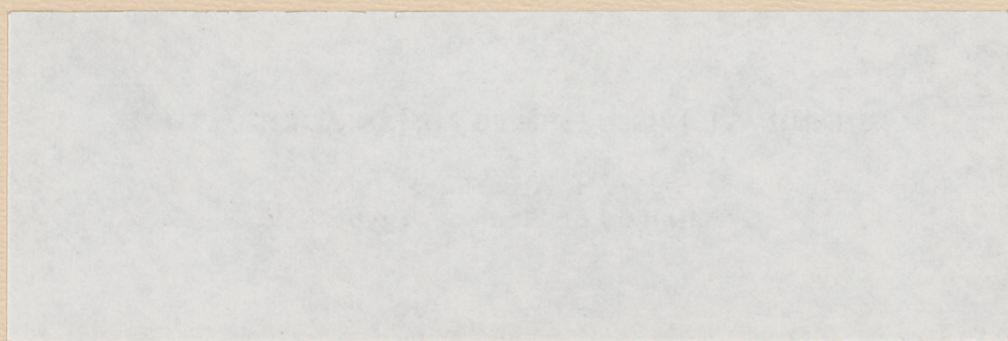
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**ADS/EGYPT** 





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" The Egyptian Experience in Mechanization "

By Dr. A.H. Abou - Sabe  
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I am happy to participate in this seminar discussing mechanization issues in Egyptian Agriculture. Since we have a number of speakers discussing different aspects, then I plan to confine my presentation to the past experience and efforts in mechanization of Egyptian agriculture.

The 1st recorded organized effort in this area was carried out by the Ministry of Agriculture in 1920 and was published in a report on the Motor Tractor Trials carried out at Kafr Bata( December 1920 ) and Damanhur(April 21) The introduction to the report stated the following:

"The necessity during the war for cultivating increased areas of land revived in all European countries the interest in ploughing by mechanical means and gave the internal combustion motor its chance.

On the close of active hostilities motor tractors from all countries - America, Britain, France, Italy, Switzerland, Germany Czecho-Slovakia , etc- began to find their way in considerable numbers into Egypt.

Demonstrations were held, but these were mostly of a private nature, and purchasers had little opportunity of comparing different machines under the same conditions of work. In the absence of an impartial body such as the Society of Motor Manufacturers and Traders, which had carried out the tractor trials at Lincoln( Nebraska ) in 1919, the Ministry of Agriculture felt it incumbent on itself to arrange for official or semi-official trials. This was in the interest as much of the fellah, who tended to purchase without satisfying himself as to a machine's suitability and reliability, as of the maker, who would have the advantage of comparison of types in devising improvements in design for Egyptian agricultural practice.

Early in the summer of 1920, therefore, a general Committee, representative of these interests, was formed and a scheme for the trials worked out. The gratifying number of thirty entries-representing twenty- four different types and six nationalities of origin- was received, and twenty-seven machines took part."

The tractors were tested for primary and secondary tillage ( with moldboard plows, disc plows, chisel cultivators, and disc harrows, both trailed and mounted implements used .

They were also tested for operating irrigation pumps, stationary threshers while road transport was ruled out due to the " present back ward state of country roads".

The committee concluded the trials with the following observations:

"We would like, however, to make certain observations which may be of value to manufacturer and purchaser:

1. It does not seem to us advantageous to use caterpillar tractors, where the chief merit of the tracks is the reduction of pressure on the soil. For in the wheel machines both pressure and adhesion were on the whole satisfactory, when the wheels and plough were well guided. The complication in control and guidance of the tracks is against the employment of caterpillars, especially in sandy land, where their upkeep also becomes very heavy.
2. During the trials we noted that certain outfits were driven by very skilful European mechanics, One must not expect, then in practice to obtain results from the tractors such as were obtained by those skilled drivers. Only one or two machines had an Egyptian driver, and the reason of this is to be found in the fact of the recent introduction of agricultural motor into Egypt. It seems desirable that a drivers' section should be started in the various Government practical schools, where each owner or agent could send his mechanics to do a one or two months' course during any period of enforced idleness. A certificate of fitness to drive such and such machines could be given, as in the case of chauffeurs. Drivers possessing such certificates would be entitled to a higher rate of pay, while owners, too would profit from the scheme.
3. We draw the attention of purchasers to the fact that a moderate machine well driven will give better results than a good machine badly driven. It would seem almost necessary then to organize trials for drivers, if one would promote cultivation by tractor.
4. In the largest estates and farms there are usually at the head of the administration competent men who are able to guide the mechanic. But in smaller places an experienced mechanic is necessary, if the system is to have a chance of success. At the moment, in the hands of one of our Egyptian drivers, a tractor of superior workmanship and finish would give no better results than an ordinary model.
5. Apart from this, one must consider the cost of the tractor in relation to the work demanded of it. In most trials one seems to forget to take into account the purchase price, and, if the present trials succeed in drawing the attention of buyers to this point, so much good has been done.



6. Another very important question is that of the cost of spare parts. In this connection certain firms rob their clients without fear or favour. The spare part is sold at two or three times the price at which it figures in the original price list. Any firm selling at a reasonable reduction, taking into account fluctuations in the market, would do much to popularize the tractor.
7. Under present conditions we put the life of a tractor at a maximum of five years. Interest on the money would be rated 6 per cent and a tractor can work on an average one thousand hours per year, say 100 days of 10 hours each. The estimate is not excessive, for in agriculture, during the busy seasons, 10 hours is a practical minimum."

The Agricultural Judges report tackled also different aspects of mechanization and suggested several policies to be adopted, as appear in the following statements:

- A- Late rains in 1920 and 1921 delayed ploughing and lost time would have been recovered by use of tractors, whilst even in a normal year a late beginning of ploughing would save one cutting of berseem ( clover), much more valuable than the cost of ploughing.
- B- Co-operation of neighbouring proprietors in purchase of a tractor, which they would want at the same time, is unlikely. Nor does contract ploughing seem very hopeful.
- C- Much unreclaimed land in Egypt has to be levelled, but there were no road scoops or graders shown in action. For such work there is a good opening for tractors, and contract works to level might be possible, as it can go on all the year round.
- D- In Egypt, as elsewhere, too deep ploughing is to be avoided. It is not so much a question of bringing up salt, as is often alleged, as bringing up unaerated or unoxidised till or subsoil. But if a shallow furrow stirred the soil, as deep as possible, without bringing it to the surface, much advantage would accrue. No subsoil attachments to ploughs were shown.

The soil in Egypt when drying shows wide vertical cracks, and about seven inches deep it cracks horizontally. A cultivator properly set takes advantage of these cracks and rolls over these natural clods, exposing them to the sun for further cracking. This form of cultivation is in many cases all that is needed. It takes little power, and a large area can be covered.

- E- An ordinary tooth harrow has very little effect on Egyptian soil. Clod crushers have more tendency to sink clods than to break them. The disc harrow, however, does much better work, but requires more weight than is usually given.
- F- The foregoing remarks will show how advisable it is to study local soil and conditions, for unless implements are suitable, the finest tractor possible cannot do good work.

And the report then concludes by saying "the need is urgent for commencing the instruction of native personnel in the care and handling of the tractor , and no opportunity should be missed of studying which machines may be suitable for the different types of Egyptian soil".

This report is very valuable indeed.... to what extent was it circulated? I dont know .. but it was published by cairo Government Press in 1921. It just happanned that I came across it last year in Behera 's Library..

The observations and recommendations referred to above are still outstanding , and are very close to the recommendations we still put forward today. The only difference is that we were so much closer to Europe in 1921 with regard to our state of mechanization of Agriculture , in fact Egypt held one of the earliest tractor trials all over the world , only 2nd to the United states in 1919. The progress of farm mechanization , however , was very slow in the following 30 years - with a tractor population reaching up to about 8000 units in 1951 .

With the <sup>a</sup>vent of the 1952 Revolution , several economic and social measures were taken , directed specifically at the Agricultural sector , at least in the early stage of the revolution. This included:

1. The Agrarian reform laws,
2. The permanent council for social affairs whose objectives were mainly directed towards the promotion and upgrading of economic and social status of rural areas,
3. Pioneer trials on consolidation of the utilization of fragmented holdings towards maximization of agricultural productivity,
4. Setting up and supporting agricultural cooperatives , increasing the availability of agricultural credits through the Agricultural credit banks.
5. Launching an aggressive plan for reclamation of new lands.
6. Drawing up integrated plans for economic and social development.
- and 7. Several other measures and programs aimed at increasing the Agricultural productivity.

The main objective of these programs was to serve the small farmer with limited ownership- less them 5 acres each - who constitute 95% of the total land-owners , and who hold title for ownership of 52% of the total cultivated area.

The 1<sup>st</sup> major policy for promoting farm mechanization was approved by the Ministry of Agriculture in Feb. 1956. It was based on an integrated plan proposed by the University of Alexandria in 1956, and which consitituted the following:

1. Inituation of Agricultural Engineering education both at the University and technical high school levels.
2. Introducing extension programe to the farming community , that would help farmers recognize and appreciate the capability of machinery in performing various operations at reasonable costs.



3. Supporting and funding research and development programs that would help select and develop machinery more adaptable to Egyptian farming conditions. The results of this work were supposed to lay the foundation for local farm machinery manufacture.
4. Exercise some control on the local representative of tractors and farm machinery manufacturers. This includes the necessity to test and certify the imported machinery before being made available to the farmer. Also , to control the prices of spare parts and the minimum inventory that should be made available .

Also, to encourage cooperation between the Ministry and these representatives, who already formed a " Society for farm machinery in 1956 ", to arrange for demonstration programs and field days to familiarize the farming media with the various capabilities of machinery.

5. Encourage the farming community in every possible way, including providing credit facilities to procure machinery, provided the owner or cooperative society shall make the service of such machinery available to the community.
6. Encourage private enterprises to set up custom-hire-service centers for rent, service, and repair of farm machinery.
7. Set-up Government controlled pilot centers to give the same service and also help monitor the hire rates.
8. Improve the field efficiency of farm machinery through promoting the establishment of " crop areas " large enough to utilize the machinery efficiently- say one day 's work - without interference with ownership rights of individuals.

Most of this plan actually saw the light one way or another, but as separate activities instead of being a part of an overall plan for development. The result was that some activities progressed much faster than others, thereby reducing tremendously its impact.

The question is ... where do we stand today?

- While tractor population increased at a relatively high rate, with an estimated number at present being around 38000 ( excluding tractors older than 10 years ) , we are falling far short from providing the necessary spare parts and service facilities. The results are reflected in appreciable down time , higher costs of service, and a heavy drain on the national economy.
- This situation is aggravated by the fact that not enough attention was given to technical training and or education for the proper operation , maintenance , repair , and management of farm machinery.
- There is virtually no organized extension effort in this area, except very recently. The result is that the farming community is still unaware of the various capabilities of machinery application , and

the tractors are used only for plowing, threshing, pumping irrigation water, and transport.

With the upward trend of unavailability of farm labour for various reasons, especially at the peak seasons, major farm operations like planting, cultivating, and harvesting, are now major constraints, and constitute a heavy burden on production costs and development,

This situation leads sometimes to rash decisions from the Government - which is a typical criteria of development decisions in Egypt - in an effort to relieve some of the constraints. These types of decisions usually forego other important items which are essential to ensure success of decisions taken, and which usually means heavy investments.

If the farm labour shortage continues, which is expected to be the case for some time, then we have to plan from now for the mechanization of non traditional crops, including truck crops, so the development would be natural and gradual.

In spite of the fact that the Universities carry out limited research work in Mechanization, we have to concede that this research is carried out as a necessity to fulfill academic obligations. What we need is a nationally integrated research program to satisfy the needs of developing our agricultural production. Virtually also there is very limited participation from specialists in the various fields of agriculture to help develop the proper machinery and/or modify the existing agricultural practices to suit mechanization. Also, there is no input whatsoever from the farmers themselves in the machinery or mechanization development, which can be successful only if this two way channel of communication is established. Also, there is virtually no linkage with plant breeders or efforts from their part to develop crop varieties more adaptable to mechanization.

We need also to look much closer into some established belief that cattle would not feed on rough straw.... Has there been a real effort to test the validity of such assumption? This is only one example, and there are many more that can be cited. If the farmer's attitude towards some of these beliefs change, then it would save on power, cost and may be change entirely some of the systems applied.

At least one Government controlled custom service center was initiated in sakha in the early 60's. This venture was not successful because the center was a part of the sakha Government complex rather than having its separate entry, and also because it was equipped with standard Russian machinery designed for large scale farming, and disregarding the Egyptian Agricultural practices.

A second center was to be established in El-Miniya, but it never saw the light.

- One Government controlled machinery repair center was also established at sakha about the same time but shortly afterwards its activities were confined to serve the sakha complex.

- A research and testing center, belonging to the Ministry of Agriculture was established in Alexandria in 1962 - It was activated for a very short period to serve the goals it was intended to perform, but soon afterwards it was converted to a receiving depot, or store, for the Ministry, and then was taken over by the Army in 1967.

This center was reactivated only recently .

- It is worthwhile to point out that the popular " drum threshers " were 1 st manufactured in the Mid 60's at Behera 's workshops, based upon a design developed by the Ministry of Agriculture.

- Another approach was adopted by the Government in the mid sixties to support farm mechanization through cooperative based custom services. However, with the limited built-in capacity for growth, and the constraints referred to above, the cooperative - operated system could not keep pace with the effective demand for custom service. With the market being initiated by these coops, however, private custom operators entered this field in rapidly increasing numbers. Today, it is estimated that privately- owned tractors outnumber by two to one those owned by coops. . .

The above review is not meant by any means to be a comprehensive one, it is rather a trial to identify some of the main landmarks associated with mechanization development in Egyptian Agriculture , The continuous effort on the central level at the Ministry of Agriculture has been instrumental in support of every activity in this field. The results were gratifying , especially since the engineering affairs of the Ministry were upgraded to the level of undersecretary of Agriculture - Much closer cooperation between the Ministry and the Universities is now one of the major positive symptoms. One of the further steps that can lead to much more favourable results would be the actual participation of University staff, on full time basis for a period from two to three years, in extension work directly under the supervision of the Ministry of Agriculture, which again leads to the establishment of a 2-way channel of information.

In closing, it is gratifying to note that positive measures are now taken by the present management of the Ministry of Agriculture, taking into full consideration the past experience, in:

- A- Formulating a five year plan 82/87 , which is now in its final stage.
- B- Coordination between aid support from different countries in support of further mechanization efforts.
- C- Recognition of the important role the individual efforts can contribute to the development.

and D- Reorganizing the activities and functions of extension.

The governing policy in formulating these plans and activities recognises the necessity and importance of working within an overall and integrated system. We sinceraly hope that these policies and plans would continue , so that there would be no need to re-read this paper again 30 years from now.

Thank you.



