

China Country Paper

Agricultural Mechanization Development in China

I PRESENT SITUATION

China agricultural mechanization is still in the developing stage, last year the mechanization level was only reached to 45.8%, however the target (mechanization level reach 70% in 2020) has been confirmed, developing speed has fasted and several positive changes have appeared in recent years.

1. The Total Farm Machinery Increase

At end of 2008, the total power of farm machinery has reached to 821.9Mkw increased 6.5% than 2007. Among it tractor 20.22M sets (big & middle tractor 2.995M, small tractor 17.22 M), farm vehicle 13.3M sets, combine harvester 0.743 M sets.

The mechanization level 45.85% was higher 3.38% than 2007, which is highest developing speed in china history.

Why it can develop so fast, there may have 3 reasons: farming lack of labor due large amount of labors transferred from rural to urban and city; farmers have more income to buy machine; government put 13 Billion RMB¥ (US\$2 Billion) to support farmers buying machinery at 2008.

2. The construction of farm machinery fleet improved

Machine size from small to middle or large; for example, in last 4 years, the number of different size tractor increased as follow:

Tractor size	2005	2006	2007	2008
Big & Middle	1.395 M	1.67M	2.04M	2.995
	Increase rate %	20%	22.6%	46.2%
Small	15.39M	15.6M	16.29M	17.22M
	Increase rate %	1.3%	4.4%	5.7%

As big & middle tractor increased more than 20% each year, small tractor only increase 5%. Consider tractor discard exceed 5% annually, the small tractor was no increase.

The machine quality improved.

Diversification of machine types, besides grain production, potato, peanut, green house vegetables, livestock productions as well processing and storage equipment all develop well.

3. Sustainable Mechanization Quickly Extended

Sustainable mechanization such as conservation tillage, direct seeding and crop straw return to field are quickly extended, and those tasks all undertaken by farm machinery organization in China.

China conservation tillage experiment started at 1991, extension commenced in 2002. With agricultural mechanization and agronomy person efforts and

government supporting, the CT extension is going well. At end of 2008, The conservation tillage area reached to 4.5Mha, direct seeding 8.45Mha (In multiple cropping area, only one season crop direct seeding, other season traditional seeding with moldboard plowing land is calculated as direct seeding) and crop straw return to field 13.35M.ha, totally there are 26.3M.ha crop land has been treated with straw return to field (mulch or mixture), which takes 22% of national cultivated land.

Three regions of CT in China at present are:

3.1 One crop a year regions in NC:

There are mainly Windy-Sandy region in North- west China, Loess Plateau region in North -central China, Cold Ridge region in North-east China. They are mostly one crop a year with rain fed crops like maize, wheat, soybean, rape seeds and small grains, the CT technology and machinery have basically matured with mainly using passive light seeders. At 2008, CT had extended to 2.1Mha.

3.2 Double cropping regions in CC:

There is mainly irrigated maize and wheat double cropping areas in Central China, The main problems in the region are: rapidly decreasing of ground water, environmental pollution by straw burning, high resources inputs and cost.

The CT extension started later but develop was rapidly with the power driven seeder innovation. At 2008, CT had reached to 0.90Mha and farmer income increased US\$180M.

3.3 Rice paddy regions in SC:

There are mainly irrigated wheat and rice double cropping, double rice cropping areas in South China. The CT works basically done by hand and animal power, the total CT area was 1.5Mha about at 2008. The mechanized CT technology and machinery are in the research stage.

4. “Across the Region” Operation Expanded

“Across the Region” operation expanded from wheat harvest to rice and maize harvest, tillage and plant. “Across the Region” harvest wheat 12.34Mha, harvested rice 4.87Mha, maize 0.68Mha, “Across the Region” plow 4.05Mha and plant 1.73Mha in 2008.

5. Farm machine service unit and family rapidly increase

At end of 2008, the farm machine service units reached 165,636 with each has 4.3 employees or cooperative persons, and farm machine families 38.3M, both together have owned more than 90% of farm machinery. On the other words, China farm machinery is mostly to do service work, farmer own a machine just for them-selves is only small percentage.

II PROBLEMS

1. Poor utilization rate and higher fuel consumption

Poor utilization rate and higher fuel consumption of farm machinery are still existed. For example, per hectare crop land takes 6.8kw of farm power at 2008, but the mechanization level only 45.9%. Some foreign country each hectare has less than 6kw farm power but fully mechanized.

There may be some reasons like small piece of crop land, small family size (less than 0.5 ha);

Low quality of farm machines;

Management not pay enough attention to machine utilization may be another reason.

2. Unbalance development

Plain area quick than mountain or hill area; dry land quick than rice paddy; grain crop like wheat, soybean, maize land quick than cash crop land like cotton, potato, fruit and vegetable.

For instance, the provinces of average mechanization level more than 70% at 2008 are Xinjiang, Heilongjiang, Tianjin, Shandong, Inner Mongolia and Hebei all in North China with plain and dry are, on the other hand, the provinces of average mechanization level less than 20% are Yunnan, Sichuan, Guizhou, Zhongqing, Guangxi, Fujian and Hainan are mountain area, rice paddy areas.

Mountain areas are most difficult for mechanization.

Unbalance crop mechanization level. Grain crop mechanization level wheat 86.5%, soybean 60.8% maize 51.8%, rice 51.2%, but cash crops, potato 20.9%, rape seeds 23%, vegetable and fruit less than 10% at 2008.

3. Poor quality of some farm machinery

Poor quality of some farm machine products, mainly small factory produced.

III CONTINUOUS DEVELOPMENT MEASURE & STRATEGIES

1. Continuously subsidize farmer purchasing farm machines

Continuously subsidize measure to farmer purchasing machines until 2020, while agricultural mechanization basically realized (mechanization level 70%). Through subsidize to guide construction adjustment of farm machinery, to raise machine quality and encourage service organization development. For instance:

Give higher subsidy rate to buy seeders (especially direct seeders) and harvest machines;

Scrap poor quality machines from subsidy list;

Give special subsidy rate to service organizations.

2. Enlarge support strength for research & innovation

For example 4 big research projects on the farm mechanization have been approved recently, there are:

Machinery development for maize production;

Machinery development for potato production;

Machinery development for hill area;

Mechanization patterns research on crop production, livestock production, green house production, agricultural product processing and storage.

3. Continuously Support Sustainable Mechanization

A national plan of "Conservation Tillage development" has been approved this year and will be start next year. It is planed that to 2015, will extend CT for 15.3Mha in 600 counties, which would take about 13% of China total cultivated

land, or 20% in North China cultivated land.

IV Suggestion for cooperation in Asian and Pacific countries

1. **How to raise the farm machine manufacture quality?**

Especially for the machines produced from small manufactures.

In China, there are about 8000 factories for making farm machinery, among it small factories are more than 6500 which manufacture capability is very weak due limited equipment and technicians.

2. **How to develop mechanization in mountain areas**

From practice in china, most difficult area for mechanization is mountain or hill area, like Guizhou and Yunnan provinces, their mechanization level only 4.12% and 6.44% at 2008, much less than other province.

It is not clear from follow 3 approaches, which one would take priority:

Leveling and amalgamating finely crop land and building tractor road first, then use middle or large machine;

Use small tractor or micro tiller to work on the existed hill area;

Build up rope or chain transport system to instead tractor system.

May be there are another approaches?

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