

28th Members' Meeting of the Club of Bologna

New technologies and services for agricultural machines: challenges and limits

10 - 11 November 2018

Bologna, Italy

**New technologies for agricultural machinery:
Focus on situation in P.R. China**

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1. Survey of the agriculture

- Large farming country, hilly and mountainous areas over 60%
- Area of cultivated land: 135 million ha
- Rural Population(2017): 577 million, make up about 41% of the total population
- Percentage of employed persons in primary industry is: 28%(2016)
- The average area of cultivated land per agricultural labor force is only 0.76ha
- The agricultural labor productivity(2016): RMB29,600 ≈US\$4,700
- Annual Net Income per farmer(2017): RMB13,400 ≈US\$1,950





1. Survey of the agriculture—challenges and problems

Production
efficiency

not high

Production
cost

rising

Ecological
environment

deterioration

Food
security

concerning

--How to increase production efficiency so as to reduce the cost of agricultural products?

--How to improve the efficiency of water, fertilizer and pesticide so as to protect the ecological environment of farmland and food safety?

--How to use machinery instead of labor in agricultural production?



2. Survey of agriculture mechanization_1

- **Agricultural mechanization**
- ✓ The mechanized levels in key links of some crops are still low.
- ✓ The mechanized levels of some production links are only about **30%**.

Table 7: Crop production mechanization level in 2016(%)[↕]

[↕]	Tillage Mechanization level [↕]	Planting Mechanization level [↕]	Harvesting [↕] Mechanization level [↕]	The comprehensive level of tilling, planting and harvesting [↕]
Crop [↕]	81.40 [↕]	52.76 [↕]	56.01 [↕]	65.19 [↕]
Wheat [↕]	99.16 [↕]	87.89 [↕]	93.74 [↕]	94.15 [↕]
Rice [↕]	99.31 [↕]	44.45 [↕]	87.11 [↕]	79.20 [↕]
Corn [↕]	94.81 [↕]	83.85 [↕]	66.68 [↕]	83.08 [↕]
Potato [↕]	63.70 [↕]	25.98 [↕]	24.70 [↕]	40.69 [↕]
Soybeans [↕]	76.27 [↕]	71.75 [↕]	66.76 [↕]	72.06 [↕]
Rape [↕]	78.93 [↕]	25.20 [↕]	34.74 [↕]	49.55 [↕]
Peanut [↕]	72.61 [↕]	43.10 [↕]	33.91 [↕]	52.14 [↕]
Cotton [↕]	93.84 [↕]	84.61 [↕]	22.83 [↕]	69.77 [↕]



2. Survey of agriculture mechanization_2

- **Agricultural mechanization**
- ✓ National crops comprehensive mechanization level of crop is only **67%**.
- ✓ Comprehensive mechanization levels of crops in 9 southern hilly and mountainous provinces are less than **50%**, three of them are less than **30%**.
- ✓ Mechanization levels of animal husbandry, fishery and agricultural products preliminary processing are just about **30%**.





3. Focus on promoting mechanized technologies

- The Chinese government issued *The opinions of the Ministry of Agriculture on the promotion of mechanization throughout the production of major crops* in 2015.
- ✓ Focus on **nine crops**, including rice, corn, wheat, potato, cotton, rapeseed, peanut, soybean, sugar cane.
- ✓ Focus on **six production links**: to improve the mechanization of main links such as tillage, planting, plant protection, harvest, drying and straw treatment.
- ✓ In the advantageous production areas of major crops, 500 demonstration counties will be built to take the lead in realizing mechanization of the whole production process.





3. Focus on promoting mechanized technologies

➤ Ecological and environmental protection mechanized technologies

- ✓ The technique of deep tillage land preparation mechanization
- ✓ No-tillage precision seeding mechanized technology
- ✓ High efficiency plant protection mechanized technology(include uavs)
- ✓ Straw comprehensive utilization mechanized technology
- ✓ Mechanized technology of grain drying
- ✓ Mechanized technology of fruit and vegetable planting
- ✓ Mechanized technology of livestock and poultry farming

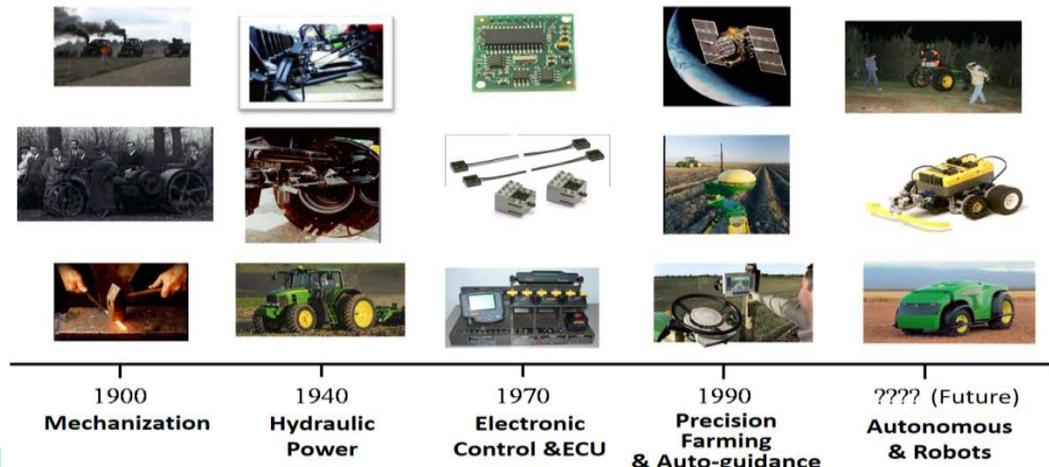
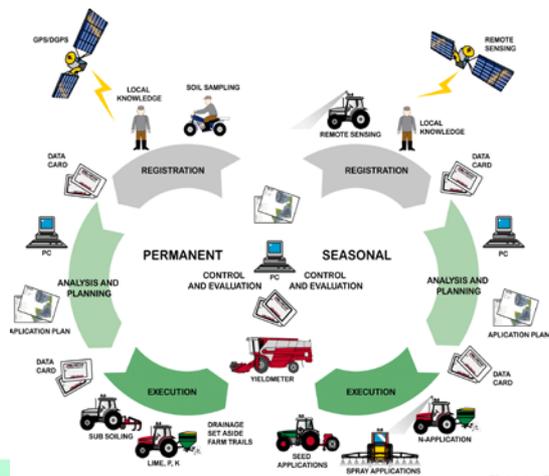
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4. Research and development of agricultural machinery and equipment

- **Chinese government issued *Made in China 2025* in 2015**
- Intelligent agricultural machinery equipment is one of ten major priority areas
- *Action Plan for the Development of Agricultural Machinery Equipment (2016-2020)*
- *China central government set up special funds to support research and development of intelligent agricultural machinery equipment. (Total RMB 980million)*





4. Research and development of agricultural machinery and equipment

11 research directions are supported:

1. Agricultural machinery operation information perception
2. Basic research on the application of precision production control
3. Intelligent design and verification of agricultural machinery and equipment
4. Development of key generic technology for intelligent operation management
5. Intelligent agricultural power machinery
6. Efficient, precision, environment-friendly and multi-functional farm operation
7. Intelligent and efficient harvest of food, cotton, oil and sugar crops
8. Facility intelligent and precision production
9. Agricultural products intelligent dry system and fine selection technology and major equipment development
10. Intelligent processing of livestock, poultry and aquatic products
11. Demonstration of mechanized operation in hilly and mountainous areas and paddy fields



5. Some measures

- The technology and machinery need people to operation and use, so the human factor is still the most important to agricultural mechanization
- To improve the knowledge and skills of farmers and support the development of agricultural machinery cooperatives
 - Training programs for farmers.
 - Fully mechanized production demonstration bases.
 - To implement subsidies for the purchase of agricultural machinery and guide the application of advanced agricultural machinery, especially high-performance, intelligent agricultural machinery.
 - To hold the field day of farm machinery operation.
 - To build the AM Cooperatives Committee of university graduates.





- ✓ There are a lot of exploration and practices in precision farming, unpiloted tractor, and BDS (Beidou navigation positioning system) in China.
- ✓ China's agricultural mechanization has great development prospects.
- ✓ It will go through a long process to realize full mechanized production, high quality and efficient development of agriculture as diversity in planting crops and systems in China .





Imagine a World with No Hunger, an Endless Supply
of Energy, and a Healthy Environment



Thanks for attention

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