# BioLines

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**BioLines** is AfricaBio's 'Biotechnology Headlines' – a quick guide to what is topical. By design, the articles are not exhaustive, but references are given to follow up points of interest. Let us know what you like and dislike about **BioLines** and what you want to see as part of this service. Articles are edited and some shortened to meet space requirements. It is not the intention of this service to infringe on copyright. **BioLines** is issued free of charge and every effort is made to acknowledge the source of information.

**CONTENTS:**



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## NEW ALLIANCE FOR A GREEN REVOLUTION IN AFRICA

http://www.rockfound.org/Library/agra1.pdf

The Rockefeller Foundation and the Bill & Melinda Gates Foundation (BMGF) are forming a new Alliance to improve agricultural productivity and the welfare of small scale farmers in the African continent through research funding and development work. To this aim, two organizations have been created: Alliance for a Green Revolution in Africa (AGRA) and Programs for a Green Revolution in Africa (ProGRA).

AGRA will contribute to poverty alleviation through agricultural development for resource poor farmers, while ProGRA will serve as a supporting organization for redistribution, to improve the productivity and profitability of small-scale farming in Africa. The first major initiative of ProGRA will be a Program for Africa's Seed System (PASS) that will operate in 20 African countries.

“The original Green Revolution was a huge success in many parts of the world," said Judith Rodin, president of the Rockefeller Foundation. "Unfortunately, in Africa, while there are many positive efforts, momentum is going the other way. Over the past 15 years, the number of Africans living on less than a dollar a day has increased by 50%. Working with the Bill & Melinda Gates Foundation and with African leaders, farmers and scientists, we're committed to launching an African Green Revolution that will help tens of millions of people who are living on the brink of starvation in sub-Saharan Africa.”

## BIOTECH GRAPEVINE READY FOR FIELD TRIALS

http://www.sun.ac.za/news/NewsItem_Eng.asp?Lang=2&ItemID=10831

Scientists at the Institute for Wine Biotechnology at Stellenbosch University, South Africa, have developed several lines of transgenic grapevine (*Vitis vinifera*) plants with increased resistance to fungal pathogens. These lines will be tested in the field to determine the stability of the transgene, and to perform ampelographic, viticultural, and vinicultural evaluations. The transgenic plants will be grafted on year-old non-transgenic rootstocks. In order to avoid dispersal of the transgene to the environment, the flowers of the transgenic plants will be bagged to contain the pollen, and the grapevines will be covered by a net to prevent seed dispersal.

## BIOETHANOL TO TAKE ROOT IN SOUTH AFRICA

http://www.irinnews.org/print.asp?ReportID=55584

Ethanol Africa plans to construct eight bioethanol factories in South Africa, the first of which will open next year. The company, formed by a group of farmers and agronomists, is already exploring the possibility of building ethanol factories in countries like Angola and Zambia.
“Africans have the potential to become the Arabs of the biofuel industry,” Chief Executive Johan Hoffman says. Bioethanol can help South Africa by providing farm and factory jobs, and ensuring a stable market for maize, sugar, and other commodities. Ethanol Africa said it hoped to source 30% of its maize from small-scale farmers and buy whatever they brought for sale at prices set before the planting season, ensuring a steady income for farmers.

## KENYA GETS NATIONAL BIOTECHNOLOGY POLICY

http://:www.biosafetykenya.co.ke.

The government of Kenya has adopted a comprehensive national policy to guide the research, development and trade in biotechnology products, the National Biotechnology Development Policy 2006, which comes into effect immediately. According to Kenyan laws, a Policy, unlike a Bill, does not have to go through parliamentary debate. The policy has been the result of several years of debate involving all major biotechnology stakeholders and relevant government departments.

Noah Wekesa, Kenyan Minister for Science & Technology, said the policy is one of the measures the government is putting in place to chart its vision on biotechnology development and application in the country. This policy will provide those developing and applying the technology a clear framework in which to operate in order to address fears on their safety, said Wekesa. She added that the government is determined to explore the use of biotechnology for the benefit of Kenyans, and to ensure that the country becomes a key participant in the international biotechnology enterprise within a decade.

The approval and adoption of the policy now clears the way for fast-tracking the enactment of biosafety and biotechnology laws to enable the country to be compliant with international instruments governing trade in biotechnology products.

## BIOTECH CROP PLANTINGS INCREASE IN SOUTH AFRICA

http://www.fas.usda.gov/gainfiles/200608/146208636.pdf

GM crops are now widely planted in South Africa with biotech cotton accounting for approximately 92 % of total production. Of the total soybean acreage in the country, 59% was GM, while biotech corn accounted for 29%. GM maize plantings increased from 16.6% in 2005 to 29.4% in 2006. White maize varieties, a staple food for majority of South Africans, saw an increase from 8.6 % to

28.8%. These are highlights of a report on biotechnology in South Africa released by the US Department of Agricultures Foreign Agricultural Service.

The 22-page report examines the use, development, and regulation of agricultural biotechnology in the country. South Africa can play a vital role as other countries in Africa develop biotechnology policies because it has the most resources, such as scientific expertise and financial support, as well as a progressive regulatory system. Without the South African Governments leadership role in this region, the progress in agricultural biotechnology, or for that matter any technology, can be stifled by anti-technology groups, the report noted.

Although no new commercial crop is expected soon, South African scientists are doing research on new varieties of GM maize, melon, millet, lupins, soybeans, strawberries, sugar cane, cotton, apples, tomatoes, sorghum, wheat, potatoes and grapes.

## NEWS FROM OTHER COUNTRIES

### FAO CALLS FOR SECOND GREEN REVOLUTION

http://www.fao.org/newsroom/en/news/2006/1000392/index.html

"In the next few decades, a major international effort is needed to feed the world when the population soars from six to nine billion. We might call it a second Green Revolution." This was stated by Jacques Diouf, Director General of the United Nations' Food and Agriculture Organization (FAO), as he addressed a recent meeting of the World Affairs Council of Northern California in San Francisco, USA.

"The new Green Revolution will be less about introducing new, high-performance varieties of wheat or rice, important as they are, and much more about making wiser and more efficient use of the natural resources available to us," he said. Dr. Diouf was optimistic that this could be done, as tests conducted by the organization have shown that yield increases of up to 30% could be achieved through Integrated Crop Management (ICM), or improved crop management techniques. "It may sound incredible but we actually can save water and grow more food at the same time," the Director-General added.
Read the complete press release at

### GM BANANA FIELD TRIALS COMPLETED

http://www.export.gov.il/Eng/_Articles/Article.asp?ArticleID=4115&CategoryID=399

Rahan Meristem, an Israeli biotech company, has successfully completed a field trial that validates the complete resistance of their transgenic banana plants to a wide range of pathogenic nematodes. Nematodes are one of the crop's most destructive pathogens. Nematicides, though effective, have been banned in large parts of the world because of their polluting effects on the environment.

Rahan Meristem is currently involved in various breeding projects using genetic engineering. The company is also working on other crops, including almonds, apples, avocado, olives, and strawberries.

### CO-EXISTENCE MAPPED FOR Bt AND CONVENTIONAL MAIZE

http://www.blackwell-synergy.com/doi/abs/10.1111/j.1467-7652.2006.00207.x.

Most markets allow a 0.9% threshold of adventitious presence for GM organisms. At what distance should GM crops be planted from conventional ones to keep within the threshold? In "Pollen-mediated gene flow in maize in real situations of coexistence," Joaquima Messeguer and colleagues from various research institutions in Barcelona and Girona, Spain conduct the first study on cross-fertilization between Bt and conventional maize in real situations of coexistence in two regions in which Bt and conventional maize were cultivated. Their findings appear in the latest issue of Plant Biotechnology.

Scientists sampled maize from transgenic fields and analyzed them for the presence of GM DNA using the real-time quantification system-polymerase chain reaction (RTQ-PCR) technique. Researchers found that:

- In general, the rate of cross-fertilization between GM and conventional plants was higher in the borders, with decreasing rates toward the center of the field;
- In real conditions of coexistence and in cropping areas with smaller fields, the main factors that determined cross-pollination were the synchronicity of flowering and the distances between the donor and receptor fields;
- By establishing an index on the two variables, a distance of about 20 m would be sufficient to maintain the 0.9% threshold.

## PANEL REPORTS ON GM RICE ISSUE

http://www.efsa.europa.eu/en/science/gmo/statements0.html.

Consumption of imported long grain rice containing trace levels of LLRICE601 is not likely to pose any imminent safety concern to humans or animals. This is according to a statement by the European Food Safety Association's (EFSA) GMO (Genetically Modified Organisms) Panel, which evaluated the available scientific data on LLRICE601. According to the Statement, the Panel believes that there is insufficient data available to provide a full risk assessment in accordance with EFSA's GM guidance.

EFSA was asked by the European Commission (EC) to provide scientific support concerning the safety of LLRICE601, which had been inadvertently released in the United States (US) and exported to the European Union (EU).

EFSA is presently reviewing an application for LLRICE62, a similar GM rice variety produced by Bayer Crop Science.

## SPAIN APPROVES ELEVEN NEW BIOTECH VARIETIES

http://www.antama.net/imgNews/13-09-06.htm

Eleven new transgenic maize varieties, all containing the MON 810 event, have been approved in Spain in September, bringing to 45 the total number of biotech varieties that can be planted commercially in the country. This approval represents the normalization of Bt maize in the country, as farmers are now able to chose from a wide range of cultivars for those most adapted to their needs.

The approval was welcomed by Esteban Andrés, secretary general of the General Association of Maize Producers. "In times where the margin of profitability are the lowest, biotechnology is the only technology that can make the cultivation of maize in areas infested with stem borers a viable option," said Andrés in a declaration to the Antama Foundation, a not-for-profit organization committed to share information on the potential benefits of biotechnology to agriculture.

## WTO RULES IN FAVOR OF BIOTECHNOLOGY

http://www.wto.org/english/news_e/news06_e/291r_e.htm.

The World Trade Organization (WTO) recently ruled in favor of the United States, Argentina, and Canada in their WTO case against the European Union (EU) over its moratorium on approving agricultural biotech products. The WTO has also challenged product bans imposed by six EU Member States (Austria, France, Germany, Greece, Italy, and Luxembourg) on seven of the biotech crops approved by the EU prior to the adoption of the moratorium. In each case, the panel upheld claims that in light of positive safety assessments issued by European scientists, the Member State bans were not supported by scientific evidence and were thus inconsistent with WTO rules.

"Today's decision affirms what the world's farmers have known about biotechnology for many years," said US Agriculture Secretary Mike Johanns. "Since the first biotechnology crops were commercialized in 1996, we've seen double-digit increases in their adoption every single year. Biotechnology crops not only are helping to meet the world's food needs, they also are having a positive environmental impact on our soil and water resources. Farmers who grow biotechnology crops in 21 countries around the world, including 5 in the EU, stand to benefit from today's decision."

## REPORT RELEASED ON BIOTECH IN US UNIVERSITIES

http://www.milkeninstitute.org/publications/m2m.html

Five United States universities topped 683 universities worldwide for their ability to turn biotechnology research into licensing income and business startups. These were Massachusetts Institute of Technology, University of California system, California Institute of Technology, Stanford University, and University of Florida. According to a report "Mind to Market: A Global Analysis of University Biotechnology Transfer and Commercialization released by the nonprofit Milken Institute, US universities dominated the top 50 of the universities studied.

Milken Institute examined the biotechnology transfer process in universities from knowledge creation to technology transfer and early-stage commercialization. Among the key findings were:

- Harvard University ranks first in terms of biotech research, as measured by papers and citations, followed by the University of Tokyo and University of London.
- The University of Texas system scores first on the Biotech Patent Composite Index, followed by U.C. San Francisco. The University of London ranks first among foreign universities (10th overall).
- Among U.S., Canadian and European universities, the United States leads in invention disclosures, patents filed and granted, licenses executed and licensing income. However, European universities surpass their U.S. counterparts in startups established.
- Research activity has a high rate of return. Each 10-point increase in research papers score contributes an additional $1.7 million in annual licensing income.
- Investments into offices of technology transfer (OTT) also offer high returns. For every $1 invested in OTT staff, the university receives a little more than $6 of licensing income.

## ICRISAT PROMOTES THE POTENTIAL OF BIOFUELS

http://www.icrisat.org.

The world's drylands can contribute to a bio-fueled future, and the challenge and opportunity for those interested in developing biofuels are to ensure that the dryland poor are not left behind. This was stated by Dr. William Dar, Director General of the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), in a document now available on the ICRISAT website.

Dr. Dar takes a look at the prospects of developing bioethanol and biodiesel in India, both of which are attractive alternatives to increasingly expensive fossil fuels. The cost of ethanol production is no constraint; rather, it is the supply of raw materials for production that is hampering India's ethanol industry. This is where ICRISAT and partners come in: instead of using leftover molasses from sugar refining, ICRISAT is working on sweet sorghum. This little known dryland crop stores large quantities of energy as sugar in its stalk while producing reasonable grain yields. This sugar can be fermented into ethanol more cheaply than from molasses and with even greater energy savings compared to maize grain.

As in bioethanol, raw materials are in short supply for biodiesel in wasteland areas. ICRISAT is working with a private company on the possibility of using sweet sorghum, along with two other dryland species that can contribute to better biodiesel production: *Pongamia pinnata*, a leguminous tree adapted to wetter wastelands with problem soils; and *Jatropha curcas*, a more drought-tolerant shrub adapted to well-drained wastelands. Both produce fruits containing about 35% oil suitable for bio-diesel.

## Bt NEEDS HELP TO KILL MOTH

http://www.news.wisc.edu/12934.html

A clean gut means survival for larvae of gypsy moth fed with *Bacillus thuringiensis* (*Bt*), a widely used organic pesticide. Researchers at the University of Wisconsin-Madison, USA, counter the wide belief that *Bt* activity alone is needed to cause the insects' death. Scientists determined that native bacteria in the moth's gut need to be present for *Bt* to be lethal. "Ultimately, this is a toxin-mediated septicemia (blood poisoning) modulated by the gut community", write the authors. The team published the findings in a recent issue of the Proceedings of the National Academy of Sciences (PNAS).

Results of the research may have implications in managing the deployment of the *Bt* technology. "The work also raises the possibility that the genes encoding the (*Bt*) toxins could be deployed more effectively in transgenic crops by exploiting the role of insect-borne bacteria that enhance insecticidal activity," writes the researchers in the PNAS report.

## AGORA PROVIDES GLOBAL ACCESS TO AGRIC INFO

http://www.fao.org/newsroom/en/news/2006/1000406/index.html.

The Food and Agriculture Organization (FAO) recently announced the launching of the second phase of the Global Online Research in Agriculture (AGORA) initiative, which will provide more countries with access to leading food and agriculture journals for little or no cost. The public-private partnership between FAO, some of the world's leading science publishers and other key partners including the World Health Organization and Cornell University, was formed in response to the needs of thousands of students, researchers and academics in poorer countries for better access to important agricultural information.

"In less than three years, AGORA has already helped bridge the knowledge gap by providing 850 institutions access to over 900 journals in the areas of agriculture and related subjects," notes Anton Mangstl, Director of FAO's Library and Documentation Systems Division. Through AGORA, public and private sectors are making an important contribution to the achievement of the United Nations Millenium Development Goals by providing essential information to improve the standards of poor countries.

## BIOTECH TOMATOES FOR EDIBLE MALARIA VACCINES?

http://dx.doi.org/10.1016/j.mehy.2006.04.079

Malaria affects 300–500 million people annually, and over two billion individuals reside in areas where the disease is endemic. A proposal to deliver malarial vaccines using tomatoes, published recently in the journal *Medical Hypothesis*, was forwarded by Kamal Chowdhurya and Omar Bagasra at Chaflin University, South Carolina. Tomatoes with different antigens for malaria would be identified by the different fruit sizes, shapes and colors. By using edible vaccines, the authors hope that the logistical difficulties in immunizing over a million children living in malaria prone areas can be overcome, at a fraction of a cost of a regular vaccination.

"Our hypothesis is to immunize the children/infants by feeding them one variety of tomato at a time, 3–6 weeks apart", said the researchers. The researchers expect that the low dose of antigens that are administered should be enough to trigger an immune response, protecting the children from the malarial parasite in the future.

Several challenges need to be resolved before tomato can be used to produce these biopharmaceuticals. Among these include the development of tomato lines with consistent high gene expression levels; and conducting studies assessing the risks of out-crossing among the transgenic crop and their close relatives via pollination.

## FOOD SHORTAGES THREATEN 40 COUNTRIES, SAYS FAO REPORT

http://www.fao.org/newsroom/en/news/2006/1000416/index.html

The Food and Agriculture Organization (FAO)s report Crop Prospects and Food Situation says that 40 countries face a food crisis with Darfur in Sudan in a precarious food supply situation that may worsen with security problems.

The world cereal harvest in 2006, the FAO report warns, has deteriorated due to exceptionally hot and dry weather in countries like Australia, Argentina, and Brazil. South Asia is also experiencing drier-than-normal weathers that may affect second paddy crops. FAOs forecast for cereal production is about 1.6% less than that of the 2005 level. A global concern will thus be the declining stock of food and inadequacy of supplies to meet demand amidst surging world prices, the report noted.

## NOTICE BOARD

**3 – 8 November 2006 -** The Permanent Inter-State Committee for Drought Control in the Sahel (CILSS) has embarked on a process of harmonization of GMO regulations since 2001 to facilitate and secure trade between sub-regional countries. The course "The Bio-safety of Genetically Modified Plants, with Special Reference to Ecological Impacts" intends to address the environmental aspects of GMO utilization, will be held in Niamey, Republic of Niger. The workshop will bring together about twenty participants working in the fields of agricultural products and by-products, seed, and/or GMO quality control. Applicants must be citizens of the following CILSS Member States: Burkina Faso, Cape Verde, The Gambia, Guinea Bissau, Mauritania, Niger, Mali, Senegal, and Chad. Some places are reserved for self-sponsored candidates. For more information see: http://www.agrhymet.ne/PDF/Atelier_biodiversite_eng.pdf.

**9 – 10 November 2006 -** The Research and Information System for the Non-Aligned and Other Developing Countries (RIS) of India is organizing with the Biotechnology Coalition of the Philippines and other institutions the Asian Conference on Biotechnology and Development, to be held in Manila, Philippines, on November 9-10. The conference aims to bring together representatives of different stakeholders in order to review and discuss the issues surrounding biotechnology, and to identify how this technology can be used to spur development and growth of countries within the Asian region. More information on this event is available: http://www.bcp.org.ph/asianbio2006/about/index.htm

**28 November 2006** - "Plant-derived Natural Products: A Resource for Bioactive Compounds" will be held in Bracknell, Berkshire, United Kingdom. This meeting will discuss the opportunities for optimizing naturally-based remedies in medicine, new plant-based approaches to crop protection and how vitamin deficiencies can be alleviated simply, cheaply and effectively. It is an opportunity to debate these issues and identify the way forward, assess the opportunities, applaud the successes and look to the promises for the future. Read more at http://www.soci.org/SCI/events/details.jsp?eventID=EV858.

**November 2006 -** The SAARC (South Asian Association for Regional Cooperation) Agricultural Information Center (SAIC) is organizing a Regional Workshop on Research–Extension Linkages for Effective Delivery of Agricultural Technologies in SAARC Countries. To be held at the National Academy of Agricultural Research Management in Hyderabad, India, the workshop aims to study national policy processes providing facilitating framework and practices for establishing stronger agricultural research - extension linkages; highlight the technical, economic and institutional conditions influencing development of collaborative linkages between research and extension systems; and improve agricultural communication between research and extension organizations. The proceedings of the workshop will be published by SAIC and widely distributed for follow-up actions by the relevant institutions. Further details can be obtained at http://www.saic-dhaka.org/Regional%20Workshop.html

**November 2006 -** Three one-week workshops of the International Training Program on Plant Genetic Resources will address topics in conservation and the use of plant genetic resources and seeds. These will be held in Iran, and will include in situ and ex situ conservation strategies (November 4-8, 2006); Support of local seed supply and small-scale seed enterprises (November 11-15, 2006); and genetic resources, rights, and institutional policies (November 18-22, 2006). For more information, visit http://www.aarinena.org/rais/documents/Conferences/TrainingW/IPGRI2006Iran/IPGRIWS2006iran.htm.

**November 2006 -** The Associated Chambers of Commerce and Industry of India (ASSOCHAM) have organized a Summit on Green Revolution II: Knowledge Agriculture. This will be held in New Delhi, India. The summit is being organized in partnership with the Indian Council for Agricultural Research, Government of India. The focus of the summit is on Knowledge Agriculture and its role in the resurgence of rural India. For more information, visit http://www.assocham.org/.

**21 – 26 January 2007 -** "Temperature Stress in Plants" will take place in Ventura, California. The program will cover the physiology, biochemistry, and genetics/genomics of plant responses to

high and low temperatures. In addition to model species, important issues regarding agronomic, horticultural and ornamental species will be addressed. In order to be considered for an oral presentation, submit abstracts November 1, 2006. For more information, visit http://www.grc.uri.edu/programs/2007/tempstrs.htm.

**26 – 29 March 2007 -** The third general meeting of The Rockefeller Foundation program on "Biotechnology, Breeding, and Seed Systems for African Crops" will be held in Maputo, Mozambique, and will be co-hosted by The Rockefeller Foundation and the Instituto de Investigação Agrária de Moçambique (IIAM). The Rockefeller Foundation grantees working on the genetic improvement and seed systems of African crops, plus many other individuals, who are interested in this work, are invited to attend. For more information, visit http://www.africancrops.net/rockefeller/icv3/.

**Dr. Margaret Karembu** has been appointed as the new Director of ISAAA's AfriCenter, based in Nairobi, Kenya. Dr. Karembu obtained her PhD in Environmental Sciences Education from Kenyatta University, and is experienced in both formal and non-formal training of environmentalists, farmer groups, science communicators, journalists, training of trainers (TOT), as well as use of participatory training methodologies. As Director, she will be in charge of managing and implementing selected ISAAA-facilitated projects in Africa. Find out more about the AfriCenter at http://www.isaaa.org/africenter.

**ILRI RECRUITING A BIOSCIENCES RESEARCH SUPPORT SCIENTIST -** The Africa-based, globally networked International Livestock Research Institute (ILRI) is seeking to recruit a Biosciences Research Support Scientist to facilitate capacity building through strategic planning, technical coordination, implementation and monitoring of research projects within the Biosciences eastern and central Africa (BecA), a new center for excellence in modern biology in Africa hosted by ILRI. The position will be based in Nairobi, Kenya. For further details and requirements write to recruit-ilri@cgiar.org (quoting Ref: BRSS/T4/10/2006) or visit http://www.biosciencesafrica.org and http://www.ilri.org.

**IPGRI CHANGES NAME -** The International Plant Genetic Resources Institute will be known as Biodiversity International or Biodiversity from December 2006. Emile Frison, IPGRIs Director General said in a statement that this move will reflect the current organizations strategy which focuses on improving peoples lives through biodiversity research. The organization is the world's largest international institute dedicated to the conservation and use of plant genetic resources. For more details visit: http://www.ipgri.cgiar.org/ institute/NewName.htm.

**CAPACITY BUILDING PROGRAM IN AGRICULTURAL TRADE POLICY -** The International Agricultural Trade Research Consortium (IATRC) has received a grant from the William and Flora Hewlett Foundation to sponsor participation of a select group of developing country researchers in two IATRC meetings per year. The purpose of the three-year program is to provide researchers in government and academia, who are concerned with agricultural trade and policy, an opportunity to increase their analytical capacity and broaden their research networks. For more information, eligibility criteria, and details on how to apply, visit http://www.iatrcweb.org/CapBuildProgram/capacity.htm, or contact Linda M. Young (1-406-994-5604 or lmyoung@montana.edu).

**MONSANTO ARGENTINA OFFERS FREE ONLINE BIOTECH COURSES -** Monsanto Argentina is offering three online electronic biotechnology courses free of charge open to anyone wishing to know more about biotechnology. The first course, Basic Biotechnology, offers an overview of biotechnology today, explains terms and definitions, and describes the regulation and requirements necessary for the commercialization of biotech crops. Two additional courses, Bt Maize and herbicide resistant Maize (RR Maize), are open to those who have completed the basic course. The courses are in Spanish and have an average duration of one month. Visit: http://www.monsanto.com.ar/h/cursos.php for more information.

**BIOSAFETY IN PLANT BIOTECHNOLOGY -** The Università Politecnica delle Marche, Italy, is offering a 12-month E-learning master in Biosafety in Plant Biotechnology based on a

combination of distance-learning and on-campus training sessions. The course is distinctively interdisciplinary with students and faculty from natural and social sciences, and it leads to an accredited diploma. The program is supported by the United Nations Industrial Development Organization (UNIDO). Deadline for submission of applications is 31 October 2006. For further details visit: http://193.205.134.131/Entra/Engine/RAServePG.php/P/3374110800/M/3276110807 or contact Prof. Bruno Mezzetti at b.mezzetti@univpm.it.

**SURVEY ON SUSTAINABLE DEVELOPMENT -** The Food and Agriculture Organization (FAO) is conducting a world-wide survey to determine the role and impact of Information and Communication Technologies (ICT) in agriculture, for the promotion of sustainable development. Results from survey will help better to define the role that digital technologies can have in improving information exchange and communication related to agriculture. The survey may be completed in English, Spanish or French at: http://www.fao.org/rdd/eagsurvey/index_eag.asp?lang=en&ref=