

Present Status and Development Program of Farm Mechanization

農業機械化之現況及展望*

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中 文 摘 要

農業機械化可使農民獲得節省勞力，降低生產成本，提高產量或改善工作環境之利益，其中節省勞力為本省農業機械化發展之主要原動力。

政府在推行農業機械化工作上之主要措施有：

1. 提供農民購買農機之貸款及補助款。
2. 補助農民設置水稻育苗中心，供應壯健秧苗。
3. 辦理各種農機具使用保養與修護訓練計劃。
4. 加強辦理農機具研究發展計劃。

至67年底止，本省農業機械化程度，以整地為最高，達76.8%；水稻插秧，39.9%；水稻收穫，14.6%；稻谷乾燥24.6%。其他作物之機械作業，均尚在開始階段。

政府於67年7月起設置農業機械化基金，全面推展農業機械化工作，預期可產生以下之成果：

1. 農機具之性能將獲改善，效率更加提高。
2. 小型曳引機將取代耕耘機為主要之整地機械。
3. 在五至十年之內，稻作生產可全面機械化。
4. 實用的太陽能乾燥系統將可發展出來。
5. 林業、漁業及畜牧機械之發展層次將可提高。

Background Information

Taiwan (Formosa) has an area of 35,990 square kilometers and a population of 17.1 million. The density of population is 476 persons per square kilometer.

There are 885,000 farm families (about 5.64 million persons or 33% of the total population) and 918,000 hectares of cultivated lands. Each farm family consists of six to seven members and holds an average 1.04 ha of land only. Therefore, farming is kind of small in scale.

According to official statistics, our farm labor numbers about 1,553,000 persons—25% of the total labor force (6,228,000). Rural labor is getting less year by year due to the attractive work in factories or the fancy life style in cities.

More than half of cultivated lands are paddy fields. Rice (summer crop if

* 本文為作者在農復會服務時，於民國67年9月參加亞太糧肥中心舉辦「小農機械化研討會」之報告，略加增添新資料而成。

any)-rice (winter crop if any) is the most popular cropping pattern in Taiwan. Generally, summer crops are vegetables, while winter crops include corn, soybean, tobacco, flax, rapeseed, sweet potato, and vegetables.

Table 1 shows the production of top ten crops as well as oranges and vegetables of different kinds.

Table 1. Production of Major Crops in 1978

Crop	Acreage (1,000 ha)	Production	
		Total (1,000 tons)	Average (tons/ha)
Rice	752	3,055 (2,444)*	4.06 (3.25)*
Sugarcane	106	7,941	75.19
Sweet potato	92	1,463	15.96
Peanut	58	92	1.60
Tea	27.7	26	0.93
Soybean	24.5	41	1.67
Cassava	16.7	250	15.01
Banana	9.6	182	18.97
Pineapple	9.0	250	27.83
Tobacco	8.6	22	2.59
Vegetables	228	2,814	
Oranges	33.5	374	

* In the form of brown rice.

Source: Taiwan Agricultural Yearbook, 1979 edition.

Present Status

Farm mechanization has at least one, sometimes all, of the following advantages: 1) Saving labor, 2) Reducing farming cost, 3) Increasing agricultural production, and 4) Improving working conditions. The saving of labor is the main motive force of farm mechanization development in Taiwan. Owing to the small land-holdings of individual farmers, the commonly used agricultural machines are of small types as compared with the Western ones.

The development of machines for rice cultivation is the first requirement in the promotion of our farm mechanization program. So far, there are many local-made types of power tillers, rice transplanters, sprayers, rice combines, threshers, dryers and nursery equipment available in the market. Some of these machines can also be used for other field crops than rice. The development of machinery for forestry, fisheries and animal husbandry is still in its infancy, however.

The following are major measures adopted by the Government for the promotion of farm mechanization:

1. Providing loans and subsidies to farmers for purchase of farm machinery implements

Individual farmers or farmers' organizations are subsidized at 10 to 20 percent

of the cost for buying rice transplanters, rice dryers and other newly developed devices on condition that the machines be local-made ones.

Besides subsidies, farmers may apply for loans from the Provincial Cooperative Bank, the Land Bank of Taiwan or the Farmers Bank of China to cover the remaining cost of above-mentioned machines. This kind of loaning also applies to the procurement of power tillers, tractors and attachments, power threshers, farm engines, power sprayers, etc., for entire cost. Repayment of the loans is made in six to fourteen installments over a period of three to seven years, depending on the amount of loans. The interest on loans is 8.5% per year.

2. Setting up rice nursery centers

The use of rice transplanters needs specially raised rice seedlings. It is not economical in both time and cost to raise rice seedlings individually. The operation of rice nursery centers has the advantages of 1) simplifying the farmer's field work, 2) saving labor and cost, and 3) improving seedling-raising techniques. Also, the farmer may apply to the Government for a 25% subsidy in setting up a rice nursery center capable of providing rice seedlings for at least 100-ha paddy fields. So far, there are more than 480 rice nursery centers in Taiwan. The Government is going to continue this program for the coming years in order to accelerate the mechanization of rice transplanting.

3. Training farmers in the operation and maintenance of farm machinery/ implements

Development of suitable machines for local use is not enough. It is necessary to teach farmers how to operate the machines and maintain them in good condition so as to lower the fixed and operating cost. This kind of training is conducted island-wide by two junior colleges of agriculture and a number of agricultural vocational schools. Their courses include the operation and maintenance of engines, power tillers, rice transplanters, sprayers, threshers, rice combines, and dryers.

4. Strengthening research, development and improvement of farm machinery

Current researches are concentrated on the development and improvement of suitable planting and harvesting machines for field crops in order to solve the labor shortage problem which is getting serious year by year.

A solar energy system for drying farm products has been tested by the Agricultural Engineering Department of the National Taiwan University for a couple of years. Preliminary results show it to be a right direction for a new source of energy.

As indicated above, the promotion of farm mechanization covers three types of work, namely, extension, training and research. Responsible for overall planning and programming are the Council for Agricultural Planning and Development (CAPD), the Ministry of Economic Affairs (MOEA), and the Provincial Department of Agriculture and Forestry (PDAF).

Besides teaching, agricultural schools also conduct farm machinery research and training programs. They include the National Taiwan University (NTU), National Chung Hsing University (NCHU), Chiayi and Pingtung Junior Colleges

of Agriculture, and about 20 agricultural vocational schools.

Under PDAF, there are seven District Agricultural Improvement Stations (DAIS) responsible primarily for extension work and the Taiwan Agricultural Research Institute (TARI) and its Agricultural Experiment Stations responsible for research.

Under MOEA, there is the Agricultural Vocational Training Center which trains farmers in the operation and maintenance of rice combines and tractors.

In Taiwan, land preparation is conducted by using power tillers (mostly for paddy fields) and tractors (for dryland). As for other farm operations such as transplanting, harvesting and drying, only those for the rice crop have some achievements. The extent of agricultural mechanization in Taiwan by the end of 1978 is shown in Table 2.

Table 2. Extent of Agricultural Mechanization in Taiwan

(By the end of 1978)

Farm practices	Machine used	Number of machines (set)	Capacity (ha/set)	Total capacity (ha)	Extent of mechanization (%)
Land preparation	Power tiller	60,000	10	600,000	76.8*
	Tractor	2,100	50	105,000	
Rice transplanting	Rice transplanter	15,000	10	150,000	39.9**
Rice harvesting	Rice combine	5,500	10	55,000	14.6**
Rice drying	Rice dryer	18,500	5	92,500	24.6**

* Total capacity divided by the area of cultivated land (918,000 ha).

** Total capacity×2 (crops) divided by the rice growing area (752,000 ha).

Future outlook

On July 1, 1978, an Agricultural Mechanization Fund was set up under MOEA. A committee for management and handling of the Fund has been appointed with its members from the MOEA, CAPD, PDAF, Ministry of Finance, Council for Economic Planning and Development, and Provincial Food Bureau.

The Government will provide NT\$ 1,000,000,000 for the Fund every year from 1978 to 1981. It is estimated that there needs a farm machinery loan of about NT\$ 2,000,000,000 per year. The difference will be contributed by the loaning banks with interest compensation from the Government's loan interest which will be mostly used for implementing the farm mechanization program.

With the Fund, our agricultural mechanization would have a very bright future. The following achievements can be expected:

1. Farm machines will be improved to become more efficient.
2. Small tractors will be developed to substitute power tillers for land preparation.
3. Rice farming will be fully mechanized within five to ten years.
4. Practical solar energy systems will be developed.
6. Development of machinery for forestry, fisheries and animal husbandry will be raised to a higher level.