



Conservation agriculture machines brought to Afghanistan

By RAJIV SHARMA

CIMMYT is taking the next step in bringing Afghanistan a much-needed intervention to improve wheat research and production, an official for the country said at a meeting last month.

With support from the Australian Centre for International Agricultural Research (ACIAR), CIMMYT-Afghanistan held the “Conservation Agriculture: Concept and Application” training event in Kabul from 28 to 29 October. Thirty-five participants from the Afghanistan Agricultural Extension Project (AAEP), the Agricultural Research Institute of Afghanistan (ARIA), CIMMYT, the Food and Agriculture Organization of the United Nations (FAO), the International Center for Agricultural Research in the Dry Areas (ICARDA), [Kabul University](#) and other stakeholder organizations attended the program.

Wheat accounts for 60 percent of an average Afghan’s caloric intake, but domestic wheat production falls short of the country’s needs. This happens in part because more than half of Afghanistan’s wheat is rain-fed, but rainfall is often scarce and irregular in those areas. Moreover, wheat is often the sole crop for those farmers, making them food-insecure and economically vulnerable.

“Conservation agriculture is a set of practices that includes reducing or eliminating traditional tillage, keeping crop residues on the soil and using intercropping or crop rotations,” said Rajiv Sharma, senior scientist and country liaison officer for CIMMYT-Afghanistan. “Its benefits include saving resources like time, labor and fuel, as well as reducing farmers’ risk,




Photo: Rajiv Sharma/CIMMYT

promoting diversified cropping and more effectively capturing and retaining rainfall in the soil.”

In his inaugural speech, Mir Aminullah Haidari, deputy minister for technical affairs for Afghanistan’s [Ministry of Agriculture, Irrigation and Livestock \(MAIL\)](#), congratulated CIMMYT for its work in support of the country’s wheat research and production. Mohammad Qasem Obaidi, director of ARIA, welcomed the participants and thanked CIMMYT for organizing the training.

Sharma said he hoped ARIA-CIMMYT would use the 2013-14 season to experiment with conservation agriculture interventions throughout Afghanistan.

Harminder Singh Sidhu, senior research engineer for CIMMYT, introduced the participants to different types of conservation machines available and used globally, which were imported by CIMMYT for the event. Attendees watched field demonstrations of two- and four-wheel zero tillage seed drills, raised bed planters and two-wheel tractors. H.S. Jat, CIMMYT agronomist, introduced conservation agriculture concepts, principles and procedures. He later helped wheat agronomists from six ARIA stations plan conservation agriculture experiments relevant to their local conditions. Participants expressed satisfaction and were excited to try new machines and new ways of conserving resources at their experiment stations and in farmers’ fields. 

Asia: Spreading conservation agriculture, developing researchers

By M.L. JAT, TRIPTI AGARWAL AND PROMIL KAPOOR



Photo: Ram Dhan Jat/CIMMYT-Karnal

Asia can benefit from site-specific conservation agriculture solutions to face challenges such as diverse ecologies, soils, production systems and an expected 30- to 50-percent hike in food demand by 2020. To train young scientists on conservation agriculture-based crop management technologies and encourage wider adoption of these practices in Asia, CIMMYT and the Borlaug Institute for South Asia (BISA) held the fourth “Advanced Course on Conservation Agriculture: Asia” from 17 to 31 October at Punjab Agricultural University (PAU), the BISA location in Ludhiana.

The course was organized in collaboration with the Indian Council of Agricultural Research (ICAR) and PAU, with support from the CGIAR research programs on WHEAT, MAIZE and Climate Change, Agriculture and Food Security (CCAFS). Fifteen researchers from the national agricultural research systems and international agricultural research centers in Afghanistan, India and Iran attended.

“Punjab is considered to be India’s food bowl with 4.2 million hectares under cultivation,” said S.S. Gosal, director of research, PAU. “ut rice-wheat monoculture and rampant usage of water and pesticides are depleting resources. Adoption of conservation agriculture and crop residue management to maintain soil health and having long-term strategies involving suitable crop varieties, machinery, pest and nutrient management for conservation agriculture will reverse the trend.”

B.S. Dhillon, vice chancellor of PAU Ludhiana, explained the course’s objective was to build on existing research and train researchers to adapt conservation agriculture practices and incorporate farmers’ innovations. He praised CIMMYT’s role in starting partnerships and pushing for the wider adoption of conservation agriculture as well as engaging students, extension agents, service providers and farmers. “BISA-CIMMYT is serving as a common platform for research on conservation agriculture,

sustainable intensification, precision agriculture, climate-resilient production systems, smart mechanization and developing a new generation of scientists,” he said.

M.L. Jat, senior cropping systems agronomist for CIMMYT and course coordinator, said the course was instrumental in promoting conservation agriculture in the area. “Significant efforts are being made by a range of stakeholders in the region to make conservation agriculture relevant to the needs of smallholder farmers,” he said. “However, from farm-to community-level adoption, capacity development of stakeholders at various scales and levels to adapt conservation agriculture systems in diverse agro-ecologies has remained a major thrust in the region.”

The comprehensive course included interactive presentations and field sessions. Main sessions focused on laser levelling and field training, recent advances in conservation agriculture-based machinery in India and Mexico, hands-on training on calibration, operation of conservation agriculture machinery, measuring greenhouse gas emissions, precision agriculture and nutrient management and an overview of weed and water management in conservation agriculture systems. The participants also visited machine manufacturers and learned about the socioeconomic impacts of conservation agriculture.

H.S. Sidhu, senior research engineer for BISA, CIMMYT consultants Ken Sayre and Raj Gupta and resource people from PAU, ICAR institutions and the International Plant Nutrition Institute contributed significantly to the course.

“The course covered in detail all aspects of conservation agriculture technologies,” said course participant Sadegh Afzalnia from Iran’s Ministry of Agriculture. “I will take along the learning and put my best effort to out-scale conservation agriculture technology in my country.” ▼

Trees keep Ethiopia's wheat cool and productive

By FRÉDÉRIC BAUDRON



Wheat grows under the canopy of *F. albida* around mid-October in Mojo area, Ethiopia

Researchers with CIMMYT's Global Conservation Agriculture Program (GCAP) in Ethiopia have found that use of agroforestry systems involving an indigenous tree could mitigate climate change effects in Ethiopian smallholder wheat systems. Specifically, their study showed that maximum temperatures under the canopy of *Faidherbia albida*, a nitrogen-fixing, acacia-like species found throughout African savannas, were constantly 4 to 5°C lower than temperatures outside the canopy.

By 2050, the maximum daily temperature in wheat-growing areas of Ethiopia is predicted to rise by 2 to 3°C. This could significantly reduce yields of wheat, a crop that accounts for 18 percent of Ethiopia's cereal area and nearly a fifth of its cereal production. The crop is key to the food security and incomes of smallholder farmers who grow it.

CIMMYT researchers are studying the effect of scattered trees that are currently common in farmers' field. Keeping trees in fields for the production of firewood and fencing materials is extremely common in Ethiopia. "But these trees have other functions and may positively affect the productivity of

crops underneath," said Frédéric Baudron, CIMMYT cropping systems agronomist based in Ethiopia.

In addition to more wheat-friendly temperatures, the benefits of *F. albida* in wheat systems are manifold, according to Baudron. "Soil moisture increases greatly under the canopy, resulting in a greener wheat crop for a longer period of time," Baudron said. "The presence of *F. albida* also fosters longer wheat leaf blades, a greater number of tillers per plant, longer spikes and a higher number of seeds per spike — all of which translates into higher stover and grain yields." Moreover,

the incidence of wheat diseases like fusarium wilt and head smut diminishes under the tree canopy.

Under the World Agroforestry Centre (ICRAF)-led project Trees4Food, funded by the Australian International Food Security Centre (AIFSC) and managed by the Australian Centre for International Agricultural Research (ACIAR), GCAP-Ethiopia studies interactions between food crops and various indigenous trees in wheat- and maize-based systems.

In the case of *F. albida*, there are no tradeoffs between the provision of tree products and the crop yield underneath. Research aims to come up with management practices — such as proper fertilization rates, genotypes of crops, pruning management and tillage practices — that maximize the existing synergy. With other tree species commonly found in Ethiopian fields (such as *Acacia tortilis*, *Cordia africana*, or *Croton macrostachyus*), these tradeoffs are often substantial. In that case, research aims to come up with management practices that minimize competition. The project is being implemented in Ethiopia as well as Rwanda. 🌱



This photo, taken the same day, shows wheat a few meters outside the canopy of *F. albida*.

Photos: By Frédéric Baudron

Crop physiology solves real-life problems

By BRENNA GOTH

Photo: Thomas Lumpkin/CIMMYT



CIMMYT's wheat physiology unit has grown from a small team led by one scientist in Mexico to a group that now includes specialists in crop modeling, crop physiology, molecular genetics and remote sensing.

Matthew Reynolds, who leads the team, has seen a significant increase in the application of plant physiology since coming to CIMMYT nearly 25 years ago. "When I first started," he said, "we worked to convince skeptical plant breeders that physiology could be useful to them." Today, the team is widely recognized for its contributions and has produced germplasm that is being used by national agricultural research systems.

Last month, Reynolds became a 2013 fellow for the Crop Science Society of America, which is the highest recognition given by the organization. He was also invited to speak at a Bayer's 150th anniversary science symposium, which featured a wide range of disciplines from medicine to crop research.

A United Kingdom native, Reynolds comes from a botany and crop physiology background. He first came to CIMMYT after earning a Ph.D. at Cornell University in New York. Though he had more experience working with potatoes than wheat, Reynolds said he was enticed by the opportunity that CIMMYT provided to work on "the real and tangible problem of food security."

He sees wheat as an exciting crop to work on not only for its importance worldwide as a food source, but also because it is so widely adapted. "It is the best suited of any major staple food crop to drier conditions," Reynolds said. "That makes it an important pillar for food security as we face the uncertainties of climate change."

Reynolds splits his time between CIMMYT's headquarters in El Batán, Mexico, in the Central Mexican Highlands, and Ciudad Obregón, Sonora state. In Ciudad Obregón, an irrigated desert research station in northern Mexico, Reynolds and his team conduct most of their research and advise visiting scientists and Ph.D. students. He also travels frequently to interact with partners worldwide.

Collaboration and sharing knowledge are crucial to his work. Field guides and manuals on physiological breeding edited by Reynolds and colleagues have been translated into Chinese, Russian and Spanish. Reynolds also compiled and edited the book *Climate Change and Crop Production*. Another recent endeavor has been to establish the Wheat Yield Network, which unites institutions worldwide working on raising the yield potential of wheat.

The work is demanding and the problems aren't getting any less, Reynolds said. But he sees the job as not only intellectually stimulating but a privilege. "It's extremely satisfying," he said, "to help solve real-life problems for people who really need it, through a combination of science, training, and global collaboration." ¶



Researchers receive fellowships

By BRENNA GOTH



Congratulations to two CIMMYT scientists who received fellowships this month. Wheat physiologist Matthew Reynolds (pictured left) became a fellow of the Crop Science Society of America (CSSA) while wheat breeder Zhonghu He (pictured right) received a fellowship from the American Society of Agronomy (ASA). Both awards were presented earlier this month in Florida. They are based on professional achievements and are only awarded to the top 0.3 percent of each society. He, based in China, was promoted to CIMMYT distinguished scientist last year and received the CSSA fellowship in 2009. Reynolds is based in Mexico and received the ASA fellowship in 2011. "I'm honored to be given this award," Reynolds said. "It's nice to be recognized." ¶¶



Emergency response training held in Agua Fría

By CHUY SANTILLÁN

Keeping the work place clean is one way to prevent accidents, CIMMYT employees at the Agua Fría experiment station in Mexico learned during a full-day course to form emergency brigades. The three-part course was held on 5 November with 23 participants led by Alan Alfaro and César Reyes from Global Emergency. Participants enthusiastically volunteered to form firefighting, evacuation and rescue and first-aid brigades.

The first part of the course included the fundamentals of fire types, how to avoid and control fires, types of extinguishers and which extinguishers to use in specific circumstances. Participants used extinguishers in real exercises and toured the station's facilities to see if there was free access to emergency exits. This exercise highlighted the importance of keeping the workspace clean and free of obstacles.

The second part of the course included techniques to rescue injured people and evacuate using a simulator. Participants were also instructed on the basics of first aid, how to tend to a wound and how to transport wounded people on stretchers. Finally, participants were asked to put into practice the lessons they learned throughout the day. Teamwork was emphasized as a crucial component of emergency brigades.

Thanks to Agua Fría Superintendent Ciro Sánchez and to María Félix Gómez for organizing course logistics. ¶¶

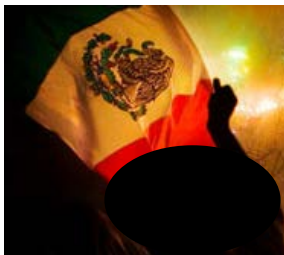


Welcome Krishna Dev Joshi



The Global Wheat Program welcomes Krishna Dev Joshi, who will work in Pakistan as a wheat scientist for the Agricultural Innovation Project. He has worked as a seed systems specialist with CIMMYT's Cereal Systems Initiative for South Asia project in Nepal (CSISA-NP) since 2012. Before joining CIMMYT, Joshi trained as a plant breeder at the University of Wales in the United Kingdom and worked with Bangor University, Wales, as a research fellow for nearly 12 years. He has also worked with various organizations in Nepal as an agronomist, plant breeder and seed expert.

Joshi took part in several projects in South Asia, developing client-oriented participatory crop improvement and other technology and strengthening grassroots seed enterprises. He contributed to the release of six rice varieties developed using participatory breeding, as well as the release of chickpea, mungbean, oilseed and soybean varieties. Joshi has experience in marginal and high-potential production systems, and much of his research is relevant to climate change adaptation. ¶¶



CIMMYT employees in Mexico: the office will be closed on Monday, 18 November in recognition of Revolution Day.

Recent publications by CIMMYT staff

- [Modeling the response of tropical highland herbaceous grassland species to climate change: The case of the Arsi Mountains of Ethiopia.](#) 2013. Aklilu Mekasha; Lisanework Nigatu; Kindie Tesfaye Fantaye; Duncan, A.J. *Biological Conservation* 168:169-175.
- [Precision nutrient management in conservation agriculture based wheat production of Northwest India: Profitability, nutrient use efficiency and environmental footprint.](#) 2013. Sapkota, T.B.; Majumdar, K.; Jat, M.L.; Kumar, A.; Bishnoi, D.K.; McDonald, A.J.; Pampolino, M. *Field Crops Research* Online first
- [Trend and variability of rainfall in Tigray, Northern Ethiopia: Analysis of meteorological data and farmers' perception.](#) 2013. Gebre Hadgu; Kindie Tesfaye Fantaye; Girma Mamo; Belay Kassa. *Academia Journal of Agricultural Research* 1(6):88-100.
- [Trends in daily observed temperature and precipitation extremes over three Ethiopian eco-environments.](#) 2013. Aklilu Mekasha; Kindie Tesfaye Fantaye; Duncan, A.J. *International Journal of Climatology* Online first
- [What are the farm-level impacts of Malawi's farm input subsidy program? A critical review.](#) 2013. Lunduka, R.; Ricker-Gilbert, J.; Fisher, M. *Agricultural Economics* Online first ¶¶

Birthdays 22-30 November

Jonathan de La Luz 23; Clemente Salas 23; Alejandro Ramírez 24; Aklilework Bekele 24; Andrew Amutamwa Chavangi 24; Isaiah Ziweya Nyagumbo 24; Erasmo Renova 25; Jennifer Jiménez 26; Joseph Ombaka Orende 26; Ulises Gaona 27; José de Jesús González 27; Philip Ade Doyo 27; Rogelio Hernández 28; Sign Phiri 28; Sagat Ishmukhanbetov 28; Sivakumar Sukumaran 28; Ana Sofía Medina 29; Khandakar Shafiqul Islam 29; Yoseph Alemayehu Abebe 29; Emrah Koc, 29; Andrés Guerrero 30; Rosalía Muñoz 30; Raciél Paredes 30; Martín Rodríguez 30 ¶¶

Weekly photo contest ▶

Photo contest winner



A woman examines a 100-gram pack of the drought-tolerant KDV4 maize variety produced by Dryland Seed Company in Machakos, Kenya. These small packs allow farmers with few resources to buy small quantities of seed and accumulate enough to plant for the next season. Florence Sipalla submitted this photo.



Runner Up:

Rogelio Arias, a member of the Seed Health Laboratory, sent this picture of the fungus *Trichoderma* present in maize.