CropBiotech Update in China

A quarterly summary of current developments in China' agri-biotech scene, for global sharing, and produced by the China Agricultural Biotechnology Information Center at the China National Center for Biotechnology Development, in cooperation with the International Service for the Acquisition of Agri-biotech Applications (ISAAA).

1 News

2 Research

1.1 GREAT PROGRESS IN BREEDING OF SUPER HYBRID RICE IN CHINA

Chinese Academician Longping Yuan, of the China National Hybrid Rice R&D Center in Changsha, China, recently noted that great progress has been made in the Breeding of Super Hybrid Rice. Dr. Yuan is the principle investigator of the project, which has been funded by the China Ministry of Agriculture since 1996. The aim of the project would make the yield targets for single season crop of rice hybrids reaches as follows. In phase I (1996 to 2000), the yield should be over 10.5 t/ha and in phase II (2001-2005), 12 t/ha. The goals in the first phase have been realized. A promising two-line indica/japonica combination, P88s/0293, yielded more than 12 t/ha at five demonstration locations with around 7 ha each in 2003 and at twelve locations in 2004. This second generation super hybrid rice will be released for commercial production in 2006. Based on the above achievements, the phase Ⅲ super hybrid rice breeding program is proposed, in which the yield target is 13.5 t/ha, and which can be fulfilled by 2010.

For more news from China, please visit
http://news.xinhuanet.com/newscenter/2005-05/08/content_2930549.htm

1.2 THREE-LINE HYBRID BREEDING IN COTTON BREAKTHROUGH IN CHINA

A major cotton breeding breakthrough has made China the first country in the world to commercialize a cotton strain that can resist bollworms and increase output by 25

per cent. The milestone advancement was pioneered by scientist Guo Sandui and his team at the Chinese Academy of Agricultural Sciences. The "three-line hybrid cotton with insect-resistant gene," if planted on the 3.33 million hectares of land where it is fit to grow, will theoretically increase output by 1 million tons each year.

The "three lines" refer to the male-sterile, maintenance, and restorer lines in cotton breeding. This system maintains and multiples hybrid heterosis, leading to high quality and high yields.

More information can be read at
http://www.chinadaily.com.cn/english/doc/2005-09/19/content_478842.htm

2.1 NEW COTTON RESISTANT TO GLYPHOSATE AND BOLLWORM DOCUMENTED

In order to breed new cotton varieties, Peilin Xu and his colleagues in Zhongshan University developed a new strategy for a new transgenic cotton resistant to glyphosate and bollworm. Researchers transformed two genes, aroAM12 and Bts1m, into commercial cultivar Shiyuan 321 of cotton (Gossypium hirsutum L.) by Agrobacterium-mediated transformation. The aroAM12 gene encodes 5-enolpyruvyl-shikimate-3-phosphate synthase (EPSPS), and Bts1m is a synthetic recombinant gene consisting of 331 N-terminal amino acids of CryIAc and 284 C-terminal amino acids of CryIAb.

The transformants were selected directly on medium supplemented with 80μmol/L glyphosate. In this research, 52 regenerative cotton plantlets were obtained through screening with selective molecular markers. Insect bioassay and glyphosate resistance assay indicated that the transgenic cotton plants obtained were highly resistant to glyphosate and the insect.

For more information, read the article at:
http://www.chinacrops.org/magtech/web/qikan/Cpaper/zhaiyao.asp?bsid=32

2.2 LYSINE-RICH GENE INCREASED LYSINE CONTENT IN MAIZE SEED

Minguang Ao and his colleagues of the National Key Laboratory of Agricultural Biotechnology in China Agricultural University recently isolated a natural lysine-rich gene, named SBgLR, from potato（Solanum tuberosum L）.

Researchers transformed maize (*Zea mays* L.) with the gene by microprojectile bombardment, and found that protein content of 96.7% transgenic plants was

increased from 5.4% to 58.1%, and lysine content in 93.3% transgenic plants increased from 3.2% to 54.8%. In the second generation of transgenic plants, the crude protein and the lysine contents were increased from 19.2% to 55.1% and from 3.2% to 51.6%, respectively. Six transgenic lines with the increase over 30% in both protein and lysine contents were selected for further breeding. The result showed SBgLR gene could be used to improve the protein and lysine contents in maize seed.

For more information, read the complete article at:
http://www.cau.edu.cn/nsjxb/main/wqcx/2004-05.html#y1

2.3 SNOWDROP LECTIN GENE CONFERRING APHID RESISTANCE TO CHRYSANTHEMUM PLANTS

The Chrysanthemum aphid is a major pest of the plant, and is difficult to control and remedy. Hongjun Fang and their colleagues in Liaonin Normal University have made headway in controlling the pest.

Researchers successfully transformed chrysanthemum with the gna gene, encoding snowdrop lectin protein, via an Agrobacterium-mediated method. The insect bioassay inoculated with aphid showed that the resistance to aphid in different transgenic plants was different, and the inhibition rate of aphid population were from 10% to 84% with an average rate of 39.4% in different transgenic lines. The leaf-extracts from different transgenic plants had different resistant activities demonstrated in red-blood cell bioassay.

More information can be read at
http://www.wanfangdata.com.cn/qikan/periodical.Articles/ycxb/ycxb2004/0412/041217.htm

2.4 EXPRESSION OF CHITINASE AND GLUCANASE GENE IN COTTON LIFTED DISEASE RESISTANCE

Fusarium and *Verticillium* wilt are two important diseases in cotton in the world. Traditional breeding methods have not yielded resistant germplasm. Hongmei Cheng and her colleagues in Biotechnology Research Institute, Chinese Academy of Agricultural Sciences, have explored a new way to control the diseases. They transformed cotton with two genes, coding for chitinase and β-1,3-glucanase, singly or doubly, by pollen-tube pathway method. Molecular analysis of transgenic cotton plants by polymerase chain reaction (PCR) and Southern hybridization, and

successive repeated selection of transgenic cotton lines in greenhouse and fungi-infected nurseries during the period of 1996-2000, demonstrated that the transgenic cotton lines with Fusarium wilt and Verticillium wilt resistance were obtained. Meanwhile, the above anti-fungal genes have been integrated into insect-resistant cotton variety GK19, which resulted in the development of transgenic lines resistant to both cotton boll worm as well as *Fusarium* and *Verticillium* wilt.

For more information, read the article at:
http://www.chinaagrisci.com/v2/qikan/manage/wenzhang/at-2005-5085.pdf