Plant Protection in China

Prof. Xueping Zhou

Institute of Plant Protection

Chinese Academy of Agricultural Sciences

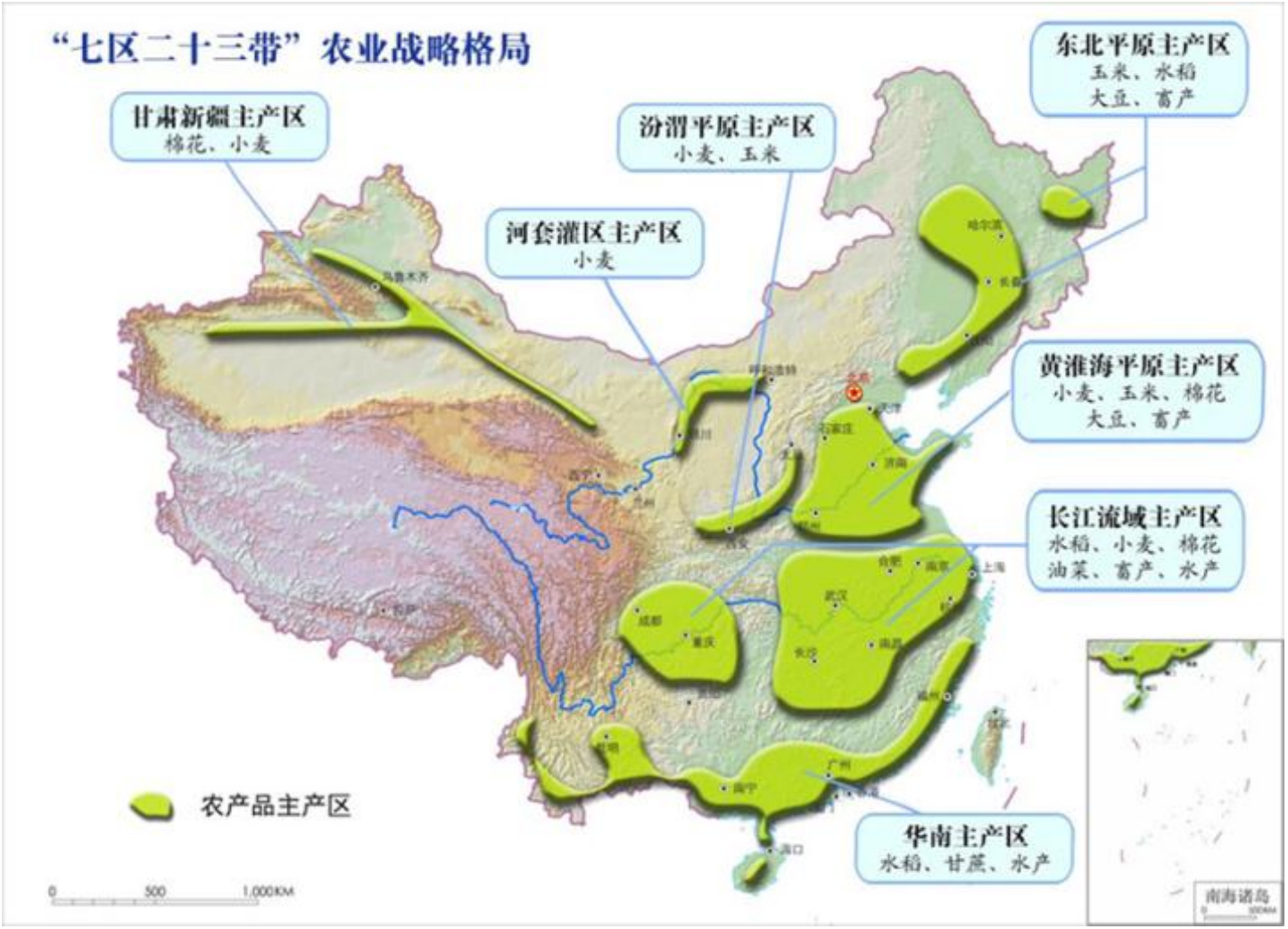
E-mail: xpzhou@ippcaas.cn

25 September 2018, Nanning. China

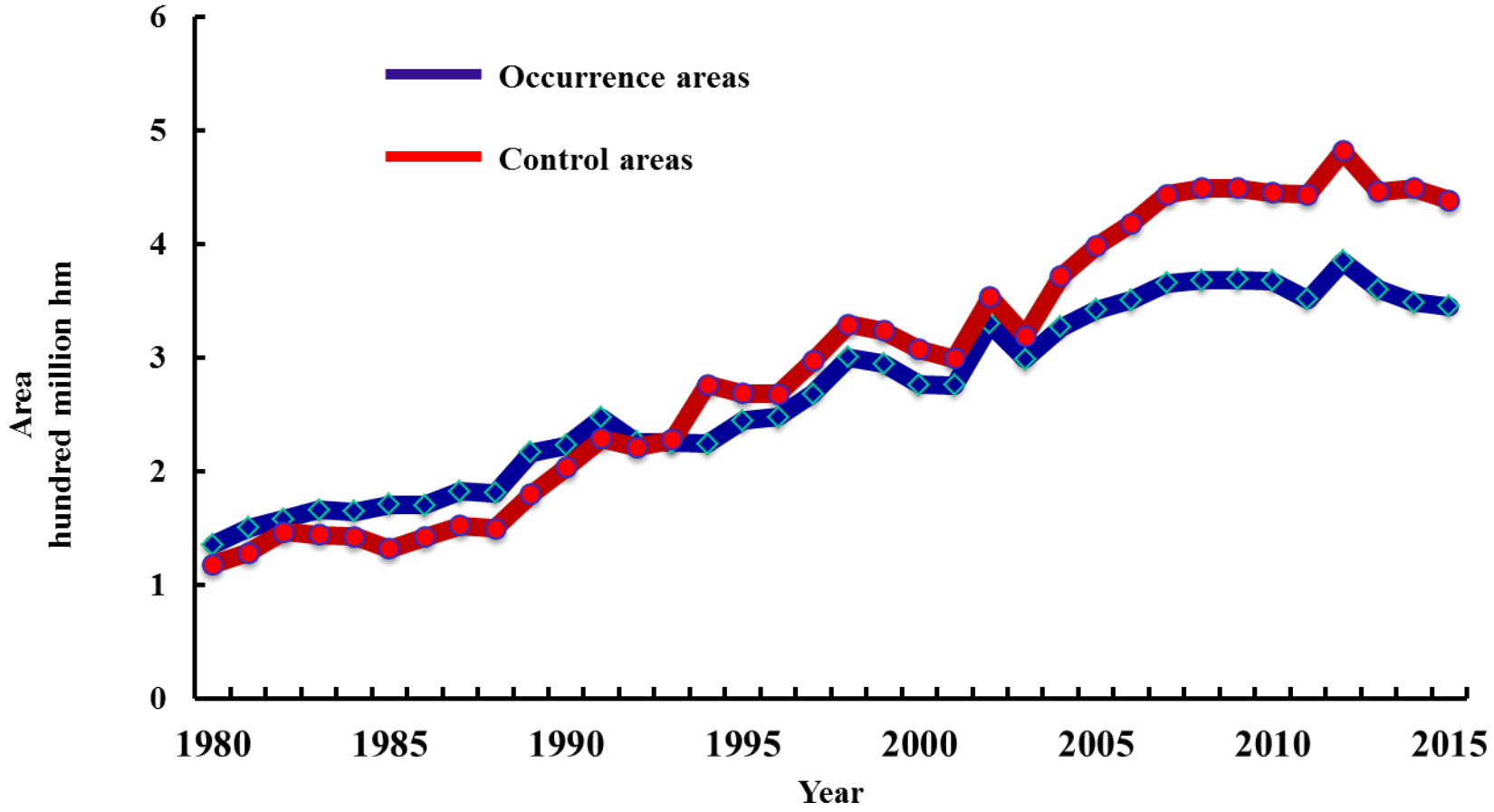
Contents

- Introduction
- Challenge
- Suggestion
- Progress

Overview of agricultural diseases and insect pests in China



Major Pest Monitoring and Control



Major agricultural diseases and insect pests

- About 120 species
- Type Ⅰ: 14 species, Type Ⅱ: about 100 species

Type Ⅰ: More than 100 million mu per year

Actual loss over one million tons per year

Have a huge influence on politics and society

wheat (5) : wheat aphids, stripe rust, gibberellic disease, powdery mildew, sheath blight

rice (4):rice planthopper, rice stem borers, rice blast, rice sheath blight

maize (2): corn borer, corn leaf spot disease

polyphagous pests (3): locust , armyworm, meadow moth

Wheat stripe rust

Rice planthopper

Brown rice planthopper

Sogatella furcifera

Laodelphax striatellus

Trapping by single light in Zhangjiagang, Jiangsu, Augest 31

Tens to hundreds of thousands of rice planthopper were trapped by single light, causing direct disaster.

The outbreak of rice planthopper in middle and lower reaches of Yangtze River and Jiangnan rice areas in 2005, which resulted in three million mu disaster area and nearly five million tons loss.

Rice stem borers

- Long distance migration, known as “two-specific migration insects” on rice with the rice planthopper.
- A common pest in most countries that produce rice in Southeast Asia.




Damage in spike period

Rice blast

Rice sheath blight

水稻纹枯病

Rice sheath blight

sheath blight 纹 枯 病

Rice virus diseases

Corn borer

- Corn borer, known as boring insect, is the main pests in maize roduction. It distributed in most area of corn belt except Tibet and Qinghai. Asian corn borer is the major species, and European corn borer is occurred in Xinjiang.
- Major occurred in northeast, north China and Huang Huai. In general years, 10% of spring corn and 20~30% of summer corn were damaged by corn borer, and over 50% was reduced in production by severely damage. .

Armyworm

Major migratory pests

Harm on winter wheat and corn

Centralized hazards in Northeast, North China and Huanghuaihai region in China.


The 2nd generation damage on spring maize


The 3rd generation damage on summer maize
2013/06/25

Locust

- **Divided into two categories: Migratory locust and Grasshopper**
- **Migratory locust includes three subspecies:** *Locusta migratoria manilensis* Meyen, *Locusta migratoria* L., *Locusta migratoria tibetensis* Chen
- **Grasshopper includes *Oedaleus asiaticus* Bei Bienko, *Oedaleus infernalis* Saussure, *Calliptamus italicus* Serville, *Oxya chinensis* Thunberg, *Chondracris rosea* De Geer *et al*.**
- **China suffers from locusts harm since ancient times. Oracle Bone Inscription had recorded locusts. Nearly 900 plagues of locusts have been recorded since 707 BC, and it occurs once every 9 to 11 years on average.**


Swarms of *Locusta migratoria migratoria*
migrating from abroad to Xinjiang, China

Meadow moth of beet

- *Loxostege sticticalis* L.
- Migratory pests in northern of China.
- Omnivorous, damage on a variety of crops.
- Climatic conditions influence their migration, e.g. on the eve of the 2008 Olympic Games, lots of adults moved into downtown of Beijing, which influenced by the edge of typhoon.

In early August, 2008, just when the Beijing Olympic games was in nervous preparation, massive meadow moths also flew to Beijing Olympic venues.....

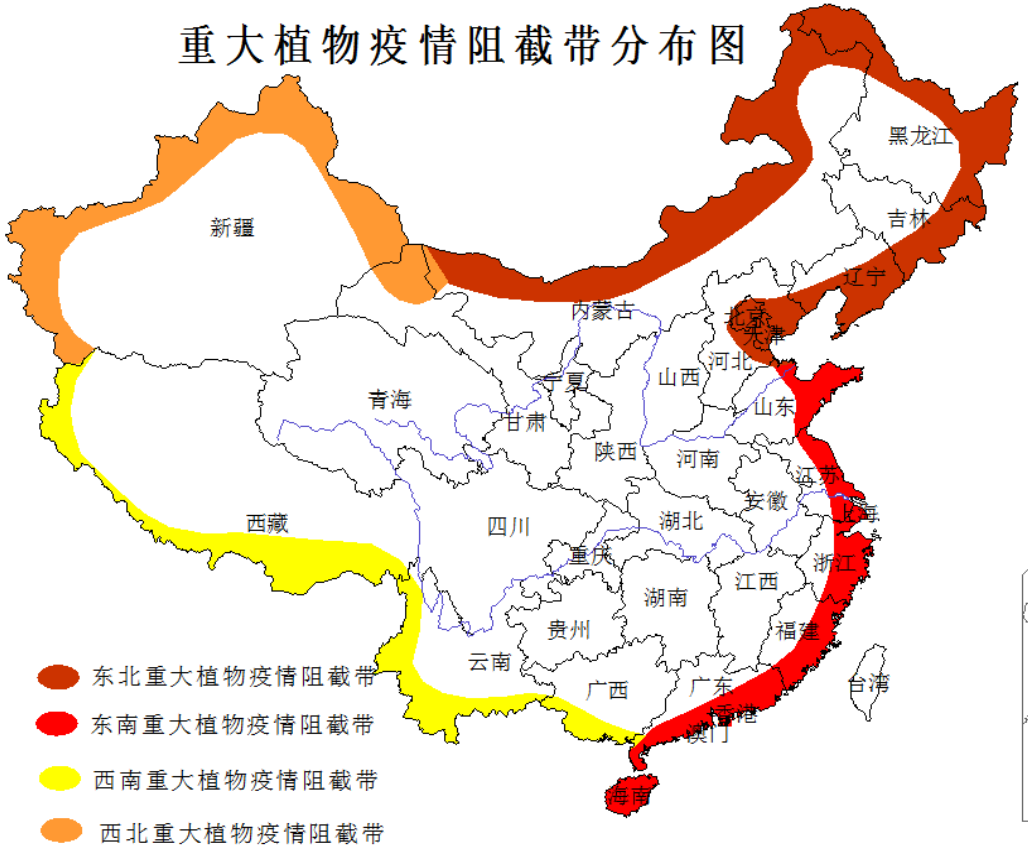
At night, a large amounts of adults dancing around the Lamps in the venue and its surroundings

In the morning, the wall of the Olympic stadium were covered by

Epidemic of invasive plant

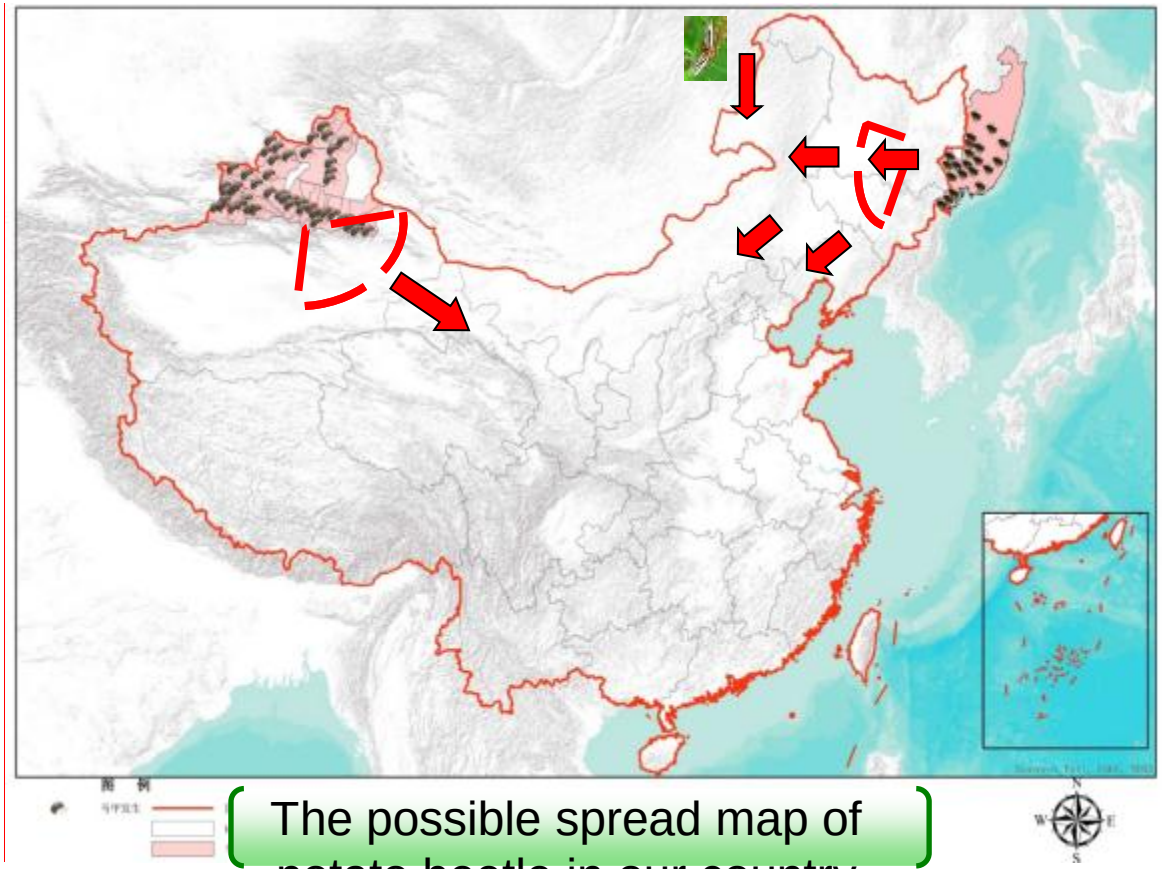
Of the 100 most threatening invasive species in the world, more than 50 were found in China.

In the past 10 years, more than 20 new species spread to our country with an average increment of 1~2 species per year, and the intrusion speed was dozens of times than before 1980s

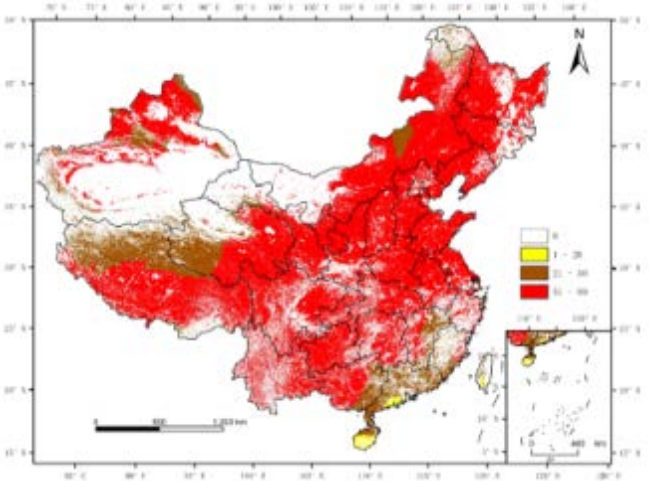


Colorado potato beetle

- During World War II, the German army cast Colorado potato beetle to the British Isle of Wight.
- **Distributed in Xinjiang, and the epidemic was found in Heilongjiang in 2014.**



The possible spread map of potato beetle in our country

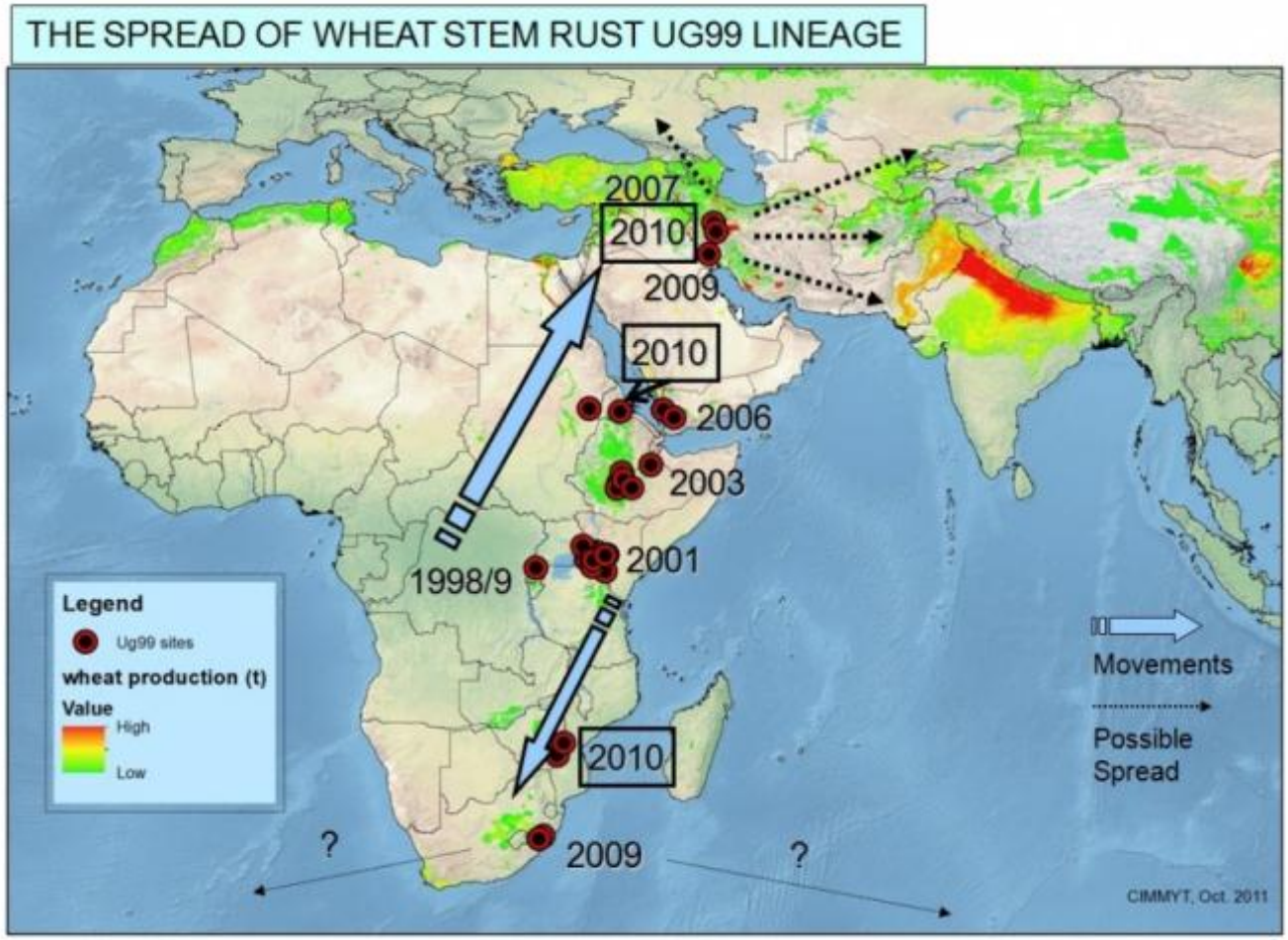


Wheat stem rust Ug99 variant

Wheat killer-Ug99, once invade our country, could cause a devastating blow to 21.3 million hm^2 winter wheat highly possibly.

In 1999, it was first discovered in Uganda.

Spread to Kenya in 2001, to Ethiopia in 2003, and over the sea to Yemen with wind in 2007.

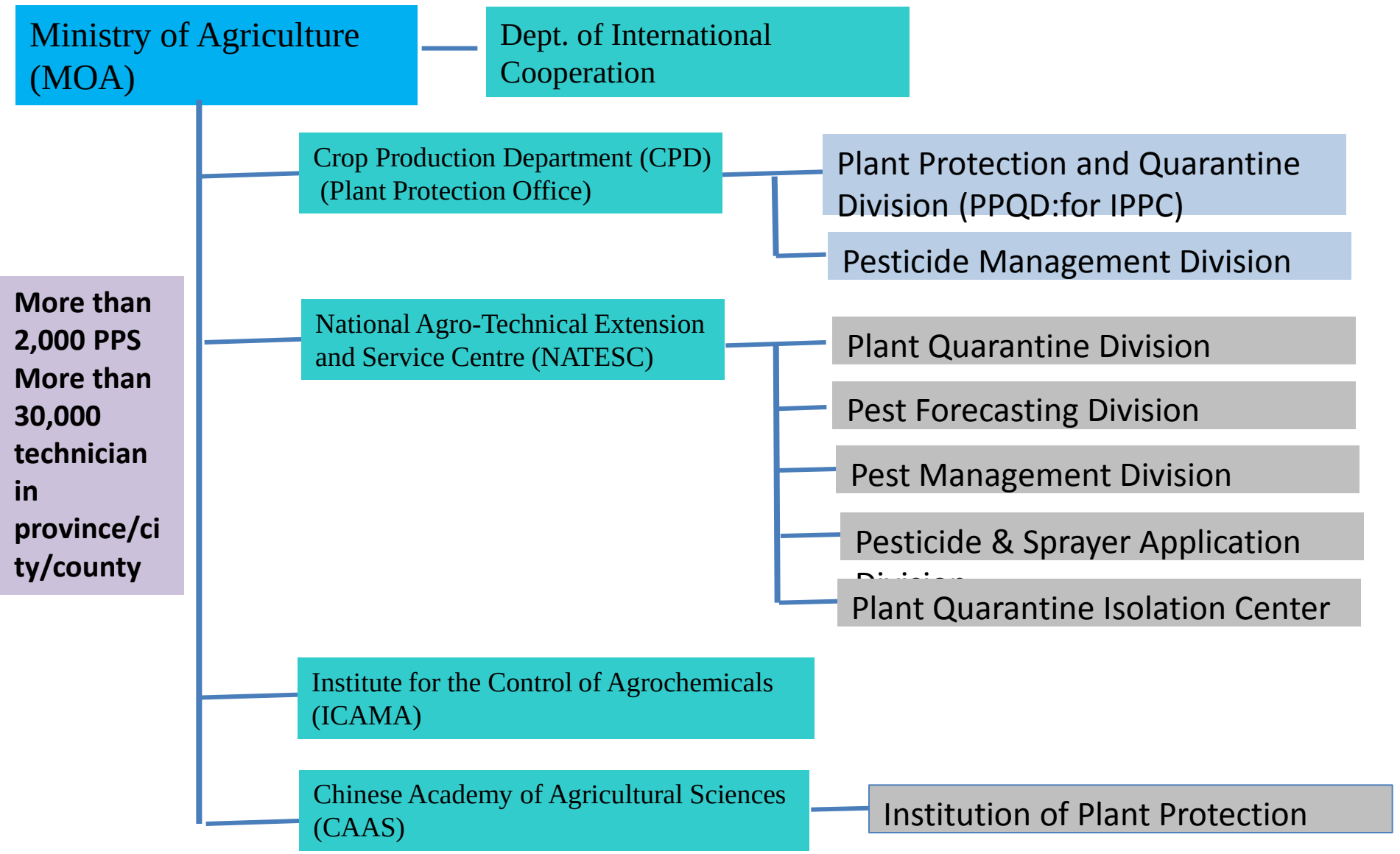


Wheat blast

Brazil (1985) → South America → Bangladesh (2016）

→ India (suspected, 2017）

Organization chart in MOA



Research Institutions on Plant Protection

Research Institution

Institute of Plant Protection,
Chinese Academy of Agricultural Sciences

INSTITUTE OF ZOOLOGY
CHINESE ACADEMY OF SCIENCES

Provincial Institute of Plant Protection

College/ University

More than 30 Universities working on the basic research on plant health

Zhejiang University

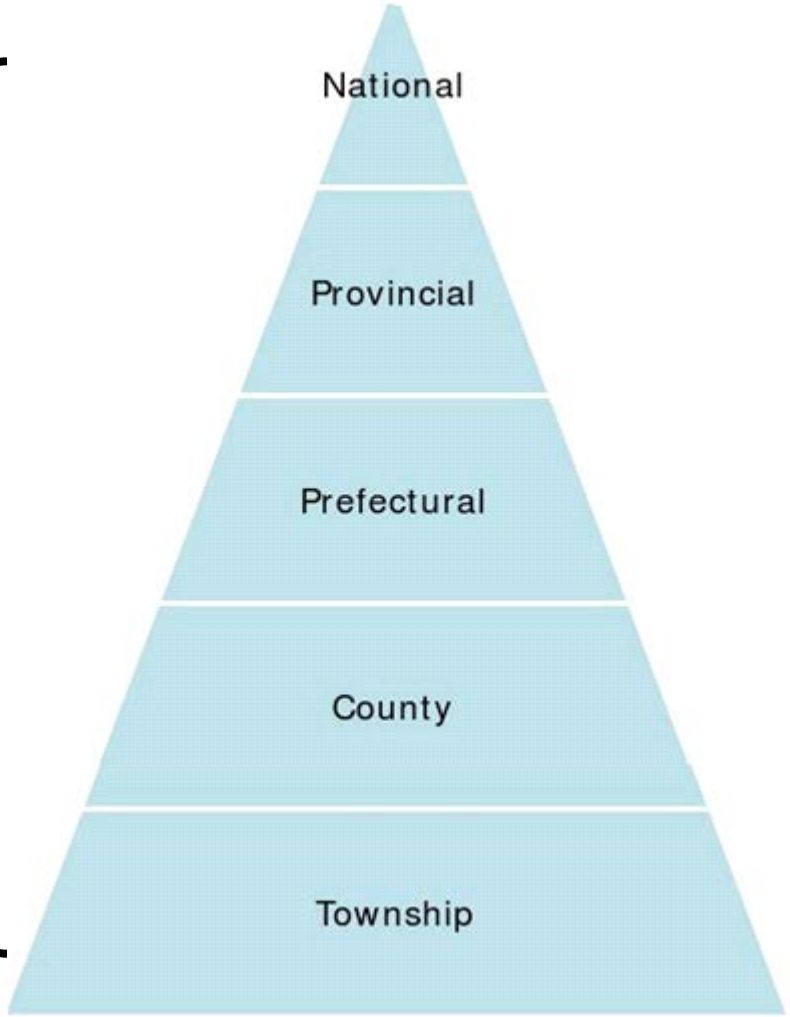
China Agricultural University

Nanjing Agricultural University……

Extention

Framework of extention system

Five levels of extention system



The National Agro-Tech Extension and Service Center (NATESC)

↓

Provincial-Township Plant Protection Station
or
Extention Service Station

Contents

- Introduction
- Challenge
- Suggestion
- Progress

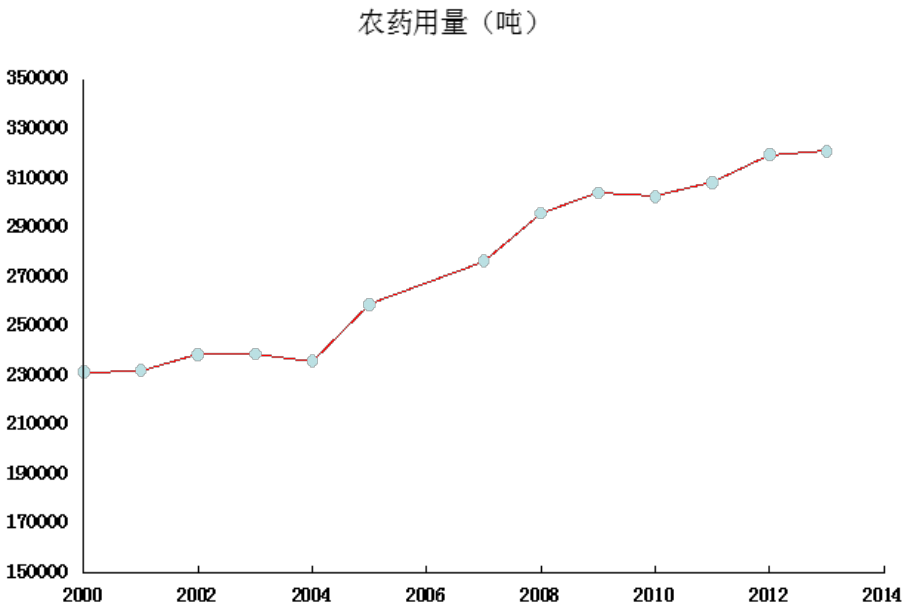
Major Pest Monitoring and Control

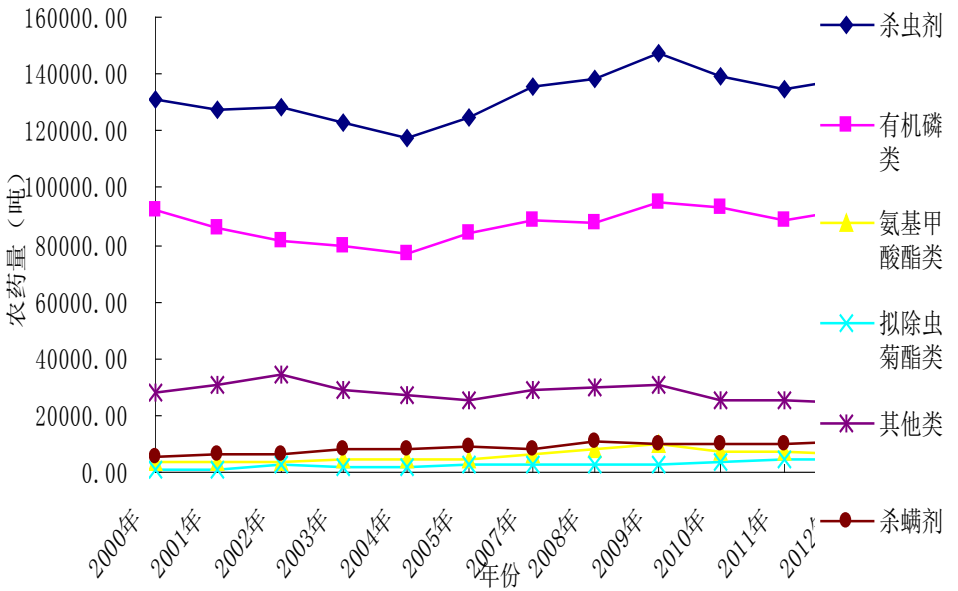
- Spray pesticide
- Cultivate resistant cultivars
- Protection & use of bio-diversity
- Protection & use of natural enemies
- Use of non-chemical measures

Pesticides

- 320,000 t in 2013,

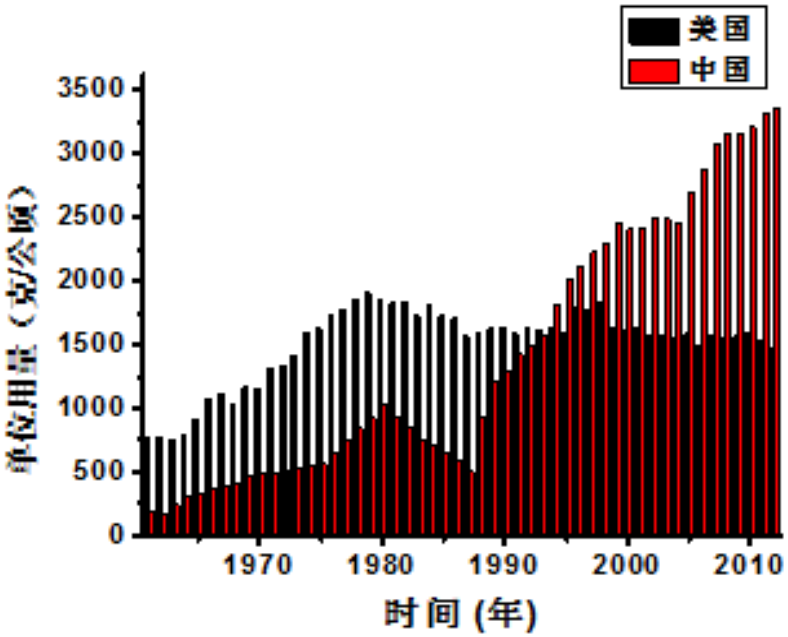
  230,000 t in 2000.
- Increased by 39% compared to ten years ago, increased by 8% per year.
- Residue, Resistance, and Resurgence
- Central Economic Work Conference: Transformation of agricultural production pattern



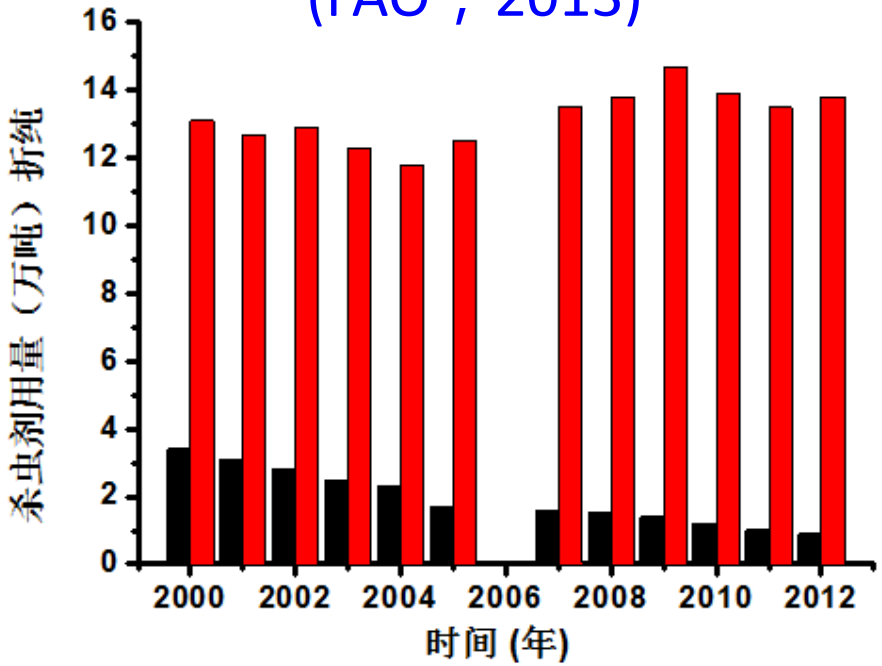


Contrast of pesticide using between China and USA

- **In 2013, the total amount of pesticide formulation reached to 1,830,000 t in China**
- **Pesticide consumption per unit area in China is 2.3 times than USA, and for the insecticide, it is 14.7 times.**

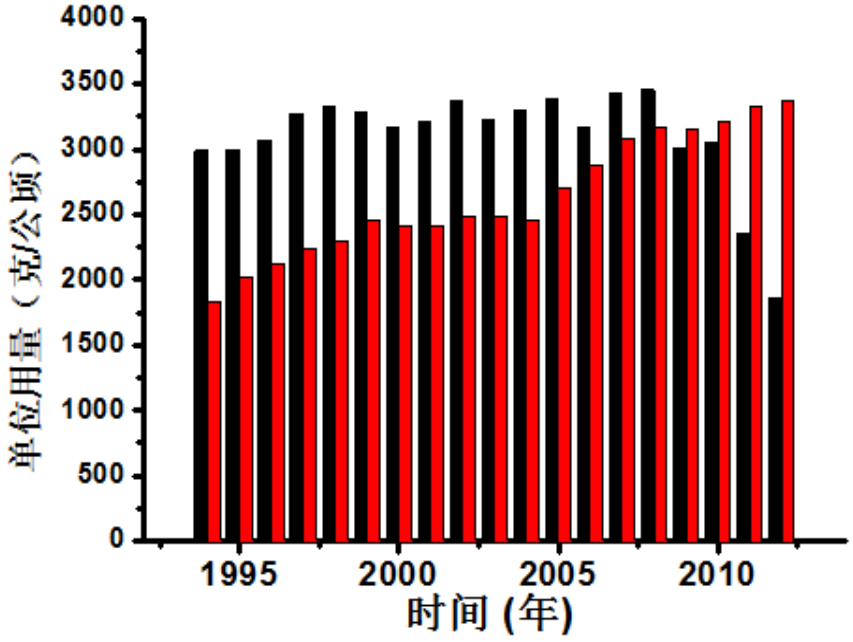


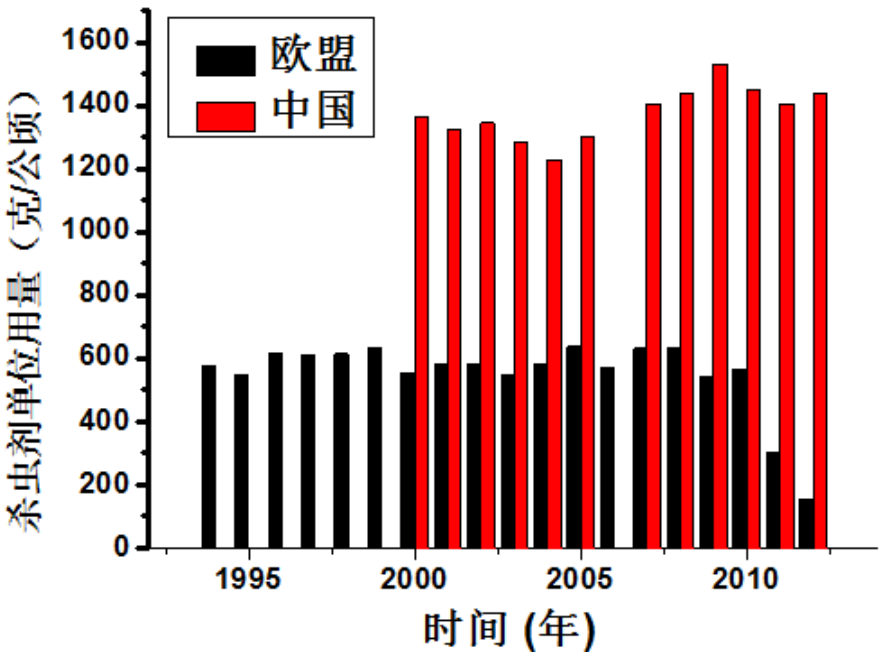
(FAO，2013)



Contrast of pesticide using between China and EU

- **Pesticide consumption per unit area in China is 2 times than the EU, and for the insecticide, it is 9.3 times.** (FAO，2012)





Serious problems caused by pesticide overusing

- Environmental pollution: pesticide contaminated soil area was more than 666 hm^2, and the main pollutants, including neonicotinoid pesticides (imidacloprid etc) and organic phosphorus insecticide (chlorpyrifos etc), annual emissions to the environment amounted to 343,000 and 87,000 t.
- Agricultural product safety: due to unreasonable application, poison garlic chives, poison cowpea, poison ginger and other events frequently occurred , the public consumption confidence declined, and agricultural products frequently blocked in international trade.
- Biodiversity decreased: neonicotinoid pesticides resulted in the sharp drop in the number of honeybees and other vector insects, and fipronil and other caused massive deadth of fish in China, as well as field ladybugs and other beneficial enemies population decreased significantly.

Contents

- Introduction
- Challenge
- Suggestion
- Progress

National strategic planning

- Green prevention and control: **cover rate would be more than 30%, which is increased by 10% 2014;**
- Unified prevention and control: **cover rate would be more than 40%, which is increased by 10% than 2014;**
- Scientific Application: **Utilizing rate of chemical pesticides would be more than 40%, which is increased by 5% than 2013.**

农 业 部 文 件

农农发〔2015〕2 号

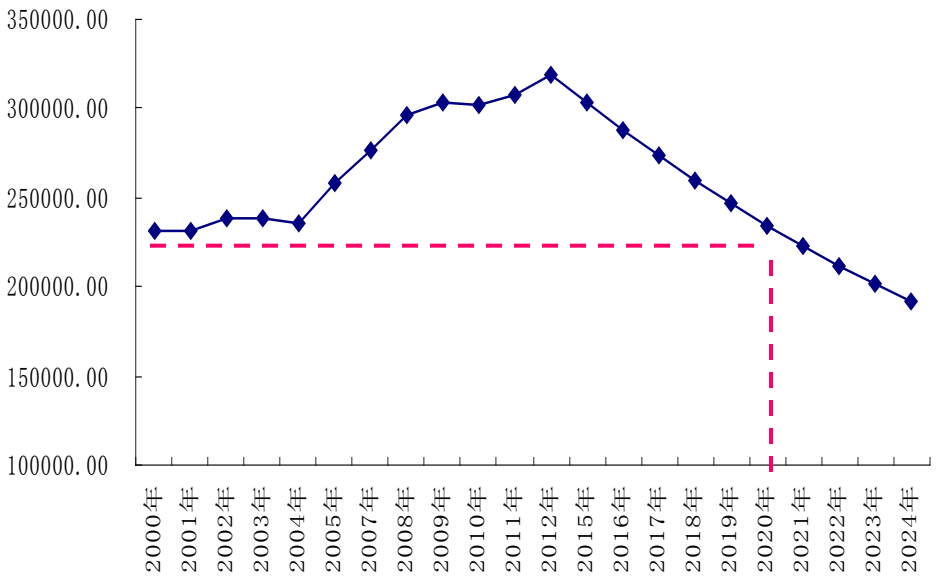
农业部关于印发《到 2020 年化肥使用量零增长行动方案》和《到 2020 年农药使用量零增长行动方案》的通知

各省、自治区、直辖市和计划单列市农业（农牧、农村经济）厅（委、局），新疆生产建设兵团农业局，黑龙江省农垦总局：

为贯彻落实中央农村工作会议、中央 1 号文件和全国农业工作会议精神，紧紧围绕“稳粮增收调结构，提质增效转方式”的工作主线，大力推进化肥减量提效、农药减量控害，积极探索产出高

By 2020, zero growth of pesticides

Ideas and Goals



Reduce 15000 T per year

Decreased to the level at the beginning of the century, by the year 2020

Pesticide Management

- **Green pest management:** ***Strategies, tactics & technologies of non-chemical pest management were promoted aiming at reducing pesticide usages.***

  In order to protect human health and environmental safety, pesticide management was strengthened and pesticide registration system was improved.

---The Regulation on Pesticide Administration and its supporting polices such as the Pesticide Registration Data Requirements, the Measures for the Administration of Pesticide Product Labels and Instructions, the Measures for the Administration of Pesticide Test Institutions were being revised.

Pesticide Management

- **Ban & restriction on the use of the high risk and hazardous pesticides**

---The No.2032 Notice was published by the MOARA in 2013, for the revocation and restricted use of chlorsulfuron, metsulfuron-methyl, ethametsulfuron, asomate, urbacide, chlorpyrifos and triazophos.

--- In accordance with the No.1745 Notice, the formulation paraquat SC registration and manufacture permit were withdrawn in July 1st, 2014, and is canceled to use in July 1st, 2016.

--- To fulfill the POPs Convention, the last production line of dicofol in the Yangnong Corporation was closed in May 17th, 2014, which marked dicofol to be completely banned in China.

Technical measures

- **Control: control crop diseases and insect pests**

  Control the disease and pest initial population number

  Control the using frequency: no harmful effect even though disease and pest occurred

- **Replace: replace High-toxic pesticides and inefficient spray tools**

  Develop low toxicity and risk pesticide

  Increase the atomization and subsidence, preventing the issues like serious escape and leakage.

- **Precise: implementation of precision pesticide application**

  Precision pesticide application to targets

  Pesticide application symptomatic timely and appropriate

- **Unified: promotion of unified prevention and control**

  Provide specialized service to resolve the serious confusion and difficulties of pesticide application

Contents

- Introduction
- Challenge
- Suggestion
- Progress

1. Improving the level of monitoring and forecasting

- Established 1029 nationwide monitoring regional stations to monitor major insect pests and diseases
- Preliminary established monitoring and forecasting digital system for major crop diseases and insect pests; achieved network management, graphical analysis and visual warning of the monitoring information; improved level of real-time information sharing on prevention and control of major diseases and pests.

Monitoring and warning

Pushing standardization of monitoring and survey tools


农作物重大病虫害数字化监测预警系统
农作物重大病虫害数字化监测预警系统
Monitoring and forecasting of crop disease and insect pest digital system
首页 帮助 退出
数据管理 | 图形化监测预警 | 专家咨询 | 移动端信息报 | 病虫监测图片库 | 系统维护 | 办公应用
登录人：国家系统管理员 单位：全国农业技术推广服务中心
请及时报送未上报的病虫调查监测表！
系统切换
农作物重大病虫害数字化监测预警系统
Monitoring and forecasting of crop disease and insect pest digital system
首页 帮助 退出
数据管理 | 图形化监测预警 | 专家咨询 | 移动端信息报 | 病虫监测图片库 | 系统维护 | 办公应用
登录人：国家系统管理员 单位：全国农业技术推广服务中心
请及时报送未上报的病虫调查监测表！
农作物重大病虫害数字化监测预警系统
Monitoring and forecasting of crop disease and insect pest digital system
首页 帮助 退出
数据管理 | 图形化监测预警 | 专家咨询 | 移动端信息报 | 病虫监测图片库 | 系统维护 | 办公应用
登录人：国家系统管理员 单位：全国农业技术推广服务中心
农作物重大病虫图形化监测预警
实时插值
下边界 上边界 颜色
1 0.00 118.20
2 118.20 236.40
3 236.40 354.60
4 354.60 472.80
5 472.80 591.00
更新专题图
返 回
新疆
内蒙古
北京
辽宁
吉林
河北
天津
宁夏
山西
山东
青海
甘肃
陕西
河南
江苏
安徽
西藏
湖北
上海
四川
重庆
浙江
贵州
湖南
江西
福建
云南
广西
广东
台湾
香港
澳门

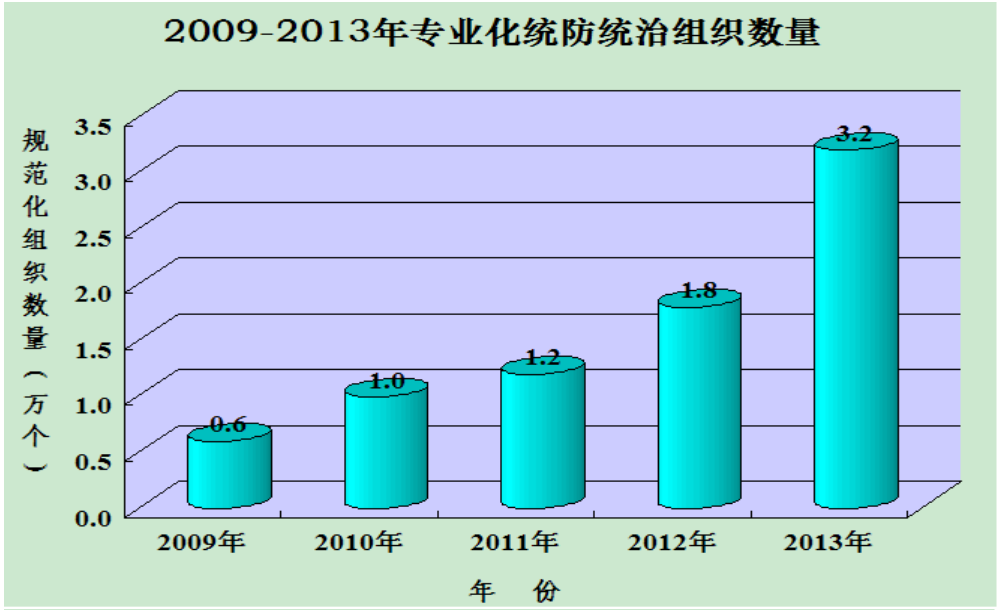
2. Optimizing prevention and control system

- promoting professional unified prevention and conrtol

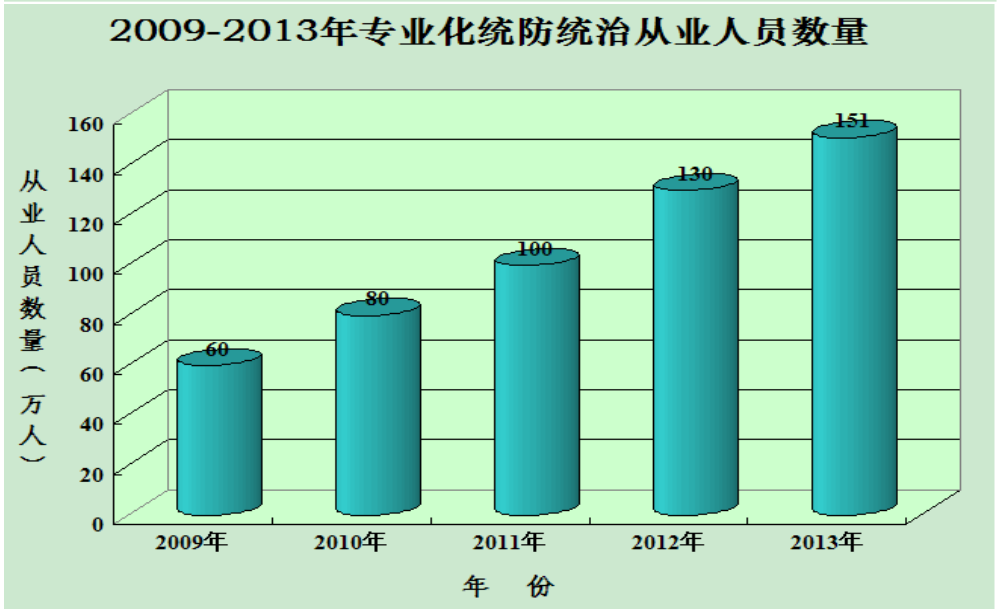
  Supporting and developing professional prevention service organization and promoting the unified prevention and control, which provide a new way to resolve the issue of preventing disease and insect pest by single family. This strategy has a remarkable economy, social and ecological benefits.

Disaster management and control

➢ Rapid development and prosperity of groups

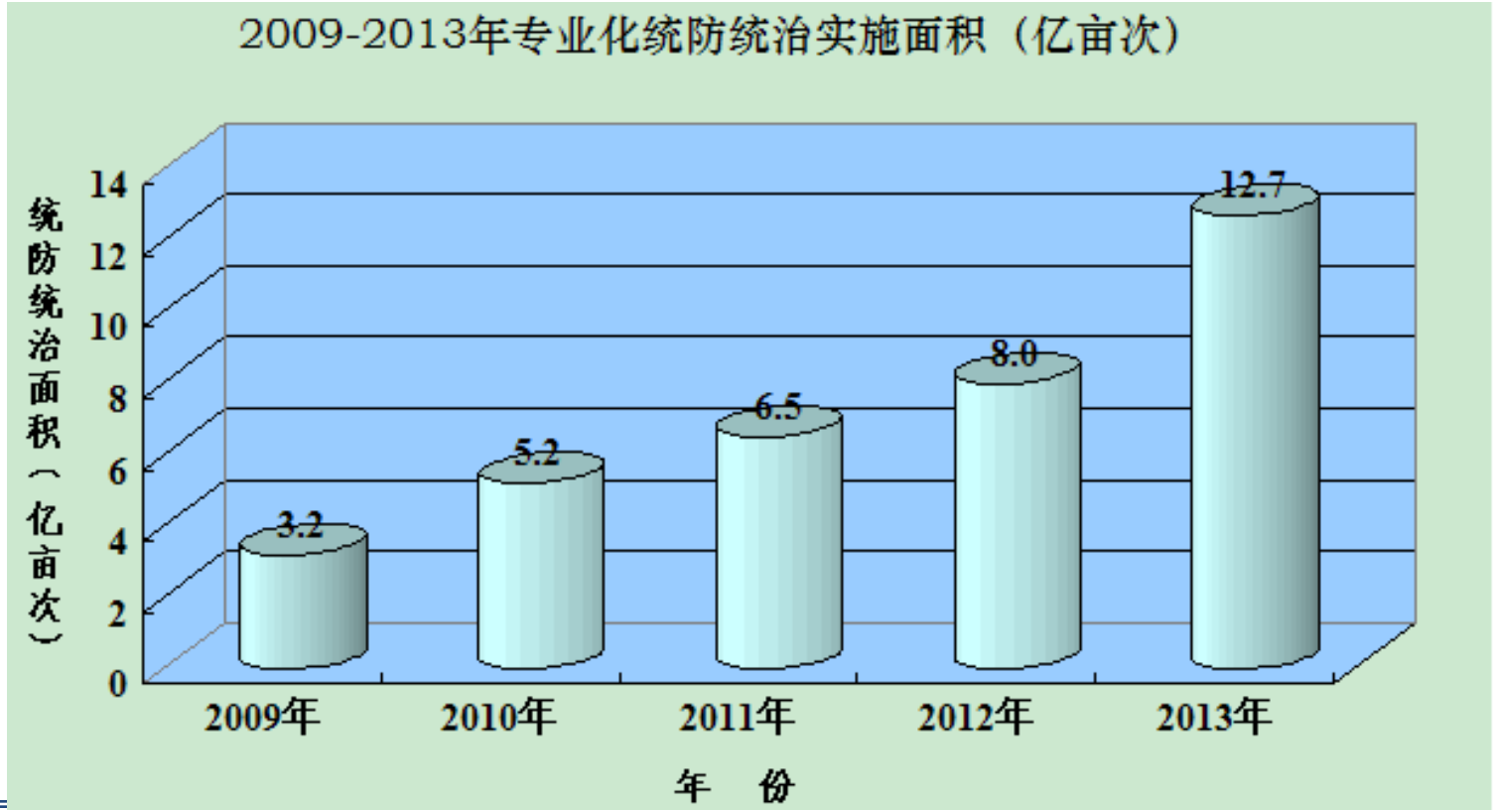


Professional prevention organization developed rapidly since 2009. Now it reached more than 100,000.



Employees increased at the speed of 20-30 million people per year. It reached to 151 million in 2013, which was 2.5 times than 2009. Employment with certificates is 32%, which increased by 11% than 2012.

➢ Prevention and control capacity was improved steadily



At present, daily control capacity is about 68 million mu.

In 2013, the cumulative implemention of unified prevention and control area was 1.27 billion mu, which is four times than 2009, 2.4 times than 2010, almost 2 times than 2011, and increased by 59% than 2012.

3. Innovation for prevention and control methods

◆promoting green prevention and control

Established 218 national green prevention and control demonstration areas; Vigorously promoting ecological compatible and environment-friendly control strategies, including ecological control, biological control, physical control and scientific application of pesticide, and the effect is pronounced.

Cultivation techniques

Crop rotation

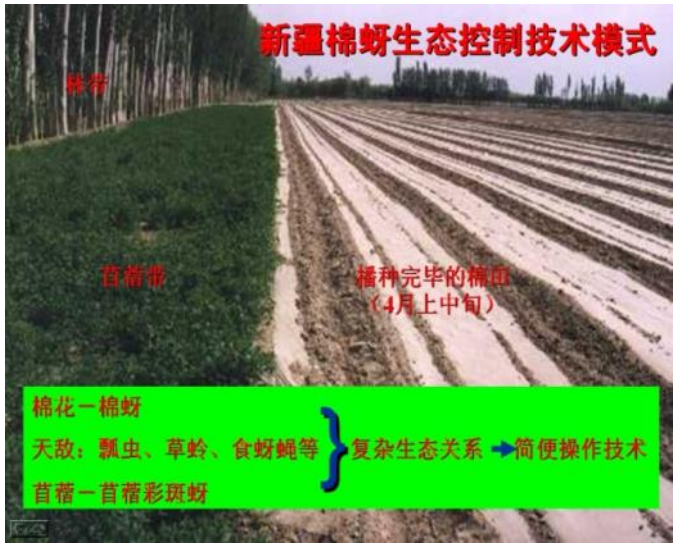
Deep ploughing

Pest net

Clean the pastoral

Ecological engineering- increase biodiversity

Increase biodiversity



Use push plant

Use bio-pesticides- virus, fungi, bacteria

Use natural enemies-release

Natural enemy insect products are more than 20 species

Application area more than 5 million mu

Use natural enemies-protect

Use insect pheromones

Use light trap and sticky trap

Use other non-chemical control measures

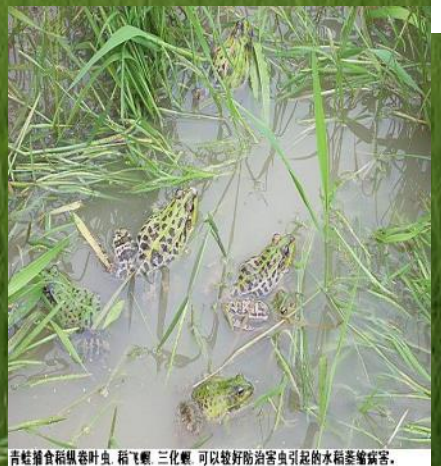
Trapping crop

Trapping plants

Light traps

Resistant varieties plus organic fertilizers

Raising ducks




Thank you!