CIMMYT in Asia

I Have Farmed Forever

IN ASIA, RISING DEMAND AND PRICES FOR QUALITY PROTEIN MAIZE (QPM) FROM CIMMYT BENEFIT FARMERS AND CHANGE LIVES.

"I have farmed forever," says Yasam Saanim. He works the steep slopes of the mountainous land near the village of Carin on the Indonesian island of Java. From childhood his life has been one of hard labor with little reward. He and his wife struggled to raise seven children on their tiny piece of rented land. With no money of his own Yasam has to borrow from the landowner every year to buy fertilizer for his third of a hectare of rice. He also grows a few bananas, cassava, sweet potatoes and durian, a pungent Southeast Asian delicacy. In return he pays the landowner 180 kg of rice at harvest. By his reckoning that represents about 30% interest. He doesn't think it is a fair deal but says he has no choice. The family survives but Yasam has never had money. It has been that way all his life.

Now, at the age of seventy, he finally sees some light in the seemingly endless tunnel of hopelessness that has been his lot as a tenant farmer.

The landowner has decided to plant maize—in particular, QPM—on 1.2 hectares of land adjacent to Yasam's. Quality protein maize is a high lysine, high tryptophan type developed by CIMMYT. Lysine and tryptophan are two of the amino acids required for the synthesis of protein in the human body. This maize can enhance the nutrition of the poor whose diets depend heavily on maize and raise the quality of maize-based pig and poultry feeds. The landowner's QPM production is for seed, which sells locally at five times the value of "normal" maize grain and reflects Java farmers' growing interest in QPM.

To Yasam's delight, he and some village women were hired to weed, fertilize, and harvest the QPM plot. Yasam earns 12,500 Indonesian rupiahs ($1.30) for each half day he works. The women are paid less (7,500 rupiahs) but in a village with little money this new income is very welcome.

Indonesia has released two open-pollinated QPM varieties, one yellow and one white. They were developed using experimental varieties from CIMMYT by Marsum Dalhan, head of the Breeding and Germplasm Section of the Indonesian Cereal Research Institute. Marsum has benefited both from CIMMYT training activities and through support for his work from the Asian Development Bank.

Virtually no maize is grown around Carin. That is good news for landowners who produce maize seed and, especially, QPM seed. Because the quality protein trait is "recessive"—that is, both parents must carry it and pass it on for it to be expressed in offspring—any plants that are fertilized with pollen from other types of maize will produce normal (not quality protein) seed.

The economics look good to the landowner. He produces two crops of quality protein seed a year. Still there is a risk. The market for this maize is in its infancy in Indonesia, where most animal feed is still artificially fortified with lysine at the feed mill. But the market is growing for the nutritionally enhanced maize. For the village of Carin the benefits are still small, a trickle-down at best. Still Yasam Saanim, a person who has farmed forever, beams with cautious optimism. "It looks like we will have a benefit from the maize," he smiles.

For more information:
m.george@cgiar.org

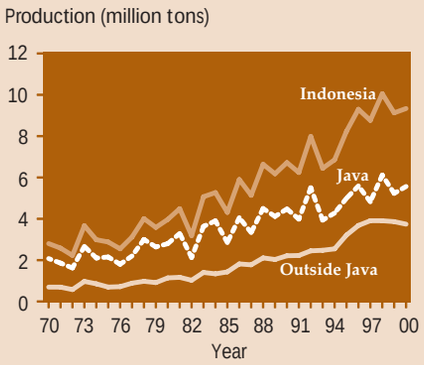
The Call for Maize Mounts in Asia

The demand for maize is expected to skyrocket in Asia over the next two decades, driven primarily by its use for animal feed. But maize use is also increasing in the uplands of seven Asian countries. These areas are often cut off from markets and inhabited by resource-poor farmers who eat much of what they grow. CIMMYT and the International Fund for Agricultural Development (IFAD) have recently completed a project promoting food and livelihood security for upland farmers in Asia who depend on maize for both food and feed.

The International Food Policy Research Institute (IFPRI) estimates that by 2020 the demand for maize in all developing countries will surpass the demand for wheat and rice, with Asia accounting for over half of this growth. Responding to these predictions, teams of researchers visited farmers in the uplands of China, India, Indonesia, Nepal, the Philippines, Thailand, and Vietnam to learn about their maize production systems.

To further develop maize improvement recommendations, national workshops and seven publications built upon the farmer surveys. Careful planning and appropriate research and development prioritization procedures on the part of scientists and policy makers will ensure an easier transition as farmers face oncoming maize demand. A clear message from the study in Vietnam, for example, was the need to help farmers apply sustainable practices to avoid degrading natural resources—particularly in fragile, marginal settings—as demand intensifies. "The project provided a much-needed avenue for better prioritization of maize research and development in the participating countries," says Roberta Gerpacio, former CIMMYT research associate who coordinated the effort. "The active pursuit of the right priorities, together with a supportive policy environment, can help make maize-based farming a more sustainable livelihood for marginal households in the Asian uplands."

The conclusions, like the one above for Vietnam, were drawn from results of systematic country-level prioritization, and drew upon findings from in-depth participatory rural appraisals in marginal, isolated areas involving village leaders and groups of farmers. Details on the sociological, agro-economical, environmental, and technological aspects of maize production were assembled in a series of six publications available through CIMMYT (see "Publications/Maize Production Systems" on www.cimmyt.org). A seventh report on maize in China is also being developed.



Maize production in Indonesia, 1970-2000.

"The third project component on maize sector policy research closely reviewed and examined country-level macro- and micro-economic policies, relating these to influences on farm and household-level conditions," says Gerpacio. A separate volume on details and synthesis of the seven country maize policy studies will be co-published with IFPRI.

Project participants also included IFPRI, Stanford University, and national research programs and ministries of agriculture in the study countries.

For more information: e.meng@cgiar.org

Helping to Reinvigorate Agriculture in Afghanistan

WHEAT IS THE NUMBER-ONE STAPLE CROP IN AFGHANISTAN, AND MAIZE IS THE THIRD. TOGETHER THEY OCCUPY 80% OF THE AREA PLANTED TO ANNUAL CROPS IN THE COUNTRY. A CENTRAL AIM OF CIMMYT IN AFGHANISTAN IS TO MAKE IMPROVED, HIGH QUALITY SEED OF BOTH CROPS AVAILABLE TO FARMERS, ALONG WITH APPROPRIATE CROP MANAGEMENT TECHNOLOGIES.

CIMMYT has collaborated with Afghan researchers for over three decades, even during the war. Thanks to the Swedish Committee for Afghanistan and the FAO, Afghan researchers maintained contact with CIMMYT and the Turkey-CIMMYT-ICARDA International Winter Wheat Improvement Program, and continued to select the best new wheat lines/varieties from international nurseries. "The new seed moved from farmer to farmer; without it, people would have suffered even more hunger and malnutrition than they did," says Hans Braun, Director of CIMMYT's Rainfed Wheat Program.

RECENT UPDATE FROM THE FIELD

An important component of a current project ("Wheat and Maize Productivity Improvement in Afghanistan") is collaborative work with the Agriculture Reseach Institute of Afghanistan (ARIA), non-government and international organizations, and farmers to verify in farmers' fields the performance and acceptability of improved wheat and maize varieties.

The project has also provided non-government organizations with seed of open-pollinated maize varieties for farmer testing and feedback, resulting in the identification of two promising varieties, and participants are

working to identify earlier-maturing varieties that better fit farmers' requirements. Project members are also working with the ARIA and the FAO, through the Improved Seed Enterprise, to offer breeder's seed of selected varieties to recognized producers of certified seed. To ensure all have access to quality seed, they are also linking with informal farmer-to-farmer distribution systems. The latter has resulted in as much as a 10-fold increase in the area under improved varieties, in some regions. The Norwegian Project Office-Rural Rehabilitation Association for Afghanistan reported that farmers who had planted open-pollinated maize varieties from the project in 2003 had bartered and sold more than two tons of seed in 2004.

CIMMYT partners in Afghanistan include the Future Harvest Consortium to Rebuild Agriculture in Afghanistan, funded by the United States Agency for International Development and coordinated by the International Center for Agricultural Research in the Dry Areas; AusAID and the Australian Centre for International Agricultural Research; FAO; the International Fertilizer Development Center and the United States Agency for International Development, ACTED, the Aga Khan Development Network, Improved Seed Enterprise, the Afghan Ministry of Agriculture, Animal Husbandry, and Food and, in particular, the Agricultural Research Institute of Afghanistan.

For more information:
m.osmanzai@cgiar.org

CIMMYT in Afghanistan: A Legacy of Impact

Overall, 700 CIMMYT maize and wheat nurseries have been grown and evaluated by researchers in Afghanistan since 1975.

WHEAT

- 300 tons of quality seed of wheat MH-97 distributed to 9,000 farmers in 4 provinces.
- All winter/facultative wheat cultivars in Afghanistan are derived from nurseries of the Turkey-CIMMYT-ICARDA International Winter Wheat Improvement Program.

MAIZE

- Tons of breeder and foundation maize seed delivered for multiplication and distribution.

TRAINING

- 50 Afghan researchers have taken training at CIMMYT.
- 5 in-country technical workshops since 2002, diverse topics (agricultural development potential and constraints, yellow rust and field scoring, research methodologies, varietal evaluation), 70 participants (farmers, NGO workers, research station officers).

Islands of Residue: Fighting Erosion and Fostering Wheat Productivity in Kazakhstan

THE LANDSCAPE OF NORTHERN KAZAKHSTAN IS LITTERED WITH ARTIFACTS OF THE OLD SOVIET CONTROLLED ECONOMY—VICTIMS OF THE TRANSITION TO A FREE-MARKET SYSTEM. OLD CUSTOMS TOO FALL BY THE WAYSIDE. IN PLACE OF ONCE-REQUISITE HEAVY PLOWING TO PREPARE FARMLAND, CIMMYT, KAZAKH AGRICULTURAL RESEARCH PROGRAMS, FARMERS, AND OTHER PARTNERS ARE ESTABLISHING CONSERVATION AGRICULTURE APPROACHES THAT ARE BOTH SUSTAINABLE AND WILL HELP DIVERSIFY THE ECONOMY.

"Plow, plow, plow—that's what we were told on the old state farms," says Darynov Auezkhan, farmer and vice-chairman of the Kazakhstan Farmers' Union, the largest such organization in the country. He reflects back on 1988, when official policy mandated the use of "black fallow," heavy mechanical tillage as early as permissible in spring to control severe infestations of wild oats and other weeds. "By the next spring I'd see places where 50 to 60% of the soil had been washed away. And then I'd see several 'islands' in the field where the straw had been retained. There the soil erosion was much, much less."

Those "islands" illustrate the basis of zero-tillage—retaining rather than plowing in or burning crop residues—while demonstrating an important advantage of this approach: dramatically decreased soil erosion. But saving soil alone is not sufficient cause for farmers to change their ways.

CATCHING AND KEEPING WATER

"Retaining soil moisture is critical to seed germination, crop establishment, and, ultimately, yield," explains CIMMYT scientist Murat Karabayev, who led the Kazakhstan/FAO/CIMMYT Technical Cooperation Project on Conservation Agriculture (2002-04). "This is particularly important in droughty northern Kazakhstan, where wheat depends heavily on residual moisture from the snow

▲ Denis Yushenko, senior scientist at the Central Kazakhstan Agricultural Research Institute and CIMMYT zero-till research collaborator, surveys gully erosion under conventional tillage and fallow. According to his measurements, erosion-prone slopes under conventional tillage lost 2 t/ha of topsoil to such gullies (not including general erosion across the field), while zero-till fields showed negligible gully erosion.

melt." Retaining resides also improves soil composition and fertility, which is eventually reflected in better yields. Through on-farm trials and demonstrations, the project promoted and disseminated such resource-conserving practices as direct seeding, zero or minimal soil tillage, and chemical fallows (a weed-killing herbicide application followed by a conventional fallow). There were also training seminars, courses, field days, study tours, and wide promotion of new practices through the mass media. The development and offering of suitable equipment for direct seeding and zero-tillage technologies was essential. Finally, project activities were backstopped by economic analyses of the new practices.

Zero-tillage plots at the Central Kazakhstan Agricultural Research Institute and the Research Production Center of Grain Farming served as the venues for initial meetings organized by the Ministry of Agriculture, the Farmers Union, and CIMMYT to introduce the technology to farmers and select candidates for on-farm trials. Maintained under the International Cooperation for Agricultural Research (ICAR) project in Central Asia and the Caucasus, the trials moved forward with direct seeding planters imported from Brazil. These were followed by locally-produced kits that could be cheaply retrofitted to existing planters. The selected farmers used zero-tillage, with technical support and agronomic analysis from CIMMYT scientists. Two independent economic analyses were conducted by Kazakh and American economists. Approximately 500 scientists and farmers participated in workshops and training seminars, and another 800 farmers observed the trials at farmer field days. Project activities were highlighted via newspapers, radio, television, and regular coverage in the *AgroInformation Quarterly*, a widely distributed publication produced by the Farmers Union. "Given that wheat is Kazakhstan's foremost crop and the country ranks sixth globally in wheat area harvested, the potential impact on rural livelihoods and food security of zero-tillage and direct seeding into residues cannot be overstated," Karabayev says. ▶

From 100 Hectares to 100 Percent: Farmers' Experiences

Although Meiram Sagymbayev's farm in Alemola Province is of "intermediate" scale—3,000 hectares on the high steppes of northern Kazakhstan is indeed intermediate—he is not your average Kazakh farmer. His background includes stints as a research scientist and agronomist in the Soviet era, and, on the other side of the historic divide, he received an award in 2002 as the best businessman in the province. He has instituted profit-sharing with his farm hands, and rather than reward extra work with vodka, he gives bonuses to his staff for not drinking during planting and harvest.

Sagymbayev recounts putting together the first rudiments of a business plan while shoveling manure and starting to implement his ideas after Kazakh independence in 1991. It is no surprise then that this innovator is leading the way in zero-till farming, and that his neighbors and others consulting with him are following. . . in a big way.

As one of the conservation agriculture project's four participating farmers, Sagymbayev sowed 100 hectares in the second wheat season of 2004 using zero-tillage. Results had been moderately encouraging the first season, but 2004 shaped up to be a very dry year in Akmola, which does not get much precipitation even in an average year, and Sagymbayev was concerned. To his surprise, the zero-tillage plot gave the highest yield in the county, and he surmised that it was time to go beyond experimentation to putting this system to work. In 2005, 100% of his wheat is planted using direct seeding and zero-tillage. He hopes over the long term to stabilize yields during both normal and dry years through zero-tillage improvement of the soil profile. His neighbor, seeing the 2004 results, sowed 2,500 of his 11,000 hectares using zero-tillage, and many more peers are watching intently—among them the county's small-scale farmers.

On an FAO-sponsored trip to the United States, Sagymbayev was impressed by how farmers there were independent yet worked cooperatively and in associations to acquire inputs and technical knowledge. Today, he is encouraged to see Kazakhstan and its farmers take fledgling steps to create cooperatives that will provide credit for purchasing fertilizer. The sharing of equipment and labor may not be far behind. In lieu of a formal extension service, he voluntarily advises neighbors on diverse farm issues, including zero-tillage. "In Kazakhstan's transition period, most farmers didn't know what to do," he observes. "Things are moving forward step-by-step and may even be accelerating, but we still have a ways to go."

Wheat farmer Viktor Surayev comes from a different place—not just on the map but in the circumstances he faces and the land he farms. Viktor's home is in Mishurino village, which prospered under the Soviet system but has since fallen on hard times, with the livestock industry declining significantly,

▲Having seen the benefits of zero-till farming, wheat farmer Meiram Sagymbayev now plants 100% of his crop with this system.

infrastructure deteriorating, and many people migrating from the area. Surayev was a farm engineer in those pre-independence days, and he earned degrees in agronomy and land management and mechanization. But large, soil-caked hands and an affable, down-to-earth demeanor quickly dispel any preconceptions about his being an ivory-tower academic. "Difference between farming now and during Soviet times?" he shrugs, wryly grins. "Still laboring with soil, planting seeds, fixing equipment…the hard work in the fields stays the same."

Unlike Sagymbayev, Surayev's land is relatively hilly and subject to severe water and wind erosion, which he blames for the low soil fertility in many of his fields. Thus it is no surprise that he sees the creation of humus and increased soil fertility as a major benefit of conservation agriculture systems, followed by better soil moisture retention. After the dry 2004 season, when he saw zero-tillage fields yield 40% more than their conventional counterparts, he increased his area under the technology from 100 to 800 hectares. Even under more favorable conditions in 2003, he found that yields under zero-tillage reached 1.8 tons per hectare, versus 1.6 tons with conventional practices.

His profits increased, not just through higher yields but due to reduced fuel, labor, and machinery repair costs. Under zero-tillage, at least three fewer tractor passes over the fields are required—a reduction of 60%—and plows, harrows, and other cultivation implements are not needed. The actual wear and tear on his aging tractors is minimized, because pulling a sprayer or zero-tillage seeder exerts far less resistance than drawing soil-turning equipment.

Surayev acknowledges increased herbicide costs under the new system, but is not overly concerned, as he believes that those costs will decrease as the weed seeds in the soil are killed off, and demand for herbicide lowers per-unit cost. These converging factors, he thinks, together with what farmers see when they visit Surayev and colleagues' on-farm trials, bode well for zero-tillage farming in the wheat belt of Kazakhstan.

Auezhkan of the Farmers' Union is likewise optimistic. "It will take about five years to have conclusive results from these experiments," he says, "but I think beyond a doubt that they will prove the technology is effective. I believe my grandchildren will be proud of my participation in this research—that I was one of the pioneers of what will become a widely spread and accepted way of farming." He concludes, "I thank CIMMYT for this too, because without them, we'd be far behind and simply not know about these technologies."

For more information: m.karabayev@cgiar.org

Kazakhstan: View from the Ground Level

"Kazakhstan is not poor. Look at the fancy new cars in Almaty, a city reminiscent of those in old Europe, or the capital, Astana, gleaming with new architectural wonders. These are not CIMMYT clients. They are doing fine. This is the argument I often hear," says Alexei Morgounov, CIMMYT scientist and regional representative to Central Asia. "But go outside the cities and you will see another story."

A drive outside of Astana, north across the steppes toward Siberia, bears out Morgounov's observation. Take a turn off the main highway and onto a deeply rutted, village dirt road and those Mercedes of the cities are quickly replaced by rickety horse-drawn carts, the occasional tractor from a bygone era chugging along accompanied by a black cloud of diesel soot, and old men and young boys in tattered clothes shepherding flocks of 10 to 20 sheep.

"Government studies show that 25-30% of the population in northern Kazakhstan lives on a dollar a day or less," Morgounov continues, "and contrary to popular wisdom, poverty is equally severe in the north as in the south, where the farms are typically much smaller. A recent FAO publication* indicates that agriculture offers 'moderate' potential for alleviating poverty in the region and that intensification (increased productivity) is a major route to that end. It's not just the product we're talking about. It's the economic activity farming can generate in rural areas," adds Morgounov.

* *Farming Systems and Poverty: Improving Farmers' Livelihood in a Changing World*; by J. Dixon, A. Gulliver and D. Gibbon. Published by FAO in 2001.

A case in point is the farm operation of Vyacheslav Cherezdanov, one of the zero-till project farmers. When he got into farming 13 years ago, it was with a business orientation. His goal was to produce food products, but he wanted to grow his own raw material: grain, principally wheat. In December 2002, after many long seasons of building up the farm operation, he realized his vision with the opening of a bakery. He was greatly encouraged when the breads, rolls, and pastries it produced consistently sold out in neighboring villages and the regional city center. His entrepreneurial instincts whetted, in 2005 he expanded his product line to pelemenis (akin to ravioli or perrogis), meat pies, personal-sized pizzas, and other delights.

Today, Cherezdanov employs considerably more people in his food processing business (39 in all), than on the farm, which employs 12—and the economic spinoffs continue, he says. Many of the raw ingredients he uses—including milk, eggs, cheese, and honey (and soon, certified meat)—are purchased from local farmers. Sugar is bought from a nearby wholesale shop. And there is room for the spinoffs to grow as he intends to expand his product line and

markets and broaden sales to more populated areas. Thanks to the zero-till technology and input from CIMMYT, he is now growing winter rye and triticale. The rye will be used for bakery products and seed sales and the triticale will be bartered with local cereal and livestock producers.

His mother, Galina Cherezdanova, is happy to see her son's business success and its positive impact on the community. A trained economist, she conducted studies for the oblast (province) indicating that of all the "profit" generated in their county, 70% comes from agriculture and 30% from small business. Most of the province's products are sent out as raw materials, she explains, but there is a big potential for small business here. She says that past calculations made on a very conservative basis showed that one ton of raw grain generated US$ 75 in economic activity compared to $150, or double that, for the finished product. "With 56 grain elevators here," declares Cherezdanova, "we need to do more to boost revenue for the rural people."

For more information:
a.morgounov@cgiar.org

Good (and Useful) Things Can Come in Small Packages

Small grants and projects can go a long way. They can be bundled together to achieve more formidable goals, and they can serve as pilot projects for proof of concept, or to get the ball rolling in an area of study. Or they can serve as a bridge in time between larger-scale projects. In short, small projects can lead to bigger and better things.

Two noteworthy examples are the International Cooperation for Agricultural Research in Central Asia and the Caucasus (ICAR) and the Regional Network for Wheat Variety and Seed Production, both at work in Kazakhstan and the region.

ICAR: Many Disciplines and Many Nations

ICAR is a USDA project managed through Washington State University (WSU), CIMMYT, and South Dakota State University, with an annual budget of $400,000, currently divided among a set of on-farm demonstrations, on-station training and trials, collaborative research mini-projects, and organization of regional fora. Initiated in 2002, the project extends through 2007 and includes partnerships with eight countries from the former Soviet Union in Central Asia and the Caucasus (CAC). Grants average US$ 10,000-20,000, much less for on-farm trials.

"The research partnerships contribute to enhanced food security, preserve threatened biodiversity, support democratic and market reforms, and develop mutual understanding and appreciation in our institutions, citizens, and nations," says Kim Garland Campbell, Co-director of ICAR (also Adjunct Professor at WSU and Research Geneticist with USDA-ARS). "The project is truly a win-win scenario for all of us."

The overarching goals of the project are to:

- Rebuild capacity in the region's research institutions for agricultural education, research, and technology transfer.
- Use improved sustainable technologies, practices, and policies to improve food sector performance.
- Support agricultural policy reform to improve economic productivity and sustain the natural resource base.
- Expand the access of the rural poor to technologies and practices that improve food security.

Says Alexei Morgounov, CIMMYT regional representative, "We are looking to strengthen ties between world-class institutions and scientists in the United States and the CAC. When one considers that the winter wheat now grown in the USA came from the Ukraine, we can see it really is a two-way street. Another less obvious but very important goal is to introduce the younger generation of scientists from the USA and CAC to the world of international agriculture and to one another. Agriculture today is global in terms of trade and economics. We need to make sure that our agricultural researchers are prepared to work globally as well."

ICAR's mandate is matched by the breadth of its activities in the field, ranging from trekking through the mountains of Kazakhstan to collect genetic diversity, to high-tech molecular analysis of plant tolerance and resistance to diseases.

Seed Money for Extension Sows New Possibilities for Farmers

In the absence of fully functioning extension systems, delivering better varieties and technologies to farmers requires innovation and experimentation—and here again, relatively small investments in focused efforts can lead the way. The extension component of the Regional Network for Wheat Variety Promotion and Seed Production, a collaboration between CIMMYT and the German Agency for Technical Cooperation (GTZ), illustrates this point.

The overall goal of the project is to identify, multiply, and promote high yielding and disease resistant wheat varieties. After a significant outlay of funds for start-up, the project has used budget allotments of approximately US $150,000–200,000 per year to support major meetings and smaller fora among scientists from the region and their international counterparts; hold field days to demonstrate improved varieties and crop management systems; send about 40 scientists from Central Asia for training in breeding and agronomy at CIMMYT-Mexico, and, as noted, support a unique pilot effort to deliver useful technologies to farmers.

Agrosemconsult was established through the project as a private company to conduct on-farm and participatory trials and support technology transfer to farmers. Three mobile groups, consisting of an agronomist, mechanic or machinery technician, with backup from a wheat breeder, have been established by Agrosemconsult in southern Kazakhstan, with mirror arrangements in Uzbekistan and Tajikistan. Each group works directly with 5-10 farmers, who try the new approaches and serve as models for their neighbors. Aside from dissemineting improved varieties, provided largely by the CIMMYT-Turkey-ICARDA Winter Wheat Improvement Program, the company has led the way in promoting bed planting for wheat and barley in the region, with technical support from CIMMYT, notably crop management specialist Ken Sayre, and backing for particular components from the ICAR project.

For more information:
a.morgounov@cgiar.org

World Wheat Crop under Threat from New Strain of Old Disease

Representatives of major donor countries and organizations, together with wheat specialists from around the world, agree that Ug99, a new strain of wheat stem rust, is a major threat to wheat production worldwide. At a meeting in Kenya in September to hear a report on the disease strain by an expert panel, they sounded the alarm to the international media and launched a global initiative to control the disease.

"Nobody's seen an epidemic for 50 years, nobody in this room except myself," said Norman E. Borlaug, Nobel Peace Laureate and former CIMMYT wheat breeder. "Maybe we got too complacent."

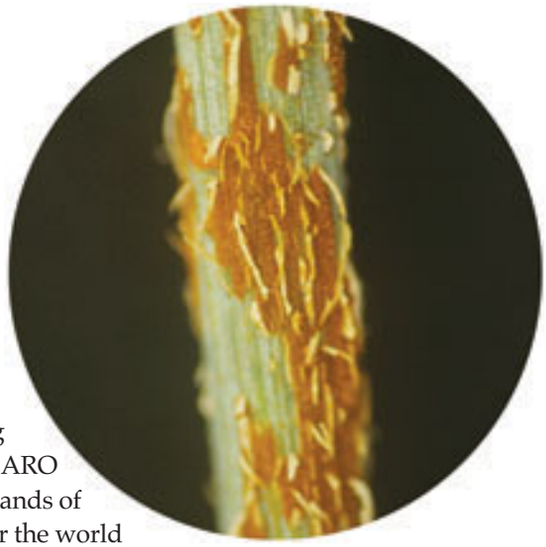
The new wheat stem rust strain Ug99 was first observed in Uganda, but its spores are spreading on the wind and damaging wheat crops in Ethiopia and Kenya. The greatest danger is that the new strain will hit the large expanses of wheat in Asia, according to a report by a panel of international experts: "It is only a matter of time until Ug99 reaches across the Saudi Arabian peninsula and into the Middle East, South Asia, and eventually, East Asia and the Americas….the current crisis is a wake-up call about the continuing and potentially devastating impact that the rust pathogens can have on a staple food like wheat."

What's at Stake?

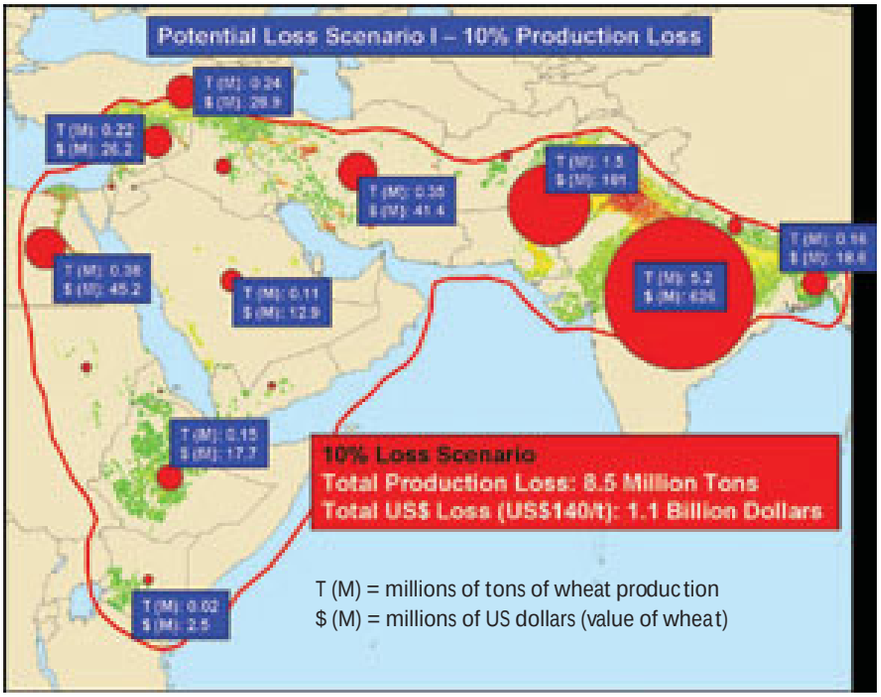
Wheat is grown on more than 200 million hectares worldwide and is a source of food and livelihoods for hundreds of millions in developing countries. If Ug99 spreads unchecked, it would reduce world wheat production at least 10%—a loss of 60 million tons of grain worth US$9 billion or more—and seriously jeopardize regional food security. "Until the advent of science-based agriculture, world wheat harvests suffered periodic attacks by evolving fungal pathogens," says CIMMYT wheat pathologist Ravi Singh. "Among the most damaging were the rusts." Modern breeding, combined with the free international exchange of experimental wheat lines, resulted in the development and wide dispersion of wheat varieties able to resist the rusts for several decades. "These resistant varieties have especially safeguarded food security in developing countries, where many farmers simply cannot afford fungicides," says Singh. But pathogens evolve and, as is occurring now, new strains emerge that break down the defenses of resistant varieties.

TIME TO ACT—NOW!

The report says that plant breeders and pathologists still have time to screen for resistant genotypes and to get them multiplied and into farmers' fields. With this aim, delegates at the meeting in Kenya endorsed the creation of the Global Rust Initiative to monitor the spread of the disease and to work on long-term solutions—including new, locally-adapted, resistant wheat varieties and a global testing and distribution system—not just for Ug99 but for other, potentially dangerous wheat rust pathogens. Lead members of the consortium developing the initiative are CIMMYT, ICARDA, the Kenya Agricultural Research Institute (KARI), and the Ethiopian Agricultural Research Organization (EARO). Several major donors have expressed interest in participating. The meeting in Kenya was sponsored by the Rockefeller Foundation. A news conference held as part of the event was attended by more than 30 media representatives and resulted in reports being published in dozens of outlets worldwide, including a story in the "Science" section of *The New York Times* on 9 September 2005.



CIMMYT has been screening materials in its gene bank for sources of resistance to the new rust strain and has identified promising candidates. KARI and EARO are also screening thousands of wheat lines from all over the world at stations that are known hotspots for wheat rusts.



An initial analysis of global wind patterns and environmental factors conducted by CIMMYT's Geographic Information Systems unit confirms there is a high potential for the fungal spores to spread from eastern Africa into the Arabian peninsula, Iran, and the expansive wheat growing regions of Pakistan, India, and Bangladesh. The expert panel report confirmed that many of the wheat varieties grown in these regions are susceptible to the new strain of the fungus. This graphic shows a conservative scenario; in the worst-case scenario, Ug99 could ruin as much as 70% of the wheat harvest.

For more information: r.singh@cgiar.org