

Typical experience of protection and sustainable utilization of soil resources in China

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2023.7.12



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PART 01

Control of degraded cultivated soil

Including the protection and utilization of black soils and the
treatment of soil acidification and salinization

1.1 Protection and utilization of black soils

In recent years, China has issued national policies, clarifying the protection tasks of black soils and promoting the technical model of black soils protection and utilization.



Policy
document



technology
application

1.1.1 Issue policy documents

In 2017, the Ministry of Agriculture and Rural Affairs (MARA, PRC) and 5 other ministries jointly issued *“the Outline of the Plan for the Protection of Black Land in Northeast China (2017-2030)”*. It is cleared that by 2030, the protection task of 16.7 million ha of black soil cultivated land will be implemented in the typical black soil areas of Northeast China.

Agriculture

Development
and Reform

Finance

Natural
Resources

Ecology and
Environment

Water
Resources



- to consolidate and increase the comprehensive ability of grain production
- to ensure the security of land resources and agricultural ecology

In 2020, China issued “*the Northeast Black Land Conservation Tillage Action Plan (2020-2025)*”, specifying that by 2025, 9.3 million ha of conservation tillage will be implemented in suitable areas in Northeast China, mainly including no-tillage, reduced tillage, straw mulching and returning to the field.

technical requirement

Increase the proportion of straw mulch to return to the field, enhance soil water retention capacity, increase soil organic matter content, and improve soil fertility

Adopt no-tillage and low-tillage to reduce soil disturbance, reduce wind erosion and water erosion, and prevent soil degradation

In 2021, China issued *“the Implementation Plan of the National Black Land Protection Project (2021-2025)”*, which clarified that the protection and utilization area of black soil cultivated land would reach at 6.7 million ha from 2021 to 2025.

Implementation of the specific content

Soil erosion control

Farmland infrastructure
construction

Cultivation of fertile soil layer

Monitoring and evaluation of
cultivated land quality

1.1.2 Technology popularization and application

From 2016 to 2021, we have implemented soil and water conservation projects, including comprehensive treatment of small watershed, sloping farmland, and erosion ditches in the black soil area in Northeast China, which had controlled more than 1.5 million ha of soil erosion.

In 2021, we analyzed the technical models and application results of more than 40 counties, regarding to the protection and utilization of black land in Northeast China. And then we summarized and formed 10 patterns of comprehensive management, which could be promoted and applied in other counties.



Lishu pattern	no tillage/reduced tillage, and straw returning to the field to cover the surface soil.	wind erosion
Longjiang pattern	Mixed and deep ploughed the crushed straw and organic fertilizer together, returned to the field. Corn-soybean rotation.	soil fertility
Sanjiang pattern	In autumn, returned the crushed straw to the subsoil, then compacted the soil. In spring, applied organic fertilizer, irrigation, and level fields.	paddy

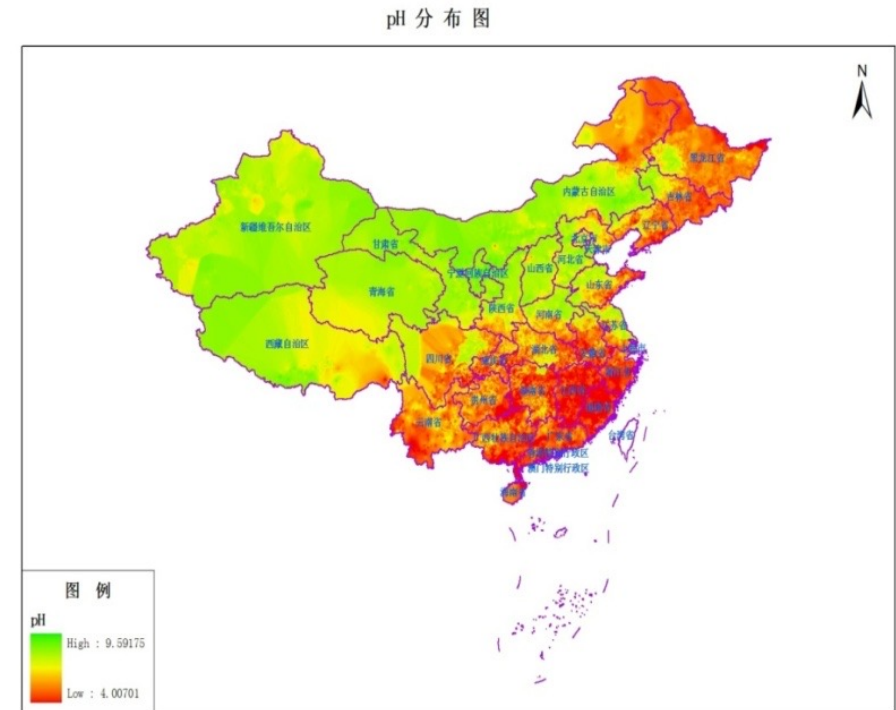


1.2 soil acidification and salinization projects

1.2.1 Selection of pilot areas

Provincial agricultural departments select counties (cities and districts) to carry out the control of degraded cultivated land, and the project implementation area of each county (city and district) is not less than 1,333 ha.

- Problem exist in cultivated soil acidification or salinization.
- The degree of attention and enthusiasm of county government departments.
- have more than 67 ha (or 667 ha) conditions for establishing concentrated contiguous experimental zone.



1.2.2 Explore comprehensive technology models

Provincial agriculture departments organized experts to identify problems and major obstacles of degraded cultivated land, and then formed solutions.

Measures

engineering

agronomy

biology

Elements

soil fertilizer

irrigation

cultivation

Management

planting system

irrigation system

fertilization system

1.2.3 Project coordination and implementation

Provincial level

Agriculture department could use both the central and provincial funds.

County level

Agricultural department is responsible for all the implementation of different types of projects, including the protection of cultivated land, the utilization of livestock and poultry manure resources, and the utilization of crop straw.

"Each person cooks one dish, and all the dishes make up a table for dinner"

1.2.4 Effects of soil acidification and salinization project

From 2020 to 2022, the Ministry of Agriculture and Rural Affairs (MARA) had organized pilot projects on the construction of centralized contiguity areas, to explore technical models for the management of degraded farmland.

Acidified cultivated land

The pilot areas covers strong acid cultivated land (pH<5.5) in the middle and lower-middle reaches of the Yangtze River basin, Southwest China and South China. These areas are also major grain producing areas of southern China.

Saline-alkali cultivated land

In areas where saline-alkali land is concentrated, saline-alkali cultivated land has been treated, combined with the construction of irrigation and drainage facilities. These areas include irrigation areas in northwest China, Songnen Plain in northeast China and coastal areas.

Through three years work, a number of technology models suitable for pilot areas have been gradually formed.

We have set up more than 700 contiguously integrated pilot areas, which have actively played a leading role in the demonstration projects, benefiting more than 10,000 new agricultural business entities and nearly one million farmers.

The cumulative area of the project for the control of degraded cultivated land

Total area	Acidified cultivated land	Saline-alkali cultivated land
560,000 ha	400,000 ha	160,000 ha

PART 02

Construction of the national soil laboratory network

Including enhance the construction of the national soil laboratory network and improving the laboratory quality control in China

2.1 Construction of standardized testing system

According to incomplete statistics, in the agricultural departments of China , there are about **1,900** cultivated land quality testing organizations.

In the past two years, in order to standardize laboratory management, we have unified the requirements for soil testing laboratories and quality control laboratories, organized three screen works. More than **800** laboratories were selected. We have preliminarily acquired information regarding the number and distribution of soil laboratories in China.

A three-level network for soil laboratories

National quality control laboratory

Provincial quality control laboratory

Soil laboratory

2.2 Quality control

Ministerial laboratories proficiency tests

Since 2007, we have carried out inter-laboratory proficiency tests on ministerial laboratories every year, with a total of 903 institutions participating and 2,569 test indicators.

Soil reference materials

In the past two years, we have organized producing work of soil reference materials, and drafted technical specifications for for agriculture soil analysis. A total of 23 soil samples of different soil types were collected in 19 provinces to produce reference materials.

Soil laboratory network

The laboratory is dynamically managed through inter-laboratory proficiency tests, sample retesting, flight inspection, etc. This year, we have completed inter-laboratory proficiency tests to national quality control laboratories, provincial quality control laboratories, and testing laboratories, with a total of 1,063 participates.

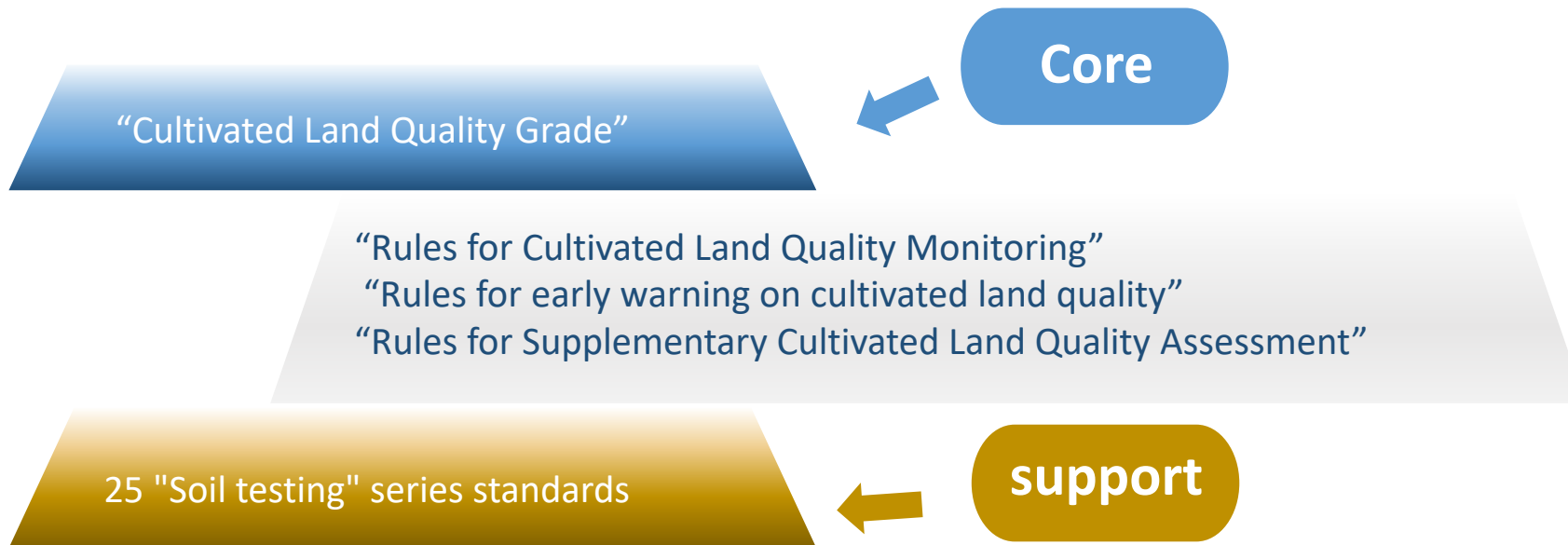
PART 03

Establishment of a standardized system

Including the construction of standard system for soil analysis,
and improve the soil detection methods

3.1 Cultivated land quality standard system

The content of cultivated land quality standard system involves more than 90 items in 6 categories, including basic standards, soil analysis standards, monitoring standards, evaluation standards, information standards, protection and supervision standards.



Standard content
investigation and sampling
sample preparation
detection method
grade division
monitoring and warning
evaluation and acceptance



3.2 Improvement of soil analysis technology

Sample preparation and detection

We make consistent requirements for laboratory sample preparation sites, tools, and sample preparation procedures. We have sorted more than 100 national and industrial standards, which involves inductively coupled plasma mass spectrometer, element analyzer and other advanced testing equipment.



Comparison experiments

In the past two years, we have carried out comparison experiments of detection methods, mainly focused on the indicators that are lack of stability and difficult to operate.



PART 04

Formulation of laws and regulations

Including the formulation of laws and regulations in provincial and national level

4.1 Laws and regulations—*—provincial level*

“The Regulation on the Protection of Black Land in Jilin Province” was officially issued in July 2018. This is China's first regulation on black land protection. Following Jilin province, Inner Mongolia Autonomous Region, Liaoning Province and Heilongjiang Province have also issued regulations providing a legal basis for the protection and utilization of black land.

Protection
mechanism

Problems-focused

Protection
measures

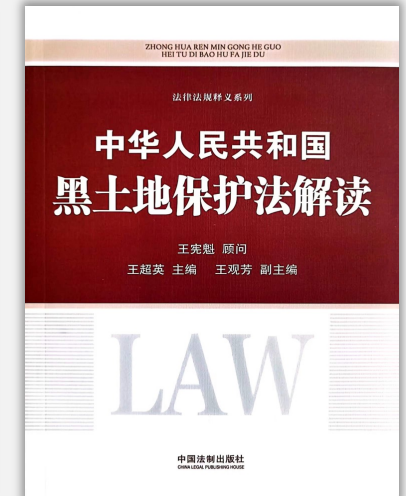
Protection system

4.2 Laws and regulations—*—national law*

In August 2022, China issued the "**Black Land Protection Law of the People's Republic of China**", which is, as far as I know, the first national legislation in the world to protect black land.



- Protect the cultivated land in the black land
- Promote the sustainable use of resources
- Maintain the balance of ecosystem
- Ensure national food security



The highlights of the Black Land Protection Law

- **Long-term strategy to ensure national food security**

The law gives priority to the use of black land for food production, implements a strict protection system, and strengthens the management and restoration of black land, to maintain the total area of black land, the function of food production, the sustainability of crop productivity, and to improve the soil quality.

- **Survey and monitoring system**

By investigation and monitoring on the type, distribution, quantity, quality, protection and utilization of black land, we aim to establish black land archives, and timely find primary problems of the cultivated black land quality.

- **Fund guarantees, scientific and technology support**

The law stipulates the fund guarantee mechanism, including capital and project support. In terms of scientific and technology support, we take integrated measures in engineering, agronomy, agricultural machinery and biology, etc.

The highlights of the Black Land Protection Law

- **Comprehensive measures to prevent and control soil erosion**

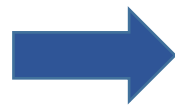
The quality of cultivated land and the ecological environment should be treated simultaneously. It emphasizes the soil fertility improvement and the farmland infrastructure construction, such as land leveling, irrigation water, roads and shelterbelt. The comprehensive measures include the treatment of soil erosion, land desertification and salinization, and the construction of farmland shelterbelts.

- **Multi-participation of the government and farmers**

It requires multi departments coordination above the county level. It stipulates the protection obligation of farmers as the main body of black land protection. And the government should encourage the society participants involved actively.

The protection of cultivated land resources should strengthen the trinity concept of "cultivated land area, cultivated soil quality and soil ecology". China released a draft law on the protection of cultivated land in September 2022. We will accelerate the legislative process, and highlight the soil quality protection at the legal level.

protection principle



**cultivated
land area**

**soil
quality**

**soil
ecology**



Thank You For Your Attention

