A new variety of grasspea (*Lathyrus sativus*), “Ceora”, was released by the Minister for Agriculture, The Hon Mr Kim Chance at the Crop Updates in Perth on 16 February 2005. Ceora is well adapted to low - high rainfall, neutral to alkaline fine textured soils in southern Australia. It is a robust, low cost multi purpose legume with the flexibility to be used as a grain crop, forage, hay or as a green manure.

Lathyrus species are new crops in Australia, with a potential area of 150,000 - 300,000 ha across southern Australia. Among the lathyrus species, *Lathyrus sativus* (grasspea) and *L. cicera* (dwarf chickling) have shown good production potential in Australia, the roles of both being seen as low input (hence low cost) multipurpose grain/forage crops. They have some distinct advantages in these roles including:

- tolerance to a range of herbicides
- tolerance to drought and waterlogging stresses (particularly grasspea)
- absence of hard seed and serious disease
- tolerance to pests and high tissue nitrogen.

The general aims of lathyrus research by CLIMA in Australia are to develop cultivars with improved yield and quality, identify roles as alternatives to current legumes in dry land farming systems and to develop animal feed markets.

Animal feed studies with lathyrus show that it is competitive or better than lupins for producing live weights gains and wool growth in sheep. The neurotoxin 3-(N-oxalyl)-L-2,3-diamino propionic acid (ODAP) in lathyrus sp. has constrained commercial releases to those with low seed concentrations (< 0.10%). In 1998, CLIMA released one *L. cicera* variety ‘Chalus’ in 1998 which has an ODAP concentration of 0.09%.

In order to develop a high yielding *L. sativus* variety with low levels of ODAP (less than 0.1%), a hybridisation program was initiated by CLIMA in 1994. One promising line, Lathyrus 20B now named as Ceora, was developed in this breeding program.

Ceora has waterlogging and drought tolerance and its seed yield has been similar or slightly less than field pea over the evaluation period (5 years). Ceora has low ODAP levels of approximately 0.04 – 0.09% and provides excellent potential as a multipurpose crop for feed grain (ruminants and monogastrics) and fodder, hay and green manure. *L. sativus* has not previously been released in Australia and therefore a weed risk assessment has been completed and Ceora has been added to the permitted weeds species list for WA.

Ceora is protected by Plant Breeders Rights (PBR) and is licensed to The Seed Group (Kellerberrin, WA) and Coorow Seeds (Coorow, WA). Keeping the benefits of the new variety tightly in growers’ hands, CLIMA is releasing it using a ‘public good’ approach by not imposing any royalty and allowing grower to grower trading after October 2008.
CLIMA’s research efforts continue to produce some excellent industry outcomes in the form of new grain and pasture legume varieties. Australia’s first grasspea (*Lathyrus sativus*) variety, “Ceora”, bred by CLIMA researchers was commercially released by the Minister for Agriculture, The Hon Mr Kim Chance at the Crop Updates in Perth on 16 February 2005.

CLIMA’s commitment to postgraduate training is ongoing, with twenty postgraduate students supervised by scientists from partner organisations and undertaking legume research projects currently enrolled at The University of Western Australia and Murdoch University.

Dr Hongxu Yuan, a visiting scientist with CLIMA from the Zhanjiang Ocean University, China together with Dr Hua’an Yang (DAWA) has recently discovered a new molecular marker for metribuzin (post-emergence herbicide) tolerance in narrow leafed lupin. This is a significant achievement within such a short period of time and clearly emphasises the importance of CLIMA’s international collaboration.

CLIMA’s Industry Advisory Group (IAG) met at Murdoch University on 25th February and provided input into future R&D needs of annual pasture legumes. CLIMA’s Governing Board will hold a special meeting on 13 April to finalise the extension of the CLIMA Memorandum of Understanding (MOU) between the four alliance partners for a further two years and discuss lupin industry priorities and R&D directions. We are at an advanced stage in the preparation of CLIMA’s comprehensive Biennial Research Report for 2003-04, which will be published before the end of June 2005.

Genomics and Biotechnology are broad fields that transcend species and subprograms within CLIMA. CLIMA has scientists with some outstanding expertise and insights, but it is important that these are applied more broadly to guide CLIMA’s overall approach to legume genomics. Following several workshops, discussions and a review of research activities in legume genomics and biotechnology at CLIMA we have recently established a cross-program Legume Genomics and Biotechnology Management Group. The members of the group are: Dr Karam Singh (CSIRO), Dr Penny Smith (UWA), Prof. Mike Jones (Murdoch), Dr Bevan Buirchell (DAWA) and Prof. Kadambot Siddique (CLIMA Director). We will also choose an expert from outside the CLIMA partners to assist the group as and when required. The committee will meet soon to identify future directions of CLIMA’s Biotechnology and Genomics research.

In June 2005, CLIMA will complete 5 years since the termination of commonwealth funding in 2000. CLIMA has made excellent progress during these past 5 years as evidenced by the successful release of new varieties, the attraction of significant research funding from a range of sources, the training of a new generation of legume scientists and the maintenance of national and international credibility via partnerships and publications. The future looks bright for the CLIMA Research Alliance, with many opportunities for further enhancement of our role in legume research and the industry.
INTERNATIONAL VISITOR DELIVERS METRIBUZIN TOLERANCE MARKER

CLIMA is currently hosting Dr Hongxu Yuan, from the Department of Biotechnology, Zhanjiang Ocean University, China. She has been working with Dr Hua’an Yang (DAWA) and has delivered WA lupin breeders a new molecular marker, one to identify metribuzin tolerance in lupin. DNA fingerprinting technology, called MFLP was used to discover the marker, which will fast track lupin breeding and screening. The marker was converted into a sequence-specific, co-dominant, and simple PCR based assay.

The marker has the technical features desirable for large scale marker implementation in applied plant breeding, and will allow breeders to select individual plants which contain the metribuzin tolerance gene. The plants not having the tolerance gene are identified and eliminated at an early stage in the breeding cycle. This discovery has been an excellent achievement in the short time Dr Yuan has been visiting WA.

MARK OF APPRECIATION FOR DR YANG’S WORK

The award was presented by Agriculture Minister Kim Chance who said “Dr Yang and his team have developed a world class process to immediately identify markers to lupin genes with resistance to anthracnose and phomopsis stem blight. This technique enables plant breeders to select lines where these genes are present more efficiently, which can halve the time taken to identify disease resistant lines in the lupin genetic improvement program. This translates into more efficient lupin breeding to release new cultivars with higher quality and higher yielding crops that will generate greater returns to the State’s valuable lupin industry, which accounts for 80 per cent of the world market worth $200million.”

NAPLIP COLLABORATORS GATHER IN THE WEST

From February 22 to 24, 2005, I attended the National Annual Pasture Legume Improvement Program (NAPLIP) collaborators annual meeting hosted by Clinton Revell and his colleagues at DAWA and held on Rottnest Island. It was an exciting experience to once again learn of the breadth of research currently taking place, and to meet with those Australian pasture researchers and breeders who are at the cutting edge.

On the first day, Professor Richard Oliver (Murdoch University) and I, as guest speakers, gave separate talks on different but linked issues in the use of molecular techniques in plant characterization and breeding, with a particular focus on pasture legumes. Then followed 2 intensive days of research presentations from southern Australian and Tasmanian members of NAPLIP. I really enjoyed the opportunity to be part of all the main sessions, and there was also a forum to discuss the future of NAPLIP.

We were also hosted to a brilliant dinner at the Rottnest Lodge, which gave me and the other participants a great opportunity to further discuss our research interests and possible future collaborations.

by Dr Kioumars Ghamkhari

As an informal part of the evening entertainment, a slide show by Mr Richard Snowball and his colleagues on their collection trips to several countries was a very enjoyable part of the experience as well, during which he took us to Eritrea, high mountainous areas of Zagross in western Iran, the Canary Islands and finally Turkey.

Overall, it was a great success for the hosts and a great opportunity for the exchange of information for all the participants. Well done Clinton and the rest of the pasture team at DAWA.
Recently researchers from UWA, CLIMA, Department of Agriculture and CSIRO attended a workshop with the Local Farmer Group Network (LFGN) in Perth. The Network is a relatively new concept to assist researchers to get involved with local farmer groups throughout the Western Australian wheatbelt. One of the issues the workshop addressed was the problem researchers have trying to get in touch with grower groups and knowing what their interests are.

Over the last few years in WA many small locally focused grower groups have been left to their own demise without any clear support for their development. Sometimes local farmer groups can find themselves quite isolated from research ideas and peer support due to distance and not knowing who to contact regarding their farming system problems.

Fortunately, one of the direct outcomes of the research workshops held by LFGN was the need for research staff to be able to access grower groups via the internet. Therefore the project team has been busy supporting local groups to get their ideas sorted, ready to be placed on the website for all to see, including the other groups.

The project team is based at UWA and shares an office with the Grower Group Alliance (GGA) Coordinator (Tracey Gianatti), as both projects share many synergies. (GGA caters for larger grower groups.)

Size of the local groups can vary from six up to fifty farming businesses. Groups must be willing to share information they generate across the network. This is an essential criterion to be a part of the network. The real strength of the network will grow as it establishes ongoing alliances with researchers at the local level, who are investigating new technology within a farming systems context.

Mr Paul Carmody (LFGN), second from left, with members of the Woolacutty Local Farmer Group

PhD Congratulations!

Congratulations to Dr Phil Nichols who received his PhD in December 2004 at a ceremony at the University of Western Australia. Phil was supervised by Prof. Phil Cocks and his thesis title was “Evolution in sown mixtures of subterranean clover (Trifolium subterraneum L.).” He was the holder of an Australian Wool Innovation scholarship. Phil, a senior legume pasture breeder at DAWA, South Perth, has been associated with CLIMA for many years and it is great to see him rewarded for his work. Phil will be presenting some of the results of his PhD studies in a CLIMA seminar on Friday 29th April.

Also to be congratulated is Dr Madeleine Wouterlood who was awarded her PhD in January, 2005. Madeleine was supervised by Prof. Hans Lambers and Dr Erik Veneklaas and her thesis title was “Carboxylates in the rhizosphere of chickpea (Cicer arietinum) - in relation to P acquisition”. She was funded by a UPA(IS) scholarship and Plant Biology, UWA. Madeleine is currently employed as a research assistant in Plant Biology.
RESEARCH REPORTS

PROSPECTS FOR COMMERCIAL PEARL LUPIN

by Dr Mark Sweetingham and Dr Jon Clements

Narrow-leafed lupins are grown on 800,000 ha of sandplain soils in Western Australia and albus lupins, which were decimated in WA by anthracnose in 1996, are still grown in parts of Victoria and southern NSW. However, returns from lupins have been variable, particularly when stockfeed prices have been low. New end-uses for lupins including aquaculture and processing opportunities for the food ingredient sector could improve profits for growers and encourage greater rotational use of lupins in sustaining cereal production. Researchers at CLIMA and DAWA led by Dr Mark Sweetingham, are evaluating the commercial potential of the pearl lupin (Lupinus mutabilis) in a project supported by the GRDC.

The pearl lupin originates from the Andean highlands of South America where it has been cultivated for centuries by the indigenous peoples of Ecuador, Peru and Bolivia. Grain protein and oil levels are similar to soybean (protein up to 45% and oil up to 18%). These levels are significantly more than occur in narrow-leafed or albus lupin and the protein is of good quality in terms of lysine and sulphur amino acids. The oil is high in unsaturated fatty acids and low in erucic acid and the grain has a thin seed coat making it highly suitable for dehulling.

There is no commercial production of pearl lupin in mechanised agricultural systems anywhere in the world. In Chile, a low alkaloid variety was developed but has not been widely adopted due to agronomic limitations such as very late flowering. Breeders in France, Germany and Poland spent some years trying to develop the crop there but reported difficulty maintaining the low alkaloid trait and found the highly branched nature of the crop meant it would not ripen in their climate. Dr Jon Clements (CLIMA) has bred low alkaloid, early flowering types that appear suitable to the winter cropping zones of southern and Western Australia. Small plot evaluation trials by DAWA have shown the ability of the plant to grow vigorously and fix nitrogen. But as might be expected, given the lack of local breeding, grain yields have been generally lower than other lupin species. However, at sites around Mt Barker in WA, yields in some trials have been comparable with the best narrow-leafed and albus varieties. Seed of new lines is being multiplied with a view to trialing them more widely, including in eastern Australia.

Pearl lupin appears to require a more fertile soil than the narrow-leafed lupin but should grow well where albus lupins are or were successful. It seems more tolerant of low pH and waterlogging than albus lupins but will prefer a well drained soil. Future breeding efforts will attempt to improve yield through better pod set and harvest index, greater disease resistance and improved herbicide tolerance.

Fish feeding trials with trout to determine the protein digestibility compared to soybean meal and other lupin species are planned to commence in WA this year.

Weeds in Winter Pulses

A new publication, Weeds in winter pulses - Integrated solutions (CRC for Australian Weed Management Technical Series #9) provides up-to-date integrated pulse-based solutions to weed management in annual cropping systems. Well-managed pulse crops can be used as a key component of a whole farm weed management program and this book, compiled by Di Holding and Annabel Bowcher, highlights recent research and ‘on-farm solution’ case studies. It covers aspects of managing weeds in the pulse phase of a rotation including:

- Factors to consider when choosing a pulse species (e.g. soil type, weed spectrum, residual herbicides).
- The impact of weeds on pulse production and the cropping rotation.
- Problem weed species in each state.
- How to ‘tip the balance’ toward the pulses instead of the weeds.
- Weed management using herbicides.
- Cultural management.
- Hygiene on farm.

Copies from:
CRC for Australian Weed Management
Phone (08) 8303 6590
Fax (08) 8303 7311
LIFE WITHOUT SEX!

by Dr Janine Croser, Ms Julia Wilson and Prof. Kadambot Siddique

Australian and Canadian pulse researchers have joined forces to take the fun out of procreation for chickpea and field peas, with the aim of speeding up the process of breeding resistance and other useful traits into new varieties. The GRDC-supported joint effort involves researchers from CLIMA, the South Australian Research and Development Institute, and the University of Saskatchewan, Canada.

Together, researchers are developing laboratory techniques for producing true-breeding lines from field pea and chickpea much faster than can be done with conventional breeding techniques. In canola, wheat, barley and many other important crop species, true-breeding ‘doubled haploid’ breeding lines are produced in a single generation via laboratory culture of their immature pollen cells (microspores) to form plants without fertilisation. These are termed haploid and have only half the chromosome complement of a seed derived plant. Pulse crops have historically been unresponsive to this technique and the international research effort has been mounted to overcome obstacles to adapting the technique to chickpea and field pea.

To date, our collaborative research has screened a wide range of chickpea and field pea cultivars for responsiveness to microspore culture techniques. Appropriate conditions for developing early stage haploid embryos from the microspores have been developed. Our current research is focused on increasing the number of microspores undergoing division and establishing protocols for routine embryo maturation and subsequent plant regeneration.

Well done Julia!

Congratulations to CLIMA researcher Ms Julia Wilson who has been promoted from Research Assistant to Research Officer. Julia joined CLIMA in September 2003 and is awaiting the results of her PhD submission.

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

Haploid plants are infertile and thus not of much use to breeders. The second step of the process will therefore be to chemically double the chromosomes of the haploid plant to produce the same number as would be found in a seed-derived plant. Such plants are termed ‘doubled haploids’, they look like any other seed-derived plant, are completely fertile and are “true-breeding”. This single generation process replaces up to six generations of backcrossing currently used to produce true-breeding varieties.

The results of our research in pulses compare favourably with early research in crops where this technique is now used routinely, such as barley and canola, but more research is required to overcome barriers to successful embryo maturation in chickpea and field pea.

Once developed and fine-tuned, the protocol will be applied in chickpea and field pea breeding programs in Australia. New chickpea and field pea varieties developed using these techniques may be some years away, but the wait will be well worthwhile given the substantial benefits to be gained in reducing constraints on production and response time to new threats.
CLIMA EXTENSION

INDUSTRY GROUP VIEW CLIMA ACTIVITIES AT MURDOCH UNIVERSITY

by Dr Debbie Thackray

CLIMA’s Industry Advisory Group (IAG) met at Murdoch University on 25th February, to review grain and pasture legume industry needs and discuss CLIMA’s input into present and future grain and annual pasture legume R&D. After the meeting, members took a tour of some of Murdoch’s research facilities where a number of CLIMA researchers described project work being done there. Lunch provided further opportunities for researchers to discuss their work with IAG members.

The next meeting will be held at CSIRO.

The projects discussed at Murdoch were:

- Dissecting fungal disease resistance using Medicago truncatula – foliar and root diseases (GRDC Project: UWA38/UMU88) Drs Theo Pfaff Judith Lichtenzveig & Prof. Richard Oliver
- Synteny in Legumes – Rapid generation of genetic maps in legumes for generalized marker-assisted breeding – results from last 6 months on lupins and lentils. (ARC-LP Project) Dr Huyen Phan & Prof. Richard Oliver
- The SABC, what it is and how it works. Prof. Mike Jones
- Pioneering lupin markers and mapping. (GRDC Project No: UMU81; Murdoch University funding) Prof. Mike Jones
- Towards molecular dissection of virus resistance in Medicago truncatula. (CLIMA funding) Mr Mohammad Saqib
- New diseases of legumes. (Murdoch University PG Studentship) Mr Mohammad Saqib
- Commercial biotechnology diagnostics for the legume industry offered by Saturn Biotech at the SABC. Mr Chris Florides

WHAT’S NEW ON CLIMA’S WEBSITE

www.clima.uwa.edu.au

• ROOTMAP
http://www.clima.uwa.edu.au/research/pulses/rootsystems

ROOTMAP is a three dimensional (3D) root architecture model developed to simulate root systems growing in response to the non-uniform supply of water and nutrients in the soil environment. You can view animated model outputs for different scenarios on the website.

• BGM Newsletter June-December 2004
A half-yearly publication on Botrytis Grey Mould research and extension supported by ACIAR and CLIMA.

• Press releases since the last newsletter (click on “news” and then “press releases” in left-hand margin of website):
  - “Western Australia releases nation’s first home-grown grasspea” (February)
  - “Clima claims metribuzin marker” (March)

• 2005 Seminar Series (click on “Seminars” in left-hand margin of website): there is a pdf file of the whole year’s programme for printing off and also an embedded table showing upcoming seminars. Dates are full until the end of June, with some dates for the rest of the year confirmed.
**Plant Tissue Culture & Biotechnology Conference**

‘Contributing to a sustainable future’

**September 21st-24th, 2005**
Ecology Centre of the Botanic Gardens and Parks Authority at Bold Park, Perth, Western Australia

This conference will showcase recent developments in plant tissue culture and biotechnology, highlighting contributions to sustainability in horticulture, agriculture and forestry, and conservation of the natural environment. The venue will be the new Ecology Centre of the Botanic Gardens and Parks Authority at Bold Park which is a beautiful bush reserve. Delegates will stay in the beachside suburb of Scarborough a 10 minute drive away. The program will include a welcome function on the evening of Wednesday Sept 21st, followed by 3 days of papers and posters. There will be a conference dinner on Friday night and on Sunday 25th we will offer a field trip for members who wish to see the wildflowers.

Details regarding the CALL FOR ABSTRACTS are now available (deadline 1 June 2005). There will be a discounted early bird registration fee and also a discount for members of the IAPTC&B.


**First International Conference on Crop Wild Relative Conservation and Use**

**September 14th-17th, 2005 Agrigento, Sicily, Italy**

This conference will bring together the international community to address the current status and future of crop wild relatives (CWR) as a vital resource for improving agricultural production, increasing food security, and sustaining the environment. The conference will be a landmark in conservation, highlighting CWR as critical but neglected resources.

The Conference objectives are to:

- Promote the importance of wild plant species of socio-economic value to the international community
- Review the establishment of CWR inventories and establish a baseline for their conservation assessment
- Assess procedures for establishing conservation priorities for CWR
- Review the current status of information access and management for CWR
- Evaluate methodologies for in situ and ex situ CWR conservation
- Explore ways of strengthening CWR conservation and use through international and inter-agency collaboration
- Disseminate products to the European and global community, and discuss their wider application and continued use

Participation and contributions are sought from both European and non-European countries to ensure the international scope of this first Conference. Target audiences include conservation managers, plant breeders, policy-makers, information managers, researchers and other interested individuals.

Website: [http://www.pgrforum.org/](http://www.pgrforum.org/)

**MEETINGS DIARY**

2nd Australian Medicago Model Legume Workshop, Rottnest, Western Australia  
5-8 April 2005  
email: Medicago@murdoch.edu.au

International Edible Legume Conference, Durban, South Africa  
17-21 April 2005  
[http://www.up.ac.za/conferences/ielc](http://www.up.ac.za/conferences/ielc)

11th International Lupin Conference, Guadalajara, Mexico  
4-9 May 2005  

Grains West Expo, Scarborough, Perth  
19-20 July 2005  
email: adminjd@consultag.com.au

1st International Conference on Crop Wild Relative Conservation and Use, Agrigento, Sicily, Italy  
14-17 September 2005  

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

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

1st International Ascochyta Workshop on Grain Legumes, Le Tronchet, France  
3-6 July 2006  

**International Advisory Board appointments**

Following a recent visit to establish collaboration between Sultan Qaboos University (SQU), Oman and the University of Western Australia, Professor Alistar Robertson (Dean Faculty of Natural and Agricultural Sciences, UWA) and Professor Kadambot Siddique (Director, CLIMA) have been invited to join the International Advisory Board of Agricultural and Marine Sciences Journal published by SQU. The main role of the Advisory Board is to give advice, to promote the journal and to assist with refereeing articles as and when required. Professors Robertson and Siddique have accepted the invitation.
RECENT CLIMA RESEARCH PUBLICATIONS

Since the December 2004 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 full 2003 and 2004 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


Review Articles, Books and Book Chapters


BABY NEWS

Congratulations to CLIMA associate Dr Steve Wylie and wife Li Hua on the birth of Joshua, a brother to Lily and Lachlain. He was born 6th December 2004 (4.2kg) and all are doing well!

Congratulations also to ex CLIMA staff member Dr Chris Davies and husband Chris on the birth of Dakota, their first child. She was born 8th January 2005 (3.9kg).
VISITORS AND TRAVEL NEWS

GRDC INDUSTRY PLACEMENT SCHOLARSHIP INITIATIVE
by Dr Janine Croser and Ms Julia Wilson

In January, CLIMA and School of Plant Biology/Canola Breeders WA staff Ms Simone Chappell, Ms Anouska Cousin, Ms Julia Wilson and Dr Janine Croser hosted two high school students, Tam Thanh Nguyen and Jenna Blackwell as part of the GRDC Industry Placement Scholarship Initiative. The scholarships have been established to encourage high-quality students into University Agriculture studies.

Tam and Jenna chose to visit CLIMA and Plant Biology due to their interest in plant breeding and biotechnology. Staff organized a busy schedule for the students to expose them to as many different facets of tissue culture and molecular biology as possible.

During their week-long placement they set up canola, chickpea and field pea doubled haploid experiments, undertook DNA extraction and PCR of lupin, had a morning extracting anthers and performing hybrid crossing in the barley and wheat doubled haploid labs at DAWA and finished up by analysing some experimental results using the fluorescence microscope at the Centre for Microscopy and Microanalysis.

Staff members were very impressed by Tam and Jennas’ enthusiasm and aptitude and hope that they have helped in their choice of career. Jenna commented that ‘she had never realized plants could be so interesting’ and Tam has said that she ‘now realizes that agriculture is not just about farming – that science also plays a big part’.

RETURN TO ICRISAT AND BANGLADESH
by Mr Bill MacLeod

From 23 February to 5 March this year, I visited India and Bangladesh to undertake the annual review of activities being conducted as part of the ACIAR funded project “Integrated management of Botrytis grey mould (BGM) in Bangladesh and Australia”. Dr Suresh Pande at ICRISAT, Hyderabad, India, is undertaking screening of germplasm for resistance to BGM in controlled environment facilities. In addition to the routine screening activities being undertaken at ICRISAT, a non-destructive “cut twig” method currently being developed, was demonstrated to me.

In Bangladesh, the project activities being conducted by Bangladesh Agricultural Research Institute (BARI) Scientists in 4 districts have progressed to demonstration to farmers of integrated pest management (IPM) packages. I visited several of the 100 clusters of such demonstration fields; in some instances a clear benefit of IPM was apparent by comparison with farmer managed crops in nearby fields. The project activities have also been expanded this winter season into new districts surrounding the initial project target area; these are districts from which chickpea cultivation has disappeared as a result of the impact of BGM on crop reliability. Currently there is considerable interest in chickpea production in Bangladesh due its importance in the local diet and profitability in the rice based farming system.

Further information on the Scholarships can be obtained from Project Officer: Mr Colin Hawke chawke@fnas.uwa.edu.au.
**RUST-PROOFING LENTILS IN CHILE**

I recently had the opportunity to travel to Chile from 4th – 17th November 2004, as part of a GRDC funded project DAV434 “Coordinated Improvement Program for Australian Lentils (CIPAL)”. CIPAL aims to deliver superior red and green lentil varieties with improved yield, stability of yield and quality for Australia.

One of the objectives of the program is to screen germplasm for resistance to exotic diseases, using off-shore disease nurseries. The rust nursery is located at Pelluhue in the central region of Chile and managed by Dr Juan Tay and Dr Andreas France, based at INIA, Quilamapu. During this visit I evaluated breeding lines for resistance to rust in the field disease nursery and visited processing laboratories at the field station at INIA, Quilamapu.

I visited a number of chickpea and lupin crops in the central region of Chile and presented a seminar on “The grain legume industry in Australia: Opportunities for the future” at INIA, Carillanca. I had several meetings with researchers (Dr Mario Mera, Dr Haroldo Salvo Garrido and Dr Enrique Penaloza Hernandez) at INIA, Carillanca who were interested in current grain legume research activities in Australia.

There was particular interest in lupins (narrow-leaf, albus and yellow) and high protein grain for animal feed (particularly aquaculture). I also met with personnel at Productos Nutritivos Avelup in Temuco, which develop and release many lupin varieties; Graneles de Chile in Rancagua, the largest grain trading company in Chile; and Fundacion Chile in Santiago, a privately owned, non-profit organisation established by the Chilean Government involved in technology and enterprise development.

One of the Australian lentil breeding lines identified as resistant in the rust nursery in Chile also produced excellent yields in the national breeding trials across Australia in 2004. This offers future opportunities for a variety in its own right or as a parent in the crossing program.

**92ND INDIAN SCIENCE CONGRESS**

The Indian Science Congress, held annually, is the largest and most important meeting of scientists in India. The 92nd Indian Science Congress held at Nirma University in Ahmedabad, Gujarat, from 3 to 7 January 2005, was opened by the Prime Minister of India and on another half-day was attended and addressed by the President of India (formerly one of India’s leading physicists). Many of India’s leading scientists were present. Attendance was about 4,000, including 200 from overseas. Additionally, there was a Children’s Science Congress held in conjunction with the congress.

The theme of the congress was ‘Health Technology as a Fulcrum of Development for the Nation’, but also included plenary sessions on nutritional security, capacity building, environmental health, water recycling, and space science. I gave an invited lecture on ‘Increasing Crop Productivity while Maintaining Environmental Sustainability: the Australian Experience’ in a symposium on ‘Agricultural Productivity in Relation to Quality of Natural Resources: Issues, Challenges and Strategies’ in the agricultural section, one of 14 sections at the congress.

I have been traveling to India for the past 27 years and have seen incredible changes over that period. However, this was the first time that I have noted such a positive attitude to the role that science and technology can play in the country’s development. Buoyed by their successes in the world’s Information Technology industry, the leading scientists are openly talking of India being a leader in the development of generic drugs, biotechnology and space science in this century. The burgeoning number of highly-qualified scientists and relatively low wages/costs-of-living provide an opportunity for companies looking for alternatives to the increasingly difficult regulatory atmosphere in the developed world.

In particular, North America appeared to be taking the opportunities afforded by Indian science very seriously. The congress was attended by the Chief Executive Officers/Presidents/Directors of the US National Science Foundation, the US National Academy of Sciences, the US National Institute of Heath, The Gates Foundation, the former President of the National Science Foundation and the Deputy Secretary of the US Department of State, plus many of their support staff. Canada had an equivalent series of high-ranking scientists from their national science and development agencies. It would be good to see Australia taking a similar interest in the opportunities available.
## CLIMA VISITORS DECEMBER 2004 - JUNE 2005

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<td>Assoc. Prof. Andrea Pardini</td>
<td>13 Sept.-25 Feb. 2005</td>
<td>University of Florence, Faculty of Agriculture, Italy</td>
<td>Various research activities</td>
<td>Dr Ian Fillery, Adj. Prof. Neil Turner, Assoc. Prof. Mike Ewing,</td>
</tr>
<tr>
<td>Mr Ian Briggs</td>
<td>13 Dec. 2004</td>
<td>Australian Ambassador Designate to The Kingdom of Saudi Arabia</td>
<td>To discuss research and post-graduate training opportunities between Saudi Arabia and CLIMA/FNAS</td>
<td>Prof. Kadambot Siddique</td>
</tr>
<tr>
<td>Dr. Hongxu Yuan</td>
<td>8 Dec '04 - 6 June 2005</td>
<td>Department of Biotechnology, Zhanjiang Ocean University, Guangdong, China.</td>
<td>To develop molecular markers for Metribuzin herbicide resistance in lupin, to study the genetic diversity of Australian lupin cultivars, and to develop specific molecular markers for lupin anthracnose pathogens.</td>
<td>Dr. Hua’an Yang</td>
</tr>
<tr>
<td>Ms Tamar Jinjikadze</td>
<td>17-26 Dec 2004</td>
<td>Gene Bank Institute of Farming, Georgia</td>
<td>Meeting with Dr Ken Street (ICARDA) and Clive Francis re ACIAR Funded Central Asian Genetic resources Project. Update on ArcView mapping systems with Dr K Ghamkhar</td>
<td>Prof. Clive Francis</td>
</tr>
<tr>
<td>Dr Ken Street</td>
<td>17 Dec-5 Jan, 2005</td>
<td>ICARDA</td>
<td>Meetings and discussions with Prof Francis on plans for new ACIAR project in Central Asia and Caucasus. Meeting with Gene Bank manager - Georgia</td>
<td>Prof Clive Francis</td>
</tr>
<tr>
<td>Ali Ganjeali</td>
<td>February 2005</td>
<td>College of Agriculture Ferdowski</td>
<td>To undertake research on water logging of chickpea</td>
<td>Dr Jairo Palta and Adj. Prof. Neil Turner</td>
</tr>
<tr>
<td>Dr P.S. Minhas</td>
<td>17 January 2005</td>
<td>Director, Central Soil Salinity Research Institute, Karnal, India</td>
<td>To learn about CLIMA’s research activities on legumes</td>
<td>Drs Tim Setter and Tim Colmer</td>
</tr>
<tr>
<td>Prof. Dani Shtienberg</td>
<td>1-8 April 2005</td>
<td>The Volcani Centre, Israel</td>
<td>2nd Medicago model legume workshop, Rottnest. Meeting with CLIMA Researchers and Associates</td>
<td>Dr Debbie Thackray</td>
</tr>
<tr>
<td>Prof. Bogdan Wolko</td>
<td>5-11 April 2005</td>
<td>Polish Academy of Sciences, Poland</td>
<td>2nd Medicago model legume workshop, Rottnest. Meeting with CLIMA Researchers and Associates</td>
<td>Dr Hua’an Yang</td>
</tr>
<tr>
<td>Prof. Fred Muehlbauer</td>
<td>5-12 April 2005</td>
<td>Washington State University, Pullman, USA</td>
<td>2nd Medicago model legume workshop, Rottnest. Meeting and workshop with CLIMA Researchers and Associates</td>
<td>Prof. Kadambot Siddique</td>
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