

Application of Nano Carbon to Improve Yield & Nutrient Use Efficiency

A breakthrough in biotechnology and agriculture to improve plant growth and yields with reduced fertilizer usage.

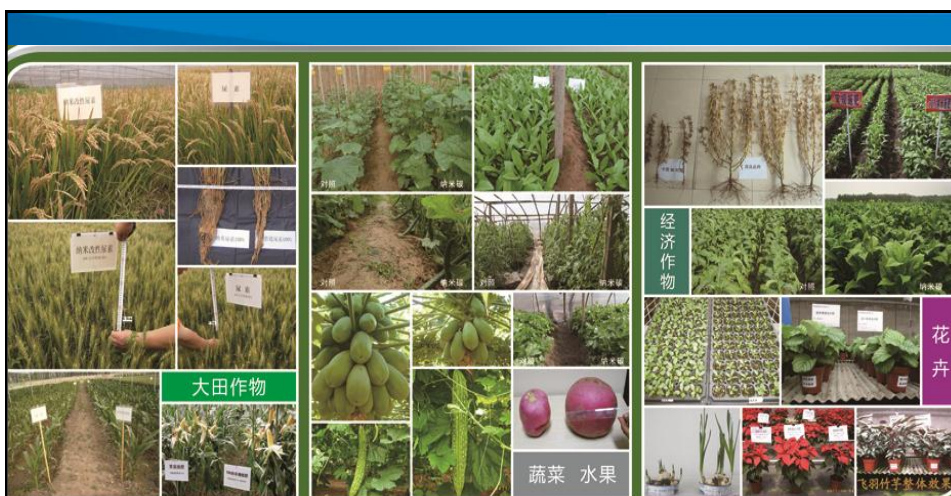
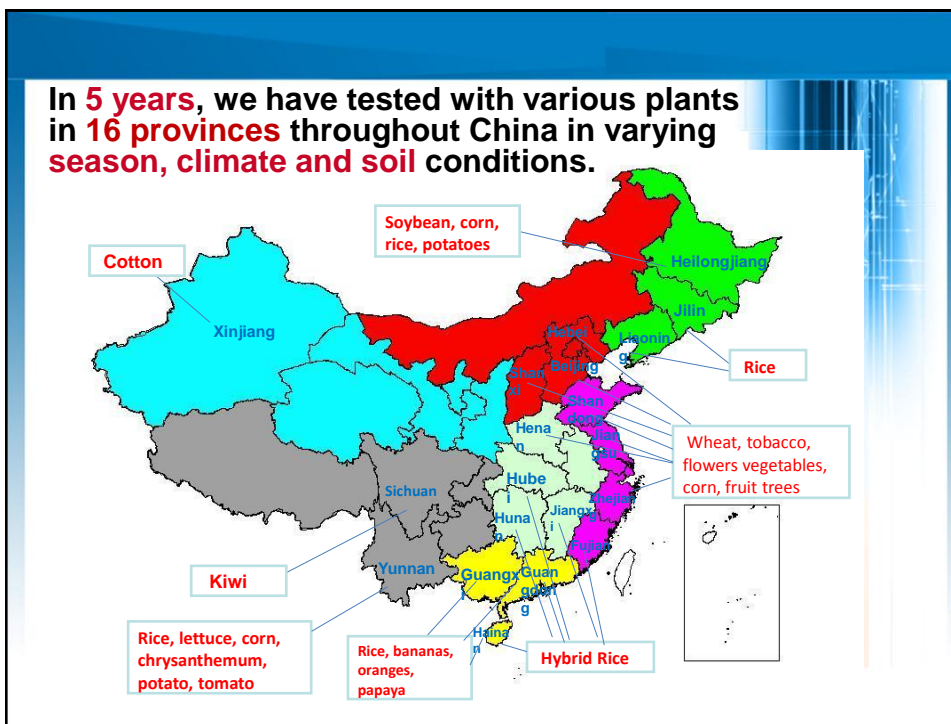
MA Yun
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Challenges & Solutions

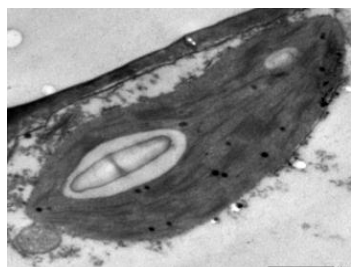
- Increased use of fertilizers does not guarantee improved crop yield, and yet leads to hardening of soil and pollution of underground & surface water
Solution: Increase the efficiency of fertilizer usage
- High cost transportation due to the volume of the fertilizers
Solution: Reduce the volume of fertilizers to save cost & storage space
- Thin profit margin by fertilizer companies due to high competition
Solution: Value-add to traditional fertilizers with better performance



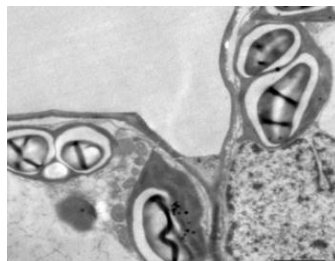


- Single-season field crops gain additional yield of 5-20%
- Vegetables gain additional yield of 20-40%
- Shorten the crop growth period - early harvesting allows the products to enter the market 7-10 days earlier than competitors which results in higher sales return

Improve the efficiency of plant respiration and photosynthesis

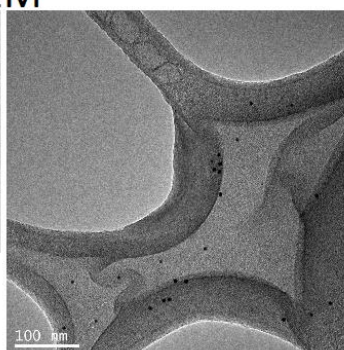
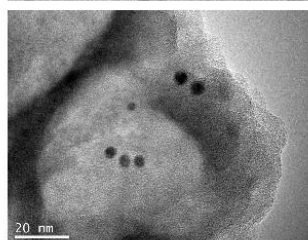
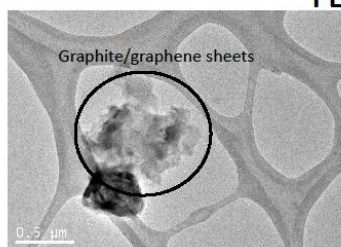


(a) Nano Carbon Treatment:
Accelerate the synthesis and transports of starch grains in chloroplast



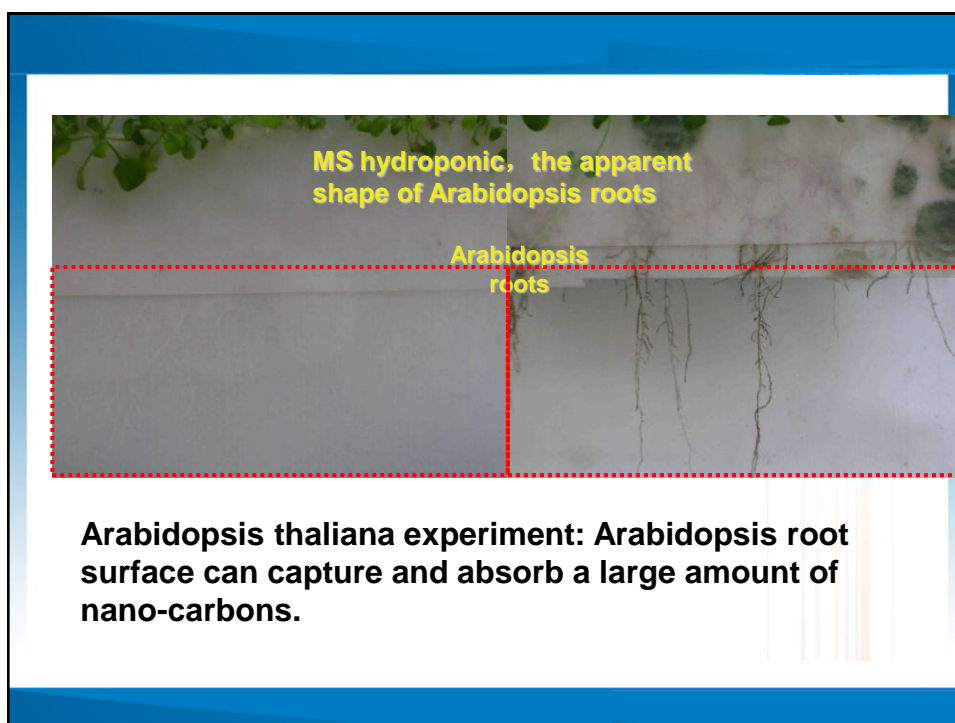
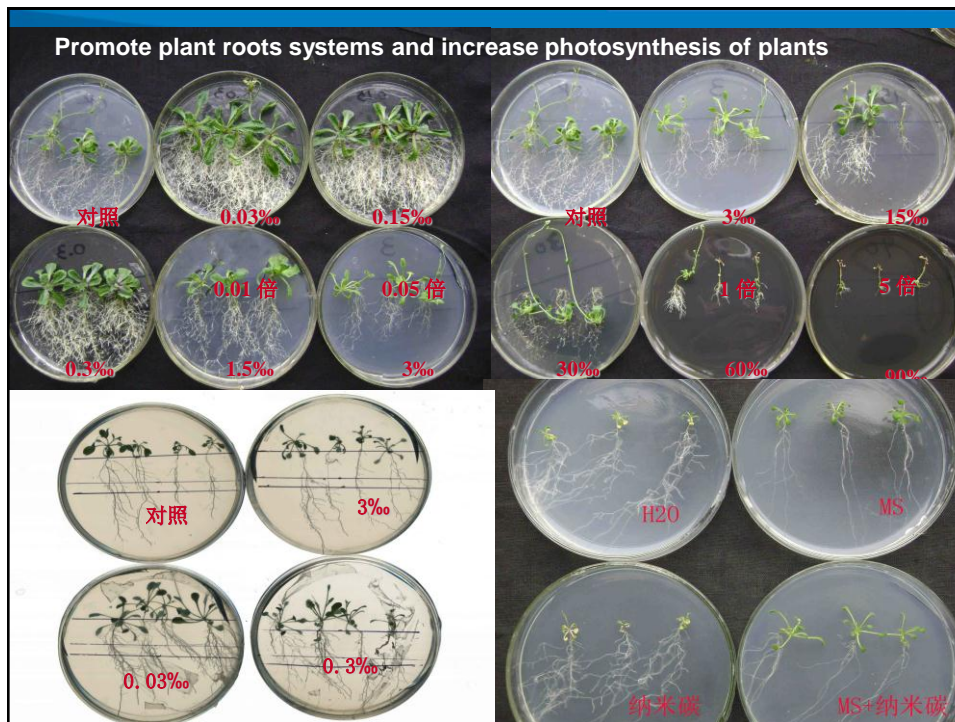
(b) The control group:
A large number of starch grains within chloroplasts siltation, has been full of chloroplast

TEM



Particles are very dark, likely metals

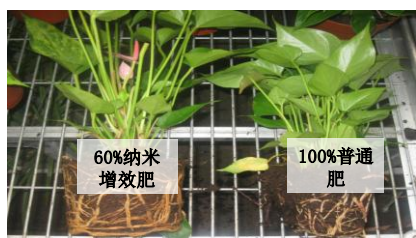
Increase fertilizer use efficiency





Other Research Findings

- Improvement in the nutritional content of crops and the quality of the taste
- Enhance plants growth by resisting diseases and improving stability of the plants by anti-bending and deeper rooting of crops
- Reduce environmental pollution caused by excessive fertilizer use.



Professors and Experts



**Academician
Yuan Longping
"Father of Rice); and
Li Jian Yang**

**Academician
Fang Rongxiang**

**Academician
Liu Gengling and
Fang Zhiyuan**

Professors and Experts



**Academicians and experts in bioscience and material science visiting
our plant and research bases.**

Participants of Our Research



Participants of Our Research

- National Hybrid Rice Research Center
- National Soybean Research Center
- China Agricultural University
- Zhengzhou Tobacco Research Institute of China National Tobacco Corporation
- Northeast Institute of Geography and Agricultural Ecology
- Jilin Agricultural University
- Yunnan Academy of Agricultural Sciences
- Heilongjiang Academy of Agricultural Sciences
- Heilongjiang Bureau of Reclamation
- Sinochem Fertilizer Co., Ltd.
- Fertilizer Industry Group in Yunnan Dawei
- Shanxi Tianji Coal Chemical Group Co., Ltd.
- China Agricultural agricultural Chain Co., Ltd.

Application Examples : Rice

Nano-enhanced fertilizer on rice yield

(June 2009, Heilongjiang Province)



Treatment	Average yield (kg/acre)	Increase additional yields	
		kg/acre	%
100% conventional fertilizer	2880	—	—
70% nano-enhanced fertilizer	3798	918	31.8

Application Examples: Winter Wheat

This technology enables a 50% increase fertilizer efficiency, equivalent to 1.5 times of the common fertilizer.



We had carried out field trials for winter wheat using nano-enhanced fertilizer though the fertilizer application rate was only 50% of the conventional usage, still increased the mass yield more than 10%.

Application Examples: Maize and Paddy Rice



We have tested in a maize field using nano-enhanced fertilizer in April to August, 2008 to August though the fertilizer application rate was only 70% of normal usage, still increased the product yield more than 18.6%

← Maize

In December 2008 to May 2009, we had field trials with China National Hybrid Rice Technology Center. We made done 8 species using nano-enhanced fertilizers, though the fertilizer application rate was only 60-70% of normal usage, still increased the product yield 20-23%.



Application Examples

Though the fertilizer application rate was only 50-70% of the normal usage, still received additional more yield more than 20%.

Soya bean



In October 2009, we carried out field trials in Heilongjiang, with only 50%-70% of normal fertilizer usage, the harvest still increased 24.4-27.4%.

Results also showed significant increments in soybean pod numbers, per plant grain numbers and grain weights.

Application Examples: Vegetables



左侧节肥50%冲施纳米碳溶胶、右侧常规施肥

2011年在河北省邯郸市永年县黄瓜苗期上冲施纳米碳溶胶一次，节肥50%的情况下，第5天观察与对照相比较病害少、叶片肥厚浓绿、植株健壮、根系发达，平均增产20%。



Application Examples: Flowers



In August 2008, the Green Apple arrowroot rate used only 60-70% of imported high-quality fertilizers. In 70 days we recorded significant increments in plant height, leaf sizes, stress tolerance, disease resistance and root systems. The grown products reaches the market **10 days earlier**.



In May 2008, we carried out the flower nano-fertilizer tests of poinsettia. Compared with the imported high quality fertilizers, the fertilizer application rate was 50% of imported high-quality fertilizers. After 30 days plant height increased 4cm more, increased corolla 3cm more, significantly increased leaf sizes, can reach the market **10 days earlier** than the competitors.

Application Examples: Tobacco

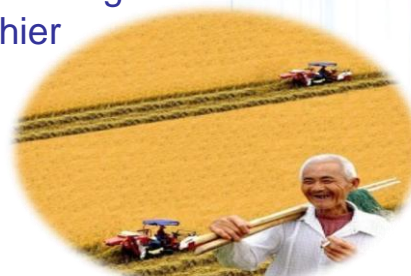


Hi-tech Research and Development Program (National 863 Projects)

Results showed that nano-efficiency fertilizer increased Tobacco yield by about 10% and significantly increase potassium ions content by 24-56%, and improve aroma quality and aftertaste of middle leaves.

Substantial Benefits

- The fertilizer industries for higher profit margin
- The farmers for earlier and better harvest
- World's food-supply to reduce poverty
- The environment for sustainable growth
- Human kind for more healthier generations



Thank you!

Prof. MA Yun

Mobile: (86) 18611321633

E-mail: may@im.ac.cn

Institute of Microbiology

Academy of sciences, China

State Key Laboratory of Plant Genomics

Datun Road, Chaoyang District

Beijing 100101

P.R. China