

Registration of Achievement	Registration No.	
	Date of approval	

Appraisal Certificate for Scientific and Technological Achievements

No. [2008] 80 Appraisal Document of Science & Technology Department of Inner Mongolia

Description of achievement: Research, Development and Application of Yongye Plant Nutrient

Institutions of Achievement: Inner Mongolia Yongye Biotechnology
Inner Mongolia Academy of Agriculture and Animal Husbandry

Form of appraisal: Meeting-based appraisal

Appraisal organizer: Science & Technology Department of Inner Mongolia Autonomous Region (seal)

Special Seal of Science & Technology Department of Inner Mongolia Autonomous Region for the Appraisal of Scientific and Technological Achievements

Date of appraisal: December 6, 2008

Date of approval: December 8, 2008

**Science & Technology Department of Inner Mongolia Autonomous Region
2003**

Brief Technical Description and Main Technical Performance Indexes

Source of task:

A self-selected project based on the demand of agricultural production and market.

Application fields and technical principle:

The technology is applicable to foliage dressing of plants. During the abstraction and refining of fulvic acid and the preparation of Yongye Plant Nutrient, oxidizer, composite precipitator, complexant, dispersant and assistant are used, realizing oriented conversion of humic acid and improving the yield rate of fulvic acid. With certain technological process, the production technology is applied to prepare composite plant growth nutrient solutions that contain fulvic acid and NPK macroelement and microelement through compounding, chelation, saturation, activation, ammonolysis and modification. These products feature stable quality and effect, applicable to grain crops and industrial crops like fruits, melons, and vegetable.

Performance indexes:

1) Take humic acid contained in weathered coal, which is abundant in Inner Mongolia, as the raw material and then choose sodium humate which contains 35% humic acid in total and about 10% fulvic acid to go through oxidation degradation for activation; add composite precipitator to separate ulmic acid and pyrotomalenic acid and to obtain fulvic acid. This process features a high yield rate, short industrial route, few "three wastes" (waste gas, waste water and waste residues), and low cost, thus providing a technical approach for manufacturing effective fulvic acid at reasonable price.

2) Take the coal-based fulvic acid prepared in the above process as the basic raw material, compound it with nitrogen, phosphorus and potassium through certain technological process and equipment, and chelate it with microelement by adding complexant, dispersant and assistant to obtain a series of composite plant growth nutrient solutions that contain water soluble humic acid macroelement and microelement: macroelement ($N+P_2O_5+K_2O$) $\geq 200g/L$, microelement (Cu, Fe, Zn, Mn, B, Mo) (based on element) $\geq 10g/L$, and water-insoluble $\leq 50g/L$.

3) As is proved in field experiments, the plant growth nutrient solutions can not only increase the grain yield by 10%-20% and vegetable yield by 15%-30%, but also accelerate the growth of crops, improve stress resistance of plants, and enhance their quality, etc.

Creativity and advancement of achievement:

The creativity lies in the selection and use of oxidizer and composite precipitator in the abstraction and refining process of fulvic acid and the selection and application of complexant, dispersant and assistant during the preparation of Yongye Plant Nutrient, and the technology also realizes efficient compounding and compatibility of humic acid and NPK macroelement and microelement. With independent intellectual property, the technology got China Invention Patent (No.: 200610131953.7) in 2006.

Popularization and application:

The technical achievement is applicable to foliage dressing for grain crops and industrial crops like fruits, melons, and vegetable. The products meet the industrial standard of China regarding humic acid water soluble liquid fertilizers and some quality indexes outperform the industrial standard of the state, boasting a variety of efficacy, such as accelerating the growth of plants, improving the resistance of plants, enhancing crop quality and increasing yield. With a broad prospect of popularization and a big market potential, the technology is of great significance to accelerate the efficient utilization of local advantageous resources and drive the development of local economy.

Prospect and Measures of Popularization and Application

According to the basic conditions for the application and popularization of fertilization technology, to analyze both from the perspective of the social, economic and ecological benefits of the technological application effect and of the operability of technology, the technological achievement enjoys a good prospect of popularization and application.

1. The technological effect boasts significant social, economic and ecological benefits.

The series of Yongye Plant Nutrient products all contain many nutrients, such as fulvic acid, N, P, K, secondary element and microelement, and have been applied to dozens of crops like field crops (grain, cotton, and oil plant), melons, fruits, vegetable and pasture in a number of places including Inner Mongolia (Hohhot, Baotou, Bameng, Ulanqab, Hulunbeier League), Gansu, Hebei, Hubei, Shandong, Xinjiang, registering desirable effects. Of them, the field crops like wheat and corn became ripe 3-5 days in advance, with plump seeds, and their yields increased by 10-15%. Vegetable, melon and fruit had thick and wide leaves, increased single fruit weight, thickened pulp, and good taste, and they became ripe earlier and can appear in the market 5-7 days in advance, with yields increased by 15-30% or even more. Grapes became bigger, tasted sweet and daintily and looked lustrous, and they became ripe 10-15 days in advance with yield increased by 10-20% (Grape Furrow of Tuoxian County). Rhizomatic crops like potato, beet, radish, and turnip (rappini) had bigger tubers and rhizomes, increased starch contents, and enhanced sugar degree, with yields increased by 15-30%. The products demonstrated a variety of efficacy, such as accelerating the growth of plants, improving the utilization rate of the fertilizer and the resistance of plants, enhancing crop quality and increasing yield. They enjoy a broad prospect of popularization and a big market potential. Their development and application have accelerated and driven the process of turning abundant weathered coal resources in Inner Mongolia into fertilizer and will no doubt bring significant economic benefits and long-term ecological benefits.

2. With simple technical operation and low cost, the technology opens a new way for ex-root nutrition.

The research, application and development of plant growth nutrient solution provide new products and approaches for ex-root nutrition, which may significantly improve the utilization ratio of fertilizer, reduce the application rate of pesticide, and reduce agricultural investment, investment in chemical fertilizer and pollution of environment and agricultural products caused by chemical fertilizer and pesticide, providing a modern, resource-conserving and environment-friendly technology for agricultural production. Not only does the technology play a direct role in accelerating the production of green and pollution-free agricultural products, but it also helps to drive the transformation of resource advantages into economic advantages.

Measures of popularization and application

The main measures of popularization and application for the technology are to establish large-scale humic acid fertilizer plants in areas with rich weathered coal resources where the humic acid resources contained in weathered coal are converted into fertilizer, to carry out ex-root nutrition in the form of humic acid water soluble fertilizer, and to improve the agricultural effect of humic acid, hence embracing the overall benefits of accelerating the growth of plants, improving the resistance of plants, increasing production and income, and enhancing quality.

Catalog and Sources of Main Technical Documents

1. Work Summary for the “Research, Development and Application of Yongye Plant Nutrient”
Provided by Inner Mongolia Yongye Biotechnology
2. Research Report for the “Research, Development and Application of Yongye Plant Nutrient”
Provided by Inner Mongolia Yongye Biotechnology
3. Report on the analysis of economic benefits for the “Research, Development and Application of Yongye Plant Nutrient”
Provided by Inner Mongolia Yongye Biotechnology
4. Sci-Tech Novelty Report
Sci-Tech Novelty Center, Institute of Scientific and Technological Information of Inner Mongolia
5. Product and Corporate Standards
Inner Mongolia Yongye Biotechnology
Hohhot Municipal Bureau of Quality and Technical Supervision
6. Product Inspection Report
Inspection and Testing Institute for Petrochemical Industry of Inner Mongolia Autonomous Region
7. Test Report on Field Fertilizer Effect
Provided by Soil and Fertilizer Station of Inner Mongolia
Provided by Soil and Fertilizer Station of Hohhot
Siziwang Banner Agricultural Technology Promotion Station of Inner Mongolia
8. Invention Patent Certificate
State Intellectual Property Office of the People’s Republic of China
9. Fertilizer Registration Certificate of the Ministry of Agriculture
Ministry of Agriculture of the People’s Republic of China

Appraisal Opinion

On December 6, 2008, Science & Technology Department of Inner Mongolia organized experts to appraise the project of "Research, Development and Application of Yongye Plant Nutrient" accomplished by Inner Mongolia Yongye Biotechnology in Beijing. After careful examining the appraisal materials, and listening to the project summary report, technical report, economic benefit analysis report and other reports, experts of the appraisal committee reached at the following opinions through query and deliberation:

1. The project with complete materials and detailed and reliable data conforms to the appraisal requirements.
2. The subject selection of project conforms to the industrial policies and development plan of the state and is of great significance to promote the efficient utilization of local advantageous resources and drive the development of local economy. The products developed meet relevant standards, play an important role in developing agricultural production and increasing yield and incomes, and has a broad application prospect.
3. The technical route of production is reasonable and the technology is advanced; the project has realized large-scale production.
4. The products developed in the project boast a variety of efficacy, such as accelerating the growth of plants, improving the resistance of plants, increasing yield, enhancing crop quality and increasing fertilizer utilization rate. A number of tests and demonstrations prove that the yields of grain crops can be increased by 10-20% and vegetable by 15-30%; the quality of agricultural products can be improved significantly, with notable economic and social benefits.
5. The project shows obvious creativity regarding the selection and application of oxidizer, composite precipitator, complexant, dispersant and assistant in the abstraction process of humic acid and product preparation, and realizes the efficient compatibility between humic acid and macroelement, secondary element and microelement. And the project also possesses independent intellectual property.
6. The overall project level reaches the world class.

Suggestion: The scope of popularization and application should be further extended.

Consent (seal)

Signature of chairman: _____ Signature of Vice Chairman: _____

December 6, 2008

Opinion of the Appraisal Conducting Agency

Consent to the appraisal opinion (seal)

Signature of responsible leader: _____(seal)
Special Seal of Science & Technology Department of Inner Mongolia Autonomous Region
for the Appraisal of Scientific and Technological Achievements
December 8, 2008

Opinion of the Appraisal Organizing Agency

Consent (seal)

Signature of responsible leader: _____(seal)
Special Seal of Science & Technology Department of Inner Mongolia Autonomous
Region for the Appraisal of Scientific and Technological Achievements
December 8, 2008

Information of Institutions Making the Achievement

No.	Institution of achievement	Postal code	Code of province/city	Detailed address	Province/ministry (affiliated to)	Nature of institution
1	Inner Mongolia Yongye Biotechnology	010070		Yongye Biological Park, Yongye Road, Jinshan Development Zone, Hohhot	Inner Mongolia	4
2	Inner Mongolia Academy of Agriculture and Animal Husbandry	010031			Inner Mongolia	1
3						
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Notes: 1. An additional page can be added if the number of institutions exceeds eight and the sequence must be completely consistent to that on the cover of the appraisal certificate;

2. The full name of the institution of achievement rather than an abbreviated one must be filled, fully consistent to the official stamp of the institution. The institution name must be written in the first column and the names of its affiliates in the second column;

3. The code of province/city will be written by the appraisal organizing agency according to the codes of province, autonomous region, and departments of the State Council as well as other agency codes;

4. The detailed address should specify the province (autonomous region, municipality directly under the Central Government), city (prefecture), county (district), street and house number;

5. Province/ministry (affiliated to) means which province, autonomous region, municipality directly under the Central Government or department of the State Council the administrative relationship of the institution is subject to and its name should be written into the table. If the institution involves a dual subordination relationship of region/department, please write the major subordination relationship;

6. Nature of institution means which one of the five natures the institution belongs to: 1. Independent scientific research institution, 2. College or university, 3. industrial or mining establishment, 4. collective or individual enterprise, 5. other; and please choose to fill 1, 2, 3, 4, or 5 in the column.

Roll of main researchers and developers

No.	Name	Gender	Date of birth	Technical title	Education level (degree)	Working organization	Creative contribution to achievement
1	Gao Jing	Male	1941.10	Professor-level senior engineer	University	Inner Mongolia Yongye Biotechnology	Technical scheme, research and development
2	Wu Zishen	Male	1968.03	Senior economist	University	Inner Mongolia Yongye Biotechnology	Design planning
3	Wang Shunian	Male	1946.09	Popularization researcher	University	Inner Mongolia Yongye Biotechnology	Field test
4	Wang Lixia	Female	1969.12	Engineer	Secondary school	Inner Mongolia Yongye Biotechnology	Research and development
5	Gao Lifen	Female	1969.04	Engineer	University	Inner Mongolia Yongye Biotechnology	Research and development
6	Zhao Peiyi	Male	1972.03	Researcher	Doctor	Inner Mongolia Academy of Agriculture and Animal Husbandry	Field test
7	Duan Yu	Male	1963.01	Senior agronomist	Master	Inner Mongolia Academy of Agriculture and Animal Husbandry	Field test
8	Hao Shanghua	Male	1959.05	Senior agronomist	University	Soil and Fertilizer Station of Hohhot	Demonstration and popularization
9	Gong Qiang	Male	1949.10	Economist	University	Inner Mongolia Yongye Biotechnology	Preparation, research and development
10	Xie Rongzeng	Male	1956.10	Medicine specialist	Junior college	Inner Mongolia Yongye Biotechnology	Small-batch production and preparation
11	Liu Yu	Male	1965.08	Agronomist	Master	Soil and Fertilizer Station of Inner Mongolia	Agricultural science test and promotion
12	Zhou Tao	Male	1976.05	Agronomist	University	Inner Mongolia Yongye Biotechnology	Agricultural science test and promotion
13							
14							
15							

Note: An additional page may be added when the number of main researchers and developers exceeds 15.

Roll of the Appraisal Committee

No.	Position in the Appraisal Committee	Name	Working organization	Specialty of study	Specialty engaged	Title	Signature
1	Chairman	Lin Qimei	China Agricultural University	Soil organism	Microorganism	Professor	
2	Vice Chairman	Su Haiquan	Inner Mongolia University	Chemistry	Chemistry	Professor	
3	Committee member	Shi Guanglu	Beijing University of Agriculture	Biology	Biology	Professor	
4	Committee member	Liu Rongle	The Chinese Academy of Agricultural Sciences	Plant nutrition	Soil and fertilizer	Researcher	
5	Committee member	Guo Yuhai	China Agricultural University	Agriculture	Agriculture	Professor	
6	Committee member	Sui Debao	Inner Mongolia Academy of Agriculture and Animal Husbandry	Soil and fertilizer	Soil and fertilizer	Researcher	
7	Committee member	Xu Minggan	The Chinese Academy of Agricultural Sciences	Pedology	Pedology	Researcher	
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9							
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Register of Scientific and Technological Achievement

Description of achievement		Research, Development and Application of Yongye Plant Nutrient (Bios)				Limited to 35 Chinese characters
Starting time of research		January 2004	Research concluding time	November 2004		
Primary institution making the achievement	Name	Inner Mongolia Yongye Biotechnology				
	Province/industry (affiliated to)	Code	915	Name	Inner Mongolia Autonomous Region	
	Location	Code	Name		Nature of institution	
	Contact name	Tong Baosheng			1. Independent scientific research institution, 2. College or university, 3. industrial or mining establishment, 4. collective or individual enterprise, 5. other	
	Postal code	0100701	Tel	1. 2. <u>3395765</u>		
	Address	Yongye Biological Park, Yongye Road, Jinshan Development Zone, Hohhot, Inner Mongolia				
Date of appraisal	20081206		Date of approval	20081208		
Name of the Appraisal Organizing Agency	Science & Technology Department of Inner Mongolia Autonomous Region					Limited to 20 Chinese characters
Confidentiality level of achievement	(0)	0 - No Yes	1 - Confidentiality level	(2)	1-secret 2-confidential 3-strictly confidential	
Level of achievement	(2)	1-world leading 2-world advanced 3-leading in China 4-advanced in China				
Source of task	(3)	1- state level plan 2-province or ministry level 3-not covered in any plan				
Category of application sector	(01)	01-agriculture, forestry, animal husbandry, fishery and water conservation; 02-industry; 03-geologic prospecting and prospecting control industry; 04-construction; 05-traffic and transport, post and telecommunication; 06-commerce, catering, material supply and marketing, and warehousing; 07-real estate, utility citizen and consultation service sector; 08-sanitation, sports, society, and welfare; 09-education, culture, art, broadcasting and TV; 10-scientific research and polytechnic services; 11-finance and insurance; 12-other sectors				
Situation of application	(1)	1- applied; 2- cause for non-application: A-no supporting production entity B- lack of funds C-technical noncompatibility D-achievement before industrial experiment E-other				
Scope of transfer	(3)	1-allowing import; 2-limited within domestic transfer; 3-non-transfer				
Investment in scientific research (RMB 10,000)			Investment in application (RMB 10,000)			
Investment by the state				Investment by the		

		state	
Local and department investment		Local and department investment	
Investment by other institutions	300	Investment by other institutions	6000
Total	300	Total	6000
Economic benefits of this year (RMB 10,000 or USD 10,000)			
Newly increased output value	RMB 23,250	Newly increased profit tax	RMB 6,200
			Percentage of earned foreign exchange

