亚太地区保护性耕作发展国际研讨会

山西省不同区域保护性耕作技术研究

Technique of Conservation Tillage in Shanxi Province

韩 战省

山西省农机局

Han Zhanxing

Shanxi Agricultural Machinery Bureau

Brief Information of Shanxi Province

- 山西省位于黄土高原的东侧

  It is located in the eastern part of the Loess Plateau.

- 人口：**3300**万人

  Population：33 mil.

- 耕地面积：**440**万公顷

  Cultivated land：4.4 mil. ha

- 旱地面积：**333.5**万公顷

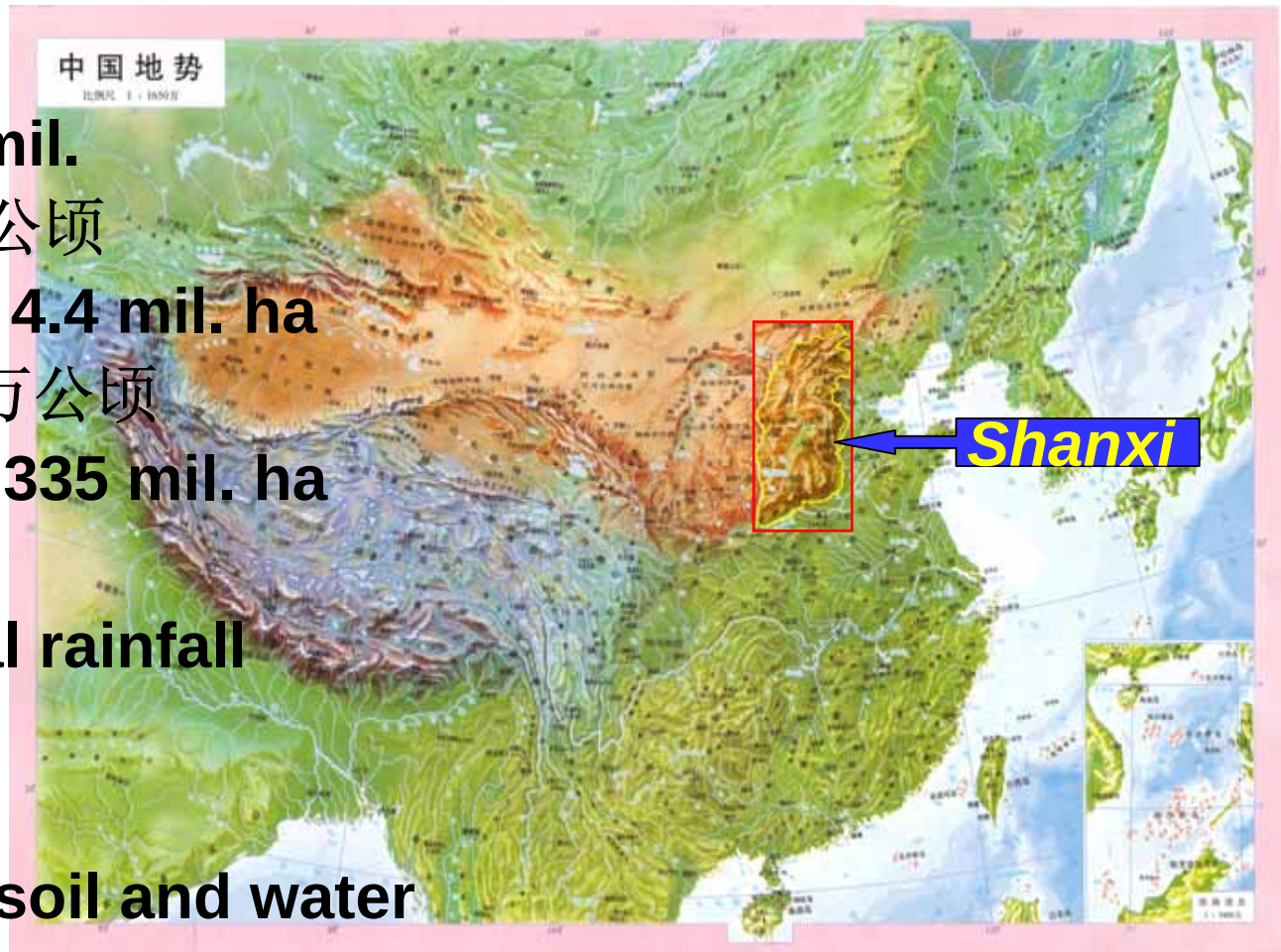
  Drought land：3.335 mil. ha

- 年均降雨量

  Averaged annual rainfall 400-650mm

- 水土流失严重

Malignant loss of soil and water



- 地形、气候条件复杂多样，农作物资源丰富

Various landform and climate

Ⅰ 北部高原区种植玉米、谷黍、高粱、大豆、薯类、莜麦、胡麻、向日葵等杂粮

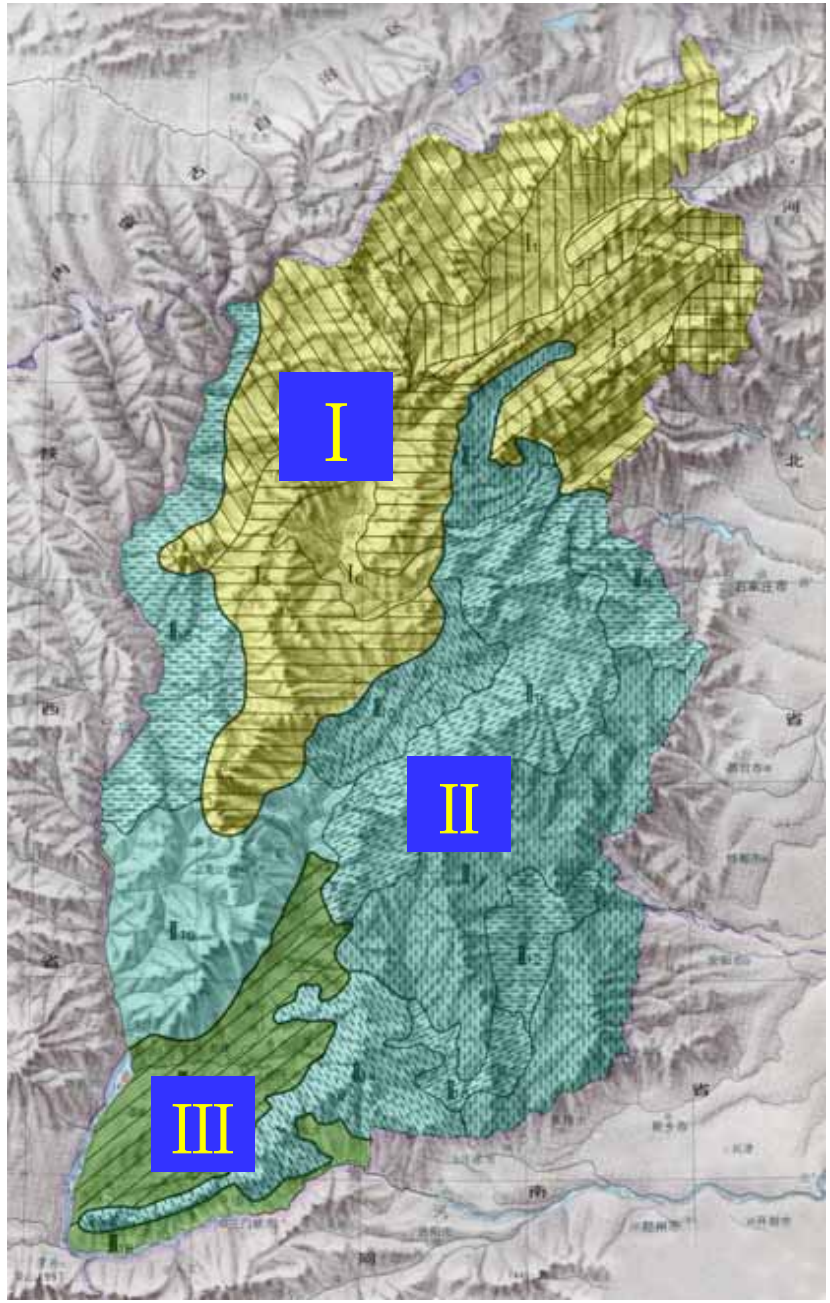
Northern altiplano areas

Ⅱ 中南部丘陵区种植玉米、小麦、大豆，一年一熟、两年三熟制

Middle and south hills areas

Ⅲ 南部盆地区小麦、玉米一年两熟制

Southern basins



山西实践 Conservation tillage in Shanxi

- 减少水土流失 Reduce loss of soil and water
- 降低生产成本 Reduce cost
- 抗旱增产 Fight a drought and increase output
- 改善生态环境 Improving environment

发展保护性耕作技术，是解决山西农业问题的现实途径和必然选择。

The conservation tillage is approach and necessity resolving Shanxi agriculture problems.

山西实施的5种类型保护性耕作技术

Technique systems of conservation tillage

A. 小麦一年一熟 One wheat a year

B. 玉米一年一熟 One maize a year

C. 小麦、玉米（或豆类）一年两熟

Wheat, maize or soybean two crops a year

D. 小麦、玉米、豆类两年三熟

Wheat, maize and soybean three crops two years

E. 小杂粮及马铃薯轮作倒茬

Coarse food grain and tomato cycle plant

A. 小麦一年一熟 One wheat a year

- 分布在中南部丘陵区，实施旱作栽培

  Drought planting

- **9月10日~9月22日播种**

  Seeding：Sept.10-22

- **次年5月25日~6月20日收获**

  Harvest：May25-June20 next year

- **6月~9月休闲**

  Fallow time：June-Sept.

收获 HARVEST

- 联合收获，人工撒匀麦秸

  Combine harvest，throwing equably straw by hand.

- 割晒机或人工收获留高茬 **Harvest by cutter-or manual work.**

深松 DEPTH LOOSE

- 开始实施保护性耕作的地块，当年深松
- 根据土壤压实情况，每3-5年深松一次
- 小麦收获后，土壤墒情合适，即可直接进行深松作业，无需秸秆处理。

In order to break the ploughed bottom, depth loose should use in the same year before conservation tillage. According to the soil compaction situation, depth loose per 3-5 years, the work time be supposed to determine refer to the soil moisture.

秸秆处理 STRAW MANAGEMENT

- 前茬亩产大于200kg，秸秆粉碎、除草
  Chop straw and weeding
- 亩产大于300kg，秸秆粉碎，地表浅旋
  深度6~8cm
  秸秆覆盖率50~70%
  Soil surface cultivating

杂草控制 WEEDING

- 对于产量较低的麦田，杂草长至**10~20cm**时，进行化学除草
- 对于产量较高的麦田，控制杂草要把化学除草与地表处理结合起来

Utilizing synthesis technical measures according to the actual situation, take maximum limit reduces the production cost to control the weed.

免少耕播种 SOWING WITH ZERO-TILLAGE

· 采用免耕播种机免耕播种

Sowing using zero-tillage seeder.

· 采用多用途少免耕播种机在免耕地播种

Sowing using mini-tillage seeder at the field of zero-tillage.

B. 玉米一年一熟 One maize a year

- 种植面积在100~115万ha

  Planting area： 1-1.15 million ha a year

- 一年一熟玉米种植面积占75%

  Area with one maize a year：about 75%

- 播种期4月10日~5月1日

  Seeding time： Apr. 10-May 1

- 收获期9月25日~10月10日

  Harvest time：Sept.25-Oct.10

- 生长期120天左右

  Growth period：about 120 days

收获、秸秆处理 HARVEST-STRAW MANAGE

· 人工收获，秸秆直立

Harvest by manpower, straw erectly.

· 机械收获同时秸秆粉碎

Combine harvest and chop straw.

- 产量高或风大、低温地区，秸秆粉碎、浅旋处理

Chop straw and surface tillage at the area of higher output

- 产量较低地区，保持秸秆直立越冬

Straw erectly at the area of lower output

- 养畜地区留茬固土

Keep down stubble at the area livestock feed

免少耕播种 SOWING WITH ZERO-TILLAGE

- 免耕播种机免耕播种

Sowing using zero-tillage seeder

- 小型少耕播种机播种

Sowing using mini-tillage seeder

·多用途少免耕播种机免耕播种

Sowing using mini-tillage seeder.

·旋耕播种机播种

Sowing using rotary-tillage seeder.

杂草控制 WEEDING

- 人工除草与化学除草相结合，以成本最低为目标

Utilizing synthesis technical measures according to the actual situation, take maximum limit reduces the cost to control weed.

C. 小麦、玉米（豆类）一年两熟

Wheat, maize or soybean two crops a year

- 小麦收获　**Wheat harvest：　May 28-June 15**
- 随即播种玉米或大豆　**Then maize and soybean sowing**
- 玉米（大豆）收获　**Maize or soybean harvest：Sept.25-Oct.5**
- 随即播种小麦　　**Then wheat sowing**

玉米播种 MAIZE SOWING

· 小麦收获后人工点播

Wheat combine harvest, maize planting by hand.

· 人工清理浮草，免耕播种

Maize sowing using zero-tillage seeder.

· 人工清理浮草，少耕播种

Maize sowing with mini-tillage.

· 人工清理浮草，旋耕播种玉米或大豆

Weeding by hand， maize or soybean sowing using rotary-tillage seeder.

小麦播种 WHEAT SOWING

· 秸秆粉碎，旋耕播种

Chop straw, sowing wheat with rotary-tillage seeder.

·秸秆粉碎，人工撒肥，旋耕播种

Chop straw, fertilization manual，sowing wheat with rotary-tillage seeder.

·对产量较低的地块(＜350kg),秸秆直立,免耕或少耕播种

At the field of lower output, stand straw, sowing wheat with rotary-tillage and mini-tillage seeders.

·豆茬地免耕播种小麦

Wheat sowing with zero-tillage seeder at the field of soybean stubble.

D. 小麦、玉米、豆类两年三熟

Wheat, maize and soybean three crops two years

- **10月份收获玉米，随即播种小麦　Maize harvest—wheat sowing on Oct**
- **次年6月小麦收获，播种大豆　Wheat harvest—soybean sowing on June next year**
- **9月大豆收获冬休闲　Soybean harvest—fallow**
- **来年4月播种玉米　Maize sowing next year**

· 玉米收获后，旋耕或少耕播种小麦

Maize harvest, sowing wheat with rotary-tillage, mini-tillage seeder.

· 小麦收获后，旋耕、少耕、免耕播种豆类

Wheat harvest, sowing soybean with rotary-tillage, mini-tillage, zero-tillage seeder.

- **3-4**年深松一次　**Depth loose per 3-4 years.**
- 免耕播种玉米

Sowing maize with zero-tillage seeder.

- 人工除草与化学除草相结合

Weeding with manual work and chemistry.

E. 小杂粮、油料及马铃薯

Coarse food grain and

· 小杂粮及马铃薯常年种植面积135万ha

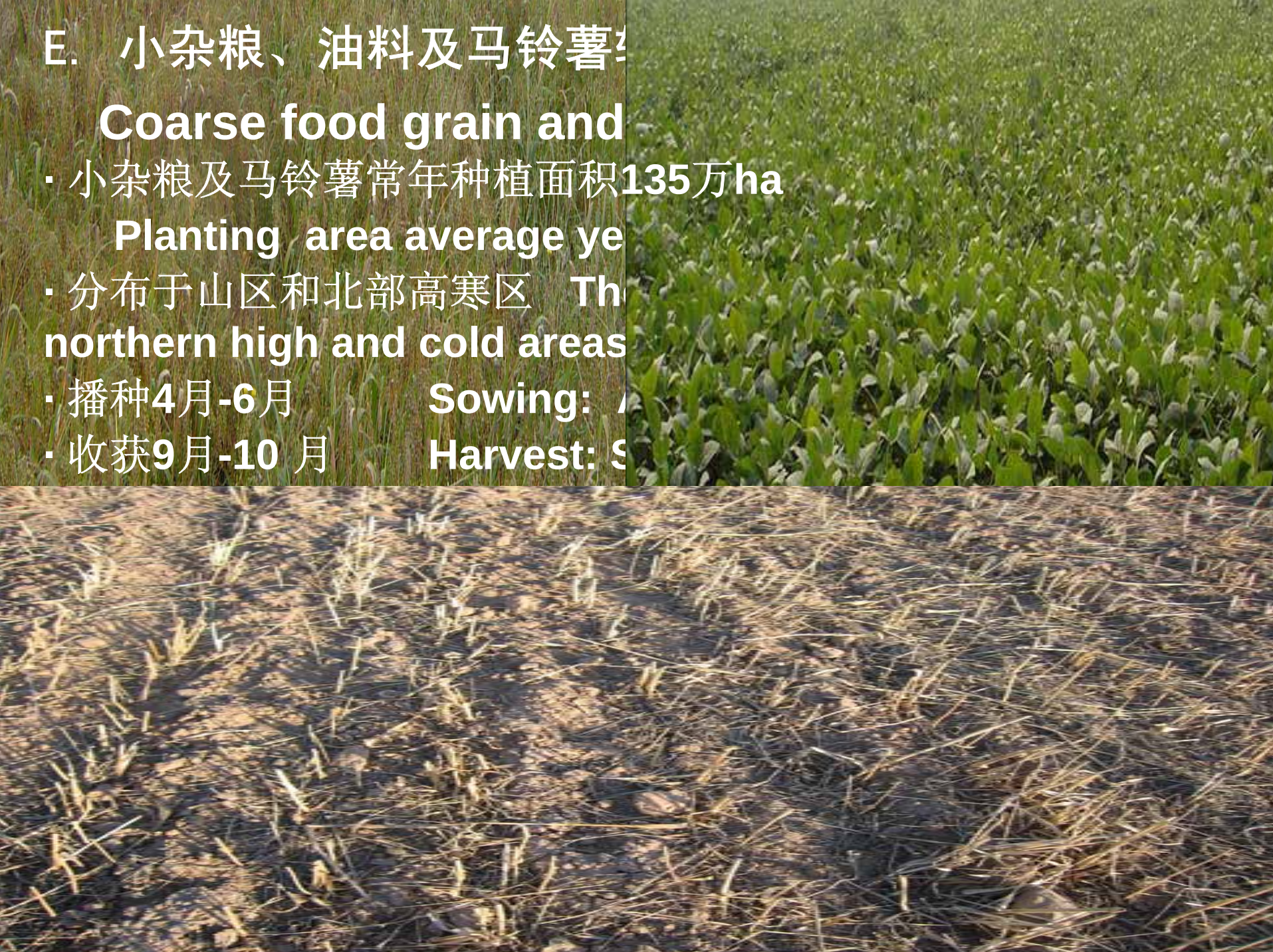
Planting area average ye

· 分布于山区和北部高寒区 Th

northern high and cold areas

· 播种4月-6月 Sowing: A

· 收获9月-10 月 Harvest: S



收获留茬固土　HARVEST REMAIN STUBBLE

· 割晒机收获，留茬

Harvest by cutter, remain stubble.

· 人工收获留茬

Harvest by manpower remain stubble.

轮作倒茬 CYCLE PLANTING

- 谷黍茬必须种植其它作物，不能连种

  Don’t to plant millet continued.

- 胡麻、莜麦、豆类、马铃薯轮作倒茬

  Cycle planting benne, naked oats, soybean, potato.

- 经过三至四年免少耕种植杂粮和油料作物后倒茬种植马铃薯

  Potato planting every 3-4 years.

黍子


豆类


莜麦


马铃薯

· 免少耕播种

Sowing with mini-tillage and zero-tillage.

·人工除草与化学除草相结合

Weeding with manual work and chemistry.

结论建议及问题讨论 DISCUSSION

a 结论

- 小麦、玉米一年一熟，小麦、玉米（或豆类）一年两熟，小麦、玉米、豆类两年三熟保护性耕作技术，符合山西同类区域发展保护性耕作的实际，可大面积推广应用。

One wheat a year, one maize a year, wheat maize or soybean two crops a year, wheat maize and soybean three crops two years, these technique systems of conservation tillage, conform with the reality developing conservation tillage in congener areas in Shanxi, can be popularized cosmically.

- 秋、冬季留茬固土是山西北部高寒区实施保护性耕作的关键措施，应大力推广。

Keeps stubble protect soil at higher and cold areas of northern Shanxi in autumn and winter, can be popularized energetically.

b 问题讨论及建议

- 山西北部玉米种植区的玉米秸秆多数作为牲畜饲料被利用，不能实现作物残茬覆盖地表，因此，要研究这类地区保护性耕作技术规范，制定技术标准。特别是要重点研究保护性耕作播种、除草技术，优化免耕播种技术、旋耕播种技术、少耕播种技术、除草技术，完善技术体系。

Optimizing the techniques of zero-tillage sowing, rotary-tillage sowing, mini-tillage sowing, weeding. Establishing the technique standard and perfecting the technique systems of conservation tillage.

- 作物残茬覆盖地表，会明显降低地温。因此，对于气温较低、无霜期短的一年一熟玉米种植区，不宜推广免耕技术模式。要在这类地区建立长期稳定的试验区，研究相关问题。

The crop stubble covers the soil surface, reduces the ground temperature obviously. Therefore, to maize areas that lower temperature and shorter frost-free period, zero-tillage mode is unsuitable.

- 谷黍等小杂粮作物在山西种植面积较大，但实施保护性耕作的技术还不完善。因此要进一步研究谷黍杂粮保护性耕作技术体系，特别是要重点研究播种技术、除草技术。在免耕技术尚未成熟的情况下，积极推广秋季留茬固土，春季少耕播种技术。

The technique systems of conservation tillage be required to improve at the northern area in Shanxi, and the seeder with small grain be required to develop.

- 关于机具问题

- 小麦、玉米免耕播种机在少、免耕条件下，能较高标准满足农艺要求，通过性较好，但用途单一，使用经济性差。

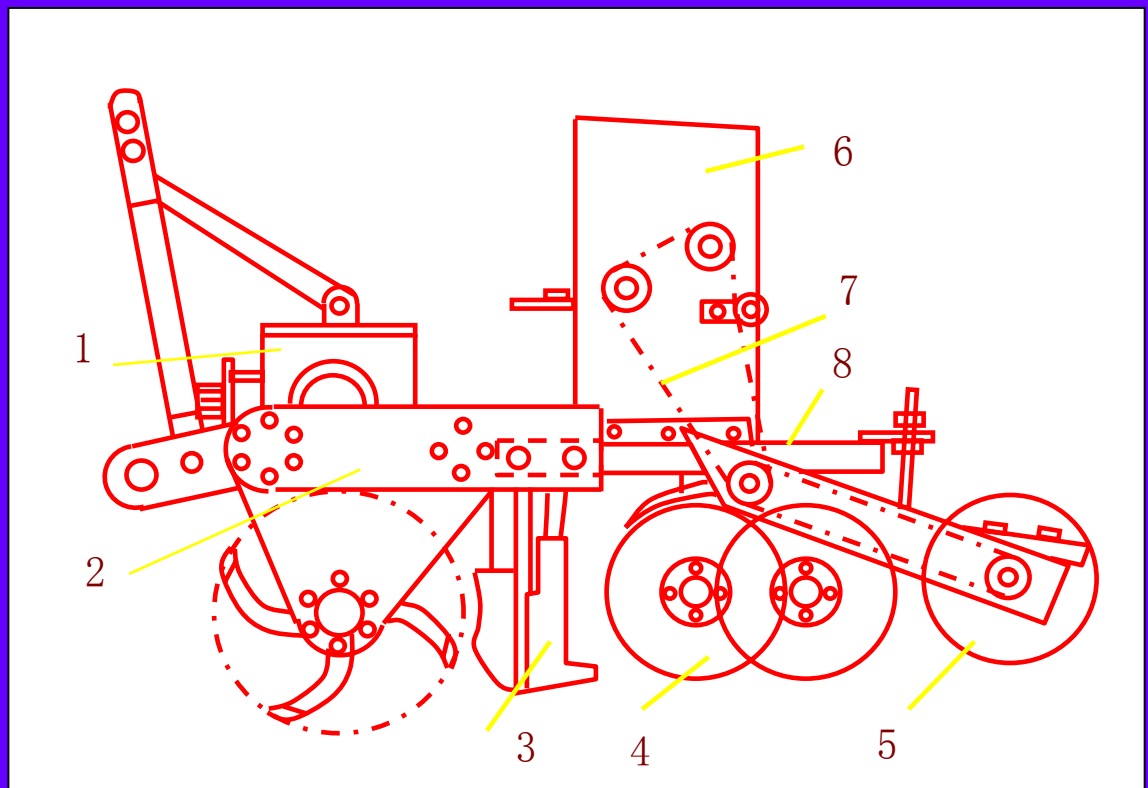
The available seeders with zero-tillage be unitary, higher prices, lower availability factor, worse economy, requires that developing various multi-purpose seeder, to improve the work effect of the farm machinery families being engaged in conservation tillage.

- 玉米、豆类小型少耕播种机，适合小地块播种，经济适用，但质量标准低。

The available maize and soybean seeders with mini-tillage, adapt to sow at small field, has good benefit, but work quality is lower at the field of more residue.

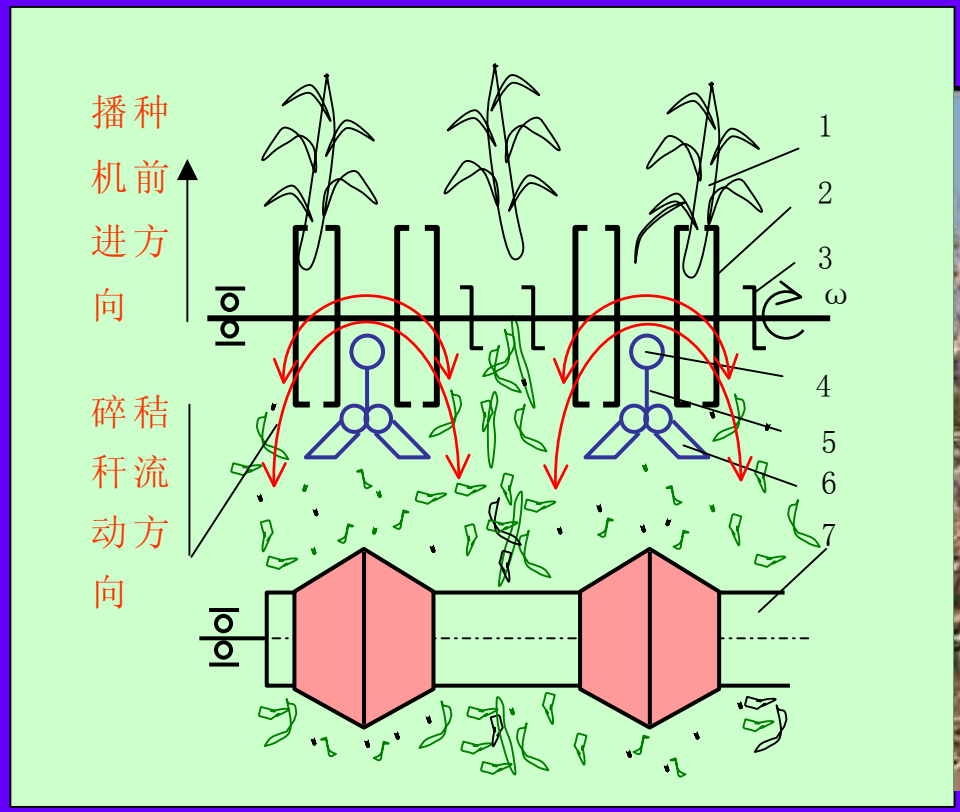
- 旋耕播种，通过性好，可在较大秸秆覆盖量条件下作业，基本满足作业的农艺要求，经济性好，但对土壤搅动大。

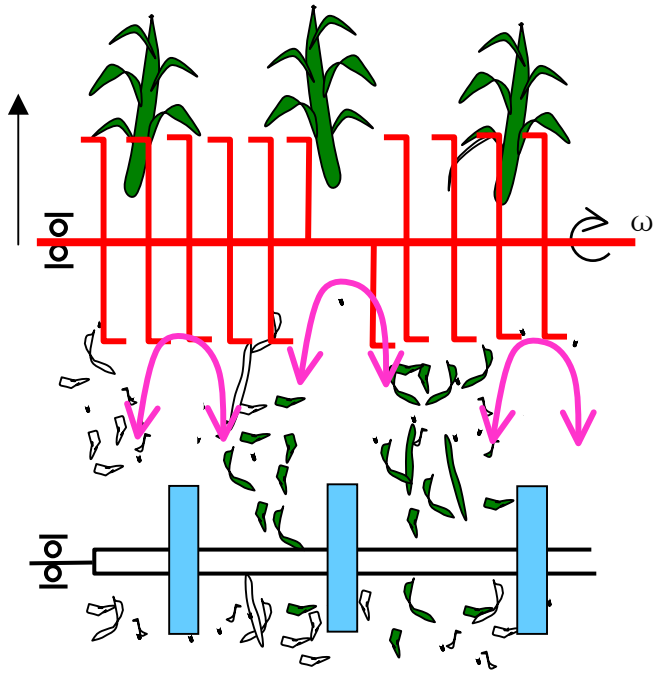
The rotary-tillage seeder, pass easiness, adapt to sow at more residue, good benefit, but stir soil overabundance.



- 条带播种机通过性好，基本满足农艺要求，但作业效率低，经济性差。

The strip-zero-tillage seeder, adapt to sow at more residue, efficiency lowness.





- 要研制适合多种作物使用的、较高标准满足保护性耕农艺要求的多用途少、免耕播种机，以提高农机户从事保护性耕作的经济效益。

Developing various multi-purpose seeders, to improve the effects of the farm machinery family being engaged in conservation tillage.


谢 谢 ！
THANKS