CROP BIOTECH 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

NEW AGRICULTURE INITIATIVES TO AID AFRICA

The U.S. Department of Agriculture (USDA), in cooperation with the U.S. Agency for International Development, will develop and implement a trade enhancement program to help Africa's raw agricultural products enter the global market. This will be done by improving the capacity of African producers to meet international plant and health requirements. USDA Secretary Mike Johanns made this announcement during the Africa Growth and Opportunity Act (AGOA) Forum in Dakar, Senegal. The AGOA serves as a framework to strengthen trade ties in agricultural goods.

Later this year, a trade and investment mission will be sent to southern Africa to see possibilities for joint venture, bilateral trade, and investments in the agricultural sector. The USDA is also working on a new program to encourage investment in agricultural processing and in encouraging African countries to take a more active role in global trade negotiations.

In the same AGOA Forum, Kenya Deputy Minister of Trade and Industry Zaddock Syon'goh stressed that agriculture is critical to African economies and that there is a need to add value to its exports. He called on African farmers to "embrace biotechnology" to improve agricultural productivity and make farming a viable occupation.

http://usinfo.state.gov/usinfo/Archive/2005/Jul/19-966715.html

CHINA TO BENEFIT FROM U.S. TRADE PROJECTS

China will be assisted by the U.S. Trade and Development Agency (USTDA) to enhance its trade opportunities. These include the conduct of three training programs to open the Chinese market to agricultural biotechnology products, strengthen intellectual property rights (IPR) protection in China, and strengthen bank lending practices. This was announced by USTDA Director Thelma J. Askey in Beijing during the 16th Joint Commission on Commerce and Trade consultations between the two countries.

USTDA will fund a program to train Chinese policy makers and regulators on science-based risk assessment, food safety, regulatory principles, and practices for import and approval of genetically engineered agricultural products. Another training program will assist China in complying with its World Trade Organization

commitments and obligations under the Agreement on Trade-Related Aspects of Intellectual Property Rights. It will cover the role of customs inspection and enforcement in IPR protection including copyright, patent, and trademark issues.

Since 2001, USTDA has funded over 75 activities supporting important development objectives in China. For more of the agency's activities in China, visit
http://hongkong.usconsulate.gov/uscn/trade/general/others/2005/071101.htm

CROP BIOTECH – OPPORTUNITY TO DEVELOP SUSTAINABLE FUTURE

The implementation of a system to enable a sustainable platform for the future should be given high priority in society. This means developing biotechnology and genomic tools to enable the development of crops with specific traits that are optimized for biofuels and bioenergy. So says James McLaren of the StrathKirn Inc. in an article in the journal TRENDS in Biotechnology.

McLaren said that a combination of specifically designed biomass with new approaches to bioprocessing might provide the best opportunity to create this sustainable future. Such biomass may include grains, tubers, oilseeds and lignocellulosic products.

The author added that biotechnology has a new toolset that can be used to design and optimize the capture of solar energy through crops. The better understanding of genome sequences, gene function, gene expression, protein interactions and metabolic control mechanisms will enable a sound scientific basis for further applications of biotechnology tools in renewable primary production and in bioprocessing.

Read the full paper on "Crop biotechnology provides an opportunity to develop a sustainable future" in the Vol. 23, No. 7 July 2005 issue of TRENDS in Biotechnology or email James McLaren at mclaren@strathkirn.com

COTTON BY-PRODUCT FINDS ITS ROOTS

Recent work by the Agricultural Research Service (ARS) of the United States Department of Agriculture (USDA) has been focused on the production of gossypol, a compound with antifungal, antibacterial, and possibly even anti-cancer properties.

Gossypol is found throughout the cotton plant, but can be difficult to extract in large quantities. This prompted ARS plant physiologist Barbara Triplett to initiate concentration of the compound in cotton roots, by allowing the plant to grow clumps of hairy roots specially primed to produce gossypol.

Hairy root culture can be started from almost any plant, given the right environmental conditions. Researchers can tweak temperature, pH, nutrients, and hormones, and from then on can culture roots in the laboratory. In this case, researchers found that the hairy roots were able to produce gossypol in vitro, and that the compound was also present in the surrounding culture medium.

Read the details at
http://www.ars.usda.gov/is/AR/archive/jul05/root0705.htm

BETTER BARLEY TO BE DEVELOPED FOR BETTER BREWS

Scientists from the Biotechnology and Biological Sciences Research Council (BBSRC) of the United Kingdom are focusing their research on barley improvement by investigating the activities of certain key genes that control specific characteristics of the crop. The project, entitled “Association Genetics of UK elite Barley,” is sponsored by BBSRC, the Scottish Executive Environment and Rural Affairs Department (SEERAD), and the Department for the Environment, Food and Rural Affairs (Defra) through the Sustainable Arable LINK Programme.

Barley is especially important to Scotland, which uses it to brew whiskey and beer. It is grown on about 50% of Scotland’s arable land, and whiskey is the biggest food-and-drink export earner for the UK. To improve the crop, barley genes affecting yield, disease and pest resistance, and the amount of alcohol that can be extracted to produce malt whiskey are currently being studied.

For more information, visit http://www.bbsrc.ac.uk.

RESEARCH

SUPPRESSED GENE DELAYS TOMATO RIPENING

When Tzann-Wei Wang and colleagues of the University of Waterloo, Canada suppressed the activity of deoxyhypusine synthase (DHS) in tomato plants, they found that the tomato fruits did not ripen as quickly as their conventional counterparts, and that, at higher levels of suppression, plants were sterile or had changes in plant structure. Their work, “Antisense Suppression of Deoxyhypusine Synthase in Tomato Delays Fruit Softening and Alters Growth and Development,” appears in this month’s Plant Physiology.

DHS is an enzyme present in eukaryotic cells, and participates in reactions that activate other enzymes, which in turn initiate protein translation. Researchers found, through RNA blotting, that the enzyme family activated by DHS likewise increased in expression as fruits began to age and soften.

Researchers suppressed the activity of DHS by expressing part of the enzyme’s untranslated region in tomato, resulting in antisense gene control for the plant. With much lower DHS activity in the transgenic tomato, researchers found that 1) transgenic fruits ripened normally, but exhibited delayed post-harvest softening and aging; 2) transgenic plants under strong DHS suppression were also male sterile and did not produce fruit; and 3) these same plants had larger, thicker leaves with higher levels of chlorophyll.

Read more in this month’s Plant Physiology at http://www.plantphysiol.org. The article appears on pp. 1372-1382 of the journal.

VITAMIN AIDS PLANT IMMUNO AS WELL

Thiamine, or Vitamin B1, is a potent compound useful in maintaining the immune system of humans. Spraying it on plants, however, can also contribute to the plant immune system, and it is this new property of thiamine that Il-Pyung Ahn and colleagues from the Seoul National University explore in “Vitamin B1 Functions as an Activator of Plant Disease Resistance.” Their findings appear in this month’s Plant Physiology.

Researchers found that thiamine induces systemic acquired resistance (SAR) in plants, which enhances resistance to many, but not all fungal, bacterial, and viral pathogens. By spraying thiamine on rice, *Arabidopsis*, and cucumber, among

other crops, and inoculating the plants with the pathogens, the researchers found that the incidence of viral and bacterial infections amongst the plants was much lower. For instance, thiamine treatment of the rice cultivar Nakdong also induced resistance to the compatible bacterial leaf blight pathogen *Xanthomonas oryzae* pv *oryzae* strain.

The effect of thiamine spraying lasted for as long as 15 days for the plants. These findings provide a new way by which scientists could develop strategies for the control of plant diseases.

Read more in this month's Plant Physiology at http://www.plantphysiol.org. The article appears on pp. 1505-1515 of the journal.

RESEARCH COMPARES GM, CONVENTIONAL POTATO VARIETIES

An article in this month's Plant Physiology reports on the "Comparison of Tuber Proteomes of Potato Varieties, Landraces, and Genetically Modified Lines," a study conducted by Satu J. Lehesranta and colleagues of the University of Kuopio, Finland. Using 2-dimensional protein electrophoresis, researchers compared 32 non-genetically modified (GM) genotypes, 21 tetraploid cultivars, 8 landraces, and 3 diploid lines.

Researchers found that only 9 out of 730 proteins showed significant differences between GM lines and their controls. There was much less variation between GM lines and their non-GM controls, compared with that found between different varieties and landraces. Moreover, no new proteins unique to individual GM lines were observed; thus, there was no evidence for any major changes in protein pattern in the GM lines tested.

Read more in this month's Plant Physiology at http://www.plantphysiol.org. The article appears on pp. 1690-1699 of the journal.

CBT NEWS FEATURE

'Round A Table of Wines and Wars: Agricultural Practices of the Etruscans

The Italian peninsula seems to shimmer and shine with history and art, from graceful, full bodied nymphs set against make-believe cypresses and oaks, to

crumbling mounds of marble on which lie the almost breathable, almost visible words of lives, songs, and politics past. But before all the art, before the reawakening, before the soldiers cloaked in scarlet and gold, and the senators in their Senate hall…before the reign of emperors and tyrants was a race of peoples whose culture lived on in the greatest empire the world has ever known.

They were the Etruscans, a mysterious tribe that scattered throughout northeastern and southern Italy, and brought civilization and urbanization in their wake. Their colonies stretched from the Arno river in what is now Tuscany; to the Tiber, which cuts through Rome. Their origins are still disputed; early accounts from the Greek historian Herodotus claimed that they were migrants from Asia Minor. Dionysius, another Greek historian, wrote that the Etruscans were native to Italy. Whatever the case, the Etruscans were heirs to a rich volcanic land, and served as one of the greatest influences on what would later be Roman culture.

The twelve-city league of the Etruscans were reminiscent of the independent city-states of Greece; and, like the political framework on which their government was based, there was no lack of jealousy or enmity. The culture was the same from one city to the next, besides. The Etruscans were a hardworking race, where women occupied the same social stratum as men, and where the citizens enjoyed an economy based on industry and agriculture. They were rich in copper, tin, lead, silver, and iron, which they worked, cast, and exported. Their land was rich in water or volcanic soil, which, in conjunction with the geography and climate of Italy, allowed them bountiful harvests from both earth and sea.

The Etruscans were also deeply rooted in the supernatural, with reverence for the dead echoing the rituals used by the ancient Egyptians. They built tombs fashioned like their houses and laid household objects amongst the dead, for use in the afterlife. Divination was the order of the day for their priests, who, unlike the hallucinatory predictions made by the oracles at Delphi, sacrificed an animal and spoke of the future through marks on its liver.

And, like the surrounding tribes, the Etruscans had their own military. However, unlike the assimilators that were the Romans, the Etruscans dominated the people they conquered and forced them into labor on farms, so that the conquerors would have more time for other tasks in commerce and industry. For instance, they had good knowledge of hydrology and hydraulics, and were able to provide satisfactory land drainage to clear the Seven Hills of Rome of marshland, and make way for cities to be built. The Etruscans' sense of hydraulic engineering allowed them to regulate river flows, prevent the silting up of harbors, and provide water for public use.

All throughout their conquered lands were groves, fields, and gardens where forests and swamps had once been. The Etruscans planted cereals such as barley, millet, panic grass (grass used for fodder) and rye, from which they

extracted “puls,” the precursor of today's bread. They cultivated olives, grapes, garlic, onions, ceci beans, black eyed peas, fava beans, and lupins.

Fruit groves throughout the city states were heavy with pomegranates, figs, blackberries, strawberries, and egg-sized apples and melons. In the barns and yards roamed cows, pigs, chickens, ducks, geese, goats, and sheep. The forests were replete with game, which included hare, deer, and wild boar. From the sea came fresh fish, tuna, and tortoise eggs. In the house, rolling pins rolled out dough, and cutting wheels turned to make fresh pasta. Cellars and cabinets were filled with olive oil and wine.

The Etruscans, in other words, were the rock on which gourmet Italian cooking would be built.

Etruscan cooking was as rich as the tribe’s harvests, and much of it has been passed down to today’s tables, ingredient for cooking ingredient. Rosemary was the herb of choice, and was used to give roasted fish or pork an aromatic flavor. Honey was used to sweeten food; salt, to preserve it. Other popular meats included beef, venison, hare, and ducks, all of which would be served with various sauces and gravies. Also on the menu was cheese, made from the milk of cows and pigs, drizzled with olive oil, and covered with the ashes of fragrant woods.

Just outside the kitchen was the raucous Etruscan dining room. Rarely were knives and spoons used, and forks were virtually unknown. Etruscans scooped their savory dishes and juicy meats with their hands, then used the soft part of their bread to wipe them clean. Walking amongst the guests were free range chickens, cats, and dogs, ready to pick up scraps, including the gravy soaked, grime spotted bread which their masters threw away after use.

Wine was never absent during a meal, and the Etruscans enjoyed it. They conceived temperature controlled cellars long before today’s vintners engineered them. They kept their wine in amphorae, cooled it before serving, and distributed it in ceramic or gold goblets. Today’s wine drinking ritual was not alien to the Etruscans either. They studied the wine's color, sniffed its bouquet, and then downed it, with hardly any of the delicacy demanded by modern table manners.

Present amongst the guests were young, naked men and women, who served dinners to the sound of flutes. Etruscans were eager music lovers, if not hedonists altogether. According to the Greek writer Athenaeus, “they kneaded their bread, practiced boxing, and whipped their slaves to the sound of pipes.”

As any good meal will inevitably come to an end, then so did the centuries of Etruscan rule. And as the revelry disappeared, then so did the city states, all under the pressure of new, stronger civilizations. The Greeks, with their stronger military, defeated the Etruscan fleet, so that the latter lost control of the sea, and

with it, their economic wealth. Celtic tribes fled the cold north, looking for warmer lands south of the Alps, where they chased the Etruscans out and destroyed their cities. Villagers close to Etruscan colonies soon united and became the highbrowed, elite class – and, eventually, the powerful Romans. As a result, Etruscan language was suppressed, and their culture outlawed.

Not all was finished, however, for with the grandeur that was Rome was an underlying, enduring fascination for the ways of old. What was long considered Roman technology is actually Etruscan in origin: stone arches, paved streets, aqueducts, sewers, bronze crafting, a twelve month calendar, the use of first and last names, growing grapes and olives, fighting in a phalanx...

The list goes on and on, and, through the years of change and conquest, the legacy remains. The Etruscans built a world teeming with the heady spill of wine, the warm sight of olive trees in full bloom, the chorus of voices in a feast steeped in flavored meats and bare skin. As the tribe disappeared, so did it stamp its indelible mark, upon foods that tease the senses, brews that intoxicate, and lands that continue to yield the fruits of generations and civilizations long gone, but never forgotten.

For more on the Etruscans, visit
http://members.tripod.com/~Centime/Etruscans/eng.html,
http://www.castellobanfi.com/features/story_salute.html, and
http://www.mysteriousetruscans.com/eng.html.

DOCUMENT REMINDERS

EFSA INVITES COMMENTS ON GM DOCUMENTS

The European Food Safety Authority (EFSA) has just released two documents and opened them for public comment. The documents, “Draft Guidance Document for the Risk Assessment of GMMs [Genetically Modified Microorganisms] and their Derived Products Intended for Food and Feed Use” and “General Surveillance of the Impact of GM Plants” are available at http://www.efsa.eu.int. EFSA welcomes written comments on the documents until the 15th of September, 2005. The outcome of this consultation will be taken into account during the final adoption of this document by EFSA’s GMO Panel.

WARDA RELEASES NEW DOCUMENTS

The Africa Rice Center (WARDA) has just released new documents detailing work done by WARDA, as well as its plans for the coming years. These include Warda at A Glance, Highlights of WARDA's 10-year strategic plan, and The Growing NERICA boom in Uganda. All documents are also available in French. Download them at http://www.warda.org

FAO PUBLISHES WORKSHOP REPORT

The Food and Agriculture Organization's (FAO) Crop and Grassland Service held a workshop early this year, entitled "The way forward to strengthen national plant breeding and biotechnology capacity." The workshop brought together participants of wide and varying expertise, from developing countries in Africa, Asia, and South America, in order to discuss the decline in plant breeding and how it might be remedied. For details on the workshop, download the report at http://www.fao.org/ag/AGP/AGPC/doc/themes/pb-workshop.pdf or contact elcio.guimaraes@fao.org for more information.

ANNOUNCEMENTS

BCIL AND ISAAA TO HOLD WORKSHOP

The Biotech Consortium India Ltd (BCIL), in collaboration with ISAAA, is organizing a "National Workshop on Management of Field Trials of Genetically Modified Crops" at the NAAS Lecture Hall, NASC Complex, Dev Prakash Shastri Marg, New Delhi on the 9th August 2005. The workshop is supported by the CropLife International.

The main feature of the workshop is the rolling out of Croplife International's "Model Best Practices Guidelines for the Management of Confined Field Trial of Genetically Engineered Plants" by international experts. The workshop will also provide participants an opportunity to discuss various issues related to conducting field trials of genetically modified (GM) crops in India.
For further information contact Dr. Vibha Ahuja through vibhaahuja@biotech.co.in.

NEW WEBSITE FOR TEACHING AVAILABLE

The Biotechnology Online Secondary School Resource, now available online at http://www.biotechnologyonline.gov.au/, has just been launched. Fitting in with Australian State and Territory Science curriculums, the site provides information on biotechnology meant for teachers and students of the subject, and aims to supplement current educational resources through informational text, case studies, worksheets, activities for students, and advice for teachers. It is produced and maintained by Biotechnology Australia, a government agency.

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.
