Addressing the challenges of sustainable cotton production under competition in China

Ziying MA mzhy@mail.hebau.edu.cn
Weili LIANG lwl@hebau.edu.cn
Guiyan WANG guiyan@sina.com
Michel FOK michel.fok@cirad.fr
Presentation plan

- China farming: current characteristics
- China cotton: current status
- Challenges beneath the recent policy for sustainable agriculture
- Lessons learnt from challenges formerly overcome
- Conclusion: Will new challenges be overcome?

WCRC6, Goiania, Brazil, May 1-5, 2016
Current characteristics of agriculture

• Land shortage ⇒ tiny farms
  – ⇒ Particular cultivated canopy
  – Restructuring is ongoing
  – Multicropping = obligation for maximal land use

• Income gap is increasing for a while

• Agriculture is getting feminized

• Labor is getting scarce in fields

• Water shortage in some important ag. areas
Cultivated canopy in tiny farms
Houses and fields along railroads
Farmers' villas...

...in place/addition of old houses
121 millions ha for feeding 1.35 billion people
Multiple cropping linked to possibility for irrigation

Cultivated area

irrigated area

sown area
Intercropping is common to maximise land use
Relay cropping involving cotton

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Tiny farms

• No. Farms?
  – Lack of stats
  – Decreasing
    • ← abandon of farming by families

• Farm size
  – ± 0.7 ha
    • Increased from 0.5 ha
    • Still increasing
Restructuring under process
Income gaps in nominal and real terms
Cropping: declining source of farmers' income
Increasing daily salary
2005 - 2012

Source: Zhao Zengjun, 2013,
Cropping: a ladies' business
Water = rare in some areas
Water table is down and down, in Hebei province
Cotton production characteristics

• Production is quitting traditional growing areas
• ...because Production costs are high
• ...price lag behind competing crops
Cotton in 3 regions

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Cotton area decline and yield increase
Decline in traditional growing regions

- Yellow River Valley
- North West Region
- Yangtze River River

Bt cotton
...partly because of less attractive price relatively to competing crops
...of high total costs hurt by input price indexes

Costs in Hebei province (our surveys)

Source: Price indexes from China Stats yearbooks

Fok M. & Wang G. WCRC6, Goiania, Brazil, May 1-5 2016
...and of increased pest control cost in spite or because of Bt cotton use

Costs/ha, constant Yuan 2002

Costs in Hebei province (our surveys)
Current policy for sustainable agriculture

• Emphasis again on agriculture: a rather recent move
• Top-down policy with decentralization initiatives
• Many actions considered covering 3 dimensions of sustainability
  – Not all are valid for cotton cropping
Agriculture in Central gov. policy

• From Central Document No. 1 issued early every year
  – Worth being known
  – Go beyond common (W)external views
    • Doubt on Central decisions in China
  – Reality
    • China has means for its policy
      – Vs right policy without means in many countries
What is worth noting in Chinese Central policy for agriculture?

• In favour of agriculture
  – agricultural modernization,
    • efficiency, inclusive process and environment-friendly
  – At least 53 million hectares of high-quality farmland will be created by 2020
  – Agriculture by better trained farmers
  – More diversified incomes sources to farmers
  – Farmers to benefit from education and socio-medical services

• In favour of restructuring the agri sector
  – Reform of "residential permit" engaged in favour of rural people

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China is worth to be scrutinized

• Why?
  – Crucial challenges being addressed
  – Adequate fund/investment is engaged
  – Things change very quickly
Hear the change: from noisy motorbikes to silent electrical bikes
How sustainability is addressed in the current policy?

• Central policy published on Jan. 28, 2016
• Detailed policy measures on March 30, 2016
• 47 policy measures
  – 9 specific to animal production and fisheries
3 pillars of sustainability: economic, social, environmental

A frame to categorize contemplated actions

More economic oriented actions and actions in-between pillars

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2 **Subsidy** for the acquisition of agricultural machineries

3 Subsidy for renewing agricultural machineries

5 **Target price policy** for cotton in Xinjiang, and soybean

10 Support to **fertilizing** guided by soil analysis

18 Support to the **modernization of seed industry**

17 **Adjustment policy of the structure of crop production**

4 Minimum purchase price for wheat and rice

6 County level incentives for grain and oil production

20 Support to the transformation of food to animal feed

30 Support to the in situ primary processing of agricultural products

39 Development of agribusiness

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34 Train new type of **specialized farmers**

36 **Train** farming talents
14 Subsidy for the preservation of farmland and improvement of its quality

16 Implement the promotion of land for farming

45 Financial awards to compensate creation of public goods at village level

23 Incentive policy for the protection grassland resources

25 Support to reforestation and conversion to grassland
1 Subsidy for the preservation of agriculture

35 Reform of agricultural extension system and support to its infrastructures

38 Support farmers' cooperative development

41 Development of various forms of moderate scale of farm management

43 Decentralization of the land contract and management rights

44 Reform to promote Rural Collective Property Right System

46 Support measure to agricultural insurance

47 Financial support for the National Agricultural Credit Guarantee System
8 Further promote the **high yield** program for grain, cotton, oil and sugar and support the development of highly **productive mode** of green food.

9 Support to subsoiling operations for soil improvement.

11 Pilot policy in favour of **crop rotation and fallow** implementation.

13 Support to achieve **zero growth** of fertilizers and pesticides use.

15 Support to strengthen high-standard construction of farming infrastructures.

42 New pilot experience in the **financial compensation of public services** provided by agriculture.
Challenge of preserving cotton cropping

• Challenge of integrating cotton into a multi-cropping sequences
• Solution = Transplanting :
  – Technique carried out in late 1980s
  – Still under adjustment to adapt to farming conditions
Lessons learnt from challenges formerly overcome

- Capabilities for innovative approach
- Process of recurrent technology development
- Phenomenon of technology integration
- Potential interest of some technologies out of China
- Some promising signs of mechanization adapted to moderate size of farming

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Transplanting: from nursesy to field
From specific nutritious blocks to common plastic pots
From rooted to bare-root transplants to comply with mechanized operation
Challenge of making labour investment acceptable

- Cotton transplanting is labour intensive
- Managing density and labor requirement: contribution from hybrid varieties
  - Hybrid used in the whole Yangtze river Valley
  - Use under extension to Yellow River Valley
- Low density: 23 – 30 000 plants/ha with hybrid varieties
  - Vs Medium density: 45 – 75 000 plants/ha
Challenge of spraying more effectively

• Through adaptation of the spraying techniques and devices
• Evolution of spraying devices
  – Adaptation to feminization of agriculture
  – Potential interest out of China
From diesel motor to electrical sprayer
Challenge of further mechanization

• Adjusting mechanization to higher but still moderate farm size
  – More recent achievements ↔ less labor availability
  – Some achievements of potential interest out of China
Machineries sometimes selfmade
Innovative multifunction small scale tractors: potential market out of China
Challenge of mechanical harvest to be overcome

Is conventional harvestor well suited?
Challenge of consolidating cotton production in the North-West

• Taking advantage of systematic irrigation
• Irrigation:
  – Focus ⇐ cotton shifting to West
  – topic conducive to new research outputs
More research on systematic irrigated production

Drip-irrigated film-mulched cotton field, Xinjiang.

Source: www.aquasmart.cn/news/irrigation/hyxw/32657_2
Conclusion

- Cotton, alike agriculture in its whole, at the edge of dramatic change
- Political will and support are ensured
- Many challenges ahead
Conclusion

• Yes, new challenges will be overcome like former ones?
  – ← a large widespread technical and research network and motivated by a huge potential market for innovation
  – ← Chinese style of recurrent innovations
  – But biggest challenge: adapt mechanical harvest
Conclusion

• No, new challenges won't be overcome like former ones?
  – Less technical innovations requested
  – More institutional innovations to involve
    • less achievements in institutional innovations
  – ...but still lack actions for coordinated pest control based on better interaction between producers and extension services

• Multidisiplinary approach is needed...notably social sciences
Thank you for your attention