

CropBiotech Update



INTERNATIONAL SERVICE
FOR THE ACQUISITION
OF AGRI-BIOTECH
APPLICATIONS

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

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FAO ON MARKER-ASSISTED SELECTION

A comprehensive assessment on Marker-Assisted Selection (MAS) by the Food and Agriculture Organization (FAO) was conducted to evaluate the technology and to determine the reasons behind its “apparent failure to deliver its promise”. Shivaji Pandey, the Chairperson of the FAO Working Group on Biotechnology, emphasized that while the technology can “revolutionize” the way varieties and breeding stocks are developed, there are several requisites that need to be in place before the full potential of MAS is realized. Pandey cited reasons such as: high costs involved in laboratory infrastructure; equipment needed for generating data; data handling and management capabilities; presence of well-qualified staff; and good funding. In addition, the application of the technology can only be fully realized when well-structured breeding programs are already in place, which is often not the case in many developing countries. The technology must also be used only when there is a clear advantage over traditional selection techniques.

Please see the full report press release in

<http://www.fao.org/newsroom/en/news/2007/1000630/index.html>

To obtain a copy of the report please send an e-mail to nadia.sozzi@fao.org.

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LOW-INCOME FOOD-DEFICIT COUNTRIES MAY SUFFER FOOD INSECURITY IN 2007 – FAO REPORT

A slowdown in cereal production and prospects for continued high international prices could result in tighter food supply situation in low-income food-deficit countries, according to the latest Crop Prospects and Food Situation report by the Food and Agriculture Organization. In Africa, in countries such as Morocco, Zimbabwe, Namibia, Lesotho, and Swaziland, grain production is severely affected by drought. In Somalia, output is anticipated to be reduced due to irregular rains in the main growing areas.

In the Democratic People's Republic of Korea the food supply outlook remains precarious, but the first shipment of rice food aid from the Republic of Korea reportedly arrived in late June. Many districts in Nepal are also estimated to be food deficient. Chronic and widespread food insecurity prevails in the Far- and Mid-West mountain regions, where food assistance to vulnerable populations remains limited. The overall food security situation in Iraq continues to be adversely affected by conflict and security problems. In the Americas, Bolivia remains affected by serious crop and livestock losses following drought and floods during the main cropping season earlier this year.

Read the press release at <http://www.fao.org/newsroom/en/news/2007/1000628/index.html>.

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ONE SPECIES, MANY GENOMES: HOW PLANTS ADAPT TO LOCAL ENVIRONMENTS

How do you distinguish between a wild variety of *Arabidopsis thaliana* and a lab strain? Just look at their genomes. Scientists in Germany and the United States were surprised that on average, every 180th DNA building block of the

Arabidopsis genome is variable. And about four percent of the reference genome (the sequenced genome of a lab strain of the plant) either looks very different in the wild varieties, or cannot be found at all. In their study, the researchers compared the genetic material of 19 wild strains with that of the genome of the lab strain. They examined every one of the roughly 120 million building blocks of the genome.

Detailed analyses showed that genes for basic cellular functions such as protein production or gene regulation rarely vary. Genes that are important for the interaction with other organisms, on the other hand, such as those responsible for defense against pathogens or infections, are much more variable.

"The genetic variability appears to reflect adaptation of local circumstances," says Detlef Weigel from the Max Planck Institute for Developmental Biology. It is likely that such variable genes allow plants to withstand dry or wet, hot or cold conditions, or make use of short or long growing seasons. Weigel is already collaborating with the International Rice Research Institute (IRRI) in the Philippines to apply the methods and experience gathered with *Arabidopsis* to twenty different rice varieties.

Read the news article at http://www.mpg.de/english/illustrationsDocumentation/documentation/pressReleases/2007/pressRelease_20070718/index.html

AFRICA

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SOUTH AFRICA INCLUDES BIOTECH IN 10-YEAR PLAN

The South Africa Cabinet has recently approved its Ten-Year Innovation Plan for South Africa (2008-2018). It includes biotechnology as an essential part of the plan. In "Innovation Towards A Knowledge Economy" where the Plan was presented, Dr. Phil Mjawara, Director General of the Department of Science and Technology, stressed that South Africa is positioning itself for the knowledge economy and innovation was deemed to be a key ingredient. Research and development investment by government, Mjawara said, was important to increase "both the capacity to innovate internally and the capacity to absorb external innovation." He identified grand challenges for science and technology, among which was the need to leverage research and development investments and see to the growth of the biotechnology industry.

Highlights of the Cabinet meeting are available at <http://link2media.co.za/PrView.cfm?id=2328217>. Additional information provided by Margaret Karembu of the East and Central Biotechnology Information Center in Nairobi.

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BIOTECHNOLOGY IN SOUTH AFRICA: AN ANNUAL REPORT

The U.S. Department of Agriculture's Foreign Agriculture Service (USDA-FAS) has published a full report on biotechnology in South Africa, including the status and the extent of GM plantings in the country. The success of GM adoption in South Africa is likely due to the progressive South African Regulatory System and the presence of scientific expertise and financial support. Biotechnology regulatory matters are discussed and decided by an Executive Council composed of representatives from eight South African governmental departments. South Africa can set the model in this part of the world in developing biotechnology policies. However, as with other countries with strong anti-GM movements, the process of approving new GM crops has also slowed down in recent times.

The 21-page report can be viewed online at <http://www.fas.usda.gov/gainfiles/200707/146291657.pdf>

AMERICAS

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BIO LAUNCHES AGRI-BIOTECH PROGRAM

The Biotechnology Industry Organization (BIO), a US-based inter-sectoral group for biotechnology information, advocacy and business support, launched "Excellence through Stewardship: Advancing Best Practices in Agricultural Biotechnology". This industry-coordinated effort aims to enhance regulatory compliance and product quality for consumers. BIO says the program intends to promote the responsible management of agricultural biotechnology; the continued adoption of plant biotechnology globally; and the enhanced value of biotech-derived plant products in the marketplace.

The three main components of the program are:

- Adoption of quality management principles and management practices for maintaining plant product integrity that outline the basic tenets of the Excellence through Stewardship program.
- Publication of a Quality Management Program Guide for BIO member companies and others involved in agricultural biotechnology research and development to use for understanding and implementing their own best practices.
- Adoption of an independent, third-party Stewardship Audit Program designed to verify implementation of stewardship programs, and confirm quality management systems and compliance with principles and management practices.

Read BIO's press release at <http://www.bio.org>

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US SCIENTISTS BREED DISEASE-RESISTANT PLANT FOR AFRICA

Michael Timko, a Professor of Biology in the University of Virginia, is helping African breeders to develop the resistance of cowpea to the weed Striga in West Africa. He and other scientists have sequenced the cowpea genome and are using this information to speed up and improve the breeding process by modern molecular-based technologies.

Cowpea is a primary protein source for millions of people. About 80 percent of the world's cowpea crop is grown in Africa, mostly by subsistence farmers. The entire plant is used for food, and for hay and fodder for cattle. However, the *Striga gesnerioides*, or "witchweed," is so virulent that farmers must relocate their cowpea crop to new soil every few years. Timko's approach is to improve the performance of plants by identifying genes that control key characteristics, and then use this knowledge in selective breeding programs that emphasize those traits using associated genetic markers. The resulting product is the delivery of improved parasite-resistant hybrids to the farmer in shorter amounts of time.

Read the full press release at <http://www.sciencedaily.com/releases/2007/07/070722111035.htm>

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FIELD TESTING BUGS WITH A TASTE FOR SOYBEAN APHIDS

Aphids feeding on soybeans were introduced in Minnesota in 2000, and currently account for losses of \$200 million

annually in production loses and chemical pest control. Scientists of the University of Minnesota are currently testing a beneficial insect that could be used as a biological control agent: *Binodoxys communis*, a stingless wasp that kills soybean aphids.

"The soybean aphid was imported without any of its natural enemies, the organisms that keep aphids in check in China," said Dave Ragsdale, a University of Minnesota entomologist. "Our researchers and extension experts are working to provide that check-and-balance system in Minnesota."

More information is available at

http://www1.umn.edu/umnnews/Feature_Stories/A_bugeatbug_world.html

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NATURAL FUNGICIDE FIGHTS GARLIC WHITE ROT

"White rot" is a fast-spreading and persistent fungus responsible for decimating California's garlic acreage, which produces 86% of the national garlic production. In order to control this pest, scientists at the University of California, Davis, have developed a natural fungicide that is between 95-99% effective against white rot.

This fungicide is however no conventional treatment, as the fungicide must be applied to the field a season before a farmer wishes to cultivate garlic. The active ingredient is a garlicky-smelling compound, named DADS (for diallele disulfide), found naturally in garlic and onions. When applied to the soil, DADS tricks white rot spores into germinating, but in the absence of the crop, the fungus dies through lack of food. Researchers hope the fungicide can be used as part of an integrated pest management strategy for white rot.

"I'm optimistic that this fungicide will enable growers to produce a profitable crop on infested fields," said Mike Davis, UC Davis plant pathologist. "The next phase of our research, a demonstration project beginning this fall, will focus on how this compound performs in a commercial field."

Read more at

http://www.news.ucdavis.edu/search/news_detail.lasso?id=8250

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RESEARCH NET SET TO IMPROVE VEGETABLE PRODUCTION IN BRAZIL

The production of Curcubitaceae, a family that comprises pumpkins, melons, cucumbers, generates a yearly income of about R\$300 million (US\$158 million) in Brazil. In order to improve the sustainable production of these crops for resource poor farmers, EMBRAPA, the Brazilian Corporation for Agricultural Research, has established in partnership with universities, farmers' unions and cooperatives, the Participative Network for Research and Development of the Genetic Resources of the Curcubitaceae.

Maria Aldete Ferreira, researcher at EMBRAPA Genetic Resources and Biotechnology, explains that families have traditionally grown these crops for their own consumption, and sold the excess for cash. The seeds they use are local, and have been conserved through generations. "The aim of the initiative is to stimulate production for sale, and teach farmers to produce crops of enhanced quality" says Aldete Ferreira.

To this objective, EMBRAPA has already conducted three training workshops for farmers in states of Ceará, Minas Gerais and the Federal District. Farmers are shown best practices for cultivation of these crops, and learn how to differentiate between different varieties of Curcubitaceae.

More information at

<http://www.agenciabrasil.gov.br/noticias/2007/07/17/materia.2007-07-17.2692410494/view>

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MANAGING AGRI_BIOTECH IN COLUMBIA

Three key aspects for agricultural biotechnology development are needed in Columbia. Ingrid Schuler of the Departamento de Biología, Universidad Pontificia Javeriana and Luis Antonio Orozco of the Universidad de los Andes in Colombia, enumerate the following:

- A substantial increase in investment focused on the development of patentable industrial applications using biodiversity and genetic resources.
- An increase in efforts of governmental and non governmental institutions in implementing and applying regulations on biosafety, intellectual property rights and access to genetic resources, thereby stimulating investment and innovation.
- Provision of opportunities for open discussion and wide dissemination of information that will enhance the decision-making capacity of consumers and the general public.

The article "Managing agricultural biotechnology in Colombia" is available online at <http://www.ejbiotechnology.info/content/vol10/issue3/full/15/index.html>.

ASIA AND THE PACIFIC

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ENVIRONMENTAL CONCERNS BOOST AUSTRALIAN SUPPORT FOR GM FOODS

Biotechnology Australia, a government agency tasked with managing the National Biotechnology Strategy and with coordinating non-regulatory biotechnology issues, has released a survey showing that the Australian public support for genetically modified (GM) food crops has increased from 46 per cent in 2005 to 73 per cent in 2007. This positive perception is attributed mainly to the role that GM foods play in countering drought and pollution. Respondents in the study placed the highest values on the following biotechnology applications:

- cleaning up pollution (97 per cent support);
- developing environmentally-friendly vehicle fuels (97 per cent);
- recycling water more effectively (96 per cent);
- helping address climate change (91 per cent); and
- combating salinity (90 per cent).

The full study can be found at <http://www.biotechnology.gov.au/reports>. Read Biotechnology Australia's press release at <http://www.biotechnology.gov.au/index.cfm?event=object.showContent&objectID=DCEAD39B-D2FA-0E45-120609745D799F3E>.

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BIG BOOST FOR HIGH FIBER GRAINS RESEARCH IN AUSTRALIA

A High Fiber Grains Research Cluster composed of the Universities of Queensland, Adelaide, Melbourne and the CSIRO will combine their skills and resources in developing wheat with improved health benefits and heightened value for the grains industry. This cluster will function through the Food Futures National Research Flagship.

"Dietary fiber contains a range of plant compounds and cellular structures that resist digestion and have the potential to lower plasma cholesterol and glycaemic index, as well as to promote regularity and improve bowel health that could help resist cancers and chronic diseases" Professor Gidley says. The Cluster will focus on the biggest source of fiber in grains - non-starch polysaccharides (NSP) of the plant cell wall: understanding its functions, the biosynthetic controls, developing strategies to manipulate their levels and composition in grains. The Cluster will invest more than \$A12.7 million in the collaboration over three years, with the university partners receiving more than \$A3.6 million directly from the Flagship Collaboration Fund.

See press release in <http://www.csiro.au/news/HiFiClusterMedRel.html>

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VIETNAM TO SET UP HI-TECH R&D CENTERS

Can Tho province in Vietnam will soon have three agricultural research and development centers devoted to the use of advanced technology for developing new plant and animal varieties. The main facility will serve as a venue for research and academic interfaces, while the two auxiliary centers will be devoted to research in agricultural production. Priority projects will be plant breeding, the development of orchards, and expansion of vegetable plantations.

Support activities to be provided by the centers include human resources training, and the improvement of management and product quality. Fine-tuning a rice processing system to meet the standards in the European Union and the US has also been included in the development program.

For more information, contact Hien Le of Agbiotech Vietnam at hientttm@yahoo.com.

EUROPE

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REPORT OFFERS TIPS FOR A SUCCESSFUL BIOTECHNOLOGY SECTOR

A report from the European Commission, a product of the BioPolis Initiative, compared the national biotechnology policies across Europe. All 27 member states of the European Union as well as Switzerland, Norway and Iceland, and the candidate countries Croatia and Turkey were included in the study.

Data collected during the study includes: biotechnology research and development (R&D) spending by public bodies; policy measures designed to foster the sector; the number of scientific publications and their citation rates; the number of patents applied for; and the number of skilled staff working in the non-profit sector.

Several recommendations were made for a successful performance: there should be a coordination of policy actions that address the core innovation policies such as science, technology and education, public health and regional development; promote basic research and the development and commercialization of products and services; focus on certain points where the country has a niche; and develop collaborations with other countries.

For more information and to download the report, visit:
http://ec.europa.eu/research/biosociety/index_en.htm

RECOMBINANT DNA, PROTEINS OF GM FEED DEGRADE IN GI TRACT - EFSA

In response to a request made by the European Commission to investigate the potential for transgenes or their products to be incorporated into animal tissues or products such as eggs and milk, the European Food Safety Authority (EFSA) recently prepared a literature survey on the fate of recombinant DNA of genetically modified (GM) feed within the gastrointestinal tract of livestock. EFSA has concluded that biologically active genes and proteins are common constituents of foods and feed of varying amounts. A rapid degradation into short DNA or peptide fragments is observed in the gastrointestinal tract of animals and humans. A large number of experimental studies on livestock have also shown that recombinant DNA fragments or proteins derived from GM plants have not been detected in tissues, fluids, and edible products of farm animals.

To read the complete report, visit http://www.efsa.europa.eu/etc/medialib/efsa/science/gmo/statements.Par.0002.File.dat/EFSA_statement_DNA_proteins_gastroint.pdf.

EU BIOTECH INDUSTRY URGED MEMBER STATES TO ADDRESS ISSUE OF ZERO TOLERANCE

The European biotech industry announced its support for the European Commission Director-General for Agriculture and Rural Development Report on the Economic Impact of Unapproved GMOs on EU Feed Imports and Livestock Production. It also calls on institutions to urgently address the issue of low-level presence of European Union (EU)-unapproved GM materials entering Europe in traded commodities. The EU continues to apply a zero tolerance for EU-unapproved GM materials being present in low levels in imported products. The industry has urged Member States to keep pace with approvals in other regions of the world, many of which are key trading partners of the EU. Imports of essential GM derived feed and food products may slow down considerably or come to a halt, as traders would be unwilling to assume the risk of having traces of EU non-authorized biotech crops detected in their shipments.

To read more, visit http://www.europabio.org/articles/Final_Low_Level_Presence_Reference_and_Key_messages_docume....pdf.

Research

MARKER-FREE PLANTS FROM LEAF DISC AGROINFILTRATION

A technique called agro-infiltration was touted to be an excellent and efficient method for producing marker-free transgenic tobacco plants. The method was demonstrated to have an average transformation efficiency of about 15%, compared to just 0.7% when the conventional procedure of *Agrobacterium* co-cultivation was employed, said researchers in the University of Antwerp, Belgium.

The marker-free tobacco plants were regenerated from leaf discs transformed with marker-free plasmid vector

containing the gene β -glucuronidase (GUS). The difference between co-cultivation and agro-infiltration is that in the latter, the researchers subjected the leaf discs to a vacuum treatment after immersing them in the bacterial suspension.

Agro-infiltration has been regarded as a powerful tool in various studies. It is routinely used to study transient gene expression in plants. Its added utility in producing marker-free transgenic plants may help crop breeders in addressing the biosafety concerns on selectable markers raised by stakeholder groups.

For the details, the research paper published in Plant Cell Reports may be accessed by subscribers at <http://www.springerlink.com/content/f152466671270750/>.

URGENT NEED TO CONSERVE VANILLA GENETIC RESOURCES

A comprehensive review on the worldwide efforts for the *ex-situ* preservation (for example in botanical gardens and seed banks) of vanilla genetic resources was recently presented by researchers in France. Vanilla is a member of the orchid plant family. According to authors Severine Bory and colleagues, results of studies dealing with the taxonomy, reproductive biology and diversity of vanilla, specifically *Vanilla planifolia*, suggest the urgent need for conserving the genetic resources of the species.

Commercial vanilla flavoring is extracted from the vanilla species *V. planifolia*. Various factors, which include over-collection in the wild and deforestation, led to the extinction of wild populations of the species. Bory's group recommends that maintenance of germplasm in field or *in vitro* collections in genebanks is essential in perpetuating the existing genotypes to make them available for vanilla breeding and production. They added that collaborative international efforts should help protect vanilla in its area of origin, where it is highly endangered.

For more information, subscribers may access the review article published in Genetic Resources and Crop Evolution at <http://www.springerlink.com/content/p1k3k0288m4v0513/>.

GM GERANIUM WITH IMPROVED OIL QUALITY

Oils extracted from rose-scented geranium species have many uses in the perfumery, cosmetic, food and pharmaceutical industries. Because of the importance of essential oils from geraniums, researchers are seeking ways to increase oil yield and quality in the species.

Indian researchers report that one method that can help improve geranium oil quality is the hairy root transformation method. The group of Gauri Saxena produced transgenic geraniums from the cultivar 'Hemanti' using *Agrobacterium rhizogenes* mediated re-insertion. Hairy root cultures from Hemanti were produced by wounding explants with sterile needles dipped in bacterial suspension. The wounded explants were subsequently grown in a tissue culture medium.

The researchers reported that two of their transgenic lines differ in oil composition profiles from the non-transformed control. The transgenics have oils that have low concentration of citronellol and high concentration of geraniol. In addition, there are higher levels of compounds called geranyl esters which improve olfactory value.

For more information, the paper published in Plant Cell, Tissue and Organ Culture can be accessed by subscribers at <http://www.springerlink.com/content/b5j878x1g30v8233/>.

REVIEW: IMPROVING CONTAINMENT STRATEGIES IN BIOPHARMING

The review, authored by Denis J. Murphy of the Biotechnology Unit, University of Glamorgan, UK, examined the challenges of segregating biopharmed crops expressing pharmaceutical or veterinary agents from mainstream crops, particularly those destined for food or feed use. The strategy of using major food crops as production vehicles for the expression of pharmaceutical or veterinary agents was critically analyzed in the light of several recent episodes of

contamination of the human food chain by non-approved crop varieties.

Commercially viable strategies to limit or avoid biopharming intrusion into the human food chain require a more rigorous segregation of food and non-food varieties of the same crop species via a range of either physical or biological methods. Even more secure segregation is possible by the use of non-food crops, non-crop plants or *in vitro* plant cultures as production platforms for biopharming. In the current atmosphere of heightened concerns over food safety and biosecurity, the future of biopharming may be largely determined by the extent to which the sector is able to maintain public confidence via a more considered approach to containment and security of its plant production systems.

Subscribers can access the review in

<http://www.blackwell-synergy.com/doi/abs/10.1111/j.1467-7652.2007.00278.x>.

Inquiries can be directed to dmurphy2@glam.ac.uk

Announcements

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THE INTERNATIONAL CENTRE FOR GENETIC ENGINEERING AND BIOTECHNOLOGY (ICGEB) WORKSHOPS

The ICGEB will be holding several courses and workshops on biosafety and agricultural biotechnology. These include : 1) a workshop on "Biosafety of GM crops and the evolution of regulatory frameworks: Issues and challenges," September 24-28, 2007 in Minas Gerais, Brazil; 2) a practical course on "Evaluation of risk assessment dossiers for the deliberate release of genetically modified crops," October 8-12, 2007 in Ca' Tron di Roncade, Italy; 3) a theoretical and practical course called "Molecular approaches in gene expression analysis for crop improvement," October 8-19, 2007 in New Delhi, India; and 4) a theoretical and practical course entitled "Insecticidal proteins: Application and regulatory issues," November 12-23, 2007 in New Delhi, India. ICGEB offers a number of one- to two-week workshops and training courses throughout the year.

Information on this year's courses and workshops is available online at

<http://www.icgeb.trieste.it/MEETINGS/CRS07/Meetings2007.htm>

SEA PAPAYA NETWORK VIDEO NOW AVAILABLE

"Nurturing the Seeds of Cooperation: The Papaya Biotechnology Network of Southeast Asia" is a 17-minute video that documents the collaborative efforts of various stakeholders and partners to develop Papaya Ringspot Virus (PRSV)-resistant papaya, and papaya with delayed ripening trait. The video highlights public-private partnerships and how member countries of the network have benefited through the capacity building efforts, and technology and information sharing initiatives. For more information about the video, email knowledge.center@isaaa.org.

BIOMED CENTRAL'S PORTAL FOR OPEN ACCESS FOR DEVELOPING COUNTRIES

BioMed Central has just introduced a new information portal calling attention to the developing world's need for open access to the scientific and medical literature. The site aims to provide resources about open access and internet technologies in the developing world, and to disseminate research published in open access journals that are of relevance to developing countries.

Access the site at:

<http://www.biomedcentral.com/developingcountries/>

ERRATUM

In the last issue of the Crop Biotech Update, the article "Indo economist bats for biotech" should have identified Dr. Bustanul Arifin as an economic observer from the Institute for Development of Economics and Finance (INDEF) in Indonesia.

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