Two new kabuli chickpea varieties developed in Western Australia could help reinvigorate a crop option devastated by Ascochyta blight. Launching the new varieties, Nafice (tested as FLIP 97-503 CLIMAS) and Almaz (tested as FLIP 97-530 CLIMAS), at the Mingenew-Irwin Group Heavy Land Field Day on 26 August, Agriculture Minister Kim Chance said both offered significantly improved resistance to Ascochyta blight. Since Ascochyta blight was first observed in WA in 1999, the area of chickpea in the State had dropped from 80,000 hectares to 5000 hectares. “The future of the chickpea industry hinges on provision of varieties with high levels of resistance to ascochyta,” said Mr Chance. “This is a significant development. Chickpeas, in particular kabuli types, are high value crops and offer growers the chance to diversify. There is also significant export potential if chickpeas can again become a viable crop for Australia.”

By Professor Kadambot Siddique

The potential size of the kabuli chickpea industry in Australia is over $70 million per annum and there are also rotational benefits from a legume crop to following cereal and canola crops. In WA, the potential for the new kabuli varieties is 30,000 hectares, mainly on suitable, free draining soils in medium rainfall areas such as at Dongara, Mingenew, Moora, the Avon Valley, Katanning, Darkan-Williams and Speddingup.

The names of the new varieties were chosen to acknowledge the superior quality of the varieties and the initial crossing made at the International Centre for Agricultural Research in Dry Areas (ICARDA), Syria. The names will also assist in the marketing of the products to the Middle East, Europe, Indian sub-continent and other countries. Nafice means very precious, highly sought in Arabic and Almaz means diamond.

The new varieties were developed with the support of the Council of Grain Grower Organisations (COGGO) Ltd, the Grains Research and Development Corporation (GRDC), the University of Western Australia and the Department of Agriculture Western Australia, through CLIMA’s Germplasm development program. The development process involved close collaboration with ICARDA, Syria and the Aegean Agricultural Research Institute (AARI), Izmir, Turkey.
FROM THE DIRECTOR

Professor Kadambot Siddique
ksiddiqu@fnas.uwa.edu.au

During the past several months, vigorous discussion has occurred between CLIMA partners in relation to CLIMA’s position within the newly formed Agricultural Research Western Australia (ARWA) partnership between Curtin University of Technology, Department of Agriculture Western Australia, Murdoch University and The University of Western Australia. CLIMA’s Governing Board concluded that CLIMA’s role fitted well with the aspirations of the ARWA and would complement ARWA’s activities.

I am pleased to inform you that the CLIMA Governing Board has approved an extension of the current CLIMA Research Alliance until 30 June 2007. The extension is based upon developing a clear pathway in terms of integration of current CLIMA research into ARWA. Together with the Governing Board of CLIMA and the management team, I will be developing strategies for this to occur over the next two years. As far as research projects are concerned I believe that the above transition will have very little impact and we should focus our attention on developing strong collaborative projects with our partners in addressing industry needs.

Mr Hendy Cowan (Murdoch) has completed his term as the Chair of CLIMA Governing Board in June 2005 and Professor Alistair Robertson (UWA) has taken up this position for 2005-06. Mr Rob Delane has recently been replaced by Mr Keith Alcock as DAWA’s representative on the CLIMA Board.

CLIMA has recently announced $130,000 of core funds to distribute in 2005-06 for grain and pasture legume research activities that will benefit CLIMA and its stakeholders. The grain and annual pasture legume programs will select successful submissions soon after the closing date of 31 August 2005. This is the 5th year CLIMA is allocating such funds. These funds have been very useful to CLIMA researchers in undertaking small projects and in travel support.

In July, CLIMA and CRC salinity jointly hosted an industry forum entitled “Maintaining crop profitability whilst lifting animal performance on mixed farms”. The forum was a great success and brought together some 60 farmers, consultants, industry personal, animal, and plant (crops and pasture) researchers at a single venue to address the issues facing mixed farms.

CLIMA researchers were successful in attracting 8 externally funded projects recently and I would like to congratulate all involved in the project development (see table on page 3).

Two new ascocytta resistant, high yielding and high quality kabuli chickpea varieties were released by the Minister for Agriculture Hon Kim Chance, at the Mingenew-Irwin Heavy land Field Day on 26th August. These varieties were jointly developed by UWA and DAWA with financial support from COGGO and GRDC through CLIMA’s germplasm development program. An anthracnose resistant Albus lupin variety developed by DAWA in partnership with COGGO and GRDC was also released on the above date.

We have just published a comprehensive CLIMA Biennial Research report for 2003-04 and hard copies are available on request.

Several international visitors are currently visiting CLIMA and I encourage you to meet and discuss your research with the relevant visitors (see “Visitors” Table on page 13).

Andromeda – the first anthracnose resistant Albus lupin variety developed in WA

continued from page 1

by Dr Kedar Adhikari

Also launched at the Mingenew-Irwin field day was “Andromeda”, the first anthracnose resistant Albus lupin variety developed by DAWA. It was bred by Drs Kedar Adhikari and Bevan Buirchell in cooperation with DAWA’s lupin breeding team, with GRDC and the Council of Grain Grower Organisations Ltd (COGGO) support for fast-tracking the process. It is developed from a cross made in 1997 between an anthracnose resistant landrace from Ethiopia and a well adapted, but highly susceptible WA bred line.

Andromeda has significantly better anthracnose resistance than Kiev Mutant and is suggested as its replacement in the medium to low rainfall areas of WA, where anthracnose risk is moderate to low. The level of resistance is insufficient to protect Andromeda if grown in the wetter coastal locations or in the Chapman Valley. It can be grown successfully in areas east of Nabawa to Mingenew to Carnamah in the northern agriculture region and shows potential in the central wheatbelt and the Great Southern wherever blue lupin, an anthracnose source, is not a common weed. It may not perform well in the far eastern wheatbelt of WA, due to limited moisture.

Based on limited observations, Andromeda is similar to Kiev Mutant with respect to other lupin diseases: immune to Cucumber Mosaic Virus, moderately susceptible to brown leaf spot and Bean Yellow Mosaic Virus. It is marginally better than Kiev Mutant for resistance to Pleiochaeta root rot.

The seed colour, protein content and alkaloid level of Andromeda are similar to Kiev Mutant. The seeds are slightly bigger, making it readily acceptable in the human food market. In recognition of the source of the anthracnose resistance, Andromeda is named after a princess of Ethiopia, daughter of King Cepheus and Queen Cassiopeia. Andromeda is being commercialised through COGGO and seed will be available to growers in 2006.
**FEATURE ARTICLES**

**LUPINS TOLERANT TO METRIBUZIN AND ANTHRACNOSE**  
by Dr Ping Si

CLIMA scientist Dr Ping Si, based at the University of Western Australia, has identified several mutant narrow-leaved lupin lines highly tolerant to the herbicide metribuzin. These mutants were induced from the cultivar Tanjil. At an application rate much higher than the recommended rate in the field, all conventional Tanjil seedlings were killed by metribuzin, but seedlings of the mutants had no leaf damage and grew healthily despite the high rate (see photo). The mutants also showed greater tolerance to metribuzin than the commercially available tolerant cultivar Mandelup, which had some leaf damage at the high rate. These mutant lines will be a valuable source of increased tolerance to metribuzin for future lupin breeding.

This work was achieved through close collaboration with Drs Mark Sweetingham and Bevan Buirchell from DAWA. Mutation breeding is a valid and practical method for generating new genetic variation in the search for important characteristics. Because mutation naturally occurs at a very low rate, artificially inducing mutation in plants is used to accelerate the rate of generating valuable germplasm.

Dr Si first induced the mutation in Tanjil seed in 2002, when she started a GRDC-funded project to improve herbicide tolerance in lupins. Tanjil is a cultivar resistant to anthracnose, but susceptible to metribuzin and this makes it difficult for farmers to grow when herbicides are widely used. The mutant lines have been tested for metribuzin tolerance over three generations. It is expected that some of the metribuzin-tolerant mutant lines will retain Tanjil’s useful anthracnose resistance and recently two of them have been found to have a molecular marker specific for anthracnose resistance present in all their seedlings. Therefore, these two mutant lines are tolerant to both metribuzin and anthracnose. A new cultivar having both good resistance to anthracnose and high tolerance to metribuzin will make farmers’ lives easier.

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**RECENT SUCCESSFUL CLIMA PROJECTS WITH EXTERNAL FUNDING**

<table>
<thead>
<tr>
<th>Funding Organisation</th>
<th>Project Title</th>
<th>Duration and Budget</th>
<th>Project Supervisor/Leader</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRDC ‘An International Collaboration to develop Interspecific Hybrids between Chickpea and its wild relatives’</td>
<td>2005/6 - 2007/8 3 years $359,453</td>
<td>Prof. Kadambot Siddique and Dr Heather Clarke</td>
<td></td>
</tr>
<tr>
<td>GRDC ‘Pearl Lupin – development of the first Australian cultivar for commercial evaluation’</td>
<td>2005/6 - 2007/8 3 years $155,993</td>
<td>Dr Mark Sweetingham and Dr Jon Clements</td>
<td></td>
</tr>
<tr>
<td>GRDC ‘Lupin germplasm characterisation’</td>
<td>2005/6 - 2007/8 3 years $515,000</td>
<td>Dr Bevan Buirchell and Dr Fucheng Shan</td>
<td></td>
</tr>
<tr>
<td>GRDC ‘Improved herbicide tolerance for pulses in the Western Region’</td>
<td>2005/6 - 2007/8 3 years $451,500</td>
<td>Dr Mark Sweetingham and Dr Ping Si</td>
<td></td>
</tr>
<tr>
<td>GRDC ‘Interspecific hybridisation in lupins’</td>
<td>2005/6 - 2007/8 3 years $450,037</td>
<td>Dr Jon Clements</td>
<td></td>
</tr>
<tr>
<td>ACIAR ‘Better crop germplasm and management for improved production of wheat, barley, pulse and forage legumes in Iraq’ – CLIMA component</td>
<td>2005/6 - 2007/8 3 years $98,000</td>
<td>Prof. Kadambot Siddique</td>
<td></td>
</tr>
<tr>
<td>ARC-Linkage Project (COGGO &amp; DAWA) ‘Development of doubled haploid techniques for rapid production of homozygous genomes in chickpea and field pea’</td>
<td>2005/6 - 2008/9 4 years $620,950</td>
<td>Prof. Kadambot Siddique, Prof. John Kuo, Dr Tanveer Khan and Dr Janine Crosse</td>
<td></td>
</tr>
<tr>
<td>Crawford Fund Crawford Fund Training Award – Dr Ashawani K. Basandrai (ICRISAT, India) – August to December 2005</td>
<td>2005 4 months $11,800</td>
<td>Prof. Kadambot Siddique and Mr Bill MacLeod</td>
<td></td>
</tr>
</tbody>
</table>
In July, 62 researchers (animal, crop and pasture), economists, farmers, advisers, feed suppliers and other industry members met at a Forum where presentations and discussions were around the theme of “Maintaining crop profitability whilst lifting animal performance on mixed farms”. The forum, held at The University of Western Australia, was hosted by CLIMA and the CRC for Plant-based Management of Dryland Salinity and was convened by CLIMA’s Industry Advisory Group. The most recent research results on animal production and feed rations, cropping systems, annual pasture legumes, weed control and farm profitability were conveyed to the industry. The future industry needs of mixed farms and animal production in relation to sustainability and profitability were identified.

The aims of the meeting were to:

1. Identify issues facing farmers wanting to increase animal production in a mixed system.
2. Identify better ways to manage conventional systems and discuss new system approaches to feed animals whilst supporting cropping.
3. Inform industry members of current legume research activities of relevance for mixed crop/animal farms in Western Australia.

The program and an overview of the main messages from the meeting, with a summary of the individual presentations and discussion sessions are available from CLIMA. djthack@clima.uwa.edu.au

See CLIMA media release “Legumes lift livestock” on website: www.clima.uwa.edu.au/news

Pulse Australia has appointed Alan Meldrum as its first Pulse Development Officer in WA. Alan is well known from his role as Manager of DAWA’s Merredin Research Station for 15 years. In that time he managed commercial crops of lupin, faba bean, desi chickpea and field pea as well as overseeing the legume research work on the Research Station.

This appointment will facilitate sharing of information across all sectors of the pulse industry and provide support for activities and initiatives that will promote and enhance pulses as a valuable contributor to the wealth of the agricultural sector in WA. Pulse Australia aims to work closely with all industry participants to identify areas of need, avoid duplication of effort and promote Pulses. This will include working closely with Pulse WA.

Alan’s appointment will also bring a strong link to the Pulse Australia Crop Support team in the Eastern States to provide a conduit for information flow across state boundaries. Pulse Australia is pleased to acknowledge the very significant support of the CBH Group in making this appointment possible.

Alan Meldrum can be contacted on (08) 94540383 or mobile 0427384760 and by email: ameldrum@pulseaus.com.au

THE CROP / LIVESTOCK MIX: HOW TO SUCCEED

by Dr Debbie Thackray
YIELD IMPROVEMENT OF CHICKPEA IN DROUGHT-PRONE ENVIRONMENTS

by Dr Jens Berger

A collaborative investigation of chickpea adaptation by Australian and Indian scientists, running since 1998, was wrapped up at a final project meeting held in the Indian Institute of Pulses Research (IIPR), Kanpur in April. The ACIAR project CS1/96/07 ‘Traits for yield improvement of chickpea in drought-prone environments of India and Australia’ used a genotype by environment approach, with a broad array of germplasm from throughout the world and many different sites in both countries, as well as smaller, detailed physiological studies at limited sites.

The project has demonstrated the pivotal role of phenology to adaptation in both countries (Berger et al. 2004; Berger et al. 2005). In Australia, we demonstrated that early phenology and high harvest index is a productive strategy for chickpea under most conditions, and essential for productivity under terminal drought. However, because of the cool temperature sensitivity of chickpea at flowering, selecting for earliness alone is insufficient, and more efforts are necessary to uncover chilling tolerant genotypes. In India, we demonstrated the dynamic role phenology plays in adaptation. Genotypes specifically adapted to the north are able to delay flowering at later flowering sites or higher latitudes more than non-adapted material, and consequently increase both source and sink potential under the relatively unstressful conditions. In contrast, in stressful southern and central regions escaping drought by early flowering, podding and maturity is critical for yield. However, the combination of intermediate flowering and relatively early, responsive maturity is a phenological compromise that leads to wide adaptation, with high yields both in the north and south of India. ICCV 10, BG 391 and BG 1006 are good examples of widely adapted varieties in India. This information is being applied in breeding programs in both countries.

Capacity building for Indian agricultural science was another key component of the project. There was considerable investment in research infrastructure at Haryana Agricultural University, Hisar, the Indian Agricultural Research Institute, New Delhi, and the Indian Institute of Pulses Research, Kanpur. In addition, four training courses in measuring plant water relations, data handling, experimental design, and analysis, totaling to more than two months, were held at various locations in India. Finally, a considerable number of scientists from almost all participating centres visited Australia for a period of two weeks to six months to attend conferences, visit trial sites and receive on-the-job training. The close interaction between Indian and Australian scientists over the life of the project has forged firm social and scientific ties which we hope will lead to more collaboration in the future.

References


See CLIMA media release “Indian peas help drought ease” on website: www.clima.uwa.edu.au/news

WANTFA REVIEWS NO-TILL TECHNOLOGY IN WA

Herbicide resistance, soil compaction, moisture retention and residue handling are just some of the challenges facing growers who no-till farm in Western Australia. As the leading proponent of this farming system, the Western Australian No-Till Farmers Association (WANTFA) recognised it was timely to review current practice and with the support of GRDC and the Australian Government Department of Agriculture, Fisheries and Forestry’s National Landcare Sustainable Industries Initiative, commissioned Dr Rolf Derpsch, a consultant based in Paraguay, to prepare a situation analysis of no-till technology in Western Australia. Dr Derpsch is regarded internationally as an acknowledged authority in regard to sustainable agriculture and travels the world consulting to industry leaders and students interested in sustainability.

Dr Derpsch was accompanied by WANTFA’s Dr Ken Flower completing an itinerary that covered nearly 4000 kms from Mullewa in the North to Salmon Gums and Albany in the South. Information was provided by close to 500 farmers and thirty scientists. At the WANTFA trial site this year numerous trials have been implemented as a result of Dr Derpsch’s suggestions, including work on residue management and cover crops.

For a copy of the “Situational Analysis of No-Tillage systems in WA and Recommendations for the Way Forward” by Dr Rolf Derpsch, please contact Ms Erin Wright at WANTFA on (08) 9622 3395 or email at erin.wright@wantfa.com.au

by Ms Erin Wright

Indian and Australian scientists attending the final project meeting

WANTFA REVIEWS NO-TILL TECHNOLOGY IN WA
PATTERNS OF VIRUS SPREAD IN LUPINS

To assist in planning management strategies for two viruses in narrow-leaved lupin, a study was done to understand their patterns of spread. Additionally, inheritance studies were done on the necrotic trait of one of them. For Bean yellow mosaic virus (BYMV), it was found that a single dominant gene controls the systemic necrotic response to the virus present in all narrow-leaved lupin cultivars. This in turn dictates the pattern of virus spread in the field with the BYMV necrotic strain, when spread is examined under different infection scenarios in an effort to establish best management techniques.

Pronounced gradients were found in the incidences of symptomatic plants starting at the edges of narrow-leaved lupin stands when two non-persistently aphid-borne viruses, BYMV necrotic strain (BYMV-N) and Cucumber mosaic virus (CMV), spread into them from external sources. With CMV, but not BYMV-N, internal, secondary spread around infection foci was considerable reflecting the polycyclic and largely monocyclic spread patterns of CMV and BYMV-N respectively. The explanation for the ‘edge effect’ is that the majority of incoming aphids flying from external virus sources alight at the margin initially before moving deeper into a stand. When they first alight, they probe plants and infect them but lose a non-persistently aphid-transmitted virus in the process, so that plants probed later remain healthy. The sharper gradients with BYMV-N than for CMV reflect rapid removal of infection foci with the former. In contrast, with CMV the infected plants are not killed and remain in the stand providing infection sources for further cycles of acquisition and spread by aphids. When non-host barriers separating the edge of a stand from an external virus source were introduced, with BYMV-N, they reduced the steepness of the gradients (Fig. 1).

The combination of information from SADIE maps of spatial pattern, and analysis of the distribution of symptomatic plants along and across rows showed that CMV spreads in a more comprehensive manner than BYMV-N in lupin stands. Also, in the absence of ‘edge effects’ at the margin of a stand, the small BYMV-N clusters that formed from internal spread were shown to follow limited, phased cycles.

An explanation of the systemic necrotic reaction to infection with BYMV-N in narrow-leaved lupin was sought through inheritance studies. Segregation for the necrotic (systemic hypersensitive) response to infection with BYMV-N was studied in progeny plants from six crosses. The parents were two cultivars that always developed necrosis when infected (Danja and Merrit) and two genotypes that always responded without necrosis (90L423-07-13 and P26697). In the four possible combinations of crosses between the different necrotic and non-necrotically reacting genotypes, segregation for the necrotic response in F2 progeny plants always fitted a 3:1 ratio (necrotic:non-necrotic). All F2 progeny plants from the cross between the two non-cultivar genotypes became infected without necrosis while 99% of the F2 from the cross between the two cultivars developed necrosis. These results suggest that the systemic necrotic response to infection with BYMV-N is controlled by a single dominant hypersensitivity gene, named Nb-1.

This research was supported by GRDC.

Fig. 1: Gradients of BYMV-N infected lupin plants bordering a) a 20 metre non-host oat barrier ( ) or b) a track with BYMV-infected clover plants ( ).

PhD Congratulations!

Congratulations to Julia Wilson who will receive her PhD at a ceremony at Edith Cowan University in September 2005. Julia was supervised by Dr Ian Bennet & Assoc. Prof. Paul Lavery and her thesis title was “In vitro propagation of some Western Australian seagrasses”.

Julia is a Research Officer with CLIMA working on two projects: “An International collaboration to develop robust protocols for doubled haploid production in field pea, chickpea and lentil” (UWA 00035) with Dr Janine Crosier and Professor Kadambot Siddique and “An International collaboration to develop interspecific hybrids between chickpea and its wild annual relatives” (UWA 00036) with Dr Heather Clarke and Profesor Kadambot Siddique.

Congratulations also to Zaman M. Nuruzzaman who will receive his PhD on September 14 at a ceremony at the University of Western Australia. Zaman was supervised by Professor Hans Lambers, Dr. Erik J. Veneklaas (both UWA) and Mr Mike Bolland (DAWA). His thesis title is “Phosphorus benefits of white lupin, field pea and faba bean to wheat production in Western Australian soils” and he was the holder of a GRDC scholarship.

Zaman is currently employed as a Research Associate with CLIMA working on the ACIAR funded project “Integrated management of BGM of chickpea in Bangladesh and Australia” with Mr Bill MacLeod and Prof. Kadambot Siddique.
A ‘MODEL’ LEGUME

Plant scientists often use a model plant to investigate basic plant biology. Scientists can learn all about the model species, and then apply their findings to a whole range of other similar plants. It saves them duplicating the same research in different plants. In legumes, the model plant commonly used is Medicago truncatula, also known as barrel medic. Medicago is used because it has much in common with both crop and pasture legumes yet it is much easier to work with from a scientific point of view than commercial legume species.

Aphids can cause devastating losses in both legume crops and legume-based pastures. Developing new aphid resistant legumes is getting closer by using Medicago as a model. Professor Karam Singh and a CSIRO team in Perth have identified aphid resistance in Medicago and are now identifying the genes responsible for it.

Current methods for dealing with aphids, namely pesticides, are often too costly and not always successful – limiting the industry’s ability to produce legumes for human consumption and stock feed. If aphid resistance genes can be identified in Medicago it will be much easier to find the equivalent genes in commercial legumes, to help breed aphid-resistant legume crops and pastures. Different defense mechanisms used by legumes to fend off aphids have also been identified. CSIRO scientists have found that the most resistant Medicago plants recognised when an aphid was starting to feed and this triggered a response that forced the aphid to remove its mouth parts.

Fungal pathogens that kill their host plant, called necrotrophic fungi, are also a major problem facing many legume crops. CSIRO in collaboration with Murdoch University has exposed over 70 fungal isolates representing 29 fungal species to a number of distinct but closely related Medicago plants. Some of the Medicago plants showed resistance to the most serious pathogens including Rhizoctonia solani, Fusarium oxysporum and Phoma medicaginis. These resistant plants will now provide the basis for further studies to understand the mechanisms involved in resistance, which could lead to effective ways of addressing them. In addition, the group is analysing a specific class of regulatory proteins, called ERF transcription factors in Medicago that are thought to play key roles in plant defence responses against these damaging fungal pathogens.

With Murdoch University, CSIRO recently hosted in Western Australia the Second Australian Model Legume Workshop. This workshop brought together over 20 international and about 100 Australian scientists including biotechnologists, physiologists, agronomists and breeders to improve understanding of Medicago and provide research solutions for legume based industries. The meeting resulted in good interactions between these different groups and the future for legumes in Australia looks bright with the linking of the molecular/model system work with the needs and aims of the breeders.

This research was supported in part by GRDC and DEST.

RECOGNITION FOR WA SCIENTISTS

Dr Mark Sweetingham

Dr Sweetingham, Principal Plant Pathologist with DAWA and Grain Legume Program Leader with CLIMA, is to be awarded the Australian Institute of Agricultural Science and Technology (AIAST) Australian Medal of Agriculture for 2005. This is presented in recognition of outstanding achievement in agricultural science and is awarded to Dr Sweetingham for his work on diseases of lupins and for his empathy for grain growers which has led him to recognize significant production problems. Dr Sweetingham has published extensively on integrated management of lupin diseases and in particular has worked on lupin anthracnose, phomopsis stem blight, which can cause deaths in sheep grazing lupins, Rhizoctonia solani and Pleiochaeta setosa, the causes of brown spot and root rot in narrow-leaved lupin. Dr Sweetingham also works closely with lupin breeders on the use of biotechnology to confer pest and disease resistance and his been instrumental in the development of screening techniques for a variety of lupin diseases. His research and leadership has significantly influenced the grain legume industry at both state and federal levels.

Dr Sweetingham is an active member of the CLIMA Research Alliance and we congratulate him on this award and are proud to be associated with him.

Prof. Kadambot Siddique

Professor Kadambot Siddique (Director, CLIMA) has recently joined the Editorial Advisory Board of the International Journal of Post-harvest Technology and Innovation. The journal is published by Inderscience Publishers, Geneva, Switzerland.
PULSE BRIEFING WORKSHOP - APRIL 2005

by Dr Tanveer Khan

Professor Fred Muehlbauer, Principal Research Geneticist and Physiologist with USDA and an Adjunct Professor at the Washington State University visited CLIMA in April. Professor Muehlbauer is an eminent scientist who is internationally known for his contribution to pulse improvement. A Briefing Workshop was organised in Professor Muehlbauer’s honour where CLIMA scientists and associates presented brief talks on a range of projects on chickpea, field pea, lentils, faba bean and lupins.

The Workshop was opened by Dr Tanveer Khan who gave an overview of the state of Pulse Genetic Improvement in Western Australia, with special attention to field pea and desi chickpea breeding. Professor Kadambot Siddique, Ms Kerry Regan and Dr Peter White then briefed about the genetic improvements in kabuli chickpea, lentils and faba beans in their respective presentations. Various aspects of the role of wild Cicer in the improvement of chickpea were discussed in presentations by Mr Nader Danehloieipour, Dr Heather Clarke (given in her absence by Dr Julia Wilson) and Dr Jens Berger. Ms Oonagh Byrne talked about incorporation of pea weevil resistance from P. fulvum into P. sativum, while Ms Jean Galloway and Dr Moin Salam presented their work on epidemiology and modelling of black spot disease of peas. Dr Janine Croser and Dr Julia Wilson presented the progress on doubled haploid technology in chickpea and field pea. Mr Bill MacLeod talked on integrated management of foliar diseases of chickpea. Dr Ping Si outlined her work using mutation breeding to improve herbicide resistance in chickpea and lupins. Mr Jonathan Anderson and Dr Judith Lichtenzveig, while presenting an overview of molecular biological work, focused on genetic dissection of resistance to necrotrophic pathogens in the model legume, Medicago truncatula.

The presentations were followed by a one hour general discussion session chaired by Professor Muehlbauer. The discussion was summed up by Professor Kadambot Siddique, emphasising that pulse improvement is relatively young with enormous opportunities for new initiatives and ideas. He stressed the need for linking with post graduate training programs and developing international collaboration, and also emphasised the importance of focussed breeding in key crops for WA.

Professor Muehlbauer presented a seminar on “Breeding for Resistance to Ascochyta Blight in Chickpea” following the Workshop and offered collaboration in a number of key areas.

A CD compilation of the workshop presentations is available from CLIMA.

djthack@clima.uwa.edu.au

GRAINS WEST EXPO - JULY 2005

by Dr Debbie Thackray

The theme for the 2nd Grains West Expo, held over two days in July, was “Working together to be the best” and we did OUR best to show how this has been put into practice for the grain legume industry through the CLIMA Research Alliance.

Our display included:

• New legume varieties – plants and seed of “Sonali” and “Rupali” chickpeas with chilling tolerance and partial ascochyta resistance; plants and seed of “Ceora” grasspea, a low input multi-use legume crop.

• Novel biotechnology techniques – illustrations of innovative methods for delivering desirable technologies and germplasm for use in breeding programs.

• Breeding for quality improvement – increasing protein content in lupin, with plants and seed of Andean pearl lupin, which has very high protein and oil content but requires adaptation to the Australian Environment.

• Disease resistance in chickpea – plants and seed of two new Kabuli chickpeas with ascochyta resistance – FLIP- 97 503 CLIMAS and FLIP- 97 530 CLIMAS (cvs Nafice and Almaz).

• Value adding to legume products – fish pellets illustrating use of lupins to improve aquafeed formulations.

and more!

The event was attended by industry members representing the whole supply chain “from paddock to plate”, with a wide selection of presentations from local, national and international speakers.

Proceedings are available from John Duff.

dj@consultag.com.au
RECENT CLIMA RESEARCH PUBLICATIONS

Since the April 2005 newsletter, we have been notified of the following publications by CLIMA researchers and associates. Conference papers and posters are not listed here, but are included in the 2003, 2004 and 2005 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 publications to Prof. Kadambot Siddique. Journal papers, refereed conference papers and book chapters attract considerable research income payment to CLIMA from its University partners.

Scientific Journals


WHAT’S NEW ON CLIMA’S WEBSITE  www.clima.uwa.edu.au


  This site includes details on a high density molecular linkage map for lupin, which is the first map published in a journal for the lupin spp., and on molecular markers for anthracnose and phomopsis resistance.

- **Press releases since the last newsletter** (click on “news” and then “press releases” in left-hand margin of website):
  - “Lupin growers engaged in fishy affair” (May)
  - “Indian peas help drought ease” (July)
  - “Legumes lift livestock” (August)
  - “New varieties could reinvigorate crop options” (August)

- **2005 Seminar Series** (click on “Seminars” in left-hand margin of website): there is a pdf file of the 2nd half of the year’s programme for printing off and also an embedded table showing upcoming seminars. From time to time changes have to be made, so keep yourself up-to-date by referring back to the website. Reminder emails are sent a week before each seminar; so ask to be put on our seminar email list if you’d like to receive these (email: gmadson@fnas.uwa.edu.au).

- **Link to Agricultural Research Western Australia (ARWA) website** (click on “links” in left-hand margin of website).
New CLIMA Faces

Mr Daniel Kidd
Daniel joined CLIMA as a Technical Assistant in June and has previously worked for CLIMA at Shenton Park Research Station where he assisted in research into annual and perennial pasture legume species. He is currently employed in the National Annual Pasture Legume Improvement Programme (NAPLIP), based at the Department of Agriculture Western Australia (DAWA) in South Perth. He is contributing to sub clover (*Trifolium subterranean*) improvement, and developing balansa clover varieties for waterlogged/saline sites and *Trifolium isthmocarpum* for slightly waterlogged sites. He is also helping with a CRC Salinity project involving balansa clover/medics and grasses for saline/waterlogged land.

Daniel has a B.Sc. in Biological and Environmental Management from Edith Cowan University and his main research interests are in rehabilitation of saline land for productive agriculture.

Mr Tim Maling
Tim joined CLIMA in July as a Research Associate working on an ARC linkage project between CLIMA and DAWA on “Predictive Models & Decision Support Systems for Virus Diseases and Aphid Vectors of Lupin and Canola”. This is with Prof. Kadambot Siddique, Adj. Prof. Roger Jones, Dr Art Diggle, and Dr Debbie Thackray. Currently he is based at DAWA, but he will spend time at UWA in the future.

Tim has a B.Sc. in Molecular Biotechnology from Curtin University and did his honours project on modeling the biophore of biphenyl binding proteins. Since then he has worked with “Silverfox” providing a variety of precision agriculture services to WA growers; including biomass analyses based on infrared satellite imagery and developing management zones for variable rate fertilizer applications.

Tim’s main research interests involve the in silico representation of ‘real world’ environments; be they agricultural or biomedical, systemic or molecular.

MEETINGS DIARY

1st International Conference on Crop Wild Relative Conservation and Use, Agrigento, Sicily, Italy
14-17 September, 2005
http://www.pgrforum.org/

2005 Pulse Australia focus conference “Chickpeas in Farming Systems”, Goondiwindi, QLD
21-23 September, 2005
email: tganderson@growzone.com.au

Plant Tissue Culture & Biotechnology Conference, Perth, Western Australia
21-24 September, 2005

7th International Symposium on Aphids, Fremantle, Western Australia
2-7 October, 2005
http://www.aphidsymposium.org/

4th International Food Legume Research Conference, New Delhi, India
18-22 October, 2005
http://www.isgpb.com/others/announcement.htm

Plant genomics and biotechnology: challenges and opportunities, Raipur, India
26-28 October, 2005
http://www.icpgb2005.org

1st International Ascochyta Workshop on Grain Legumes, Le Tronchet, France
3-6 July, 2006
email: aep@prolea.com

BABY NEWS

Congratulations to former CLIMA staff member Oonagh Byrne and partner Alex on the birth of Sinead Anita Byrne. She was born 28th July at 2.48pm, she weighed in at 3.39kg (7lb 7oz) and all are doing well! Especially, as Oonagh has heard that her other baby, her PhD, has been accepted with minor corrections!
OMAN AND WESTERN AUSTRALIAN CONNECTION STRENGTHENED

by Prof. Kadambot Siddique

Dr Nadiya Abubakar Al-Saady’s recent sabbatical (13th June to 12th August 2005) at the University of Western Australia (UWA) has further strengthened the collaboration between Sultan Qaboos University (SQU) Muscat, Oman and UWA. UWA has recently established collaboration with SQU especially in the area of Agricultural and Marine Science. Dr Al-Saady is an Assistant Professor with the Department of Crop Science, College of Agriculture and Marine Sciences (CAMS), SQU. She is also the Assistant Dean for Post Graduate Studies and Research at SQU. Dr Al-Saady holds a BSc (Agric) from SQU, and an MSc and PhD (Plant Genetics and Agronomy) from The University of Minnesota, St-Paul, USA. Her current research area includes molecular genetics and diseases of crop and pasture plants in Oman.

During part of Dr Al-Saady’s study leave she worked with Prof. Alistar Robertson (Dean Faculty of Natural and Agricultural Sciences at UWA) and Prof. Robyn Owens (Dean Graduate Research School, UWA) on the development of a program on joint badging PhDs between UWA and CAMS at SQU. She also spent time with the Graduate School getting hands on experience on how the graduate program is run at UWA. While at UWA she was located at CLIMA and interacted with a number of legume researchers on their projects: Dr Fucheng Shan on the use of molecular markers to study genetic diversity in legume crops; Dr Janine Croser learning the techniques involved in producing doubled haploids in legumes; Ms Simone Chapple on the genetic transformation of legumes; and Dr Heather Clarke on wide hybridisation techniques in chickpea. Finally, Dr Al-Saady and Professor Kadambot Siddique have developed a draft project proposal on “Characterisation and utilisation of Omani grain and forage legume landraces using molecular techniques”. The project will be submitted for potential funding from His Majesties Strategic Grant in Oman.

VISITORS AND TRAVEL NEWS

VISITING SCIENTIST EXAMINES ROOT GROWTH

by Dr Jairo Palta

Associate Professor Ali Ganjali was a Visiting Scientist at CLIMA and CSIRO Plant Industry from February to September 2005. He is with the Research Center for Plant Science at the Ferdowsi University of Mashhad, Iran.

Assoc. Prof. Ganjali’s primary interests are in chickpea, particularly the physiology of yield under drought, which is a major constraint to chickpea production in Iran. During his time with CLIMA, he worked at CSIRO with Dr Jairo Palta and Adj. Prof. Neil Turner and conducted an experiment to determine the root growth characteristics of desi and kabuli chickpea under transient waterlogging by root mapping using glass-walled growth boxes.

Assoc. Prof. Ali Ganjali scanning roots of chickpea from his glasshouse experiment at CSIRO.
EXCHANGE PROGRAM TO UC DAVIS, USA

Mr Tegu Wijayanto

From June 19 to August 19, 2005, I took part in an exchange research program at the University of California (UC) at Davis, USA. This program is part of and financially funded by the ARC Linkage International project (LX0346900) obtained by A/Prof. Wallace Cowling, Dr. Susan Barker and Prof. David Gilchrist (UC Davis). In Prof. Gilchrist’s Plant Pathology laboratory at UC Davis, I conducted research work in connection with my PhD thesis, that is determining the expression of the anti-apoptotic p35 gene and its effects on apoptotic inducer and/or fungal infection in transgenic narrow-leafed lupin which I generated at the CLIMA lab, University of Western Australia. This research work will be an important part of my thesis, and at Davis they have the experience, expertise and resources to conduct such work. In addition, the program has enabled research contacts to be made in the USA.

TRAVEL TO SOUTH AMERICA PROVIDES FRUITFUL OUTCOMES

by Adjunct. Prof. Roger Jones

Earlier this year I travelled to Peru and Florida to hold discussion at three universities and the International Potato Centre in Peru from 25th March to 2nd April 2005, and then from 7th to 14th April to participate in two scientific conferences, one in Peru and the other in Florida.

I visited the National Agrarian University in Lima (the capital of Peru), the University of the Altiplano in Puno (on Lake Titicaca near to the border with Bolivia) and the San Antonio Abad University in Cuzco (the old capital of the Incas). The conferences were the 9th International Plant Virus Epidemiology Symposium – Applying Epidemiological Research to Improve Virus Disease Management, at Lima, 3-7 April, and the 2nd Joint Conference of the International Working Groups on Legume and Vegetable Viruses at Fort Lauderdale, Florida, 10-14 April. I presented the Chairman’s address to the Lima Conference. At the Florida conference I spoke on selection for virus resistance in lupins. Much useful information was gathered from the visits and conferences.

Some key points relating to broadacre agriculture are:

• The visits to the Universities in Puno and Cuzco established contact with these key pearl lupin germplasm collection centres and laid the foundation for future collaboration. Little English is spoken at Puno, so the discussions were all in Spanish.

• The traits needed to breed pearl lupin for WA have already been identified by the Peruvians within the diverse lines in these two germplasm collections, e.g. early flowering, high yield, drought resistance, high protein and oil contents, anthracnose resistance, low alkaloids, etc.

• Severe rust and viral disease infections were evident in pearl lupin crops and grow-outs in Cuzco province but not in Puno province which is at higher altitude.

• Both Puno and Cuzco centres also have large faba bean germplasm collections, and collections of other Andean crops e.g. Quinoa, Occa, Ollucu, Masua, Aracacha, and Macca. Some internationally funded collaboration with USA and Europe is already underway with other Andean crops, e.g. quinoa.

• At the Plant Virus Epidemiology Symposium in Lima, a particular focus was on selection of the most suitable control measures to use for a given disease situation using simulation models. Avoiding use of control measures that have the side affect of selecting virus strains with greater virulence or that are inappropriate for other reasons was stressed. The operation of the plant disease biosecurity network in the USA was also described and the use of GIS and GPS technologies in identifying cropping areas at greatest potential risk from newly introduced viral pathogens. A diverse selection of host resistance, phytosanitary, cultural and chemical control measures against viruses that were effective in diverse crops were described by different speakers.

• At the smaller International Working Group’s conference in Florida, the focus was on new and emerging virus diseases and the more molecular aspects of virus research but damaging virus diseases in a wide range of crops were again described. Effective deployment of transgenic virus resistance in papaya in the field and crops of beans and tomatoes devastated by whitefly-transmitted begomoviruses were observed on the field trip.
<table>
<thead>
<tr>
<th>Name</th>
<th>Dates</th>
<th>Institution</th>
<th>Main Purpose of Visit</th>
<th>WA Contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr Ali Ganjali</td>
<td>April - September</td>
<td>College of Agriculture Ferdowsi Uni., Iran</td>
<td>Experimental work on root growth in chickpea, talks, etc.</td>
<td>Adj. Prof. Neil Turner &amp; Dr Jairo Palta</td>
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<tr>
<td>Dr Tony Fischer, Dr M S Rahman, Mr R K Neupane, Mr N K Yadav</td>
<td>6-8 June, 6-8 June, 5-10 June, 5-10 June</td>
<td>ACIAR, NARC Nepal, NARC Nepal</td>
<td>Nepal Project review.</td>
<td>Prof. Clive Frances UWA</td>
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<tr>
<td>Assistant Prof. Dr Nadiya Abubakar Al-Saady</td>
<td>10 June - 12 August</td>
<td>Sultan Qaboos University (SQU), Muscat, Oman</td>
<td>To develop collaboration between SQU and UWA (FNAS). To gain hands on experience in molecular genetic diversity studies on legumes. To develop projects of mutual benefit between SQU and CLIMA/FNAS.</td>
<td>Prof. Kadambot Siddique &amp; Prof. Alistar Robertson UWA</td>
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<tr>
<td>Dr Rajendra Malhotra</td>
<td>21 – 26 August</td>
<td>ICARDA</td>
<td>To participate in the launch of the new ascochyta resistant kabuli chickpea varieties in Australia and to discuss chickpea breeding and resistance to disease.</td>
<td>Prof. Kadambot Siddique, UWA</td>
</tr>
<tr>
<td>Ms Nadia Bazihizina</td>
<td>August - October</td>
<td>University of Florence, Italy</td>
<td>Undergraduate field work in genetic resources for thesis.</td>
<td>Mr Richard Snowball, DAWA</td>
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<tr>
<td>Prof Kang Lihua, Mr Jiang Yegen, Mr Ma Haibin</td>
<td>22 August</td>
<td>The Research Institute of Tropical Forestry, Chinese Academy of Forestry, Guangzhou, China</td>
<td>Exchange research information on legumes.</td>
<td>A/Prof Bernie Dell Mr Yinglong Chen School of Bio. Sci. and Biotech., Murdoch University.</td>
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<tr>
<td>Dr Ashwani Kumar Basandrai</td>
<td>26 August - 15 November</td>
<td>CSK Himachal Pradesh Agricultural University, India</td>
<td>The Crawford Fund Fellowship Epidemiology and integrated management of BGM in chickpea.</td>
<td>Prof. Kadambot Siddique and Mr Bill MacLeod UWA/DAWA</td>
</tr>
<tr>
<td>Dr Sirajul Islam, Mr Ali Afza, Dr Abu Bakr</td>
<td>September</td>
<td>Bangladesh Agricultural Research Institute, Bangladesh</td>
<td>Scientific exchange and Senior scientist visit through ACIAR funded project &quot;Integrated management of BGM of chickpea in Bangladesh and Australia&quot;.</td>
<td>Mr Bill MacLeod &amp; Prof. Kadambot Siddique DAWA / UWA</td>
</tr>
<tr>
<td>Dr Suresh Pande</td>
<td>September</td>
<td>ICRISAT India</td>
<td>Development of ACIAR funded project &quot;Integrated management of BGM of chickpea in Bangladesh and Australia&quot; and COGGO / ICRISAT chickpea breeding project.</td>
<td>Prof. Kadambot Siddique &amp; Mr Bill MacLeod DAWA/DAWA/UWA</td>
</tr>
<tr>
<td>Dr Sergio Ochatt</td>
<td>18 - 25 September</td>
<td>INRA, Dijon, France</td>
<td>Meet with researchers who use tissue culture as a tool, in particular, techniques for doubled haploids and interspecific hybridisation. Attend the Plant Tissue Culture and Biotechnology (PTC&amp;B) conference at Bold Park.</td>
<td>Drs Heather Clark and Janine Croser UWA</td>
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<tr>
<td>Dr Pooran Gaur</td>
<td>25 - 30 Sept</td>
<td>ICRISAT, Hyderabad, India</td>
<td>Joint chickpea breeding program: Visiting trials, project meeting and project planning for 2006.</td>
<td>Dr Tanveer Khan DAWA</td>
</tr>
<tr>
<td>Dr Richard Harrington</td>
<td>30 September</td>
<td>Rothamsted Research, UK</td>
<td>To attend International Aphid Symposium in Fremantle. To meet colleagues with interests in entomology, plant-virology and effects of climate change on insects.</td>
<td>Dr Debbie Thackray UWA</td>
</tr>
<tr>
<td>Ms Francesca Natalia</td>
<td>October - December</td>
<td>University of Florence, Italy</td>
<td>Post graduate experience in pasture systems research.</td>
<td>Mr Richard Snowball DAWA</td>
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The visit to India was for the final meeting of the ACIAR-funded project on ‘Traits for yield improvement of chickpea for drought-prone environments of India and Australia’ that is the basis of an accompanying report in this newsletter by Dr Jens Berger. We finished the project with a roof-top dinner at a local hotel which was disrupted by a pre-monsoon dust storm that blew over tables, smashed glasses and forced everyone inside! Prof. Kadambot Siddique, Dr Jens Berger and I also visited ICRISAT to evaluate progress on two other chickpea projects and begin to develop a new project on salinity/boron toxicity tolerance in chickpea.

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