Climate Smart Practices for Crops Production with Minimum Water and Energy Inputs in Northern China

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Outline

- The challenges to feed increasing population
- Climate smart practices for sustainable crop production
- Successful stories in northern China
The challenges to feed increasing population in China

- Arable land: 8%
- Renewable fresh water: 6%
- Fertilizer: 32%
- Cereals: 19%
- Meat: 30%
- Vegetables & fruits: 38%
- Population (2020): 20%
- Population (2030): 1.45 billion

- Arable land: ↓~10-15 10^4 ha/a
- Temperature warming rate: ↑0.22°C/10a
- Available fresh water: 360~370 billion m³

Climate Smart Practices
Climate smart practices for sustainable crop production

1. Climate, resources and environment

- Climate resilient cropping system
  - Maize
  - Rice
  - Cotton
  - Wheat
  - Breeding high resistant variety to climate change

2. Climate resilient cropping system

- Drought resistant wheat varieties
- Maize varieties with high yield

3. Key solutions to crop production

- Canopy
- Surface mulching
- Healthy soil
- Intercropping/Rotation
- Optimized planting density
- Plastic film mulching
- Straw mulching
- Organic input
- Conservation tillage
- ICT for precise water and nutrients management

4. Sustainable crop production system
Successful story in North China Plain- Nonfully irrigated wheat

### Challenges

![Map of North China Plain]

### Cropping system

<table>
<thead>
<tr>
<th>Year</th>
<th>Wheat</th>
<th>Maize</th>
<th>Peanut</th>
<th>Soybean</th>
<th>Cotton</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>100%</td>
<td>0%</td>
<td>50%</td>
<td>0%</td>
<td>50%</td>
</tr>
<tr>
<td>2018</td>
<td>50%</td>
<td>50%</td>
<td>0%</td>
<td>0%</td>
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</tr>
</tbody>
</table>

- Irrigation water: ↓ 750 m³/ha
- Electricity for pumping water: ↓ 30%
- Winter wheat WUE: ↑ ~10%

### Climate smart practices

- Deficit irrigation to reduce water and energy inputs
- Fertigation to increase resource use efficiency
- Return straw in field to improve soil health
Successful story in Northeast China - Controlled Irrigated Rice and Conservation Tillaged Maize

Challenges

Climate smart practices

Intercropping to improve light and water use efficiency

Maize/soybean with straw mulching preventing soil erosion

Rice alternated wetting and drying to save water and improve quality

Cropping system

Water and Electricity ↓ >35.0%
Rice yield ↑ 6.4%
Rice WUE ↑ 39.1%
Successful story in Northwest China: Drip Fertigated Cotton with Plastic Mulching

Challenges

Yield ↑ 20%-30%
Water and fertilizer ↓ 30%-50%
Electricity for pumping water ↓ >30%

Cropping system

Cotton, Maize, Wheat, Tomato

Climate smart practices

- Integrated Machinery for seeding and drippers and mulching
- Precise fertigation for water and nutrients supply
- Machinery for harvesting plastic film and driper

Integrated Machinery for seeding and dripers and mulching

Precise fertigation for water and nutrients supply

Machinery for harvesting plastic film and driper
Thank you

Your valuable comments and suggestions are highly appreciated.