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September 2010

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The First Global Conference on Biofortification is taking place on November 9-11, 2010, in Washington, D.C., USA. Organized by the HarvestPlus Challenge Program of the CGIAR, this is the first international effort to take stock of progress, share lessons learned and chart the future of biofortification. This 3-day event will bring together agricultural scientists, public health specialists, policymakers, donors and business leaders to advance this emerging agricultural intervention for public health. For more information, [visit the event website](#). Opportunities for organizations to exhibit are also available. To request an invitation or for further enquiries, please email biofortconf@cgiar.org.

Award

Ayman Abou Hadid Wins 2010 Egypt State Award in Agricultural Science



Ayman Abou Hadid, president of the Egypt Agricultural Research Center, was given the 2010 State Award in Agricultural science by the Egyptian Academy of Science and Technology on behalf of the Prime Minister of Egypt. The award was granted in recognition of his contribution to Egypt's knowledge, research and information in the field of agriculture. More information is forthcoming on this website:

<http://awards.asrt.sci.eg/viewRewards1.jsp>. Abou Hadid

represents Egypt as a Member of the CGIAR and works in close partnership with several CGIAR Centers.



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Garden Variety

Crop improvement, environmental sustainability and higher farm incomes all depend on agricultural biodiversity — as does simply consuming a healthy, balanced diet.

Agricultural biodiversity is well understood to be a source of desirable traits. The genetic bases of disease resistance, for example, are sought in the vast array of agricultural biodiversity and then bred into existing crop cultivars and livestock breeds to create new cultivars and breeds that are better able to thrive under stress. This kind of scientific breeding will remain important as the world grapples with feeding more people a better diet using fewer resources. However, agricultural biodiversity can also deliver better nutrition, enhanced resilience, greater sustainability, and higher farm incomes, all of which offer pathways out of poverty.

Nutrition is perhaps the most important. More than 60 years after the start of the Green Revolution, hunger still stalks more than a billion people, and 2 billion people, mostly young women and children, suffer the "hidden hunger" of micronutrient deficiency.

The problem is not simply the lack of proteins or calories, but the lack of diversity in the diet, which is one way to guarantee of an adequate supply of micronutrients. Very good evidence from several studies, mostly in the developed world but increasingly from developing countries, indicates that a diverse diet protects people from several non-communicable diseases and is associated with a longer, healthier, more productive life.

Non-communicable diseases such as obesity, type 2 diabetes, heart disease and cancer were long thought of as diseases of affluence, but they are spreading most quickly in low- and middle-income countries, where 80% of the deaths from them occur. Current approaches to the problems of malnutrition are clearly not working. Agricultural biodiversity as the basis of healthy diets and resilient food systems offers a fresh approach.

In Kenya, people traditionally ate more than 200 species of leafy vegetables. Almost all are much more nutritious than the cabbage and kale that were often the only green vegetables for sale in cities, but their wider use is stymied by perceptions of backwardness, supplies that are erratic and unhygienic, and the ignorance of younger adults, especially in cities, about how to prepare them.

Working with a range of partners, Bioversity International trained Kenyan farmers to grow traditional leafy vegetables and worked on quality control and supply chains. Supermarkets were enlisted to help make the produce available in cities, and colorful leaflets offered recipes for preparing them. Well-known entertainers and government figures endorsed traditional foods on mass media. The result was an increase in deliveries to markets from 30 tons per month to 400 tons per month 3 years later. The retail value of the trade is estimated to be US\$1.5 million daily, and the incomes of farm families supplying the vegetables have increased by a factor of 2 to 20.

Although the vegetable species and some intervention techniques are specific to East Africa, the general methods and ideas behind this initiative are applicable globally. Similar projects promoting Andean grains in Bolivia and Peru, nutritious millets in India and Nepal, and nutrient-rich fruits in the Pacific are making considerable headway.

When the World Health Organization (WHO) and others first sounded the alarm about micronutrient deficiency, they said that dietary diversity was the preferred option for tackling the problem. This original emphasis was slowly overtaken by a much more clinical approach, which saw each deficiency as a distinct disease to be



cured by administering a specific supplement. Supplements, fortified foods and biofortified staples currently rule, but the original food-based solutions advocated by WHO and others need to be reassessed. The CGIAR's proposed Mega Program on Agriculture for Improved Health and Nutrition will go a long way toward reasserting the primacy of food-based approaches, including biofortification where appropriate, and will help policymakers understand that there are alternative ways to tackle malnutrition that often provide other benefits as well.

Ecosystem complexity is known to go hand in hand with resilience, and this applies to agricultural ecosystems. Growing different varieties of crop species can control pest and disease outbreaks, augmenting farm profitability, and also allows the best use of diverse growing conditions. Access to a range of cultivars gives farmers more options for dealing with capricious weather, as a variety that avoids drought or flood by maturing quickly can mean the difference between life and death. Livestock and fish add to human nutrition and can also contribute to soil fertility and farm incomes. Additionally, agricultural biodiversity will be essential for adapting agriculture to climate change.

The multiple benefits of making greater use of agricultural biodiversity in these various ways will be seen in long-term improvements that will be self-sustaining, as healthier communities engage in a diversified and less destructive agriculture that offers a nutritionally superior diet, which in turn keeps communities healthier – all with profound effects on economic development.



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Interview with Carlos Seré

Carlos Seré, Director General of the International Livestock Research Institute (ILRI), explains why genebanks and other measures are needed to protect livestock diversity, which is essential for ensuring world food supplies.



Breeding programs could boost the productivity of local breeds in sub-Saharan Africa, such as the humpless N'Dama cattle. Photo: ILRI.

Q: How seriously endangered is the world's livestock genetic diversity?

CS: Currently, about one-fifth of the world's 7,616 livestock breeds are at risk of extinction. For example, the hardy Ankole cattle of East and Central Africa are being replaced by high-yielding Holstein-Friesian dairy cows and could disappear within the next 50 years.

In the industrialized world, just six tightly defined breeds already account for 90 percent of all cattle. A 2007 report by the Food and Agriculture Organization showed that over-reliance on a small number of livestock breeds is resulting in the loss of around one breed every month. Livestock genetic diversity is especially vulnerable in the developing world, which is where the vast majority of farm animal breeds reside.

In Vietnam, the proportion of indigenous sows dropped from 72 per cent in 1994 to just 26 percent 8 years later. In some countries, chicken populations have changed practically overnight from genetic mixtures of backyard fowl to selected uniform stocks raised under intensive conditions.

Across the developing world, livestock are herded by pastoralists or tended by farmers who grow both crops and livestock on small plots of land. Many of these farmers face a daily struggle to survive, so they are unlikely to prioritize conservation of their rare breeds – at least not without significant support.

Q: What is the tradeoff between improving livestock production and conserving livestock diversity, and how can it be better managed?

CS: From Africa to Asia, farmers of the South, like the farmers in Europe and the Americas before them, are increasingly choosing the breeds that will produce more milk, meat and eggs to feed their hungry families and raise their incomes.

They should be supported in doing so. But we cannot afford to altogether lose the breeds that are abandoned. Many of them possess genetic attributes that are

critical for coping with threats such as climate change and emerging pests and diseases.

We urgently need policy support for their conservation. This means creating incentives that encourage farmers to keep traditional animals. For example, breeding programs could boost the productivity of local breeds, or farmers could be helped to access niche markets for traditional livestock products. The latter include grass-fed Boran beef raised by dryland pastoral herders in Kenya and Ethiopia, sweet milk from the long-horned Ankole cattle of Uganda and Rwanda, buffalo milk produced by urban dairies in India, and the popular free-range “black” chicken and native Mong Cai potbellied pigs kept by ethnic communities in the remote mountains of northern Vietnam.

Policymakers must also consider the value of indigenous breeds when designing restocking programs following droughts, disease epidemics, civil conflicts and other disasters that deplete herds.

Q: With such support, can farmers and herders do enough to stop the loss of livestock genetic diversity?

CS: We must do all we can to help farmers and herders conserve the farm animal breeds they have selected and nurtured over many generations. But poor farmers cannot stem all the diversity loss in farm animal breeds, even with additional help. We need a parallel, even bigger effort, to link local, national and international resources and conserve livestock genetic diversity through dedicated livestock genebanks.

The livestock breeds that need to be conserved, in Africa especially, are not confined tidily within national boundaries. They are important regionally and even globally. For that reason and also because it's expensive to conserve livestock genetic diversity, we urgently need international initiatives to reinforce national efforts.

National livestock genebanks already exist in Europe and the Americas. But with the exception of South Africa and possibly Namibia, they are practically nonexistent in sub-Saharan Africa, which is home to many threatened livestock breeds.

International livestock genebanks should store frozen cells, semen and DNA of endangered livestock from across the world. It is these genes that will help us feed humanity and cope with unforeseen crises.

Such facilities should also be used to conserve the legacy of 10,000 years of animal husbandry. Collections must be accompanied by comprehensive descriptions of the animals, the populations from which they were obtained, and the environments and local practices under which they were raised.

The necessary technology is already available. Cryopreservation has been used for years to aid both human and animal reproduction. What's lacking is a strong policy framework for widespread use of the available technologies to preserve livestock genetic diversity.

Q: Does the erosion of livestock genetic diversity merit as much attention as that focused on crop diversity?

CS: Documenting and conserving the diversity of cattle, goats, sheep, swine and poultry is at least as essential as the maintenance of crop diversity for ensuring future food supplies in the face of health and environmental threats.

Just as we should know which crop varieties are most tolerant to flooding or disease, we should know which kinds of milking goat can bounce back quickly from a drought, which breeds of cow resist infection from sleeping sickness and which types of chicken can survive avian flu.

But while crop genes are being stored in thousands of collections across the world and a fail-safe genebank buried in the Arctic permafrost, no comparable effort exists to conserve livestock genes.







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The Other Bottom Billion

Healthy agriculture and ecosystems ultimately depend on preserving biodiversity at the base of the food chain, where a billion organisms can live in a handful of soil.

Ask most people about biodiversity and they will most likely talk about endangered birds, mammals and fish. But the concerns we share for preserving diversity on a grand scale should also apply to soil macro- and microfauna, including microbes.

Researchers, farmers and policymakers have long sought to develop agricultural systems that are self-sustaining, low input, diversified and energy efficient. Maintaining soil biodiversity is essential to that goal, and soil macrofauna are increasingly recognized for their positive effects on nutrient cycling, regulating pest populations and encouraging plant growth.

Soil macrofauna include the full range of "creepy-crawlies" most of us know by their vernacular names as earthworms, termites, ants, spiders, grasshoppers, centipedes, millipedes and beetles. Common microfauna are nematodes and rotifers (tiny wormlike organisms), mites, and single-cell protozoa. Another level down is the realm of soil fungi and bacteria. Altogether, more than a billion organisms can live in a handful of soil.

While not nearly as photogenic as the noble elk, the soaring eagle or the leaping salmon, soil is where life on earth is generated. Using the energy absorbed from the sun to combine water with carbon dioxide drawn from the air, soil populations produce the sugars, starches and proteins that sustain all life on the planet. Healthy soil regulates the flow, storage and quality of water. It supports the crops that produce 99% of our fiber and food. Maintaining healthy diversity in soil macro- and microfauna is no less important than protecting habitats for river dolphins, rehabilitating mangrove forests or saving critically endangered saiga antelopes. The fact is, the base of the food chain that supports earth's millions of species is in soil.

As Chutinan Choosai, an entomologist at Khon Kaen University, and her coauthors explained in *Termite mounds and dykes are biodiversity refuges in paddy fields in north-eastern Thailand*, which was published in *Environmental Conservation* in 2009, rice lands illustrate how this complex interaction of organic life and inorganic matter works.

Rice paddy is one of the most common land uses across Asia and in expanding parts of Africa. In northeastern Thailand, 35% of the landscape is paddy field. Rice paddy in general does not encourage soil biodiversity, and northeast Thailand is a particularly harsh environment for organisms in the soil. It is sandy and often saline, with very low fertility. It cycles through a cool dry season, an extremely hot dry season and a rainy season during which most of the landscape is flooded. What research shows, however, is that these radically altered landscapes provide refuges in the form of bunds (soil embankments with an average height of 40 centimeters) and termite mounds. Bunds and termite mounds provide a safe haven for soil macrofauna during the rainy season, when paddy fields are flooded, as well as the shade and humidity necessary for their development and survival during the dry season.



Bunds and termite mounds provide a safe haven for soil macrofauna during the rainy season, when paddy fields are flooded (left) and offer as well the shade and humidity necessary for their development and survival during the dry season (right).

As ecosystem engineers, termites play a prominent role in maintaining biodiversity. They modify soil properties by displacing soil organic and mineral compounds from one site to another, and by producing biogenic structures with specific physical, chemical and biological properties. Soil ecologists sometimes refer to these structures as “fertility islands,” which create spatial variability in soil properties at the ecosystem scale.

Ants and earthworms modify soil particle size and the dynamics of soil organic matter, and other soil macrofauna play important roles in promoting litter decomposition and mineral nitrogen dynamics. Termite mounds and bunds provide a haven in which soil macrofauna predators like ants and spiders can shelter and thus constitute a sustainable resource for controlling certain rice pests. Finally, insects are themselves consumed as food by people in many parts of the world. In northeast Thailand some species of ants, grasshoppers and crickets are common culinary ingredients or side dishes and valuable sources of protein.

Because soil fauna provide important ecosystem functions and services, their conservation must be integrated into sustainable agricultural systems. In an important step toward that end, the Tropical Soil Biology and Fertility (TSBF) Institute of the International Center for tropical Agriculture (CIAT) recently completed an 8-year major global initiative, which was aimed at finding ways to enhance agricultural productivity through improved management of below-ground biodiversity.

Meanwhile, in the course of its work on agricultural water-management solutions, the International Water Management Institute incorporated the International Board for Soil Research and Management in 2001, further strengthening its expertise in soil research. Also, the newly proposed CGIAR Mega Program Durable Solutions for Water Scarcity and Land and Ecosystem Degradation integrates the work of CGIAR Centers and their partners on soil into a comprehensive research program addressing the intersection of land, water and ecosystems.





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Jungle Idol

A participatory tree-domestication program is working with communities to hunt down valuable trees in the forest which farmers can clone.

In 1999, Christophe Missé attended a training session held by the World Agroforestry Centre in Nkolpépé, Cameroon, that he says changed his life. He learned techniques for developing superior varieties of indigenous fruit trees and now runs a nursery with his neighbors, selling over 7,000 trees per year. He has also planted hundreds of indigenous fruit trees on his farm.

"With the money I've made I've built a new house," he says. "I can now pay for two of my children to go to private school."

Missé is one of many thousands of smallholders who benefit from the participatory tree-domestication program managed by the World Agroforestry Centre. Locating superior varieties of fruit trees in the forest and introducing them on farmland is broadening biodiversity and generating income for poor farmers in Africa, Latin America and Asia. In the program, local farmers play key roles in selecting, propagating and planting new varieties, in addition to managing them on the farm. And it is the farmers who stand to benefit most from this approach.

"We ask local people which indigenous trees they value most and for what traits," explains Zac Tchoundjeu, co-leader of World Agroforestry Centre's Global Research Project on Tree Domestication and Agroforestry Germplasm. "Most commonly the response is ones with large, sweet fruit grown on trees that mature quickly."



African plums for sale at a market in Cameroon. Photo: Charlie Pye-Smith/World Agroforestry Centre.

In Cameroon, these species include bush mango (*Irvingia gabonensis*), African plum (*Dacryodes edulis*), African nut (*Ricinodendron heudelotii*) and bitter kola (*Garcinia kola*). In the Amazon, they include three palm species — aguaje (*Mauritia flexuosa*), majo or ungurahui (*Jessenia batauba*), and peach-palm (*Bactris gasipaes*) — and two other fruit trees, camu-camu (*Myrciaria dubia*) and cupuaçu (*Theobroma copuazu*). In China, they include pine nut and walnut.

In Africa, there are around 3,000 species of wild fruit, representing an enormously important — and largely untapped — natural resource.



A farmer in Peru shows the macabo fruit (*Theobroma bicolor*), which is native to Central and South America and is a relative of the cacao tree. It is eaten fresh and used in desserts or to flavor beverages. Photo: Marcos Tito/World Agroforestry Centre.

The high biodiversity of the Amazon includes hundreds of wild fruit trees. The Frutales Amazónicos Project of the multidisciplinary Amazon Initiative aims to unleash the potential of a selection of them to generate income, alleviate poverty and safeguard genetic diversity.

"We are combining technological, socio-organizational and market innovations to tap into the biodiversity potential of Amazon fruit trees," said Julio Ugarte, a World Agroforestry Centre researcher in Peru.

Once species have been chosen for domestication, local people help scientists identify individual trees in the wild that possess the desired traits. Vegetative material is then collected to establish superior germplasm accessions at research sites and nurseries.

"Domestication takes advantage of the huge genetic variation that exists in the wild," says Tchoundjeu. "Different trees of the same species can bear fruits that are sweet or sour, large or small."

Scientists then research how best to propagate superior trees so that large numbers of clones can be made available as soon as possible. Conventionally, crop domestication entails breeding new varieties that capture the desirable traits of the wild species, but this can take considerable time with slow-maturing trees. To domesticate superior fruit trees needed now, researchers test vegetative propagation techniques such as rooting, grafting and marcotting. Farmers are trained on which techniques to use for which species, enabling them to propagate wild species for their own nurseries and farms.

"The success of the participatory tree domestication program lies in its use of simple, low-cost horticultural techniques that have an almost immediate impact on reducing poverty and improving human welfare," says Tchoundjeu, noting that the number of farmers' nurseries in Cameroon has grown from just four a decade ago to several thousand today. "People become less dependent on commodity markets, and they produce a crop they can both eat and sell."

"In China, mountain farmers earn 30% more from selling certified organic pine nuts and walnuts," adds Jianchu Xu, a senior scientist in the World Agroforestry Centre's China Program. "They practice chemical-free management that enhances both soil fauna and water quality."

The biodiversity benefits of growing more indigenous trees on farms are evident. Natural forests benefit, too, as farmers with improved incomes are much less likely to exploit them.

Participatory tree domestication in Cameroon is the subject of a new booklet in the Trees for Change series published in English (*The Fruits of Success*) and French (*Les fruits du succès*) and available at www.worldagroforestry.org.



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Plastic Fantastic

A simple barrier technology prevents Andean potato weevil infestations, benefiting farmers while also yielding important environmental and biodiversity dividends as a result of reduced insecticide applications.

An ordinary sheet of plastic is proving to be a simple and effective alternative to expensive, harmful insecticides for controlling a major potato pest. That is what International Potato Center (CIP) researchers working in the high Andes have discovered. The results are not only helping farmers but also protecting biodiversity and the environment.



Plastic sheet barriers prevent Andean potato weevil damage by up to 70% more than do several insecticide applications. Photo: CIP.

Andean potato weevils (*Premnotrypes suturicallus*) pose a major problem for farmers at altitudes of between 2,800 and 4,200 meters, where potato is an important staple and cash crop. The weevils, which are very common at these altitudes, crawl into potato fields at the beginning of the growing season and breed, and when the larvae hatch they move into the soil, feeding underground on tubers. To date no crop resistance to the weevil has been detected. Farmers attempt to control weevils mainly by using 2-4 applications of insecticides, which are expensive, highly toxic, and often ineffective because the dosages are wrong or mistimed. From 15% to 40% of tubers are commonly infested at harvest, even with the use of insecticides. When no control measures are taken, the weevil can destroy half of the crop or more.

But the Andean potato weevil has an Achilles heel: it is flightless.

"Erecting a simple plastic barrier just 30-50 centimeters high and 10 centimeters into the ground is very effective in stopping weevil migration to potato fields and consequently tuber damage," explained CIP entomologist Jürgen Kroschel. "What's more, it's an idea that has been tested collaboratively with local farmers to assess its impact, ease of use and acceptability."

Under CIP's integrated pest management program, more than 60 individual field experiments were carried out over 4 years with farmers in the high Andean villages of Nuñunhuayo and Aymara. The experiments set out to determine the efficiency of plastic barriers, farmer receptivity and the potential economic benefits to farmers.

The results are very positive. Barriers were found to reduce Andean potato weevil damage by up to 70% more than did insecticide applications. They were tested against other Andean weevil species in locations throughout Peru, Bolivia, and

Ecuador and, in all cases, were found to be equally as effective as insecticides or more so.

Comparing increased yields and higher prices for undamaged tubers to costs, the plastic barriers proved to be an excellent investment. Average net benefits for farmers were US\$147 per hectare in one of the test villages and \$807 per hectare in the other.

Local opinion on the alternative technology was very positive. More than 90% of the farmers participating in the project considered the barriers a very useful and easy-to-install tool, and they were interested in promoting them further among other farmers. Farmers are now being encouraged to experiment with the barriers, expanding their use in communal rotation systems. The technology is being taken up by national agricultural institutes in Peru to further promote its use in smallholder agriculture.

Farmers are not the only ones to benefit, as there are important environmental and biodiversity dividends.

Not surprisingly, the method scores high on the environmental impact quotient (EIQ). The EIQ uses a formula to calculate the impact of a pesticide on wildlife, farmers, consumers and agroecologies. Including fungicide applications for the control of late blight disease, the EIQ of 32.9 for the plastic barriers was less than a fifth of the EIQ of 191.5 recorded for farmers' traditional spraying practices. The plastic sheeting is good for at least two seasons, after which it can be recycled.

"The plastic barriers reduce the weevil population enormously," said Kroschel. "So if an entire village applies this method for several seasons, we can effectively minimize the weevil population and ultimately could get to a point where farmers can produce potatoes without needing any special weevil control."

Also important is the technology's potential impact on insect biodiversity. The application of broad-spectrum insecticides affects not only weevils but also their natural enemies, upsetting species' natural balance and diversity. Prolonged insecticide use in the Andes has degraded populations of parasitoid and predator insect species, such as ladybirds and hoverflies, which help control other potato pest populations such as potato tuber moth and aphids.

"We study how we can influence agricultural systems by bringing in more biodiversity to augment natural enemies and get a more stabilized agroecosystem," explained Kroschel. "The plastic barrier is a simple but effective tool that we can use toward that goal."



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Start Small to Win Big

Payment schemes to reduce carbon emissions from deforestation in the Brazilian Amazon are most likely to fly high if they target smallholders Worldwide, at least 40% of rainforests have been destroyed in the past 30 years. The Brazilian Amazon is a principal candidate to reduce emissions from deforestation and forest degradation (REDD), because it contains most of the globe's largest remaining tracts of rainforest and suffers the world's largest forest loss every year in absolute terms. This is important for climate change, because up to one-fifth of global carbon emissions annually come from land-use change such as clearing forests for agriculture.



Targeting payments to smallholders may not only be an effective way to implement REDD in Brazil but also a pro-poor short-term bet for pilot payment schemes designed to reduce carbon emissions. Photo: CIFOR.

According to the Brazilian National Institute for Space Research, between 2000 and 2005 roughly 13 million hectares of Brazilian Amazon forest were felled. Reducing the carbon emissions associated with continuing deforestation of this kind may secure important side benefits, such as conserving biodiversity and cultural values as well as regulating the regional climate.

Owners of relatively large tracts of land, thought to be responsible for 80% of current deforestation in the Brazilian Amazon, would be the biggest financial beneficiaries if direct payments were used to curb emissions of greenhouse gases from forests. This is according to a new study by researchers in the Center for International Forestry Research (CIFOR) and their partners.

"When four-fifths of a major environmental problem is caused by large landholders, then any solution will have to provide some compensation to this group for their losses," said Sven Wunder, a CIFOR scientist and coauthor of *Direct Conservation Payments in the Brazilian Amazon: Scope and Equity Implications*, which was published this year in the journal *Ecological Economics*. "And if that achieves the desired emission reductions, perhaps it's a necessary evil."

The research team estimated that an investment of US\$6 billion in REDD could halve the forest loss projected between 2008 and 2019 in the Brazilian Amazon. This would conserve about 12.5 million hectares, an area more than half the size of the United Kingdom.

If direct payments for avoided deforestation were targeted to areas with high historical deforestation rates, the study finds that a large share would go to



owners of large holdings measuring 100 hectares or more. Yet, the authors emphasize that three-quarters of future deforestation will take place in areas that have ill-defined or insecure tenure, mainly on unclassified public lands or private land without clear boundaries or inside strictly protected areas – conditions under which payment schemes are often ineffective. Only a quarter of future deforestation is projected to occur in indigenous territories, sustainable use areas, and land reform settlements, in which farmers can legally negotiate forest use rights.

“The land-tenure chaos represents the single largest impediment for using on-the-ground payments to implement REDD in Brazil on a large scale,” says Jan Börner, a CIFOR scientist and coauthor of the study. This is because many big players have only shaky claims to the forestlands they operate on. Targeting payments to smallholders may thus be not only an effective, but also a pro-poor short-term bet for pilot payment schemes designed to reduce carbon emissions, the authors suggest. Further investments in land tenure regulation and improved enforcement of forest conservation laws will be needed before direct payments can be introduced at larger scales.

The research was funded largely by the Brazilian Ministry of Environment, with additional support from the German Gesellschaft für Technische Zusammenarbeit, European Union, and Centrum für Internationale Migration und Entwicklung.



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'Remember Me?'

Mealybug pests followed cassava from South America to Southeast Asia, and now a parasitic wasp is tagging along to hold the mealybug population in check.

At the start of a carefully crafted emergency campaign to thwart a pest outbreak that is wreaking havoc on Thailand's vital cassava crop, agricultural researchers are releasing parasitic wasps, the pest's most effective natural enemy, in the eastern part of the country.



Mealybugs on cassava crops in northeastern Thailand. Photo: Neil Palmer / CIAT.

Thailand accounts for more than 90% of global exports of this tropical root crop, which is critical for food security and economic growth in many developing countries. About 5 million growers across Southeast Asia supply cassava to domestic and foreign processors, which extract starch from the roots for a wide variety of food and other products and also convert them into animal feed and biofuel.

"Cassava is an important crop for small-scale farmers in our country, so there's no time to lose in applying the fastest, most reliable solution available, which is biological control using the parasitic wasp species *Anagyrus lopezi*," said Amporn Winotai, a senior entomologist in Thailand's Department of Agriculture.

The cassava pest, a mealybug (*Phenacoccus manihoti*) originating in South America, sucks sap from the plants, causing them to shrivel. Cassava is itself a South American native, carried by Portuguese traders to Africa and Asia, where it thrived in the absence of the insect pests that inhabit its home territory.



The Anagyrus lopezi wasp is a tiny but highly effective cassava mealybug parasitoid native to South America. Photo: Georg Goergen/IITA.

But, eventually, the mealybug and other pests caught up with cassava, devastating crops first in sub-Saharan Africa and now in Southeast Asia. The spread of *P. manihoti* has been confirmed on 160,000 hectares in eastern and northeastern Thailand, where the pest is cutting yields by as much as half.

"Since the country's cassava industry generates about US\$1.5 billion of income each year, reductions of that magnitude could translate into hundreds of millions of dollars in economic losses if the pest is allowed to spread further," said Tin Maung Aye, an agronomist with the International Center for Tropical Agriculture (CIAT by its Spanish abbreviation).

In mounting the emergency campaign, Thai scientists consulted with the International Institute of Tropical Agriculture (IITA) and CIAT. These two Centers and various partner organizations curbed mealybug attacks on Africa's cassava crop during the 1980s through a highly successful biocontrol campaign, which staved off a major food security catastrophe, according to IITA entomologist Georg Goergen, who took a colony of live wasps from Benin to Bangkok last year for mass rearing.

Identifying *P. manihoti* in Thailand was at first complicated, Goergen reported, by its resemblance to another, closely related mealybug species, *P. madeirensis*, which is probably also from South America but poses no threat to cassava.

Within a year after confirming the presence of *P. manihoti*, Winotai recounted, her team had arranged to import the parasitic wasps, following strict quarantine procedures. They then carried out mass multiplication and controlled field testing. "The results convinced us that it was time to begin releasing the wasp on a large scale to contain the damage as soon as possible," she added.

Early on, researchers discarded the option of containing the mealybug in Thailand with pesticides. "Applying chemicals on such a large scale would be environmental vandalism," said Tony Bellotti, a CIAT entomologist, who has spent 35 years investigating cassava pests. "Sending in the wasps is a proven way to kill mealybugs quickly and effectively."

Measuring just 2 millimeters in length, *A. lopezi* has already shown itself to be a formidable natural enemy of the cassava mealybug in South America and sub-Saharan Africa. Even when infestations are low, female wasps are able to detect and home in on their prey, injecting their eggs into the mealybugs. As the wasp larvae grow and as adult females feed on the host insect, the mealybug population starts to decline. The wasps pose no threat to humans or other animals.

A. lopezi proved so effective in sub-Saharan Africa that Hans Herren, the scientist who led the biocontrol effort there, was awarded the World Food Prize in 1995. The collaborative effort also earned IITA and CIAT the CGIAR's 1990 King Baudouin Award, which recognizes outstanding contributions to agriculture in developing countries. The economic benefits from biocontrol of the cassava mealybug exceeded the research investment by a factor of at least 200.

CIAT scientists are investigating reports that the cassava mealybug has already spread to Cambodia, Laos and Vietnam. Bellotti expects that it will soon



reach other parts of Southeast Asia as well, including Myanmar, southern China, and, eventually, Indonesia and the Philippines.



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Modulation to Minor

Scientists fighting the epidemic of Ug99 wheat stem rust aim to breed durable resistance by shifting from major to minor resistance genes — again and again.

Since its identification 11 years ago in Uganda (hence its name), Ug99 has energized governments and scientists to protect wheat crops from this virulent stem rust pathogen. In 2008, several countries began producing seed of new, rust-resistant wheat varieties for distribution to farmers. Agricultural experts hope these high-yielding varieties will be in farmers' fields by 2011, providing a buffer against Ug99.

Stem rust is an old foe. Norman Borlaug, the late Nobel Peace Prize winner and father of the Green Revolution, battled this fungal disease in the 1950s. After years of painstaking plant breeding, he and his team endowed improved wheat varieties with rust resistance. The most popular source of resistance, the gene *Sr31*, was later bred into most of the world's wheat. This resistance held for decades, and wheat crops flourished. Many thought stem rust was defeated, so research and funding shifted to other priorities.

But now rust is back — and mutating. Four new strains able to overcome previous forms of genetic resistance have crept into wheat fields, causing international alarm, according to Ravi Singh, a distinguished geneticist and pathologist with the International Maize and Wheat Improvement Center (CIMMYT by its Spanish abbreviation). "Ug99 and its four new variants now threaten major wheat growing areas on every continent," said Singh. "Eighty percent of cultivated wheat varieties worldwide are susceptible."



Within a decade of the emergence of Ug99, its deadly spores had moved into Kenya, Ethiopia, Sudan, Yemen and Iran. A damaging race of Ug99 has recently surfaced in South Africa. Photo: CIMMYT.

Experts have feared that massive global crop losses to Ug99 could undermine food security. Within a decade of the emergence of Ug99, its deadly spores had moved into Kenya, Ethiopia, Sudan, Yemen and Iran. A damaging race of Ug99 has recently surfaced in South Africa.

In response to this diverse and evolving pathogen, scientists have sought new and varied sources of resistance as part of a global initiative to fight rust. National governments have sped seed multiplication, varietal testing and approval procedures.

Experts at the Kenya Agricultural Research Institute and the Ethiopian Institute of Agricultural Research have performed a remarkable service by helping to screen each year thousands of experimental wheat lines received from breeding programs

worldwide that were exposed to severe, natural infections of Ug99.

Efforts are starting to pay off. The [Borlaug Global Rust Initiative \(BGRI\)](#) was launched in 2005 to provide a common venue for the world's wheat and rust experts to exchange information about the disease and its movements, as well as about resistant wheat lines.

At a recent meeting, BGRI participants discussed several countries' progress in producing resistant seed. Sources included resistant lines from CIMMYT, the [International Center for Agricultural Research in the Dry Areas](#) and, in some instances, participating countries' own breeding programs or commercial suppliers. New stocks of resistant seed should be ready for distribution to farmers by 2011, significantly shortening the 10 years it usually takes for a new variety to be tested and made available.

Iran's national Seed and Plant Improvement Institute has released six wheat cultivars, five of bread wheat and one of durum, that resist Ug99, reported M.R. Jalal Kamali, a senior CIMMYT-Iran wheat scientist. Iran is expected to account for 95% of the Ug99-resistant wheat seed produced in seed multiplication efforts, according to Kamali.

Once established, the new rust resistance promised to be more durable than the old. Rust resistance has historically been based on single major genes that block the spores' entry into plant tissue. This type of resistance is highly effective in the short term but sets the stage for its own downfall by creating strong evolutionary pressure that favors more virulent rust mutants. Modern minor resistance genes offer only partial protection. They are harder to breed for, because their presence is less visible in field experiments, but most wheat experts agree that they offer better crop security.

"With minor genes, the disease is not eliminated, but its attack on the plant is slowed," explains Singh. "Like the code for a combination lock, several minor genes in tandem in the same variety are hard for the pathogen to 'decipher' and provide more durable resistance. CIMMYT's strategy has been to identify and breed minor genes into wheat varieties as well as assisting partners in this challenging task."

CIMMYT's work to develop and disseminate wheat varieties with stem rust resistance receives support from the Borlaug Global Rust Initiative; governments of Australia, India, Switzerland and the USA; Bill & Melinda Gates Foundation; Syngenta Foundation; Fundación Produce-Mexico; and Arab Fund for Economic and Social Development.



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A Safe Investment

Aflasafe® is a win-win formula for African farmers and investors that uses otherwise harmless fungi to control those that produce deadly aflatoxins in maize and peanut.

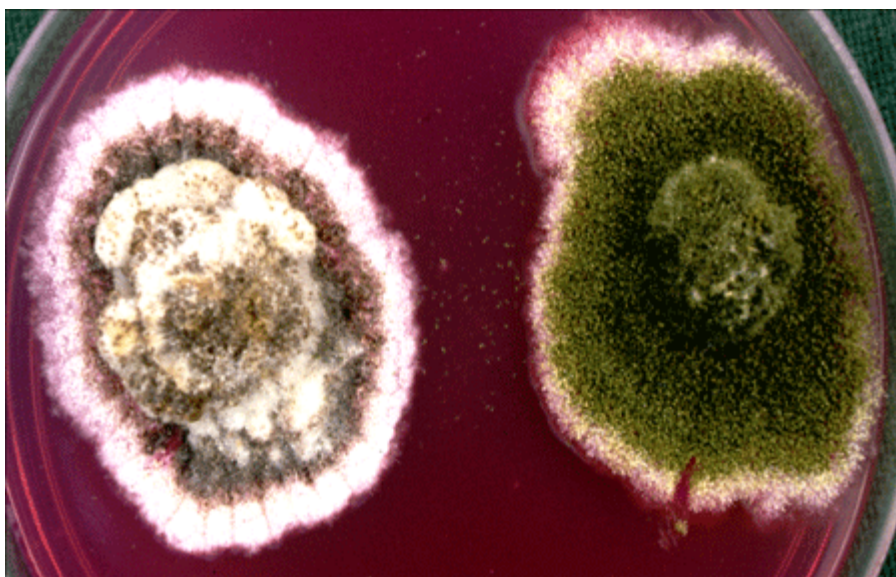
The biological control of aflatoxins using aflasafe® has rekindled hopes of a brighter future for African farmers battling crop contamination even as it opened doors for the private sector looking to invest in a winning formula in the continent's agriculture sector.

The aflasafe® technology, which uses "good" fungus to fight the "bad" ones, has provided relief to hundreds of maize farmers in northern Nigeria, a region where more than 70% of the population depend on agriculture for at least part of their livelihood.



A Nigerian maize farmer with a container of aflasafe® ready for application in his field. Photo: R. Bandyopadhyay/IITA.

In 2009, participating Nigerian farmers in field trials using aflasafe® reduced contamination by about 80%, according to research by the International Institute of Tropical Agriculture (IITA). IITA developed aflasafe® in collaboration with the African Agricultural Technology Foundation and the Agriculture Research Service of the United States Department of Agriculture and has provisionally registered the brand name in Nigeria.



Agricultural products are infected by a complex community of aflatoxin-producing fungi. Toxigenic strains in the community (left) produce a large amount of aflatoxins, while atoxigenic strains (right) produce none. Through biological control, natural fungal diversity reduces aflatoxin contamination by displacing toxigenic strains with carefully selected atoxigenic strains that are indigenous, safe and biocompetitive. Photo: Peter Cotty/USDA-ARS.

Work is underway to identify native strains of good fungus in Burkina Faso, Kenya and Senegal to produce local formulas of aflasafe® that are adapted to the unique conditions of those countries. Consequently, results of efficacy tests of the product have opened a window of opportunity for the private sector.

“The approach is the best method of controlling aflatoxins,” said Dotun Oladele, a senior laboratory technology manager with Animal Care Consults during a United Nations Industrial Development Organization (UNIDO)-convened meeting with the private sector in Lagos that offered IITA the chance to introduce aflasafe®.

Produced by the fungus *Aspergillus flavus*, aflatoxins raise barriers to the domestic and international trade of maize and peanuts in sub-Saharan Africa because of contaminated grains. Worse, the contaminated grains are carcinogenic, posing dangers to humans and livestock alike.

“Aflatoxin contamination in grains is a major problem but is unknown to many poultry farmers,” explained Oladele. “When it attacks, some farmers assume it to be spiritual in nature. Once aflatoxicosis sets in, egg production drops then poultry die in large numbers soon after.”

Representatives of local investors under the aegis of the Nigeria Economic Summit Group and the New Partnership for Africa’s Development (NEPAD) Business Group commended the technology and promised to sell the business model to their members with a view to finding an investor.

“We know of a lot of people that will be interested in this technology and that have the capability to galvanize this idea into manufacturing,” said A.A. Roberts, executive secretary and chief executive officer of the NEPAD Business Group-Nigeria.

According to Ranajit Bandyopadhyay, IITA plant pathologist, and Irmgard Hoeschle-Zeledon, coordinator of the CGIAR’s Systemwide Program on Integrated Pest Management, an initial investment of US\$1-3 million in an aflasafe® manufacturing plant is likely to reap investors about N20 million (\$1.33 million) annually.

Bandyopadhyay indicated that an investment in an aflasafe® manufacturing plant in Nigeria would pay off considering the huge demand for quality maize in the country and its neighbors.

He estimated that over 60% of maize harvested in Nigeria currently has high levels of aflatoxins and is at risk to being rejected by the feed industry.

“This makes investment in this technology highly viable, not only for profit but also to improve the health of the people,” he added.



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Rice Plus

Modern farmers should preserve their rice lands' diverse terrestrial, semi-aquatic and aquatic plants and animals that contribute nutrition, medicines and income.

Rice fields are important for both rice production and the great biodiversity they possess. Paddy landscapes parallel some of the most diverse natural ecosystems on earth, harboring more than 100 useful plant species and an enormous diversity of insects, fish, invertebrates, birds and small mammals. This biodiversity is essential to the livelihood of poor farmers, who depend on it as a free source of food, medicine, building materials, fuel and fodder, as well as for manufacturing domestic tools, utensils and handicrafts. Biodiversity in agricultural landscapes is also vital to regulating ecosystem processes and practicing integrated pest management — and so to the sustainability of the production.



Field ditches and water ponds provide aquatic habitats for wildlife.
Photo: Paul Peters.

The collection and consumption of wild food plants from agricultural fields have been documented in many cultures, illustrating their importance to farming households in agrarian societies around the world. Wild food plants are critical sources of nutrients, flavorings and medicines. They even serve as famine food in times of scarcity. Such plants help balance the diet of the rural poor, especially toward meeting the nutritional needs of children and women.

In northeast Thailand, the poorest region of the country, wild food plants from rice fields are essential to farm households' food security. Farmers in this region also harvest insects, fish, birds, frogs, crabs, snails and rats from their fields for inclusion in their diet. Wild food plants and animals are important ingredients of local dishes and the culinary tradition of this region. Many poor farmers, especially women, gather them to sell for cash.



Wild food plants such as the water lily abound in northeast Thailand. Photo: Gisella Cruz García.

Traditional rice farmers maintain diverse aquatic, semi-aquatic, and terrestrial habitats that are ecologically intertwined. Hillocks, shelters, pond margins, roadsides and tree rows are examples of terrestrial habitats. Paddies can be dry or flooded depending on the season and access to irrigation, whilst ponds provide aquatic habitats. The distribution of plant diversity in these habitats is not only related to the species' water tolerance and life cycle, but also to the different degrees of management they have. The way traditional farmers manage rice landscapes and wild food plants is towards preserving and encouraging wild species valued as food or that have multiple uses.

This situation is different in central Thailand, where rice production has long since more intensive and the landscape more homogeneous. Rice landscapes there have fewer biodiversity-rich habitats such as ponds, hillocks, tree rows and shelters than in northeast Thailand. The brown planthopper outbreak in 2010 affected the central plains so badly because the natural enemies to the hopper had disappeared, according to K.L. Heong, an expert in integrated pest management at the International Rice Research Institute.

In a village in Kalasin Province in northeast Thailand, more than 80 wild food plants are consumed. Yet agronomists traditionally regard 30% of the herbs, shrubs, vines and trees that grow in the diverse habitats of the rice landscape as weeds and urge their removal. Furthermore, in the last 20 years, the intensification of agriculture, introduction of agrochemicals and mechanization, migration of the young to urban areas for jobs, and deforestation threaten the availability of wild food plants.

Farmers know that wild food plants from rice fields are likely to be contaminated by agrochemicals, especially pesticides. To cope, most farmers do not collect wild food plants during the 3 weeks following pesticide application. Some keep separate fields of rice and wild food plants for their own consumption where they do not use pesticides at all.

Labor shortages caused by out-migration encourage mechanization, which tends to homogenize landscapes to facilitate the use of tractors. This eliminates many habitats such as hillocks that harbor diverse useful vegetables, fruit trees, vines and insects. Young people's migration away from rural areas also disrupts the handing down of knowledge about identifying, managing and preparing wild foods. Further, children's food preferences are shifting to vegetables consumed more commonly in cities, such as cucumbers, tomatoes, cabbage and carrots.

Given the importance of wild foods harvested from rice landscapes, trends toward the loss of biodiversity and traditional knowledge are alarming. To preserve wild food as a resource for local communities and maximize their benefits for poor rural households, a holistic and integrated approach to managing rice landscapes is vital.





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Diverse Approaches

A multipronged strategy applies an array of technologies, from germplasm conservation to geographic information systems, to stem biodiversity loss

The word "biodiversity," coined as recently as 1985, means the sum of all plant and animal variety in a certain environment. This raises questions about the interdependence of species: If one species is removed, what are the repercussions for those that remain? What are the forces that contribute to the loss of biodiversity? What measures are we taking to arrest human forces such as careless use of weed killers, deforestation and the ceaseless march of urbanization into farm and grazing lands?

To draw attention to the issue and spur solutions to meet the challenge, the United Nations has declared 2010 to be the International Year of Biodiversity.

For several years in the past, the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) focused its research on five mandate crops. Current awareness has steered the Institute toward a more holistic mission. ICRISAT's approach to preserving biodiversity is multipronged, as it entails conserving genetic resources, diversifying the uses of its mandate crops, expanding its mandate, developing farmer-friendly pest-management strategies, and employing modern tools such as geographic information systems to track the spread of land erosion and degradation to protect threatened areas and salvage areas already affected.



Fruit tree species, such as the *Ziziphus mauritiana* (Pomme du Sahel), can multiply farm incomes for dryland farmers in the Sahel. Photo: ICRISAT.

ICRISAT operates a genebank that, under a treaty with the Food and Agriculture Organization of the United Nations, makes it the custodian of germplasm accessions of its five mandate crops and six small millets gathered in 144 countries, with 90% of these 119,000-plus accessions conserved in long-term storage. ICRISAT conserves duplicate samples at the Svalbard Global Seed Vault in Norway. Crop varieties under the ICRISAT mandate are safe, secure and freely available for all to use.

In addition to the germplasm of crop landraces, ICRISAT conserves that of wild relatives of its mandate crops. This allows crop breeders to use wide crosses to capture special traits found in the wild relatives toward the development of improved crop varieties with better ability to withstand drought, pests and disease.

Good examples are the resistance built into improved groundnut against late leaf

spot, rosette diseases and the tobacco army worm. A history-making pigeonpea hybrid was developed using cytoplasmic male sterility techniques applied to genes from wild pigeonpea, as were improved pigeonpea varieties with high protein content, dwarf growth to channel nutrients into grain production, and resistance to *Helicoverpa* moth larvae.

ICRISAT's work on crop diversification has three objectives: improving the livelihood options of the farmer, effectively using scarce water resources, and strengthening sustainability.

Crops such as pearl millet, sorghum and groundnut are used for human consumption, and their stems and leaves make excellent fodder. Sorghum and pearl millet grains are now used as poultry feed and in the brewing industry. Sweet sorghum is a super crop, as its grain is used for food, juice from its stems is used to make ethanol, and the residue from the crushed stems and leaves is used as livestock fodder.



African market gardens add to the incomes of farmers, especially women. Photo: ICRISAT.

Biodiesel tree crop such as *jatropha* and *pongamia* can grow on degraded lands. Besides the immediate financial benefits from the sale of their oil-bearing seeds, they strengthen the capacity of the degraded land to retain water, thereby helping farmers to cultivate higher-value medicinal and aromatic crops nearby.

Small irrigated plots in mostly rainfed areas of West and Central Africa, known as African market gardens, are used for growing vegetables that add to the incomes of farmers, especially women. ICRISAT and the World Vegetable Center work with these farmers to alleviate poverty and malnutrition through the production of these vegetables.

ICRISAT entomologists have researched eco-friendly methods of protecting crops from insect pests, chiefly *Helicoverpa armigera*. Solutions include manually shaking infested plants to dislodge pests and the manufacture of the nuclear polyhedrosis virus as a bio-pesticide. ICRISAT has developed other eco-friendly bio-pesticides and studied the effects of insecticides on untargeted insects.

ICRISAT and the International Livestock Research Institute jointly research livestock fodder derived from sorghum, pearl millet and groundnut. In Zimbabwe, ICRISAT works with goat farmers to promote livestock production through improved feed, animal health and marketing.

ICRISAT focuses on promoting sustainable rural livelihoods that capitalize on the integration of crop production, agroforestry, livestock improvement, horticulture, silviculture and bio-energy. ICRISAT deeply appreciates the partnerships involved in its mission and is grateful to individuals and institutes who complement its efforts.

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An Update on Media Coverage of CGIAR Research

Diverse stories on major research breakthroughs maintain the CGIAR's high media profile

To add further momentum to the CGIAR's collective efforts in media outreach during 2010, the Fund Office and Burness Communications (a private firm with which the CGIAR has a longstanding relationship) organized a 2-day story development workshop, the third such event to be held since 2007. Taking place at the headquarters of Bioversity International near Rome, the workshop brought together a dozen communications professionals from nine Centers plus the Global Forum on Agricultural Research.

In addition to a series of practical skills-building sessions, the program included a stimulating dialogue with three high-profile reporters from major media, who offered a helpful take on the news value of current CGIAR stories, on general media interest in agriculture and on recent trends in print journalism that impinge on the CGIAR's media outreach.

The workshop resulted in about a dozen strong story ideas, three of which have already been developed and promoted with the media; an additional three are now in the works. Following are brief reports on the results of the media outreach done so far in follow-up to the workshop.

A paradigm shift in rice research for Africa

A story promoted in advance of the International Day of Biodiversity on May 22, dealt with recent research at the Africa Rice Center that gives "elite status" to genetically diverse varieties of African rice (*Oryza glaberrima*) in efforts to raise yields in farmers' fields. The new research counters the widely held view that, African rice, preferred by local consumers for its taste and cultural significance, is inherently lower yielding than Asian rice.

The promotion resulted in stories by several major news agencies (including Associated Press, Reuters and EFE), which led in turn to extensive online coverage on more than 30 news websites, such as CNBC, Forbes and *Scientific American* Online. In addition, BBC World Service and Voice of America aired stories in French, and a West Africa correspondent for Agence France-Presse visited the Center to interview scientists and farmers.

New wave of interest in wheat stem rust

The ongoing struggle to ward off epidemics resulting from the fast-moving and mutating Ug99 race of the wheat stem rust pathogen continues to hold the attention of major news media around the world. That much was clear from a story promotion carried out in May by the Borlaug Global Rust Initiative (coordinated from Cornell University in the USA), International Maize and Wheat Improvement Center and International Center for Agricultural Research in the Dry Areas, with support from Burness Communications.

Centering on new findings presented at a technical workshop held in St. Petersburg, Russia, the outreach resulted in major print, radio and online coverage. Highlights included wire service stories in four languages, a piece on the homepage of BBC World Service and articles in print media, such as *Le Figaro* in France, *Die Tageszeitung* in Germany and the *Financial Times* in the UK.

African antidote for aflatoxin

In June, the Fund Office/Burness team supported communications colleagues at the International Institute of Tropical Agriculture (IITA) in promoting a story about a novel approach to biological control of the fungus (*Aspergillus flavus*) producing



aflatoxin, which poses a major health and economic problem in Africa. The technology involves releasing local strains of the fungus that do not produce aflatoxin, which then compete with and drastically reduce the poison-producing strains.

This story prompted considerable online coverage as well as a Voice of America story and articles in several major African daily newspapers, such as Kenya's *Daily Nation*.

A sting operation in Thailand

Classical biological control of the cassava mealybug across sub-Saharan Africa more than two decades ago generated immense economic benefits, while illustrating dramatically why collaborative international research is important. Now, Thai scientists are acting out this drama once more by introducing the same species of parasitic wasp that worked in Africa to subdue a major outbreak of cassava mealybug in their country, with technical advice from IITA and CIAT.

A July story on this new "sting operation" gave rise to widespread coverage in prominent news outlets around the world. Highlights included stories by several news agencies (for example, Reuters, Agence France-Presse and Associated Press) as well as original stories by the *New York Times* and *Science* and *New Scientist* magazines.



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An Update on Implementation of CGIAR Reform

Steady progress continues in implementing CGIAR reform. In recent months the Consortium of the CGIAR Centers was formally established, the first Funders' Forum accepted the Strategy and Results Framework, and the Consortium Board and the Fund Council each held their second meeting to advance their consideration of Mega Program proposals. Inger Andersen was appointed the new Fund Council chair, and the recruitment of the Independent Science and Partnership Council continued. Soon, all the elements of the new CGIAR will be in place, and new research programs will be under way.

Consortium Established

The Consortium Board met for the second time on 24-26 May in Rome, Italy, to consider, in preparation for the upcoming meetings of the Funders' Forum and the Fund Council, the Strategy and Results Framework, Mega Program concept notes, and proposals for fast-tracked Mega Programs. The Consortium Board submitted one Mega Program, the Global Rice Science Partnership, to the Fund Council for its consideration, approved the development of an additional 11 Mega Program proposals, and commissioned two scoping studies on gender and crosscutting issues regarding genetic resources.

By June 2010, all 15 CGIAR Centers had signed the Constitution of the Consortium of the CGIAR Centers, officially establishing this new body. In May, with the Consortium soon to be established, its predecessor, the Alliance of the CGIAR Centers, held its final meeting and officially disbanded. The personnel of the former Alliance Office now act as the interim Consortium Office.

The search and selection process for the Consortium chief executive officer (CEO) is under way, with the announcement of the CEO anticipated in early September. Prospective host countries have all submitted bids to host the Consortium Office, and a decision on its location — in Addis Ababa, Ethiopia; Montpellier, France; New Delhi, India; Rome, Italy; or Nairobi, Kenya — is expected in late August or early September. The Consortium is seeking the status of an international organization with its own legal standing under international law and hopes that this status can be secured in 3-6 months.

Inaugural Funders' Forum and Second Fund Council Meeting Held

The inaugural CGIAR Funders' Forum took place on 15 July 2010 in Rome, Italy, in conjunction with the second CGIAR Fund Council meeting on 14 and 16 July. The Funders' Forum brings together all CGIAR donors biennially with the Board of the Consortium of the CGIAR Centers, the leadership of individual Centers and other stakeholders to discuss strategy and common issues. The Fund Council, the decision-making body of the CGIAR Fund, meets twice annually to decide on issues related to the research portfolio and fund allocation and to monitor research and system performance.

A key item on the Funders' Forum agenda was to consider the new Strategy and Results Framework for the CGIAR submitted by the Consortium Board. The forum accepted the framework as a work in progress, but Forum participants agreed on the need for a stronger, more visionary strategy that better articulates what the new CGIAR can achieve, positions the CGIAR within the broader agricultural research community, and provides a solid foundation for developing the Mega Program portfolio. The Consortium Board is leading the revision of the strategy, which will be resubmitted to donors for final endorsement by January 2011. While the strategy is being revised, the development of the Mega Program portfolio will continue, with the approval of Mega Program proposals contingent on the Forum's final endorsement of the Strategy and Results Framework. [Click here for meeting documents from the Funders' Forum.](#)

The Fund Council considered the first of four fast-tracked Mega Program proposals,

the Global Rice Science Partnership, but was unable to complete a thorough review or decide on the proposal, as members did not receive the proposal sufficiently in advance of the meeting. The Consortium is developing three more fast-tracked Mega Program proposals — on climate change, maize and wheat — for submission to the Fund Council, which anticipates reviewing them for final decision when it next meets in November 2010. [Click here for meeting documents from the Fund Council.](#)

New CGIAR Fund Council Chair Appointed

Chairing the Funders' Forum and Fund Council meetings in July 2010 were Katherine Sierra's final acts as CGIAR Fund Council chair. The Fund Council unanimously approved Inger Andersen, World Bank vice president for sustainable development, as the new CGIAR Fund Council chair. In the video interview linked immediately below, Andersen describes her work experience in Africa and the Middle East, as well as her perspective on the importance of strengthening the links between research and delivery to improve the livelihoods of smallholder farm families. [Link to video.](#)

CGIAR Fund Establishment Advanced

Progress continues toward establishing the legal framework for the CGIAR Fund through the development of two documents: The CGIAR Fund Governance Framework addresses a number of accountability and operational points, and the contribution agreement between each donor and the World Bank, in its role as trustee, is a template that sets forth the specific modalities of donor contributions and trustee services for the CGIAR Fund as they affect the signatories. An overarching legal document linking the various elements of the new CGIAR system will be explored in the coming weeks. Funding for the CGIAR in 2011 is anticipated to build on the historical upward trajectory of contributions, with total funding to the CGIAR in 2010 and 2011 increasing steadily beyond the 2009 level of US\$606 million. In 2011, an estimated US\$360 million will be channeled through the new CGIAR Fund.

Independent Science and Partnership Council Being Recruited

The Independent Science and Partnership Council is currently being recruited. The council will consist of a chair, four regular members, and the chair of the Standing Panel on Impact Assessment as an additional ex-officio member. The council will provide independent scientific advice and expertise to the Fund Council and the Funders' Forum. More broadly, it will play a vital role in strengthening the productivity and quality of science in the new CGIAR, catalyzing scientific partnerships with other agricultural research institutions, and supporting the CGIAR's important role as an honest broker in global debates.

To learn more about CGIAR reform, visit <http://www.cgiar.org/changemanagement/index.html>.



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