

From Functional Agriculture to Functional food: A 10-year practices in China

Xuebin YIN, Qiguo ZHAO

Key Lab for Functional Agriculture
USTC in Suzhou,
Chinese Academy of Sciences

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- 1. What is functional agriculture?
- 2. Why selenium in China?
- 3. A 10-year road and The challenges
- 4. Call for collaboration in the future

Functional Agriculture

Using biofortification method to produce functional agricultural products.

Road map of China
Agriculture Science &
Technology
to 2050

by Science Press, 2009

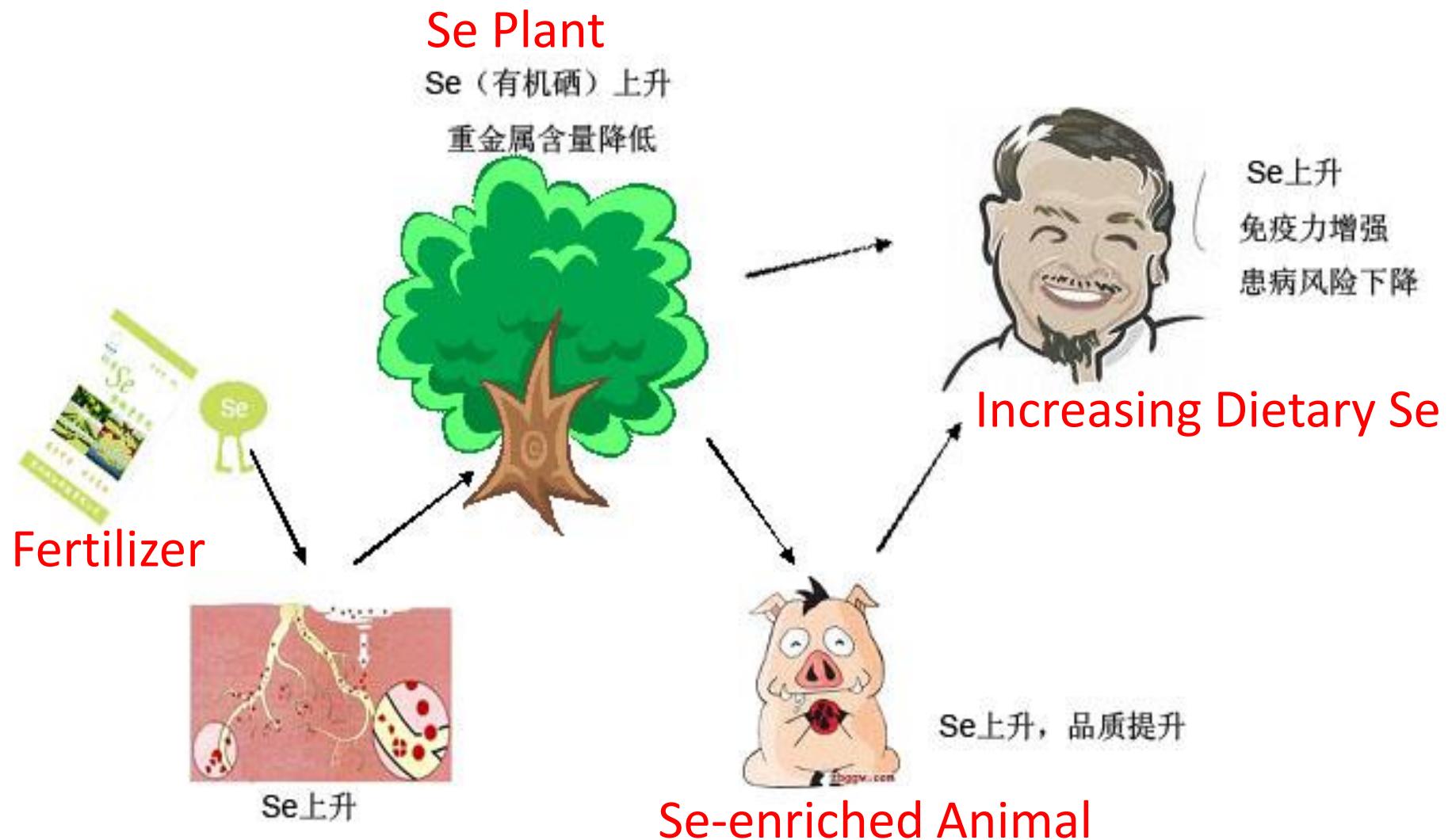


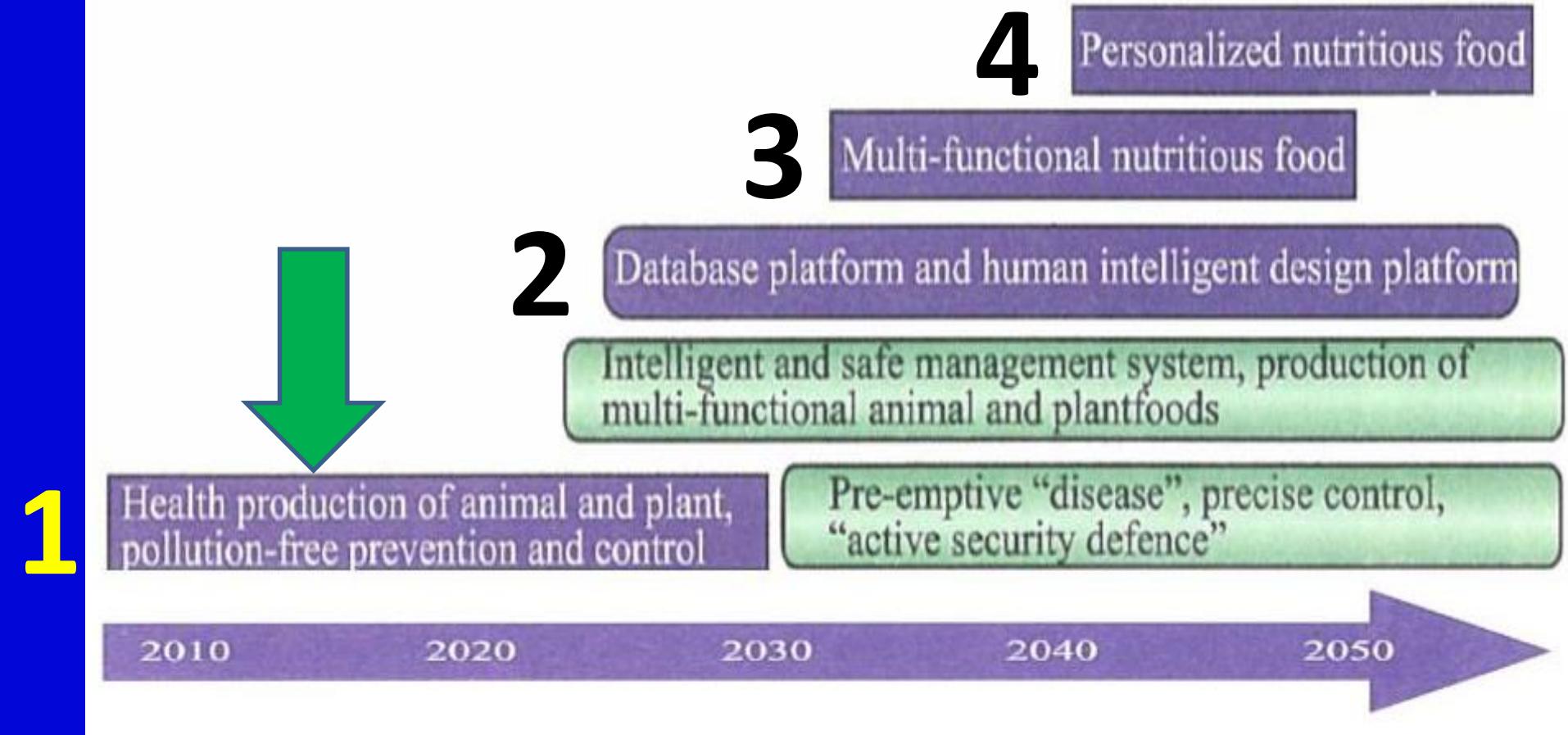
创新2050: 科学技术与中国的未来

中国至2050年 农业科技发展 路线图

中国科学院农业领域战略研究组

Functional agriculture in China





Road map of China functional agriculture to 2050

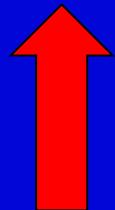
中国至2050年功能农业发展路线图

Functional Agriculture

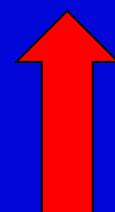
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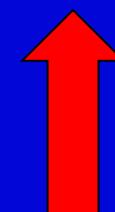
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Human Long Life

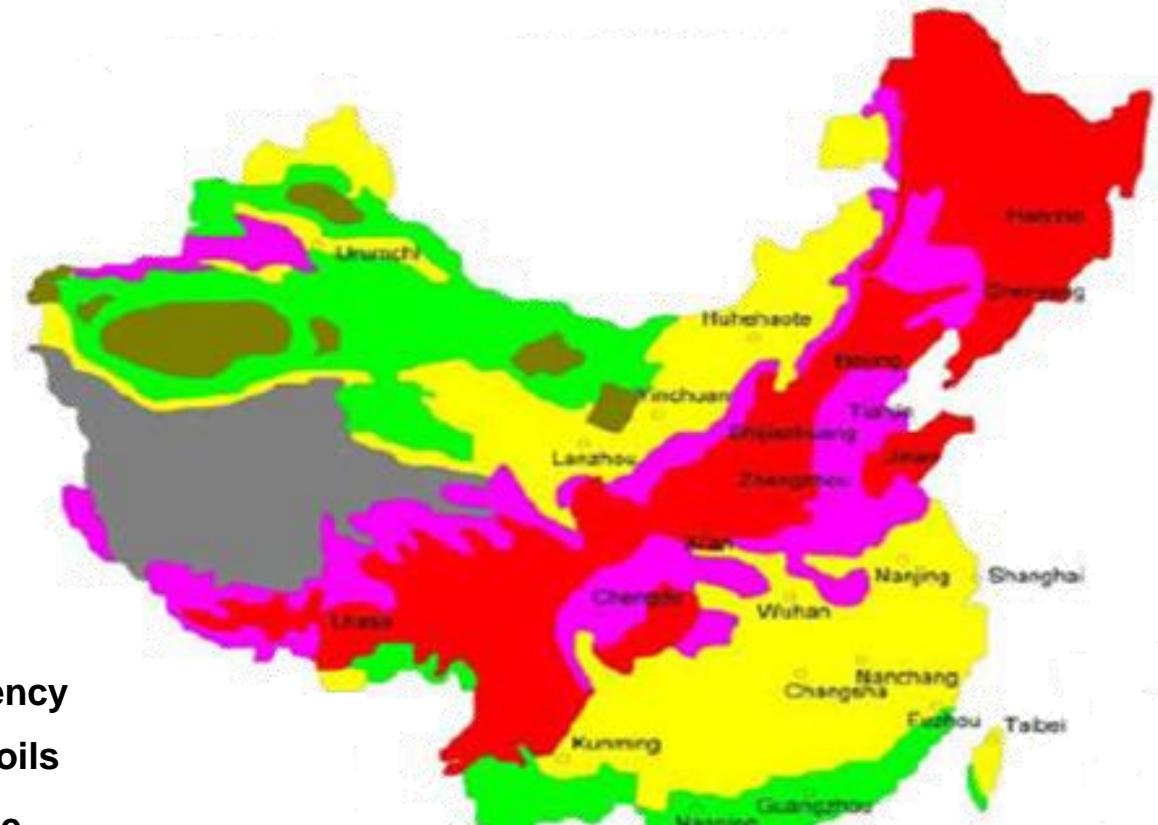


Farm Income



Enterprise Benefit

Inadequate Dietary Intake of Se for over 70% Chinese, even in the Developed City (Suzhou)



Se deficiency

Low Se soils

Normal Se

Se overplus

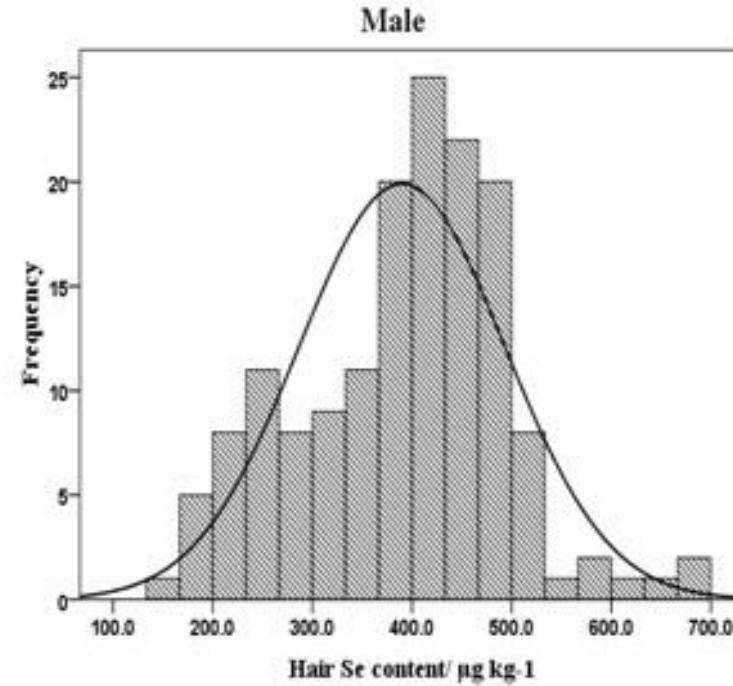
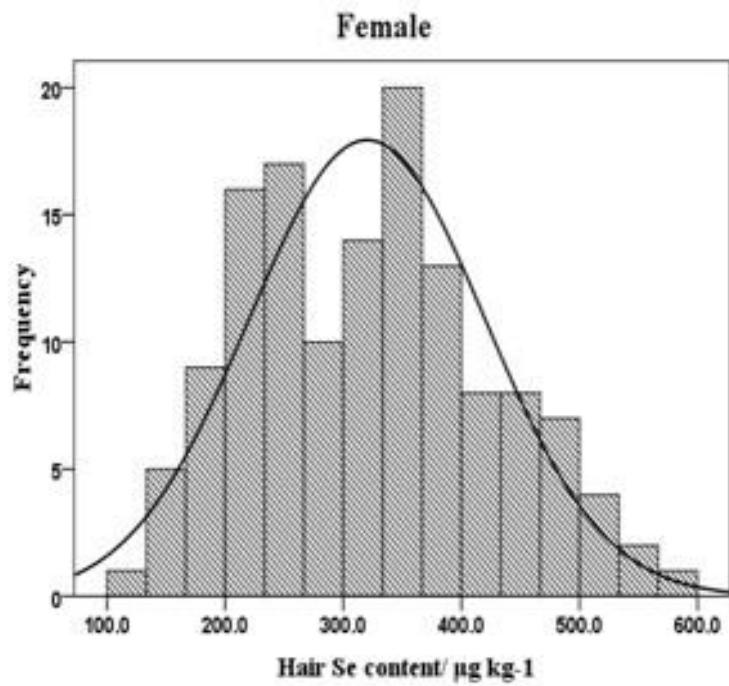
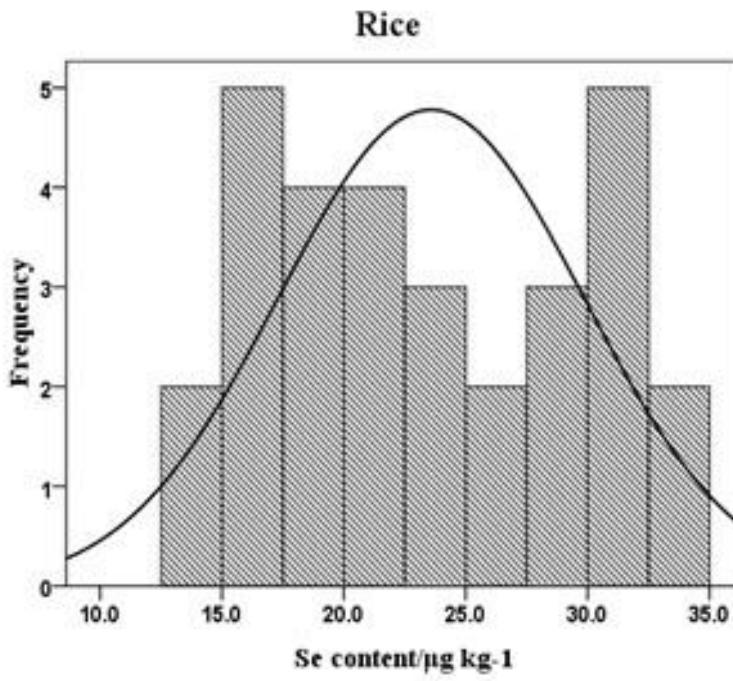
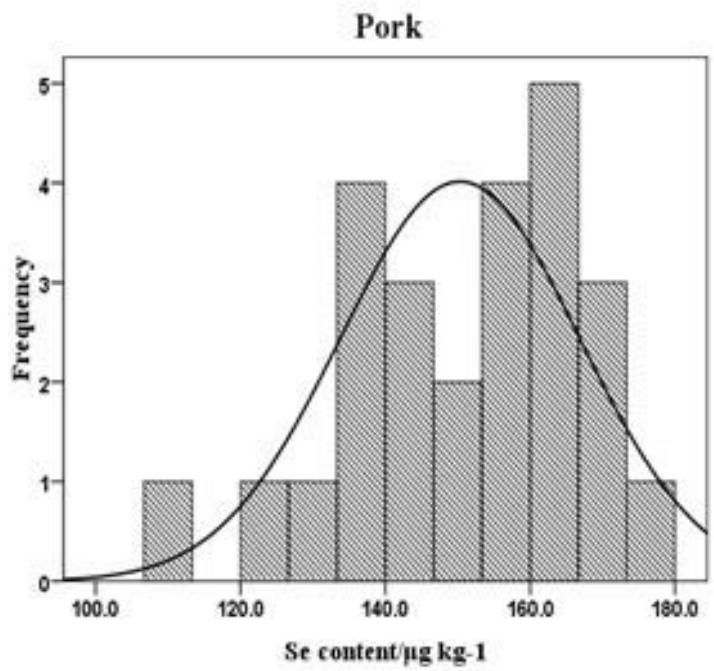
High Se

Not-investigated

Suzhou

Suzhou Districts	Xiang cheng	Cang Lang	Jin Chan g	Wu zhon g	Ping jiang	New District	SIP
Dietary Se intake ($\mu\text{g}/\text{d}$)	46.6	40.1	40.1	48.0	46.1	39.2	47.0





Solutions for Hidden Hunger



Comparison of daily dietary Se intake in various countries or regions.

Survey method	Selenium intake ($\mu\text{g day}^{-1}$)	Reference
<i>Selenium deficiency country/region</i>		
Keshan disease area (China)	7	Yang (1990)
Burundi (Africa)	17	Benemariya, Robberecht, and Deelstra (1993)
<i>Moderate Se deficiency country/region</i>		
UK	Estimated from food consumption data	34
Greece	Seventy-four foods and food ingredients purchased in the North West part of Greece, Se intake was calculated using the estimated quantities of each food consumed	39
Suzhou (China)	Concentrations of Se in typically consumed foods in Suzhou were determined, Se intake was estimated based on the daily per capita consumption.	44
<i>Selenium adequate country/region</i>		
Korea	Total diet study-128 types of foods dietary exposures to selenium were estimated based on food consumption data from the 2002 KNHANES II	58
Netherlands	Market basket (221 food items)	72
Slovenia	Duplicate portion	87
Japan	Model composite diets food intake per capita (g wet weight/day) \times concentration in diet (mg/g wet weight) = daily intake (mg/day)	129
USA	NHANES II (1988–1994) USDA Nationwide Food Survey	114 (male 134, female 94)
Canada	Total diet study (composite analysis), 191 (Winnipeg), 224 (Halifax), 113 (Toronto), 149 (Toronto)	113–224
		Health Canada (1979)

技术大学





Se, beginning....

Qiguo Zhao's prediction:

Developing Totally **80-100** Species

**Production of Functional Foods in China and
the ratio of functional agriculture will be**

increased to 1% in 2020.

Using rhizosphere fertilizer for easy standardization

由于根部施肥更易标准化，我们选择根部施肥



- The MOST important reason is rainy affects-free.
- 根部施肥基本不受降雨影响，而叶面喷施受天气影响大。

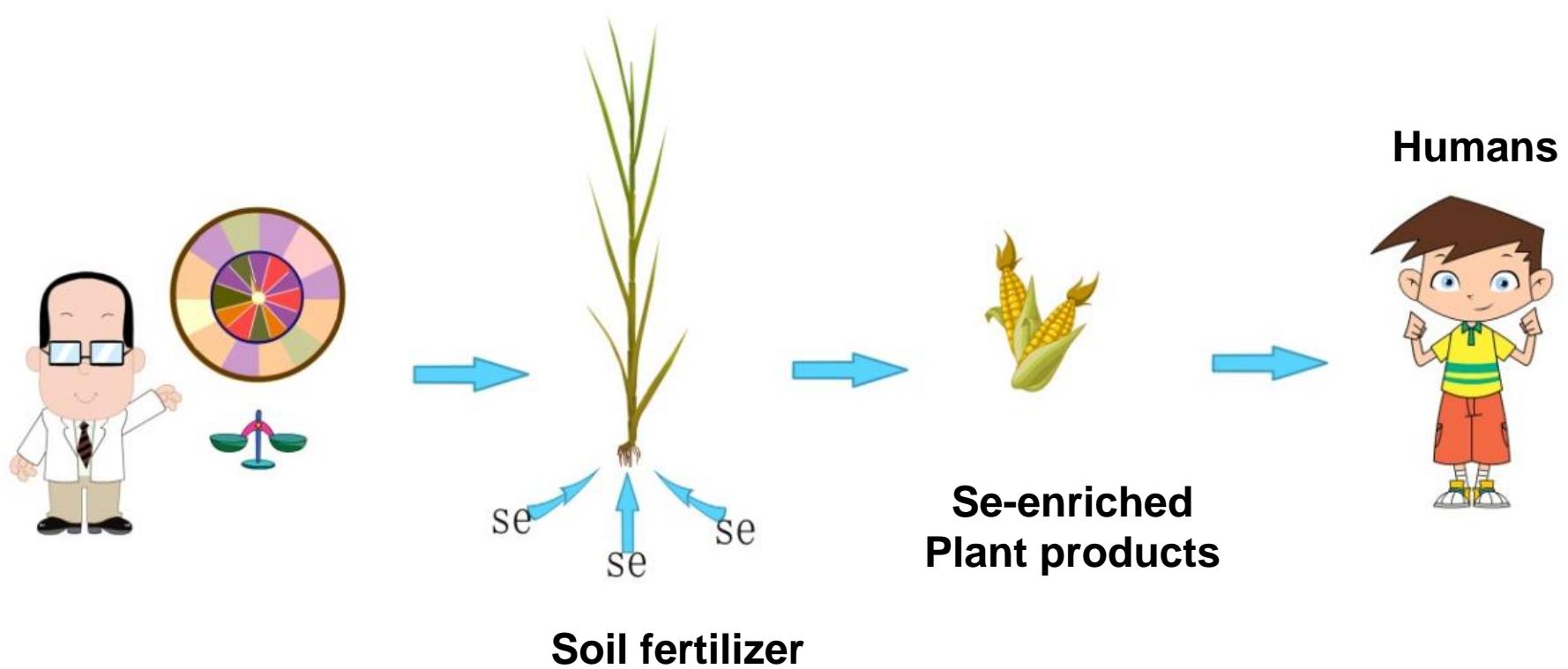
Using rhizosphere fertilizer for farmer protection 为了保护农业操作人员健康，我们选择根部施肥



- The SECOND reason is protecting farmer health.
- 有助于保护农业操作人员健康。



Totally 30 species of Se (mineral) biofortification products is developed.



4 Levels Application

- Level 1: Pot test to field trial (<1 acre)
- Level 2: 1-100 acres
- Level 3: 100-10,000 acres
- Level 4: >10,000 acres
(Large Scale Functional Agriculture Base)

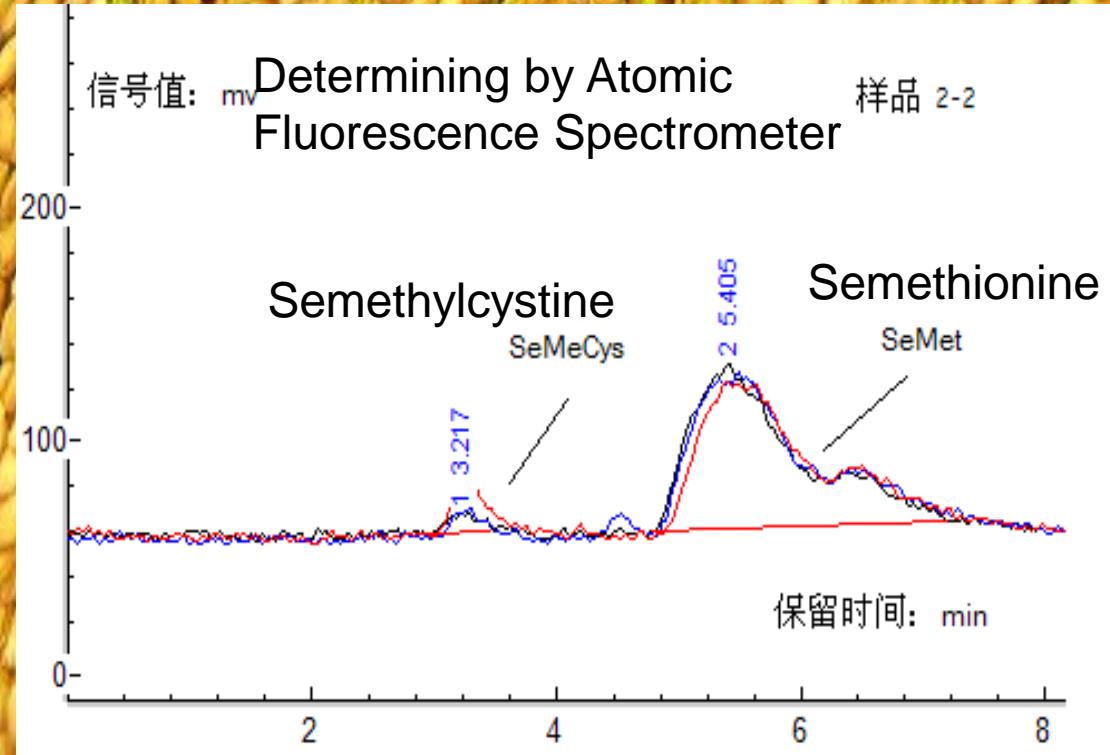






Se-enriched rice by Setek Co.

200 µg Se/kg, Se content RSD <20%





中国名牌



**Se-enriched rice by Setek Co.
200 µg Se/kg, Se content RSD <20%**

A close-up photograph of a cucumber plant. In the foreground, a large, vibrant yellow flower is fully bloomed. Behind it, a small, round, yellow fruit is visible. Further up the stem, a long, green cucumber is growing, and a tendril with a hook-like structure is wrapped around a brown, textured surface, likely a support. The background is dark and out of focus.

20-50 mug/kg

RSD 20%

A photograph of four people (three men and one woman) standing in a field of potato plants. They are holding several potatoes in their hands. The background shows a vast, hilly landscape with green fields and some rocky outcrops under a clear sky.

20-50 mug/kg

RSD 20%

A close-up photograph of several ripe red strawberries with green stems and white flowers. Some strawberries are in sharp focus in the foreground, while others are blurred in the background.

20-50 mug/kg

RSD 20%

20-50 mug



1.5 mg/kg
RSD 20%

Dashan Village

50 mug/crab
Suzhou

feeding with Se maize



2011/10/15 10:33

每天一个蛋，强壮我自己！

吴中集团与硒谷科技共同精心培育

富硒太湖生态草鸡蛋，含有丰富的天然维生素和
多种微量元素及氨基酸，每枚蛋含硒量有机硒15-25微克。

30 mug/egg
RSD 20%

Feeding with Se maize

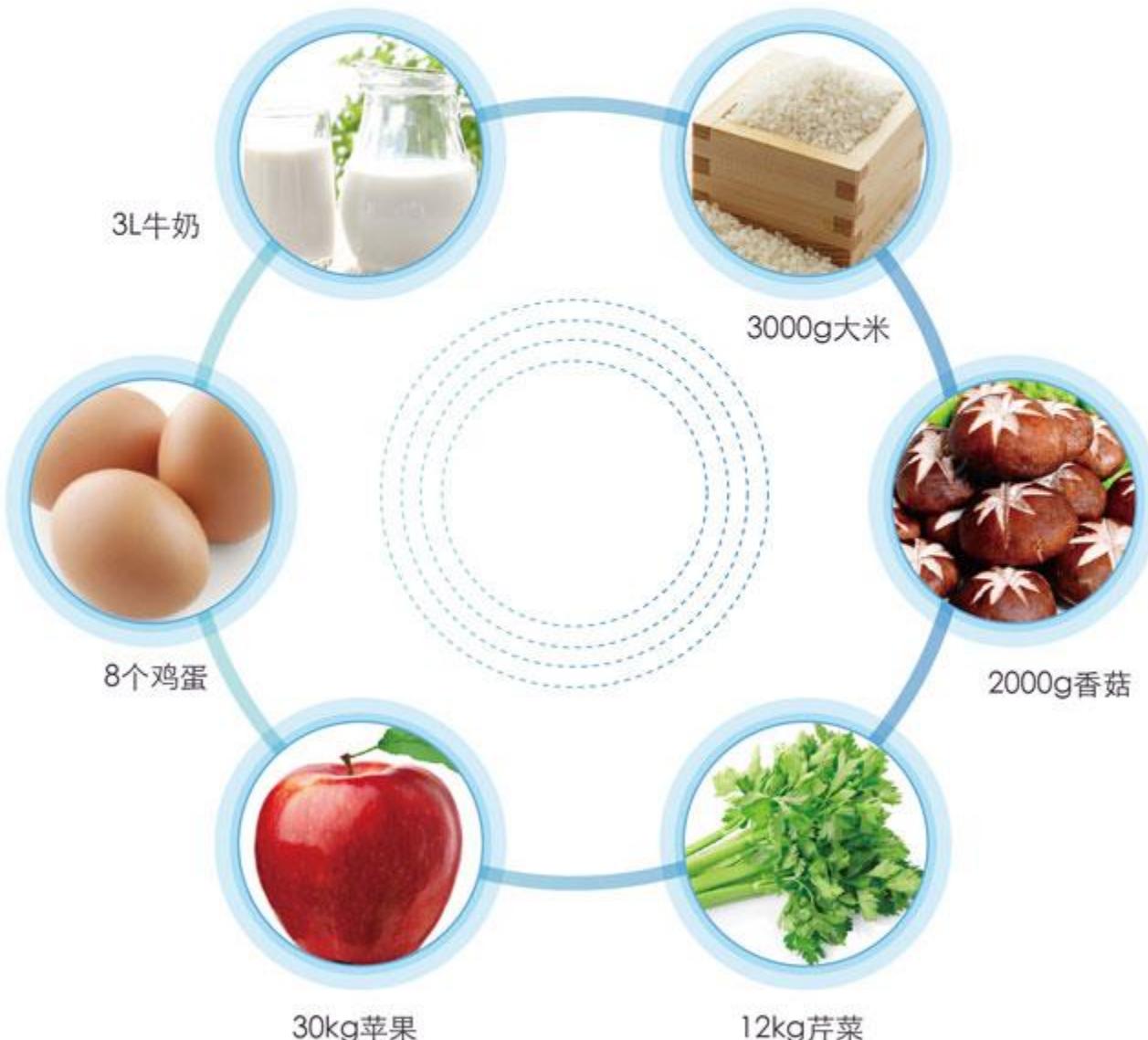


Se real Breakfast
100 mug/bag

RSD 10%



一量匙高硒谷物营养粉



High Quality

=

Strict Standards

A 9-step procedure

- ◆ Analyzing soil mineral (such as, Se, Zn) content
- ◆ Investigating normal fertilizer and irrigation procedure
- ◆ Designing mineral (such as, Se, Zn) fertilizer
- ◆ Making programme of application
- ◆ On-site training
- ◆ Middle-stage monitoring
- ◆ Amended fertilizer
- ◆ Analyzing and certificating agricultural products
- ◆ Scientific description for products





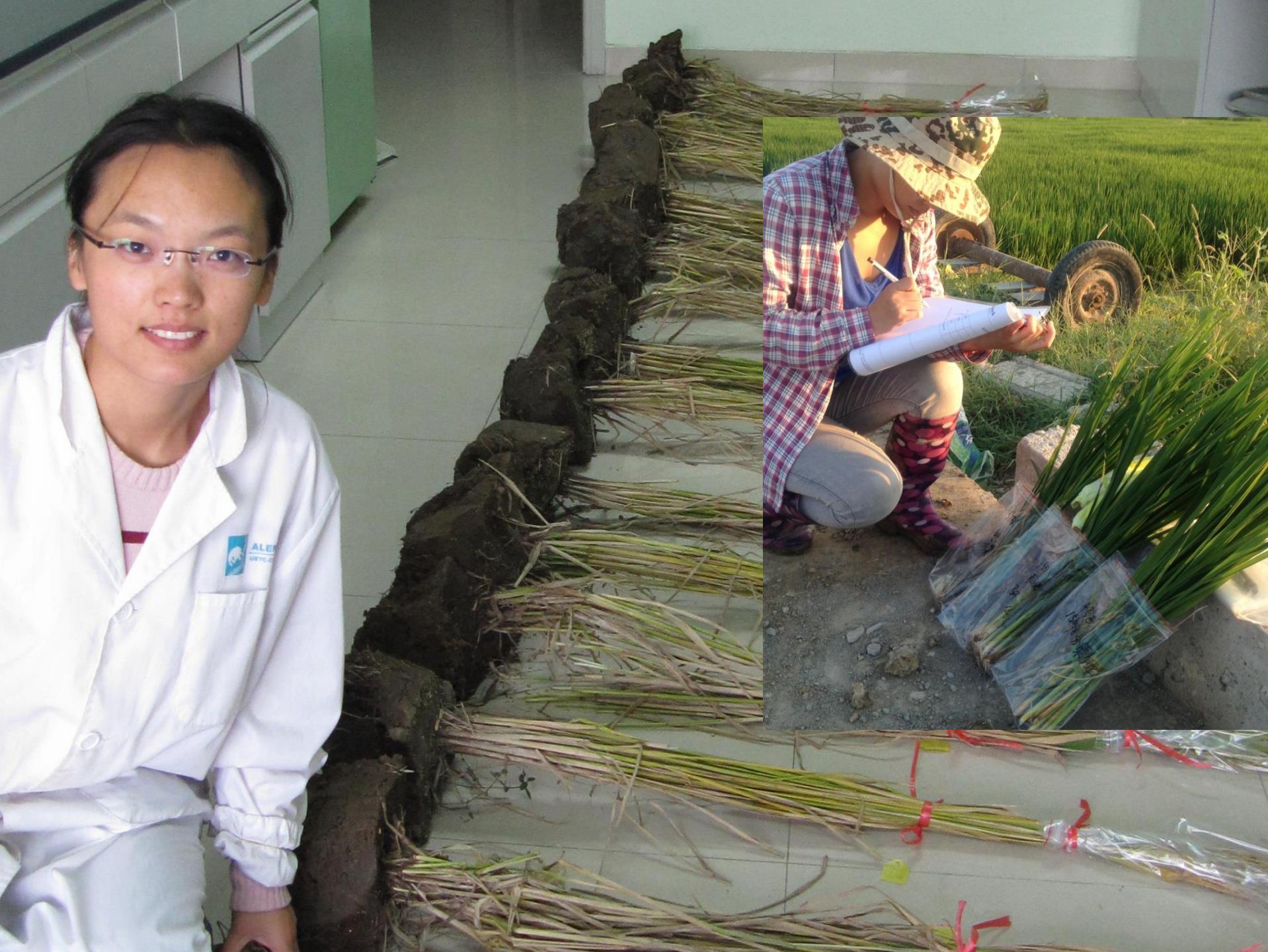












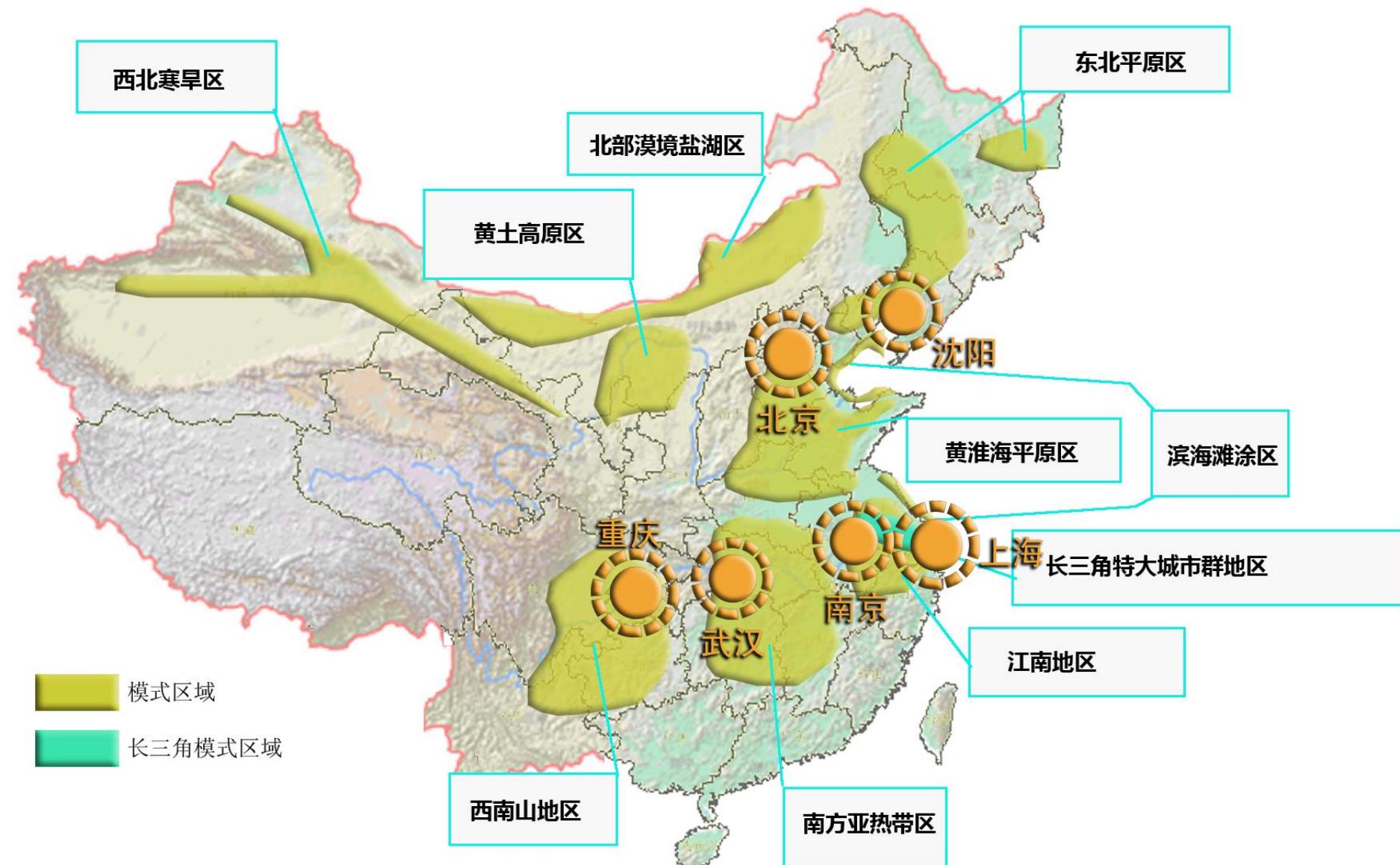




Zn-enriched rice by Microharbor Co.
30 mg Zn/kg, Zn content RSD <20%

Bases at 10 strategic areas of China

(~20 large-scale bases, 2016)



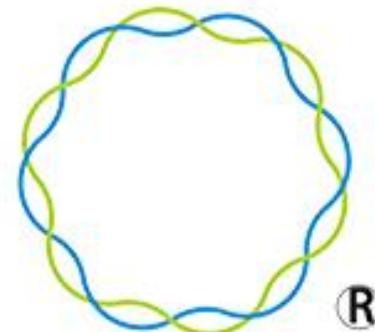
First aims To 1%

Many Top brands in China begin to cooperate with us in developing functional agriculture.





CNSG
中盐集团



Setek
硒谷科技

Green salt healthy color

Interdisciplinary research

- The interdisciplinary research in agriculture, food, nutrition and medical sciences should be strengthened.



Future's Challenges and collaborations

- ✓ Higher quality in standardization of functional agricultural products, for larger scale application or in Thailand different areas.
- ✓ Should Se-food be recommended to the residents in a Thailand particular city? A particular person? Determine the intake, OR Predicting Model of dietary Se intake.
- ✓ Intervention study regarding to some chronic diseases? Such as, cancer, immune system, Or heavy metal toxicity (Hg, Cd, As, Pb).

国际交流与展望 International Cooperation Platform of Se Society



A group of approximately 20 people, mostly young adults, are posing for a photo in front of the Portugal pavilion at an international exhibition. The pavilion has a distinctive gold-colored, angular facade. The word "PORTUGAL" is written in English and Chinese characters above the entrance. The people are dressed casually, with some wearing name tags or event-related shirts. Some individuals are making peace signs or smiling broadly.

葡萄牙
PORTUGAL

Thank you!
Email: xbyin@ustc.edu.cn