A lush, green garden with various plants, flowers, and a central lawn area. The garden is filled with a variety of greenery, including tall evergreens, flowering shrubs, and a central lawn area where a few people are walking. The overall scene is vibrant and well-maintained.

Canadian Experience of Conservation Agriculture and Project Implementation in China

Yuxia Li , Chi Chang

Long Term Technical Advisors

**China-Canada Sustainable Agriculture Development
Project (SADP)**

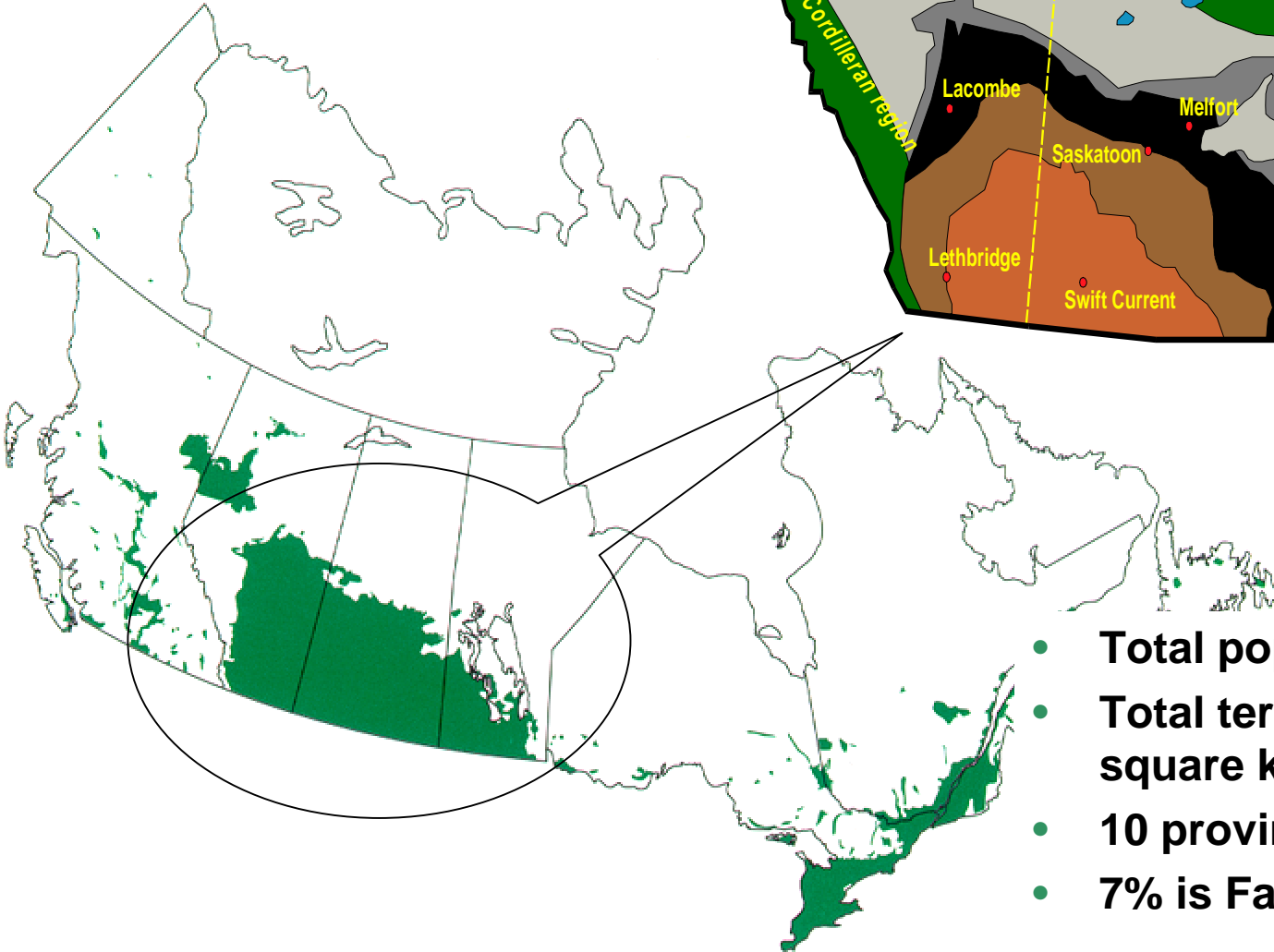
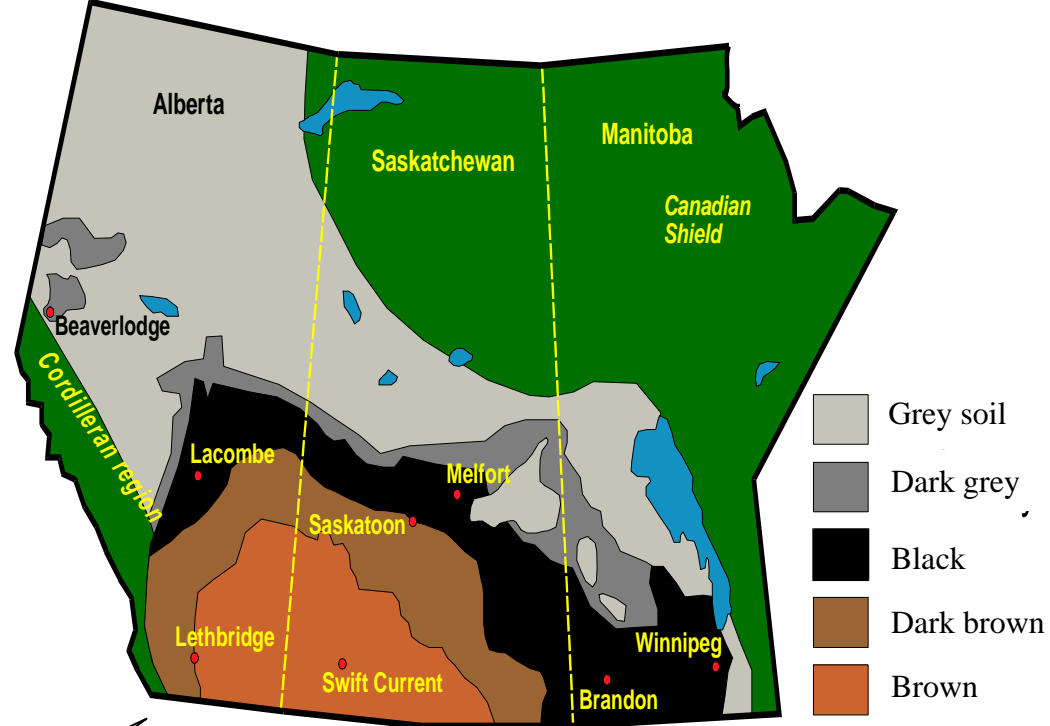
Henan, 23rd-26th October, 2007

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Dr. Wayne Lindwall, Dr. George Clayton, Dr. Guy Lafond, Mark Stullburg, Dr. Brian McConkey, Dr. Neil Harker, David Handby, Dr. Neil McLaughlin

About 80% of farming land in Western Canada



- Total population: 32,000,000
- Total territory: 10,000,000 square km
- 10 provinces, 3 districts
- 7% is Farming land

Green Mountains



Golden Carpet

The Initial Problem...



Too many immigrants to Western Canada increased population in prairie between 1867 to 1929





- 1917 to 1928 warning signs of droughts
- 1929 to 1934 increased natural/economic disaster



- Conventional tillage left soil bare
- Tillage and harrow both in spring and autumn
- Weed control with tillage in summer fallow, no residue cover
- Single crop

Dust Storm in 1930s



Serious Soil Erosion



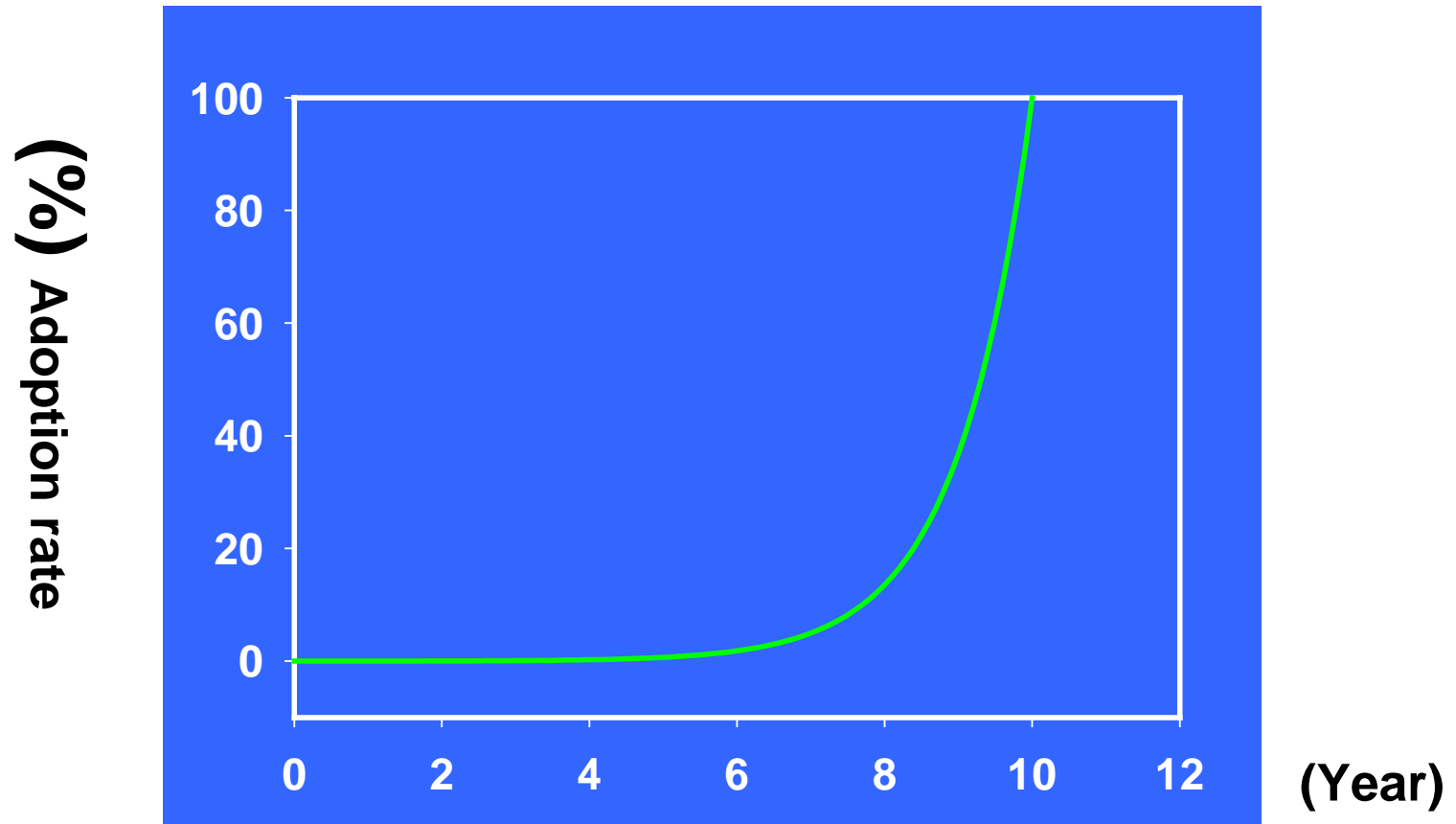


- Reduced tillage depth and intensity, improved tillage method and left crop residue cover on surface to reduce erosion
- Tillage was gradually replaced by herbicide in summer fallow when herbicide was cheaper
- Developed Canadian-made no-till seeders and residue management equipment



- Extended crop rotation and integrated weed/pest control
- Reduce production cost, reduce herbicide use, reduce greenhouse effect and enhance capacity of resisting natural disaster

Low adoption rate at the beginning



- Poor residue management, weed problem, no-till seeders not suitable, herbicide expensive, less crop rotation;
- Poor sharing experience between agronomists, engineers, extension specialists, farmers, government officials.

More research demonstrated the benefits of CA after long term

- **Crop yield**
- **Soil organic matter**
- **Water infiltration**
- **Water Use Efficiency**
- **Soil moisture**

**Increased/
Improved**

- **Production cost**
- **Operation numbers**
- **Soil erosion**
- **Runoff**
- **GHGs emission**

Decreased

More research demonstrated the benefits of CA after long term

- Crop rotation and weather have greater impact on weed and disease problems than tillage systems.**
- Diversified extended crop rotations work well with conservation agriculture**
- Rapid development of a “Canadian-made” solution for seeders and equipments**

“Working together” towards common goals for sustainable agriculture resulted in more rapid technology transfer of CA

- Farmers and farmer associations**
- Better communications**
- Tax benefits for CA adoption**

The change of farming land use in western Canada

- “More crop diversity, Less fallow in summer”

<u>Land use</u>	<u>1988</u>	<u>1999</u>	<u>2004</u>
	(million ha)	(% changing rate)	
• Grain	17.7	+9.2	-6.4
• Oilseed	4.3	+1.6	+48.7
• Pulse crop	0.4	+111.8	+452.7
• Fallow	8.7	-29.2	-58.7

Now...

Over 70% farm land adopted no-till or reduced tillage



Enhance capacity of resisting natural disaster

- **In 2002, farmers had adequate harvest and there was no soil erosion in prairie area in Canada even though there was serious drought**
- **This is a great achievement of conservation agriculture**



China-Canada Sustainable Agriculture Development Project

- **Inner Mongolia Autonomous Region, Xinjiang, Gansu, Sichuan, Hunan (Xiangxi), Hubei (Enshi)**
- **Technical support (long term and short term advices)**
- **Provide training in China and Canada**
- **Work directly with organizations on technology demonstration and extension**
- **Promote sustainable development in grassland, livestock and farming practices**



Changing Ideas & Behavior

- **Farmers/herders and farmer associations**
- **Extension specialists**
- **Administrators and leaders**
- **Cultural exchange and mutual benefits**

**Participatory Approach
Gender Equity
Farm Field School**

Environmental concern and sustainable development

**Mouldboard plow
with bare soil surface**



Sand storm

Dust storm in April, 2005, Beijing



cnsphoto

Soil erosion



Burning crop residue

The basic principles of CA

- **Crop residue cover**
- **No-till and reduced tillage equipments**
- **Weed control**
- **Crop rotation**
- **Increase farmers' income**

Challenge to solving environmental problems is that producer needs to see an economic benefit



Residue Management in Ecotone



- **Animal is fighting for crop residue**
- **Less soil surface cover under CA leads to soil degradation**

Forage Trail



Residue Management



Conservation Agriculture Starts at Harvest



Crop Residue
Distribution

Strip cropping in potato production area to reduce wind erosion and improve soil moisture



No-till Seeders developed under China-Canada project



Modified no-till seeder



Weed Control

- **Weather and crop rotation have a great impact on weed management than tillage**
- **Herbicide, machinery and hand-hoe weed control may be used**
- **Crop residue can reduce weed population**
- **Other agronomic methods (fertilizer placement, seeding rate and depth, timing of herbicide application etc.)**



Effect of Crop Rotation

- **Crop residue improves the environment of soil microorganism**
- **Having more choices of herbicide, reducing the disease/weed problem**
- **Rotation improves crop residue management**
- **Rotation includes forage and pulse**

Farmer's benefit is the key for crop rotation!!!

Farmers' participation is very important



- **Changing tillage system needs to change the whole agriculture production system;**
- **Applied research, demonstration, farmers' participation and training are necessary;**
- **Farmers need time to adopt new technologies;**
- **The success of CA in Canada takes 30-40 years.**

Sharing Experience between China and Canada



Publication/Promotion

website:
www.ccag.com.cn



Canadian Experience

Better Communication and Cooperation: farmers, extension specialists, research, stakeholder and government department; engineers, agronomists, soil scientists, weed specialist;

Provide comprehensive best management practices: harvest, crop residue management, seeding, fertilizer placement, weed and pest control, harvest

Learn from other countries, develop systems suitable for local environment, soil condition and practices, benefit both farmers and environment

Thank you !

