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IN THIS ISSUE

- * Impressive S&T Results for Agriculture
 - * China-India S&T Cooperation Strengthened
 - * China-Franc CDM Project Launched
 - * China-Russian S&T Business Talk
 - * Ethnic Groups DNA Bank
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SPECIAL ISSUE

Impressive S&T Results for Agriculture

During the 10th Five-year period (2001-2005), Chinese researchers have landed major technical breakthroughs in satisfying the key technical requirements of agricultural

development, through combined tireless efforts of authorities concerned and S&T personnel. The efforts have found solutions to the common and key technologies that restrict China's agricultural development, and the techniques for enhancing the competitiveness of traditional agricultural products. The development spurs up the S&T advancement in the field of agriculture, and facilitates upgrading of agricultural businesses.

Statistics show that during the 10th Five-year period, 1,246 organizations have become part of the efforts, with researchers involved amounting to 14,383 in number, of whom 6,950 are ranked at a senior level, or 48.3% of the total, 3,979 at an intermediate level, or 30.2%, and 2,063 at a junior level, or 14.1%. The total workload has reached 186,065 person/month.

The efforts have resulted in 3,013 new products, new materials, and new devices, and 368 awards granted by authorities at ministerial or provincial level or above. Other accomplishments include 490 patent grants, 77 international or national standards, 91 industrial standards, 6,184 high caliber personnel (of them 1,827 having doctoral titles), 14,289 papers (723 published in international journals), 1,206 production lines, and 2,962 demonstration centers occupying an area of 170 million mu (1 mu = 0.0667 hectare).

Under the radiation of commercial application oriented demonstrations, S&T findings have turned out a comprehensive economic return worth RMB 100.515 billion, with an additional output value amounting to RMB 251.725 billion, newly created profits and taxes RMB 10.38 billion, and hard currency earned USD 1.101 billion.

INTERNATIONAL COOPERATION

China-India S&T Cooperation Strengthened

A memorandum of understanding on cooperation in the field of science and technology between the Chinese Ministry of Science and Technology and the Indian Ministry of Science and Technology was inked on September 7, 2006 in Beijing. A steering panel was also established to coordinate S&T collaborations between the two nations. On the same day, the first joint work meeting was held, where XU Guanhua, Chinese

Minister of Science and Technology, and Kapil Sibal, Indian Minister of Science and Technology were present. Representatives from the Ministry of Agriculture, the State Seismological Bureau, the China Meteorological Administration, the National Natural Science Foundation, and the State Oceanography Bureau are also part of signing ceremony and the first work meeting.

In 1988, an intergovernmental protocol on cooperation in the field of science and technology was signed between China and India. Up to date, five joint committee meetings have been held, from which came out several dozens of collaborating projects. In the meanwhile, a range of S&T accords or MOUs were signed between government agencies of the two nations. S&T cooperation between China and India has covered extensive fields, including agriculture, biotechnology, chemicals, health, electronics, and advanced materials. Some of the collaborations have reached an impressive scale or depth. The steering panel established not long ago will be responsible for addressing strategic issues concerning the bilateral cooperation, and providing guidance for S&T cooperation activities between the two nations.

China-Franc CDM Project Launched

A ceremony to launch China-France CDM capacity building projects was held on August 23, 2006 in Chengdu, Sichuan. Some 30 representatives, from the Chinese Ministry of Science and Technology (MOST), the State Development and Reform Commission, China Agenda 21 Management Center, and local authorities, and from French Consulate in Chengdu and Representative Office of French Development Agency in Beijing, attended the event.

China-France CDM projects will benefit the development of four provinces (Guangxi, Sichuan, Guizhou, and Yun'nan) in southwest China, pointed out a MOST senior official. Chinese participants shall screen out their priorities carefully, and have a thorough understanding of PIN and PDD documents, so as to raise the project design capability, added he. Under the guidance of the Ministry of Science and Technology, the State Development and Reform Commission, and the Ministry of Foreign Affairs, China Agenda 21 Management Center will coordinate the efforts in organizing, implementing, and managing the project activities, striving to complete the mission

as planned. Ms Agnes Biscaglia, Deputy of Representative Office of French Development Agency in Beijing talked to the audiences about the significance of China-France cooperation in the field of climate change, and expressed her thanks to the efforts made by MOST, the State Development and Reform Commission, and China Agenda 21 Management Center.

China-France CDM capacity building projects will be financed by the French Development Agency, jointly organized by MOST and the State Development and Reform Commission, and executed by China Agenda 21 Management Center. CDM projects will find their home in Guangxi, Sichuan, Guizhou, and Yun´nan simultaneously, in an attempt to enhance CDM capacity building in these provinces. The project activities will last for two years.

China-Russian S&T Business Talk

Co-sponsored by the Chinese Ministry of Science and Technology, Shandong Provincial Bureau of Science and Technology, Yantai Municipal Government, and Weihai Municipal Government, a China-Russian business talk on advanced materials and marine technologies was held August 24-29, 2006, in Yantai, Weihai, and Qingdao. 25 representatives from the Russian side and more than 100 representatives from 60 Chinese organizations attended the activities.

During the event, a number of activities have been staged, including technology forums, project talks, visits, and entertainment. Both Chinese and Russian experts made presentations on the development status and trends of advanced materials and marine technologies, and priorities for cooperation. Some 100 representatives from Shandong Province attended business talks, where 20 intentions of cooperation and accords were reached. Russian experts visited Chinese enterprises, and research institutes in Yantai, Weihai, and Qingdao, and had an in-depth discussion of the projects of mutual interests with their Chinese counterparts.

**RESEARCH AND
DEVELOPMENT**

Ethnic Groups DNA Bank

A DNA bank with a most complete collection of Chinese ethnic groups' DNA specimens was created at the Yun´nan University.

According to a briefing on August 30, 2006., the gene bank has collected more than 8,000 DNA specimens of 54 ethnic groups in China (Gaoshan ethnic group in Taiwan is not included).

The project team has collected 2,880 DNA specimens of 54 ethnic groups in 16 provinces, and in 14 districts of Yun'nan Province. In the meanwhile, researchers obtained 6,000 blood specimens from Yi and Hani ethnic groups and four families having a genetic disease history in 27 villages of Honghe and Dali prefectures. The efforts has led to the establishment of two national technical procedures: technical procedures before collecting ethnic groups' DNA blood specimens, and technical procedures for collecting, consolidating, and preserving ethnic groups' DNA blood specimens.

In the past few years, researchers have studied genetic polymorphisms of Chinese ethnic groups and their ethnic origins, using the DNA bank, and harvested numerous findings. They reported for the first time the genetic or haploid frequencies of 47 known spots on Y-DNA, mtDNA, and regular chromosomes in 25 ethnic groups in Yun'nan. The extensive genetic frequency data published are precious for studying human genetic origins. Three genes that have been discovered for having a disease link, including neurofibromatosis, hypertension, and polydactyly thumbs (preaxial), are of application values for earlier detection and treatment of the diseases.

Top Prize for China's Speech Synthesis Techniques

iFlyTEK Speech Lab, a part of the University of Science and Technology of China in Anhui, has won the top prize for its English speech synthesis system at Blizzard Challenge, an international contest for speech synthesizers.

Co-sponsored by Carnegie Mellon University and Nagoya Institute of Technology, Blizzard Challenge is an authoritative international contest for English speech synthesis, designed to be a testing platform for a unified English speech synthesis system. It facilitates exchanges and communications between speech research bodies, and promotes the in-depth development of speech synthesis techniques.

With the support of the National 863 Program, and thanks to its tireless efforts during the 10th Five-year period, iFlyTEK Speech Lab has landed major breakthroughs in speech synthesis

techniques that have been accepted by the marketplace. As the techniques can fully meet diverse application needs, iFlyTEK has made its research findings into a brand new high tech business in China. Conservative estimate shows that the existing Chinese speech industry has a market volume exceeding RMB 100 billion. Speech synthesis techniques have found applications in diverse areas, including telecommunication, voice service, call center, and telephone bank. Speech synthesis technique makes mobile phone reading aloud a short message possible, and allows toys to tell stories. iFlyTEK has so far rolled out a number of product lines from telecommunication applications to built-in applications. One can find everywhere in China mobile phones, car telephones, car GPS systems, and digital terminal products equipped with iFlyTEK speech synthesis techniques.

Enhanced Agricultural Disasters Control

During the 10th Five-year period(2001-2005), China has achieved noticeable progresses in monitoring major plant diseases/pests and agrometeorological disasters. The efforts have raised China's capability of agricultural disaster watch and control.

Chinese scientists have worked out solutions to a range of key technologies involving pest data collection and analysis, real time field micro-climate monitoring and warning, defining key meteorological elements that affect crop diseases and pests, and associated medium term prediction and forecast. They have developed useful equipment for the purpose, including a vertical radar system for insects watch, and an insects data collecting and analyzing system, which conquered the difficult side of collecting insects data using radar means.

Real time earlier warning system for migrating insects, a result derived from the same effort, has defined earlier warning indicators for major attacks of rice hopper, and established a roadmap for the regional landing of rice hopper, and associated earlier warning platform. The findings have resulted in a preliminary solution to the real time watch of insects in the long run. Researchers also unveiled the relationship between the occurrence of rice hopper epidemic and meteorological environment, and developed a long term forecast model for wheat powdery mildew and rice hopper, using atmospheric circulation elements.

Along with the restructuring efforts in the field of agriculture, the colony composition, number, and biomass of rodents have changed. To understand the cause behind the change of rodent's number, an effort was made to investigate different types of weed colonies over croplands, their threats, and associated variations. A disaster prediction and earlier warning model, combining agrometeorology, climatology, and forecasting techniques, was developed for forecasting four major agrometeorological disasters in northern China, including droughts, cold spell, waterlog, and chilling injury.

In addition, researchers have developed a comprehensive risk assessment model for agrometeorological disasters, and the associated parameter and indicator system. They completed remote sensing data based drought grading and associated watch/evaluation, and established a preliminary technical system for agrometeorological disasters watch and earlier warning.

China's Crop Seeds Safer

During the 10th Five-year period, Chinese scientists have landed important breakthroughs in guarding the safety of crop species resources, by strengthened the preservation and earlier warning of crops seeds.

Researchers have completed the vitality measurement of 6,475 species seeds (including paddy rice, wheat, and soybean) preserved at the national seeds bank for an extended period of time. Derived from the study are a dozen of indicators showing the vitality, biochemical property, and degradation of crop seeds, and a seed survival curve under low temperature storing conditions. Researchers created a vitality losing earlier warning system for 5 major crop seeds, including rice, wheat, and soybean, based on a range of related earlier warning indicators concerning accelerated degradation, biochemical property, and changes in genetic integrity. Corresponding safety measures, dynamic monitoring system, best practice for seeds updating, and associated information network system are also developed for the purpose.

In the meanwhile, researchers performed quarantine examination of the pathogens in 6,530 species seeds in stock, and identified the type and number of pathogens in major crop seeds preserved at the national seeds bank, and associated

implications on the health of seeds in preservation, and on future reproduction. Effective approaches have been developed to place the type and quantity of pathogens under control.

Information Process and Precision Agriculture

China's agricultural information process and precision agriculture have made laudable breakthroughs in needed key technologies, and rolled out a range of hardware and software for the purpose. The effort spurs up the development of agricultural information process, and speeds up the change from traditional agriculture to a modernized one.

Hardware: some 20 hardware products have been developed for agricultural information process and precision agriculture, including 9 types of sensors in 6 categories, and associated signal converter, cropland information collection and precision irrigation control system, greenhouse environment parameter collection and precision irrigation control system, intelligent yield prediction system for combined harvesters, precision fertilizer applicator, palm sized cropland information collecting system, variable pesticides sprayer, GSM/GPRS based wireless intelligent yield predictor, multi-port data transmitter, integrated forest monitor, and electronic angle gauge.

Software: researchers have developed some 70 software systems tailored to agricultural information process and precision agriculture, including livestock market analysis, prediction, and earlier warning system, decision making support system for wheat, corn, and cotton management, geographic information system for precision agriculture, precision cropland information collecting system, Arcview based crop diseases and pests control system, GPS based flying operation system for forestry, wheat management model V.10, rice growth model V 1.0, precision agriculture decision making support system V 1.0, online agricultural information management system V 1.0, knowledge based online crop management decision making support system V 1.0, geographic information system for crop production and management V 1.0, digital crop decision making support system V 1.0, dynamic cost analysis and management system for agricultural businesses V 1.0, and dynamic management system for agricultural production V 1.0.

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