

中国农业机械化现状与环境

Agricultural Mechanization Status and Context in China

Li Hongwen

Professor, China Agricultural University
Head, Conservation Tillage Research Center, MOA

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on Sustainable Agricultural Mechanization in Asia, Bangkok, Thailand, 2011

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Brief

Agricultural Mechanization in China?

- ◆ Development of Agricultural Mechanization in China was ever very bad, and is now very quickly; argued whether China need Mechanization, now stop such argument;
- ◆ Talking and worrying about on which way we should develop AM, and how to make Mechanization more efficiency.

Brief

SAMS ? (practically)

Main part of sustainable agriculture = CA

Then:

Main SAMS = CA Mechanization

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Brief

SAMS ?

◆ CA developed quickly, but still meet many problems

Two parts

Part 1

Agricultural Mechanization in China

Part 2

Sustainable Agricultural Mechanization
in China (Mechanized CA)

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AM in China

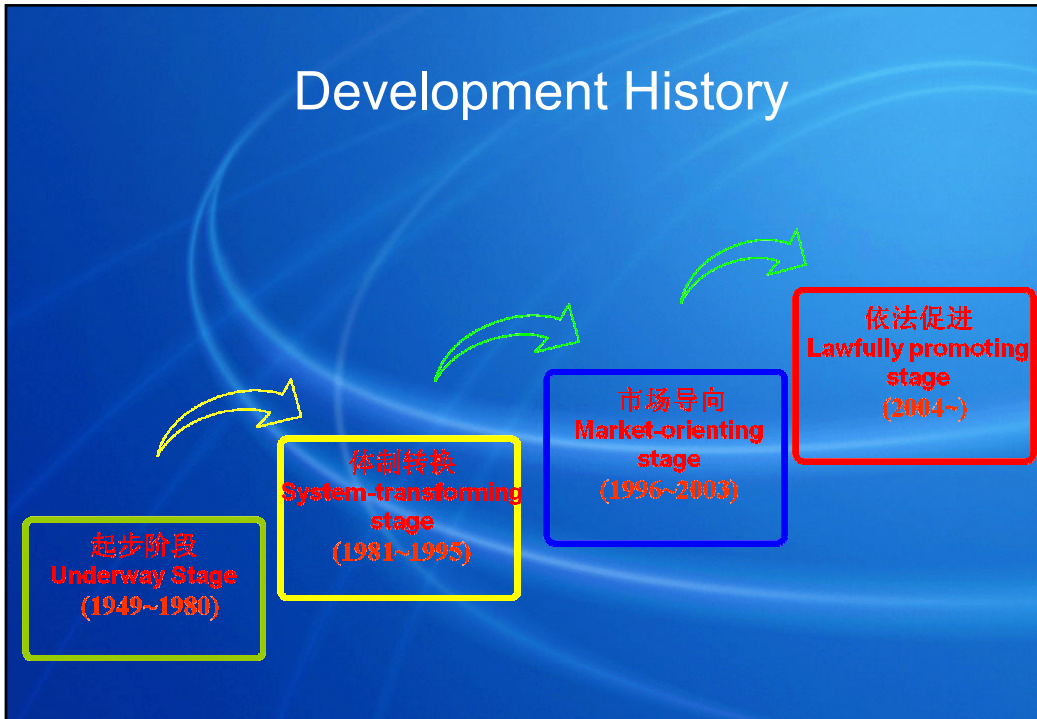
Government

- Ministry of AM: before 1990s
- Department of AM, MOA: after 1990s

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	Government	University/ School	Research institute	Test	Extension
Country	Department of AM, MOA	CAU	CAAMS	Test station	Extension station
Province	Bureau of AM	Provincial AU	Provincial institute	Provincial test station	Provincial extension station
County	Bureau of AM	Some: School	Some: institute	Few	extension station
Town	AM technician	Some: Farmer school			

Development History



(一) 起步阶段(1949~1980年) Starting Stage (1949-1980)



(二) 体制转换阶段(1981~1995年)

System-transforming stage (1981-1995)

1

调整发展战略
方针

Strategies and
policies of
development were
adjusted

2

改革农机所有
制

Ownership system of
agricultural
implements was
reformed.

3

小型农机具快
速增长

Increased
availability of small
agricultural
implements.



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(三) 市场导向阶段(1996~2003年)

Market-orienting stage (1996-2003)

1

农机跨区作业
迅速发展

Rapid development of
Cross-region
cooperation and
sharing of agricultural
machinery.

2

农机社会化
服务领域扩大

Socialized services of
agricultural
machinery were
expanded

3

国家多方面扶
持农业机械化

Agricultural
mechanization was
supported by the
State through
various means



(四) 依法促进阶段(2004年至今) Lawful promoting stage (2004 up to present)

1

实施《农业机械
化促进法》
Agricultural
Mechanization
Promotion Law was
carried out.

2

实施购机补贴
政策
Farming machinery
purchase subsidy
policy

3

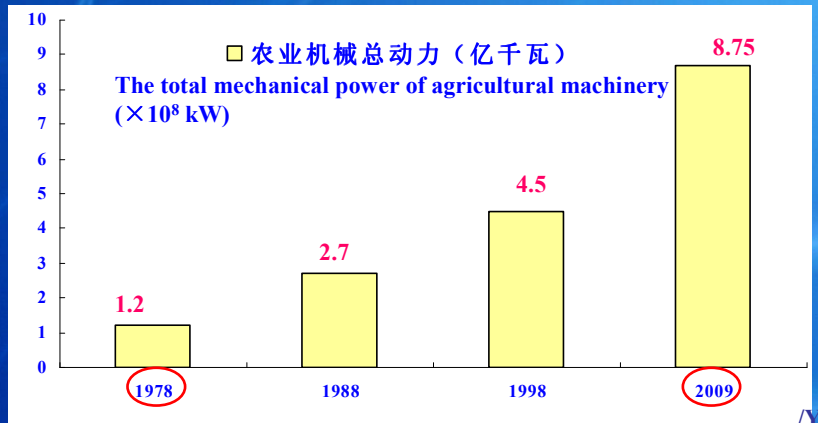
科学发展观统
领全局
Agricultural
mechanization
processes are guided
by the concept of
scientific
development



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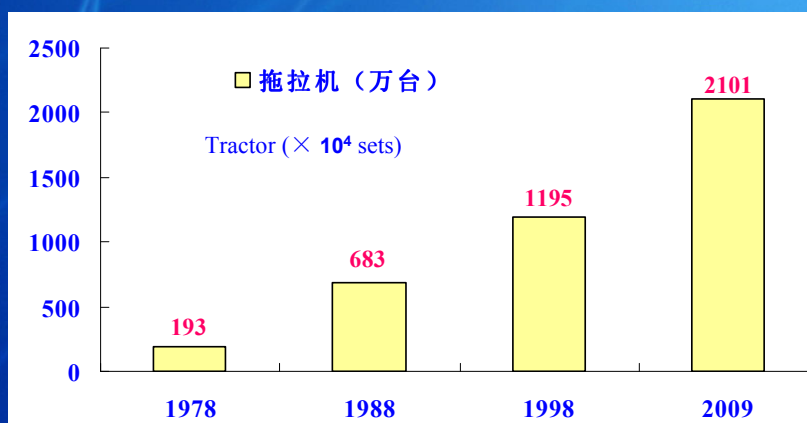
Achievements of AM in China

The Gross of AM Improved Significantly

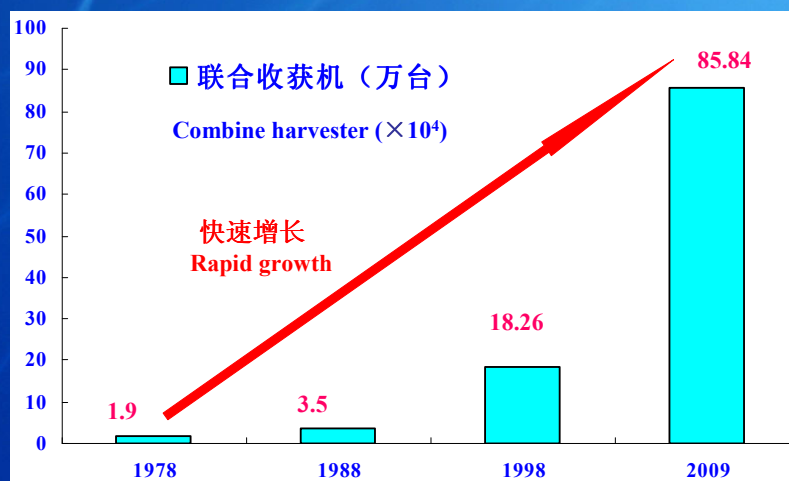


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The Gross of AM Improved Significantly

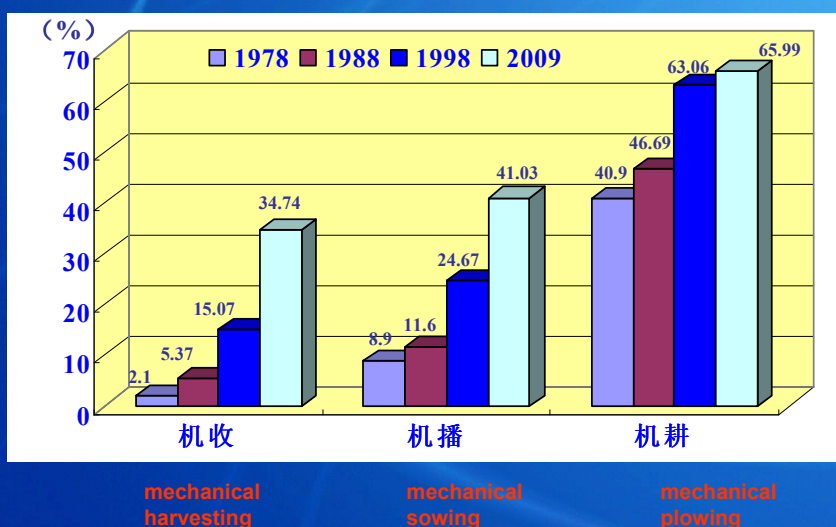


The Gross of AM Improved Significantly



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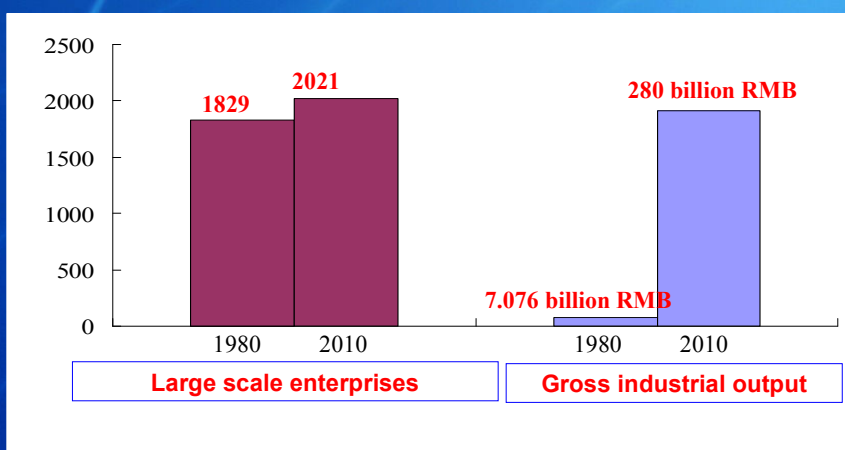
The Level of AM Improved



- 小麦wheat: Mechanization >85%。
- 玉米corn: Sowing >75%。
Harvesting>25%。
- 水稻 Rice: Sowing>20%。
Harvesting>60%。

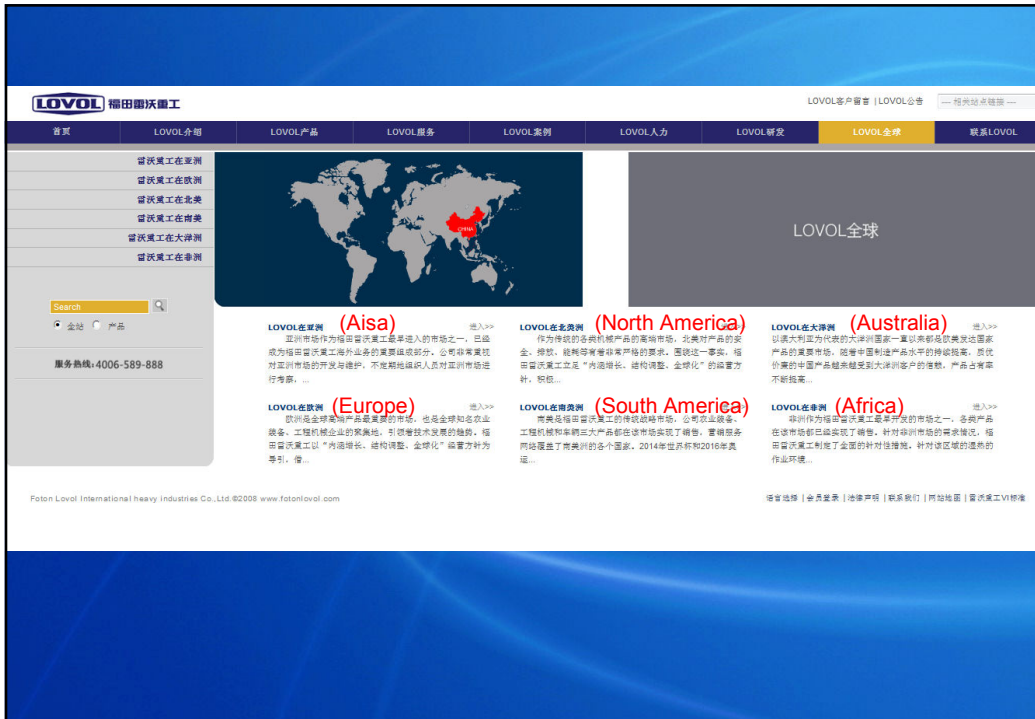
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The Production Capacity Enhanced



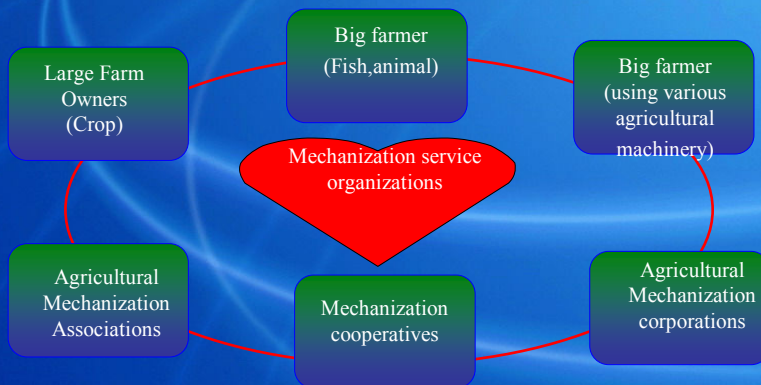
农机工业产值：2009年是1980年的32倍。

Gross industrial output in 2009 was 32 times higher than 1980



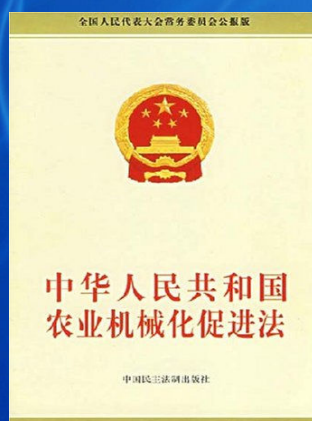
- International AM companies from North America, South America, Europe, Asia entered China market

Socialized Service Organizations Expanded



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Polices



➤ 科研开发
Scientific research

➤ 质量保障
Quality Assurance

➤ 推广使用
Technology dissemination

➤ 社会化服务
Social service

Law of the peoples Republic of China on Promotion of Agricultural Mechanization was carried out from November 1, 2004.

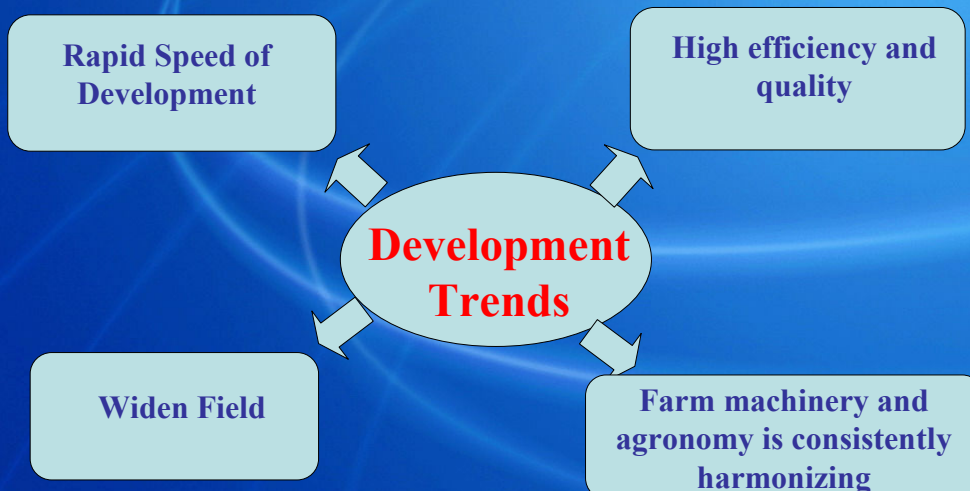
WHY AM SO FAST IN CHINA?

Four Wheels Driven

- 1、**Labor** 劳动力
- 2、**Benefit** 农机作业服务利益驱动
- 3、**Technical Progress** 工业技术进步
- 4、**Policy** 政策的推动

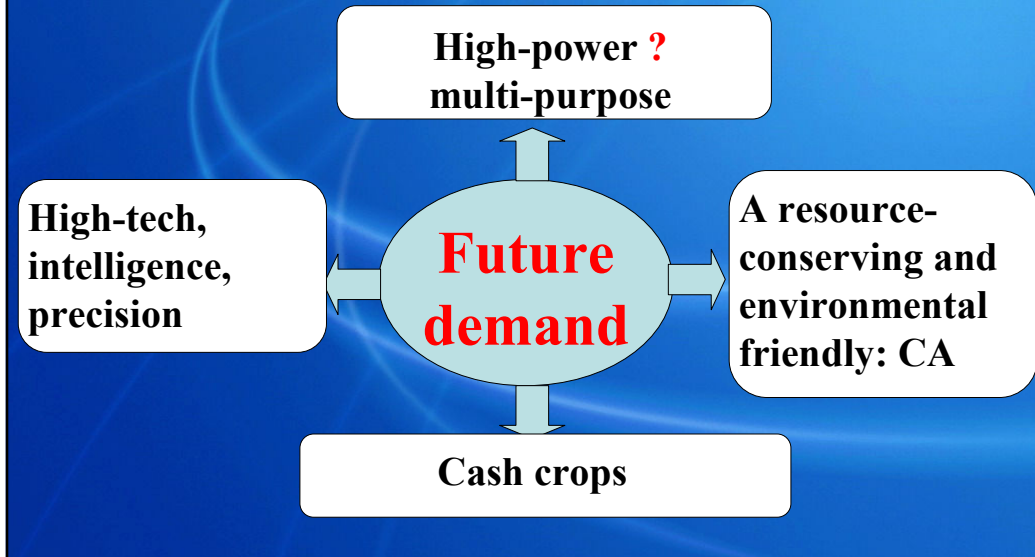
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Future



四、中国农业机械化发展展望

Development prospects of China's agricultural mechanization



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1024x768 148k jpg
供应手扶拖拉机(图)



2000x1557 196k jpg
供应手扶拖拉机



960x768 62k jpg
供应手扶拖拉机花生地膜覆盖...



1000x750 130k jpg
手扶拖拉机,旋耕机,农业机械...



650x555 86k jpg
手扶拖拉机-手扶拖拉机-sich...



500x500 92k jpg
...版可受手扶拖拉机打火机 - ...

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400x287 22k jpg
...江苏-804型拖拉机_江苏清拖...



1600x1200 522k jpg
拖拉机包装设备及用具,拖拉...



3648x2736 1604k jpg
...添置大中型拖拉机及配套农具...

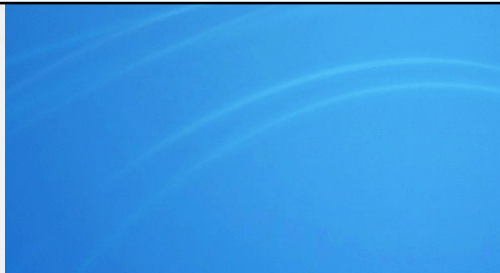
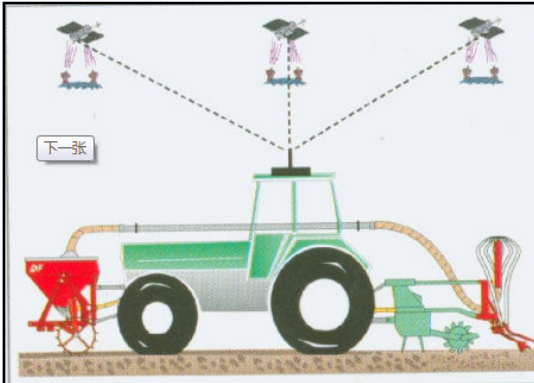









1024x768 136k jpg
玉征拖拉机大图摄影图 - 爱...



288 hp

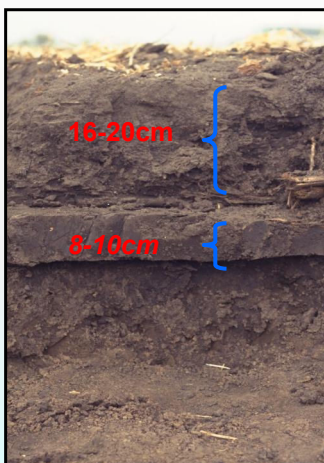
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 500x400 89k.jpg ...3000型激光平地机应用 - 北...	 500x450 88k.jpg ...农业激光平地自动控制系统...	 3072x2304 4039k.jpg ...不可小觑的激光平地新技...
 794x599 88k.jpg ...3000型激光平地机应用 - 北...	 2592x1944 1648k.jpg 【拓普康激光平地机价格_拓...	 592x439 20k.jpg ...供应天玉激光平地机-中华...
 503x400 64k.jpg ...蓝地机(激光平地机)_大合...	 527x233 24k.jpg hv401激光平地机(北京天玉信...	 476x359 56k.jpg 激光平地机(北京-上海路神...

CA in China

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Hard Pan



Stubble Burning

Runoff



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Wind Erosion/Dust Storm



cnsphoto

- ◆ Fuel consumption: 21million tractors, 0.86million harvesters. Fuel?
- ◆ Example: 120 million ha farm land ; averagely 60L diesel/ha for plowing. So, only plowing needs 7200million L diesel !!!!!



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Problems from None CA

- ◆ Soil degradation
- ◆ Water Erosion
- ◆ Wind Erosion
- ◆ Greenhouse Gas
- ◆ High input
- ◆ Stubble Burning
- ◆ Decline of Underground Water Level
- ◆ Too much fuel consumption
- ◆ Hard Pan
- ◆

5 Zones



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North East



Black Soil Degradation

In the past, Common: >30cm:

Now:

About 25%: 20-30cm

About 12%: <20cm

About 3%: lost all black soil

SOM go down

North West



Agro Pastoral Zone

Strong wind, dry, degraded soil

壤生产能力不断下降。“2003年以前，每年都有六七万公顷次油菜受春天季风的侵害，使油菜无法出苗，或者出苗后被风沙打死”，内蒙古自治区海拉尔垦区农业管理部部长程万鹏说，“这种情况发生后要采取补播措施会造成油菜生长期不够，难以成熟、不仅增加了作业成本、还降低了经济效益。”

In Hailaer, Before using CA, Spring, some young rape seedling are killed by erosion; after CA, nearly none was killed

The bottom of the slide features a map of China with a red box highlighting the Agro Pastoral Zone in the north. A decorative blue wave pattern is at the very bottom of the slide.

Loess Plateau

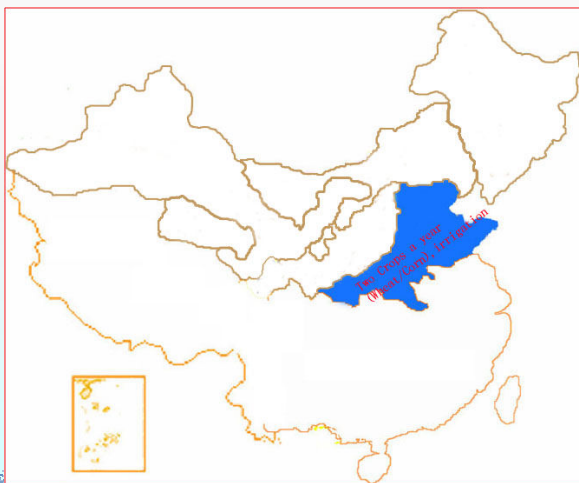


Erosion, Yellow River

s Drought of 10 years.

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Two Crops Area



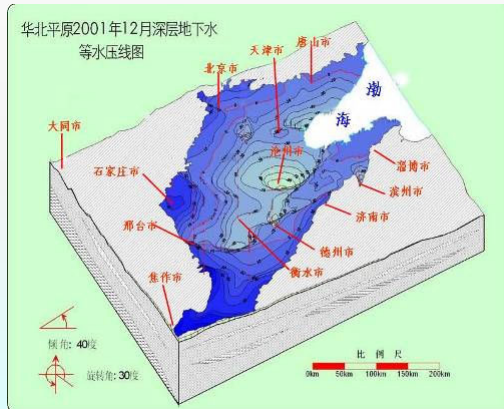
With Less than 600mm rain, to grow 2 crops a year.

Too much irrigation, make ground water level go down quickly, 1 m/year in somewhere

To catch time for sowing, have to burn stubble

Too much input

Two Crops Area



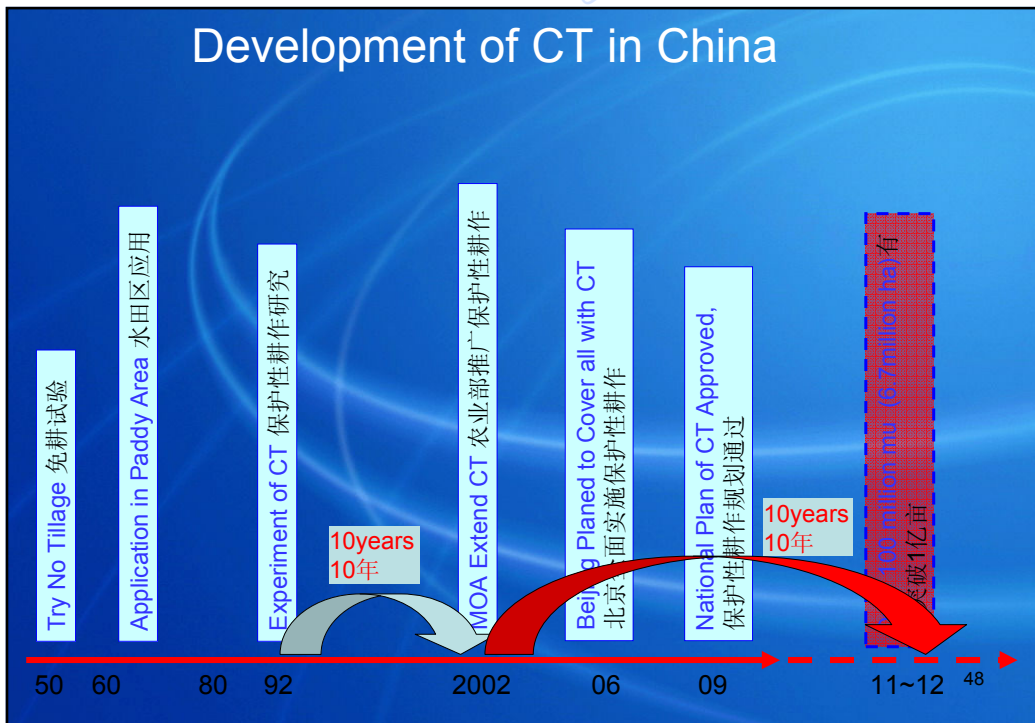
Underground Funnel

1m/year

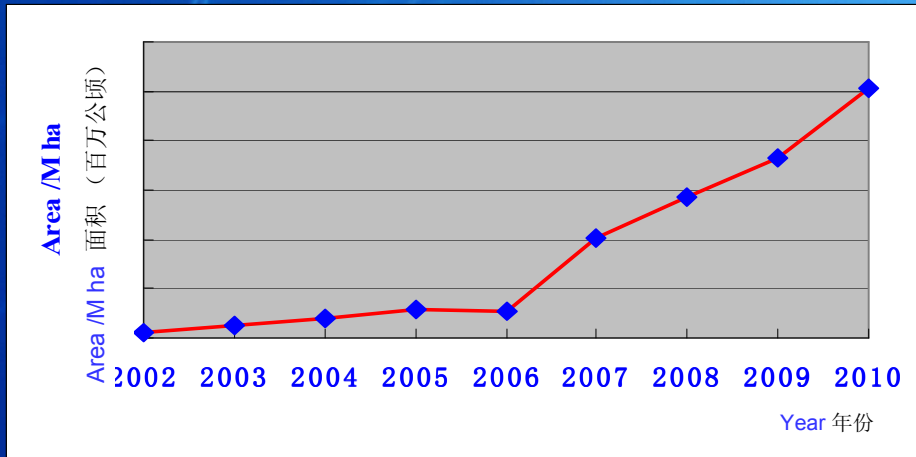
Deep Well

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Development of CT in China



Development of CT in China



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2010 年全国农业机械化统计年报

各地区农业机械化作业情况表 (续表6)

地区	1. 机械总动力		2. 机械总作业面积		3. 机械总作业量		4. 机械总作业效率	
	万千瓦	千公顷	千公顷	千公顷	千公顷	千公顷	千公顷	千公顷
全国合计	27531.29	9232.74	11152.52	5688.87	...	...	...	...

CA area

全国农业机械保有量表 (续表1)

机械名称	单位	2009年	2010年	2010年比2009年	
				增加量	增长率
1. 联合收割机	万台	...	...	...	...
2. 玉米联合收割机	万台	...	...	...	...
3. 小麦联合收割机	万台	...	...	...	...
4. 水稻联合收割机	万台	...	...	...	...
5. 油菜联合收割机	万台	...	...	...	...
6. 花生联合收割机	万台	...	...	...	...
7. 棉花联合收割机	万台	...	...	...	...
8. 甘蔗联合收割机	万台	...	...	...	...
9. 其他联合收割机	万台	...	...	...	...
10. 其他收获机械	万台	...	...	...	...
11. 其他收获机械	万台	...	...	...	...
12. 其他收获机械	万台	...	...	...	...
13. 其他收获机械	万台	...	...	...	...
14. 其他收获机械	万台	...	...	...	...
15. 其他收获机械	万台	...	...	...	...
16. 其他收获机械	万台	...	...	...	...
17. 其他收获机械	万台	...	...	...	...
18. 其他收获机械	万台	...	...	...	...
19. 其他收获机械	万台	...	...	...	...
20. 其他收获机械	万台	...	...	...	...
21. 其他收获机械	万台	...	...	...	...
22. 其他收获机械	万台	...	...	...	...
23. 其他收获机械	万台	...	...	...	...
24. 其他收获机械	万台	...	...	...	...
25. 其他收获机械	万台	...	...	...	...
26. 其他收获机械	万台	...	...	...	...
27. 其他收获机械	万台	...	...	...	...
28. 其他收获机械	万台	...	...	...	...
29. 其他收获机械	万台	...	...	...	...
30. 其他收获机械	万台	...	...	...	...

No till Seeders

CA and No Till seeders are included in Annual Report of Agricultural Mechanization by MOA

Introduction of CTRC



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Who is CTRC?

- Only and leading organization on CT/CA in China
- Main support to MOA and all provinces on CT/CA



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Series No/minimum till Seeders

◆ Hand Seeder



Only about US\$25

◆ Seeder for 2 wheels tractor



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◆ Seeders for 4 wheels tractors without driven anti-blockage system



◆ Seeders for 4 wheels tractors with driven anti-blockage system



中国农业大学
博士学位论文
带状免耕播种机的试验研究
Study on the Strip-Chipping Anti-Blocking No-till Planter
研究生 张世强
指导教师 高怀文 教授
学科门类 工学
专业名称 农业机械化工程
研究方向 机械化生产与栽培系统
答辩委员会主席 高怀文 教授
答辩日期 2008年5月25日



Started from 1997, 1 Ph.D student graduated in 2001

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1. Prove the benefits of CA in China

- 1960s, no-till study in China. 20 years, fail
- 1991, restart with Conservation tillage (CT), succeed. Used in most Northern China provinces.
- The first CA field still exist, No.1 in China



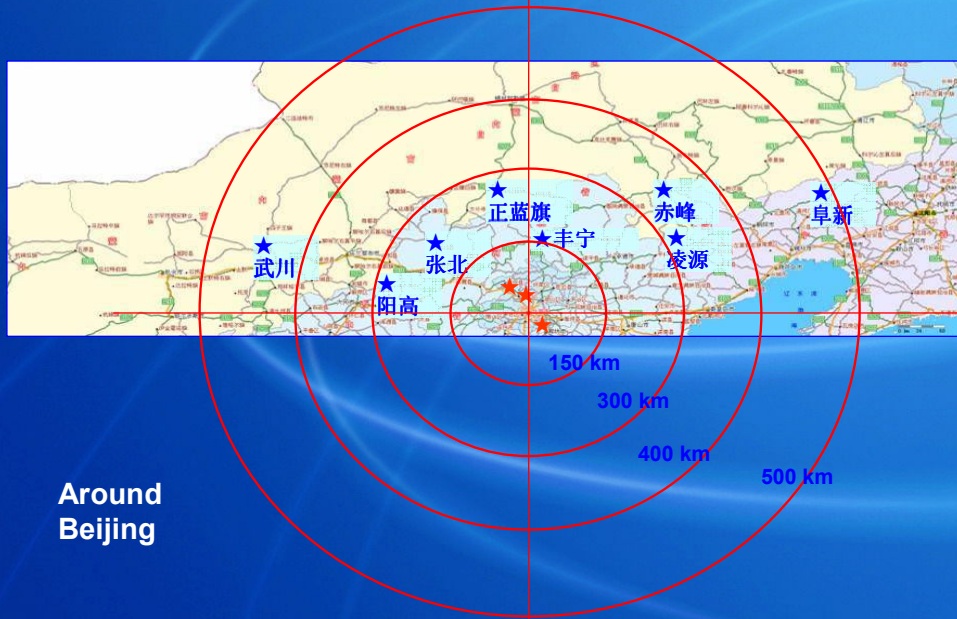
2. Prove the impact of CA on wind erosion controlling



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Wind Erosion Monitoring Points



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3. Prove the impact of CA on Water erosion controlling

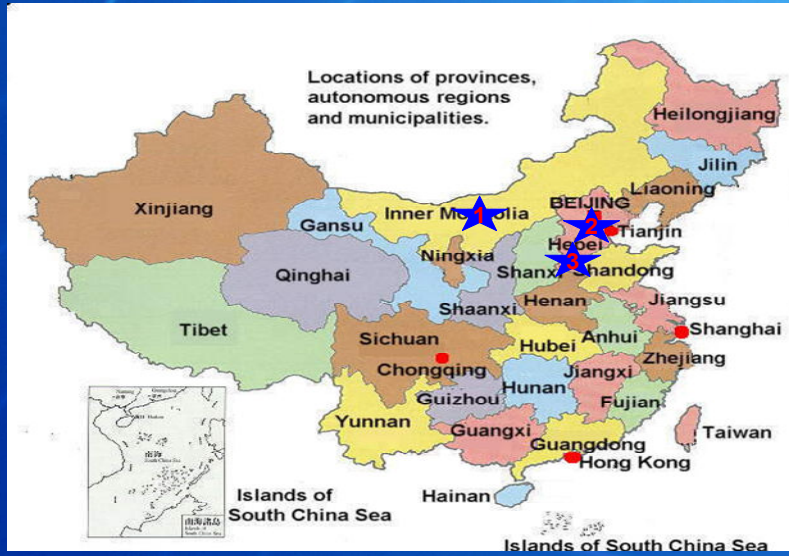


Rainfall simulating



Runoff Measurement

4. CO2 Flux



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5. Controlled Traffic/PRB

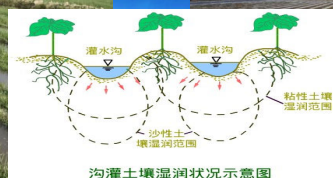


Save fuel



Save Water

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- Three Times of National Science and Technology Progress Award
- More than 60 patents
- More than 100 papers

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Sustainable Agricultural Mechanization?

What Can Agri Mech make sustainable?

To agricultural machines:

increase efficiency, reduce machines number, reduce fuel consumption;
increase technology, reduce operations, reduce lower tech machines;

To agriculture and soil:

reduce soil disturbance and hard pan;
reduce move out of stubble;
reduce use of resources;
reduce use of chemicals;

Yields: must be increased in Asia!!!

That's mechanized CA !!!!!

Constraints?

- **AM:** efficiency with small land? The way for development.....
- **CA:** 10 years ago, constrains were: few persons accepted. Present constraints are: firstly, lack of economic al well operated no till seeders; then, traditional idea of plowing even CA has been widely known.....

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