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Cassava under threat

Pest and disease outbreaks put SE Asia on high alert

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The move follows a CIAT investigation into reports from Thailand's eastern and northeastern regions, of damaged and stunted cassava plants with low root yields.

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CIAT entomologist, Dr Tony Bellotti, was part of the investigation team that traveled from CIAT headquarters in Colombia to the region: "When we arrived at the plantations in Thailand, I was stunned. Straight away I realized we've got real problems."

A drive around the Korat region, about 3 hours from the capital, Bangkok, confirmed the worst: the road was flanked by field-after-field of affected plants.

One troubling discovery was the large number of mealybugs—well-known cassava pests in Latin America and Africa, but rarely a problem for cassava producers in SE Asia. The sap-sucking insects weaken plants, resulting in leaf distortion, and lower root yields.

The Thai fields were also found to be infested by tropical whitefly and red mites, while Cassava Bacterial Blight (CBB) and Brown Leaf Spot disease were also widespread. Although seen before, none of these pest and disease problems had previously caused significant losses in Thailand.

Some analysts now predict a cut in Thai cassava output by at least 30% this season; some farmers face losses as high as 80%. Some have already abandoned their crop.

Dr Tin Maung Aye, a cassava specialist in CIAT's Asia office said: "These pests and diseases will place a huge strain on Thailand's cassava production. Not only will the incomes of smallholder farmers be greatly affected, but so will those of the many laborers employed in the cassava industry. There will be widespread economic and social implications."

Double-trouble

Then, more bad news as farmers in neighboring Vietnam began to report problems in their cassava crops. The team again found mealybugs, tropical whitefly, and red mites, but the main problems were not pests, but diseases.

"The CBB was incredible," said CIAT pathologist Dr Elizabeth Alvarez. "The disease was just oozing from the stems. I've worked with cassava for 30 years and I'd never seen anything like it."

They also found symptoms known as "Witches' Broom", still new to Vietnamese farmers. This is typified by discoloration and distortion of cassava leaves, and shortening of the branches and stems. When the affected cassava is uprooted, the roots are thinner and smaller.

Further investigations are underway, and CIAT is now investigating reports that fields in Cambodia, Laos, and the Philippines have also been affected.

"It's no surprise if these problems are spreading quickly," continued Tony Bellotti. "If the mealybug, for example, can find its way from its native Latin America, across the Atlantic to Africa, and then to Asia, it can find its way around the Mekong region and beyond.

"We can be fairly sure that China and Myanmar will be hit soon, and in time, Indonesia too," he said.

"Cassava production in SE Asia has enjoyed an extended honeymoon period. That period is now over."

Taking control

CIAT Asia is working with national partners to provide cassava management guidelines. "This is a red alert," said Tin Maung Aye. "We're still coming to terms with the scale of the problem, but without decisive action, we expect a huge slump in cassava output in SE Asia. That would be devastating for rural livelihoods in the region.

"The spread is almost certainly caused by the movement of infected planting material," Tin continued. "One of the first responses is for the authorities in affected countries to impose strict quarantine regulations on the movement of cassava, especially the stems used as planting material, and of related species, like jatropha.

"Farmers also need to be trained to select and safely store clean planting material, and to identify pests and diseases. Establishing an effective surveillance and monitoring system with a Geographic Information System (GIS) database is essential.

"We will also need to develop an Integrated Pest and Disease Management (IPDM) strategy, based primarily on biological control. With sufficient and well-focused donor support, the current attempts to develop an effective IPM strategy could be strengthened very quickly, which will help protect next season's crop. Over the medium to longer term, the biological control and IPDM strategy would be strengthened and include release of natural enemies to control pests and the insects that carry the diseases. Breeding of cassava varieties with greater pest and disease resistance would become a priority.

"As a result of generous, long-term support from The Nippon Foundation, CIAT and partners have had an extremely positive impact on cassava production in SE Asia, and the livelihoods of cassava farmers. We are therefore well-placed to provide solutions to the current pest and disease outbreaks," he continued.

"But there is no time to lose."

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CIAT's main recommendations at this stage are:

- Select pest and disease-free plants in the field for collection of stems as planting material.
- Store stems for planting in a cool, dry place, and if necessary dip in a systemic insecticide such as Thiamethoxam.
- Avoid application of foliar pesticides—they can affect beneficial biological control agents.
- Restrict the movement of cassava planting stakes, especially from infected areas and restrict the movement of related species such as jatropha.
- Train extension staff and farmers in the identification of the various pests and diseases and develop a network of trained professionals in the region and a GIS-based system to monitor pests and diseases.
- Initiate research into the identification and control of all observed pests and diseases, and their vectors.
- Initiate a breeding program to develop resistance to pests and diseases.

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Drought-tolerant beans bring relief to farmers

Millions of farmers are set to benefit from a new drought-tolerant bean variety developed jointly by CIAT and the national agricultural research program of Nicaragua.

The release of the hardy "INTA Sequia" common bean, which can survive extreme drought, coincided with last month's United Nations Climate Change Conference (COP15) in Copenhagen, Denmark, where world leaders met to discuss ways to tackle climate change and help farmers around the world adapt food production.

CIAT's new bean variety was formally released by research partner, the Nicaraguan Institute of Agricultural Technology (INTA), in parts of the country's drought-stricken Pacific Coast and central mid-altitude regions in mid-December. While the pioneering work on INTA Sequia was carried out in Central America, the improved seed will also be released elsewhere in Latin America, and in East and southern Africa other improved varieties are currently being tested.

Beans are the "meat of the poor" in many developing countries, providing dietary protein and essential micronutrients, as well as being an important source of income for small farmers. During trials, INTA Sequia was extremely popular with farmers in Nicaragua, producing significantly higher yields of better quality beans than locally-available commercial varieties grown under the same conditions. Farmers and their families also reported that INTA Sequia is delicious to eat. INTA Sequia is the first of several improved drought-tolerant bean varieties currently under development by CIAT and its partners.

Maps recently released by CIAT's Decision and Policy Analysis (DAPA) Program highlighted the potential impact of drought tolerant varieties on bean production in Africa. They showed that much of Africa's estimated 4 million hectares of bean fields are already adversely affected by rising temperatures and increasing frequency of drought linked to climate change. By 2020 as much as two-thirds of bean fields could be affected, threatening the livelihoods of around 1.75 million farming families. Over half of these areas could benefit from planting new bean varieties like INTA Sequia.

Steve Beebe, leader of CIAT's Bean Program, said: "Millions of bean farmers are under threat from climate change and the release of INTA Sequia is a major step towards adapting food production in some of the poorest countries of the world. This is a milestone for bean producers and bean scientists. Now there is no time to lose in getting the new seeds to all of the people who need them."

Through the Pan-Africa Bean Research Alliance (PABRA), CIAT and the CGIAR (Consultative Group on International Agricultural Research) are well-positioned to distribute the new variety quickly and efficiently to African farmers. CIAT's close links with research partners and government ministries in Latin America will also ensure dissemination is fast and effective.

Ongoing biofortification work across the CGIAR to increase the zinc, iron, and protein content of common beans means the drought-tolerant varieties could be further improved.

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Chayote—a CIAT/SADU success story

This edition's digital story looks at the success of CIAT Asia in improving the livelihoods of chayote farmers in Vietnam's northern uplands.

The delicious, nutritious shoots of the chayote plant are popular with wealthy diners in Hanoi. By reforming the market chain and improving the links between producers, distributors and retailers, the project has enabled farmers in the district of Tan Lac to gain a small but significant slice of the lucrative chayote trade.

Four-minutes in length, *Chayote—a CIAT/SADU* success story, gives an insight into the project and the farmers who have benefitted from it.

The SADU (Small-Scale Agroenterprise Development in the Uplands) project was funded by the Swiss Agency for Development and Cooperation (SDC).

You can read the script in English on the CIAT blog.

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Life after COP15—agriculture is part of the solution

CIAT's Andy Jarvis explains why CIAT is optimistic after COP15

As the dust settles following the United Nations' COP15 Climate Change summit last month, it is important to evaluate some of its small, but significant successes.

CIAT was present in Copenhagen, contributing to a unified message from many like-minded institutions, that agriculture must be included in any plans to address climate change.

And while the conference will be remembered for the failure of national governments to agree strict, binding limits on greenhouse gas emissions, this overshadows the progress made with respect to recognizing the role of agriculture in tackling climate change.

In short, there are reasons to be optimistic.

Part of the problem, part of the solution

There is no doubt about it, agriculture is a major part of the climate change problem. It is a net contributor to greenhouse gas emissions, primarily through livestock production and the use of chemical fertilizers, as well as through indirect contributions, such as food transportation.

But agriculture is also a significant part of the solution to climate change. There are many opportunities to reduce greenhouse gas emissions from agriculture, which at the same time enhance on-farm productivity and contribute to climate change adaptation.

These include many of the lines of work in which CIAT is directly involved, for example, the use of improved forages to improve livestock production, and better soil fertility management. Such eco-efficient practices—which CIAT strongly endorses and promotes—can significantly reduce the impact of agriculture on the environment, and the sector's future contributions to greenhouse gas emissions.

COP15's recognition of the importance of agriculture in tackling climate change is, therefore, no small achievement. Now we need to carry that momentum forward.

Adaptation—funding the future

In addition, eco-efficient agriculture can help small producers adapt effectively to the effects of climate change. Already, the rural poor in many developing countries are among the first victims, as they suffer the effects of unpredictable rains, and the increasing frequency of drought.

By improving agricultural practices and funding adaptation research and implementation, eco-efficient agriculture can both improve environmental sustainability and improve rural livelihoods.

While COP15 saw great international focus on the role of forest protection in mitigating climate change, the event also saw the pendulum swing towards the creation of an adaptation fund. At CIAT, our message is clear: any adaptation fund must give due prominence to agriculture.

We will continue to lobby strongly for this.

So, while many commentators were disappointed with some of the outcomes of COP15—and CIAT is no exception—we must not dwell on this. Instead we must continue to apply pressure, to ensure that agriculture continues to be prominent in any discussions on climate change in 2010, and that COP16 in Mexico City in November makes up for the shortcomings of COP15, and builds on some of its under-reported achievements.

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While in Copenhagen, CIAT launched its "adaptation road map" concept, which we are using to evaluate the most appropriate actions for confronting climate change in developing countries. The flyers are available here. We have already completed our first national study of agriculture and climate change in Laos and we will soon issue one for Colombia, and one for Thailand later in the year.

- Read what The Economist made of the importance of agriculture at COP15 here.
- For more information about the COP15 side event Agriculture & Rural Development Day (ARDD), see here.
- For CIAT pictures from COP15, ARDD, and Forest Day, see the Flickr set here.
- For the CGIAR's coverage of COP15 and the associated side events, see here.

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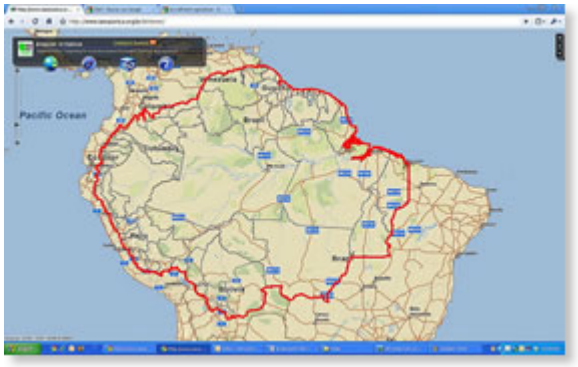
Interactive Amazon map could help protect rainforest



A new online tool for studying land-use in the Amazon could help decision makers and researchers design incentive-based approaches for managing the region's ecosystem services.

Developed by CIAT and the World Agroforestry Centre (ICRAF), the Amazon Initiative Interactive Map Server, is the first freely-available web-based application of its kind. By using satellite imagery and digital geographic information, it allows users to select specific areas of the Amazon and retrieve information about population density, biodiversity, land cover, and rates of forest loss.

Crucially, the application helps users to estimate the opportunity cost of Reducing Emissions from Deforestation and Forest Degradation (REDD) in a user-defined area, placing a monetary value on forest conservation. This can be used to calculate the cost of carbon offsetting.

The tool also calculates simulated future deforestation rates, biomass density, and other factors related to sustainable development. This means it could be particularly useful for REDD project developers, by helping to locate pressure on forests and their causes, and the impact on carbon storage and other ecosystem services. These issues were central to REDD debates at last month's United Nations Climate Change Conference (COP15) in Copenhagen, Denmark.

Glenn Hyman, of CIAT's Decision and Policy Analysis (DAPA) Program and the World Bank-funded Amazon Initiative is delighted by the release of the trial version of the application, which took scientists at CIAT, ICRAF, and other partner organizations 6 months to develop. "This is the first application that puts this type of analysis online in an easy-to-use format," he said. "Its beauty is its simplicity. There is no software to download and you don't have to be a GIS expert or economic modeler—all you need is a web browser."

According to Jan Börner, an agricultural economist for the Amazon Initiative: "During the last 3 years we have been involved in several studies dealing with the biophysical and socio-economic determinants of effective ecosystem service management in the Amazon for both governments and international donors. This tool provides access to the data and basic methodological approaches used during this work. We encourage user feedback from our online forum in order to better tailor the application to their needs."

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Quickstart guide. Upon entering the site, users can select one of four options. First-time users should read the Online Help before they get started. They can also visit the Amazon Initiative online forum discussing the tool. A third option allows users to provide feedback to the Amazon Initiative and the developers of this application by filling out a short survey. Finally, users can dive straight in and get started using the application.

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Unlocking the potential of grassland

Better use of tropical grasslands could be as effective in the fight against hunger as investment in irrigation schemes, and could also help to protect the environment. The findings come from the first phase of the CGIAR Challenge Program on Water and Food (CPWF), which was completed in December.

The CPWF's Basin Focal Projects studied water use in 10 major river basins, including the Nile, Ganges, and Mekong to see how to improve water productivity—the amount of water required per unit of food produced. Researchers found that vast quantities of water pass through grassland systems, which could be used more productively through the introduction of crops, changes in livestock production, or better integration of crop-livestock systems.

The results come at a time when food and water systems are under increasing pressure. Last week, the United Nations Food and Agriculture Organization (FAO) predicted that global food production must rise by 70% by the middle of the century to meet the demands of population growth and a changing climate. It recognized the crucial role of water in agricultural systems, recommending investment in improved water control and management.

The findings of the Basin Focal Projects suggest there are important gains to be made simply by using available water more effectively. "Grassland is by far the major water user in Africa, for example," explained project leader Simon Cook. "If there is enough water available for grassland, there is a strong chance that more resource-efficient, productive, and high-quality food or forage crops can be grown instead. This represents an opportunity for improving water productivity over huge areas."

Tentative calculations indicate that improvements to grassland systems offer gains in food production that would otherwise require a major hike in irrigation productivity. Measures could involve the introduction of improved forages with higher nutritional quality, and an increase in the stocking rate. These relatively low-cost, low-technology solutions could be of particular importance in developing countries, contributing to improved livelihoods while at the same time reducing pressure on land and water resources.

There are wider environmental benefits too: a recent article about *Brachiaria* in the journal Proceedings of the National Academy of Science, describes how this forage grass acts as a nitrification inhibitor, helping reduce greenhouse gas emissions, as well as the need for nitrogen fertilizer.

Michael Peters, leader of CIAT's Tropical Forages Program, supported the findings of the Basin Focal Projects: "Using improved forages to 'capture' some of the available water, and then increasing the stocking rate not only increases food production, it could also improve efficiency of land use, freeing up new areas for production, conservation, and reforestation. "It's a great example of how eco-efficient agriculture could work—achieving both improved livelihoods with benefits for the environment."

But to completely unlock the potential of grassland, Simon Cook suggests that structural reform is also fundamental: "The answer is institutions," he said. "Currently many river basins are chronically mismanaged and we see food and water systems being treated as separate systems, whereas in reality they interact. A key need seems to be filling institutional gaps and enabling people to have access to, and be able invest in, agricultural land while also sharing the benefits from water use equitably."

"The next step is to get this information to the right people."

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