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SPECIAL SECTION:
A TRIBUTE TO INFLUENTIAL PLANT BREEDERS

In this April edition tributes to**:**

Peter R. Jennings
Stanley J. Peloquin
Heiko K. Parzies
Hartwig H. Geiger
CIMMYT's Plant Breeders

1. NEWS, ANNOUNCEMENTS AND RESEARCH NOTES

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Special Section: A tribute to influential Plant Breeders

Peter R. Jennings, a renowned rice breeder for his contribution to the green revolution in rice, is celebrated not only for his scientific achievements but also for inspiring a generation of younger scientists who went on to become distinguished in their own fields. At his 80th birthday, Peter still maintains his sharp and extraordinary ability to dissect and find solutions to complex problems.

Several options and routes are presented to us in our life that can lead us to unexpected journeys. One never knows where one of them would take us nor if our dreams and expectations would come through. If we find someone at the crossroads to guide us, then the journey is much easier. I had the privilege of running into Peter who guided my first steps into rice breeding and offered me his helpful hand in difficult moments. I was not the only one who benefitted from Peter's guidance and benevolence.

Peter mentored young researchers from National Rice programs in Latin America before becoming a promoter of FLAR (Latin America Fund for Irrigated Rice), where he spent several years as consultant and mentor of young students eager to learn from his passion about rice, a saga that he started during his first appointment as rice breeder at the IRRI, The Philippines, and kept alive during his career. He used to call them "my tigers" with pride and love.

(Contributed anonymously)

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Stanley J. Peloquin, Emeritus Campbell-Bascom Professor (1921-2008) was an internationally renowned plant geneticist and breeder who made exceptional contributions to the quantity, quality, and sustainable supply of food for the world from his innovative and extensive scientific contributions with direct applicability in crop improvement.

For five decades, Professor Peloquin merged basic research in plant reproduction, cytology, cytogenetics, genetics, potato breeding, and education at the University of Wisconsin-Madison. His germplasm enhancement philosophy of "putting genes into a usable form" is a prime example of farsightedness in science.

A huge part of Professor Peloquin's lifetime impact was his classroom teaching and mentoring of undergraduate and graduate students. Cognizant that scientific vocabulary, once established, exhibits considerable inertia, he understood that adoption by the broader scientific community of more accurate and specialized terms would occur only with increased comprehension and common usage. Prof. Peloquin endeavored to provide both, and vociferously encouraged others to do likewise. He regularly used enhanced terminology in daily communications with students, research assistants, and peers, as well as in the laboratory's presentations and publications. Moreover, he was quick to challenge inappropriate usage of the older terms.

His contagious enthusiasm and wide range of scientific knowledge and interests inspired his undergraduate workers, graduate students, colleagues and peers at all levels. He instilled the thrill of science into numerous undergraduate and graduate students who subsequently traveled around the world to pursue careers as researchers, teachers, and administrators.

Many feel that much of their success was related not only to what they learned from him about science but also about life. We all learned one principle: "hard work always pays off." Prof. Peloquin will remain a source of inspiration to all researchers and practitioners or plant breeding.

Above text from:
Ortiz, R., L. Frusciante & D. Carputo. 2005. Stanley J. Peloquin: potato geneticist and cytogeneticist. *Plant Breeding Reviews* 25, 1-19
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http://aob.oxfordjournals.org/content/104/5/795.full

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Heiko K. Parzies (1959-2011) was a private lecturer holding the *venia legendi* in plant breeding at University of Hohenheim, Stuttgart, Germany. There, he led an independent working group on crop improvement research in the Tropics and Subtropics, with focus on barley, sorghum, pearl millet and minor millets.

He tremendously contributed to training of many students and colleagues from Sub-Saharan Africa, India, Middle East, and Germany. He was an excellent research partner to a number of agricultural research institutions working on dryland cereals, including the ICRISAT pearl millet and sorghum breeding programs in West Africa, ICARDA, and the National research institutes in Burkina Faso, Kenya, Mali, Niger, Nigeria, Senegal, Sudan, Tanzania, Uganda, Jordan and others. Heiko very unexpectedly died in August 2011. His open, friendly, positive, humorous and competent character will always remain an example to us. (Contributed by Bettina Haussmann and Willmar Leiser).

Hartwig H. Geiger, Professor emeritus of Population Genetics at University of Hohenheim, Stuttgart, Germany has influenced my work through his unique lectures in population - and quantitative genetics which is the basis for strategic and informed crop improvement research.

His continued support and guidance throughout my career from Diploma thesis up to the Habilitation (*venia legendi*) in plant breeding, and especially his support to my research on genetic improvement of tropical cereals tremendously contributed to where and what I am today .

Contributed by Bettina Haussmann).

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CIMMYT's Plant Breeders

CIMMYT´s breeders (Borlaug, Rajaram, Braun, Brajcich, Pfeiffer, Singh, Ammar, etc.) are for me the best example of what Plant Breeders must do integrating "Field" and "Science" at the service of farmers. If Plant Breeding were a Religion they would be the High Priests.

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1 NEWS, ANNOUNCEMENTS AND RESEARCH NOTES

1.01 **Plant breeding promotes harmony between agriculture and the environment**

April 2, 2012
Urbana, Illinois, USA

Can we feed and clothe the growing world population while simultaneously preserving or improving ecosystem services and the natural environment? A recent study found that with the right partnerships, plant breeding will be essential for addressing challenges in agriculture.

Wes Barber, a University of Illinois plant breeding graduate student, said the study aimed to highlight the advances and possibilities in various aspects of plant breeding. He said by developing crop varieties that not only meet end-use targets but that also use resources more efficiently, plant breeders can continue to improve the sustainability of agriculture as well as urban and forest ecosystems.

Varieties that require application of fewer off-farm inputs decrease the cost of production, lower fossil fuel energy use, and reduce contamination of water systems, which help to improve public health and stabilize rural economies.

"Plant breeders objectives aren't just focused on yield," Barber said. "Through this study we hope to show groups not traditionally associated with plant breeding, or even agriculture, that they have much to gain by interacting with and supporting plant breeding. It's a powerful tool for meeting today's environmental challenges because it can develop plants that simultaneously improve food production and the natural environment."

This study "Plant breeding for harmony between agriculture and the environment" was published in Frontiers in Ecology and the Environment.

Researchers included E. Charles Brummer, Wesley Barber, Sarah Collier, Thomas Cox, Randy Johnson, Seth Murray, Richard Olsen, Richard Pratt and Ann Marie Thro.

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1.02 **Climate change helps then quickly stunts plant growth, decade-long study shows**

April 9, 2012
Arizona, USA

Global warming may initially make the grass greener, but not for long, according to new research conducted at Northern Arizona University.

The study, published this week in Nature Climate Change, shows that plants may thrive in the early stages of a warming environment but begin to deteriorate quickly. "We were really surprised by the pattern, where the initial boost in growth just went away," said Zhuoting Wu, NAU doctoral graduate in biology. "As the ecosystems adjust, the responses changed."

Researchers subjected four grassland ecosystems to simulated climate change during the decade-long study. Plants grew more the first year in the global warming treatment, but this effect progressively diminished over the next nine years, and finally disappeared.

The research reports the long-term effects of global warming on plant growth, the plant species that make up the community, and the changes in how plants use or retain essential resources like nitrogen. The team transplanted four grassland ecosystems from higher to lower elevation to simulate a future warmer environment, and coupled the warming with the range of predicted changes in precipitation—more, the same, or less. The grasslands studied were typical of those found in northern Arizona along elevation gradients from the San Francisco Peaks down to the Great Basin Desert.

The researchers found that long-term warming resulted in loss of native species and encroachment of species typical of warmer environments, pushing the plant community toward less productive species. The warmed grasslands also cycled nitrogen more rapidly, an effect that should make more nitrogen available to plants,

helping them grow more. But instead much of the nitrogen was converted to nitrogen gases lost to the atmosphere or leached out with rainfall washing through the soil.

Bruce Hungate, senior author of the study and NAU biological sciences professor, said the research findings challenge the expectation that warming will increase nitrogen availability and cause a sustained increase in plant productivity.

“Faster nitrogen turnover stimulated nitrogen losses, likely reducing the effect of warming on plant growth,” Hungate said. “More generally, changes in species, changes in element cycles—these really make a difference. It’s classic systems ecology: the initial responses elicit knock-on effects which here came back to bite the plants. These ecosystem feedbacks are critical. You just can’t figure this out with plants grown in a greenhouse. ”

The findings caution against extrapolating from short-term experiments, or experiments in a greenhouse, where experimenters cannot measure the feedbacks from changes in the plant community and from nutrient cycles. The research will continue at least five more years with current funding from the National Science Foundation and, Hungate said, hopefully for another five years after that. “The long-term perspective is key. We were surprised, and I’m guessing there are more surprises in store.”

Additional coauthors include George Koch, NAU professor of biological sciences, and Paul Dijkstra, assistant research professor of biological sciences. Wu completed the study as part of her doctoral thesis in biology and earned her degree in 2011.

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1.03 **World's first genetically modified crop that has been deliberately engineered to emit a repellent-smelling substance against insect pests**

Now growing in a small patch of land in the Hertfordshire countryside.

Scientists have created the "whiffy" wheat in an effort to combat aphid attacks that can cause upwards of £120m of damage each year to the UK's most important cereal crop, which has an annual value of £1.2bn – and rising.

The field trial, however, is also one of several "second generation" GM crops that scientists hope will be more acceptable to the British public who resoundingly

rejected the first generation of commercial GM crops – such as herbicide-tolerant cereals – which are nevertheless grown extensively outside Europe.

The first commercial GM crop was developed in the early 1990s. It was a tomato that would remain fresh after picking and although consumed in the United States, it was never sold in the UK.

Monsanto, the multinational agrochemicals company based in St Louis, Missouri, then came up with a herbicide-tolerant soybean plant. The crop could grow even if sprayed by a weedkiller, which was conveniently made by the same company.

For many people, GM technology was not seen as a socially useful scientific development but a means for companies to increase their market share and profits. The death knell for GM in Britain probably came at the end of the 1990s when a scientist working at a UK research institute claimed to have shown that GM potatoes were poisonous to laboratory rats – even though the research methodology was widely condemned as flawed.

The green movement jumped on GM as anti-environment, while anti-capitalists claimed it was designed to maximise profits at the expense of the people. Meanwhile the Daily Mail came out against "Frankenfood" as unwarranted meddling with the food chain.

But now scientists believe the time has come to fight back. They believe that time is running out for new ways to feed a growing human population, exacerbated by the growing number of wealthy people of the developing world who want to eat to a protein-rich, meat-based diet.

Scientists view GM technology as a way of extending the successful "green revolution" of the late 20th Century into the 21st Century. This is the background to the GM wheat trial in Hertfordshire.

The GM wheat contains an added, synthetic gene that causes the plant to exude an insect pheromone on its leaves which is naturally produced by "frightened" aphids as a warning signal to other aphids. Although the pheromone released by the GM wheat plants will be undetectable to the human nose, the scientists hope that it will deter species of cereal aphids which spread harmful plant viruses as well as sucking energy from the crop.

However, the aphid's "fear" pheromone – known as farnesene – has the opposite effect on beneficial insects, such as ladybirds and parasitic wasps that feed on aphids, because they are attracted to the smell. The scientists hope these predators will visit the GM crop early enough in the growing season to prevent aphid infestations.

The small-scale field trial, at the government-funded Rothamsted Research station near Harpenden, is designed to test whether the GM wheat variety is able to repel significant numbers of aphids as well as attract the beneficial insects that feed on them, said Rothamsted's director, Professor Maurice Moloney.

"GM has traditionally been associated with killing something. Either killing the weeds or killing the insects. In this case what we are doing is putting a 'no parking' sign on every leaf of the plant.

"It's a very different strategy from what's been done so far and I think it will open up many avenues that will allow us to use natural mechanisms and allow to respond to concerns from the public about the amount of pesticides that are used."

The field trial has been approved by the Government's Advisory Committee on Releases to the Environment, which has to oversee all outdoor GM experiments and field trials. Among the many preconditions was the stipulation that the GM wheat would not be eaten by humans or animals at the end of the experiment.

The committee also stipulated that the movement of pollen and seeds from the crop should be controlled with biological barriers and weed killer. A tall metal fence will protect the site from unauthorised people as well as birds, hedgehogs, rabbits and other large animals. Professor John Pickett, the scientist in charge of the experiment, said that there is still likely to be some opposition to the trial, even though it has been discussed in detail with people and organisations opposed to GM crops.

"We've had meetings with the public and anti-GM lobby groups, and we've found there is common ground because I think there is a lot of common interest in improving the sustainability of agriculture and in using natural processes," Professor Pickett said. "We do feel there is a better view of GM technology from the public at large but we recognise there are some individuals who are strongly against this kind of thing and they may seek to disrupt it by direct action," he said.

The idea behind the experiment dates back to the mid-1980s but it was only in 2006 that Rothamsted scientists demonstrated that it was possible to isolate the gene for the farnesene pheromone and insert into an experimental plant. "We've done a lot of work in the lab and it works really well. It repels the aphids and attracts in the parasitic wasps brilliantly – better than our wildest dreams," Professor Pickett said.

Many wild flowers have evolved the same pheromone gene as a natural defence against aphids, so the scientists went to the peppermint plant as the source of the gene that they engineered and inserted into the wheat plant. Professor Moloney said that the study of "chemical ecology" is about understanding the substances that are continually being passed between organisms and using them in a way that can control pests in a more natural way that is less harmful to the environment than some pesticides.

"When we breed for plants, we breed for things like yield and disease resistance – and sometimes what's lost in the process is some ancient natural mechanisms the plant uses to protect itself," Professor Moloney said.

"Quite often we find it's the weeds out there that are protected against aphid attack, as opposed to crop plants. So what we've done is go back to these wild plants to see if we can reconstruct mechanisms that they probably would have had earlier in their evolution."

However, many wild plants produce a mixture of volatile substances that allow aphids to distinguish the plant-produced substance from the genuine insect fear pheromone. The difficult trick was to create a GM wheat plant that produces copious quantities of pure pheromone, said Professor John Napier, who led genetics team behind the work.

The idea eventually would be to produce GM wheat varieties that do not need to be sprayed with harmful pesticides. The scientists believe that preventing aphid infestations would benefit the wider environment, including the songbirds that feed on aphids.

The new GM: Latest crop of ideas
Cereals with a "zinc sink"
Scientists hope to produce genetically modified grains such as cereals and rice with higher levels of zinc, which is essential for many vital enzymes. A third of the world's population is estimated to have a zinc-deficient diet.

Fish oil in plants
The genes for long-chain omega 3, an ingredient of fish oil with proven benefits for human health, are being inserted into plants in the hope of producing GM oilseed rape with medicinal properties.

Purple tomatoes
Genetically modified tomatoes have already been created with extra genes for boosting the red pigments found in snapdragon plants. These antioxidants, which are also found in blueberries and blackberries, could help to prevent cancer.
Steve Connor

http://www.independent.co.uk/news/science/gm-20-a-new-kind-of-wheat-7595087.html?goback=%2Egde_2118589_member_104504206

Contributed by Rodomiro Ortiz
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1.04 **Australian Centre for Plant Functional Genomics and CSIRO join forces with Vilmorin & Cie to commercialize Nitrogen Use Efficiency (NUE) wheat in Australia**

April 6, 2012
Paris, France and Sydney, Australia

The Australian Centre for Plant Functional Genomics (ACPFG) and CSIRO announced today that the world's fourth largest seed company, Vilmorin & Cie (Vilmorin), has taken a license to access technology that aims to reduce the amount of Nitrogen fertilizer used by Australian growers for their wheat crops. This technology was sourced by ACPFG and CSIRO's Food Futures Flagship (working though CSIRO Plant Industry) in 2007 from Arcadia Biosciences Inc (Davis, California) for the Australian market.s

Nitrogen fertilizer production uses large amounts of energy and excessive use of nitrogen has sometimes led to environmental problems in many regions. It is currently the largest single cost for cereal growers. This license brings together leading Australian wheat research groups with the largest European wheat seed company.

"This is an exciting development and represents an important milestone for ACPFG." said Michael Gilbert, ACPFG's General Manager. "ACPFG was established to develop and deliver new technologies for the benefit of Australian farmers and improvements in nitrogen use efficiency has been a major target. CSIRO has been a valuable partner and now we have a respected European company to help us further develop and deliver the technology".

"Wheat has recently attracted strong international interest as an important staple crop and Vilmorin has had a long standing commitment to wheat seed research and development", said Dr Bruce Lee, Director of the CSIRO's Food Futures Flagship. "CSIRO has always had a long-standing commitment to wheat so this is an excellent partnership and we are looking forward to exploring the applicability of this technology to wheat".

Emmanuel Rougier, CEO of Vilmorin, said "In 2008, we made a strategic investment in Australian Grain Technologies, the largest wheat breeding company in the country. This licensed technology will complement that investment, and we aim to make GMO wheat integrating the NUE technology available to every Australian grower that wants it. Globally, we invest over 15% of our revenue in research and are strongly committed to the international development of innovative new varieties of wheat".

Wheat is the largest acreage crop in the world. It is the staple food for 35 percent of the world's population and represents 20 percent of the total protein intake. Increasing global food production is needed as the population approaches 9 billion by 2050.

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1.05 **IRRI using biotech for developing rice varieties**

April 07, 2012

By Munawar Hasan

LAHORE International Rice Research Institute (IRRI-Philippines) is making headways in effective use of biotechnology for developing rice varieties that are nutrient-rich, resistant to drought, salt, flood and diseases.

This was highlighted during various meetings and presentations made by the scientists as part of the '6th Pan-Asia Farmers Exchange Programme', arranged by CropLife Asia and Biotech Coalition of the Philippines during the last week of March.

Objective of this annual programme, being held for the last six years, is to create awareness amongst the farmers and other stakeholders about benefits of genetically modified (GM) crops for humanity and the work being done by the IRRI.

Genetic modification was a valuable research tool for scientists that helps understand gene function and its distinct scope, said Parminder Virk, senior plant breeder at IRRI while giving presentation to participants.

IRRI was developing varieties that would help the rice farmers of the world to increase the yields. One of such variety was the Golden Rice, a new type of rice that contains beta-carotene, a source of Vitamin-A.

World needs an extra 1.5 percent rice per year to meet the growing population's needs at an affordable price and research of the IRRI in this regard poised to benefit rice consumers and farmers worldwide, particularly those in Asia, where 90 per cent of rice is produced and consumed, he observed.

Speaking at the seminar, Dr. Parminder Virk, Ms. Bita Avendano, Ms. Cornita Guerta shared IRRI's research and development activities in length.

The world needs varieties that can be sown in adverse climatic conditions. IRRI has already released a rice variety tolerant to submergence in India and Philippines and will be releasing the same in Nepal soon, the scientists said.

The participants also visited two BT cornfields being supported by two different companies dealing in GM crops to witness the benefits of this corn crop. They were informed that GM corn is also known as 'vaccinated corn' in the Philippines because it offers resistance to various insect pests besides having other qualities

http://www.thenews.com.pk/TodaysPrintDetail.aspx?ID=101563&Cat=3&dt=4/7/2012

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1.06 **Embrapa apresenta novo pasto de *Brachiaria humidicola***

April 26, 2012
Brazil

A cultivar de *Brachiaria humidicola*, **BRS Tupi**, chega em uma boa hora já que há no mercado poucos materiais disponíveis para solos rasos e com problemas de drenagem. A Tupi é uma alternativa de uso para áreas úmidas sujeitas a alagamentos temporários, uma opção na diversificação de pastagens, diminuindo o risco eventual a pragas e doenças.

A BRS Tupi é resultado de uma seleção massal em populações derivadas de plantas coletadas em Burundi, no leste da África. A coleta foi realizada pelo Centro Internacional de Agricultura Tropical (CIAT), com sede na Colômbia, em viagens entre 1984 e 1985 pelo continente africano. Os trabalhos de seleção duraram 18 anos e foram coordenados pela Embrapa Gado de Corte em parceria com outros centros de pesquisa.

A cultivar foi selecionada com base na produtividade, vigor, produção de sementes, resistência por tolerância a cigarrinhas-das-pastagens. Em avaliações agronômicas regionais e sob pastejo, mostrou capacidade de suporte e desempenho animal superior em comparação à Brachiaria humidicola comum em Campo Grande, no Acre e no sul da Bahia. Registrada junto ao Ministério da Agricultura em maio de 2004, em julho de 2009, recebeu o certificado de cultivar protegida.

De florescimento mais precoce (primavera/verão), mas de produtividade de sementes semelhante a comum, a Tupi, em comparação a comum, apresentou desempenho superior, sobretudo na seca, quando sustentou lotação mais alta e garantiu uma produção de 53 kg de peso vivo/ha, comparada a 20 kg da outra. A nova cultivar também possibilitou maior ganho de peso individual na estiagem em decorrência de sua melhor relação folha/caule e boa digestibilidade. Os resultados, contudo, variam de acordo com a região do país, relatam os pesquisadores responsáveis pelos estudos.

“A Tupi cresce e floresce rápido e tende a acamar demais, com isso o manejo deve ser cuidadoso, com ajustes da carga animal o que vai depender do tipo de solo onde foi plantado. Em solos mais férteis pode-se colocar uma carga animal mais alta e em solos menos férteis uma carga menor, em torno de 1 UA (unidade animal = 450 quilos de peso vivo)”, indica Rodrigo Amorim, um dos pesquisadores envolvidos.

Características - A BRS Tupi é uma planta estolonífera e desenvolve-se formando touceiras (crescimento cespitoso-estolonífero). Tem porte mediano e atinge uma altura vegetativa de 50 a 75 cm. Apresenta perfilhamento mais intenso e denso do que a comum. Seus rizomas (caules subterrâneos) são curtos e a bainha das folhas é estriada, com pilosidades claras chamadas de tricomas. Isso a diferencia da humidicola comum, que não apresenta pelos.

Outras características das flores que distinguem essa cultivar são: anteras amarelas (extremidade onde se concentra o pólen), diferente das roxas presentes na cultivar comum; e estigma (órgão que recebe o pólen) vermelho-escuro – na Llanero é branco com pontas roxas e na humidicola comum varia entre roxo e preto. A visível pilosidade das espiguetas da cv. BRS Tupi a diferencia das duas cultivares.

A BRS Tupi mostrou-se resistente às cigarrinhas, por tolerância, revelando-se melhor planta hospedeira que a humidicola comum. No entanto, comparando-as quanto ao nível de resistência por tolerância, a Tupi mostrou-se mais resistente.

Informações sobre a comercialização de sementes são obtidas na Associação para o Fomento à Pesquisa de Melhoramento de Forrageiras – (Unipasto) através do http://www.unipasto.com.br e na Embrapa Produtos e Mercado (www.snt.embrapa.br), Unidade da Embrapa que elaborou os contratos de licenciamento da cultivar para que ela seja inserida no mercado e responsável pela produção de sementes básicas.

Unipasto, Rua das Paineiras, Lote 06, Torre B, sala 706,71.918-000 - ÁguasClaras - Brasília/DF. Fone: (61) 3274-0784
www.unipasto.com.br

http://www.seedquest.com/news.php?type=news&id_article=26458&id_region=&id_category=&id_crop=

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1.07 **Institute for agricultural research Samaru and partners win West Africa Sub-regional award in maize breeding**

The Nigerian team of maize breeders was declared winner for the 2011 best breeders for drought tolerant maize for Africa (DTMA) Project.

This is the second time the Nigerian breeders had won the award since inception of the DTMA project in 2007. The first time was in 2007.

The DTMA Project team in Nigeria comprises the Institute for Agricultural Research of Ahmadu Bello University Zaria, the University of Ilorin, the Obafemi Awolowo University, the University of Maiduguri, seed companies and the National Agricultural Extension and Research Liaison Services of the Ahmadu Bello University.

The Nigerian team was adjudged the best by a panel of judges who evaluated the contribution of the breeder's teams of the DTMA projects participating countries. The participating countries which attended the annual meeting held at Noda Hotel in Kumasi Ghana were Benin Republic, Ghana, Mali and Nigeria.

The meeting was held on April 16-20, 2012. The Nigerian maize research team in collaboration with the International Institute of Tropical Agriculture succeeded in registration and release of a total of 17 DT varieties and hybrids in 2009 and 2011.

The DT maize varieties released in 2009 comprised six hybrids and seven open pollinated varieties while in 2011 four open pollinated varieties with value added traits were released. The new DTMA maize varieties include extra-early, early, intermediate and late maturity groups for the various maize ecologies of Nigeria and other West African countries.

Receiving the award on behalf of the Nigerian team, the National Coordinator for Maize Research, Prof. Shehu G. Ado expressed that his team would continue to improve maize varieties to withstand the vagaries of weather in the changing climate to make sub-Saharan Africa self-sufficient in food with increased income to maize farmers. In his speech the Director, Crops Research Institute Kumasi, Ghana, Dr. Hans Adu-Dapaah who presented the award urged all the breeders to continue with the laudable work of improving maize to withstand drought and other stresses militating against profitable production.

Members of the Nigerian team present at the Annual Planning Meeting include Prof. S.G. Ado, Prof. M.A.B. Fakorede, Prof. G. Olaoye, Prof. J. E. Onyibe, Dr. I.S. Usman, Dr . I.Y. Dugje and Mr. I. Abdullahi, the Managing Director of Maslaha Seeds Ltd.

The DTMA project goal is to develop superior maize germplasm with 1t/ha yields increase over existing varieties and reach 30-40 million farmers in sub-Saharan Africa by 2015.
Contributed byShehu G. Ado
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Source: SeedQuest.com

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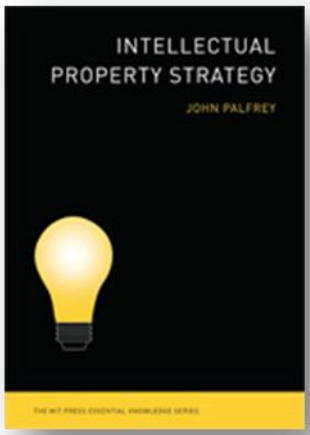
1.08 **Intellectual Property Strategy: A wise man's guide**

April 5, 2012
Geneva, Switzerland



A recently published book by Harvard Law School Professor John Palfrey offers a thoughtful and useful handbook for executives or just about anyone else to better understand and use intellectual property, in ways that encourage sharing and openness.

In "Intellectual Property Strategy", published by MIT Press, Palfrey uses a patient educator's tone in walking the reader through the steps to assessing IP and making it work in often surprising ways.

With plenty of clear, real-life examples making points along the way, Palfrey opens up new thinking on topics such as treating IP as a core asset class; benefiting from the IP of others – legally; creating freedom of action through IP; and establishing a flexible IP strategy.

An example of the common sense style is the message that, "Sharing can be good for a brand. It is also good to be known as a fair player in the marketplace – honestly licensing to and from others for the benefit not just of the organizations involved but your customers too."

Another example: "The idea behind open innovation is simple: the creators of new ideas don't have to be within your organization in order to be helpful."

The book is not only published in print, but also in an experimental format with a series of companion case studies and related material, to be read in a purely digital format. This allows a "deeper dive" in at points throughout the book online.

More about the book is here.

http://www.seedquest.com/news.php?type=news&id_article=25898&id_region=&id_category=&id_crop=

Source: SeedQuest.com

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1.09 US Supreme Court GM crop patent case

Can a farmer commit patent infringement just by planting soybeans he bought on the open market? This week, the Supreme Court asked the Obama administration to weigh in on the question. The Court is pondering an appeals court decision saying that such planting can, in fact, infringe patents.

In 1994, the agricultural giant Monsanto obtained a patent covering a line of "Roundup Ready" crops that had been genetically modified to resist Monsanto's Roundup pesticides. This genetic modification is hereditary, so future generations of seeds are also "Roundup Ready." Farmers had only to save a portion of their crop for re-planting the next season, and they wouldn't need to purchase new seed from Monsanto every year. The company didn't want to be in the business of making a one-time sale, so when Monsanto sold "Roundup Ready" soybeans to farmers, it required them to sign a licensing agreement promising not to re-plant future generations of seeds.

However, farmers remain free to sell the soybeans they grow in the commodity market, where most are used to feed people or livestock. Roundup Ready soybeans have become extremely popular; they now account for 94 percent of all acres planted in Indiana, for instance. Vernon Bowman, an Indiana farmer, was a customer of Monsanto who realized that Roundup Ready soybeans had become so common in his area that if he simply purchased commodity soybeans from a local grain elevator, the overwhelming majority of those soybeans would be Roundup Ready. Commodity soybeans are significantly cheaper than Monsanto's soybeans, and they came without the contractual restriction on re-planting.

So Bowman planted (and re-planted) commodity soybeans instead of using Monsanto's seeds. When Monsanto discovered what Bowman was doing, it sued him for patent infringement.

Patent protection or freedom to farm?

Bowman argued his use of the seeds is covered by patent law's "exhaustion doctrine." This doctrine, like copyright law's first sale doctrine, holds that a patent holder's rights in a particular product are "exhausted" when the product is sold to an

end user. The Supreme Court beefed up the exhaustion doctrine in 2008 when it held that LG could not "double dip" on patent licensing fees — charging both chipmaker Intel and OEM Quanta royalties for the same chip.

Bowman argued that when Monsanto sold seed to a farmer, it exhausted its rights not only to that specific seed but to all of the seed's descendants. Since Bowman wasn't required to sign a licensing agreement before buying commodity seeds, he argued that he was free to plant the seeds and even to save and re-plant each season's crop for future seasons.

But Monsanto countered that each new generation of seeds is a separate product and thus requires a separate patent license. In effect, Monsanto contends that Bowman is illegally "manufacturing" infringing soybeans.

Monsanto has a point. Taking Bowman's argument to its logical conclusion would imply that anyone could buy a single batch of commodity (but still Roundup Ready) soybeans and use it to sell an unlimited number of copies. This would effectively eviscerate Monsanto's patent protection.

Yet Monsanto's position — that planting Monsanto-derived soybeans always requires Monsanto's permission — could also have troubling consequences. In a world where 94 percent of soybeans in circulation are descended from Monsanto's genetically engineered seeds, it might be hard for farmers who *didn't* want Monsanto's seeds even to buy seeds that were not patent encumbered. Monsanto's position would effectively place the burden on farmers to test seeds they hope to plant in order to ensure they are not covered by any patents.

Last year, the United States Court of Appeals for the Federal Circuit ruled, as it had on several previous occasions, that patent exhaustion did not cover second-generation seeds. The Supreme Court has now asked the Solicitor General, the official in charge of representing the Obama administration before the Court, to weigh in on the case.

The *Patently-O* blog reports that a request for the Obama administration's views typically requires four justices, suggesting significant interest in the case. However, the Obama administration may agree with the Federal Circuit and recommend against the Court taking the case. And the Court may opt not to hear the case even if the Obama administration recommends taking it. Should that happen, Monsanto's appellate court win would stand.

http://www.wired.com/wiredscience/2012/04/arstechnica-agriculture-patents/

Source: Ars Technica via SeedQuest.com

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1.10 **Lords of the harvest: third-party signaling and regulatory approval of genetically modified organisms**

April 10, 2012

Executive Summary

How do regulatory agencies make decisions? This paper suggests that regulatory agencies are influenced by the firms they regulate, but not exclusively via the direct influence of lobbying, sponsorship of scientific research, and advocacy. Instead, Hiatt and Park find that agency decision making is affected by the social influence of agency stakeholders and peer agencies. The research looks specifically at the approval by the U.S. Department of Agriculture between 1992 and 2007 of genetically modified organisms, or plants whose genetic material has been altered using genetic-engineering techniques to enhance such desired traits as herbicide resistance, pesticide properties, and nutritional content. The authors found that signals from salient stakeholders and a peer agency positively influenced GMO product approvals by reducing uncertainty surrounding the agency's pursuit of legitimacy. It is the presence of uncertainty, in conjunction with anxiety about legitimacy, that motivates regulatory agencies to look to third-party actors for additional information.

Key concepts include:

- Regulatory agencies are not merely discrete economic entities. They are also social actors striving to maintain legitimacy and maximize autonomy.
- Regulatory agencies rely on signals from stakeholders and peer agencies to reduce particular kinds of uncertainty.
- Regulatory agencies' preoccupation with legitimacy creates conditions in which firms can influence regulatory decision making by capturing third-party actors-in this case, salient stakeholders and peer agencies.
- Government is relevant to virtually every business sector, but regulated industries like biotechnology, telecommunications, electricity, and pharmaceuticals are particularly subject to state intervention.

About faculty in this article

Shon R. Hiatt is assistant professor of business administration in the Organizational Behavior unit at Harvard Business School.

Author abstract

Little is known about the factors that influence regulatory agencies' decision making. We posit that regulatory agencies are influenced by the firms they regulate but not exclusively via political influence, as is argued in the traditional regulatory-capture literatures. Instead, regulatory decisions are indirectly shaped via third-party actors whose signals reduce uncertainty in the agency's pursuit of legitimacy. Focusing empirically on the U.S. Department of Agriculture's approval of genetically modified organisms (GMOs), we find that signals from salient stakeholders and peer agencies

have a positive influence on product approval and that their effects vary under different dimensions of uncertainty. We also discuss the implications of these findings for business-government relations and for nonmarket strategy.

http://hbswk.hbs.edu/item/6846.html

Source: SeedQuest.com

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1.11 **Biotech and Organic Farming: Coexisting Peacefully**

July 01, 2011
Washington

By Kathryn McConnell
Staff Writer

Agricultural biotechnology and organic farming can coexist — even thrive in the same food-supply chain — despite the fact that some proponents of organic farming have been at odds with the scientists who genetically engineer seeds.

So say Pamela Ronald and Raoul Adamchak, co-authors of *Tomorrow's Table: Organic Farming, Genetics and the Future of Food*, a new book that argues that organic farming and agricultural biotechnology combined can meet the world's future food needs. Ronald, a plant pathologist at the University of California–Davis, and Adamchak, an organic farmer for 30 years, should know something about good combinations — they have been married for 15 years.

"We want readers to distinguish between fact and fiction," Ronald said June 21 in Washington at the American Association for the Advancement of Science. "Polarizing debates on seed technologies versus farming practices" distract from the challenge of creating "a healthy and productive agricultural system."

With the world's population expected to increase to 9.2 billion people by 2050, farmers must "double or triple food production to meet demand," Ronald said. "Agriculture needs our collective help and all appropriate tools if we are to feed the growing population in an ecological manner."

The Challenge

Ronald described some of the challenges of feeding a growing population. The amount of arable land is limited, she said, and is being lost to urbanization and erosion. "As a result of erosion over the past 40 years, 30 percent of the world's arable land has become unproductive," she said. Making the problem worse, most

eroded soil carries pesticides and fertilizers and ends up polluting lakes and rivers. The polluted waters kill fish.

Freshwater systems also are strained, according to Ronald. Many rivers have become nearly dry. About half of the world's wetlands have disappeared. Major groundwater aquifers are being mined for urban and industrial use. That means more food must be produced on the amount of land now available using less water.

Another part of the challenge stems from climate change. As glaciers melt, low-lying croplands will see more flooding that will cost the people living in those areas nutrition and livelihoods. Climate change can also cause increased temperatures and severe droughts in other areas, according to Ronald. In recent years, for instance, Australia has had two record-breaking droughts that crippled wheat production. Russia stopped wheat exports for nearly a year because of its drought in 2010.

Genetic engineering, also known as genetic modification, can work well along with organic farming, Ronald said, to meet the challenges of urbanization, erosion and climate change.

Plant pathologist Pamela Ronald spends much of her lab time looking for ways to genetically improve rice.

The genetically engineered way

Genetically engineered seeds carry traits that make plants tolerate climate and soil stress, resist disease and pests, and provide essential micronutrients. In 2010, more than 15 million farmers in 29 countries grew biotech crops, reports the International Service for the Acquisition of Agri-biotech Applications, an international research group. Those countries represent more than half of the world's population.

Experts from the Indian, Chinese, Mexican, Brazilian, French, British and U.S. science academies have concluded that the genetically altered crops now on the market are safe to eat, Ronald said.

The organic way

Organic farming is good for the environment because it uses crop rotation to reduce the buildup of pests that attack a single crop. Organic farmers use leguminous cover crops, such as lentils and alfalfa, to increase soil fertility and organic matter to fertilize. However, for some staple crops, like rice, yields are often lower on organic farms. In addition, the higher prices of organic produce make it unaffordable to some consumers.

Desired result

In the book, the authors write that either organic farming or genetic engineering should be used if the desired result is abundant, safe, nutritious and more-affordable

food. Using both methods brings a desirable reduction of harmful inputs, like synthetic fertilizers and pesticides.

Ronald and Adamchak want farming practices to be safe for farm workers and want healthy rural economies. They want practices that keep soils fertile, enhance crop genetic diversity and protect native species. To do all that, "we need everyone at the table," Ronald said.
Read more:

http://iipdigital.usembassy.gov/st/english/article/2011/07/20110701162347nyrhtak0.7071955.html#ixzz1rpT7KvRX

Source: SeedQuest.com

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1.12 Science Magazine study on pesticides and pollinator colony health

Canada

March 30, 2012

Pollinators, such as honey bees, are crucial to agriculture and food production. Bayer CropScience is committed to bee health and has been actively involved in finding solutions to improve honey bee health for more than 25 years.

Bayer has reviewed a paper published today in Science Magazine regarding the potential interaction of imidacloprid insecticide and bees.

All new research involving bee health is to be welcomed, but care must be taken in drawing conclusions based on relatively artificially generated results, particularly when compared to the weight of evidence from previous studies. In this study bees were unrealistically exposed to imidacloprid and then allowed to continue to develop in semi-field conditions.

The study involving bumblebee colonies in the UK, provides useful information as part of the growing body of research regarding this important pollinator. Although the doses are higher than what would typically be found in the environment, the authors noted a decrease in queen production when compared to the untreated colonies. These results are not consistent with previous studies, which showed no adverse effects on bees at field-relevant concentrations.

Insights into recent research studies

Recently, several studies – from Purdue University and Jeff Pettis, et al. – have underscored the complex interactions between crop protection products and honey bee health. The level of exposure to these products is critically important in determining the impact on foraging honey bees. Modern seed treatment applications of these products minimize the potential for accidental exposure, to ensure the impact on bees is minimal.

Bayer's commitment to research
Imidacloprid is one of the most heavily researched insecticides in the world in terms of bee safety assessment. Bayer CropScience and independent researchers have conducted dozens of intensive laboratory and field trials on imidacloprid over the past 10 years and have confirmed that it may be used without impacting honey bee populations. These studies have investigated the effects on bee mortality, weight gain, worker longevity, brood development, honey yield and overwintering survival.

Bayer's commitment to Bee Health
Bayer is committed to bee health and has been actively involved in finding solutions to improve honey bee health for more than 25 years. As a company dedicated to crop protection, Bayer is committed to environmental stewardship and sustainable agricultural practices, including the protection of beneficial insects such as honey bees.

http://www.seedquest.com/news.php?type=news&id_article=25729&id_region=&id_category=&id_crop=

Source: SeedQuest.com

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1.13 Insecticidal seed treatments can harm honey bees

April 8, 2012
Ames, Iowa, USA

By Erin Hodgson, Department of Entomology (ISU) and Christian Krupke, Department of Entomology (Purdue)

Neonicotinoids are a relatively new class of chemistry to control insects. They are now widely adopted because they are persistent and systemic in plant tissues. Most field crops in Iowa have a neonicotinoid seed treatment. Common examples of neonicotinoids include: clothianidin (Poncho ®), thiamethoxam (Cruiser ®), and imidacloprid (Gaucho ®). Active ingredient rates range from 0.25-1.25 milligrams per kernel (sold as 250-1,250 rates).

Neonicotinoids are extremely toxic to bees. Lethal LD50 rates (the rate at which half of the exposed population dies) for clothianidin are 22-44 nanograms per bee for direct contact and 2.8-3.7 nanograms per bee for oral ingestion. In other words, a single corn kernel with a 1,250 rate of neonicotinoid seed treatment contains enough active ingredients to kill over 80,000 honey bees.

There has been an increased public awareness of pollinator health and the decline of bees in North America. Researchers have identified multiple contributing factors for honey bee decline, including: Varroa mites, disease-causing pathogens, habitat loss, malnutrition, the intensity of migratory pollination services and pesticides.

Bees are susceptible to many broad spectrum insecticides, but how are they getting exposed to a chemistry largely used for seed treatments? Christian Krupke, a field crops entomologist at Purdue University, and several others took a closer look at how honey bees might be interacting with neonicotinoids. They published a recent article reporting several potential exposure routes. Here is a summary of their findings:

- Bees, pollen and nectar were collected from an apiary during the corn planting season in Indiana. All dead and dying bees had traces of clothiandin, and stored pollen had high neonicotinoid levels.
- Soil samples collected from fields not planted with a seed treatment for two years still contained detectable levels of clothiandin.
- Dandelions collected from around field edges before planting had detectable levels of neonicotinoids.
- Talc used as an additive for planting treated seed had extremely high levels of neonicotinoids. Planter exhaust expelling tainted talc could be coming in contact with bees or plants they forage.
- Corn pollen collected by honey bees later in the season was screened; half of the corn pollen samples analyzed had neonicotinoids.

Their paper makes the following summary: neonicotinoid exposure is likely a combination of direct contact; indirect contact with dosed weeds/crops, talc or soil; and through ingestion from pollen in dosed plants. This year, approximately 200 million acres of crop land will be planted with crops that are treated with neonicotinoids, 94 million with corn alone. This means that some exposure is inevitable, but the following recommendations may help minimize the danger to honey bees during the planting season:

- Farmers should communicate with nearby beekeepers or apiaries about your intentions to plant. Visit the Iowa Department of Agriculture and Land Stewardship Sensitive Crops website for more information.
- Beekeepers should move hives away from production fields during the planting period if possible.
- Always use the recommended amount of talc to allow proper planting, removing this lubricant is not recommended.

- Do not clean planter equipment/hoppers near fields, especially around flowering plants.

Because of the importance of pollinators and the prevalence of these insecticides in our cropping systems, there is a great deal of research on this topic in independent labs all over the world. We will likely see more studies that explore the linkage between pollinator decline and pesticides in the near future, so stay tuned. For now, the best thing to do is minimize the high level exposures during planting as much as possible using the steps outlined above.

Erin Hodgson is an assistant professor of entomology with extension and research responsibilities; contact at ewh@iastate.edu or phone 515-294-2847. Christian Krupke is an associate professor of entomology at Purdue University with extension research responsibilities.

http://www.seedquest.com/news.php?type=news&id_article=25965&id_region=&id_category=&id_crop=

Source: *Integrated Crop Management NEWS* via SeedQuest.com

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1.14 **Ancient Egyptian cotton unveils secrets of domesticated crop evolution**

April 2, 2012
Warwick, United Kingdom

Scientists studying 1,600-year-old cotton from the banks of the Nile have found what they believe is the first evidence that punctuated evolution has occurred in a major crop group within the relatively short history of plant domestication.

The findings offer an insight into the dynamics of agriculture in the ancient world and could also help today's domestic crops face challenges such as climate change and water scarcity.

The researchers, led by Dr Robin Allaby from the School of Life Sciences at the University of Warwick, examined the remains of ancient cotton at Qasr Ibrim in Egypt's Upper Nile using high throughput sequencing technologies.

This is the first time such technology has been used on ancient plants and also the first time the technique has been applied to archaeological samples in such hot countries.
The site is located about 40 km from Abu Simbel and 70 km from the modern Sudanese border on the east bank of what is now Lake Nasser.

They also studied South American samples from sites in Peru and Brazil aged between 800 and nearly 4,000 years old. The results showed that even over the relatively short timescale of a millennia and a half, the Egyptian cotton, identified as G. herbaceum, showed evidence of significant genomic reorganisation when the ancient and the modern variety were compared.

However closely-related G.Barbadense from the sites in South America showed genomic stability between the two samples, even though these were separated by more than 2,000 miles in distance and 3,000 years in time. This divergent picture points towards punctuated evolution - long periods of evolutionary stability interspersed by bursts of rapid change – having occurred in the cotton family.

Dr Allaby said: “We think of evolution as a very slow process, but as we analyse more genome information we can see that there’s been a huge amount of large-scale proactive change during recent history. “Our results for the cotton from Egypt indicate that there has been the potential for more adaptive evolution going on in domesticated plant species than was appreciated up until now.

“Plants that are local to their particular area will develop genes which allow them to better tolerate the stresses they find in the environment around them.

“It’s possible that cotton at the Qasr Ibrim site has adapted in response to extreme environmental stress, such as not enough water.

“This insight into how domesticated crops evolved when faced with environmental stress is of value for modern agriculture in the face of current challenges like climate change and water scarcity.”

For archaeologists, the results also shed light on agricultural development in the ancient world.

There has long been uncertainty as to whether ancient Egyptians had imported domesticated cotton from the Indian subcontinent, as had happened with other crops, or whether they were growing a native African variety which had been domesticated locally.

The study’s findings that the Qasr Ibrim seeds were of the G. herbaceum variety, native to Africa, rather than G.arboreum, which is native to the Indian subcontinent, represents the first molecular-based identification of archaeobotanical cotton to a species level.

Dr Allaby said the findings confirm there was an indigenous domestication of cotton in Africa which was separate from the domestication of cotton in India.

"The presence of cotton textiles on Egyptian and Nubian sites has been well documented but there has always been uncertainty among archaeologists as to the origin of these.

"It's not possible to identify some cotton varieties just by looking at them, so we were asked to delve into the DNA.

"We identified the African variety – G. herbaceum, which suggest that domesticated cotton was not a cultural import – it was a technology that had grown up independently."

The study Archaeogenomic evidence of punctuated genome evolution in Gossypium, which was funded by NERC, is published in the journal Molecular Biology and Evolution.

http://www.seedquest.com/news.php?type=news&id_article=25794&id_region=&id_category=&id_crop=

Source: SeedQuest.com

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1.15 **Members appointed to USDA National Genetic Resources Advisory Council**

April 6, 2012
Washington, DC, USA

U.S. Agriculture Secretary Tom Vilsack announced today the appointment of nine members to the National Genetic Resources Advisory Council (NGRAC), a council originally established statutorily by the Food, Agriculture, Conservation, and Trade Act of 1990 (7 U.S.C.A. 5843).

The NGRAC has been re-established to formulate recommendations on actions and policies for the collection, maintenance, and utilization of genetic resources; to make recommendations for coordination of genetic resources plans of several domestic and international organizations; and to advise the Secretary of Agriculture and the National Genetic Resources Program (NGRP) Director of new and innovative approaches to genetic resources conservation.

The NGRAC will advise on ways to ensure that the NGRP serves the needs of all farmers for high-quality and diverse seed (both genetically engineered and non-genetically engineered) for their particular farming operations. The NGRAC will also advise on how the department can develop a broad strategy for maintaining plant

biodiversity available to agriculture, and strengthening public sector plant breeding capacities.

The following members were appointed for either a 2-, or 4-year term effective October 1, 2011:

Scientific Members

- Dr. Manjit Misra (NGRAC Chair), Professor/Director of the Seed Science Center Institute for Food Safety and Security as well as the Director of the Biosafety Institute for Genetically Modified Agricultural Products (BIGMAP) at Iowa State University.
- Dr. Jane Dever, Associate Professor of Plant Breeding at Texas AgriLife Research with Texas A&M University.
- Dr. Karen Moldenhauer, Professor & Rice Industry Chair for Variety Development, University of Arkansas Division of Agriculture.
- Dr. Stephen Smith, Fellow of Pioneer Hi-Bred International (a DuPont business).
- Dr. Allison Snow, Professor of the Department of Evolution, Ecology, and Organismal Biology at The Ohio State University.
- Dr. Mulumebet Worku, Animal Scientist/Professor/Biotechnologist with North Carolina Agricultural and Technical State University.

General Public Members

- Matthew Dillon, Director of Seed Matters, Clif Bar Family Foundation.
- Dr. Herman Warren, President of Warren and Associates Seeds.
- Terry Williams, Fisheries and Natural Resources Commissioner for the Tulalip Tribes.

In addition to the appointed members, 8 ex-officio members have been invited to participate as members, or to nominate alternates to serve in their place, of the NGRAC including:

- Dr. Peter Bretting, National Program Leader, Office of National Programs, USDA – Agricultural Research Service (ARS).
- Dr. Sharlene C. Weatherwax, Associate Director of Science for Biological and Environmental Research, Office of Science, US Department of Energy representing the Secretary of Energy.
- Dr. Francis Collins, Director of the National Institutes of Health.
- Dr. John Holdren, Director of the Office of Science and Technology Policy.
- Dr. Simon Liu, Director of the National Agricultural Library.
- Dr. Gary Pederson, Supervisory Geneticist for the USDA-ARS.
- Dr. Subra Suresh, Director of the National Science Foundation.
- Dr. Catherine Woteki, Under Secretary for the USDA Research, Education, and Economics Mission Area and the USDA Chief Scientist.

http://www.seedquest.com/news.php?type=news&id_article=25931&id_region=&id_category=&id_crop=

Source: SeedQuest.com

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1.16 National seed bank to be set up in western Victoria

April 12, 2012

By Lucy Barbour

The Victorian Government will spend $3 million on a national seed bank in Horsham in the state's west. The national genebank will hold more than 180,000 seed samples from Australia and around the world and is expected to be up and running by the middle of 2014.

Victorian Agriculture Minister Peter Walsh says it's a step towards feeding a growing world population. "So for growers it means that we have a world class facility here to store genetic material and to be involved in plant breeding and it gives our farmers world class opportunities for new varieties."

http://www.abc.net.au/rural/news/content/201204/s3475745.htm

Source: SeedQuest.com

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1.17 USA - More funding necessary for Germplasm Enhancement of Maize program

April 12, 2012
Alexandria, Virginia, USA

Three key seed industry representatives met with Congressional delegates March 27-28 in Washington, D.C., to discuss the importance of the Germplasm Enhancement of Maize (GEM) program and demonstrate that more funds are needed to meet increasing demands.

GEM is designed to widen the germplasm base of commercial hybrid corn in the United States through the introduction and incorporation of novel and useful germplasm gathered from around the globe. It is a cooperative effort of the U.S.

Department of Agriculture's Agricultural Research Service, land-grant universities, private industry, and international and non-governmental organizations.

Tom Hoegmeyer of Hoegmeyer Hybrids, Major Goodman of North Carolina State University and Terry Molnar of Pioneer Hi-Bred, a DuPont Company, spent two days meeting with members of the Subcommittee on Agricultural Appropriations, U.S. House of Representatives and U.S. Senate. Together, they stressed that current funding levels for the GEM program are inadequate to provide needed capacity for the regeneration, maintenance and distribution of the corn genetic resources.

In the U.S. alone, more than 92 million acres of corn were planted in 2011 with a raw material value of about $76 billion per year. These corn acres are primarily based on two genetic races of maize; there are more than 250 races identified globally. "The lack of diversity within our corn production acreage makes U.S. farmers and the surrounding agricultural community vulnerable to changing environmental pressures and market needs," said Goodman who manages the North Carolina State University Corn Breeding and Genetics Lab. "A narrow genetic base is associated with higher risk, increasing the potential for new diseases or insect species to become widespread in corn growing areas.

"There's also risk associated with abiotic stresses such as drought, flooding, heat or soil salinity extremes."He said resistance to these risks can be found in genetically diverse exotic germplasm sources. "These exotic sources would not only help protect crops and farmers pocketbooks, but reduce the need for pesticide use associated with combatting insect, disease and weed pressures," Goodman said.

Breeders need access to sources of diverse germplasm to ensure the continued success of U.S. corn farmers and their ability to adapt to a variety of pressures. The GEM program provides this access and maintains the germplasm.

The additional funding requested of the 112th Congress of the United States would support research project needs and better support genomic exploration of allelic diversity and adaptation at the Raleigh, NC, and Ames, Iowa, facilities.

http://www.seedquest.com/news.php?type=news&id_article=26065&id_region=&id_category=&id_crop=

Source: *American Seed Trade Association newsletter* via SeedQuest.com

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1.18 **Plants and animals under greater threat due to climate change - Species can lose their ability to adapt**

April 16, 2012
Wageningen, The Netherlands

Plant and animal species can lose their ability to adapt as a result of climate change. This is shown by research performed by Marleen Cobben with which she hopes to obtain her doctorate at Wageningen University (part of Wageningen UR) on 17 April 2012.

Cobben used computer calculations to illustrate how the genetic base of plants and animals is seriously deteriorating due to climate change. The smaller genetic base makes species more vulnerable to problems such as diseases. Moreover, the fragmentation of landscapes and the loss of wildlife areas is accelerating this decline.

Cobben has demonstrated that climate change is causing the populations on the northern side of the species' living area to migrate further north. However, these populations have less genetic variation than the populations that live in the centre of the species' range. As a result the populations that establish further north are genetically poor.

The populations in the centre of the living area have more genetic variation. Cobben's research shows that the large genetic variation in these populations cannot migrate north quickly enough when temperatures rise. If these populations become extinct, this genetic variation is therefore lost. And this loss is definite: Gene varieties will disappear permanently from the species, causing an overall genetic impoverishment.

A reduced genetic base makes plant and animal species more vulnerable to threats such as diseases: when fewer gene varieties exist there is a smaller chance that a gene variety is present when a plant or animal population is threatened by a disease. The species therefore loses part of its ability to adapt.

Cobben's computer calculations shed a new light on the effects of climate change on plants and animals. People often think that species with slow shifting ranges will manage by adapting to the new climate conditions: adaptation as an alternative survival strategy. However, if the right gene varieties cannot migrate to the right place fast enough, plants and animals will be less 'climate-proof' than expected.

Cobben believes that her findings underline the importance of preserving or creating large wildlife areas and connections between these areas. "This gives us more time," she says. "Preserving genetic diversity for a species is linked to the survival of populations in the centre of the species' range. The longer these survive, the larger the chance that those gene varieties can migrate north. If this migration is blocked by barriers in the landscape, the genetic variation will decline more quickly, making the species even more vulnerable to new threats such as diseases."

Cobben's research was carried out on the middle spotted woodpecker, a species which has increased in numbers in the Netherlands over recent years. The woodpecker is a so-called 'model species', meaning that it is very suitable for this type of ecological research.

Woodpeckers are most easily found at this time of year, in early spring. They are very active, and pecking. Since the trees have yet to develop full foliage, they are relatively easy to spot.

http://www.seedquest.com/news.php?type=news&id_article=26131&id_region=&id_category=&id_crop=

Source: SeedQuest.com

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1.19 **Ancient genes and modern science deliver salt-tolerant wheat**

April 18, 2012

By Heather Bray and Matthew Gilliham

Ten thousand years ago, somewhere in the 'fertile crescent' near modern day Turkey, several small but amazing events kick-started the spread of farming, the birth of civilisation and ultimately changed the world.

Although we are still learning about the precise nature of these events, we know that at this time people began to collect seeds from local wild grasses to grow them for food, selecting the best seeds to grow in subsequent seasons. During this process of selection and cultivation the wild grasses cross-bred, or hybridised, leading to domesticated forms of ancient wheat such as einkorn and emmer. Selection and cultivation continued, giving rise to both modern bread wheat and durum wheat, used for making pasta and couscous.

Wheat is now the most cultivated crop in the world and forms the staple food for 35% of the world's population. However, thousands of years of repeated selection and crossing to obtain the best yields and quality has significantly narrowed wheat's gene pool.

For a team of Australian researchers looking at the problem of salinity tolerance in durum wheat, the solution was clear: look at the ancestors and wild relatives of modern wheats for tolerance to salt and re-introduce these genes into modern wheat lines.

"It was some pretty big thinking about 15 years ago by our collaborators at CSIRO that started this work," says Dr Matthew Gilliham of the University of Adelaide and the ARC Centre for Plant Energy Biology. Matthew is senior author on a paper recently published in *Nature Biotechnology* announcing the development of a line of durum wheat which is salt tolerant under commercial farming conditions.

Salinity affects over 20% of the world's agricultural land and is a major issue in Australia's prime wheat-growing areas, with nearly 70% of this land susceptible to salinity. "Through the years, wheat has lost genetic diversity for things such as tolerance to harsh environmental conditions. That's why we need to go back in time, get some genes from wild relatives and ancestors that grow in these harsh conditions and cross them back in."

To find genes for salt tolerance, researchers from Australia's CSIRO looked at *Triticum monococcum*, also known as einkorn. It is not a direct ancestor of bread wheat or durum, but it is closely related to the grasses that were, and it still grows in some parts of the world today. It can also grow in salty soil.

When the initial crosses between durum and the *T. monococcum* were made using traditional plant breeding methods, whole pieces of chromosomes containing thousands of genes were introduced. More years of crossing and selection were needed to reduce the number of genes from the *T. monococcum* in the durum lines and by 2009, researchers were trialling durum wheat lines with increased tolerance to salinity. But what where the genes and how did they work?

In salty soils, sodium ions from salt enter wheat plants via the roots. From there they enter the plant's water-transport system from where they can be taken to the leaves. "The hypothesis we were working on is that salinity tolerance in cereal crops, especially wheat, is related to the ability to exclude sodium ions from the leaves. If you build up sodium levels in leaf cells you start to inhibit essential life processes like photosynthesis, so wheats that exclude salt from their leaves grow better in salty soils" explained Matthew.

"Our group, including researchers from the Australian Centre for Plant Functional Genomics, used a range of molecular and physiological tests to work out that the important gene in this story was the sodium transporter gene TmHKT1;5-A. We worked out where the gene was turned on, and what it did. This gene makes a protein that acts as a sodium selective transporter, which prevents the sodium from entering the shoots by filtering it out at the root level, it essentially turns the roots into a sodium selective sponge. Compared to the shoots, the build up of sodium in root cells does not inhibit cellular metabolism very much at all."

Although the understanding of the function of the sodium transporter involved transgenic (genetic modification) techniques, the introduction of the genes into the durum lines did not, meaning that the lines of wheat could be tested under

commercial conditions without going through Australia's strict regulatory framework for genetically modified organisms.

The durum line was trialled on a variety of field sites across Southern Australia including a commercial farm near Moree in northern New South Wales, These trials were led by CSIRO researchers Richard James and Rana Munns. Farmers in this area usually harvest about 2.5 tonnes per hectare, a typical and profitable yield for broad-acre, rain-fed (non-irrigated) cropping in semi-arid areas.

However, like many farms in the grain producing areas of Australia, salinity is beginning to affect yields. On this farm, a commercial durum variety and the line with the introduced sodium transporter genes had the same performance on normal soil. But at the highest salinity level, the new line outperformed the commercial variety by approximately 25%. This means farmers can use varieties developed from the improved line across their farms, even in paddocks only partly affected by salinity with a significant yield advantage over the current varieties.

"Our research is the first to show that sodium exclusion genes increase grain yield in the field" said Matthew, which is why the group's work is attracting a lot of attention, including publication in the prestigious *Nature Biotechnology*. But the team's work is not over yet. They have already identified other genes from ancient relatives that may be useful in improving salinity tolerance further, highlighting the huge potential for improving modern wheat using the diversity already present in nature. "There are other aspects to the salt- tolerance story and more genes to identify and characterise" adds Matthew. "We haven't solved the problem, we have just put one piece back in the puzzle."

About the Authors

Dr Heather Bray is a science communicator with the Waite Research Institute and a research fellow in the School of History and Politics at the University of Adelaide. She is fascinated by both the science in agriculture and the social aspects of food production in contemporary Australia. Twitter handle: @heatherbray6

Dr Matthew Gilliham is a senior research fellow in the School of Agriculture, Food and Wine, supported by the ARC Centre for Plant Energy Biology. His research focuses on how plants use, transport and exclude nutrient elements and aims to develop more nutritious and productive plants tolerant to abiotic stresses. Twitter handle: @ionplants

http://blogs.scientificamerican.com/guest-blog/2012/04/18/ancient-genes-and-modern-science-deliver-salt-tolerant-wheat/

Source: SeedQuest.com

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1.20 **Max Planck Institute POD corn is not a maize ancestor**

Pod corn, a crop that is said to be maize's wild ancestor, is proved to be a product of mutation that results to development of leaves in the wrong places. Max Planck Institute for Plant Breeding Research and Friedrich Schriller University said that the cause of leaf generation in the cob area is a leaf gene that is usually not active there. This type of maize has bewildered scientists for years with its covered kernels. These "covers" are long membranous husks which are known as glumes. In contrary to those who believe that this is an old relative of our normal maize today, pod corn is said to be just a mutant corn.

Findings of Heinz Saedler, Günter Theißen and their team have discovered how the mysterious look of the pod corn arises and the results show that it has nothing to do with the domestication of the maize as it is today. Saedler said that from the old crossing experiments the mutation must consist of at least two genetic components that can be inherited separately.

When one component is inherited, the glumes that surround the kernels in this mutant are significantly smaller and less noticeable than that of the samples with both genetic components. Thus, these results show that the two components involved are copies of the same gene which are usually together and located in chromosome four (4). The region that controls the transcription of the gene is said to be damaged according to researchers and as a result, glumes develop a leaf-like pattern and mature until the kernels are completely wrapped.

The mutated gene is proved to belong to an entire family of development control genes known as the MADS-box gene family and other representatives of this family control other developmental processes in the plant.

Read more at http://www.mpg.de/5755791/pod_corn_leaves_inflorescences

Source: Crop Biotech Update 27 April 2012

Contributed by Margaret Smith
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1.21 **Superstars of botany: Rare specimens**

A handful of plant collectors has shaped the field of botany. Now they are disappearing, and there are no clear successors.

25 April 2012
By John Whitfield

http://www.nature.com/news/superstars-of-botany-rare-specimens-1.10498

Plant collectors are also facing a growing number of bureaucratic hurdles. Tropical countries, seeking to protect potentially lucrative sources of drugs and crops, have tightened their regulation of plant collecting. India is among those that ban the export of plant specimens altogether; other countries demand that botanists specify what groups they will collect, hindering broad floristic work.

“Each time I go back to Bolivia there's more paperwork and more restrictions,” says Wood. That makes it harder for botanists to gain international experience, he says. “There's a disincentive to start in another country, because it means starting your permits and contacts from scratch.” The top collectors of the future are likely to be born in, or migrate to, tropical countries, he says.

This shift is already happening, with local collectors and herbaria compensating for the decline of the big-hitting Westerner, says Gerrit Davidse, of the Missouri Botanical Garden, a co-author of the collector analysis. “In the past, you could mostly ignore local collections in places such as Mexico and Brazil,” he says. “Now you ignore them at your peril.”

The tight regulations do not spare native collectors. “We have many problems applying for permits,” says Alfredo Fuentes, a botanist at the National Herbarium of Bolivia in La Paz. “It is very difficult to explain why we collect, and that the collections are not for commercial purposes. We spend a lot of time on this.” In Kenya, says Luke, it is “a huge song and dance” for local botanists to send specimens abroad to be identified, which is usually necessary for the most interesting finds.

The bottleneck means that star collectors of the past remain a force in present-day botany. Today's researchers spend their days with plants collected by botanists going back to the eighteenth-century days of Joseph Banks, and speak of their forebears with the same familiarity as they do of their contemporaries. As Wood puts it: “Collectors have a sense of their place in history.”

Contributed by Rodomiro Ortiz
rodomiro.ortiz@slu.se

Source: SeedQuest.com

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1.22 **Environmental and conservation seed workshop to be held during annual convention of the American Seed Trade Association (ASTA)**

March 30, 2012
Alexandria, Virginia, USA

Different from years past, the 10th Annual Environmental and Conservation Seed Workshop will be held June 19 as part of the American Seed Trade Association's Annual Convention.

"Normally the workshop is held in April and we spend a day at USDA meeting with and hearing from the different agencies and bureaus that deal with seed, and the following day we go on the Hill as part of the fly in," said Leslie Cahill, ASTA vice president of government affairs and staff liaison to the Environmental and Conservation Seed Committee. "With this year's Annual Convention being held in the D.C. area, it only makes sense to combine everything and make better use of our resources and members' time."

Individuals with an interest in environmental and conservation seed should mark their calendars for Tuesday, June 19, from 9 a.m. to 4 p.m. As usual, the workshop will be held at USDA headquarters.

ASTA's Annual Convention will be held June 20-23 at the Gaylord National in National Harbor, Md. A block of rooms has been reserved at the rate of $199 per night. For reservations, call 301-965-4000 or visit www.gaylordnational.com and mention "ASTA."

A printable registration form for the Annual Convention is available at http://www.amseed.org/pdfs/AC12-RegistrationBrochure.pdf and online registration will open soon.

For questions and additional information about the workshop, contact Cahill at 703-837-8140 or lcahill@amseed.org.

For questions and information about the Annual Convention, contact Jennifer Crouse, ASTA director of meetings and services, at 703-837-8140 or jcrouse@amseed.org.

http://www.seedquest.com/news.php?type=news&id_article=25740&id_region=&id_category=&id_crop=

Source: *Newsletter of the American Seed Trade Association (ASTA)* via SeedQuest.com

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1.23 Success of ISF World Seed Congress 2011 enables £50,000 donation from the British Society of Plant Breeders to support seed improvement project in Kenya

April 2012
United Kingdom

The British Society of Plant Breeders (BSPB) is donating £50,000 to FARM-Africa to support a two-year seed improvement project in Kenya.

The project will work with 1500 local farmers in Eastern Kenya to improve the quality and supply of drought tolerant seeds. This in turn will boost local food security and the incomes for farmers' families, benefitting 9000 people.

The decision to support the project was made possible by the success of last year's International Seed Federation (ISF) World Seed Congress, which was hosted by BSPB in Belfast, Northern Ireland.

The ISF World Seed Congress 2011 offered a unique opportunity for BSPB to welcome the world's seed industry to the UK, and the record attendance in Belfast reflects a growing recognition that innovation in the plant breeding and seeds sector will be a key factor in addressing the global challenges of food security and climate change.

An added bonus is that surplus revenue from the Congress has enabled BSPB to support the vital work of FARM-Africa in helping smallholder farmers to access the benefits of improved varieties and better quality seeds.

According to FARM-Africa, the donation from BSPB will help to transform the lives of farmers struggling to grow food for their families on tiny plots in unimaginably harsh conditions. The project will provide these farmers with the seeds they desperately need to feed communities in this highly vulnerable region and, as food production grows, farmers will also be able to produce surpluses which can be sold to pay for essential household and medical expenses as well as schooling for children.

About the project

The availability and affordability of quality drought tolerant seeds is a major constraint to local farmers in Kenya, who often plant crops which are not suited to the region's drought-like conditions.

The BSPB-funded project seeks to break this cycle of crop failure and create food security in Kenya by giving farmers access to drought tolerant crop varieties.

Based in Kitui County, Eastern Kenya, the BSPB-funded project will test an approach for disseminatig drought tolerant seeds of approved varieties provided by the Kenya Agricultural Research Institute (KARI).

Over 80% of Kenya's land is classified as either arid or semi-arid. The results of the project are therefore highly important as successes will be shared and implemented across other regions and districts.

A recent FARM-Africa project in the same area doubled yields for smallholder farmers by using drought tolerant crops and improved soil and water conservation techniques. Working with three crops - sorghum, green grams and pigeon peas – and across four cropping seasons, FARM-Africa believes the long-term sustainability of the project will hinge on three key factors: linking seed producers to local seed and input dealers; improving farmers' awareness of the benefits of improved varieties; and linking seed producers to KARI for the supply of quality foundation seed and technical advice.

FARM-Africa is a different kind of charity working to end hunger and bring prosperity to rural Africa. For too long, Africa has struggled with the problems of hunger and poverty. Again and again, images of famine have challenged the world to end this human tragedy – but still it happens. Today, with climate change to deal with too, the need is more urgent than ever.

FARM-Africa is helping Africa's farmers to end this cycle of despair and take charge of their future.We're doers, bringing the technology and know-how to Africa farmers to help them manage their resources for the long-term.We're there, on the ground, shoulder to shoulder with farmers to ensure the best farming techniques take root and spread so there's food not just this harvest, but every harvest.We bridge rural communities, governments and businesses so that farmers can grow food AND sell it too, ensuring that Africa's farmers build better lives.

You can learn more here: http://www.farmafrica.org.uk/

http://www.seedquest.com/news.php?type=news&id_article=25774&id_region=&id_category=&id_crop=

Source: SeedQuest.com

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1.24 **The electronic nose knows when your cantaloupe is ripe**

March 30, 2012

Have you ever been disappointed by a cantaloupe from the grocery store? Too ripe? Not ripe enough? Luckily for you, researchers from the University of California, Davis might have found a way to make imperfectly ripe fruit a thing of the past. The method will be published on March 30 in the Journal of Visualized Experiments (JoVE).

"We are involved in a project geared towards developing rapid methods to evaluate ripeness and flavour of fruits," said paper-author Dr. Florence Negre-Zkharov. "We evaluated an electronic nose to see if it can differentiate maturity of fruit, specifically melons. The goal is to develop a tool that can be used post-harvest to better evaluate produce, and develop better breeds."

When fruit ripens, it develops a characteristic volatile blend, indicating its maturity. Traditionally, the gold-standard of evaluating these volatiles has been gas chromatography, but it takes up to an hour to analyze a single sample, which makes it impractical to use outside the lab.

Dr. Negre-Zakharov and her team wanted to determine if the much cruder— but much faster— electronic nose was able to determine if the melon they used in the experiment were ripe. It was. "It's quite encouraging technology for the purposes of determining maturity," she said.

The project is part of the Specialty Crops Research Initiative, funded by the United States Department of Agriculture, which was "established to solve critical industry issues through research and extension activities." Dr. Negre-Zkharov and her team are working on quantitative methods of evaluating fruit-ripeness in the hopes that it will help the industry produce better quality produce.

"It's very impressive that the electronic nose system can do a type of gas chromatography in about a minute. Ultra-fast, indeed. Also, the sample preparation is as easy as making a smoothie at home. Such a user-friendly system could greatly help analysis efficiency in this field," said JoVE Science Editor, Dr. Zhao Chen. "Given the popularity of JoVE video-articles, I expect many researchers will know and adopt this method in their own research."

Since the very nature of the project is to give people useful tools, the researchers decided to publish in JoVE, the only peer reviewed, PubMed-indexed science journal to publish all of its content in both text and video format. "We thought that the best way to get people to adopt the method was showing a video, instead of publishing a text," said Dr. Negre-Zkharov.

The next step is to take the electronic nose out into the field to determine if it can still determine fruit maturity with all of the background smells interfering— like soil and air-quality. Though the team has already tested the device in the field, they have not yet analyzed their results.

Presentation by Dr. Florence Negre-Zakharov
Investigating fruit volatile metabolism: toward improving crop flavor quality
Seed Central, December 2011
Watch the presentation

To watch the full video article, please click here:
http://www.jove.com/video/3821/fruit-volatile-analysis-using-an-electronic-nose

The Journal of Visualized Experiments (JoVE) is the first and only Pubmed and Medline indexed academic journal devoted to publishing research in the biological sciences in video format. Using an international network of videographers, JoVE films and edits videos of researchers performing new experimental techniques at top universities, allowing students and scientists to learn them much more quickly. As of January 2012 JoVE has released 59 monthly issues including over 1500 video-protocols on experimental approaches in developmental biology, neuroscience, microbiology and other fields.

Fruit Volatile Analysis Using an Electronic Nose Simona Vallone1, Nathan W. Lloyd2, Susan E. Ebeler3, Florence Zakharov11Department of Plant Sciences, University of California, Davis 2Department of Chemical Engineering and Material Science, University of California, Davis 3Department of Viticulture and Enology, University of California, Davis A rapid method for volatile compound analysis in fruit is described. The volatile compounds present in the headspace of a homogenate of the sample are rapidly separated and detected with ultra-fast gas chromatography (GC) coupled with a surface acoustic wave (SAW) sensor. A procedure for data handling and analysis is also discussed.

http://www.seedquest.com/news.php?type=news&id_article=25732&id_region=&id_category=&id_crop=

Source: *The Journal of Visualized Experiments* via SeedQuest.com

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1.25 X-ray technology harnessed to grow more nutritious crops

April 5, 2012
Kigali, Rwanda

Agricultural researchers in Rwanda have adapted a technology widely used in the mining sector to analyse the mineral content of food crops such as beans and maize, with a view to developing more nutritious crops.

The team, from the Rwandan Agricultural Board (RAB), say the idea was inspired by a study published in the journal Plant and Soil earlier this year (21 January), which noted the use of X-ray fluorescence (XRF) analysis to determine the mineral content of soil samples.

XRF analysis generates X-rays of different colours to indicate the presence, and concentration, of elements such as iron and zinc. It is quick to display results, and each sample costs just 15 US cents to analyse – compared to US$20 for other chemical analysis technologies.

In Rwanda, beans are regarded as a near-perfect food as they contain many important nutrients, and between 22 to 30 per cent of arable land across the country is currently used to grow them, according to the RAB.

The Rwandan team used XRF to analyse three varieties of bio-fortified beans – climbing, bush and snap beans. They analysed 15 samples in total, and found four were particularly rich in mineral nutrients such as iron and zinc, according to Augustine Musoni, a senior researcher at the RAB. "This is a step forward in [reducing] malnutrition while improving the lives of smallholder farmers," Musoni told SciDev.Net. Iron deficiency in food crops can inhibit physical and mental development in children, and increase the risk of women dying in childbirth, Musoni added.

The Plant and Soil study was funded by HarvestPlus, which is part of the Agriculture for Improved Nutrition and Health programme of the Consultative Group on International Agricultural Research (CGIAR).

HarvestPlus has formed partnerships with research institutes in Bangladesh, Mexico and India to make further use of the technology in crops like rice and pearl millet. It has set up XRF facilities in these institutes and trained local scientists to use them.

The main purpose of the new technology according to Tiwirai Lister Katsvairo, the Rwanda country representative for HarvestPlus, is to deliver nutritious staple food crops to reduce "hidden hunger" — the lack of dietary vitamins and minerals, adding that more than half of Rwanda's children under five, and a third of the female population, are anaemic.

Daphrose Gahakwa, deputy director-general of the RAB said that XRF technology would be a beneficial method of testing mineral content in seeds. The challenge in delivering this innovation, she said, was how to deliver those benefits to remote areas of the country.

Link to abstract in Plant and Soil

http://www.seedquest.com/news.php?type=news&id_article=25950&id_region=&id_category=&id_crop=

Source: SeedQuest.com

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1.26 **EU-funded project to speed up the development of drought and disease resistant crops**

April 2, 2012
United Kingdom

As parts of the UK have been officially declared to be in a state of drought, the announcement of a new EU-funded project which aims to speed up the development of drought and disease resistant crops is timely.

The five-year, three-million Euro project is set to revolutionize the way in which new plant varieties are produced. Molecular and computational techniques will be used to identify processes associated with the way drought and disease combine to make matters much worse than either alone. The project will also identify novel genes and biochemical pathways that improve plant resistance to these stresses.

The approach will be developed using a clover-like plant as a model. Under laboratory conditions, hundreds of these plants will be subjected to drought and/or infection with a type of soil fungus called Fusarium. The latest high throughput imaging technology will be used to monitor the performance of the plants without disturbing them. The information obtained from studying the model plant will then be applied to breeding new pea varieties. These new varieties will be compared with existing commercial crops, identifying those which perform better when challenged with a combination of Fusarium and drought. The best of the plants will undergo field trials at different sites across Europe.

The project is being led by The Food and Environment Research Agency (Fera) and involves 12 national and international partners. Dr Adrian Charlton, Project Leader and Head of Chemical & Biochemical profiling at Fera said “This project brings together the very best expertise in plant-based molecular biology and biochemistry in Europe and should lead to groundbreaking improvements in the techniques used for crop breeding. Fera scientists will be studying the biochemical profiles from the best performing plants and linking these back to the genes responsible using advanced computational techniques.”

Researchers aim to develop principles and techniques that can be rolled out for crop breeding generally. Small to medium sized businesses should be able to use these to

develop business opportunities. This should significantly reduce the time taken to breed new crop varieties that are more able to withstand the challenges commonly associated with climate change, such as extreme weather and changing incidence of pests and diseases.

Peas are being studied initially as they are well characterised genetically. Peas, like other legumes, have a key role as a sustainable source of protein in both human and animal diets. Importantly, peas can replace imported soybeans, which currently represent over 75% of feedstock protein in the EU. Farming of legumes has a low carbon footprint compared with other crop types and they also replenish nitrogen in the soil for the following crop. Legumes don't require, and reduce the need in other crops for, nitrogen fertilisers which are a major source of greenhouse gases and farm energy consumption. Increased cultivation of drought and disease resistant legumes developed as a result of this project will be important in ensuring future food security, whilst mitigating the effects of climate change.

The soil fungus Fusarium is being used as an example of disease stress because this type of infection affects the way in which plants can mobilise water and so the damage it causes is compounded during drought conditions. The prevalence of this economically devastating fungal disease is predicted to increase due to climate change.

Background
Legumes are notable for their ability to fix atmospheric nitrogen. This is due to a symbiotic relationship with bacteria which are found in the root nodules of these plants. As a result legumes do not require nitrogen fertiliser, which reduces fertiliser costs for farmers and gardeners who grow legumes, and allows legumes to be used in crop rotation to replenish soil that has been depleted of nitrogen.

The production of nitrogen-based fertilisers uses about 1% of the world's energy. The use and production of nitrogen fertilisers can lead to the production of nitrous oxide (N₂O), a greenhouse gas with about 300x the potency of CO₂. Increased planting of legumes can therefore help to combat climate change.

This new project is titled ABSTRESS.

The partners are:

- The Food and Environment Research Agency, York, UK (lead).
- University of Essex, Colchester, UK.
- University of Aberystwyth, Aberystwyth, UK.
- Centre National de la Recherche Scientifique (CNRS), ISV, Gif sur Yvette, France.
- Institut National de la Recherche Agronomique (INRA), Dijon, France.
- Agricultural Biotechnology Centre, Gödöll?, Hungary.

- Consejo Superior de Investigaciones Científicas, Cordoba, Spain.
- GenXPro GmbH, Frankfurt, Germany.
- Arterra Bioscience, Naples, Italy.
- Processors and Growers Research Organisation, Peterborough, UK.
- Agrovegetal S.A., Savilla. Spain.
- Agritec Ltd., Šumperk, Czech Republic.
- Biotecgen Srl., Lecce, Italy.

As the project progresses more information will be posted on the website - *www.abstress.eu*.

http://www.seedquest.com/news.php?type=news&id_article=25816&id_region=&id_category=&id_crop=

Source: SeedQuest.com

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1.27 New forage plant prepares farmers for climate changes

April 4, 2012
Copenhagen, Denmark

Researchers, including plant researchers from the University of Copenhagen, have developed a new type of the corn-like crop sorghum, which may become very significant for food supplies in drought-prone areas. Unlike the conventional drought-resistant sorghum plant, which is an important crop in e.g. Africa, China and the USA, this new type does not form toxic cyanide when exposed to long-term drought. Consequently, farmers in drought areas will no longer need to discard their sorghum crops in future.

Sorghum, or durra, is an important forage crop in many countries, for example the USA, Africa, China and Australia. The plant is grown instead of corn because it produces more biomass and better withstands long periods of drought. However, when exposed to drought, the sorghum plant produces large amounts of dhurrin, which forms toxic cyanide, i.e. Prussic acid.

Forced to discard crops
Farmers thus face a big dilemma. During a period of drought when they most need food for their animals, they are often forced to discard their sorghum because they do not know how poisonous it is and how much the animals can eat without suffering from cyanide poisoning.

In Australia alone, farmers lose hundreds of millions of dollars each year as a result: "The fact that the sorghum plant produces large amounts of the natural cyanogenic glycoside dhurrin when exposed to drought is a serious problem for farmers in many parts of the world. Dhurrin breaks down to form toxic cyanide or Prussic acid when an animal eats the plant. So when there is a drought and most need for forage, the farmer can no longer use the crop and it goes to waste," says Professor of Plant Biochemistry at the University of Copenhagen, Birger Lindberg Møller .

New, toxic-free sorghum strain is a breakthrough

Recently, Birger Lindberg Møller and his research group have, in collaboration with, for example, Monash University in Australia, developed a sorghum plant which is unable to produce Prussic acid.

Instead of using genetic engineering, the researchers used plant breeding and advanced biochemical and molecular biological screening methods:"This is a breakthrough which, globally, can be very important for agriculture, especially in warmer climes where climate change is expected to cause longer and more frequent periods of drought in future. Especially in Africa, where farmers cannot afford to buy new forage in periods of drought, it is a huge step forwards that they will now be able to feed their animals with sorghum they can grow themselves," says Birger Lindberg Møller.

The University of Copenhagen and Monash University have submitted a patent application.

Copenhagen Plant Science Center gathers plant research. Professor Birger Lindberg Møller is an internationally leading researcher in explaining the way in which plants produce bioactive natural substances. This research area will be a key part of the research profile for the future Copenhagen Plant Science Center .

The centre will bring together the University of Copenhagen's research and education within plants and plant-based foods and provide even better possibilities for working with the business sector.

On Wednesday 28 March, Maive Rute, Director for Food, Agriculture and Biotechnology in the EU Commission, visited some of the research environments which in future will make up the Copenhagen Plant Science Center. The purpose of the visit was to examine the possibilities for major new EU initiatives and investments in the plant and energy area: "The visit is important because in future it will increasingly enable Danish research results to be translated in collaboration with both small and larger businesses into specific products and developing strategies which can counter some of the challenges posed by climate change in terms of reduced yields and the spread of new plant diseases.

There is a serious need for knowledge-based solutions within bioenergy, foods, medicine and other bio-based raw materials which can benefit research and business," says Professor Poul Erik Jensen , who, with Professor Birger Lindberg Møller, is an acting head of the centre.

Read more at the Copenhagen Plant Science Center website.

http://www.seedquest.com/news.php?type=news&id_article=25875&id_region=&id_category=&id_crop=

Source: SeedQuest.com

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1.28 **Hunt on for rice to resist salt, flooding**

April 17, 2012
Bangkok

With rice production in Vietnam's fertile Mekong delta threatened by salt water from rising sea levels, researchers say they're turning to genetics for help. Scientists at the International Rice Research Institute are working with Vietnamese counterparts in experiments in the Philippines to develop a variety of rice that can withstand submergence for over two weeks and also resist increased salinity.

An existing flood-tolerant variety, dubbed "scuba rice," already offers half the solution, researchers said. "IRRI is experimenting to find a rice variety to deal with both problems," Bjorn Ole Sander, a scientist at the world's leading non-governmental research center on rice, told Inter Press Service. "Even if we have rice crops that are tolerant to floods they can die because of salinity."

The search for a salinity-tolerant variety that could be cross-bred with scuba rice is daunting, he said. "It will take at least four years to find a rice variety that will be tolerant to both salinity and flooding," he said.

With climate change and global warming the search for a solution is vital, he said, noting that salt water from the South China Sea now spreads 25 miles into the Mekong delta, unlike the 6 miles inland the sea tides reached 30 years ago. "That would be the answer to the problems faced in the Mekong Delta from flooding and salinity from the rising sea tides."

Researchers in Britain and Japan also are working on developing saline-resistant rice.

Read more:

http://www.upi.com/Science_News/2012/04/17/Hunt-on-for-rice-to-resist-salt-flooding/UPI-38661334707302/#ixzz1snWqPrac

http://www.upi.com/Science_News/2012/04/17/Hunt-on-for-rice-to-resist-salt-flooding/UPI-38661334707302/

Source: SeedQuest.com

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1.29 **Creating the perfect tomato**

April 18, 2012

By John Buchanan Central Florida's Agri-Leader

A tomato is no longer just a tomato. And as consumer knowledge and tastes become ever more sophisticated, a good tomato is no longer necessarily good enough.

That's the underlying business philosophy that has driven Immokalee-based, super-grower Lipman — the largest field grower of tomatoes in North America — to work to develop proprietary varieties that incorporate abundant flavor, nutritional value, color, shape and shelf life.

In the past, tomatoes were selected as inbred, or self-pollinated, varieties. Growers would simply choose a plant that did better than the rest, then replant its seeds. Today, however, there is much more science behind the process.

"Parents," or tomatoes chosen for their superior genes when it comes to taste, size, color and resistance to disease, are inbred until the lines are stable — usually for six or seven generations. Then, "Tomato A," bred for a trait such as ideal taste, is intercrossed with "Tomato B," bred for ideal size and shape, to create a new hybrid that can be brought to market with much fanfare.

During the first three years of the process, Lipman develops a "library" of parents, explained Mark Barineau, the company's director of breeding. "Then we pull those off the shelf and intercross them to make our new hybrid materials." After that, it typically takes another two to three years to actually bring the new hybrid to market. And that includes field experimentation in actual growing.

Lipman's ability to develop new varieties has resulted from key advances in technology, including analytical capabilities at the DNA level. "We've also come a very long way," Barineau said, "in terms of the ability to challenge our varieties with

different pathogens effectively so that we know that the disease resistances we're working on really are there."

Another important advance has been at the farming level. "That means the tools that allow us to grow and monitor our crops more effectively," Barineau said. "For example, the genetic markers that are available now for looking at varieties at a DNA level. We can look right down to the base pairs of DNA. We can look at changes in base pairs. And that allows us to very powerfully evaluate our material."

At the same time, he said, challenges have increased, too. "The number of pests and pathogens we have to deal with from a farming standpoint has increased," he said. "There are new races of bacteria, new races of blight. There are a range of things that didn't attack plants when I first got into the business 20 years ago. So we've had to change our varieties to give us more flexibility in the growing aspects. "From a farming standpoint, we've also had to be much more sensitive to the range of pesticides that can be applied, although we try to minimize the number of those applications and also try to minimize the number of materials that we use to make them more 'green' or 'friendly.'"

If smaller or less tech-savvy growers want to learn more about how Lipman does what it does, the best way is via an extension office of the University of Florida. "The UF people are up on the latest practices and they're in a position to deal with individual growers," Barineau said.

Lipman's innovation also matters to its retail customers and ultimately to consumers. "Consumers today are a lot more knowledgeable," said Tim Wynn, the third-generation proprietor of 74-year-old, high-end grocer Wynn's Market in Naples. "And a lot of them are looking for the kind of flavor we all used to get from good old-fashioned, vine-ripe tomatoes. And they're also looking for tomatoes that are beautiful."

Because he competes with Whole Foods and Fresh Market, Wynn said he is constantly on the lookout for the best tomatoes he can find. He has had great success with Lipman's vintage ripes. "I just want to make my customers happy," Wynn said. "And that's what helps us about all the work Lipman is doing. Their vintage ripes are a step above your everyday tomato and they sell very well for us."

Wynn said he is further encouraged that Lipman recently announced a consumer-branding campaign that will commence later this month with aggressive advertising and promotion.

"The more knowledge the customer has, the easier that makes my job," Wynn said. "So I think it's great they're doing that. "The more knowledge the customer has, the more they're going to come in demanding those particular products. And I get to sell more, so everybody wins."

For more information, go online to www.lipmanproduce.com.

http://www2.tbo.com/business/2012/apr/18/creating-the-perfect-tomato-ar-393376/

Source: SeedQuest.com

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1.30 **Tomatoes: GM, Aroma and Tradition**

April 25, 2012
By Enrico Uva

For our frugal parents in the late 1960's, pressure cookers and mason jars were not an option. In fact, since our tomato-dominated gardens couldn't provide the needed volume, our extended family drove to farms to pick more tomatoes, often overfilling allotted baskets. Then back home, not for ecological reasons but strictly to lower costs, any glass container in sight was recycled, filled with crushed tomatoes and topped with a basil leaf. Jars and bottles were placed in big oil drums, and fires were lit in the fields behind our suburban homes so we could preserve sauce for the long, upcoming winter.

When we carry out traditions, we are under the illusion that we are repeating acts dating back to the dawn of our culture. But a few years later, as an adolescent, a plaque at Montreal's Botanical Gardens made me aware that tomatoes are not indigenous to the Old World, let alone Italy. Pasta can be traced to the Roman Empire, but it was eaten without tomato sauce.

Even after tomatoes were brought in from South America or Mexico (there are two competing hypotheses with not enough evidence to declare a winner) they were assumed to be poisonous because of their similarities to mandrake and belladonna. Finally, at some point between the 1600's and 1700's, tomatoes were used for culinary purposes in southern Europe, but the custom did not become widespread until the 1860's when they were first mass-produced.

When it comes to classifying the tomato, many have experienced confusion, regardless of their knowledge of botany. Aside from the Nix versus Hedden issue, people forget or ignore that the seeded berry grows from a flower; they persist in calling it a vegetable because it is not as sweet as a pear or a cantaloupe, and it's not tossed into a fruit salad. The same applies to other fruits such as peppers, cucumbers and squash. But for a long time, botanists incorrectly classified the domestic tomato as *Lycopersicon esculentum*, even though Linnaeus in 1753 along with prior

taxonomists realized merely from morphological features that it belonged to the same genus as that of wild tomatoes and potatoes. The current classification of *Solanum lycoserpicum* is based on comparative chloroplast DNA analyses and other molecular studies.

Constant artificial selection, the first form of genetic modification of tomatoes, probably took place in Mexico and Western South America, where the tomato was first domesticated, and it continued later and more intensely in Europe. One of the many resulting changes involved flower structure. The female part, the stigma, has become less protruding and, in the case of commercial varieties, completely surrounded by the fused anthers. This has increased fruit yield, but by preventing cross-pollination, it has reduced genetic variation. For a while, only the odd spontaneous mutation would cause change.

Then in the 1990's transgenic tomatoes appeared and some failed even before the irrational EU ban of GM foods came into effect. The single-gene approach had been oversimplistic. The Flavr Savr tomato was given a gene that interfered with the production of an enzyme that would normally soften the fruit. The shelf life was indeed extended, but the firmness was not really improved, and the GM fruit could not be harvested when ripe.

Tomato researchers realized that the genetics of a quantitative trait is hard to investigate. The effect of one gene is small and often influenced by environment or by the interaction with other genes. Many tomato traits are genetically controlled by a combined action of quantitative trait loci(QTLs) with favorable allelic genes found in wild species grown in Ecuador, Peru, Chile and even in the Galapagos.

Having spent many hours of my youth picking tomatoes, I've always been fascinated by the aroma of tomatoes and by the smell exuded by stems alone. Here are some examples of volatiles found in fresh tomatoes, which some have been investigating not for my nostalgic reasons but with the hope of accentuating aroma through genetic modification.

Annually 100 million metric tons of tomatoes are produced worldwide. The leading consumers are Mediterranean countries with 60-100 kg eaten per capita per year. The combination of poverty and lower popularity of the tomato elsewhere in the world creates an overall global annual consumption of only 14 kg/cap/y. The leading producers are China, US, India, Turkey, Egypt, Italy and Spain. Ironically, Italy has become China's largest customer for the type of tomato used to make tomato paste.

Paste, which has a lower water content than fresh tomatoes, is understandably more concentrated in vitamins A, C and the reddish compound lycopene. In test tube studies, lycopene is the best antioxidant among carotenoids. But the same was said of anthocyanins, and then evidence for the *in vivo* effect turned out to be scant. With lycopene, however, some supportive epidemiological studies have also been done.

While the Mayo Clinic maintains that the cancer-preventive action of lycopene is still controversial, many researchers nevertheless believe that increasing the content of lycopenes and other phytochemicals is a worthwhile pursuit, but that it won't be successful without an interdisciplinary approach.

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Genetic Improvement of Solanaceous Crops
Autar K. Mattoo. Maharaj K. Razdan, *First Fruit: The Creation of the Flavr Savr Tomato and the Birth of Biotech Foods*

Belinda Martineau, *The Chemistry of Fresh Tomato Flavor*, Emin YILMAZ, TURKEY Turk J Agric For25 (2001) 149-155

http://www.science20.com/chemical_education/tomatoes_gm_aroma_and_tradition-89237

Source: SeedQuest.com

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1.31 **New Downy mildew resistant cucumber**

Two downy mildew resistant cucumber varieties will be available to farmers in the United States and Canada this spring. Monsanto's Seminis brand will offer the new slicer cucumber varieties exclusively with FarMore® and F1400 Cucumber Technology from Syngenta Seed Care. This seed protection system provides fungal disease and insect control to enhance cucumber performance and quality.

Downy mildew is a disease affecting the quality and yield of many crops, including cucumbers. Ronnie Blackley, Monsanto's Cucurbit Technology Development Lead said that the new varieties offer cucumber growers a new defense against downy mildew, which was previously limited to fungicides.

More information about the new crops is available at:
http://monsanto.mediaroom.com/downy-mildew-resistant-cucumber-hybrids.

Source: Crop Biotech Update 27 April 2012

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1.32 **Realizing the potential of Africa's vegetative crops requires new tools for rapid multiplication of healthy and improved planting material**

Bananas, plantains, cassava, potato and sweet-potato, as well as other indigenous African root vegetables are key in solving Africa's food and income security challenges. The total production of these crops almost doubles that of maize, rice and wheat in Africa.

These vegetatively propagated crops are an excellent source of cheap energy and are a key staple foods in Sub-Saharan Africa. The importance of these crops is well known for example East African Highland bananas in the African Great Lakes region, and cassava and plantains in West Africa.

Some cultivars are very nutritious because they are rich in vitamins or essential minerals. Research shows that a family of five could meet their annual vitamin A requirements from only a small 10 x 50 meter plot of recently developed orange flesh sweet-potato, even at low yield levels of around 5 tons per hectare.

Root and vegetative crops such as these are mostly produced, processed, and traded in farm households or locally, making them less vulnerable than grain to abrupt price changes in international markets. Cassava and sweet potato can be grown in marginal conditions and nontraditional areas, and can be produced with relatively few inputs because of their ability to tolerate many abiotic stresses such as drought or heat or poor soils.

In some agro-ecosystems, they often complement cereals to cut risk and make more efficient use of resources by providing food earlier in the farming calendar or by be planted in otherwise fallow periods between grain crops. They are also known as "famine crops" because of their particular role during the "lean or hunger season" when their tuberous roots can be harvested as needed to meet shortfalls in grain and other vegetative crops. A uniquely African Green Revolution requires urgent improvements in the supply of new and improved cultivars of these vegetative crops.

Multiplication and dissemination of new cultivars requires new innovation in greenhouse, tissue-culture, micro-propagation and decentralized field multiplications of healthy planting materials. In Africa today, farmer or commercial multiplication of these crops is very low compared with multiplication of cereal and pulse seed.

Most planting materials used by farmers are often of poor quality because they are infected with pests and diseases, which perpetuate (and exacerbate) pest losses through successive growth cycles. Newly developed higher yielding, or disease and pest tolerant cultivars, have not been made available in sufficient and reliable quantities to satisfy the demands of African growers.

The best strategy to deliver healthy planting materials for vegetatively propagated crops includes micro-propagation of healthy propagules of selected germplasm along with multiplication in greenhouses, shade-houses and field plots.

Micro-propagation is the process of growing tissue culture for plant shoot-tips in a laboratory until they are ready for transplant into the field. This propagation system significantly reduces pathogen incidence and may dramatically improve yield when coupled with good agronomic practices. Micro-propagation systems can easily include quality control to ensure certification and delivery of "clean" propagules. Tissue culture-derived materials can rapidly grow, helping the introduction of newly bred germplasm at reasonable cost and speed.

They are also amenable to biological enhancement (e.g. with endophytes that extend the benefits of "clean" planting material) before delivery to farmers. Macro-propagation will be further use to multiply additional clean planting material locally and at a lower cost. However, when re-infection rates are high, a continual supply of new planting material will be a must for annual or biennial replanting or these vegetatively propagated crops.

Phytosanitary testing to support schemes for certifying the quality of such materials throughout the production chain will be also a key element for this rapid multiplication system. The production, conditioning, and marketing of certified planting materials will be the responsibility of the public or private grower but the certifying agency must verify that they follow the approved regulations outlined by the national authority to meet the required standards for certification.

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1.33 **Molecular hybridization applications for virus resistance screening and large scale detection in solanaceae and cucurbits**

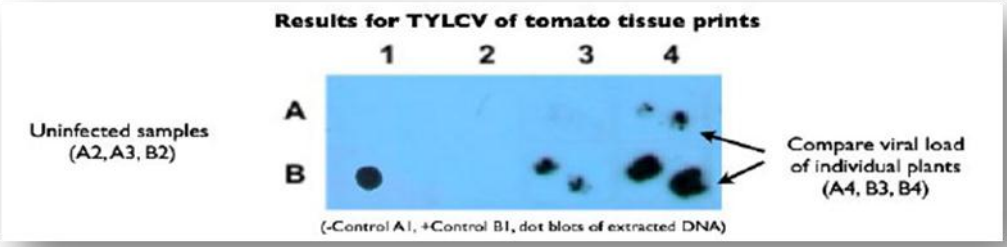
April 4, 2012
Roquetas de Mar, Spain

Since the appearance of Molecular Hybridization probes for Potato spindle tuber viroid detection in the early 1980s, their use has increased and expanded to cover a wide variety of economically important vegetable and fruit crops, including Solanaceae and Cucurbits. Their specificity to concrete viruses strains (ie. TYCLV-IL,

TYLCSV, PepMV-EU, PepMV-CH2), coupled with the robustness of semiquantitative results and in addition to their suitability for large scales assays has made them a preferred tool in plant breeding programs.

Hybridization Process

Unlike probes of the past, today's probes are non-radioactive and contain labelled digoxigenin which attaches to viral RNA or DNA strands from hybridized samples. The preparation of samples can be in form of RNA and DNA extraction dot blots, Crude leaf extract dot blots or tissue prints applied to a nylon membrane. The absence or presence of a virus, as well as the intensity of a samples' viral load can be observed through chemiluminescence shown from an autoradiography films taken of the hybridized nylon membrane.



Advantages Over Other Methods

In addition to high specificity and robust results, Molecular Hybridization is perfectly suited for diagnosing high numbers of samples (hundreds) at one time. This large scale capacity makes it a preferred alternative to other methods in terms of labor as in the case of ELISA, and costs with regards to PCR / RT-PCR. Aside from being a research tool, this method is ideal for early diagnosis in the field to detect viral infections when plants are still asymptomatic.

Pathogens of Economic Interest

The experts at Savia Biotech along with researchers from public laboratories in Spain have developed a list of over twenty Molecular Hybridization probes to detect the most common viruses that affect Solanaceae and Cucurbits. Savia Biotech offers Molecular Hybridization to the public in form of Probe kits for in-house diagnosis, Membrane kits that include processing services, and training seminars on how to use probes.

For more information on Molecular Hybridization please visit www.saviabiotech.es or contact info@saviabiotech.es

http://www.seedquest.com/news.php?type=news&id_article=25851&id_region=&id_category=&id_crop=

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1.34 **Better cotton? It's all in the genes, says Israeli geneticist**

April 9, 2012

By David Shamah

Rosetta Green has signed a deal with Bayer CropScience AG to produce hardier seeds that will grow high-quality cotton in challenging environmental conditions

Israel's Rosetta Green, which produces special genes that are developed and modified to improve crop production, has signed a deal with international seed manufacturer Bayer CropScience AG to produce seeds to improve cotton yields for farmers.

Rosetta Green's technology is based on the development of microRNA genes, which play important roles regulating key traits in plants.

As the world population has grown, now topping seven billion people, the "green revolution" of the past 50 years is beginning to show its age. Pesticides are not as effective as they used to be as insects become more resistant, and water for irrigation is becoming an ever more expensive — and more rare — commodity, as food production ramps up to meet demand.

Of even greater concern to scientists are the increasingly Westernized lifestyles in the Far East, as billions of people begin demanding better quality food, and especially meat; it takes far more water to produce a pound of meat than a pound of wheat. There's only so much pesticide farmers can apply to crops, and there's only so much water available. Rosetta Green has been developing microRNA (miRNA) genes to alleviate both these problems.

In the 1990s, researchers discovered that miRNA acts as a "master genome regulator" in plants and mammals. By manipulating miRNA, Rosetta Green scientists have been able to develop more resistant strains of cotton, corn, soybeans, and other crops.

The problems in food crop production are exacerbated in cotton production. Because cotton is not considered a food, stronger pesticides can be used to treat them. However, those pesticides eventually find their way into the surrounding environment, contaminating water and land. In addition, irrigation practices in many countries that are dependent on cotton for exports, like Egypt and Pakistan, have placed a major strain on water resources. Even in countries where water use is more efficient, like in Australia, recent droughts have challenged cotton farmers and raised the cost of production significantly.

It's in response to these problems, the company said, that Rosetta Green will work with Bayer in an attempt to develop new cotton varieties that could produce better yields under difficult environmental conditions, using less or poorer quality water. Bayer, the company said, has committed to pay Rosetta Green if certain milestones are achieved in the development and commercialization of the products, plus royalties on future revenues from sales. Those royalties could amount to tens of millions of dollars, the company added.

Amir Avniel, Rosetta Green's CEO was optimistic that the company's researchers could come up with new and improved cotton strains. "We believe that microRNA genes have great potential in the agriculture industry and in crop improvement, and are hopeful that the new technology that Bayer and Rosetta Green will develop will succeed in significantly increasing cotton yields, especially in periods of drought and water shortage and in countries that suffer from chronic scarcity in potable water. Such developments could significantly increase the areas where crops can be grown and gradually grow more and more crops in arid areas with limited water availability or access to brackish water only," Avniel added.

Rosetta Green was established in 2007 as a subsidiary of Rosetta Genonics, and is now a public company traded on the Tel Aviv Stock Exchange. Among the other projects the company is working on is one to develop strains of crops that utilize fertilizer more effectively. Scientists estimate that plants only utilize about 30-70% of the fertilizer that is applied to them during their life cycle, and the wasted fertilizer often runs off into water supplies, contaminating them. Rosetta Green has identified microRNAs that correlate with improved fertilizer use efficiency in corn and soybean, and is working on developing them commercially.

"We are one of the only companies in the world working with miRNA," Avniel said. "Our tests show that increasing the miRNA in specific crops yields significant improvements in plant traits, and we continue to develop technology to improve key traits in wheat, potato, castor bean, algae, tomato, trees and more."

http://www.timesofisrael.com/its-all-in-the-genes-says-israeli-mirna-pioneer/

Source: SeedQuest.com

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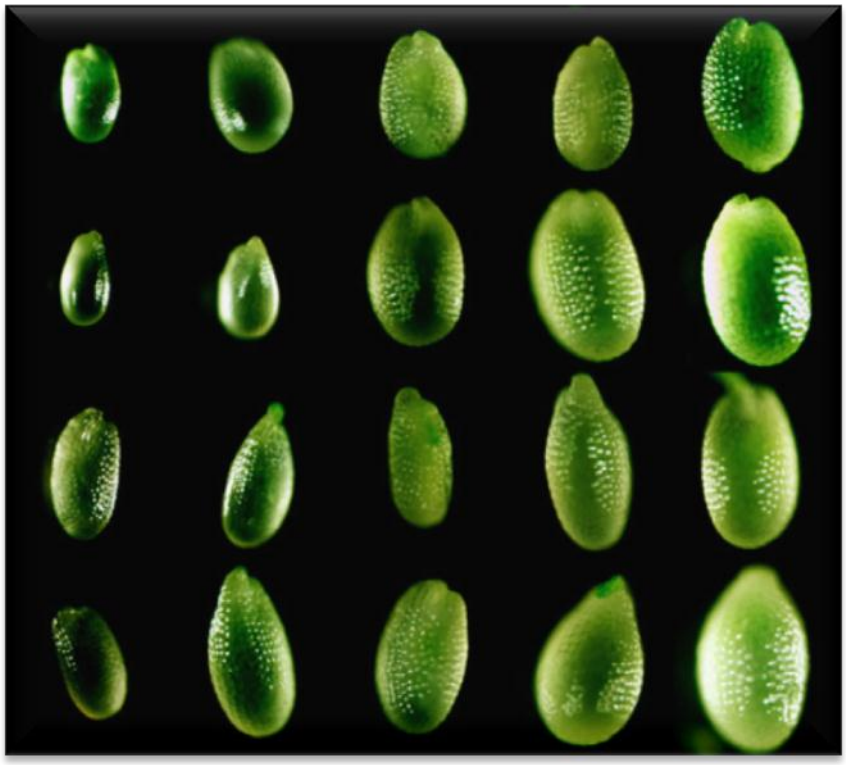
1.35 **Seed size is controlled by maternally produced small RNAs, scientists find**

April 11, 2012
Austin, Texas, USA

Seed size is controlled by small RNA molecules inherited from a plant's mother, a discovery from scientists at The University of Texas at Austin that has implications for agriculture and understanding plant evolution.

"Crop seeds provide nearly 70 to 80 percent of calories and 60 to 70 percent of all proteins consumed by the human population," said Z. Jeff Chen, the D.J. Sibley Centennial Professor in Plant Molecular Genetics at The University of Texas at Austin. "Seed production is obviously very important for agriculture and plant evolution."



Small RNAs affect development of seeds. Arabidopsis seeds 3, 4, 5, 6 and 7 days after pollination (left to right).

First row: diploid seeds.

Second row: seeds from a cross between a diploid mother and tetraploid father.

Third row: seeds from a cross between a tetraploid mother and diploid father.

Fourth row: tetraploid seeds.

Note that seeds in the third row (5 to 6 days after pollination) are much smaller than those in the second row as a result of increased maternally inherited small RNAs.

Chen and his colleagues, including David Baulcombe at the University of Cambridge, provide the first genetic evidence that seed development is controlled by maternally inherited "small interfering RNAs," or siRNAs. They published their research April 3 in the journal PNAS.

SiRNAs are known to control a number of aspects of growth and development in plants and animals. The researchers used Arabidopsis, a rapidly growing flowering plant in the mustard family, for the study.

In this case, the researchers found that the siRNAs influence the development of a seed's endosperm, which is the part of the seed that provides nutrients to the developing plant embryo, much like the placenta in mammals. The endosperm is also the source for most of the nutritional content of the seed for humans and animals.

Despite the importance of the endosperm, little has been known about the molecular mechanisms that govern its growth.

In flowering plant seeds, the embryo is formed by fusion of one paternal and one maternal genome, while the endosperm combines one paternal and two maternal genomes. This process of embryo and endosperm formation is known as "double fertilization."

The scientists found that when a female plant with a duplicate genome (known as a tetraploid) is crossed with a male plant with a normal genome (called a diploid), not only is there an increase in the maternal genome in their offspring's seed endosperm, but there is also an associated increase in maternal siRNAs.

Those maternal siRNAs decrease the expression of genes that lead to larger endosperm growth, meaning that the siRNAs create smaller seeds. "Now we understand that siRNAs play a large role in sensing maternal and paternal genome imbalance and controlling seed development, and that maternal control is important," said Chen.

The researchers are working to find out how exactly siRNAs regulate gene expression in the endosperm and embryo and how they control seed size. These new findings will enable scientists to develop biotechnological tools for improving seed production and crop yield. But Chen cautioned that "bigger isn't always better." In fact, in his experiments, seeds lacking the control of the maternally inherited siRNAs grew so large that they collapsed.

Chen's research is funded by the National Science Foundation Genetic Mechanisms program. It was also the result of a Fulbright Award he received to do research with Baulcombe, a Royal Society research professor, at Cambridge. Baulcombe is widely recognized for his pioneering and seminal research discovering the role of siRNAs in gene silencing in plants.

http://www.seedquest.com/news.php?type=news&id_article=26033&id_region=&id_category=&id_crop=

Source: SeedQuest.com

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1.36 **A new approach to molecular plant breeding**

April 16, 2012
Beltville, Maryland

A U.S. Department of Agriculture (USDA) scientist has shown researchers and plant breeders a better way to handle the massive amounts of data being generated by plant molecular studies, using an approach that should help speed up development of improved crop varieties.

Jean-Luc Jannink, who is with the Agricultural Research Service (ARS) Plant, Soil and Nutrition Research Unit at the agency's Robert W. Holley Center for Agriculture and Health, in Ithaca, N.Y., has demonstrated that by using a statistical approach known as Genomic Selection (GS), scientists can capture and exploit more of the data produced by the growing number of studies focused on DNA sequences found in plant genomes. GS is currently used in cattle breeding.

ARS is the principal intramural scientific research agency in USDA. This research supports the USDA priorities of improving agricultural sustainability and promoting international food security.

Scientists and plant breeders increasingly use molecular tools to develop improved crop varieties. By identifying genes associated with desirable traits, they don't have to wait to observe crops grown from seeds.

But molecular tools require analyzing massive amounts of data, and important traits like drought tolerance and yield are the result of the combined actions of multiple genes, each with a small effect. These genes are called quantitative trait loci (QTLs), and the conventional Marker-Assisted Selection (MAS) approach to handling molecular data has limited power to detect small-effect QTLs and estimate their effects.

Jannink's recommended GS approach exploits more data by including all of the small-effect QTLs and estimating the effects of all of the known genetic markers in a plant population.

Jannink and his colleagues recently constructed statistical models, using both GS and MAS approaches, and compared how well they could predict values associated with 13 agronomic traits in crosses made from a "training population" assembled for the study. They gauged the model's accuracy by comparing their predictions with field observations of 374 lines of wheat.

The results showed the GS approach was more accurate at predicting trait values. Jannink had similar success in a study using oats. Both studies were published in *The Plant Genome*. The work is expected to speed up molecular breeding efforts and should prove extremely useful, given the pace of advances in DNA technology.

Read more about this research in the April 2012 issue of Agricultural Research magazine.

http://www.seedquest.com/news.php?type=news&id_article=26126&id_region=&id_category=&id_crop=

Source: SeedQuest.com

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1.37 DNA recombination for targeted plant breeding

Did evolution invent games of chance? During the development of sperm and egg cells, maternal and paternal genes are mixed at random, thus giving rise to new combinations of traits. What are the molecular mechanisms of this process known as DNA recombination? How can it be used to breed plants with higher yields? Prof. Dr. Holger Puchta and his team at the Karlsruhe Institute of Technology (KIT) are investigating the processes associated with the breaking up, unwinding, crossing over and rejoining of DNA strands in thale cress (Arabidopsis thaliana). In a strange twist, the researchers are also dealing with breast cancer genes.

Crossing over refers to a process that occurs during meiosis when the maternal and paternal chromosomes in the precursor cells of sperm and egg cells cross over and exchange extensive DNA fragments that carry genes. The exchange of genetic material between homologous chromosomes is key in the ability of species to adapt to changing environmental conditions such as increasing heat or the successive acidification of soil. Recombination produces new combinations of genes, which leads to the appearance of individuals that are better suited to dealing with a new situation.

But what makes the DNA strands cross over? How do existing bonds in the DNA molecule break up, and how do new bonds develop? “All these questions also help us answer certain key issues involved in DNA repair,” said Prof. Dr. Holger Puchta from the Institute of Botany II at the Karlsruhe Institute of Technology (KIT). “Answers to these questions might also support our efforts to exploit the mechanisms in medical and biotechnological applications.”

The Holy Grail of breeders

As far as researchers can tell, DNA recombination takes place at random sites in the genome during the development of germ cells. Evolution “throws the dice” and more or less waits to see which of its experiments survives. However, Puchta and his team are interested in finding out whether the recombination mechanisms can also be used for specific applications. They believe that this would be the Holy Grail for breeders of agricultural crops. Crop breeders have always been interested in crossing suitable plants in order to make them more resistant to heat and high salt concentrations or to get them to produce higher yields.

The researchers from Karlsruhe are therefore trying to gain an understanding of how the DNA of the cells of Arabidopsis thaliana is broken up and unwound, of the enzymes that catalyse the reconnection of DNA molecules and how the crossed DNA segments physically separate and become two separate chromosomes once again. “We are initially looking for genes whose defective versions generate mutants in which specific DNA recombination steps no longer function properly,” said Puchta.

The researchers also discovered a gene that they had not expected to find in Arabidopsis, namely a homologue of the BRCA2 gene, which has been found in mammals, including humans. Quite a large number of BRCA2 gene mutations have been found, several of which are associated with an increased risk of breast cancer.

In addition, it has also been found that the product of the BRCA2 gene is normally involved in the repair of DNA damage such as random breaks that can spontaneously occur as a result of exposure to UV radiation and chemicals. “If the BRCA2 gene is defective or missing altogether, breaks in the DNA can no longer be repaired and mutations occur that can eventually lead to the degeneration of cells and to cancer,” said Puchta.

It was a revelation when homologues of breast cancer genes were found in plants in 2003. The discovery of these genes enabled researchers around the world to study in detail the molecular mechanisms of the effects of breast cancer genes. The silencing of these genes in animal models using genetic methods leads to the death of the embryos, whereas plant embryos survive.

Applying DNA scissors to selectively improve properties of species

Puchta and his team silenced the BRCA2 gene and also manipulated the DNA repair system of Arabidopsis thaliana in other ways. This enabled them to show that the plant gene not only mediates the stability of the genome, but is also required for inheritance.

The researchers also found other proteins that interact with breast cancer genes during the DNA repair process. At present, the researchers are working on finding out whether such interaction networks also play a role in germ cells, i.e. during the DNA recombination process that leads to offspring with new combinations of genes. To this end, the researchers are not just focusing on breast cancer genes that might lead to medical insights, but also on other candidates that play a role in the molecular processes associated with the recombination of DNA. They are focused, amongst other things, on RecQ helicases, enzymes that drive the unwinding of paired DNA. Mutations in human RecQ genes are implicated in heritable human diseases.

“In order to be able to carry out such experiments, we had to find ways to manipulate the DNA of our cells,” said Puchta. Around twenty years ago, the biochemist was the first researcher in the world to use enzymes that enabled him to cut genetic information in the parent stock at specific sites and recombine, i.e. introduce new

genes at these sites. Using these “DNA scissors”, Puchta’s group has been able to obtain detailed insights into the repair of DNA double strand breaks.

The team has also been able to optimize a technique known as gene targeting. It is assumed that this technique will soon make it possible to use specific enzymes to specifically target defined genes in the genome of a broad range of different plants, modify the genes or replace these genes with genes from other plants.

According to Puchta, his research into genetic manipulation has huge potential for biotechnological applications. To this end, Holger Puchta was granted a European Research Council (ERC) Advanced Investigator Grant in 2011. This grant enables him to continue his promising work. “Using molecular scissors, we hope to control inheritance and transfer properties such as resistances to diseases, heavy metals and pests or genes that contribute to more rapid growth from wild to cultivated plants,” said Puchta.

“And best of all, the products we obtain have nothing to do with the classical and highly controversial genetically modified organisms. We do not use artificial genes, we use genes that already exist in natural organisms. We only recombine existing genes which is what happens in nature where sexual reproduction leads to new combinations of genes. The only difference is that we want to turn this natural arbitrary process into a controlled process of inheritance.” In other words, targeted evolution that helps plant breeders to reach their goals faster than traditional methods would allow. These are still dreams of the future, but the grant awarded by the EU shows that Puchta’s fundamental research has real potential.

http://www.biopro.de/standort/5_bioregionen/bioregio_freiburg/index.html?lang=en&artikelid=/artikel/07900/index.html

Source: SeedQuest.com

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1.38 **New lab speeds plant breeding efforts**

Traits such as disease resistance can be expensive to track genetically

By Mattew Weaver
Capital Press

PULLMAN, Wash. -- A new laboratory at Washington State University will help breeders more quickly pick out key traits in plants.

The $250,000 phenomics lab measures different attributes of a plant, such as height, chlorophyll in its leaves, how fast the leaves grow and how efficient photosynthesis is or how it changes with light fluctuations, said Michael Kahn, associate director of the WSU Agricultural Research Center. A camera takes photographs that allow researchers to see how plants develop.

The goal is to help breeders screen plants for a superior combination of traits that may be more difficult to find, such as disease resistance. Some traits can be followed with genetic markers, but genetic screening is expensive and difficult, Kahn said. He hopes to reduce the amount of screening required and save years in the breeding process. Kahn said research efforts include yield, pest and disease tolerance and crop timing. Breeders will be able to immediately remove those plants that don't have the desired performance after a genetic cross, said Michael Neff, WSU assistant professor. Neff said the facility is able to change temperature and growth conditions to anticipate changes in weather patterns.

WSU researchers hope to follow a plant through its life cycle. "A plant at 10 a.m. is not the same as a plant at 2 p.m.," Kahn said. "We think some of those things that might be able to improve yield would have to do with the differences between a plant at 10 in the morning and 2 in the afternoon."

The lab is primarily working with arabidopsis and camelina right now, and expects to begin looking at grasses and other crops, including wheat, in the next few months.

A USDA grant supports the facility, but will run out in 2013. Kahn hopes to bring in additional funding to operate it.

Australian researchers have used phenomics to develop wheat cultivars with salt tolerance.

Comments made about this article

http://www.capitalpress.com/content/mw-WSU-phenomics-042012-art

Source: SeedQuest.com

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1.39 **Discovery of a nitrogen "satiety" gene in plants**

April 6, 2012
France

An INRA research team in Montpellier, working in collaboration with teams from CNRS in Strasbourg and New York University, have recently achieved a major advance in our understanding of plant nutrition. They have characterised a gene involved in a molecular mechanism that can adjust the uptake of soil nitrogen by roots as a function of the nitrogen requirements of the whole plant. This research may facilitate the selection of varieties displaying a more efficient use of nitrate fertilisers, so as to ensure more environmentally-friendly crops.

To ensure their nutrition, plants absorb soil nitrate, or NO3- (the principal source of nitrogen for herbaceous plants) via their roots. This phenomenon is rendered possible by highly efficient transporters that allow the passage of nitrate through the membranes of cells at the periphery of the root.

However, because soil nitrate availability is heterogeneous and can fluctuate over time and in space, plants must constantly modulate their absorption capacity so as to maintain a sufficient nitrate intake that will meet their needs. This is facilitated by a mechanism qualified as "satiety" (by analogy with animals), that allows the plant to reduce its absorption when its nitrogen requirements have been fulfilled.

For the first time, researchers in Montpellier have identified a gene (HNI9/IWS1) that participates in this mechanism in the model plant Arabidopsis thaliana. This gene codes for a nuclear protein in plant cells, the function of which had been very poorly understood until now.

The scientists have shown that when the plant is satiated, this protein causes the deposit of epigenetic markers in the gene of the principal membrane transporter of root NO3. These markers do not modify the gene sequence but act as a "modulator" of its expression that represses synthesis of the transporter. The quantity of the transporter thus diminishes, and root nitrogen absorption is consequently reduced.

This original research opens perspectives to improve the use of fertilisers in agriculture. Indeed, nitrate is one of the principal ingredients in these fertilisers, and that part which is not taken up by crops can pollute ground and surface water. In this context, the discovery of mechanisms that are naturally implemented by plants to adjust nitrate uptake to their nutritional requirements, is of importance. One of the long-term prospects is to render plants capable of accumulating nitrogen even when their immediate nutritional requirements are met, so that they can remobilise it at a later stage. This could improve soil nitrate use efficiency by plants and allow a reduction in fertiliser inputs in agriculture.

Scientific leader:
Marc LEPETIT,Biochimie et Physiologie Moléculaire des Plantes (INRA, CNRS, Supagro, Université de Montepellier 2)
Département scientifique « Biologie végétale ,Centre Inra de Montpellier
2 place Viala 34060 Montpellier

http://www.seedquest.com/news.php?type=news&id_article=26291&id_region=&id_category=&id_crop=

Source: SeedQuest.com

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1.40 **ICRISAT and BGI seals research partnership on modern sequencing technologies for molecular crop breeding**

April 24, 2012
Shenzhen, China and Hyderabad, India

BGI, the world's largest genomics organization, and the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)based in India has jointly announced the signing of a Memorandum of Understanding (MoU) for a long-term collaboration on applied genomics research and molecular breeding.

The partnership primarily aims to enhance precision of breeding programs for semi-arid tropic crops by using next-generation sequencing technologies towards crop improvement for sustainable food production particularly in the drylands of Asia and sub-Saharan Africa.

The MoU was signed by Dr William D. Dar, Director General of ICRISAT and Dr Gengyun Zhang, Vice President of BGI. The two organizations agreed to enhance their collaboration in agricultural research-for-development, especially in the genome sequencing and analysis of ICRISAT mandate crops namely, chickpea, finger millet, groundnut, pearl millet, pigeonpea and sorghum, as well as in capacity building and other agreed activities.

While ICRISAT's mandate crops are highly nutritious and drought-tolerant, their productivity in marginal environments is very low. In the fight against poverty and hunger amid the threat of climate change, these crops are the best bets for smallholder farmers in marginal environments to survive and improve their livelihoods.

The collaboration between BGI and ICRISAT will be crucial in the development of improved varieties that can provide high yields, and at the same time meet the challenges of marginal environments and the threat of climate change and scarce natural resources in the drylands.

ICRISAT and BGI together with several organizations from the U.S. and Europe, has just completed the de novo genome sequencing of pigeonpea, known as the "poor people's meat," published in the journal Nature Biotechnology in November 2011.

"The signing of this agreement with BGI is significant in accelerating our crop improvement efforts towards improving the livelihood of poor people in the semi-arid tropics of the world," said Dr Dar. "This is not a start, rather a strengthening of our ongoing fruitful and rewarding research partnership with BGI.

Highlighting the significance of the MoU, Dr.Zhangsaid, "Genetically improved crops are the key output of breeding research. The rapid advance of genomics will accelerate the improvement of the crops with high yield, high quality and resistance to pests and diseases.With the whole genomic information of the crops, I believe we can seek much better solutions to solve the food security challenges and environmental problems in the future."

Dr. Rajeev Varshney, Director of ICRISAT's Centre of Excellence in Genomics and lead scientist and coordinator of the global research partnership on pigeonpea genome sequencing, stressed that "With the advances in sequencing and genotyping technologies and our collaboration with BGI, we should be able to not just decode the genome of a crop species but also speed up screening for 'good genes' within a crop and dramatically reduce the cost of developing new improved varieties that will benefit smallholder farmers."

Dr. Hongsheng Liang, Director of BGI-Asia Pacific, said, "We really appreciate this opportunity to collaborate with ICRISAT again. With our dedication in genomics research and bioinformatics application, I expect that we could make more breakthroughs in 'Omics'-related area as well as boost the further development of agriculture in India and other Asia-Pacific countries."

More news from: ICRISAT (International Crops Research Institute for Semi-Arid Tropics). BGI

http://www.seedquest.com/news.php?type=news&id_article=26374&id_region=&id_category=&id_crop=

Source: SeedQuest.com

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1.41 **Fine mapping wheat genes**

April 24, 2012
United Kingdom

The use of new genomic techniques and increased sequencing power promise to help breeding crops, but for wheat the pipeline from the laboratory to the field is held up by wheat's complex genome and the lack of the kind of detailed genome sequence available for simpler plants. Dr Martin Trick and Dr Cristobal Uauy have recently published a new study that applies next generation sequencing techniques to wheat and shows how it can aid in fine mapping genes to the level needed by the plant breeding community more quickly and efficiently than has been possible before.

Wheat is one of the most important crops in the world, providing a fifth of all the calories and protein consumed. Its genome is huge and during domestication has been duplicated twice for durum wheat and three times in bread wheat. Identifying the functions of genes or recognising which genes are responsible for certain traits has, because of this, been difficult, time consuming, and costly.

Synteny, the similar arrangement of genes on chromosomes between different species, can be used as a road map to identify regions in the wheat chromosome where a gene of interest is, if that gene is known in a related species. But to be of use to plant breeders, more precise mapping is needed. Genetic markers that are linked to the gene of interest are used to progressively get closer to the gene, but this bespoke process is laborious, and even at the end the markers may not be close enough to the gene to be used in commercial plant breeding programmes.

To address this, and accelerate fine mapping in wheat, Dr Uauy and colleagues at the John Innes Centre, which is strategically funded by the Biotechnology and Biological Sciences Research Council (BBSRC), used newly-developed next generation sequencing techniques to attempt to map a previously defined wheat gene, as a proof of concept experiment. These methods are concentrating on sequencing the mRNA transcribed from the DNA, such as that described for oilseed rape by JIC's Professor Ian Bancroft. These methods detect single nucleotide polymorphisms (SNPs) that can be mapped to the genome and developed into useful markers. The closer a SNP is to the gene, the more likely it is that the SNP and the gene segregate together when two plants are crossed. These SNPs can be used as molecular markers by breeders to follow genes during the breeding process.

The team tested the use of next generation sequencing and SNP detection to map a gene that affects grain protein content. They crossed two lines of wheat that are genetically identical (isogenic), except for a specific area of the genome. In collaboration with The Genome Analysis Centre, which also receives strategic funding from BBSRC, they identified 3,500 potential SNPs – representing differences between the genes of the two lines. The challenge was then to work out which of these are closest to the gene of interest.

The resulting plants from the cross were sorted by their grain protein content into two groups, or bulks. Examining the frequency of each SNP in the two bulks shows

which ones are closest to the gene, as SNPs that are close to the gene segregate together. Using this technique, called bulked segregant analysis, they were able to fine map the gene to an extremely small interval and in a much shorter time than would have been achievable using conventional mapping methods. This approach also overcomes the problems associated with the multiples genome copies in wheat as it looks at the relative frequencies of SNPs.

This study was published in the journal *BMC Genomics*, were it has been highly accessed paper. It establishes as a proof of concept that next generation sequencing and bulked segregant analysis can be used to fine map genes in wheat, and other plants with non-sequenced genomes. This will help better define genes used by breeders and provide them with the more efficient tools to deploy them into commercial varieties.

Reference: Combining SNP discovery from next-generation sequencing data with bulked segregant analysis (BSA) to fine-map genes in polyploid wheat, BMC Plant Biology, 12:14 doi:10.1186/1471-2229-12-14

http://www.seedquest.com/news.php?type=news&id_article=26391&id_region=&id_category=&id_crop=

Source: SeedQuest.com

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1.42 **MSU Researchers find out how plants decide to go into defense mode**

Michigan State University (MSU) found out how plants "decide" between growth and defense. This new research can help plants keep their balance of staying safe from peril and continuous growth.

Sheng Yang He, MSU Plant Biology professor, and his team found the two inseparable hormones, gibberellins and jasmonates, that decide what to do in a time of crisis. Gibberellins control growth while jasmonates control defense. They discovered that these two hormones, together with some key components of growth and defense programs, communicate and coordinate with each other. Sheng Yang He said that now that they have known where one of the subtle molecular links between growth and defense is located, scientists will be able to figure out ways of separating the two hormones and work with each one at a time. If this is possible, crops with increased yield potential and better defense mechanisms can be developed.

Read more at http://news.msu.edu/story/plant-scientists-find-mechanism-that-gives-plants-balance/

Source: Crop Biotech Update 27 April 2012

Contributed by Margaret Smith
Department of Plant Breeding & Genetics, Cornell University
Mes25@cornell.edu

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1.43 **New sequencing techniques for fine mapping wheat genes**

Dr. Martin Trick and Dr. Cristobal Uauy of the John Innes Centre (JIC) have recently published a study that applies next generation sequencing techniques to wheat. These can help hasten and more efficiently fine map of genes to the level that the plant breeding community needs.

Because of the wheat's huge genome, which has been duplicated twice for durum wheat and thrice in bread wheat during domestication, identifying the genes functions or knowing which genes are responsible for certain traits have been difficult, time consuming, and costly.

To accelerate fine mapping in wheat, as well as to address the problem with gene markers not being close enough to the genes needed in commercial plant breeding programmes, Dr. Ua! uy and his team at JIC used a newly-developed next generation sequencing techniques to try mapping a previously defined wheat gene. These methods focus on the sequencing of mRNA transcribed from the DNA. Also, these methods identify single nucleotide polymorphisms (SNPs) which can be mapped into the genome. Furthermore, these SNPs could be developed into useful markers.

The study tests the use of next generation sequencing and SNP detection in mapping a gene that influences grain protein content. Together with The Genome Analysis Centre, the team is able to identify 3, 500 potential SNPs that represent the differences between wheat genes of the two lines of genetically identical (isogenic) that the team crossed. The resulting plants are then sorted into two groups, according to grain protein content. Through segregant analysis, a technique that examines the frequency of each SNP in the two groups and shows which are the closest to the gene, the team is able to fine m! ap the gene to a very small interval in a much shorter time.

Read more about how these next generation sequencing techniques and segregant analysis can help in fine mapping genes in wheat and other plants with non-sequenced genome at http://www.tgac.ac.uk/news/27/68/Fine-mapping-wheat-genes/.

Source: Crop Biotech Update 27 April 2012

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1.44 **Metabolic characteristics in ruminants of proteins in hull less barley varieties**

New varieties of hull-less barley have been developed containing altered carbohydrate traits. Scientists Daalkhaijav Damiran and Peiqiang Yu from the University of Saskatchewan in Canada conducted a study to compare the metabolic characteristics in ruminants of the proteins of hull-less barley varieties (zero-amylose waxy, waxy, high-amylose, normal starch).

They conducted animal trials to get the original rumen fermentation data for modeling nutrient supply to dairy cattles. Results showed that the zero-amylose waxy hull-less barley was the highest in truly absorbed protein. All hull-less varieties had negative degraded protein balance. The researchers concluded that the changes in the starch structure in granule affects metabolic characteristics of the proteins of hull-less barley in dairy cattle.

Read the research article at:
http://www.sciencedirect.com/science/article/pii/S0733521012000185

Source: Crop Biotech Update 27 April 2012

Contributed by Margaret Smith
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2 PUBLICATIONS

2.01 **New Book Release: Plant Breeding for Biotic Stresses**

Released this week through UFV Press

Authors: Roberto Fritsche Neto and Aluizio Borem
http://www.editoraufv.com.br

Contributed by Aluizio Borem
borem@ufv.br

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3. WEB AND NETWORKING RESOURCES

3.01 **New Learning Modules for Plant Breeding Now Available**

Members of the Plant Breeding and Genomics Community of Practice and the Conifer Translational Genomics Network (CTGN) are pleased to announce publication of two new online learning modules designed to serve as complementary teaching aids for University instructors or as stand-alone lessons for graduate students, plant breeding professionals, and curious laypeople.

The first module, **"using markers to predict breeding values"**, is available at www.extension.org/pages/63412.

The second module, **"genomic selection"**, is available at www.extension.org/pages/63413.

The modules are part of a larger series available at www.extension.org/pages/60370 that covers topics from introductory genetics and genomics to applied use of genomics tools in tree breeding and ecosystem management.

The modules are offered as large format Flash videos, each with a table of contents and the ability to search the text of the slides. Spoken commentary accompanies the slides and provides an in-depth look at the issues relating to the information. A pdf version of each module is also available for download. In addition to the full movie versions on eXtension.org, the modules are available at the Plant Breeding and Genomics Community of Practice YouTube channel.

To receive regular updates from the Plant Breeding and Genomics (PBG) Community of Practice, sign up for pbgnews at http://pbgworks.org

Explore additional PBG training resources at www.eXtension.org/plant_breeding_genomics and www.youtube.com/plantbreedgenomics

Support for the Conifer Translational Genomics Network project and the development of the teaching modules hosted at the PBG website was provided by the USDA/NRI CSREES Plant Genomics Coordinated Agricultural Project (CAP) Award # 2007-55300-18603, the USDA/NIFA AFRI Applied Plant Genomics CAP Award #2009-

85606-05680 and the USDA Forest Service. Development of the website was supported in part by the National Institute of Food and Agriculture (NIFA) Solanaceae Coordinated Agricultural Project, agreement 2009-85606-05673, administered by Michigan State University.

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4. GRANTS AND AWARDS

4.01 National Rice **Month Scholarships; $8,500 in awards available**

April 16, 2012
USA

USA Rice Federation is conducting a National Rice Month (NRM) scholarship contest, sponsored by Dow AgroSciences. High school seniors in the 2012-13 school year from rice-growing counties in Arkansas, California, Louisiana, Mississippi, Missouri, and Texas are eligible to apply.

To qualify to win a USA Rice National Rice Month Scholarship, students must conduct a promotion activity in their local community during September with U.S.-grown rice as the central theme. Entries must provide details of the promotion and should be submitted by Oct. 12. USA Rice encourages students to invest some of their summer vacation time in planning an innovative rice promotion campaign for a chance to win a scholarship.

Three scholarship prizes totaling $8,500 are available. The grand prize is a $4,000 scholarship and a trip to the 2012 USA Rice Outlook Conference in Coronado, CA, for the scholarship presentation. The second-place winner will receive $3,000 and third-place, $1,500.

September is National Rice Month — a time for America to salute its rice farmers and everyone involved in the U.S. rice industry. NRM was initiated by an act of Congress in 1991 and is conducted by the USA Rice Federation.

For more information and a scholarship contest entry form, visit www.usarice.com.

Source: SeedQuest.com

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4.02 **Donald Danforth Plant Science Center's Summer Internship program gets boost from two national foundations**

April 10, 2012
St. Louis, Missouri, USA

The National Science Foundation (NSF) and The Hearst Foundations collectively awarded $711,656 to support research training for undergraduate students in The Donald Danforth Plant Science Center's Summer Internship program. Students will have the opportunity through the funding to participate in a world class research environment in the area of plant and life science to obtain valuable research skills. The Center's sought after Internship program is managed by two Principal Investigators, Dr. Leslie Hicks and Dr. Sona Pandey, and provides students with insight into the personal qualities of a good researcher, the steps to take on the road to becoming a scientist, and the broader implications of scientific discovery.

The NSF REU Site award supports research training for twelve undergraduate students for 11 weeks, during the summers of 2012-2016. Students conduct a research project under the guidance of senior scientists at the Center in the areas of cell biology, molecular biology, structural biology, biochemistry, microbiology, chemistry, computational biology, bioinformatics, developmental biology, genetics, genomics, or plant pathology.

The Hearst Foundations one year grant of $50,000 expands the Center's Internship program by approximately five students and will allow them to experience all aspects of modern scientific research, from design to experimentation to reporting. The research component of the Internship program is supplemented with additional educational and training activities including field trips and workshops in proteomics, microscopy, and tissue culture and transformation.

"These grants help expand our program by supporting additional interns to engage in an international research environment with a diverse set of research areas," Dr. Leslie Hicks, Principle Investigator at the Donald Danforth Plant Science Center. "Our program hosts students from universities across the nation to gain hands-on experience in the lab and learn the use of a variety of technologies for research."

The Center will be accepting applicants for the 2013 Summer Internship Program in November. Roughly 125 interns have passed through the program since its inception in 2001. The Center has been an NSF REU site since 2003.

About The Hearst Foundations
The Hearst Foundations are national philanthropic resources for organizations and institutions working in the fields of Education, Health, Culture and Social Service. Our goal is to ensure that people of all backgrounds have the opportunity to build healthy, productive and inspiring lives.

The charitable goals of the Foundations reflect the philanthropic interests of William Randolph Hearst. The Hearst Foundation, Inc. was founded in 1945 by publisher/philanthropist William Randolph Hearst. In 1948, Mr. Hearst established the California Charities Foundation, renamed the William Randolph Hearst Foundation in 1951. Both Foundations are national private philanthropies operating independently from The Hearst Corporation.

The two Foundations are managed as one entity, sharing the same funding guidelines, leadership, and staff. Staff based in the headquarters in New York City review all proposals from organizations located east of the Mississippi River, and staff in the San Francisco office review requests from organizations west of the Mississippi.
In addition, the Foundation administers two operating programs, the United States Senate Youth Program and the Hearst Journalism Awards program.

About The National Science Foundation
The National Science Foundation (NSF) is an independent federal agency created by Congress in 1950 "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense…" With an annual budget of about $6.9 billion (FY 2010), we are the funding source for approximately 20 percent of all federally supported basic research conducted by America's colleges and universities. In many fields such as mathematics, computer science and the social sciences, NSF is the major source of federal backing.

About The Donald Danforth Plant Science Center
Founded in 1998, the Donald Danforth Plant Science Center is a not-for-profit research institute with a mission to improve the human condition through plant science. Research at the Danforth Center will feed the hungry and improve human health, preserve and renew the environment, and enhance the St. Louis region and Missouri as a world center for plant science. The Center's work is funded through competitive grants and contract revenue from many sources, including the U.S. Department of Energy, National Science Foundation, United States Department of Agriculture, U.S. Agency for International Development and the Bill & Melinda Gates and Howard Buffett Foundations.

The Donald Danforth Plant Science Center invites you to visit its website, www.danforthcenter.org; featuring interactive information on the Center's research, scientists, news and public education outreach. RSS feeds and the brand new "Roots & Shoots" blog allow visitors to keep up to date with Center's current operations and areas of research.

http://www.seedquest.com/news.php?type=news&id_article=26003&id_region=&id_category=&id_crop=

Source: SeedQuest.com

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4.03 **TWAS Fellowships: 2012 Call for Applications**

Postgraduate, postdoctoral, visiting scholar and advanced research fellowships available to scientists from developing countries. TWAS, the academy of sciences for the developing world, www.twas.org, is now accepting applications for its postgraduate, postdoctoral, visiting scholars and advanced research fellowship programmes.

The fellowships are offered to scientists from developing countries and are tenable at centres of excellence in various countries in the South, including Brazil, China, India, Kenya, Malaysia, Mexico, Pakistan and Thailand.

Two new programmes with Iran and Pakistan are launched this year, with the Iranian Research Organization for Science and Technology (IROST) and the National Centre for Physics (NCP).

Eligible fields include one or more of the following: agricultural and biological sciences, medical and health sciences, chemistry, engineering, astronomy, space and earth sciences, mathematics and physics.

Please see http://twas.ictp.it/prog/exchange/fells/fells-overview for the latest information regarding all these programmes, including eligibility criteria, deadlines, etc, and to download the application forms and guidelines.

Women scientists are especially encouraged to apply.

Sara Dalafi
TWAS Fellowships Office
TWAS, the academy of sciences for the developing world
ICTP Campus, Strada Costiera 11, 34151 Trieste, Italy Tel: +39 040 2240687 Fax: +39 040 2240689
Email: fellowships@twas.org ¶http://www.twas.org/
twitter.com/TWASnews ¶disclaimer: http://www.twas.org/disclaimer
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5. POSITION ANNOUNCEMENTS

5.01 **Postdoctoral Research Fellow – Dept of Plant Sciences, NDSU**

Salary: 34,000+

The Department of Plant Sciences is seeking a postdoctoral research fellow with experience in molecular mapping, physical mapping and QTL analysis, breeding/marker assisted selection and a strong publication record.

Fellow to conduct research on (1) genetics/molecular marker and physical mapping, molecular genetics and analysis of complex traits, particularly quality traits in spring wheat (2) participate in the spring wheat breeding activities in the Laboratory, greenhouse, and filed activities. Laboratory work includes genetics/mapping, double haploid production, and marker assisted selection (MAS) among other activities. Field activities include planting, pollinating wheat, managing nurseries, taking notes, harvesting, and generating and analysis of data.

This is part of a large breeding/genetics research project seeking to develop new adapted spring wheat cultivars, and develop and use novel and efficient techniques in the wheat genetics and breeding program. The main goal is to use these techniques/methodologies to identify genes controlling traits of interest (emphasis will be on quality traits) and incorporate them into advanced breeding lines. Individual will work with the spring wheat breeding staff and other individuals in the biotechnology/quality/germplasm enhancement laboratories. Continued employment contingent on satisfactory job performance and funding.

Minimum Qualifications:
Ph.D. in genetics; molecular biology, plant breeding, or related discipline.
Extensive experience in molecular marker techniques, and statistical analysis (e.g., SAS or similar software) of data.
Documented ability to communicate effectively in English both writing research publications and spoken language.
Experience managing large data sets and information.
Ability to work in a team oriented environment.
Ability to work and perform all field and greenhouse research activities.

Preferred Qualifications:
Experience in physical mapping.
Experience or familiarity with quality aspects.
Strong publication record.
Experience in working in diverse groups effectively.

Screening for this position will begin May 25, 2010 although this position will remain open until filled.

For more information and to apply for this position online, go to:
jobs.ndsu.edu/applicants/Central?quickFind=51393

Contributed by Eileen Buringru
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5.02 **Monsanto plant breeding positions:**

Requires a Ph.D. in plant breeding and genetics or related fields:
1**) Line Development Breeder - Waco, NE** - Job ID: **005P4**
2) **Hot Pepper Breeder –China** - Job ID: **006NS**
3) **Tomato Breeder –China** - Job ID: **006NQ**
4) **Vegetable Trialing Lead-China –** Job ID: **006OG**

For more information or apply online at:
http://jobs.monsanto.com/careers/breeding-jobs

or www.monsanto.com/career

Contributed by Donn Cummings
donn.cummings@monsanto.com

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6. MEETINGS, COURSES AND WORKSHOPS

New listings may include some program details, while repeat listings will include only basic information. *Visit web sites for additional details.*
This section includes three subsections:

A. DISTANCE LEARNING/ONLINE COURSES
B. COURSES OF THE SEED BIOTECHNOLOGY CENTER AT UC DAVIS
C. OTHER MEETINGS, COURSES AND WORKSHOPS

A. DISTANCE LEARNING/ONLINE COURSES

Plant Breeding Methods - Distance Education version CS, HS 541-section 601 DE; 3 credits; lecture only

North Carolina State University will be offering CS,HS 541, Plant Breeding Methods in a distance education version this fall. The instructor is Todd Wehner (tcwehner@gmail.com).

For more information on HS 541 Plant Breeding Methods, see:
http://distance.ncsu.edu/courses/fall-courses/HS.php

For more information on distance education at NC State University, see:
http://distance.ncsu.edu/
For more information on Todd Wehner, see:
http://cucurbitbreeding.ncsu.edu/

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Plant Breeding Overview - Distance Education version HS 590-801,601; 1 credit; lecture only

North Carolina State University will be offering HS 590, Plant Breeding Overview in a distance education version this fall. The instructor is Todd Wehner (tcwehner@gmail.com).

For more information on HS 590 Plant Breeding Overview, see:
http://distance.ncsu.edu/courses/fall-courses/HS.php

For more information on distance education at NC State University, see:
http://distance.ncsu.edu/

For more information on Todd Wehner, see:
http://cucurbitbreeding.ncsu.edu/

Dr. Todd C. Wehner
Professor and Cucurbit Breeder
Department of Horticultural Science
North Carolina State University
Raleigh, NC 27695-7609
919-741-8929
tcwehner@gmail.com

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Master of Science in Plant Breeding at Iowa State University (distance program)

The curriculum consists of 12 courses plus a one-credit workshop and a three-credit creative component, for a total of 40 credits. The one-credit practicum is the only course that requires attendance on campus- four days during one summer. Generally,

students who have completed a degree from a College of Agriculture will meet the requirements.

Contact information is:
msagron@iastate.edu
toll-free: 800-747-4478
phone: 515-294-2999
http://masters.agron.iastate.edu

Maria Salas-Fernandez
Assistant Professor
Department of Agronomy
Iowa State Univ.
msagron@iastate.edu

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Online Graduate Program in Seed Technology & Business

Iowa State University
http://click.icptrack.com/icp/relay.php?r=48323218&msgid=597705&act=BDP

The Iowa State University On-line Graduate Program in Seed Technology and Business develops potential into managerial leadership.

Contact us today for more information about how you can apply.
Paul Christensen, Seed Technology and Business Program Manager Ph.
515-294-8745
seedgrad@iastate.edu

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B. COURSES OF THE SEED BIOTECHNOLOGY CENTER AT UC DAVIS

Seed Biotechnology Center responds to industry needs by launching SB101^{SM} Field Crops

Dates and Location:
June 11-15, 2012, Minneapolis, MN
For more information contact Jeannette Martins at jmartins@ucdavis.edu or go to SB101.

Source: Seed Biotechnology Center November 2011 Enews

Contributed by Donna Van Dolah

Seed Biotechnology Center
dlvandolah@ucdavis.edu

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European Plant Breeding Classes

For more information on the UC Davis European Plant Breeding Academy or the Plant Breeding Academy in the United States visit http://pba.ucdavis.edu or contact Joy Patterson, jpatterson@ucdavis.edu

For more information and application process visit
http://pba.ucdavis.edu/PBA_in_Europe/PBA_in_Europe_Class_II/

Week 6: June 24-29, 2013
Location: Davis, CA
Partners: Seed Biotechnology Center, UC Davis Department of Plant Science

Week 3: June 25-30, 2012
Location: Gatersleben, Germany
Partners: The German Plant Breeders' Association (BDP), Leibniz Institute of Plant Genetics and Crop Plant Research (IPK)

Week 4: Oct 8-13, 2012
Location: Enkhuizen, Netherlands
Partners: Seed Valley, Naktuinbouw

(NEW) Plant Breeding Academy in United States begins September 2012

The UC Davis Plant Breeding Academy is a postgraduate program that teaches the fundamentals of plant breeding, genetics and statistics through lectures, discussion, and field trips to public and private breeding programs. Employers appreciate the opportunity to provide their valued employees advanced training without disrupting their full-time employment. Participants attend six 6-day sessions at UC Davis. The instructors are internationally recognized experts in plant breeding and seed technology.

The UC Davis Plant Breeding Academy 2012 Class begins in September. It will include new topics that reflect the most recent developments in plant breeding theory and practice. Applications are now being accepted. For more information on the UC Davis Plant Breeding Academy visit the PBA website or contact Joy Patterson, jpatterson@ucdavis.edu.

Contributed by Donna Van Dolah
Seed Biotechnology Center

UC, Davis
dvandolah@ucdavis.edu

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Seed Central launches its series of monthly events

The program for the next several months can be viewed at:
http://www.seedcentral.org/calendarofevents.htm

To learn more about Seed Central, please visit www.seedcentral.org.

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Seed Business 101

For more information please contact Jeannette Martins at UC Davis Seed Biotechnology Center Phone (530) 752 4984 or jmartins@ucdavis.edu.

Register online: sbc.ucdavis.edu

C. OTHER MEETINGS, COURSES AND WORKSHOPS

14 May - 1 June 2012 **Rice: Research to production**, IRRI, Metro Manila, the Philippines.

See http://irri.org/knowledge/irri-training/short-courses/list-of-short-courses/rice-research-to-production-course-2012 or contact h.leung@cgiar.org for more information.

21 May – 22 June 2012. **Conservation Agriculture: Laying the groundwork for sustainable and productive cropping systems.**

Application deadline is 31 March 2012. For an application form and more details contact: Laura Ivonne Ruiz (l.ruiz@cgiar.org)

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(NEW) Tuesday, *June 19, from 9 a.m. to 4 p.m.*
Environmental and conservation seed workshop to be held during annual convention of the American Seed Trade Association (ASTA)

Different from years past, the 10th Annual Environmental and Conservation Seed Workshop will be held June 19 as part of the American Seed Trade Association's Annual Convention.

"Normally the workshop is held in April and we spend a day at USDA meeting with and hearing from the different agencies and bureaus that deal with seed, and the following day we go on the Hill as part of the fly in," said Leslie Cahill, ASTA vice president of government affairs and staff liaison to the Environmental and Conservation Seed Committee. "With this year's Annual Convention being held in the D.C. area, it only makes sense to combine everything and make better use of our resources and members' time."

Individuals with an interest in environmental and conservation seed should mark their calendars for **Tuesday, June 19, from 9 a.m. to 4 p.m**. As usual, the workshop will be held at USDA headquarters.

ASTA's Annual Convention will be held June 20-23 at the Gaylord National in National Harbor, Md. A block of rooms has been reserved at the rate of $199 per night. For reservations, call 301-965-4000 or visit www.gaylordnational.com and mention "ASTA."

A printable registration form for the Annual Convention is available at http://www.amseed.org/pdfs/AC12-RegistrationBrochure.pdf and online registration will open soon.

For questions and additional information about the workshop, contact Cahill at 703-837-8140 or lcahill@amseed.org.

For questions and information about the Annual Convention, contact Jennifer Crouse, ASTA director of meetings and services, at 703-837-8140 or jcrouse@amseed.org.

http://www.seedquest.com/news.php?type=news&id_article=25740&id_region=&id_category=&id_crop=

Source: *Newsletter of the American Seed Trade Association (ASTA)* via SeedQuest.com

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5–8 June 2012 Short course on **MarkerAssisted Plant Breeding, University of Minnesota, Saint Paul, USA**

Contact Dr. Bernardo by email (bernardo@umn.edu) or by phone 1-612-625-6282

11-15 June 2012 **Seed Business 101**, Seed Biotechnology Center, Minneapolis, MN

Seed Biotechnology Center expands the Seed Business 101 (SM) (SB101) course by offering sessions with curriculum focused on field crops.

The first session of the Seed Business 101 Field Crops is scheduled for **June 11-15, 2012**, in Minneapolis, MN.

For registrations fees, additional dates and other details please visit www.sbc.ucdavis.edu or contact Jeannette Martins at jmartins@ucdavis.edu.

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11-22 June 2012 **Plant breeding for drought tolerance, Colorado State University**

Registration and Information
Participants may apply online (http://www.droughtadaptation.org) through February 1, 2012.

Contributed by Annie Heiliger
Graduate Research Assistant
Plant Breeding & Genetics
Soil and Crop Sciences Department
College of Agricultural Science
Colorado State University=
Annie.Heiliger@ColoState.EDU

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18-22 June 2012 **Second Scientific Conference of the Global Cassava Partnership for the 21st Century (GCP21-II)**, Kampala, Uganda.

For more information, please visit the website:
http://www.danforthcenter.org/GCP21-II/

If you are interested in the conference and want to receive more information as we progress in its organization, please pre-register on the GCP21-II website.

Young scientists in developing countries will be able to apply for Travel Grants to attend the conference beginning in January 2012.

Conference registration will open in January 2012 and close May 15, 2012.
Abstracts can be loaded at any time during the registration period.

9-13 July 2012. **XVIIth Biennial Workshop on the Smuts and Bunts,** Shenzhen, Guangdong, China

Abstracts
Deadline for registration and receipt of abstracts will be on the June 1, 2012.
Send completed registration form electronically to: smut2012@163.com

The contact information are the following:

Wu Pinshan
Chinese Academy of Inspection and Quarantine
Email: smut2012@163.com

Zhang Guiming
Shenzhen Entry-Exit Inspection and Quarantine Bureau
Email: smut2012@163.com

Contributed by Bahromiddin Huseinov
yunuszod@yahoo.com

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*Conference in Ithaca New York, **July 10-13, 2012**. North American Alfalfa Improvement Conference, Trifolium Conference, and Grass Breeder's Conference will meet jointly this summer at Cornell University.*

Contributed by Julie Hansen
Dept. of Plant Breeding and Genetics
Cornell University
jlh17@cornell.edu

(NEW) NAPB Annual Meeting, August 6-8, 2012 in Indianapolis

The National Association of Plant Breeders will hold its annual meeting August 6-8, 2012 in Indianapolis, with the theme of "Sustaining Life through Plant Improvement".

The annual meeting is an opportunity for breeders and allied scientists to stay updated on recent innovations in plant science and to discuss public policy issues relevant to plant breeding.

The meeting also provides an important venue for graduate students to present their research, meet with potential employers, and become acquainted with plant breeding graduate students from other universities. This year's meeting will be hosted by Dow AgroSciences.

More information and registration for the meeting is available at www.plantbreeding.org.
Early registration ends June 1**.**

NAPB is an organization of public and private sector individuals associated with or interested in the science or business of plant breeding. It is a strong proponent for maintaining and enhancing public plant breeding research and education programs.

Patrick F. Byrne
Professor & Graduate Studies Coordinator
Colorado State University

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28 August – 1 September 2012 **13th International Cereal Rust and Powdery Mildew Conference,** Beijing, China
http://www.wheatdisease.com/web/newDetail.aspx?id=3

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(NEW) Lima-Perú, del *3 al 6 de Septiembre de 2012*.
El Comité Organizador del 58th Annual Meeting of The Interamerican Society for Tropical Horticulture y XVI Congreso de la Sociedad Peruana de Horticultura, tiene el agrado de invitarlo a participar en este evento, que se llevará a cabo en **Lima-Perú, del 3 al 6 de Septiembre de 2012.**

La organización del evento está en marcha y ya se están solicitando resúmenes de trabajos de investigación. Este año el programa incluirá ponencias magistrales, exposiciones orales y presentaciones en paneles. Así mismo se realizarán giras técnicas a zonas con producción de cultivos hortícolas de interés actual.

Agradecemos desde ya, su interés y lo invitamos a compartir experiencias e información con otras personas ligadas a la horticultura, provenientes de todo el Perú y de otros países.

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1-4 September 2012 **BGRI 2012 Technical Workshop,** Beijing, China
http://globalrust.org/traction/permalink/about343
Online registration coming soon.

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(NEW) *10-12 September 2012* • Hyderabad, India
6th International **Hybrid Rice Congress**

www.ricecongress.com

Important Dates:

Abstract Submission Deadline: 15 May 2012
Early-bird Registration Deadline: 15 June 2012
Acceptance Notification: 27 July 2012
Authors Registration Deadline: 15 August 2012
Regular Registration Deadline: 30 August 2012

Contributed by **Laurient Yves Caisip**
Yves Caisip [ycaisip@kenes.com]

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11-14 September 2012. **The 9th International Phytotechnology Society (IPS) conference**, Hasselt University in Belgium September 11th to 14th, 2012.

Phytotechnologies - plant-based strategies to clean water, soil, air and provide ecosystem services - have an effective power beyond their science when integrated into our managed landscapes.

This conference will bring together scientists, consultants, designers, engineers, builders, regulators, site owners, and site users to explore phytotechnologies to address current and emerging environmental challenges.

The conference is organized by the International Phytotechnology Society (IPS) (Jason White (USA), Steven Rock (USA), Elena Maestri (Italy), Renee Stoops (USA), Lee Newman (USA)) and by Hasselt University in Belgium (Jaco Vangronsveld, Nele Weyens, Steven Van Passel, Nele Witters, Silvie Daniels, Jan Colpaert, Ann Cuypers)

For more information, www.phytotechnologies.be

Please note that the deadline for the abstract submission is April 1th (2012) and that for the early registration is June 15th (2012).

Contributed by Elena MAESTRI Universita' di Parma Dip. Scienze Ambientali Parma, ITALY elena.maestri@unipr.it

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3-8 October 2012 **The 6th International Congress on Legume Genetics and Genomics**, Hyderabad, India.

Hosted by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) and the Indian Council of Agricultural Research (ICAR), the congress will bring together scientists working on research aspects of legume biology in model species, using genetic and genomic tools, with those working on applied aspects and breeding of food legume crop and pasture species. Topics include next generation

genomics; nutrition; development; evolution and diversity; symbiosis; abiotic stress; pathogenesis and disease resistance; translational genomics; genomics-assisted breeding; and harnessing germplasm resources.

See http://www.icrisat.org/gt-bt/VI-ICLGG/homepage.htm or contact iclgg2012@gmail.com for more information.

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(NEW) *January 28 to February 1, 2013*, in Arusha, Tanzania.
International Plant Virus Epidemiology Symposium

The 12th International Plant Virus Epidemiology Symposium (IPVE) is planned from January 28 to February 1, 2013, in Arusha, Tanzania.

The symposium will be organized by the International Institute of Tropical Agriculture (IITA), under auspices of the International Committee on Plant Virus Epidemiology (ICPVE) of the International Society for Plant Pathology.

The symposium is expected to bring lead virologists together for exchange of latest knowledge on evolution, ecology and control of plant viruses. There will be a special session on plant virology in sub-Saharan Africa, and a field excursion around Arusha and Kilimanjaro.

For further details, visit: www.iita.org/IPVE or contact Lava Kumar (L.kumar@cgiar.org).

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(NEW) Seed Business 101^{SM} Field Crops

Attracting and retaining talented new employees is a critical challenge for the seed industry. The Seed Business 101^{SM} course was created with input from industry executives to accelerate the careers of promising new employees and young managers. The course has been attended by more than 100 people since its launch in fall of 2010.

The course also offers invaluable insights and perspective to seed dealers and companies offering products and services to the seed industry, including seed treatments, crop protection, seed enhancement and technology, machinery and equipment, etc.

Seed Business 101 is one week course designed to expose the participants to the five functional areas of a seed company (R&D, production, operations, sales and

marketing; and administration). By creating a virtual seed company and case studies for each functional area, the course content is delivered in a very interactive way.

The course gives employees that are new to the seed industry a broad understanding of the major aspects of a seed company's operations and cross-departmental knowledge of best practices for profitability. The course is taught by widely respected industry executives with additional help of industry experts participating as guest speakers.

Registrations are now being accepted for the Seed Business 101^{SM} Field Crops, June 11-15, 2012, in Minneapolis.

For course details, testimonials and registrations please visit SB 101 or contact Jeannette Martins at jmartins@ucdavis.edu.

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7.EDITOR'S NOTES

Plant Breeding News is an electronic forum for the exchange of information and ideas about applied plant breeding and related fields. It is a component of the *Global Partnership Initiative for Plant Breeding Capacity Building* (GIPB), and is published monthly throughout the year.

The newsletter is managed by the editor and an advisory group consisting of Chikelu Mba (chikelu.mba@fao.org), Elcio Guimaraes (e.guimaraes@cgiar.org), Margaret Smith (mes25@cornell.edu), and Ann Marie Thro (athro@reeusda.gov). Oriana Muriel is Associate Editor (oriana.muriel@alumni.pitt.edu) The editor will advise subscribers one to two weeks ahead of each edition, in order to set deadlines for contributions.

Subscribers are encouraged to take an active part in making the newsletter a useful communications tool. Contributions may be in such areas as: technical communications on key plant breeding issues; announcements of meetings, courses and electronic conferences; book announcements and reviews; web sites of special relevance to plant breeding; announcements of funding opportunities; requests to other readers for information and collaboration; and feature articles or discussion issues brought by subscribers. Suggestions on format and content are always welcome by the editor, at pbn-l@mailserv.fao.org. We would especially like to see a broad participation from developing country programs and from those working on species outside the major food crops.

Messages with attached files are not distributed on PBN-L for two important reasons. The first is that computer viruses and worms can be distributed in this manner. The second reason is that attached files cause problems for some e-mail systems.

PLEASE NOTE: Every month many newsletters are returned because they are undeliverable, for any one of a number of reasons. We try to keep the mailing list up to date, and also to avoid deleting addresses that are only temporarily inaccessible. If you miss a newsletter, write to me at chh23@cornell.edu and I will re-send it.

REVIEW PAST NEWSLETTERS ON THE WEB: Past issues of the Plant Breeding Newsletter are now available on the web. The address is: http://www.fao.org/WAICENT/FAOINFO/AGRICULT/AGP/AGPC/doc/services/pbn.html *Please note that you may have to copy and paste this address to your web browser, since the link can be corrupted in some e-mail applications.* We will continue to improve the organization of archival issues of the newsletter. Readers who have suggestions about features they wish to see should contact the editor at chh23@cornell.edu.

To subscribe to PBN-L: Send an e-mail message to: mailserv@mailserv.fao.org. Leave the subject line blank and write SUBSCRIBE PBN-L (Important: use ALL CAPS). To unsubscribe: Send an e-mail message as above with the message UNSUBSCRIBE PBN-L. Lists of potential new subscribers are welcome. The editor will contact these persons; no one will be subscribed without their explicit permission.

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