From May to July 2008, I spent 3 months at the World Agroforestry Centre (ICRAF) in Nairobi, Kenya advising the centre and the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) on research needs to address issues on ‘Adaptation to Climate Change by Smallholder Farmers in Eastern and Southern Africa.’

The climate of Africa is already warming and dry spells are becoming longer. Recent climate change scenarios predict that mean temperatures will rise by 1°C by 2030 and by 3 to 4°C by the end of the 21st century. While global circulation models predict rainfall with greater uncertainty, rainfall is predicted to increase by about 5% in tropical eastern Africa (largely due to an increase in intense storms), while rainfall is predicted to decrease in southern Africa and the number of periods without rain to increase, particularly at the beginning of the rainy season.

While agroforestry interventions will buffer small-holder farmers against these changes because of their perennial nature, there will be impacts of climate change on agroforestry systems. For example, higher temperatures will affect the quality and price of highland coffee which is grown by smallholder farmers as well as commercial companies at altitudes from 1600-2800 m. Growing coffee at higher elevations to avoid the higher temperatures will displace the tea grown by farmers at these elevations. The alternative of growing coffee under shade is being trialed, but the consequences of greater competition for water will need to be evaluated. Agroforestry is also being promoted for its carbon mitigation benefits, but in a warming and drying world these benefits could be reduced or short-lived as experience in Europe has shown that forests that were carbon sinks became carbon sources in the hot and dry summer of 2003, reversing the carbon gains of the previous 5 years.

While in Nairobi, I evaluated the impact of warming temperatures on two of ICRISAT’s mandate crops, sorghum and pigeonpea, using the APSIM models for these two crops. Working with ICRISAT
Record food prices and associated riots in several developing countries hit the headlines in the first half of 2008, but the economic crisis has eclipsed food security latterly. Climate change has continued to be widely covered by the media. Legumes can contribute to the alleviation of food security by providing income, farm diversification, high protein food/feed and a low carbon footprint from their nitrogen fixation reducing the need for fossil-derived fertilizer nitrogen.

A highlight of the last six months was the International Lupin Conference held in Fremantle September 14-18, 2008. The conference brought together over 150 delegates from around the world. The conference, co-convened by Mark Sweetingham (DAFWA) and Jon Clements (CLIMA) had the theme “Lupins for health and wealth” and covered a wide range of topics including breeding, agronomy, animal and human health and nutrition. CLIMA/UWA was a sponsor of the Conference and several CLIMA staff contributed oral presentations.

We have received a number of new research grants in the last six months. Two new projects from GRDC started: Improving herbicide tolerance in break crops with myself as supervisor and Dr Ping Si as research scientist for three years and the other on higher yielding elite lines of pearl lupin for Australian agriculture for three years with Dr Bevan Buirchell (DAFWA) as supervisor and Dr Jon Clements as research scientist. A new project to continue the rehabilitation of agricultural research in Iraq with AusAid funding through an ACIAR project at ICARDA was secured by Professor Siddique. In Iraq the project will concentrate on improving cropping systems introducing no-till agronomy, while in Australia the focus is on capacity building. We received a grant from the Avon Catchment Council on Adaptation to sustainable farming systems through the adoption of Lucerne. In 2008, we have on-going research activities from a total of 16 research grants. A considerable number of fresh project proposals were submitted to a range of potential donors in the period.

Publications continue to flow from CLIMA research giving a tally of 23 scientific journal articles and 20 edited conference proceeding contributions in 2008.

CLIMA had three 4th year agriculture student theses this year: Ms Amy Goddard Borger (supervised by Heather Clarke) who worked on grain cropping traits of Australian native legumes - Cullen and Trigonella; Mr Troy Faithful (supervised by Kioumars Ghamkar) who studied hard seeded-ness and phylogeny in sub-clover; and Ms Nateisha Norrish (supervised by Jon Clements) who researched early vigour in narrow-leaved lupin. Mr Vasanth Garela Kumar registered for his MSc degree with a thesis entitled Shortening the Generation Cycle of Chickpea and Field Pea supervised by Heather Clarke, Janine Croser and myself. We’ve had news from a recent CLIMA PhD Dr Renuka Shrestha that on her return to Nepal she’s been appointed as National Coordinator for Grain Legumes Research Program (NGLRP). Very recently (Nov 2008), two varieties of lentil (Bharati and Sagun) and two varieties of chickpea (Tara and Avrodhi) were released for mid-hill and terai environments, respectively in Nepal, based on joint research by NGLRP, CLIMA and ICARDA, funded by ACIAR.

As visiting scientists, CLIMA has hosted two Endeavour Scholars Dr Mehrshad Barary (Ilam University, Iran) studying drought tolerance in lupins with Jon Clements and Jairo Palta (CSIRO), and Dr Maya Kumari (Banaras Hindu University, India) to carry out research in wide crosses between chickpea and its wild relatives with Heather Clarke. Additionally, Dr Xiangwen Fang from the University of Langzhou, China is at CLIMA for a year, to study chickpea drought tolerance with Professors Siddique and Turner.

William Erskine was Assistant Director General (Research) at the International Center for Agricultural Research in the Dry Areas (ICARDA) in Syria and, since January 2008, Director of the Centre for Legumes in Mediterranean Agriculture (CLIMA) and of the International Centre for Plant Breeding Education and Research (ICPBER).

Scottish born and raised on a farm near St Andrews, William completed a Bachelor of Arts in 1973, a Masters of Agriculture in 1976 and a PhD (University of Cambridge, Department of Applied Biology) in 1979.

He has since gained over 30 years experience world-wide in agricultural research and has published widely with more than 120 papers in international journals.

He serves on the Editorial Boards of The Journal of Agriculture Science, Experimental Agriculture and The Australian Journal of Agricultural Research. He is an elected Fellow of the Institute of Biology, U.K. and of the National Academy of Agricultural Sciences, India. He was given an Award for Service in Lentils by the Minister of Agriculture, Bangladesh in 2005.
CLIMATE CHANGE IN AFRICA

continued from page 1

NEL getting friendly with a black rhinoceros at Ol Pejeta Conservancy Park, Kenya.

staff in Nairobi and Bulawayo, Zimbabwe, the effects of a rise in temperature of 1 to 5°C and a 10% increase or decrease in daily rainfall were modeled for three locations in Zimbabwe and two locations in Kenya. The results showed that increasing temperatures decreased sorghum yields at all three locations in Zimbabwe, but increased yields in Kenya where temperatures were below the optimum for sorghum growth. As expected, a decrease in rainfall increased the number of failed crops (less than 200kg/ha) at the driest site in Zimbabwe, but not at the two wetter sites. Due to the faster growth and shorter time to maturity, the increased temperatures increased the water left in the soil at the end of the growing season and genotypes with a longer time to flowering and maturity gave higher yields at the warmer temperatures. However, the impact of these and other genotypic changes were smaller than the benefits provided by improved management (conservation farming and higher levels of fertilizer) leading to the conclusion that the impact of climate change for smallholder farmers can in the first instance be mitigated by better agronomic management and increased inputs.

Pigeonpea is a legume and fixes nitrogen from the atmosphere and is usually grown as an inter-row crop in association with maize or sorghum. It is therefore less able to be managed to mitigate yield losses from warming and drying temperatures. Shorter season cultivars increased the yields of pigeonpea, but whether this would fit into the farming system for pigeonpea needs evaluation.

RESEARCH REPORTS

SPEEDING BREEDING IN PASTURE LEGUMES

CLIMA, DAFWA and Future Farm Industries CRC researchers Dr MarieClaire Castello, Dr Janine Croser, Dr Daniel Real, Dr Clinton Revell, Dr Phil Nichols, Mr Brad Nutt and Dr Angelo Loi have joined forces to undertake a pilot project examining ways to accelerate generation cycles in key WA pasture legumes with funding from CLIMA.

One technique under examination is the generation acceleration protocol (GAP) to induce flowering and seed set in vitro.

Following in vitro seed set, the immature seeds are removed from the plant and germinated back into an in vitro environment. Avoiding the seed maturation phase can result in significant time-savings. The number of days to flowering can also be decreased via manipulation of physical and chemical parameters during culture, particularly the photoperiod and the plant growth regulator composition.

Preliminary results have shown French serradella (Ornithopus sativus) and subterranean clover (Trifolium subterraneum) to be particularly amenable to this technique. Successful germination of in vitro derived seed has been achieved in French serradella.

This technique will complement traditional breeding approaches such as single seed descent. It also provides a method of accelerating homozygosity in the absence of a doubled haploid protocol for these species. Development of a doubled haploid system based on recent successes in grain legumes chickpea and field pea is also under investigation for the pasture legumes Tedara (Bituminaria bituminosa var. albomarginata) and French serradella.

by Janine Croser and Marie Claire Castello
Zeferino Mira Belo looks like your average farmer, but really he is leading the pack on farm and on the running and cycling scene in Dili. His neighbours are constantly trying to catch up with him.

ACIAR/AusAID supported “Seeds of Life” project staff member Baslilio Pereira first met Zeferino in 2006 and talked about the new varieties of corn, peanuts and sweet potato the program was testing with farmers. Together they marked out small plots in his mixed garden just outside his back door. It is there they planted his first crop of Sele. Sele is a high yielding yellow maize, adapted well to East Timor.

In the first year, the new maize varieties yielded twice as much as the local corn that he was planting. He was so impressed. But the initial plots were quite small, and there was not much seed for next year. He devised a plan where he could grow the new varieties in the dry season.

This was not an easy task as he had to carry water in a wheel barrow more than 100m to irrigate the corn. But the extra work was well worth it. Not only did the crops grow well, the large yellow cobs were highly prized as a fresh corn. Traders were soon paying a premium for the large fresh cobs, that are quite scarce during the dry season.

During the initial testing, each farmer only received 200g of the new varieties. Many of Zeferino’s neighbours chose not to be involved in the Seeds of Life program, as they only received the small handful of seed. But after they saw Zeferino selling fresh corn cobs during the dry season, they soon lined up to get seed from him.

Zeferino now has his neighbours following his lead, growing the new maize in the dry season, selling the fresh corn at a premium. The local corn has small cobs and sells for about US$0.50 for 8 cobs. The new variety sells at 5 cobs for the same US$0.50. The cobs are bought by traders to sell roast corn on the beach in Dili and sometimes they sell roast corn as a snack food at cock fights.

It is also in the sporting arena that Zeferino has people following. At a recent 10km fun run in Dili, Zeferino joined the Seeds of Life team in competing for the First Lady’s Cup. Amongst hundreds of runners, Zeferino arrived at the finish line as the 8th fastest. At a recent bike ride for peace, Zeferino was the fastest bicycle rider for his district in Baucau. Whether on his bike, running along the road, or growing corn, Zeferino is a difficult man to keep up with.
4TH YEAR STUDENT PROJECTS WITH CLIMA

Ms Nateisha Norrish completed a good 4th year project entitled Early vigour in narrow-leaved lupins – water use efficiency and seed characteristics as part of her Bachelor of Science in Agriculture concluding in 2008.

The project was supervised by Dr Jon Clements (CLIMA) with co-supervision from Dr Erik Veneklaas (Plant Biology, UWA) and Dr Bevan Buirchell (DAFWA). The objectives of the research were two-fold: to investigate if high vigour narrow-leaved lupin genotypes have higher water use efficiency than the common cultivar Mandelup; and to determine whether high vigour genotypes had a higher seed weight, seed density, or larger embryonic axis than non-vigorous types. Water use efficiency, in both well watered and drought treatments, was greater in high vigour genotypes in comparison to Mandelup.

High vigour genotypes produced more biomass under well watered and drought conditions compared with the other genotypes, including Mandelup. High vigour genotypes had the highest seed weight and the longest embryonic axis compared to all other genotypes. Seed density was not associated with vigour, but embryonic axis length appears to bear some correlation with the genotypes’ potential for vigorous growth. The results highlighted that there are genotypes of narrow-leaved lupin with improved early vigour combined with higher water use efficiency. These characteristics could contribute to higher narrow-leaved lupin yields in drought prone environments in southern Australia.

Ms Norrish has gone on to take up employment with an agribusiness products and service company in WA.

Ms Amy Goddard Borger

Grain potential and drought response of the Australian native legumes were the focus of a glasshouse and laboratory based study undertaken by Ms Amy Goddard Borger. The 4th year project was supervised by Drs Heather Clarke (CLIMA) and Megan Ryan (Plant Biology, UWA). Amy’s results suggest that T. suavissima deserves further attention, since it displayed early phenology and produced abundant seed by avoiding terminal drought. It could be suitable for marginal farming land, uneconomical for current grain legume crops, in the dry areas of southern Australia. Cullen cinereum and C. graveolens exhibited good tolerance under severe drought, continuing to grow and photosynthesise while many other species wilted. Overall, the harvest index was low in wild species when compared to a domesticated grain crop but, surprisingly, pods did not shatter. Amy was awarded a GRDC scholarship and a DAFWA studentship for her 4th year program.

Mr Troy Faithful

Mr Troy Faithful successfully finished his 4th year project with Dr Kioumars Ghamkhar as the principal supervisor and co-supervised by Drs Phil Nichols (DAFWA) and Megan Ryan (Plant Biology UWA). Troy’s project dealt with measuring hardseededness (seed germination tests) in two populations of subterranean clover (Trifolium subterraneum) and simultaneously looking at this trait in 15 cultivars of this species. In the latter study, Troy used the already available red clover microsatellite markers for detecting possible associations between these markers and hardseededness. This trait is recognised by breeders as one of the important agricultural traits in the species. Troy’s study found five markers associated with hardseededness, three of them specific to this trait. Further investigation will show whether the detected markers are located in the relevant QTL regions of the genome that control this trait. Troy also confidently defended his results in his interview. Well done, Troy.

CLIMA SEMINAR SERIES

The CLIMA seminar series continues on a monthly basis. Please contact Janine Croser jcroser@clima.uwa.edu.au to suggest topics and speakers.
In July 2006, the Australian Research Council (ARC) awarded Linkage Project funding to researchers at CLIMA and the School of Plant Biology at UWA, the Centre for Comparative Genomics at Murdoch University, DAFWA, CSIRO Plant Industry in Canberra, and Kazusa DNA Research Institute (KDRI) in Japan. The aims were to exploit molecular techniques and markers for measuring genetic diversity of a world collection of subterranean clover and to explore potential linkages between these markers and important agromorphological traits in this species. Linkage projects need an industry partner to jointly support the project with the ARC. DAFWA has been generously supporting this project from the starting date (July 2007), due to its interest in the outputs and longer term outcomes of the project.

Over the last 1.5 years and even before this project started, excellent communication and correspondence between the different parties resulted in better than expected progress in the project. Nevertheless, a need for all research partners to meet and discuss progress and plan future directions prompted the arrangement of a meeting half way through the project. Collaborators gathered at CLIMA for a full day meeting with Professor William Erskine (CLIMA director) and Dr Clinton Revell (Pasture Group Leader at DAFWA). Some of the members of the research group met for the first time and very exciting and fruitful discussions caused the meeting to finish a little later than was originally planned!

I was also given a new title by Professor Erskine: “the Glue of the project” who brought the research team together. I personally benefitted from the discussions and continued to do so over the next few days after further meetings with my guests (Drs Tony Brown from CSIRO and Sachiko Isobe from KDRI) and the “in-house” team members, during separate one to one discussions. I truly enjoyed this experience and look forward to the next one at the end of the project. And … even more exciting news: the team has already agreed on preparing another ARC project proposal for submission in November 2009, to be co-funded by the Japanese Society for Promotion of Science (JSPS).
BRAINSTORMING GRAIN CROPS, YIELD AND ENVIRONMENTAL STRESS AT FLOWERING

by Heather Clarke

Fifteen minds came together at CLIMA in October to brainstorm the issue of yield loss due to environmental stress. Colleagues came from as far away as the Punjab region in India and CSIRO Canberra Australia, and nearby from DAFWA, CSIRO and UWA. New collaborations were forged with determination to tackle the complex problems of achieving tolerance to various environmental stresses. Several factors were revealed in common across research groups, species and stresses.

The morning started with an update of current research covering the topics of climate change, pulse and cereal production, environmental constraints, pollen sterility due to drought in cereals and the role of plant growth regulators, gamete sensitivity to extreme temperatures across species, drought and salinity in chickpea, before moving on to under-utilised tools for breeders including pollen selection and eco-geographical approaches. Once everyone shared the same knowledge, we moved to discussion where issues were prioritised and commonalities were identified across species.

In the afternoon, Dr Rudy Dolferus presented a seminar detailing his recent work in cereal pollen sterility due to drought and cold stress. A major conclusion of the CLIMA workshop was that the latest advances in rice and wheat research will benefit grain legume research, and vice versa that knowledge and tools developed at CLIMA for legume improvement will benefit cereal research.

The session may well have ‘yielded brain loss due to work stress’ had our competent facilitator and CLIMA director, Prof. Willie Erskine, not kept us to the agenda. There’s no doubt that the exercise was extremely useful to the whole group, who were still smiling by the end of the day for a group photo. Look out for future developments in CLIMA newsletters as participants develop new collaborative projects in this area for cereal and grain legume improvement.

Travel costs for participants from India and Canberra were sponsored by CSIRO and an Indo-Australian Department of Education Science and Training project. The workshop was sponsored by CLIMA.
A PERUVIAN TELLS OF HUGE CROP DIVERSITY IN THE LAND OF THE INCAS  by Jon Clements

Mr Enrique Tapia visited CLIMA at The University of Western Australia recently, on a Crawford Fund training award. Mr Tapia is an agronomist from the National University of the Altiplano, Puno, Perú where he works with Dr Angel Mujica on several of the enormous range of native food crops which include lupins, potatoes, corn, quinoa, amaranth and beans. His visit was part of research into developing the Andean lupin (*Lupinus mutabilis* or pearl lupin) in Australia, with the aim of developing international collaboration with Peru. This research hopes to assess the genetic diversity of the lupin species to learn more about the habitats that it is most adapted to, and also plant characteristics that are associated with increased harvest index and yield. In GRDC-funded research (through CLIMA with Dr Jon Clements and DAFWA with Dr Bevan Buirchell), the Andean lupin is being bred for Australian conditions. It is hoped that preliminary collaborative genotype by environment studies with Peru and Australia will lead to a larger project that will do more detailed work on what is expected to be very diverse germplasm within that lupin species and the approximately two hundred related lupin species from South and North America.

Mr Tapia described a group of approximately 20 related lupin species growing in regions surrounding Puno, which had many different seed and growth characteristics which may be of value to Andean lupin breeding. Mr Tapia has also been involved with research into quinoa, a gluten-free healthy grain from the Andean region which is likely to gain more attention in the future. Mr Tapia gave a well-received seminar at CLIMA during which the audience were treated to several hundred photos of Andean crop and animal diversity. The visit is likely to lead to further germplasm and knowledge exchange between Australia and Peru.
### VISITORS TO CLIMA FROM JULY TO DECEMBER 2008

<table>
<thead>
<tr>
<th>Name of visitor</th>
<th>Date</th>
<th>Institution/ Country</th>
<th>Purpose of visit</th>
<th>Name of host</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ms Safa Al Hinaai</td>
<td>21st June - 19 Aug</td>
<td>Sultan Qaboos University, Oman</td>
<td>To undertake training in interspecific hybridisation</td>
<td>Dr Heather Clarke &amp; Prof. Kadambot Siddique</td>
</tr>
<tr>
<td>Prof. Roberto Tuberosa</td>
<td>19-22 Aug</td>
<td>University of Bologna, Italy</td>
<td>To visit and engage with breeders and molecular scientists at DAFWA, CSIRO, UWA and Murdoch University</td>
<td>Prof. Neil Turner</td>
</tr>
<tr>
<td>Dr Andrew Harris &amp; Ms Roza Bali</td>
<td>21 Aug</td>
<td>University of Sydney</td>
<td>To discuss potential projects in nanotechnology</td>
<td>Dr Heather Clarke</td>
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<tr>
<td>Dr Ken Street</td>
<td>9-10 Sept</td>
<td>ICARDA, Syria</td>
<td>To discuss genetic resources research</td>
<td>Prof. Clive Francis</td>
</tr>
<tr>
<td>Dr Alghamdi Dr Alhussein</td>
<td>8 Sept</td>
<td>King Saud University (KSU) Saudi Arabia</td>
<td>To discuss research &amp; teaching collaboration between KSU and CLIMA</td>
<td>Prof. William Erskine</td>
</tr>
<tr>
<td>Dr Colin Hughes</td>
<td>10 – 20 Sept</td>
<td>University of Oxford, England</td>
<td>International lupin Conference and lupin germplasm workshop</td>
<td>Dr Jon Clements</td>
</tr>
<tr>
<td>Prof. Ewa Sawicka-Sienkiewicz &amp; Dr Renata Galek</td>
<td>13 – 26 Sept</td>
<td>Wroclaw University of Environmental &amp; Life Sciences, Poland</td>
<td>International lupin conference, lupin germplasm workshop and discussions regarding lupin interspecific crossing project</td>
<td>Dr Jon Clements</td>
</tr>
<tr>
<td>Dr Maria Campos Andrade</td>
<td>14 – 19 Sept</td>
<td>National Agriculture Station, Lisbon, Portugal</td>
<td>International lupin conference and lupin germplasm workshop</td>
<td>Dr Jon Clements</td>
</tr>
<tr>
<td>Dr Bunyamin Tar’an</td>
<td>22 – 26 Sept</td>
<td>Crop Development Centre, Uni. of Saskatchewan, Canada</td>
<td>To discuss lupin and pulse genetic improvement</td>
<td>Adj. Prof. Tanveer Khan</td>
</tr>
<tr>
<td>Dr Livinder Kaur</td>
<td>22 – 26 Sept</td>
<td>Punjab Agricultural University, Ludhiana, India</td>
<td>To discuss chickpea genetic improvement</td>
<td>Adj. Prof. Tanveer Khan</td>
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<tr>
<td>Dr Dai Sutter</td>
<td>29 Sept</td>
<td>George Weston Technologies George Weston Foods Ltd. NSW</td>
<td>Project meeting for a RIRDC project Discuss potential for new collaboration</td>
<td>Dr Heather Clarke</td>
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<tr>
<td>Dr Rudi Dolferus</td>
<td>6 – 10 Oct</td>
<td>CSIRO Plant Industry, Canberra</td>
<td>To discuss stress tolerance research</td>
<td>Dr Heather Clarke</td>
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<td>Dr JS Sandhu Dr J Kaur Dr Harsh Nayyar</td>
<td>6 Oct</td>
<td>PU, Chandigarh, India</td>
<td>To undertake a pulse breeder meeting and to discuss plant physiology</td>
<td>Dr Jens Berger</td>
</tr>
<tr>
<td>Dr CLL Gowda Dr Pooran Gaur Dr Suresh Pande</td>
<td>11 – 18 Oct</td>
<td>ICRISAT, India</td>
<td>To discuss chickpea genetic improvement</td>
<td>Adj. Prof. Tanveer Khan</td>
</tr>
<tr>
<td>Dr Hari Sharma</td>
<td>14 Oct</td>
<td>ICRISAT, India</td>
<td>To meet with CLIMA staff regarding integrated pest management in chickpea</td>
<td>Dr Heather Clarke</td>
</tr>
<tr>
<td>Mr Enrique Ruiz Tapia</td>
<td>1 Nov - 15 Dec</td>
<td>University of Puno, Peru</td>
<td>Lupin and quinoa germplasm collaboration and training</td>
<td>Dr Jon Clements</td>
</tr>
<tr>
<td>Dr John Harvey &amp; Mr Neil Young</td>
<td>3 Nov</td>
<td>GRDC</td>
<td>To discuss CLIMAs legume research</td>
<td>Prof. William Erskine</td>
</tr>
<tr>
<td>A/Prof. RL Ravikumar</td>
<td>11 – 13 Nov</td>
<td>University of Agricultural Sciences, Dharwad, India</td>
<td>To meet with CLIMA staff</td>
<td>Dr Heather Clarke</td>
</tr>
</tbody>
</table>
### Name of visitor | Date | Institution/ Country | Purpose of visit | Name of host
--- | --- | --- | --- | ---
Dr Tony Brown | 11-16 Nov | CSIRO Plant Industry, Canberra | ARC linkage project meeting | Dr Kioumars Ghamkhar
Dr Sachiko Isobe | 11-18 Nov | Kazusa DNA Research Institute | ARC linkage project meeting and future collaboration | Dr Kioumars Ghamkhar
Dr Brian Keating | 18 Nov | CSIRO Sustainable Ecosystems | Cooperation on legumes in systems | Prof. William Erskine
Dr Toshihiro Hasegawa | 21 Nov | National Institute for Agro-environmental Science, Tsukuba, Japan | Climate change research | Prof. William Erskine
Prof. Geo Xin Cai & Dr Wei Li | 28 Nov | Lanzhou University, China | Cooperation in legume research | Prof. William Erskine
Dr Dyno Keatinge | 11 Dec | World Vegetable Centre, Taiwan | Cooperation in grain legumes | Prof. William Erskine
Mr Ryohei Kataoka | 16 -18 Dec | Kobe University, Japan | Discussing new project ideas of collaboration | Dr Kioumars Ghamkhar

### NEWS OF THE ASSOCIATES

#### THE SEED HUNTER INSPIRES EVERYONE FROM SCHOOL KIDS TO SCIENTISTS

by Clive Francis

‘The Seed Hunter’, edited by Ms Sally Ingleton of 360 Degree Films, which featured the ACIAR supported collection of plant genetic resources in Tajikistan and transfer of seed to an Ice Cave in Svalbard Norway, has won two prestigious awards since its release. It has been judged the winner in the category Best Science, Environment and Technology Documentary in the 2008 Australian Teachers of Media Awards (ATOM). The film has also won the Special Development Prize at the Vaasa Wildlife Film Festival in Finland (2008), and is an entry at The Earth Vision Film Festival, Japan (2009).

The film was a great success when broadcast on National TV in Australia. The ‘Seed Hunter’ himself, Dr Ken Street, notes for reasons of popular appeal, ‘The Seed Hunter’ referred only to grain crop species cereals and chickpea, and failed to mention pasture species, despite the numerous collections made during the course of the CLIMA initiated project. This project has seen the introduction of over 4000 crop and pasture species into Australian collections.

The numerous collection missions were made possible through the financial support of ACIAR (Australian Centre for International Agricultural Research) and CLIMA. The series of collection missions in the Central Asian Republics and Caucasus were coordinated by Dr Ken Street, now of the International Center for Agricultural Research in Dry Areas (ICARDA). The infrastructure support of Ms Natalya Rukhkyan at The Institute of Botany, Yerevan, Armenia, and availability of specialist staff of the Vavilov Institute, St Petersburg, Russia, were major factors in the success of the missions.

Ken, with the support of Ms Ingleton, has produced a blog designed to address some of the ‘Seed Hunter’ deficiencies and notes Ken’s training for his PhD at the UWA Institute of Agriculture under the supervision of pasture specialist Professor Phil Cocks and the key role of another pasture guru Prof Clive Francis in initiating the Central Asia and Caucasus project.

Full details of the follow up to ‘The Seed Hunter’ can be seen on the internet: http://www.seedhunter.com/article-so-what-about-pastures.html

#### GRADUATE LEADS LEGUME RESEARCH IN NEPAL

Dr Renuka Shrestha has been a key player in CLIMA’s long running ACIAR project in Nepal “Lentil and Lathyrus in the cropping systems of Nepal” (CSI/1999/064). Recently, Renuka was appointed leader of the National Grain Legumes Research Program (NGLRP). Renuka, who completed her PhD at CLIMA (UWA)/CSIRO during the project, was supported by the Crawford Fund. During this time, Professor Neil Turner was her major supervisor.

Renuka is now based at Rampur just north of the tiger country near Chitwan. She maintains close links with CLIMA and can be contacted at: nglrp_rampur@hotmail.com
The 12th International Lupin Conference was held in Fremantle September 14-18. The conference brought together over 150 delegates from within Australia and around the world. Co-convened by Mark Sweetingham and Jon Clements with an organising committee made up of staff from DAFWA, CSIRO, UWA and industry groups, the conference with the theme “Lupins for health and wealth” covered a wide range of topics including breeding, agronomy, animal and human health and nutrition. Sponsors included Agricultural Research Western Australia (ARWA), the Grainpool, GRDC, the CRC for Plant Biosecurity, DAFWA, UWA and CLIMA. Several CLIMA staff and associates gave oral presentations. Some highlights included the use of lupins for promoting human health (lowering cholesterol and obesity) and the versatility of lupins for use in foods such as bread, noodles and pasta, sausages, snack foods and in commodities such as chocolate and milk substitute drinks. Although global production of lupins has declined since the 1996-2000 period, new opportunities such as food and aquaculture end-uses and the role of lupins in providing soil nitrogen could revive interest in the crop for profitable and sustainable agricultural systems. Currently, the major lupin-producing countries are Australia, Chile, Poland and France. Use of lupins as a forage has recently increased in the UK. Plenary speaker, Dr Soon-Bin Neoh, a director of a flour mill company in Malaysia, gave a list of recommendations for future lupin development to promote their use in food. These included increasing the protein content of narrow-leafed lupin to levels similar to yellow lupin, decreasing seed coat, promoting further the health claims for lupins, more marketing and application research and better promotion into the aquaculture and pig feed industries.

A paper by CLIMA visitor, Dr Colin Hughes highlighted the enormous species diversity available in lupins, especially from North and South America, that many people have not been aware of. A symposium “Lupins & Diabesity: Food For Thought” organised by the Centre for Food and Genomic Medicine, Western Australian Institute for Medical Research was attended both by the public and delegates and it raised awareness of the potential of lupins in healthy diets. Field tours were organised to Wongan Hills Research Station and a “Lupin Processing” tour took in several Perth sites including the lupin dehulling plant in Forestfield. A number of delegates attended post-conference meetings including a molecular marker use and implementation workshop at UWA, a lupin germplasm discussion session held at CLIMA, an aquaculture workshop and a food and health meeting. It has been proposed that the next conference be held in Poland in 2011.
This recent international conference on induced mutations in plants was jointly organized by the Food and Agriculture Organization (FAO) and the International Atomic Energy Agency (IAEA) of the UN and held at the IAEA headquarters in Vienna, Austria with the high security measures standard to the UN complexes. More than 460 delegates representing 82 countries and 9 UN organizations attended this conference. China sent the largest group of more than 50 scientists. Five out of seven Australian delegates of various states presented their research to the large audience. Prof Peter Gresshoff of The University of Queensland addressed a plenary session on “Mutational and functional genomic analysis of systemic and local regulation of legume nodulation”. My oral presentation on induced lupin mutants with improved metribuzin tolerance was well received in the Concurrent Session I “Mutational enhancement of genetic diversity and crop domestication”. Several people said to me afterwards that they would try my method when they got back home.

This conference was a good forum for learning. Many new technologies and much knowledge have been generated since the last conference of this kind held in 1995. The methods of inducing mutation have evolved from simple exposure to radiation or chemical mutagens to the reach of outer space by satellites. There were enormous numbers of successful examples of mutation breeding for the improvement of plants for human benefits, ranging from food production, nutrition to adaptation to climate change. According to the records of FAO/IAEA, over 2700 new crop varieties in some 170 species have been officially released to farmers over the last 50 years. The simple procedures of chemically induced mutation joining forces with molecular technologies have generated new technologies such as TILLING and reverse genetics. These technologies have allowed the identification of more variation in various traits than has been detected in the previous 25 years and better understanding of the complex interactions between individual genes and between genes and environment. Scientists have also made progress towards better understanding of mutagenesis mechanisms in terms of DNA damage, repair and genome stability. Before the end of the conference, I was fully convinced that induced mutation is an effective tool not only for plant improvement, but also for understanding various biological processes.
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