CROPBIOTECH UPDATE

A weekly summary of world developments in agri-biotech for developing countries, produced by the Global Knowledge Center on Crop Biotechnology, International Service for the Acquisition of Agri-biotech Applications SEAsiaCenter (ISAAA)

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NEWS

*** GLOBAL ***

CLIMATE CHANGE WILL AFFECT FOOD AVAILABILITY, SAYS FAO

Climate change will directly affect future food availability to feed the world's growing population, the Food and Agriculture Organization (FAO) said at the opening of a United Nations climate change conference in Nairobi, Kenya. Addressing a scientific and technical body, Castro Paulino Camarada, FAO Representative in Kenya, highlighted FAO's readiness to provide technical support in helping to mitigate the effects of climate change in a number of areas: bioenergy, forest management, and climate change adaptation.

FAO has been advocating the use of biofuels to provide an abundant supply of clean low-cost energy, better forest management practices, and research for the improvement of resilience of crop systems to climate variability. Camarada stressed that greater attention must be given to the impact of climate change on agriculture, forestry and fisheries, and on mitigation and adaptation measures.

Read FAO's press release at http://www.fao.org/newsroom/en/news/2006/1000436/index.html.

'NUTRIGENOMICS' – NEXT GENERATION AG BIOTECH TREND

What future next-generation applications can be expected in agricultural biotechnology? Personalized nutrition based on individual genetics, pharmaceuticals from alfalfa, drought-tolerant plants, and improved bioenergy sources – these were some potential products discussed in a symposium in Minneapolis, USA.

Nutrigenomics or applying genetic science toward human nutrition and health is expected to play a more prominent role in making these future products possible says Chuck Muscoplat, faculty member of the University of Minneapolis College of Medicine and former Dean of the College of Agriculture.

Muscoplat explained that "compounds from food can be studied and developed as modulators of gene expression rather than as simple nutrients for basic nutrition". Examples include addition of folate in the diet of pregnant women, and genistein, an isoflavone compound
in soybeans, that act as antioxidants.

For a PDFof the article go to:
http://www.isb.vt.edu/news/2006/artspdf/nov0605.pdf

UNIV OF IDAHO AND ECO-ENERGY TO DEVELOP OILSEED CROPS

The University of Idaho and Gibraltar-based Eco-Energy Ltd. have joined forces to develop high-value oilseed crops worldwide for alternative fuel production. Idaho researchers led by Jack Brown will develop new varieties tailored for global adaptation with high oil yield for all climatic and environmental conditions.

"We are perhaps unique in our approach to bioenergy. We are developing plants which are specifically designed to be liquid energy sources," said Brown. The oil produced from these crops will have specific characteristics suitable for making the highest quality biofuel. The crushed meal left over after the seed oil is extracted, can be used as a high protein livestock feed or even a soil pesticide.

Eco-Energy hopes to be able to assist developing countries through oilseed production for biodiesel through direct planting and seed-crushing management.

For additional information, visit http://www.uidaho.edu.

NEW FINDINGS HELP IRON OUT PROBLEM OF IRON DEFICIENCY

Biologists now know where and how some plant seeds store iron, a valuable discovery for scientists working to improve the iron content of plants. After mining the model plant *Arabidopsis* for clues, researchers in the United States found that iron resides in the developing vascular system of the seed, particularly in the vacuole, a plant cell's central storage site. The researchers also learned this localization depends on a protein called VIT1, known to transport iron into the vacuole.

The research helps address the worldwide problem of iron deficiency and malnutrition in humans. "Iron deficiency is the most common human nutritional disorder in the world today, afflicting more than 3 billion people worldwide," said Mary Lou Guerinot, a biologist at Dartmouth College in New Hampshire and the principal investigator on the study. "Most of these people rely on plants for their dietary iron, but plants are not high in iron, and the limited availability of iron in the soil can limit plant growth. Our study suggests that iron storage in the vacuole is a promising, and, before now, largely unexplored target for increasing the iron content of seeds. Such nutrient-rich seeds would benefit both human health and agricultural productivity."

Access the news release through
http://www.nsf.gov/news/news_summ.jsp?cntn_id=108150&org=olpa&from=news.

*** AFRICA ***

COCOA PRODUCTION IMPROVES IN WEST AFRICA

Farmers who participated in the farmer field school scheme on integrated crop and pest management on cocoa initiated in Cameroon, Cote d'Ivoire, Ghana, and Nigeria recorded between 15 to 40% yield increase while pesticide use by the farmers decreased by 10 to 20% during the pilot phase (2003-2005) of the Sustainable Tree Crops Program (STCP) managed by the International Institute of Tropical Agriculture (IITA).

Dr. Stephan Weise, STCP West African regional manager, said that the STCP has strengthened 15 large farmer cooperatives through training and technical support with potential outreach to over 31,000 farmers in the cocoa producing countries of West Africa. He noted that farmers are now receiving 5-15% higher farmgate prices on their produce through group sales, and more transparent and direct transactions.

In West and Central Africa, cocoa production declined over the past several decades because of inadequate access to improved technologies, high costs of, and limited access to inputs and credit, poor marketing and a major shift in emphasis on agricultural policies.

Email Taye Babaleye of IITA at t.babaleye@cgiar.org for more information.

*** AMERICAS ***

IFIC STUDY SAYS U.S. CONSUMERS CONFIDENT OF FOOD SUPPLY SAFETY

Majority of American consumers are confident in the safety of the United States food supply and express little to no concern about food and agricultural biotechnology. This is a finding of a study published by the International Food Information Council (IFIC).

IFIC commissioned Cogent Research to conduct quantitative assessments of U.S. adult consumer attitudes toward food biotechnology to, among others, track public awareness and perceptions of food biotechnology; and identify food biotechnology concerns.

Other findings are:

* Food biotechnology is not a consumer labeling demand.

* Although many consumers have heard at least “a little” about food biotechnology, awareness has declined and knowledge is superficial.

* Communicating specific benefits may enhance perception.

* Although awareness is low, consumers remain open to the broad concept of animal biotechnology, in general.

* Consumers remain opposed to the notion of animal cloning, as well as the use of cloned animals for breeding.

* The majority of consumers continue to be unaware of plant-made pharmaceuticals, but those who are aware tend to be favorable.

The study concludes that while there is no overwhelming consumer demand for more information about food biotechnology, it will be important to continue to make science-based information available to the public.

The full report in PDF format is available at
http://ific.org/research/upload/2006%20Biotech%20Consumer%20Research%20Report.pdf

COSTA RICANS WILLING TO TRY GM BANANA

Costa Rica is the second largest exporter of banana worldwide. Results of an exploratory study of the consumption and adoption of transgenic bananas in the country indicated that farmers are willing to adopt transgenic varieties because of potential savings in pest management costs. “This situation could be similar in other developing countries… any developments that could reduce management costs would be welcome by producers”, wrote Francisco Aguilar and Bert Kohlmann in their paper published by the International Journal of Consumer Studies.

The research has determined that a majority of Costa Rican consumers are also willing to buy and consume transgenic bananas. Those consumers that are young, have a small household, and higher levels of education and income, were found to be more likely to try the product. Aguilar and Kohlmann recommend that consumers be informed about transgenic products, their benefits, and associated risks. Only 35% of the consumers in their research were aware of the technology.

The complete paper is at http://www.blackwell-synergy.com/doi/full/10.1111/j.1470-6431.2006.00527.x

COSTS RE GRAIN SEGREGATION MAY BECOME ISSUE

The added costs associated with handling genetically modified (GM) and specialty crops have become an important issue for grain handlers. Hence, even if the cost of modifying systems to handle GM is not much, it remains to be a major constraint to actual segregation. This was a finding of a study by North Dakota State University researchers who looked into the practices, time requirements, and costs of segregating GM grain from non-GM grain.

"Marketing mechanisms to facilitate co-existence of GM and non-GM crops" published in the Agribusiness and Applied Economics Reports, revealed that unless premiums attributed for grain quality are high enough to offset these extra expenses, very few elevators will decide to segregate and test, even though it is clear that for most elevators, implementing segregation and testing would not be very costly.

See an article by Tracy Sayler at http://www.isb.vt.edu/news/2006/artspdf/nov0606.pdf.

THE TIGER TECHNIQUE IN PLANT PATHOGEN DIAGNOSIS

Scientists at the US Department of Agriculture's Agricultural Research Service (ARS) are enthusiastic over a new plant pathogen diagnostic technique that is as powerful as its namesake. Christened TIGER – short for Triangulation Identification for Genetic Evaluation of Risks – the new procedure has the potential to identify virtually every kind of microbe that may be present in a given sample, and it does so in a matter of minutes. According to William Schneider of the ARS Foreign Disease-Weed Science Research Unit, TIGER has the speed, sensitivity, and accuracy to be a powerful tool in distinguishing new, undescribed pathogens from native-born crop threats.

Like other PCR-based fingerprinting methods now used for early detection and routine monitoring of plant pathogens, TIGER makes use of specially designed fragments of nucleic acid called "primers." Their job is to find, and bind to, complementary segments of DNA in a pathogen's genome. However, unlike in today's PCR methods where primers are designed for the targeted pathogen's DNA, TIGER's primers are very general and serve as a one-size-fits-all tool that detects all bacteria in a given sample. It therefore eliminates the need for prior genome sequencing.

The database on which TIGER now relies mainly contains information on bacterial pathogens of humans. Soon there will be the addition of plant-disease bacteria, and the stage will be set for TIGER-based identifications of plant-pathogenic fungi and viruses.

The complete press release can be read at http://www.ars.usda.gov/is/pr/2006/061103.htm.

* ASIA AND THE PACIFIC *

CHINA COLLABORATES WITH NZ ON PLANT BIOTECH

Biotechnology research on potato is the focus of a scientific collaboration between China's Huazhong Agricultural University and the New Zealand Crown Research Institute's Crop and Food Research. A Memorandum of Understanding was forged between the two institutions which share interests in food technologies and agricultural sciences, particularly plant sciences.

Future cooperation will include resource sharing, staff exchanges, training and career development, joint research projects, market intelligence and technology development, joint funding applications, and joint contract and sub-contract arrangements.

See the press release at http://www.crop.cri.nz/home/index.jsp.

NEW SUGARCANE VARIETIES FOR INDIA

The Indian Council of Agricultural Research (ICAR) has identified new sugarcane varieties for each agricultural zone in India. In the Peninsular Zone, the sugarcane varieties Co 99006 (Neeraj) and Co 99004 (Damodar) were found to be suitable for cultivation. The former has tolerance to water-logging, drought and salinity, good field resistance to red rot and moderate resistance to smut. The second variety is tolerant to drought and salinity, and moderately resistant to red rot.

Other sugarcane varieties have been recently identified in a workshop held at G B Pant University of Agriculture and Technology in Pantnagar. These varieties, namely CoH 119, CoS 96268 (Mithas), Co 98014 (Karan-1) and CoS 96275 (Sweety) are suited for commercial cultivation for the North-West Zone comprising of Punjab, Rajasthan, Haryana, Western and Central Uttar Pradesh, and Uttaranchal.

To read more, visit http://www.icar.org.in/pr/29102006.htm.

MYANMAR'S EDIBLE OIL CROP SECTOR GETS A BOOST

Development is in store for Myanmar's edible oil crop sector, which recently received a loan of US$12.3 million from the OPEC Fund for International Development (OFID). The total budget of the project amounts to US$14 million; the remaining balance will be borne by the government of Myanmar.

The project will focus largely on four oil seeds: sesame, groundnut, sunflower and soybean, and on oil palm, and will boost oil crop production by expanding the availability of improved seeds and genetic material to oil crop farmers. The project will also cover the construction of two new oil solvent extraction plants and the upgrading of existing oil processing facilities. The project will likewise establish national edible oils standards and institutional capacity for edible oil quality control.

"The goal of this project is to increase the productivity and value of oil crops and their derivatives, while ensuring low cost edible oil supplies for consumers and assuring that sound policies are implemented and institutions are strengthened to develop a sustainable and competitive oil crop sector," said Geoffrey Mrema, Director of the Agricultural Support Systems Division at the Food and Agriculture Organization (FAO). The Organization will provide technical assistance throughout the project.

Read the press release at http://www.fao.org/newsroom/en/news/2006/1000437/index.html.

ICRISAT AND FAO LAUNCH SCIENCE COMMUNICATION INITIATIVE

Two international organizations are collaborating on an initiative to promote open access information sources in agricultural sciences and technology in India. The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) and the Food and Agriculture Organization (FAO) will create a new platform for information sharing on agricultural research in India through open access documentation.

The initiative, which was launched during the First AGRIS workshop on open access in agricultural sciences and technology, will enable agricultural scientists to obtain Internet-based information that are more searchable, and have access to data such as writer, citation, and source credibility. Workshop participants recommended the establishment of two pilot open access information repositories in Delhi and Hyderabad.

Read more on ICRISAT at http://www.icrisat.cgiar.org.

*** EUROPE ***

STUDY SHOWS GM OK TO ENVIRONMENT

Data available so far provides no scientific evidence that the commercial cultivation of genetically modified (GM) crops has caused environmental harm. This was the conclusion of a study "Ecological impacts of GM crops: Experiences from 10 years of experimental field research and commercial cultivation", commissioned by the Swiss Expert Committee for Biosafety.

The study focused on insect resistance maize, herbicide tolerant soybean and soilseed rape, three of the major GM crops of significance for Swiss agriculture. Dr. Joerg Romeis of the Agroscope Reckenholz-Tanikan Research Station which conducted the study said that a number of issues related to the interpretation of scientific data on effects of GM crops on the environment were brought up. The study highlights these scientific debates and discusses the effects of GM crop cultivation on the environment considering the impacts caused by cultivation practices of modern agricultural systems.

Email Dr. Romeis at joerg.romeis@art.admin.ch for additional information and how to obtain a copy of the report.

RESEARCH

BENTGRASS FOUND OUTSIDE CULTIVATION

Researchers at the Oregon State University and colleagues at the U.S. Environmental Protection Agency (EPA) found herbicide resistance genes in wild populations of bentgrass (*Agrostis stolonifera*). This is the first report of the successful establishment and persistence of an herbicide resistance gene in wild plant populations. The herbicide resistant plants were found within a 3.8 km area where transgenic bentgrass was grown in 2003. It is believed that the resistant plants in the wild populations were derived by either hybridization or by direct crop seed dispersal.

The complete paper was published by the journal Molecular Ecology and can be accessed at http://www.blackwell-synergy.com/doi/abs/10.1111/j.1365-294X.2006.03072.x

CANOLA ACQUIRES WEEVIL RESISTANCE TRAIT FROM YELLOW MUSTARD

The cabbage seedpod weevil *Ceutorhynchus obstrictus* (Marsham) is an insect pest of major economic importance in the production of canola (*Brassica napus* L. and *B. rapa* L.) in Europe and North America. Larvae feed on developing seeds within the pods, with each larva consuming about five to six seeds during development. Once they mature, the larvae chew circular exit holes in the walls of the seed pods, and pupate in the soil. Through introgression or 'backcrossing' using yellow mustard as the parent, researchers from the University of Alberta and the University of Guelph in Canada have developed canola plants with resistance to the weevil. The results are published in the October issue of *Crop Science*.

Studies were conducted to test the hereditary material of the offspring, produced by crossing *Sinapis alba* L. (yellow mustard) x *B. napus* and then backcrossing progeny to the *B. napus* parent, as potential sources of resistance to the weevil. Of the genotypes evaluated in field trials in 2001, 18 had an average of fewer than 0.05 weevil exit holes per pod, an indicator for resistance against the weevil, and

these genotypes were used for further testing. Subsequent tests confirmed several genotypes that evidently carried genes for resistance to the pest from the yellow mustard parent.

The development of weevil-resistant canola is a significant first step towards integrated management of cabbage seedpod weevil, resulting in substantial reductions in insecticide use in this crop. The complete research article “Introgression of Resistance to Cabbage Seedpod Weevil to Canola from Yellow Mustard” is available at http://crop.scijournals.org/cgi/content/full/46/6/2437.
For the abstract, readers can visit http://crop.scijournals.org/cgi/content/abstract/46/6/2437.

ASSESSING THE BENEFITS OF GOLDEN RICE 2

Vitamin A deficiency (VAD) afflicts many people around the world, especially in developing countries. Some of the adverse health outcomes of VAD include increased mortality, night blindness, corneal scars, blindness and measles among children, as well as night blindness among pregnant and lactating women. In a bid to reduce VAD-related diseases, rice plants were engineered to produce higher levels of beta-carotene in the endosperms or grains, and the result of this effort is Golden Rice 2. In an article in *Nature Biotechnology*, Alexander Stein and colleagues from the University of Hohenheim, Germany and Sitaram Bhartia Institute of Science & Research, India, presented a new methodology for assessing the potential impact and cost-effectiveness of Golden Rice 2 in India.

By building on a disability-adjusted life years (DALYs) approach and using the nationally representative food consumption data, the potential health impact of Golden Rice 2 was calculated. For assessing the potential cost-effectiveness of Golden Rice 2, the low-impact/high-impact scenario approach was followed that would determine the research, development and dissemination costs of Golden Rice 2. In this context, the researchers found that widespread consumption of Golden Rice 2 with a high ?-carotene content could significantly reduce the burden of VAD. In addition, Golden Rice 2 was shown to be a cheap and effective alternative to Vitamin A supplements in reducing the mortality rate attributed to VAD.

The complete correspondence, “Potential impact and cost-effectiveness of Golden Rice” can be accessed at http://www.nature.com/nbt/journal/v24/n10/full/nbt1006-1200b.html.

ANNOUNCEMENTS

CALL TO DEVELOP RESOURCE BOOK ON AFRICAN BIOTECH EXPERTS

The International Service for the Acquisition of Agri-biotech Applications (ISAAA) AfriCenter is in the process of developing a Resource Book that would profile available and emerging expertise, institutions and resource materials on biotechnology issues in Africa to meet the information and networking gaps that exist currently. The aim of the project is to operationalize a Pan African Network of Experts on Biotechnology Issues (PANEBI) with a view of strengthening trans-disciplinary linkages, networking and collaboration.

For more information, contact amukuna@cgiar.org or a.nderitu@cgiar.org.

FIRST INTERNATIONAL CASSAVA SYMPOSIUM

The First International Symposium on Cassava Plant Breeding, Biotechnology and Ecology, will be held in Brasilia, Brazil, 11-15 November 2006. The conference is organized by the University of Brasilia and

the Ministry of Environment, Brasilia, Brazil. The theme for the symposium is “Cassava improvement to improve livelihoods in sub-Saharan Africa and northeastern Brazil”.

More information is available at http://www.geneconserve.pro.br/meeting2/

ICGEB WORKSHOPS FOR 2007

Visit http://www.icgeb.org/MEETINGS/CRS07/Meetings2007.htm for the schedule of several workshops to be organized by the International Centre for Genetic Engineering and Biotechnology (ICGEB). Among these include a regional workshop on “Principles of biosafety research for the release of GE crops” in Khartoum, Sudan in February 2007; a workshop on “Introduction to risk assessment for the deliberate release of GMOs: Assisting decision-making in a biosafety framework” in Ca’Tron di Roncade, Italy in May 2007; and a workshop on "Biosafety of GM crops and the evolution of regulatory frameworks: Issues and challenges" in September 2007 in Belo Horizonte, Minas Gerais, Brazil.

CGIAR’S ANNUAL GENERAL MEETING

The Consultative Group on International Agricultural Research (CGIAR) will have its annual general meeting in Washington, D.C., 5-7 December, 2006. To be held with the meeting are the “CGIAR Photo Competition” and “CGIAR Exhibition”. The exhibition will highlight the work of the international centers, the Challenge Programs and CGIAR Partners.

Additional information may be obtained from http://www.cgiar.org/meetings/agm06/index.html

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DOCUMENT REMINDERS

CSIRO’S PODCASTS

CSIRO, Australia’s national science agency, started providing podcast feeds containing information about their research and on other science topics of public interest. A podcast is an internet multimedia file that can be viewed or listened to on mobile devices and personal computers. “CSIROpod”, the name of the agency’s podcast site, currently ranks fourth among Australia’s science podcasts. Media feeds are available for downloading at http://csiro.au/csiro/channel/pchdm,,.html.

The complete press release is at http://csiro.au/csiro/content/standard/ps2fr,,.html

CAMPUS RESEARCH BLOG LAUNCHED IN UC DAVIS

The University of California at Davis launched Egghead, a blog of on-campus research activities. A blog is a dynamic web page that is regularly updated with new, time-stamped entries. Egghead aims to bring together research news stories, articles, comments, and links to video and audio clips from all disciplines. Andy Fell of the UC Davis’ University Communications said that the blog takes in information which otherwise will not fit in their current publications. The blog was named after the Egghead sculpture in the university campus.

For more information please visit http://www.ucdavis.edu/spotlight/1006/egghead_blog.html or access the blog directly at http://egghead.ucdavis.edu/

BIOFUELS SUPPLEMENT

Starting with this issue, the Global Knowledge Center on Crop Biotechnology will launch its pilot supplemental section on Biofuels which will be published bi-weekly.

Renewable energy derived from biological material (plant or animal) has become a major focus in many countries. It is seen as a viable energy alternative to fossil fuels and a solution to mitigate environmental problems associated with fossil fuels (global warming). The development of biofuels is seen to have a significant role in the global future.

As countries (specially developing countries) establish their own national agenda for renewable biomass energy, information access on biofuels-related information will be important. These may include information resources on research and trends on biofuel crops, processing technologies, policy issues and institutions/ key persons with active involvement in the field.

This supplement aims to provide organized/capsulized web-based information related to biofuels and biomass energy. It is geared toward broad spectrum of end-users of diverse educational backgrounds: the researcher community, policy makers, the education sector, etc. The supplement hopes to provide a tool for information sharing and exchange among stakeholders and help in capacity building for the development of their own national biofuels agenda. Futhermore, the fostering of North-South and South-South collaborations are also envisioned as one of the aims of the newsletter supplement.

This maiden supplement on biofuels will start with a mix of information on biofuels basics, and some features in bioethanol and biodiesel (liquid fuel alterntives for the transport sector). Suggestions and comments, particularly on information content, are most welcome.

BIOMASS ENERGY BASICS AND FREQUENTLY ANSWERED QUESTIONS (FAQs)
http://www1.eere.energy.gov/biomass/biomass_basics.html
http://www1.eere.energy.gov/biomass/biomass_basics_faqs.html#available

For those who have burgeoning interest in biofuels, but are still lost in the terminology and technical jargon, this site from the US Department of Energy provides a straightforward and useful starting point. The reader with little technical background would be able to relate the word “biofuels” with other related concepts like “biomass”, “biomass-derived fuel”, “biomass power”’ “energy crops”, “bioethanol” and “biodiesel”. For example, “biofuels” is a term used for biomass-derived liquid fuels used for transportation. Here, “bioethanol” and “biodiesel” are considered important biofuels. In contrast, “biopower”, or “biomass power”, is the term used for systems that generate electricity or industrial process heat and steam. This would probably include “biogas” which is a mixture of methane and carbon dioxide from the anaerobic biological degradation of plant biomass and/or animal wastes. The Biomass Energy FAQ also provides a good overview of biomass energy feedstocks, and technologies for biomass energy processing.

BIOFUELS: A VIABLE ALTERNATIVE?
http://www.oecdobserver.org/news/fullstory.php/aid/1647/Biofuels_for_transport.html

A report from the Organization for Economic Cooperation and Development (OECD) discusses the production potential, cost/benefits and environmental impacts of production biofuels (bioethanol/biodiesel) as an alternative transport fuel.

In many countries, biofuels are currently derived from starchy materials like corn and wheat for ethanol, and soy and rape for biodiesel. However, its worldwide used as a transport fuel remains low. Nevertheless, in Brazil, it accounts to about 30% of motor fuel demand. The high cost of biofuels (about 3 times that of petrol) has kept its usage down in many countries; but with technical improvements and increasing production volume, biofuel prices would likely drop. Other non-easily quantifiable benefits are energy security, significant reduction in greenhouse gases (and other pollutant emission) and enhanced rural development.

The report further mentions that although there is a need to better quantify the cost/benefit aspects of biofuels, there is sufficient evidence that it could at least complement existing transport fuels, or better, become a serious alternative to conventional fuels.

"EVERYTHING YOU ALWAYS WANTED TO KNOW ABOUT BIODIESEL BUT WERE AFRAID TO ASK"
http://www.greenfuels.org/biodiesel/everything.htm#d

This site by the Canadian Renewable Energy Association provides a user-friendly FAQ on biodiesel for a reader with little technical background. However, it also provides more technical links and related aspects on biodiesel (economics, international outlook, biodiesel standards, etc).

NEW BARLEY VARIETIES FOR ETHANOL PRODUCTION
http://www.ars.usda.gov/is/AR/archive/jul05/barley0705.htm

Barley is being considered as an alternative feed stock for ethanol production in farmlands outside the "corn belt" of the United States. Compared to corn, however, barley has a lower starch content, and has an abrasive hull which causes wear and tear in milling equipment. It also has a "troublesome" polysaccharide called beta-glucan, which renders barley mash difficult for fermentation and distillation.

Researchers at the Eastern Regional Research Center (IRRC) in Wyndmoor, Pennsylvania, are looking for naturally "hull-less" barley varieties with high starch content. In addition, they are looking into the use of beta-glucanase enzymes to break down high viscosity of the barley mash prior to fermentation.

UNIVERSITY OF FLORIDA RESEARCHER DEVELOPS GENETICALLY ENGINEERED *E. coli* FOR CONVERSION OF PLANT RESIDUES TO ETHANOL
http://news.ufl.edu/2005/05/03/ethanol/

A scientist from the University of Florida has developed a genetically engineered *E. coli* which is capable of converting all sugar types found in plat cell walls into fuel ethanol. The organism is said to have high ethanol yields from biomass such as sugarcane residues, rice hulls, forestry and wood wastes. Professor Lonnie Ingram, of the Institute of Food and Agricultural Sciences (University of Florida), said that he cloned unique genes for direct digestion of sugars into ethanol (the same pathway found in yeast and higher plants) into *E. coli*. Plans for using the organism for commercialization with assistance from the U.S. Department of Energy are underway.

HIGH AMYLASE CORN FOR BIOETHANOL PRODUCTION BEING DEVELOPED
http://www.syngenta.com/EN/about_syngenta/biotech_faq.aspx

In an effort to improve the efficiency and economics of corn ethanol production, Syngenta AG, a company in the United States, has a project to produce a biotechnologically enhanced corn which expresses high levels of amylase. Amylase is the enzyme responsible for the break down of starch into

sugars needed for ethanol fermentation. Dubbed as “amylase corn”, these genetically modified corn seeds are designed to cut the cost of ethanol production by eliminating the need for addition expensive liquid enzymes to saccharify (the starch to sugar conversion step) the corn mash prior to ethanol fermentation.

MODIFIED POPLAR TREES AS CELLULOSE FEEDSTOCKS FOR ETHANOL PRODUCTION
http://www.biofuelsjournal.com/articles/Purdue_University_Researchers_Study_Poplar_Trees_as_Feedstock_for_Cellulose_Ethanol-37114.html

Purdue University researchers in the United States are looking into the possibility of genetically modifying the lignin of the plant cell walls in poplar trees, so that the cellulose within can be easily extracted for ethanol production, without compromising the structural integrity of the growing plant.

Poplars are said to have several benefits over traditional row crops such as corn. They do not require intensive inputs. They don’t have to be harvested every year, and therefore the grower has the option to leave the trees for another year (for example), while waiting for prices to improve. Several varieties of poplars can also grow in a wide range of climates, from subtropical to sub-alpine areas. Pilot scale fermentation studies will be conducted to determine the yield of fermentable sugars obtained from the modified trees.

*** EVENTS ***
3rd Annual Canadian Renewable Fuels Summit
Dec 10-12, 2006, Fairmont Banff Springs Hotel, Canada
http://www.greenfuels.org/events/index.htm

The summit has invited international speakers and will provide opportunities for learning the latest about the ethanol industry and networking with key players in the biofuels market.

BIOFUELS AMERICAS: CONFERENCE AND EXPO III
Cartagena, Columbia, 2007 March 13-15
http://www.centralbiofuels.com/

The conference is a venue for those who are interested in starting biofuels projects for establishing contacts with chemical engineers, consultants, financiers and marketers in biofuels. Topics will include aspects in the biofuels cycle (feedstocks, markets, etc).

Do not hesitate to tell other colleagues/contacts about this mail list. If they wish to join, they should send an e-mail message to knowledge.center@isaaa.org leaving the subject blank and entering the one-line text message as follows: SUBSCRIBE Crop Biotech Network

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Please visit CropBiotech Net web pages (http://www.isaaa.org/kc) to view previous issues of this newsletter and see other available resources for download.

While we are still developing this site, feel free to e-mail (knowledge.center@isaaa.org) us for your views and comments on any crop biotechnology product and related issues.

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