水稻全程机械化解决方案

Solution of Whole Course Mechanization of Rice Production

目录 Contents

01

中国水稻现有机械化水平
Current Mechanization Level in China

01水稻现有机械化水平
Current Mechanization Level

•种植分布

Distribution of rice planting areas in China

我国水稻集中分布在热带或亚热带的高温多雨地区。如长江流域、珠江三角洲和四川盆地，中南半岛等，我国水稻主要有六大产区分别为：I.华南双季稻作带；II.华东、华中单双季稻作带；III.西南高原稻作带；IV.华北单季稻作带；V.东北早熟稻作带；VI.西北干燥稻作带。

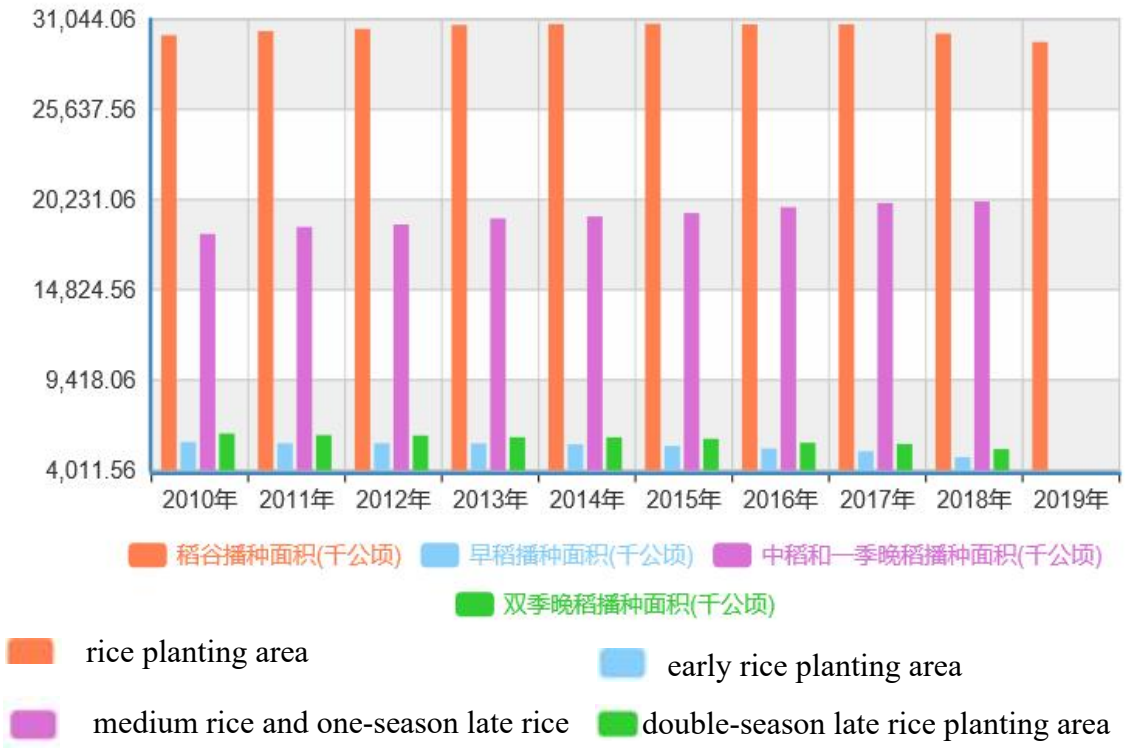
Rice planting in China is concentrated in hot or rainy areas in tropical or subtropical regions.
Six major production areas: I. South China double cropping rice planting areas; II. East and Central China single and double cropping rice planting areas; III. Southwest plateau rice planting; IV. North China single cropping rice cropping planting areas; V. Northeast early maturing rice cropping planting areas; VI. areasNorthwest dry rice cropping planting areas.

01水稻现有机械化水平
Current Mechanization Level

1.1我国水稻种植现状

Current situation of rice planting

•种植面积 Planting area



中国是世界最大的水稻生产国，自21世纪以来，我国水稻种植面积相对稳定，年播种面积3000万公顷左右，年产稻谷2亿余吨，粮食产量相对稳定。

China is the world's largest rice producer. Since the 21st century, the rice planting area has been relatively stable. Annual planting area is about 30 million hm^2. Annual output of rice is more than 200 million tons.

01水稻现有机械化水平
Current Mechanization Level

- **种植方式 Planting method**

水稻在我国南北方因气候、土壤、水分等原因种植方式存在差异。

我国水稻播插过程中，插秧、抛秧(无序和有序) 和直播 (水直播、旱直播、点播) 三种方式并存，在不同地区各有侧重。

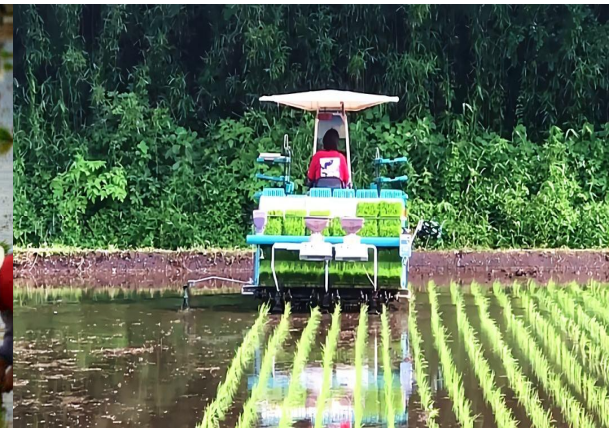
There are differences in rice planting methods in the north and south of my country due to climate, soil, moisture and other reasons.
In the process of sowing and transplanting rice in China, transplanting seedlings, seedling throwing (disordered and orderly) and direct seeding (water direct seeding, dry direct seeding, and on-demand) co-exist.

01水稻现有机械化水平

Current Mechanization Level

- **种植方式 Planting method**

育秧 Raise seedlings



插秧 Transplanting

直播 Direct seeding

抛秧 Throw-planting

01水稻现有机械化水平
Current Mechanization Level

1.2国外水稻种植机械化水平

Current situation of rice planting

国外水稻机械化生产主要形成了以美国、澳大利亚、意大利等欧美国家为代表的机械直播方式和以日韩等亚洲国家为代表的机械移栽方式。

Mechanical direct seeding methods are represented by the United States, Australia, Italy and other European and American countries.
Mechanical transplanting methods are represented by Japan, South Korea and other Asian countries.

日本久保田手扶式插秧机
Kubota Walk-behind Rice Transplanter

美国水稻直播技术
the U.S. rice direct seeding technology

01水稻现有机械化水平

Current Mechanization Level of Rice Production

•美国 US.

美国也是世界上主要水稻生产国家，种植面积在120万公顷左右。

水稻种植主要有旱直播（Dry direct seeding）和水直播(Water direct sowing)两种。

The US. is also one of the main rice-producing countries, the planting area is about 1.2 million hectares. Rice planting mainly includes dry direct seeding and water direct sowing.


深松 Subsoiling


耙地 Harrow


平地 Grader


施肥 Fertilize


直播 Direct sowing


施药 Pesticide application


收获 Harvest

01水稻现有机械化水平
Current Mechanization Level

•日本 Japan


整地 Soil preparation


育秧 Seedling Raising


移栽 Transplant;


追肥 Top dressing


喷药 Pesticide application


除草 Weeding

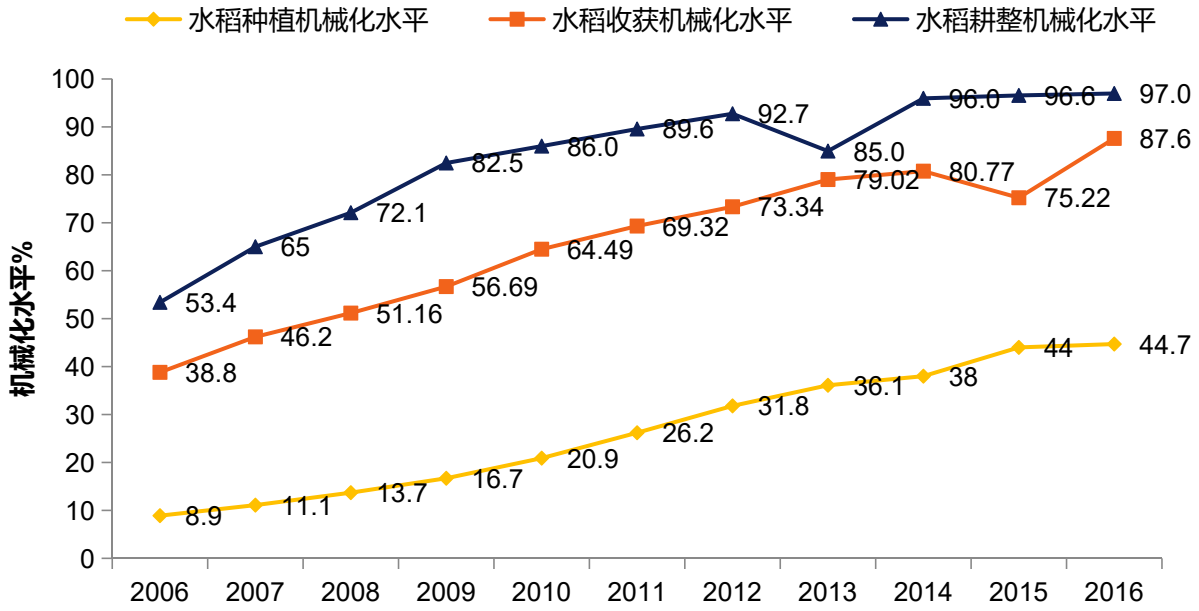

收获 Harvest

01水稻现有机械化水平

Current Mechanization Level of Rice Production

1.3国内水稻机械化水平
Status of rice mechanization

从全国水稻种植机械化生产情况上来看，整体水平不高，2015年种植机械化率超过44%。预计到2020年，我国水稻的种植机械化率将达到50%，耕种收机械化水平达78%。



The overall level of rice mechanization in the country is not high.
It is estimated that by 2020 the mechanization rate of rice cultivation in China will reach 50%, and the mechanization rate of harvest will exceed 78%.

01水稻现有机械化水平

Current Mechanization Level of Rice Production

•耕整机械

目前，我国稻田耕整机械化程度比较高，主要采用与大中型拖拉机配套的铧式犁或驱动圆盘犁完成耕翻作业 。

耕翻的水田泡水后，再用手扶拖拉机配带水耙轮或驱动耙完成碎土耙浆整地作业。

• Tillage machinery

The degree of tillage mechanization is relatively high. The plough or drive disc plough matching with large and medium tractors is mainly used to complete the tillage operation.

After the ploughed paddy field is soaked in water, Walking tractors equipped with water rake wheels or driven harrows are used to complete the ground preparation operations of crushing soil, raking, and slurry.

机械化旋耕 Mechanized rotary tillage

机械化翻耕
Mechanized ploughing

水田平地搅浆机
Paddy field mixer

01水稻现有机械化水平

Current Mechanization Level of Rice Production

•种植机械

南方水田种植方式以机插秧为主，另外还包括机直播和机抛秧，而直播方式又分为水直播和水穴播；

北方地区因气候干燥、缺水严重、地力水平较低大多采用机插秧和旱直播方式来进行水稻种植。

• Planting machinery

In south China, the planting methods mainly based on rice transplanter, machine direct seeding, and machine throwing. The rice direct seeding method is divided into water direct seeding and water hole seeding.

In North China, the planting methods mainly based on rice transplanter and dry direct sowing.

乘坐式插秧机

Ride-on rice transplanter

水直播

water direct seeding

旱直播

dry direct sowing

01水稻现有机械化水平

Current Mechanization Level of Rice Production

•收获机械 Harvesting machinery

我国水稻收割主要有全喂入和半喂入收割机两种机型，其中又以全喂入为多。这两种机型技术上都已成熟，一次完成水稻的收割、脱粒、茎秆分离、谷粒清选等作业。

Rice harvesting mainly based on full-feed and half-feed harvesters, of which full-feed is often used. Both of these models are technically mature and can complete rice harvesting, threshing, stalk separation, and grain cleaning at one time.

全喂入式联合收割机
Full-feed combine harvester

半喂入式联合收割机
Half-feed combine harvesters

01水稻现有机械化水平
Current Mechanization Level of Rice Production

- 田间管理机械 Field management machinery


背负式机动喷雾机
Knapsack motorized sprayer


担架式远程宽幅喷雾机
Stretcher wide sprayer


撒肥机
Fertilizer spreader

一般采用喷雾机、植保无人机等进行喷药和追肥。

Generally, sprayers, plant protection drones, etc. are used for spraying and top dressing.


水稻除草
weeding


植保无人机 drone

01水稻现有机械化水平

Current Mechanization Level of Rice Production

1.4存在问题 Problems

技术到位率及普及率不足。

Insufficient Technology availability or penetration

- 机械化育插秧等成熟技术未能做到标准化、模式化和实用化

农机与农艺难融合，栽培方式不规范

Difficult integration of agricultural machinery and agronomy

- 套作、间作、密植、稀植等形式多样的种植方式，增加了机械作业难度及适应性，农艺多样性与农机单一性匹配不够完善。

南方双季稻区种植机械化技术创新不足

Insufficient mechanized technological innovation

- 南方双季稻对种植机械化提出许多独特性需求，有序抛栽、大苗机插、杂交稻单少本移栽、再生稻机械化生产技术急需突破。

丘陵山区机械化发展路径急需明确

Unclear mechanized development path

- 丘陵山区尚未形成系统性的技术模式，农田、农机、农艺融合的机械化发展路径仍需进一步明确。

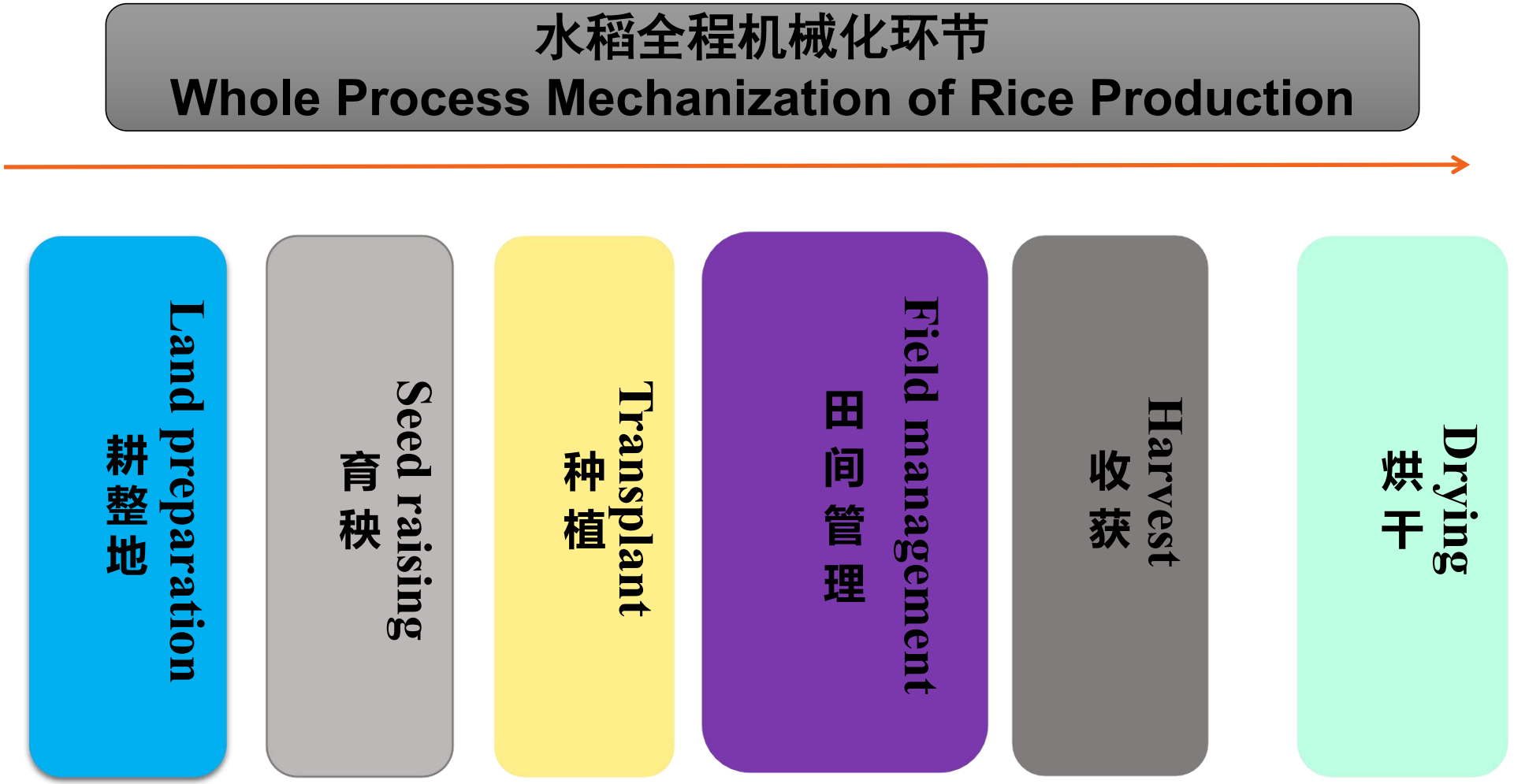
02

水稻全程机械化装备

Whole Course Mechanization Equipment of Rice Production

02水稻全程机械化装备

Whole Process Mechanization Equipment of Rice Production



02水稻全程机械化装备

Whole Process Mechanization Equipment of Rice Production

2.1耕整机械
Tillage machinery

1GLZ-230A履带式旋耕机
1GLZ-230A Crawler rotary cultivator

雷肯Juwel8液压翻转犁
Rayken juwel8 hydraulic turnover plow

樱田1GSZ-280水田埋茬耕整机
Yingtian 1GSZ-280 paddy field stubble tiller

耕整机械按作业环节分耕地机械和整地机械两大类，主要机具有：水田耕整机、旋耕机、水田驱动耙、水田铧式系列犁等。

Cultivation machinery is divided into two categories: arable land machinery and land preparation machinery.

02水稻全程机械化装备

Whole Course Mechanization Equipment of Rice Production

•耕整机械

Tillage machinery

雷肯Juwel8液压翻转犁
Rayken juwel8 hydraulic turnover plow

技术参数：配套动力120-180马力，作业幅宽1.2-2.4m。操作简单，翻转顺畅

东方红1BZ-3.0圆盘耙
Dongfanghong 1BZ-3.0 Disc Harrow

技术参数：配套动力100-140马力，耙幅3m，工作效率1.6hm²/h。结构简单，入土性能好，耕后地表平整；牵引式机具消耗动力小。

樱田1GSZ-280水田埋茬耕整机
Yingtian 1GSZ-280 paddy field stubble tiller

技术参数：配套动力33.1-44.7KW，耕幅2.8m，耕深大于12cm。能够一次完成旋耕、耙地、搅浆、灭茬四项作业，性能稳定，搅浆效果好。

02水稻全程机械化装备

Whole Course Mechanization Equipment of Rice Production

•耕整机械
Tillage machinery

德邦大为4630W型水田犁
DEBONT 4630W paddy field plough

技术参数：配套动力70-110马力，作业宽度150-210cm。具有翻垡效果好，覆盖严，碎土能力强，阻力小等优点。

耕王1GLZ-230A履带式旋耕机
Gengwang 1GLZ-230A Crawler rotary cultivator

技术参数：匹配100马力发动机，履带式旋耕机，动力强劲、操作方便、通过性好，广泛适用于南方水田旋耕、耙平、播种、开沟等多种作业，工作效率高。

02水稻全程机械化装备

Whole Course Mechanization Equipment of Rice Production

2BZP-800水稻育秧播种机
2BZP-800 rice seedling planter

2.2育秧机械
Seedling raising machinery

育秧设备包括：种子清选机、脱芒机、催芽机、脱水机、碎土筛土机、拌和机、播种机（播种流水线）、大棚温室、秧盘和秧架、增温设备、淋水设备等。

The seedling raising equipment includes: seed cleaning machine, de-mangling machine, germination machine, dehydration machine, soil crushing machine, mixing machine, seeder (sowing line), greenhouse greenhouse, seedling tray and seedling rack, temperature increasing equipment, watering Equipment etc.

02水稻全程机械化装备

Whole Course Mechanization Equipment of Rice Production

- **育秧机械**
  Seedling raising machinery

2BZP-800水稻育秧播种机
2BZP-800 rice seedling planter

水稻自动化播种流水线
the rice automatic seeding assembly line

技术参数：工作效率300-1000盘/小时，集铺土、洒水、播种、覆土等功能于一体，一次性完成水稻盘育秧播种的各道作业工序，适用于常规水稻、杂交水稻、超级水稻等多品种水稻的育秧播种。

缺点：不能用于其它作物种子的播种。

02水稻全程机械化装备

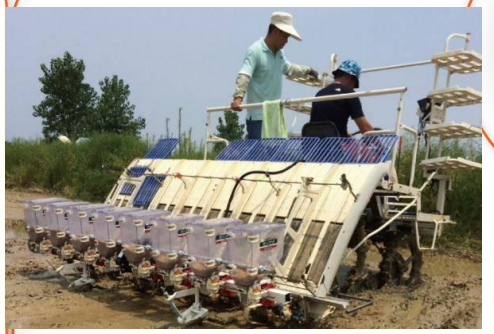
Whole Course Mechanization Equipment of Rice Production

2.3种植机械
Planting machinery

久保田手扶2ZS-4B式插秧机
Kubota Handheld 2ZS-4B Rice Transplanter

2ZGF-6/6A高速乘坐式插秧机
2ZGF-6/6A High-speed ridin rice transplanter

中联重科2ZPY-13A水稻有序抛秧机
Zhonglian 2ZPY-13A rice seedling throwing machine



矢崎2BD-8水稻直播机
Yazaki 2BD-8 rice direct seeder

种植机械分栽植机械和播种机械两大类，主要机具有：插秧机、抛秧机、直播机等。栽植机械主要包括毯状苗插秧和钵苗移栽。

There are two major types of planting machinery: planting machinery and sowing machinery. The main machines are: rice transplanter, rice thrower, row thrower, rice transplanter, and direct seeder. The planting machinery mainly includes blanket seedling transplanting and pot seedling transplanting.

02水稻全程机械化装备

Whole Course Mechanization Equipment of Rice Production

•种植机械
Planting machinery

久保田手扶2ZS-4B式插秧机

技术参数：配套动力2.6kw，工作效率0.1-0.21hm²/h，针对毯状苗移栽，操作轻松舒适，小型化轻型化，田间移动方便。

2ZGF-6/6A高速乘坐式插秧机

技术参数：配套功率：7.5kw，工作行数：8。操作精准插秧，损伤小，不担心浮苗、倒苗。

02水稻全程机械化装备

Whole Course Mechanization Equipment of Rice Production

•种植机械
Planting machinery

中联重科2ZPY-13A水稻有序抛秧机

技术参数：四轮驱动，作业效率8-12亩/时，工作行数13行；生产率0.3～0.43（hm²/h）；是适用范围广、适应性强。

矢崎2BD-8水稻直播机

技术参数：马达控制驱动，作业效率10亩/时，一台插秧机可实现插秧、直播两种作业方式，作业精度高，行距可调。

02水稻全程机械化装备

Whole Course Mechanization Equipment of Rice Production

2.4田间管理机械
Field management machinery

东风井关JKB18-H350撒肥机
Dongfeng Jingguan JKB18-H350 fertilizer spreader

3WP-700喷杆式喷雾机
3WP-700 boom sprayer

3WWDZ-16植保无人机
3WWDZ-16 plant protection drone

背负式喷雾喷粉机
Knapsack spray duster

田间管理机械又分深施肥机械、排灌机械、植保机械三大类，主要机具有：化肥深施器、弥雾机、喷粉机、水泵、电机、水管等。

The field management machinery is divided into three categories: deep fertilization machinery, irrigation and drainage machinery, and plant protection machinery. The main machines include: fertilizer deep applicator, mist sprayer, powder sprayer, water pump, motor, water pipe, etc.

02水稻全程机械化装备

Whole Course Mechanization Equipment of Rice Production

- **田间管理机械**
  Field management machinery

3WP-700喷杆式喷雾机
3WP-700 boom sprayer

技术参数：50马力，作业效率80-100亩/小时，700L药箱，作业幅度20m，适合水田、旱地种植的水稻、小麦等农作物喷洒农药。

东风井关JKB18-H350撒肥机
Dongfeng Jingguan JKB18-H350 fertilizer spreader

技术参数：采用水喷幅11m，搭载350L肥料桶，可根据肥料粒径比重调节喷洒手柄。

02水稻全程机械化装备

Whole Course Mechanization Equipment of Rice Production

- **田间管理机械**
  Field management machinery

3WWDZ-16植保无人机

技术参数：**作业速度快（≥7m/s），药箱容积16L，喷雾量：1600-2000ml/min**；整机重量轻、待电时间长； 机臂可折叠。

东方红3WF-20背负式喷雾喷粉机

技术参数：**药箱容积14L，工作效率：10-35亩/时**；射程喷粉水平25m,喷雾水平11m。

02水稻全程机械化装备

Whole Course Mechanization Equipment of Rice Production

2.5收获机械
Harvesting machinery

4LBZ-120YA半喂入联合收割机
4LBZ-120YA half-feeding combine harvester

东风井关4LZ-4.1A(HC868G)自走式全喂入谷物联合收割机
Dongfeng Jingguan 4LZ-4.1A (HC868G) self-propelled full-feed grain combine harvester

4SZ-5.0自走式割晒机
4SZ-5.0 self-propelled windrower

水稻收获机械可分为收割机（割晒机）、半喂入式联合收割机和全喂入式联合收割机三种，联合收割机可一次完成切割、脱粒、清粮等项作业，机械化程度高，作业质量好。

Rice harvesting machinery can be divided into three types: harvester (windrower), half-feeding combine harvester, and full-feeding combine harvester. The combine harvester can complete cutting, threshing, grain cleaning and other operations at one time. They are all with high mechanization degree and good job quality.

02水稻全程机械化装备

Whole Course Mechanization Equipment of Rice Production

•收获机械
Harvesting machinery

东风井关4LZ-4.1A(HC868G)自走式
全喂入谷物联合收割机

技术参数：配套动力86马力，割幅2m，喂入量4.1kg/s，具有通过性好、收割倒伏效果好、脱粒清选性能好等优点。

农夫小机灵4LBZ-120YA半
喂入联合收割机

性能：配套动力35马力，3行。行走速度：1.06-1.51m/s，收割宽度：1200mm。具有体积小、油耗低、操作灵活、作业质量好、性价比突出等特点。

是为解决丘陵山区水稻收获机械化的问题而研制的收获机械。

02水稻全程机械化装备

Whole Course Mechanization Equipment of Rice Production

•收获机械
Harvesting machinery

圣地亚4S-120割晒机

技术参数：采用转向差速装置，回转灵活，行进平稳，割台采用轴转动形式，传递扭矩大，安全系数高，故障率低，作业效果好。

阳光4SZ-5.0自走式割晒机

性能：功率：65KW，割幅：5.0m，生产效率40-70亩/小时，适宜收割牧草、大麦、小麦、水稻等农作物。

02水稻全程机械化装备

Whole Course Mechanization Equipment of Rice Production

2.6烘干机械
Drying machinery

5HPB-35谷物烘干机
5HPB-35 grain dryer

5H-15A循环式谷物干燥机
5H-15A circulating grain dryer

在政府大力推动下，机械化烘干技术发展迅速，根据生产规模进行布点建设，机械化烘干能力提升明显。

Under the vigorous promotion of the government, mechanized drying technology has developed rapidly,

02水稻全程机械化装备

Whole Course Mechanization Equipment of Rice Production

•烘干机械
Drying machinery

5HPB-35谷物烘干机

技术参数：工作高度3.28米，日产量15吨。谷物温、湿度自动监控，液压升降，灵活机动。旋风除杂，谷物更洁净。

5H-15A循环式
谷物干燥机

技术参数：双节烘烤型单机作业，每次大约烘干15吨粮食，每小时降低水分1.2-2%，烘干谷物含水率至13.5%大约需7.5小时。安全环保，使用成本低。

03

水稻全程机械化解决方案

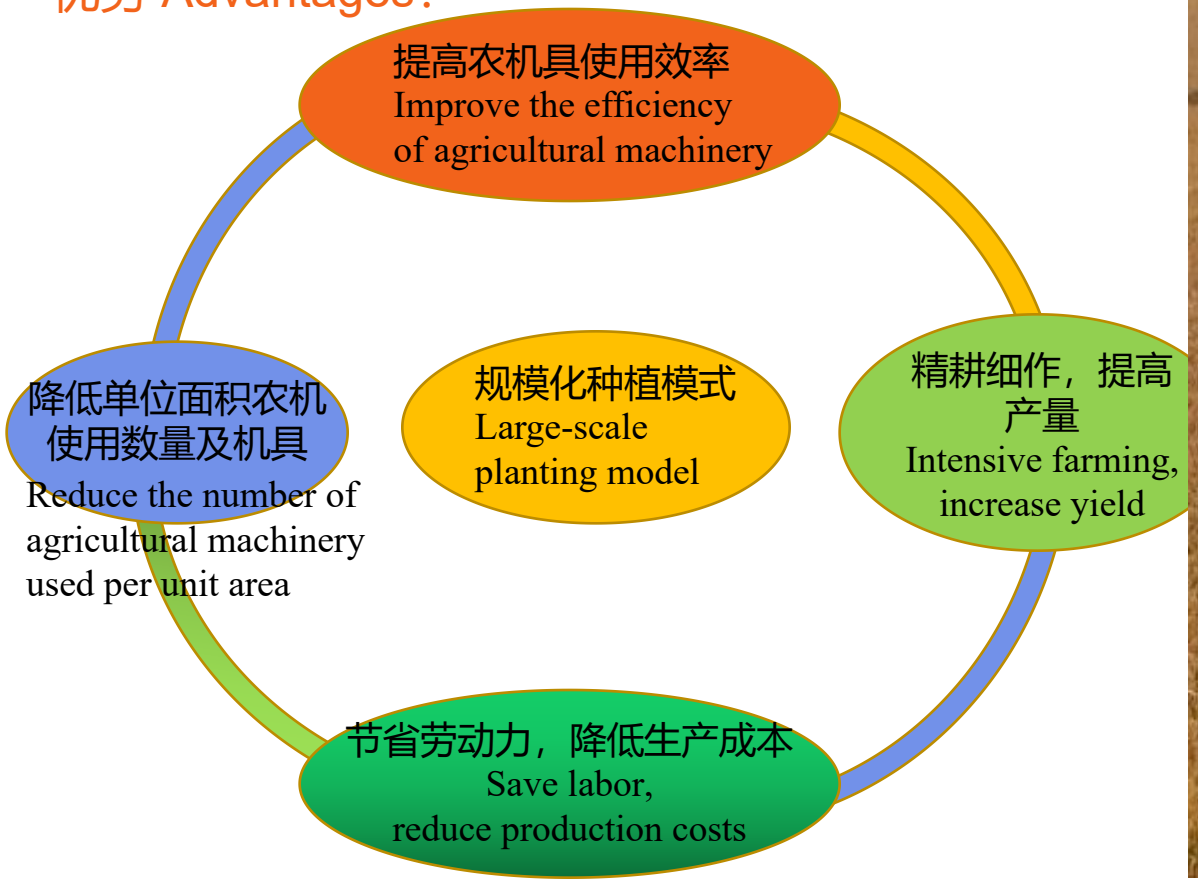
Solution of Whole Course Mechanization of Rice Production

03水稻全程机械化解决方案

Solution of Whole Course Mechanization of Rice Production

•规模化种植模式
Large-scale planting model

优势 Advantages：



措施：

• 适度发展农业大户和农业合作社，向农业规模化、集约化生产经营发展，提高土地利用率和生产率，研发适用中国国情的大型农机设备。

• 重点推广示范大型工厂化育秧技术、轻型履带式拖拉机或自走式旋耕机耕整地技术、高速插秧机机插技术、机械化高效精准施药技术、大型机械化联合收获及秸秆处理技术、大型机械化烘干技术。

• 有序推进农业生产操作规范化、标准化。

• 完善适宜机械化作业的农业基础设施建设 。

规模化种植全程机械化装备选型

Selection of mechanized equipment for large scale planting

生产环节 Process	机械名称 Equipment	价格（元） Price （CNY）
动力机械 power machinery	100马力以上拖拉机 Tractors with more than 100 horsepower	100000
耕地 tillage	拖拉机挂接犁、旋耕 Tractor connect with plough and rotary	5000
整地 land preparation	拖拉机挂接搅浆机、激光平地机 Tractor connected with the agitator and the laser grader	10000
插秧transplanting	高速乘坐式插秧机 High speed ride transplanter	120000
植保喷药 plant protection	喷杆式喷雾机 Boom sprayer	50000
收获 harvesting	自走式谷物联合收割机 Self propelled grain combine harvester	150000
干燥 drying	大型谷物干燥机 Large grain dryer	150000

58.5万元/套

585,000 CNY/set

03水稻全程机械化解决方案

Solution of Whole Course Mechanization of Rice Production

•零散种植模式
Scattered planting model

措施：

• 推广适宜丘陵山区等零散地块的小型机械化耕整地、播种、收获技术、小型机械化烘干技术。

• 以水稻播种、移栽、烘干等水稻生产关键环节为重点，探索我国水稻全程机械化生产模式。

• 完善水稻生产全程机械化配套设施，做好农田基础设施建设。

• 建立农机合作社，推广水稻生产社会化服务。

零散种植全程机械化装备选型

Selection of mechanized equipment for scattered planting

生产环节 Process	机械名称 Equipment	价格（元） Price （CNY）
动力机械 power machinery	80马力以上拖拉机 Tractors with more than 80 horsepower	80000
耕地 tillage	拖拉机挂接犁、旋耕 Tractor connect with plough and rotary	4000
整地 land preparation	拖拉机挂接搅浆机、圆盘耙 Tractor connected with the mixer and disc harrow	4000
插秧 transplanting	插秧机 Transplanter	65000
植保喷药 plant protection	背负式喷雾机 Knapsack sprayer	500
收获 harvesting	自走式谷物联合收割机 Self-propelled grain combine harvester	100000

13.1万元/套

131000 CNY / set

03水稻全程机械化解决方案

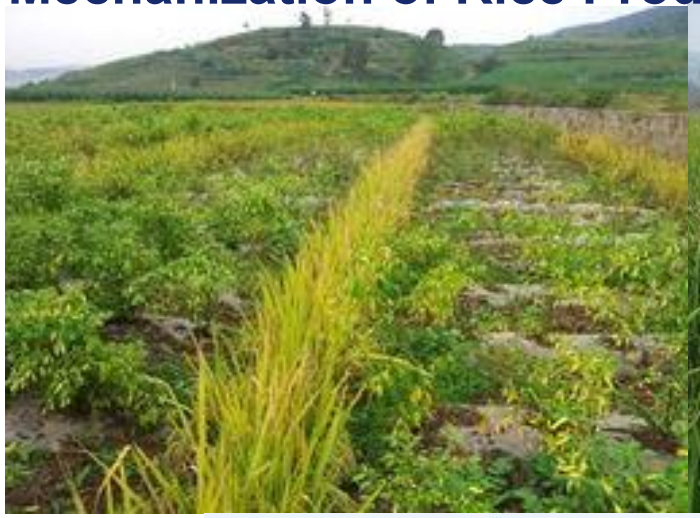
Solution of Whole Course Mechanization of Rice Production

•间作套种特定模式
Intercropping specific patterns

间作套种，提高了农田复种指数，是农业上的一项增产增收措施。

措施：

- 研究适宜多种作物生产应用的模块化配置平台。
- 推广规模化间作套种特定种植模式，促进农机农艺深度融合。



04

经济效益分析

Economic Benefit Analysis

04经济效益分析
Economic Benefit Analysis

•规模化种植模式
Large-scale planting model

生产环节 Process	机械作业成本 Operation cost	固定成本 Fixed cost (CNY)	年均折旧成本 Average annual depreciation cost (CNY)	年均节约劳动力成本 Average annual labor cost savings （CNY/mu）	营利面积 Profitable area (mu)
动力机械 power machinery	100马力以上拖拉机 Tractors with more than 100 horsepower	100000	20000	/	/
耕地 tillage	拖拉机挂接犁、旋耕 Tractor connect with plough and rotary	5000	1000	75	5
整地 land preparation	拖拉机挂接搅浆机、平地机 Tractor connected with the mixer and grader	10000	2000	75	13.3
插秧transplanting	高速乘坐式插秧机 High speed ride transplanter	120000	24000	100	80
植保喷药 plant protection	自走式喷杆式喷雾机 Self propelled boom sprayer	50000	10000	20	300
收获 harvesting	自走式谷物联合收割机 Self propelled grain combine	150000	30000	75	100
干燥 drying	大型谷物干燥机 Large grain dryer	150000	30000	60	/
其他	油耗、维护费、人工费	/	112.25CNY/mu	/	/
合计 Total：		585000	161862	**405**	**399.66**

04经济效益分析
Economic Benefit Analysis

•零散种植模式
Scattered planting model

生产环节 Process	机械作业成本 Operation cost	固定成本Fixed cost （CNY）	年均折旧成本 Average annual depreciation cost (CNY)	年均节约劳动力成本 Average annual labor cost savings （CNY/mu）	营利面积 Profitable area (mu)
动力机械 power machinery	80马力以上拖拉机 Tractors with more than 80 horsepower	80000	16000	/	/
耕地 tillage	拖拉机挂接犁、旋耕Tractor connect with plough and rotary	4000	800	75	4
整地 land preparation	拖拉机挂接搅浆机、平地机 Tractor is connected with the mixer and grader	4000	800	75	6
插秧transplanting	手扶式插秧机 Walking transplanter	6500	1300	100	4.3
植保喷药 plant protection	背负式喷雾机 Knapsack sprayer	500	100	20	5
收获 harvesting	自走式谷物联合收割机 Self-propelled grain combine harvester	100000	20000	75	66.7
其他	油耗、维护费、人工费	/	92.25CNY/mu	/	/
合计 Total：		195000	39000	**345**	**154.3**

05

发展趋势与技术展望

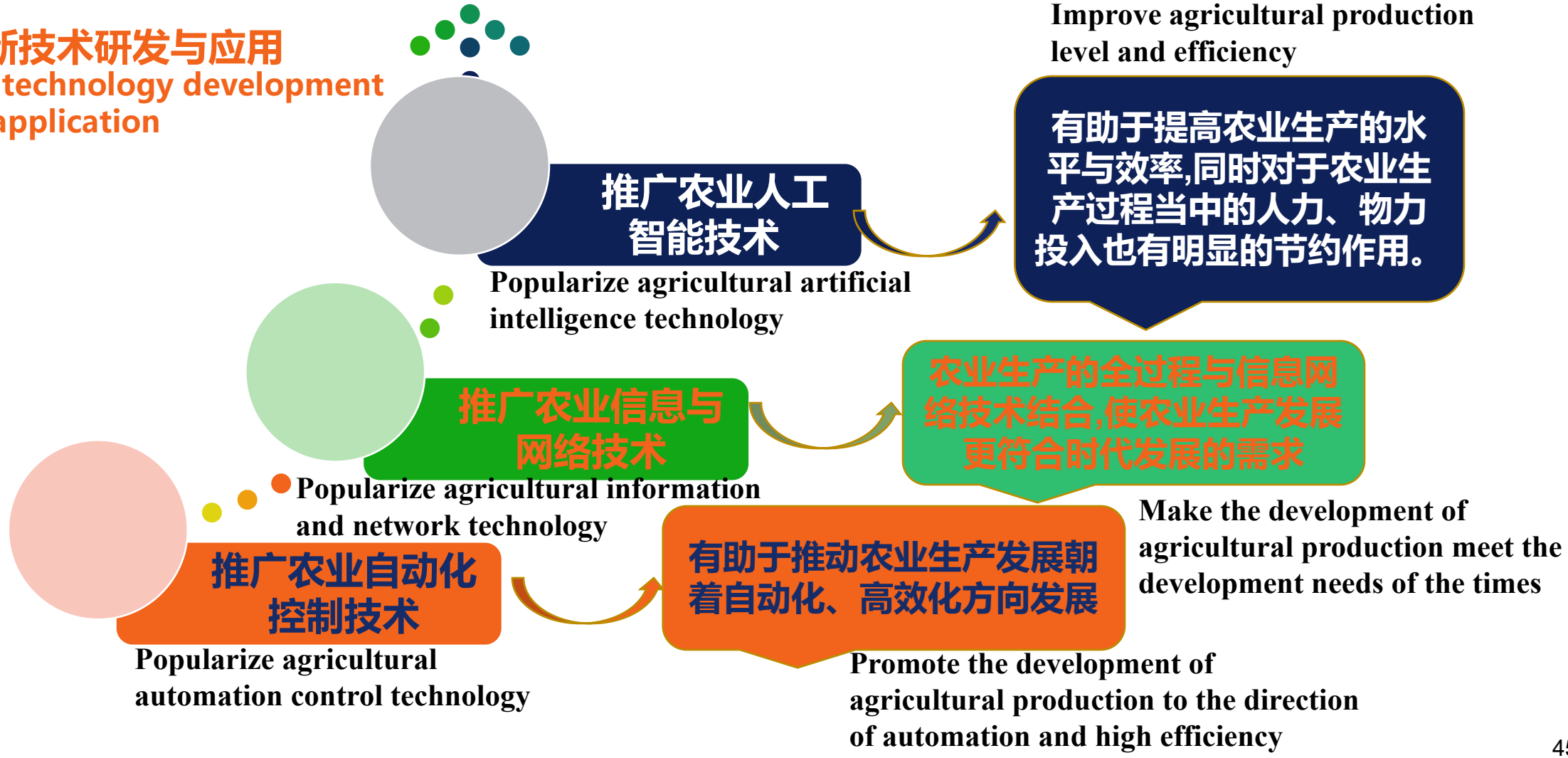
Development Trend and Technology Trospect

05发展趋势与技术展望

Development Trend and Technology Trospect

•新技术研发与应用

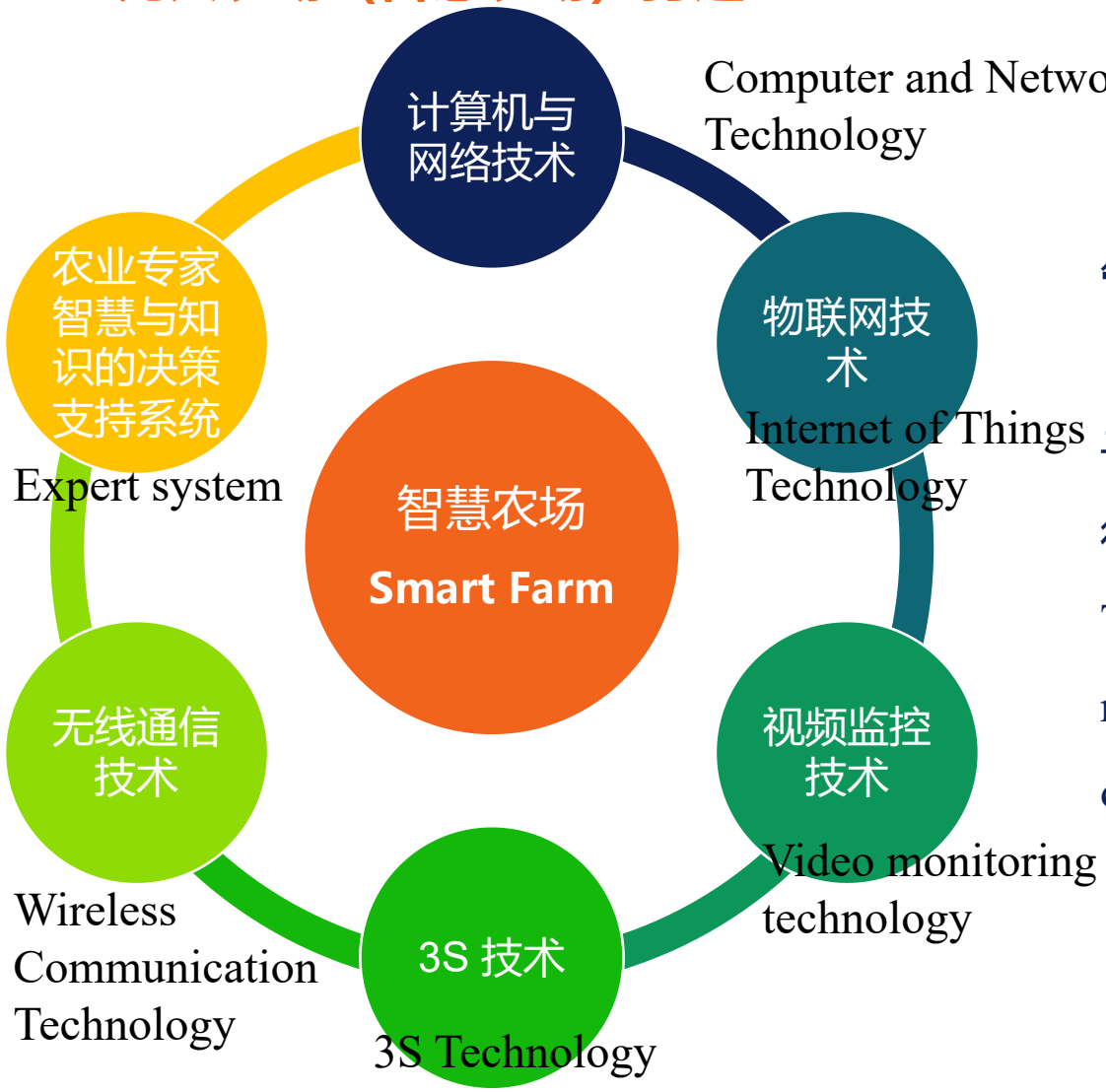
New technology development and application



05发展趋势与技术展望

Development Trend and Technology Trospect

•无人农场（智慧农场）打造 Unmanned Farm (Smart Farm)



智慧农场可实现远程监测、远程控制、灾害预警等智能管理。

近些年，随着中国北斗技术的快速发展以及智能物联电子产品的迅速崛起，国产高端农机装备的无人化技术已经取得了实质性进展，打破了完全依赖进口的局面。

The smart farm can realize intelligent management such as remote monitoring, remote control, and early warning of destruction.

06

斯里兰卡水稻种植情况

Rice cultivation in Sri Lanka

斯里兰卡水稻种植情况
Rice cultivation in Sri Lanka

•种植规模 Planting Scale

斯里兰卡可耕地面积400万公顷，已利用200万公顷（2013年），常年水稻种植面积约80万公顷，斯里兰卡的直播稻面积已占水稻种植总面积的80%。

The arable land in Sri Lanka is 4 million hectares, of which 2 million hectares have been used (2013). The annual rice planting area is about 800,000 hectares, and the direct-seeding rice area accounts for 80% of the total rice planting area.

•种植制度 Cropping System

水稻是斯里兰卡主要粮食作物，因斯里兰卡属于热带气候，高温、多雨，是水稻种植的有利条件。一年通常可以播种两季，头一年12月初播种一次，次年4月初收；4月初播种一次8月初收。

Rice is the main food crop in Sri Lanka. The high temperature and rainy tropical climate provides favorable conditions for rice cultivation.

In a year there are usually two seasons of planting. Planting in early December and harvesting in early April of the following year for one season and planting in early April and harvesting in early August for the other season.

斯里兰卡水稻种植情况
Rice cultivation in Sri Lanka

•存在问题
Existing Problems

(1) 水稻种子质量差、混种
Poor quality of rice seeds, mixed crops

(2) 拖拉机、耕整地机型老旧
Tractors and land preparation models old

(3) 整地不规范，杂草现象严重
Land preparation is not standardized and the weeds are serious

(4) 缺少农学常识，农用化学品使用不当
Lack of agricultural knowledge and improper use of agricultural chemicals

(5) 收获机匮乏，收获季节收割不及时
Lack of harvesting machines and untimely harvesting

•解决方案
Solutions

(1) 全国范围内大力推广优良水稻品种，规范购买渠道
promote high-quality rice varieties nationwide and standardize purchase channels

(2) 引进、推广国外先进先进机型
Introduce and promote advanced foreign advanced models

(3) 规范、统一各环节农艺种植要求
Standardize and unify the requirements for agronomic planting in all processes

(4) 专业人员定期开展推广服务及技术指导，包括农学知识、病虫害防御及技术指导等
Regularly carry out extension services and technical guidance, including agronomy knowledge, pest prevention and technical guidance, etc.

机型推荐
Model recommendation

•耕整地环节 Tillage

RFGQN-120旋耕机
RFGQN-120 rotary tiller

技术参数：配套动力25-30马力，生产效率1ha/h，耕宽1.7m，耕深100-180mm。
Parameters: matching power 25-30 horsepower, production efficiency 1ha/h, tillage width 1.7m, tillage depth 100-180mm.

FZ-12驱动圆盘耙
FZ-12 drive disc harrow

技术参数：生产效率2ha/h，作业幅宽1.50m，作业度深200-300mm，可很好的完成土地翻松工作。
Parameters: The production efficiency is 2ha/h, the working width is 1.50m, and the working depth is 200-300mm, which can well complete the land loosening work.

爱司伯1WG6.3微型耕耘机
AiSiBo 1WG6.3 Mini Tiller

技术参数：标定功率6.3KW，作业幅宽660mm，机型小巧，操作简单方便。
Parameters: The calibrated power is 6.3KW, the working width is 660mm, the model is small and the operation is simple and convenient.

机型推荐
Model recommendation

•种植环节 Planting

神牛牌2BD-8/2BD-10水稻直播机
Shenniu 2BD-8/2BD-10 rice seeding machine

技术参数：配套汽油机功率7.5kw，作业效率8-10亩/时，适用于水田直播作业

Parameters: gasoline engine power 7.5kw, operating efficiency 8-10 acres/h, suitable for direct live operation of paddy field

矢崎2BD-8水稻直播机
Yazaki 2BD-8 Rice Direct Seeding Machine

技术参数：作业效率10亩/时，具有作业简单、高精度穴播的优势。

Parameters: The operating efficiency is 10 mu/hour, and it has the advantages of simple operation and high-precision hole seeding.

亿森2BDZ-12(250)自走式水稻穴直播机
Yisen 2BDZ-12 (250) self-propelled rice hole direct seeding machine

技术参数：配套动力14.5kw，种箱容积120L,播种行数12行，作业效率高。

Parameters: matching power 14.5kw, seed box volume 120L, number of seeding rows 12, high working efficiency.

机型推荐
Model recommendation

•收获环节 Harvesting

农夫小机灵4LBZ-120YA半喂入联合收割机
Nong fu xiao jing ling 4LBZ-120YA half-feeding combine harvester

技术参数：配套动力26Kw，行走速度1.06-1.51m/s ，收割宽度1.2m，特别适合丘陵山区及家庭农场作业。

Parameters: supporting power 26Kw, walking speed 1.06-1.51m/s, harvesting width 1.2m, especially suitable for hilly mountainous areas and family farm operations.

背负式水稻收割机
Knapsack rice harvester

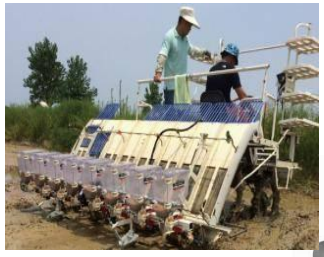
移动式稻麦脱粒机
Mobile rice and wheat thresher

手扶式割捆机
Walking bundler

斯里兰卡大中规模全程机械化装备选型

Sri Lanka's full mechanized equipment selection

生产环节 Process	机械名称 Equipment	价格（元） Price (CNY)	年折旧成本 Annual depreciation cost (CNY)	年均节约劳动力成本 Average annual labor cost savings (CNY/mu)	营利面积（亩） Profitable area (mu)
动力机械 power machinery	80马力拖拉机 Tractors with 50 horsepower	80000	16000	/	/
耕地 tillage	拖拉机挂接犁、旋耕 Tractor connect with plough and rotary	2700	540	75	/
整地 land preparation	拖拉机挂接圆盘耙 Tractor with disc harrow	4000	800	75	/
直播 direct seeding	水田直播机 Paddy field direct seeding machine	15000	3000	50	/
植保喷药 plant protection	背负式 knapsack	500	100	20	/
收获 harvesting	谷物联合收割机 Grain combine harvester	100000	2000	75	/
其他	油耗、维护费、人工费	/	92.25**CNY/mu**	/	/
总计 Total:		202200	58764	295	199.2



20.22万元/套
202,200 yuan/set

斯里兰卡零散种植全程机械化装备选型

Sri Lanka's full mechanized equipment selection

生产环节 Process	机械名称 Equipment	价格（元） Price (CNY)	年折旧成本 Annual depreciation cost (CNY)	年均节约劳动力成本 Average annual labor cost savings (CNY/mu)	营利面积（亩） Profitable area (mu)
动力机械 power machinery	50马力拖拉机 Tractors with 50 horsepower	40000	8000	/	/
耕地 tillage	拖拉机挂接犁、旋耕 Tractor connect with plough and rotary	2700	540	75	/
整地 land preparation	拖拉机挂接圆盘耙 Tractor with disc harrow	4000	800	75	/
直播、插秧 direct seeding	水田直播机、插秧机 Paddy field direct seeding machine	800	160	50	/
植保喷药 plant protection	背负式 knapsack	500	100	20	/
收获 harvesting	谷物联合收割机 Grain combine harvester	2000	400	75	/
其他	油耗、维护费、人工费	/	92.25**CNY/mu**	/	/
总计 Total：		50000	14549.4	295	49.32

5万元/套
50000 yuan/set

Role of individual farmers and cooperatives and How farmers were motivated to practices the introduced improved technologies/ practices?

Role of individual farmers:

- Individual farmers increasingly need agricultural machinery services to replace labor and improve the efficiency of agricultural operations.
- Generally, individual farmers could buy some small farm machinery and tools. They can't afford the large farm machinery and all the machinery for different crop varieties and different production Processes.

Cooperatives:

Agricultural machinery cooperatives can promote the use of agricultural machinery and the improvement of agronomy

Motivate farmers:

- The desire of farmers with higher education level to adopt new technologies is higher than that of farmers with lower education level.
- Spread the new technologies quickly and make farmers understand as much technical information as possible to reduce their uncertainty of new technologies and the supervisory risks.
- Improve agricultural technology extension institutions and try to provide farmers with opportunities to contact extension personnel.
- Extension staff could use various forms (such as centralized training, organization of visits, field guidance, distribution of technical materials, etc.) to strengthen direct contact with farmers.
- The government could also formulate corresponding agricultural machinery purchase subsidy policies to encourage farmers to accept new technologies.

What could be the role of government, Agriculture extension, research and other units?

1. Government involvement is essential to construct mature and efficient agricultural technology extension system.

2. China's current agricultural extension model presents a diversified development trend.

3. Government organizations should vigorously improve the quality of scientific and technological teams and stimulate the enthusiasm of scientific and technological personnel.

Agricultural machinery cooperatives help farmers from seedling to planting. Only a labor fee of 380 yuan per mu (24,884.25 LKR per acre) is required and the seedlings are planted in the fields.

4. Agricultural machinery extension agencies have a relatively complete extension system and a higher level of practical experience to promote the specific use and the effects of agricultural technology and machinery.

5. Colleges and universities and research institutes have valuable technical reserves, intellectual property rights and talent reserves.

6. Enterprises generally accumulated rich experience in the process of products

What would be the role of private sector?

- The existing marketing channels that agricultural machinery products can be sold directly to farmers are fundamental to a successful private agricultural system.

- Government should create conditions for the development of agricultural machinery trade.

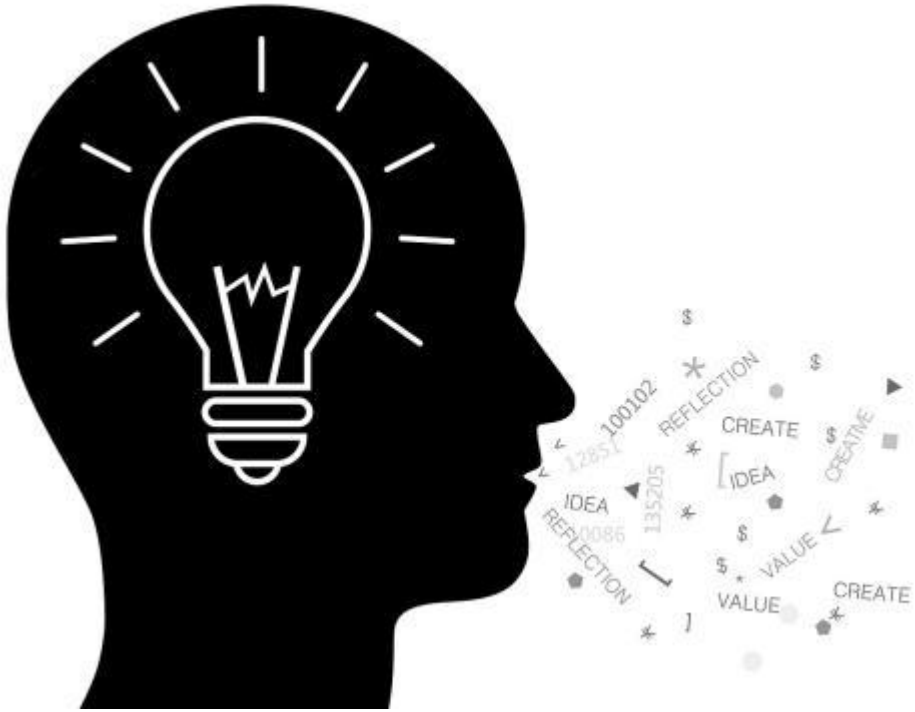
- Market conditions, especially the yield of agriculture, will determine the technical level and scope of the agricultural machinery industry. These important groups of operators need an appropriately stable and competitive business environment to develop their businesses.

华圣4HG120水稻收割机
Huasheng 4HG120 Harvester

How the Chines experiences can be incorporated in local context: With smallholder farmers and existing farming systems and cultivation practices, etc.

- It might be difficult to create big farms required for mechanized agriculture. Farmers can join together and purchase expensive farm machinery. Or the village co-operative society can purchase it and hire it out to farmers.
- Extend the complete mechanization to the state farms.
- Extend complete mechanization over to such lands where co-operative joint farming societies have been formed.
- Complete mechanization should also be extend to the old co-operative farms which have enough areas in compact blocks and have enough scope for mechanization of agriculture.
- Private big farmers should also be induced to adopt mechanization for the use of more efficient equipment is one of the principal ways by which productivity per man and per acre, and hence living standards can be raised.
- It is also a crucial problem to increase the productivity of land. The productivity per hectare could be improved by intensive cultivation.

水稻插秧、直播、抛秧三种种植方式的利与弊?
What are the advantages and disadvantages of the three planting methods of rice transplanting, direct seeding and throwing?



实现水稻全程机械化，有哪些具体措施?
What are the measures for realizing the full mechanization of rice?

谢谢

Thank you!

Prof. lv Xiaolan

Jiangsu Academy of Agricultural Sciences