

“SEEDS OF LIFE” PROGRAM IN EAST TIMOR SUCCESSFULLY REVIEWED



Australian Team Leader, Rob Williams and Seeds of Life technician Roginio, compare yields of newly released and traditional peanut varieties in Baucau, East Timor.

by Dr Harry Nesbitt

Seeds of Life - East Timor was recently reviewed and extended for a further three years. The reviewers were extremely complimentary of the program’s progress and made a number of recommendations for expanding both the activities and funding. Seeds of Life is a program within the Ministry of Agriculture Forestry and Fisheries (MAFF) supported by Australia with funding from the Australian Agency for International Development (AusAID) and the Australian Centre for International Agricultural Research (ACIAR). The Australian funding is managed by the University of Western Australia (UWA) through the Centre for Legumes in Mediterranean Agriculture (CLIMA) under ACIAR project no CIM/2003/014.

The strength of Seeds of Life lies in the ability of the program to both identify and distribute improved varieties of key food crops. Varieties imported from crop centres belonging to the Consultative

Group on International Agricultural Research (CGIAR) is evaluated on research stations, followed by on-farm trialling across a range of ecosystems. Because Seeds of Life is part of the MAFF, it is then a simple process for the Minister to recommend the most promising lines for release and to facilitate their spread through the Government seed production system.

Since the beginning of the program in September, 2005, varieties of maize, rice, cassava, sweet potato and peanut have been evaluated on research stations and on-farm. During that time, more than 1600 on-farm trials were installed by the small team based in Dili, the country’s national capital. Between two and four replicated trials of each species will continue to be installed on research stations each year to access the latest breeding material appropriate for evaluation under East Timorese conditions.

Contents

FEATURE ARTICLE

“Seeds of Life” successfully reviewed 1

FROM THE DIRECTOR 2

RESEARCH REPORTS

Gap finding study authenticated 3

Honours projects with CLIMA 3

“Five rivers of knowledge” to study chilling tolerance 4

“Mother grain” as an alternative crop in Australia 5

New research grants funded by UWA 5

CLIMA EXTENSION

CLIMA celebration 6

UWA Expo 7

What’s new on the website 7

Publications 7

VISITORS and TRAVEL NEWS

French student hosted 9

Visitors list 9

Welcome back Oonagh! 5

Yield improvements of the introduced modern compared with traditional varieties are impressive. For example, yields of modern yellow maize composites and introduced sweet potatoes are double those of locals under research station conditions. Yield increases of approximately 50% are experienced for other crops. This magnitude of yield advantage is repeated in farmers’ fields in most non-replicated trials. Farmer taste and acceptability evaluations were conducted during field days in 2005 and 2006 and the combined results led to the release in 2007 of two maize, three sweet potato, one peanut and one rice variety for seed increase and distribution to farmers.

The review team recommended an expansion in the program’s technical assistance to the Government’s seed multiplication activities to keep pace with increasing demand for these varieties.

FROM THE ACTING DIRECTOR



Dr Jon Clements
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Since the April 'Beanstalk' edition, CLIMA has evolved into CLIMA III with the opportunity for it to develop an exciting new phase and to adapt to suit the changing trends in Agricultural research in Australia and internationally. As of July 1, 2007, CLIMA III operates as a University Research Centre, with the previous MOU among the alliance partners (DAFWA, Murdoch University, CSIRO and UWA) lapsing. The mission of the University is focusing on international excellence and therefore UWA is committed to maintaining CLIMA as a locally and internationally relevant Research Centre. The CLIMA II celebration at the end of May highlighted the many successes in the past for CLIMA upon which a new phase can build on but develop even further.

New CLIMA Director

During June this year, candidates were interviewed for the position of new Director of CLIMA and the seminars that were part of this interview process provided some excellent exposure to international legume research. The announcement was made in July by Professor Alistar Robertson that Dr Willie Erskine from International Centre for Research in the



In-coming CLIMA director Dr Willie Erskine presenting his seminar at UWA.

Photo by Art Diggle

Dry Areas (ICARDA), Syria has accepted the appointment. Congratulations to Willie on behalf of all CLIMA staff and associates! Dr Erskine's experience in legume germplasm and breeding research spans more than 30 years, including periods at The University of Papua New Guinea, the International Board for Plant Genetic Resources (IBPGR, now Bioversity) and then ICARDA as a lentil breeder, followed by Germplasm Improvement Program Leader and finally as Assistant Director General for Research. He is expected to start in the position at CLIMA early in January, 2008.

Goodbyes

A note of thanks to staff who have recently left CLIMA: Dr Debbie Thackray, CLIMA's Communications Officer, has moved to a position as Research Development Officer with Research Services at UWA. We said our goodbyes in a great send-off celebration back in April but we wanted to say again that you did an incredible job Debbie and the place is not the same without you. Delightfully though, we are seeing a lot of Debbie through various Research Services activities. Prof Neil Turner retired from his Directorship of CLIMA in June this year and a big lunch was enjoyed by CLIMA and other UWA staff and CLIMA associates with him. Neil and his wife went on an extensive trip to Australia's north and he is back now part-time, working on several projects as an Adjunct Professor with UWA – thank you once again Neil for your excellent leadership and on-going support for CLIMA. Mr David Green, who assisted in ordering and accounting, left CLIMA in April and thanks are extended to David for his work with us for several years – he will be missed. Ms Helen Bowers worked with Dr Heather Clarke on chickpea hybridization research – thank you for your excellent contribution. Helen is now travelling in Europe and intends to begin a PhD back in Perth. Also Kerry Regan, who has had a long association with CLIMA pulse work, moves from her positions at UWA and DAFWA to a new role relating to women in agriculture at DAFWA. Thank you Kerry for your great work in the pulses arena – we will miss you but will no doubt still see you in the future.

CLIMA Research

CLIMA's work continues with major ongoing projects that include: the "Seeds of Life" cropping development program in East Timor (Harry Nesbitt) (ACIAR), interspecific crossing in chickpea (Heather Clarke) (GRDC), interspecific crossing

in lupin (Julia Wilson, John Quealy and Jon Clements) (GRDC), double haploid development in field pea and chickpea (Janine Croser and Kylie Edwards) (ARC), herbicide tolerance in lupins and pulses (Ping Si and John Quealy) (GRDC), germplasm evaluation and core collection development in Trifolium species (Kioumars Ghamkhar) (ARC), alternative oilseed crop development (Margaret Campbell and Clive Francis), pearl lupin breeding and agronomy (Mark Sweetingham and Jon Clements) (GRDC) and development of decision support systems to predict virus risk in lupin/canola crops (Tim Maling, Debbie Thackray, Art Diggle) (ARC). Additional project examples include Australian native legume research (Heather Clarke) (RIRDC) and improving chilling tolerance in chickpea in Australia and India (Jens Berger and Heather Clarke) (DEST). Several CLIMA internal startup grant projects are in progress and we intend to fund more of these next year. This is an investment in data collection or strengthening collaborative links to support larger project funding applications.

CLIMA visitors

CLIMA has benefited from visits from national and international researchers thanks to staff who have invited them (see the list in this newsletter) and participation in several Institute of Agriculture activities including visits by WANTFA and a group of agronomists from South Australia. I enjoyed participating in a Grower Group Alliance and Local Farmer Group Network forum. Several priorities for research that were highlighted were better herbicide options/tolerance for legumes and other crops; more profitable lupins; support for GM sources of herbicide resistance and potentially other traits such as frost and salt tolerance; different oilseed options for growers. Many of the priorities fit well with CLIMA's area of expertise and interest.

One final note is to thank Professor Alistar Robertson (Dean of the Faculty of Natural and Agricultural Sciences, UWA), Professor Kadambot Siddique (Director UWA Institute of Agriculture) and Professor Hans Lambers (Head of School of Plant Biology, UWA) for their support of CLIMA staff and myself, especially during this interim phase prior to the arrival of the new Director of CLIMA early next year. Thanks also to Professor Clive Francis (CLIMA Deputy Director) for his on-going input and encouragement for staff.

RESEARCH REPORTS

GAP FINDING STUDY AUTHENTICATED

by Richard Snowball

The development of better pasture varieties for drier parts of the southern Australian wheat belt is set to benefit from a GRDC-funded CLIMA project.

A historic plant record found in the herbarium at the Hebrew University of Jerusalem is the first case that confirms findings in an ecogeographical study of bladder clover (*Trifolium spumosum*). The characteristics of the collection sites of the current collection of *T. spumosum* originating from the Mediterranean basin were recently studied in the CLIMA project undertaken by Dr Kioumars Ghamkhar (CLIMA) under my supervision. The study identified many gaps in the seed collection of *T. spumosum*. These gaps are areas within the ecoregions and sub-ecoregions defined in this study where the species is expected to be found based on existing knowledge, but where no collections have yet been made. An example of such an area listed is Wadi Al Jayb in Jordan next to the Israeli Border.

Following my inquiry for further information on plant collections from that region, recent communications between Dr Rivka

T. spumosum was reported by A. Liston in 1983 from the Arava Valley, 70km south of the Dead Sea on the edge of Wadi Al Jayb on the Israeli side of the border with Jordan. This is an exciting revelation as it gives confidence to the results of the gap finding study undertaken by Dr Ghamkhar and myself. It is essential to confirm the herbarium record, and this will be attempted through an inter-herbaria transfer of the specimen to Perth.

The next step will be to access seed from this site in the Arava Valley. If successful it will represent the most southerly and driest location of *T. spumosum* in the collection. Seed collections of this species made in 2006 from dry sites in Israel are already showing promise in nursery rows at the Medina

Research Station. Seed collected from the Arava Valley would almost certainly add significant value to plant improvement efforts for drier parts of the southern Australian wheat belt.



Wadi Al Jayb, the area suggested for the next gap filling collection.

Hadas, Curator of the Israeli Genebank at the Volcani Center, and the herbarium in Jerusalem led to the discovery of several old records of a number of important pasture legumes. One record shows that

HONOURS PROJECTS WITH CLIMA

by Dr Ping Si

This year we have had a 4th year UWA student Mr Muhamad Ansar Kamsan undertaking his research project in yellow lupin with CLIMA scientist Dr Ping Si and Dr Guijun Yan School of Plant Biology. Ansar investigated genetic variation in herbicide tolerance in yellow lupin and found some germplasm accessions with higher tolerance to metribuzin or carfenrazone-ethyl than yellow lupin cultivar Pootallong. Dr Kedar Adhikari of DAFWA provided germplasm and was pleased with the information on these valuable accessions. Due to his dedication, Ansar got second class honours for his research project. Well done Ansar!

CLIMA scientists are keen to supervise 4th year Honours students on research projects as part of our contribution to the teaching activities of UWA. So far, two students have shown interest in undertaking research projects with CLIMA next year, but more are welcome. CLIMA will provide some financial support towards honours projects from next year.



Ping Si, Ansar Kamsan and Guijun Yan examining the yellow lupin experiments.

'FIVE RIVERS OF KNOWLEDGE' TO STUDY CHILLING TOLERANCE IN CHICKPEA

by Drs Heather Clarke and Jens Berger

Punjab means 'The Land of Five Rivers'. Our visit in August was to Ludhiana and Chandigarh in The Indian Punjab, where we gained an impression of the wide open plains, immense areas for agriculture and a strong sense of history and ancient culture. The importance of farming in this area is evident from the fact that Ludhiana has a large university, Punjab Agricultural University (PAU), dedicated to all facets of agriculture, with enviable field research facilities right in the centre of campus. Not far away in the state's capital, Chandigarh, Panjab University (PU) also has a strong focus on agriculture and science. With chickpea being a major crop and basic food in India, Jens and I found ourselves in a sort of chickpea researcher 'paradise'.

New links are being forged between researchers and breeders in Western Australia and the Indian Punjab with the help of Department of Education, Science and Training (DEST) funding. The new project, 'Eco-geographical and physiological approaches to improve chilling tolerance in chickpea in Australia and India', started with our Punjab trip in August for the first planning meeting. The change from spring to winter sown chickpea in many regions throughout the world, means that the crop encounters low temperature during pod set in many of its production areas. In India, chickpea grown in the northern plains have delayed podding and unreliable yield as a result of low temperature. Recent research at Panjab University demonstrated wide variation among local germplasm and highlighted traits which contribute to tolerance in the plant. In Australia, research at CLIMA has already improved chilling tolerance in Australian cultivars and lowered the threshold for pod set from a mean of 15°C to below



Tea meeting at Panjab University, Chandigarh: L-R sitting, Jagmeet Kaur (PAU), Hari Upadhyaya (ICRISAT), Harsh Nayyar (PU), Jens Berger (CSIRO), Heather Clarke (CLIMA) and J.S. Sandhu (PAU), with PU students standing.

12°C. To push the limit below 10°C in new material being developed in the West Australian Council of Grain Grower Organisations (COGGO) funded Desi Chickpea Improvement Programme (Dr Tanveer Khan), we need to target better chilling tolerant genetic resources, and to improve our understanding of inheritance and the physiology of tolerance. Breeders at PAU have existing links with Tanveer's programme, as well as years' of experience in chickpea breeding.

In the next three years, we will combine our skills and resources to breathe some new life, ideas and genetic resources into solving the chickpea chilling problem. In the first instance, eco-geographic data will be used to define the crop's environments and growing seasons across the global habitat range. Germplasm will then be targeted from regions with lowest temperatures during the reproductive phase of the crop.

This material will be evaluated for chilling tolerance in the field in Northern India, and some of the collection will be evaluated in South Western Australia. The physiology of reproductive chilling tolerance in chickpea will be studied both in material in the field, and at a more detailed level during controlled environment experiments.

We like to think of this project as a meeting of five rivers of knowledge, from CSIRO (Jens Berger, project co-ordinator), CLIMA (Heather Clarke and Kadambot Siddique), DAFWA (Tanveer Khan), PAU (J.S. Sandhu, Jagmeet Kaur and S. K. Gupta) and PU (Harsh Nayyar). The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT, Hari Upadhyaya), India, and the International Centre for Agricultural Research in Arid Areas (ICARDA, Ken Street), Syria, also have important roles for genetic resources in the project.

CLIMA SEMINARS 2008

The CLIMA seminar series will continue in 2008 on a monthly basis.

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to suggest topics and speakers. In particular, we value the earliest possible advice of seminars offered by visitors.

“MOTHER GRAIN” AS AN ALTERNATIVE CROP IN AUSTRALIA

by Dr Jon Clements and Gordon Francis

Quinoa (*Chenopodium quinoa* Willd., pronounced *keen-wa*) was one of the three staple foods, along with corn and potatoes, of the Inca and pre-Inca civilizations. It has been eaten continuously for 5,000 years by people who live on the mountain plateaus and in the valleys of Peru, Bolivia, Ecuador, and Chile. Their descendants, the Quechua and Aymara peoples who live in rural regions still use it as an important food crop. Quinoa means “mother grain” in the Inca language. Quinoa is considered to be a “pseudo-cereal” and its grain contains more protein (16-20%) than other cereal grains such as rice and wheat. Quinoa’s protein is of an unusually high quality with an essential amino acid balance close to the ideal and similar to milk. The protein is high in lysine, methionine and cystine and makes it an excellent food additive to boost the protein value of other cereals and legumes (eg. soybean) which are either low in lysine or low in methionine and cystine. It can be eaten as a grain in many recipes as a unique food. Perfect for vegetarians, allergy sufferers and the health conscious, it is gluten free, low allergy, low GI, high in iron, magnesium, potassium and calcium.

We have imported approximately 30 accessions of *Chenopodium quinoa* germplasm and are currently seed-increasing these at the University Field



Jon Clements and Gordon Francis with Quinoa germplasm growing at the University Field Station in Shenton Park 2007.



Station to begin a preliminary assessment of the crops potential for Western Australia. Funding for this intended research is currently being sought. The germplasm varies in many aspects including plant growth habit, flowering time, flower colour, saponin content and size of seed. The species has some good characteristics that could help it to fit into our agricultural systems because it is reported to be salt and drought tolerant, requiring low fertilizer

input, adapted to a wide range of soil types and it could provide another break crop alternative in cropping rotations. The plant is primarily in-breeding and variation for photoperiod response will be sought, to help achieve ideal flowering times combined with large biomass. Gordon Francis recently found references to use of related Australian species of *Chenopodium* by Australian aboriginal people for food, possibly for thousands of years.

NEW RESEARCH GRANTS FUNDED BY UWA

Congratulations to Drs Janine Croser and Ping Si of CLIMA on their recent success in winning UWA Research Grants Scheme funding for pilot projects on oilseed crops. Oilseed Brassicas are Ping’s old favourite and she will be investigating the feasibility of producing hexaploidy Brassica through interspecific crossing. Janine’s new project focuses on improving a high omega-3 oilseed *Camelina sativa* using her biotechnological skills.

Congratulations also to Dr Kioumars Ghamkhar on his success in winning the Faculty Start-up Fund to investigate genetic diversity in *Trifolium* by measuring DNA content.

WELCOME BACK OONAGH!

Dr Oonagh Byrne re-joins CLIMA after spending the best part of a two year career break tending to the needs of family. Oonagh has been appointed through Plant Biology in association with CLIMA as a Research Associate on a four-year ARC Linkage Project entitled “Fast tracking pea weevil resistance into field pea cultivars through interspecific hybridisation”. Oonagh completed her PhD in 2005, prior to which she worked as a CLIMA Research Officer in CLIMA from 1997 to 2004. Her current research interests include germplasm enhancement, development of novel screening techniques and plant-insect defence mechanisms. Welcome back Oonagh!



CLIMA EXTENSION

A DAY OF CELEBRATION

by John Quealy



Prof. Bob Lindner (UWA), Dr Heather Clarke (CLIMA) and Mick Poole (CSIRO) enjoying the celebration dinner.

Photo: Julia Wilson

On Thursday 31 May 2007, there was a CLIMA celebration which included past and present Industry Advisory Group (IAG) and CLIMA Board members as well as staff and research associates from CSIRO, DAFWA, Murdoch University, The Chemistry Centre, and other institutions who have worked on CLIMA projects over the years. The celebration was for the commencement of CLIMA III as a University Centre within the Faculty of Natural and Agricultural Sciences (FNAS). CLIMA started off as a Co-operative Research Centre (CLIMA I) in 1992 and, when CRC funding ceased, became a research Alliance (CLIMA II) with 4 partners in 2001.

The celebration of this transition was taken very seriously by all staff. On the week commencing 28th May staff were pre-occupied with all the necessary preparations for the big day. On Thursday morning, there was a CLIMA board meeting followed by an IAG meeting, before an informal lunch was served in the boardroom. The 2005-06 Biennial Research Reports were released (available on the website: www.clima.uwa.edu.au/publications).

A half-day forum was held in the afternoon and attracted about 80 people associated with CLIMA since its beginning. The Dean of FNAS, Professor Alistar Robertson, chaired the forum and introduced

UWA Vice Chancellor Professor Alan Robson, the first director of CLIMA, who summarized the evolution of the CLIMA partnership between UWA, the Department of Agriculture and Food WA, CSIRO and Murdoch University. Research highlights during the CLIMA II phase were presented by scientists. These highlights included variety development of grain and pasture legumes, characterizing and

utilizing germplasm of grain and pasture legumes, the ecophysiological approach to the understanding of adaptation of chickpea in Australia and new generation molecular tools for legume breeding. Finally, Professor Neil Turner (Interim CLIMA Director) outlined the research activities to be continued in CLIMA III. The Forum presentations can be viewed and listened to on the CLIMA website www.clima.uwa.edu.au.

Finally, a dinner was held at the Matilda Bay restaurant. This provided a pleasant setting with the river in the background on a still moon-lit night. Whilst enjoying the food and wine a couple of final speeches were delivered. Professor Alistar Robertson did not hold back in congratulating director of CLIMA II Professor Kadambot Siddique on the fantastic job he did in attracting research funding to CLIMA through his energetic leadership and commercial know-how. The final speech was delivered by an experienced speechmaker and legend in Agriculture, Professor Clive Francis. In his usual fashion, Clive made everyone laugh whilst retracing the formulation and early history of CLIMA. He finally delivered a little prize to Jan Peters who amongst numerous other duties did such a good job in putting together the 2005-06 CLIMA Biennial Research Report and others before that, over her many years with CLIMA.



Mr Merv McDougal (Pulse Australia), Mr Mick Poole (CSIRO) and Dr Phil Nichols (DAFWA) at the dinner.

Photo: Julia Wilson

UWA EXPO 2007

by Dr Ping Si

The theme of plant, seed and food was presented by CLIMA staff at the UWA EXPO on 19th August 2007 which attracted the interest of all sorts of people. It was a great day for CLIMA to make a connection with the wider community. School students were keen to observe

the young embryos of chickpea and field pea under a microscope. Many urban people were learning about the connections between plant, seed and food in grain legumes. Some people wanted to know where they could buy lupin flour. It was most interesting to see the surprise on the faces of some migrants from Canada and Italy that Western Australians grow these legumes as well.

WHAT'S NEW ON CLIMA'S WEBSITE

www.clima.uwa.edu.au

- **CLIMA Celebration Forum – audio and visual files of the presentations**

<http://www.clima.uwa.edu.au/home>

- **CLIMA newsletter November 2007**

<http://www.clima.uwa.edu.au/news/newsletter>

- **Press releases since the last newsletter**

<http://www.clima.uwa.edu.au/news/press>

“Super model on show on green bridge” (3 may)

“The good oil on mustard” (30 may)

“Three phase power to spark clima” (13 june)

- **Seminar series updates**

<http://www.clima.uwa.edu.au/seminars>

- **CLIMA Biennial Report 2005-2006**

<http://www.clima.uwa.edu.au/publications>

CLIMA PUBLICATIONS LIST – 2007

We have been notified of the following publications in 2007. Publications prior to 2007 are included in the 2003, 2004, 2005 and 2006 CLIMA publications lists which are on the website: www.clima.uwa.edu.au under “publications”. We encourage all CLIMA staff and associates to forward 2 hard copies of your CLIMA-related publications to CLIMA's Director.

Scientific Journals

Basu, P.S., Berger, J.D., Turner, N.C., Chaturvedi, S.K., Ali, M. and Siddique, K.H.M. (2007). Water use efficiency: Osmotic adjustment of chickpea (*Cicer arietinum*) is not associated with changes in carbohydrate composition or leaf gas exchange under drought. *Annals of Applied Biology*, **150**: 217-225.

Bramley, H., Turner, N.C., Turner, D.W. and Tyerman, S.D. (2007). Comparison between gradient-dependent hydraulic conductivities of roots using the root pressure probe: the role of pressure propagations and implications for the relative roles of parallel radial pathways. *Plant, Cell and Environment*, **30**: 861-874.

Coutts, B.A., Walsh, J.A. and Jones, R.A.C. (2007). Evaluation of resistance to *Turnip mosaic virus* in Australian *Brassica napus* genotypes. *Australian Journal of Agricultural Research*, **58**: 67-74.

Danehlouepour, N., Yan, G., Clarke, H.J. and Siddique, K.H.M. (2007). Diallel analyses reveal the genetic control of resistance to ascochyta blight in diverse chickpea and wild *Cicer* species. *Euphytica*, **154**: 195-205.

Ghamkhar, K., Snowball, R. and Bennett, S.J. (2007).

Ecogeographical studies identify diversity and potential gaps in the largest germplasm collection of bladder clover (*Trifolium spumosum* L.). *Australian Journal of Agricultural Research*, **58**: 728-738.

Jones, R.A.C., Coutts, B.A. and Hawkes, J. (2007). Yield-limiting potential of *Beet western yellows virus* in *Brassica napus*. *Australian Journal of Agricultural Research*, **58**: 788-801.

Kamphuis, L.G., Williams, A.H., D'Souza, N.K., Pfaff, T., Ellwood, S.R., Groves, E.J., Singh, K.B., Oliver, R.P. and Lichtenzweig, J. (2007). The *Medicago truncatula* reference accession A17 has an aberrant chromosomal configuration. *New Phytologist*, **174**: 299-303.

Nasar-Abbas, S.M., Plummer, J.A., Siddique, K.H.M., White, P.F., Harris, D. and Dods, K. (2007). Nitrogen retards and oxygen accelerates colour darkening in faba bean (*Vicia faba* L.) during storage. *Postharvest Biology and Technology*, (in press).

Nasar-Abbas, S.M., Plummer, J.A., Siddique, K.H.M., White, P.F., Harris, D. and Dods, K. (2007). Cooking quality of faba bean after storage at high temperature and the role of lignins and other phenolics in bean hardening. *LWT – Food Science and Technology*, (in press).

Nichols, P.G.H., Barbetti, M.J., Sandral, G.A., Dear, B.S., de Koning, C.T., Lloyd, D.L., Evans, P.M., Craig, A.D., Si, P. and You, M.P. (2007). Coolamon subterranean clover (*Trifolium subterraneum* L. var. *subterraneum*). *Australian Journal of Experimental Agriculture*, **47**: 223-225.

Nichols, P.G.H., Sandral, G.A., Dear, B.S., de Koning, C.T., Lloyd, D.L., Evans, P.M., Craig, A.D., Nutt, B.J., Barbetti, M.J., Si, P. and You, M.P. (2007). Izmir subterranean clover (*Trifolium subterraneum* L. var. *subterraneum*). *Australian Journal of Experimental Agriculture*, **47**: 226-229.

O'Keefe, D.C., Berryman, D.I., Coutts, B.A. and Jones, R.A.C. (2007). Lack of Seed Coat Contamination with *Cucumber mosaic virus* in Lupin Permits Reliable, Large-Scale Detection of Seed Transmission in Seed Samples. *Plant Disease*, **91**: 504-508.

Palta, J.A., Turner, N.C., French, R.J. and Buirchell, B.J. (2007). Physiological responses of lupin genotypes to terminal drought in a Mediterranean-type environment. *Annals of Applied Biology*, **150**: 269-279.

Shan, F., Clarke, H.J., Yan, G., Plummer, J.A. and Siddique, K.H.M. (2007). Identification of duplicates and fingerprinting of primary and secondary wild annual *Cicer* gene pools using AFLP makers. *Genetic Resources and Crop Evolution*, **54**: 519-527.

Siddique, K.H.M., Regan, K.L. and Malhotra R.S. (2007). Registration of 'Nafice' Kabuli Chickpea. *Crop Science*, **47**: 436.

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Registration of 'Almaz' Kabuli Chickpea Cultivar. *Crop Science*, **47**: 437.

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Turner, N.C., Palta, J.A., Shrestha, R., Ludwig, C., Siddique, K.H.M. and Turner, D.W. (2007). Carbon Isotope Discrimination is not Correlated with Transpiration Efficiency in Three Cool-Season Grain Legumes (Pulses). *Journal of Integrative Plant Biology*, **49** (10): 1478-1483.

Vadez, V., Krishnamurthy, L., Serraj, R., Gaur, P.M., Upadhyaya, H.D., Hoisington, D.A., Varshney, R.K., Turner, N.C. and Siddique, K.H.M. (2007). Large variation in salinity tolerance in chickpea is explained by differences in sensitivity at the reproductive stage. *Field Crops Research*, **104**: 123-129.

Webster, C.G., Coutts, B.A., Jones, R.A.C., Jones, M.G.K. and Wylie, S.J. (2007). Virus impact at the interface of an ancient ecosystem and a recent agroecosystem: studies on three legume-infecting potyviruses in the southwest Australian floristic region. *Plant Pathology*, **56**: 729-742.

Books/Chapters

Asseng, S. and Turner, N.C. (2007). Modelling genotype x Environment x Management Interactions to improve yield, water use efficiency and grain protein in wheat. In: J.H.J. Spiertz, P.C. Struik and H.H. van Laar (eds.). 'Scale and Complexity in Plant Systems Research: Gene-Plant Crop Relations', Springer, pp. 91-102.

Knight, J.D. and Thackray, D.J. (2007). Decision Support Systems. In: H.F. van Emden and R. Harrington (eds.). 'Aphids as Crop Pests', CABI, U.K., pp. 677-688.

Toker, C., Lluch, C., Tejera, N.A., Serraj, R. and Siddique, K.H.M. (2007). Abiotic stresses. In: S.S. Yadav, R. Redden, W. Chen and B.B. Sharma (eds.), 'Chickpea Breeding and Management'. CABI, U.K., pp. 474-496.

Conference Publications

Si, P. (2007). Accumulation of oil and protein in seeds of canola (*B. napus* L.) varieties at different sowing dates. *Proceedings of the 12th International Rapeseed Congress, 26-30 March 2007, Wuhan, China*. Fu T. and Guan C. (eds) Volume III. *Agronomy*, pp 15-17.

VISITORS AND TRAVEL NEWS

FRENCH STUDENT by Dr Janine Croser

CLIMA researcher Dr Janine Croser recently hosted third year French student Mr Emmanuel Koen from the Etablissement National D'enseignement Supérieur Agronomique de Dijon, for a six-week training period. Emmanuel worked with several CLIMA researchers on a variety of projects, including chickpea and field pea doubled haploidy, chickpea and lupin interspecific hybridisation, and ecogeography of trifolium genetic resources. Emmanuel's enthusiasm for science and capacity for hard work were appreciated by all who worked with him. His full social calendar meant he thoroughly enjoyed his time in Perth. We may not have seen the last of Emmanuel as he hopes to return next year to continue his training within CLIMA. I am sure all would be very pleased to make him welcome at any time in the future.



Emmanuel with CLIMA researchers Janine Croser, Heather Clarke, Kylie Edwards and Helen Bowers.

CLIMA VISITORS - JUNE DECEMBER 2007

Name	Date	Institution/ Country	Purpose of visit	Host
Mr Neil Young, Ms Bronwen MacLean, Prof. Richard Oliver	12th June	GRDC	Review of CLIMA activities	Prof. Neil Turner
Mr Emmanuel Koen	8 th July - 17 th August	Dijon University France	To undertake a 6 week training with CLIMA scientists	Dr Janine Croser
Dr Mahmoud Solh	24th August	Director General, ICARDA, Syria	Visit to the Institute of Agriculture	Prof. KHM Siddique
Dr Dai Sutter	5th September	George Weston Foods Ltd., New South Wales	Project meeting for RIRDC project on Native Grain Legumes and meeting with CLIMA scientists	Dr Heather Clarke
Prof. Hu Liyong, Prof. Yang Guozheng	6 th – 14 th September	Huazhong Agricultural University, China	Scientific exchange of information and Seminar presentation	Dr Ping Si
Mr Neil Young	17 th September	GRDC	General discussion	Dr Jon Clements
Dr J. S. Sandhu	16 th -27 th September	Punjab Agricultural University, India	Project meetings for the COGGO/ ICRISAT/DAFWA/CLIMA project and the Indo-Australian DEST/CSIRO project.	Adj. Prof. Tanveer Khan
Dr Mathew Abang	19 th -21 st September	ICARDA, Syria	Meeting with Australian participants in ACIAR	Bill MacLeod
Dr Pooran Gaur, Dr Vincent Vadez	27 th -31 st October	ICRISAT India	Project meeting for the COGGO/ ICRISAT/DAFWA/CLIMA project and ARC linkage project; View chickpea trials in WA	Adj. Prof. Tanveer Khan

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