

AGRICULTURE MECHANIZATION IN GUANGDONG

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ABSTRACT

In this paper, a historical review of agricultural mechanization in Guangdong is taken and the present situation and restricting factors are analyzed. The developmental orientation and objectives by 2010 are worked out, while measures necessary for quickening the progress of agricultural mechanization in this province are also suggested.

1. INTRODUCTION

Modern agriculture can not develop without mechanization. Intensive management and labour productivity can't increase independent of the mechanization of farm work. Thus, mechanization of agriculture is an important sign of agricultural modernization. How can farm work be mechanized in Guangdong? Does it suit the developmental requirement of whole economy in the province? This is an urgent and important project which decides on the developmental strategy of agricultural mechanization in Guangdong. The authors of this paper have spent more than half a year to investigate the problem, aiming at providing scientific basis for the relevant organizations involved in management, production and marketing as well as in scientific research.

2. HISTORICAL REVIEW

Guangdong started mechanizing farm work in 1952. Over forty years, it has experienced four stages of starting, taking shape, development and adjustment. Here is a brief account of how it has developed.

2.1 The first stage---Starting, a pilot project was carried out from 1952 to 1957. Guangdong began to set up some farm machinery stations in the state-run farms, introduced large and medium-sized machinery made in the former Soviet Union for demonstration. Meanwhile some small-sized farm machines and equipment were trial-produced.

2.2 The second stage---Taking shape, from 1958 to 1963. Production, scientific research, management, supplying and marketing, extension and tech-service of farm machinery began to form systems so that they laid down a good foundation for developing Guangdong's farm work mechanization, provide favorable conditions for quickening it's pace in the whole province. Farm machines were managed by the state, people's commune and production team respectively.

2.3 The third stage---Development, from 1966 to 1978. Large, medium and small-sized tractors, various kinds of farm machinery equipment and tractors station increased rapidly. In 1978, total power of farm machinery in Guangdong reached 7,539,000HP, a yearly increase by 19.7% on average. Due to the interference by ultra-"Left" idea, farm machinery development divorced from the conditions of the rural economy tech-management standard and social possibility at that time. In this period, large and medium-sized tractors were managed mainly by the production brigade, while walking tractors mainly by the production team.

2.4 The fourth stage---Adjustment, from 1979 up to now. In order to develop rural economy, Guangdong has adjusted the unitary planned management system. Thus bringing about many changes as follows: Original, farm machinery dominantly managed both by the government and the rural collectives, is now mainly under the management of individual farmers. Farm work to be mechanized has expanded from crop planting to forestry, animal husbandry, sideline occupations and fishery. Farm machinery manufacture is market oriented from originally planned production. Management solely relied on administrative methods in the past. While now it depends upon laws and regulations in combination with market regulations. Extension work has developed through demonstration, experiments and introduction in contract with the past administrative measures. As a result mechanization of farm work in Guangdong has been accelerated and the use of various kinds of farm machinery are on the great increase. According to statistics, in 1991, the total power of farm machinery in Guangdong was 12,848, 200 kw, which increased by 1.6 times over 1978 (see table 1). Meanwhile, in Guangdong the establishment of socialized service system of farm machinery come into being. Now this province has established a lot of service organizations including 86 farm machinery companies, 92 farm machinery schools and 81 tech-extension departments at county level, while at township level, 1615 farm machinery management and service stations have been set up. There are also 2,269 service groups and 55,000 specialized farmer households engaged in service work of farm machinery villages.

3. PROBLEMS AND RESTRICTING FACTORS

3.1 Problems

3.1.1 In general, mechanization of agriculture is in low level in Guangdong. Farm work is mainly done by manpower or animal-power in some areas, particularly in mountainous areas. In the light of statistics, in 1991, tractor-ploughed areas in the whole province only accounted for 16.1% of the total cultivation areas. While machinery planted areas made up 0.1%, machine harvested areas only 0.3%.

3.1.2 In Guangdong, most of large and medium-sized tractors and small tractors were produced or introduced in 1960's and in 1970's. They have become worn-out and inefficient, having a high consumption of diesel oils. Because of being out of repair, 279 large and medium-sized tractors and 1830 small-sized tractors are sealed up for safety reason; 154 large and medium-sized ones and 1,331 small-sized ones are discarded as being useless. Power-generated drainage and irrigation facilities for farm use were seriously aging and most of them have exceeded the time limit of service.

3.1.3 Most of the villages located in the Pearl River Delta and rich plain areas have set up the service stations of farm machinery, but those in mountainous or remote poor areas haven't yet. According to investigations in the whole province, there are still 3% towns and 85% administrative villages which haven't established arm machinery stations. The unperfected service system of farm machinery can not suit the needs of the development for farm work mechanization.

3.2 Restricting Factors

3.2.1 Natural Conditions. Guangdong has various type of land form and varied topography. Within the province, there are mountainous areas, at lands and hilly land crisscrossing with each other. Cultivated areas are small in size and irregular in shape. Acreages below 2 mu (about 0.13ha.) accounts for 87% of the total cultivated land and those below 1 mu (about 0.07ha.) 31%. In addition, the province has high temperature and rainfall and frequently encounters natural disasters.

3.2.2 Funds. Some investigators pointed out that farmers' capacity of buying farm machinery is positively correlated with their incomes. Practices in recent years have also shown that farmers' need for machinery grows as economy develops. Of course, their income is still low now. Lots of farmers in mountainous areas haven't got rid of poverty yet.

3.2.3 Energy. Since farm machinery management system is constructed, diesel oils for farm uses cannot meet the requirements of agricultural production. In 1990, the consumption of diesel oil was about 321,600 tons. By calculation, each Kcal of power averagely consumes 38.89 kg diesel oil, only able to keep engine working 140 hours. The shortage of farm diesel oils has made farm machinery unused most of the time in one year. Their efficiency could not be brought into fullplay. It is predicted that Guangdong will be in short of diesel oils and electricity for a long time. This undoubtedly will restrict the development of agricultural mechanization.

3.2.4 Farm workers. There were 15,942,500 farm workers engaged in the primary industry in 1992. Each farm worker cultivated 2.36 mu (about 0.16ha.) of land on average. Large numbers of farm worker detained in the fields have hindered the development of agricultural mechanization. What is more, the worker's quality in terms of science, technology and culture level is quite low. According to our surveys, at present, illiterate and semi-illiterate farm workers make up 3.9% of the total workers in the countryside; The percentage of those who with primary school qualification is 38.6%; graduated from junior middle school 44.0%; from senior middle school 13.1%; from secondary specialized school only 0.4%. As for farm workers who have received various specialized technology training, about 20.6%, and untrained farm workers high up to 79.4%.

4. ORIENTATION AND OBJECTIVES

4.1 Orientation

On the basis of Guangdong's provincial conditions, mechanization of farm work should proceed towards diversified economy in agriculture from single farming toward development of farming, forestry, animal husbandry, side-line occupations and fishery; from simple field workshop towards pre-production and post-production. Meantime, efforts should be made to improve the mechanization

of crop growing and to get the greatly mechanized processing of agricultural products and by-products.

4.2 General Objectives

It is predicted by the year of 2010 total powers of farm machinery will have reached 30,000,000HP. Power of tillage machines will be about 8,500,000HP. There will be 40,000 large and medium-sized tractors and 450,000 small-sized tractors. Power of drainage and irrigation engines will go up to 5,000,000HP. power of agricultural product-processing machines will be about 5,200,000HP. Power of transportation machines for farm uses will rise to 11,300,000HP. And there will be 16,000 plant protection machines. General crop production will be fully mechanized. Sugar cane and peanut production will be mechanized in the main. The principal links in forestry production and construction will be basically mechanized. Fishery's production will proceed towards multi-production development of hydraulic pressure, electrification and automation as well as information. Freezing, keeping fresh, storing of aquatic products and their comprehensive use will be automatically combined and controlled.

4.3 Regional plans

4.3.1 The Pearl River Delta enjoys an advantageous geographic position, a convenient transportation, highly developed economy and stronger basis of agricultural mechanization. Therefore, this region should focus on manufacturing those machines for further processing, keeping fresh and storing farm produces; machines suitable for diversified economy in agriculture, especially pond-fish culture and processing machines, equipments for raising animals and poultry in the plant and their products-processing machines. By 2010, the whole process of rice culture will be highly mechanized. sugar-cane production, animal and poultry raising, fresh-water and sea water fish will be mechanized in the main. Agricultural products and by-products will be mechanized and automatized.

4.3.2 Mountainous regions. According to statistics, in 1991, there were 49 counties geographically belonging to mountainous regions in Gunagdong. Cultivated areas accounted for 41.71% and population for 40.64%. Due to its inconvenient transportation and communication system, the low productivity and weak farm machinery basis, great attention should be paid to develop mechanization of transportation and communication so as to accelerate commodity circulation in the rural areas. Development must be emphasized on processing bamboo, timber, fresh fruits and medicinal materials as well as forages. There are still needs for making and providing machines suitable for individual farmers to raise animals and poultry in large and middle-sized sheds; machines and equipment good for fish culture in mountainous ponds and reservoirs. To develop hydro-resources machines and equipment should be provided to meet small hydro-electrical stations' needs. By the year 2010, field work will be basically mechanized. Main forestry products and it's by-products will be highly mechanized.

5. STRATEGIC MEASURES

5.1 Administrations of farm machinery should strengthen planing, guidance and tech-supervision in agricultural mechanization. In accordance with conditions

in nature, society, economy and technology, short-term, medium-term and long-term plans should be made respectively. Secondly, in the light of characteristics and conditions of different regions within this province, measures should be worked out to determine the optimum disposition in production scale, and the standard to be equipped with machines. Conducting tests at selected places before gradually introducing the experiences of the pilot project. Lastly, strengthen tech-supervision in order to raise work efficiency, prolong the service time.

5.2 Adding the input of funds and energy. Funds must be added to farm machinery industry to produce more good quality and applicable machines in order to improve the equipment standard in farm machinery. Try to solve the aged problems of farm machinery. and quicken the renewal steps through many channels. Preferential policies should be given to collect the renewal and re-production funds to farmers' households for buying new farm machines and new equipment. More diesel oils, gasoline and electricity must also be supplied. Meanwhile, energy saving measures should be set out, for example, the consumption quota for one HP of engine, the deadline of reasonable renewal and etc.

5.3 Make great efforts to develop the service system of farm machinery so as to strengthen these functions of service. Firstly, management and service bodies of farm machinery at various levels including province, municipality, county, township and village must be set up and perfected. Then mobilize farmers to run their service groups. In the meantime, various kinds of service organizations must be perfected. The service system established should take city as the head, county's as the body, township's as the backbone and village's as the grassroots. More items of services should be offered extensively in ploughing, harvesting, plant protection, drainage and irrigation, transportation and communication. It can also involve consultation, processing, marketing and so on.

5.4 Research and develop new farm machines. We must selectedly introduce the advanced farm machines and equipments from abroad. In addition, we must mobilize and organize experts and technicians to develop and manufacture new farm machinery while can be widely used in the whole province.

5.5 Train technical personnels through multi-ways and at all levels. We must run well the college of polytechnic of South China Agricultural University and secondary specialized schools of farm machinery in this province and at city level to provide high and middle rank technical personal with high quality. The provincial government cities and countries should run some short-term, long-term tech-training classes to train tractors drivers and workers for farm machinery manufactures, for farmer's households in order to improve the quality of the professional in farm work mechanization.

6. CONCLUSION

Mechanization of agriculture in Guangdong has experienced four stages of stating a pilot project, taking shape, development and readjustment. At present, the standard of agricultural mechanization in this province is still low. Farm machinery has become aging seriously. The main factors restricting further development of agricultural mechanization including natural conditions, founds,

energy, and the number of workers and their quality. By the year 2010 the total power of farm machinery will reach 30,000,000 HP, an average of 16,603,400 HP as compared with 1991. Agricultural production will be mechanized in the main. Strategic measures to achieve the year of 2010's objectives include: to strengthen planning, guidance and tech-supervision, to add funds and energy, to develop the service system of farm machinery and to cultivate tech-personnels through multi-channels.

REFERENCES

1. Feng Wen and Ruiqing Li, 1988. A Study on mechanization of agriculture in Guangdong. Guangdong Countryside in 2000, Guangdong Rural development Research Centers. (In Chinese), P237-257.
2. Guangdong Provincial Statistical Bureau, 1989. Statistical materials of economy and society in Guangdong. Guangdong People's Press. (In Chinese)
3. Guangdong Provincial Statistical Bureau, 1992. Statistical yearbook of Guangdong, China statistical Press. (In Chinese).
4. Sufeng Zheng, 1991. Mechanization of agriculture in March. Guangdong, march in the reforms. Compiled in collaboration by Guangdong Rural Development Research Center and Guangdong investigation team of society and economy (In Chinese). P126-132.
5. Zemin Hu, 1992. A study on the developmental Strategy for agricultural modernizing of Guangdong Province. Proceedings of the International agricultural engineering conference. Asian Institute of Technology Bangkok, Thailand. (In English). Vol.IV, P1109-1115.

TABLE

Table 1. Amounts of Main Farm Machinery in Guangdong

Machinery name	Unit	1978	1991
Total power of farm machinery	kw	4,897,000	13,396,600
Large and medium-sized tractors		13,344	9,940
Walking tractors		97,598	354,357
Boat tractors		794	507
Pumps		130,600	212,928
Reap-threshing combine harvesters		193	362
Power-driven harvesters		469	1,705
Power-driven threshers		108,505	301,839
Plant protection machinery		4,325	22,284