

Country Paper of China

Agricultural Mechanization Development in China

Gao Huanwen

Prof. China Agriculture University
Chief Expert of CT of Ministry of Agriculture

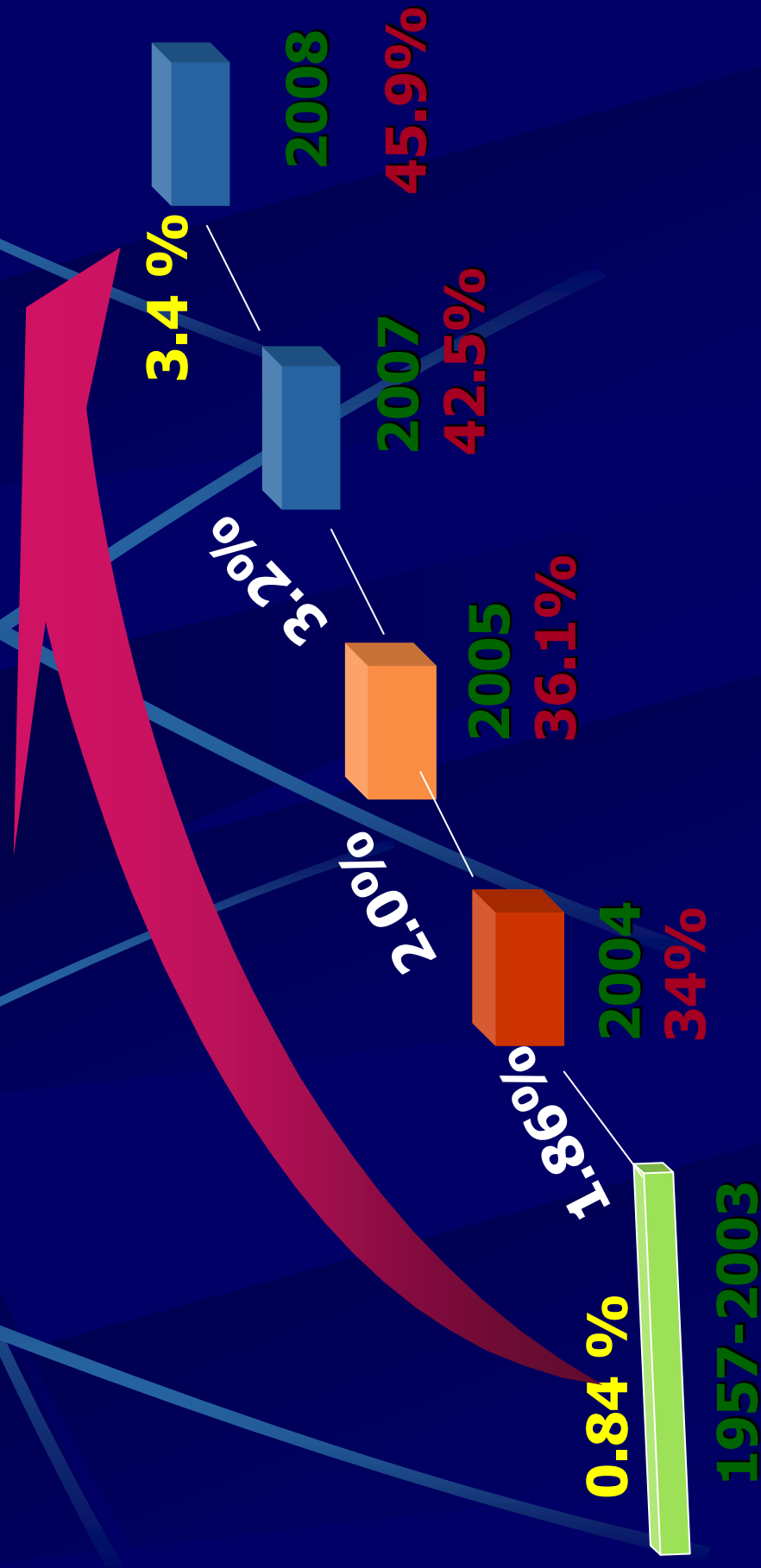


I PRESENT SITUATION

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

Target: Ag. Mech. level 70% in 2020

Each year increase 2.25% from 2005 to 2020



1. The Total Farm Machinery Increase

- Total farm power 822Mkw at 2008, increase 6.5% than 2007.
Among:
 - Tractor 20M sets (Big & Middle 3M, Small 17M)
 - Farm vehicle 13M sets
 - Combine harvester 0.74 M sets.
- Mechanization level 45.9% was higher 3.34% 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;
- Farmer has more income to buy machine;
- Government put 13 Billion RMB ¥ (US\$2 Billion) to subsidize farmers buying farm machines at 2008.

2. The Construction of Farm Machine Fleet Improved

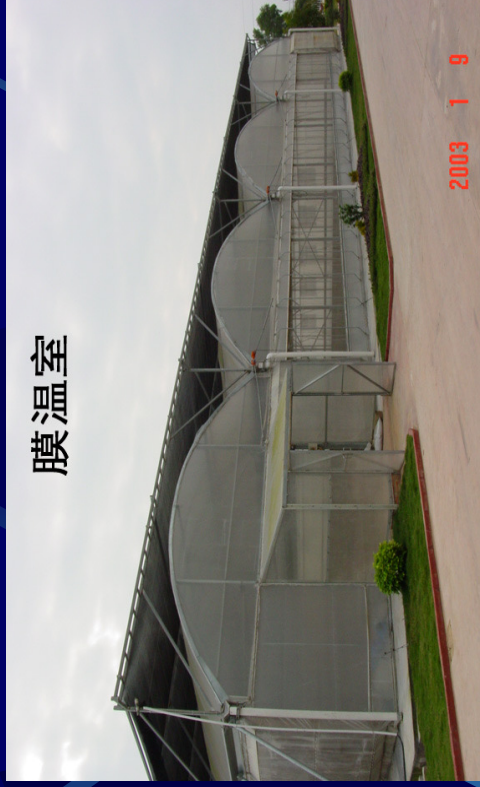
- Machine size from small to large, in last 4 years, the number of different size tractor increased as follow:

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.



Soybean Mechanization



膜温室

Green House Mechanization



Livestock Mechanization



Grain Process Mechanization

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 are undertaken by farm machinery organization in China.
- China CT experiment started at 1991, extension commenced in 2002. At end of 2008:
 - Conservation tillage reached to 4.5Mha;
 - Direct seeding 8.45Mha;
 - Crop straw return to field 13.35M.ha;
- Total 26.3Mha crop land has been treated in sustainable way, which takes 22% of national cultivated land.

Three regions of CT in China

3.1 One crop a year regions in NC

There are mainly cold and dry area in Northern China 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.

3.1.3 CT extension in Loess Plateau of NC



3.1.2 Windy-Sandy Area in North-west China

The main objectives of CT are control wind erosion, preserve soil moisture, avoid farmland and lawn desertification.



3.1.3 Cold Ridge Area in North-east China

The main characteristics are: low temperatures, soil erosion and drought in spring; CT objectives are to reduce wind erosion, improve soil moisture.



3.2 Double cropping regions in CC

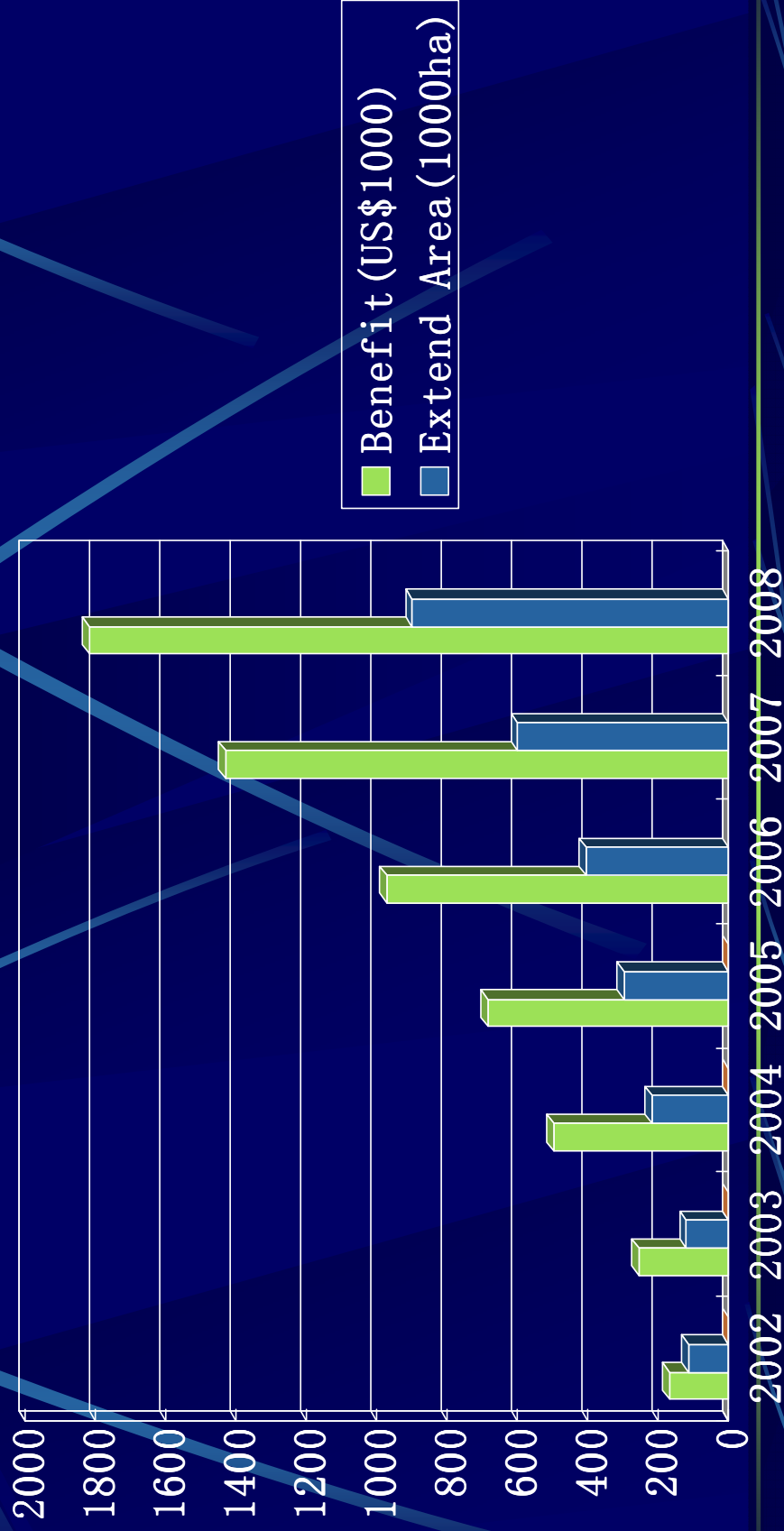
There is mainly irrigated maize and wheat double cropping areas in Central China, the CT extension started later but develop was rapidly with the power driven seeder innovation. At 2008, CT had reached to 0.90Mha.

CT in Double Cropping Area of Center China

The main problems in the region are: rapidly decreasing of ground water, environmental pollution by straw burning, high resources inputs and cost.



With the development of power driven no-till seeders, CT has extended to double cropping area for 0.9Mha and farmer income increased US\$180M at 2008.



3 kinds of power driven seeders



Strip rotary hoe
seeder



Strip chop seeder

Driven disc seeder



3.3 Rice paddy regions in SC

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

3.3.1 CT rice & wheat direct seeding buy hand in South China



↑
Farmer throwing Rice
seedlings on residue
cover paddy field

Wheat spreading use
hand tool



Mechanized CT in research stage



Planting wheat on rice
stubble field

Rice transplanting in
rice residue paddy



4. “Across the Region” Operation Expanded

- From wheat harvest operation to rice and maize harvest, then, plow and plant operations.
- In 2008, “Across the region” harvest wheat 12.34Mha, rice 4.87Mha, maize 0.68Mha.
- “Across the region” plowing 4.05Mha and plant 1.73Mha.

5. Farm machine service unit and family rapidly increase

- At end of 2008, there are 165,636 farm machine service units with each unit has 4.3 employees or cooperative persons.
- farm machine families are 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 themselves is only small percentage.

II PROBLEMS

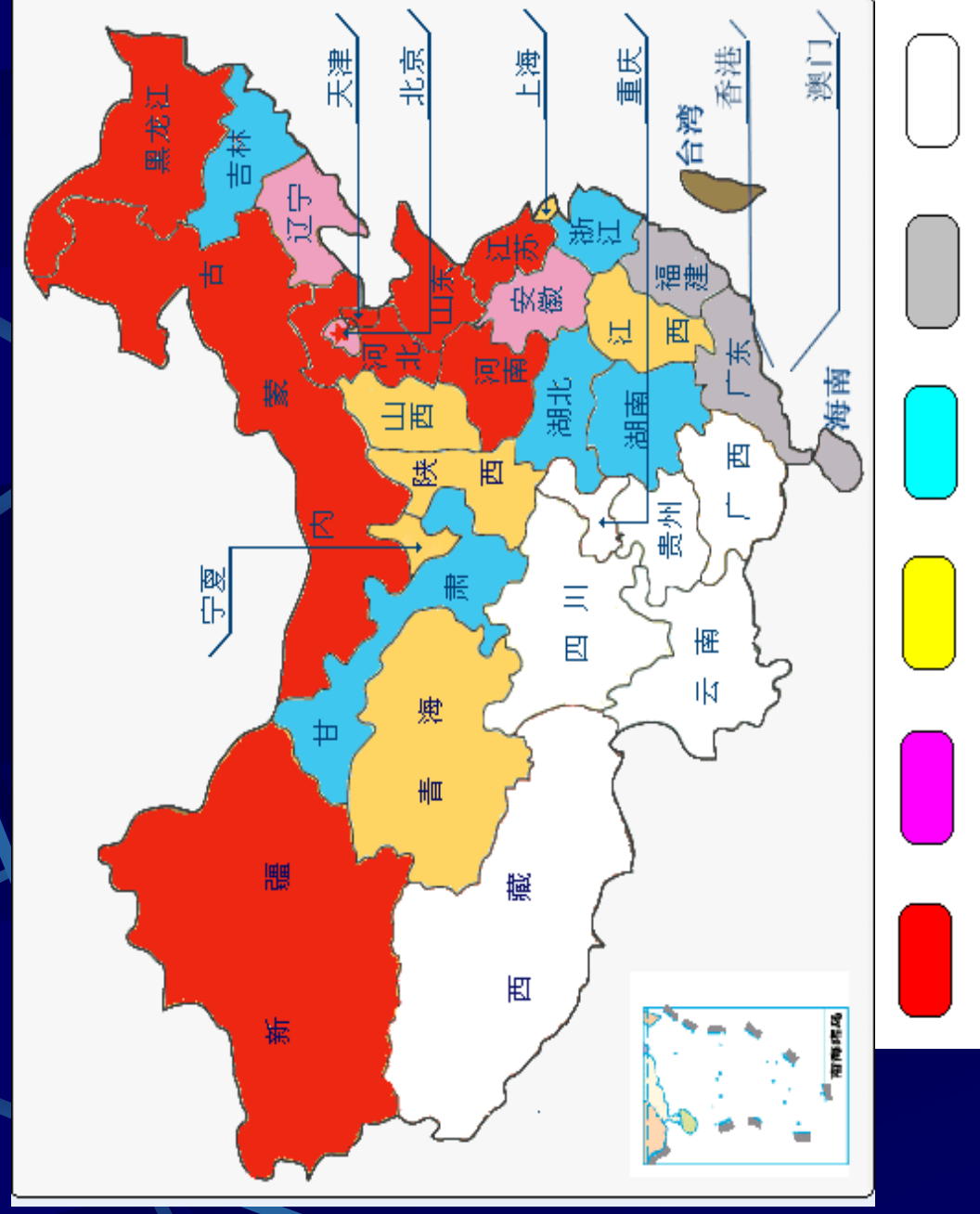
2.1 Poor Utilization and Higher Fuel Consumption

- Chinese crop land takes 6.8kw farm power per ha at 2008, but mechanization level only 45.9%. Some foreign country has less than 6kw/ha farm power but fully mechanized.
- The reasons may be 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.

2.2 Unbalance Development

- Plain area quick than hill area; dry land quick than rice paddy; grain crops quick than cash crops.
- For instance, the provinces of mechanization level more than 70% at 2008 are Xinjiang, Heilongjiang, Tianjin, Shandong, Inner Mongolia all in North China with plain and dry area, contrarily, the provinces of mechanization level less than 20% are Yunnan, Sichuan, Guizhou, Zhongqing, Guangxi are all in mountain area, rice paddy areas.

The Situation of Farm Mechanization at 2008



Mechanization level
 >60% 50% 60% 40% 50% 30% 40% 20% 30% <20%

Mountain areas are most difficult for mechanization



Hill area in
Heilongjiang of
North-east China



↑
Mountain area in
Shanxi of North
China

Mountain area in
Guizhou of South
China



From practice, most difficult for mechanization are mountain or hill areas. Like Guizhou and Yunnan provinces their mechanization level only 4.12% and 6.44% at 2008.



Tractor chopping the corn stock on terrace



Small tractor direct seeding on small land front of mountain

Unbalance crop mechanization level

- Wheat 86.5%, soybean 60.8%, maize 51.8%, rice 51.2%
- Potato 20.9%, rape seeds 23%, vegetable and fruit less than 10% at 2008.

2.3 Poor quality of some farm machines

- Poor quality in some of farm machines, mainly small factory produced.

III DEVELOPMENT MEASURE & STRATEGIES

1. Continuously subsidize farmer purchasing machines
 - Subsidize will continue until 2020, when agricultural mech. basically realized.
 - 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;
 - Scrape 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.
- It is planned that to 2015, will extend CT for 15Mha in 600 counties, which takes 13% of total national cultivated land, or 20% in North China.

IV Suggestion for cooperation in Asian and Pacific countries

1. How to raise the farm machine manufacture quality? especially for small manufactures.

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

2. How to develop mechanization in mountain area?

There are 3 approaches:

- 1) Use middle or large machine, but before it leveling and amalgamating finely crop land and building tractor road;
- 2) Use small tractor or micro tiller to work on the existed mountain area;
- 3) Build up rope or chain transport system to instead tractor system.

Which one should take priority? And other approaches?

Thank you

