



# CLIMA Peoples' Winning Ways

**Dr James Ridsdill-Smith**, Chief Research Scientist at CSIRO Entomology and CLIMA's Disease and Pest Management subprogram leader became a Fellow of the Australian Institute of Agricultural Science and Technology in November. James was recognized for his significant contribution to the understanding of biological control of cattle dung using dung beetles and for his work with redlegged earth mites which included release of the TIMERITE® model.

James also received the degree of Doctor of Science from the University of Cambridge in the UK in July on the basis of his published work. He travelled over with his family for the occasion.

**Drs Jon Clements and Miles Dracup** received an award for the best poster at the Fourth European Grain Legumes Conference in Cracow,



Professor Marcello Duranti, chairman of the Fourth European Grain Legumes Conference Scientific Committee, presents Jon Clements with best poster award at the conference dinner, held at the Niepomice Royal Castle.

Poland in July. Their poster, "Selection for Thinner Seed Coats and Pod Walls in *Lupinus angustifolius*" was chosen out of the 200 posters displayed at the conference.

**Professor Kadambot Siddique** flew with his wife Almaz, to Adelaide in early November to receive the prestigious

Urrbrae Award. The award is conferred biannually and is made in recognition of outstanding contributions to the science or practice of Australian agriculture.



Mr Terry Tierney, Urrbrae Agricultural High School, Almaz Siddique and Professor Kadambot Siddique during the Urrbrae Memorial Award Ceremony.

Professor Siddique is recognized for the innovative nature and high value to practical agriculture of his work in the area of production agronomy, crop physiology, breeding, quality improvement and marketing.

## CLIMA Continues to Attract International Visitors

**Dr Geletu Bejiga**, Director of the Crops Research, Ethiopian Agricultural Research Organisation, visited CLIMA for 12 days in July. During his visit, Bejiga gave a seminar entitled: "Crop and forage research priorities in Ethiopia."

**Dr Rajendra S. Malhotra**, senior Chickpea Breeder and the Project Manager for Food Legumes at ICARDA gave a seminar, "Food legume Improvement at the International Centre for Agricultural Research in Dry Areas (ICARDA)". Dr. Malhotra was in WA on a GRDC visiting fellowship for one week and met with CLIMA and other researchers at UWA, WADA, Murdoch University and CSIRO.

**Dr Oxana Dzyuba**, Senior Research Scientist with the Vavilov Institute of Plant Industries, St Petersburg, Russia. Oxana helps maintain one of the world's



John Howieson inspects pastures with Uruguayan scientists Maria Abreu and Elena Beyout at the Ballard Seed's Annual Pastures Field Day

largest collections of Brassica species some of which have already been forwarded to Australia. She is working for three months on a collection of mustards and *Brassica juncea* x *B napus* hybrids with Dr Janet Wroth. Oxana is sponsored by a Crawford foundation scholarship.

Two Uruguayan scientists, Ms Maria Abreu and Ms Elena Beyout, are

visiting Assoc Prof John Howieson at the Centre for Rhizobium Studies for three months, with support from the Crawford Foundation and INIA, Uruguay.

### Announcements

#### CLIMA & CRC Salinity

#### Christmas Party Thurs, 20

December 5 pm onwards. Thurling Green near CLIMA at UWA. \$10 per person (includes meats, salads, drinks, etc) Kids under 5 free; there will be a visit from Santa!

RSVP: [mcc@cyllene.uwa.edu.au](mailto:mcc@cyllene.uwa.edu.au)

#### Lupins in Iceland

The 10th International Lupin Conference will be held in Iceland 19 - 24 June 2002. You can find further information on the conference homepage:

[www.rala.is/lupin](http://www.rala.is/lupin)

## From The Director

During the past few months I have been busy formulating a new structure (management and research) for CLIMA designed to crystallize our research leadership and capabilities and ensure access and communication with key industry groups. We now have program and subprogram leaders in place. The CLIMA Program Management Team has just commenced monthly meetings. Heather Clarke is coordinating a seminar series based on CLIMA projects on Fridays at fortnightly intervals. We have also commenced regular press releases on CLIMA activities.

In August, we ran a successful CLIMA industry consultation workshop with more than 50 participants, including grain and pasture legume growers, processors, marketers, GRDC

representatives, key researchers, and representatives of the CLIMA research alliance. The purpose of this workshop was to begin a dialogue with industry which will identify industry priorities and define the role that CLIMA can play in terms of industry-focused research and development. A key recommendation of the consultation process was to put together an Industry Advisory Group (IAG). Mr Trevor Flugge, Chairman AWB Ltd has accepted the invitation to chair the CLIMA IAG. Eighteen members from various sectors of the agriculture industry in WA have accepted CLIMA IAG membership. The IAG will ensure that CLIMA remains focused primarily on meeting the strategic needs of the legume industry.

Based on the recommendations of the

workshop, we have also developed a portfolio of research project proposals from CLIMA. Projects are developed based on industry priorities and the research capabilities within the four partner organisations ( Department of Agriculture Western Australia, The University of Western Australia, CSIRO and Murdoch University). Projects have also been developed with CLIMA associates such as the Chemistry Centre of WA, Fisheries WA and grain and pasture legume researchers in other states. Furthermore, in line with GRDC priorities, a number of international collaborative links have been established with key research institutions.

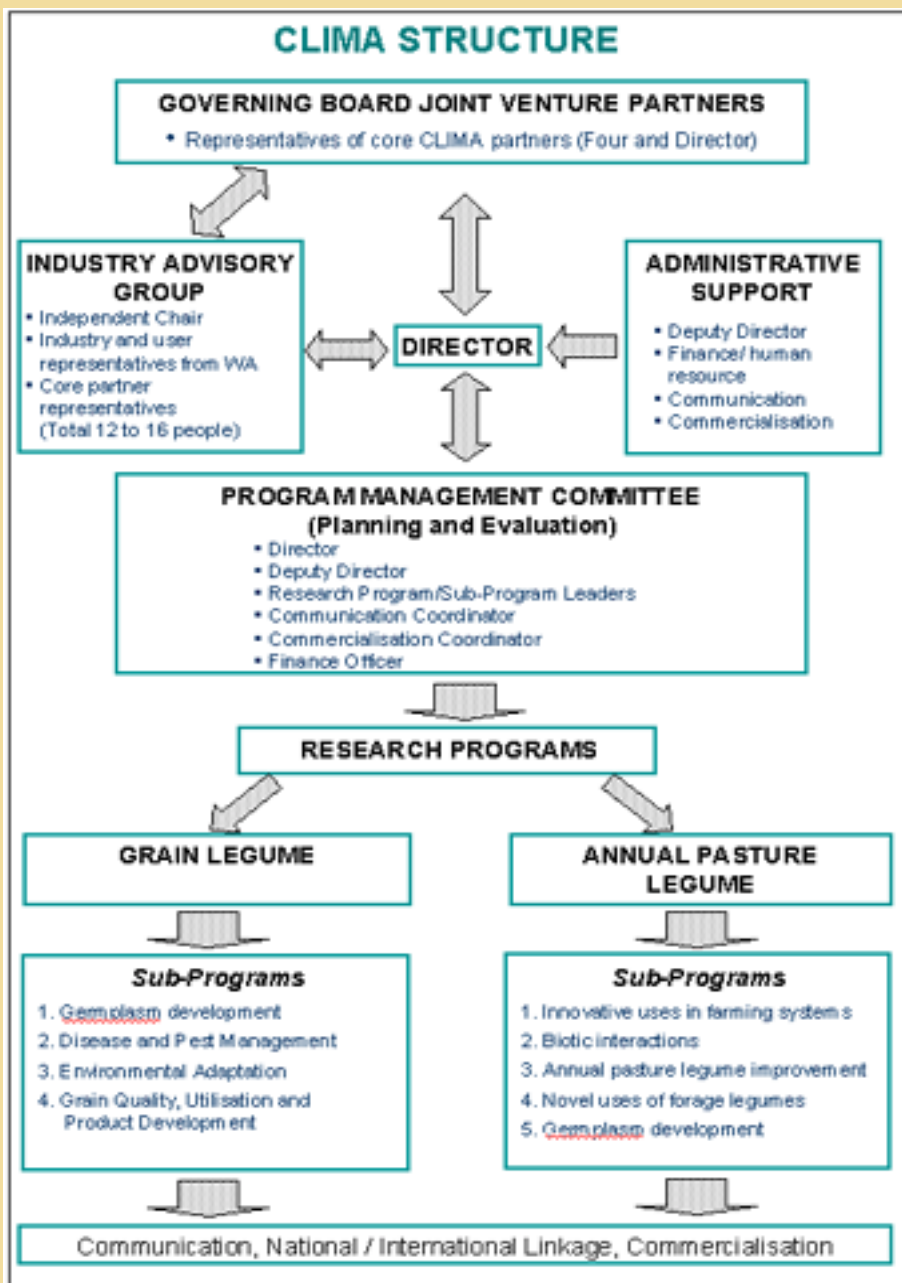
I have sent the portfolio of projects to GRDC as an indication of CLIMA's research capabilities. Funding for projects in the portfolio will be sought from a variety of sources, including the private sector. Researchers are in the process of developing full proposals for GRDC. Researchers with new ideas for projects should discuss them with me in order that they may be included in the CLIMA portfolio.

CLIMA partners have chosen to submit all grain and pasture legume projects of mutual benefit via CLIMA to potential funding bodies. The development and submission of these projects via CLIMA will strengthen existing links between the partner organisations, and I believe CLIMA is in a good position to coordinate activities in a way which best reflects the legume industry needs. I have also commenced discussions with a number of private groups on funding of projects of mutual benefit.

A number of interstate and international scientists (including the NAPLIP spring tour organised by Angelo Loi) have visited CLIMA during the past few months. Contacts have been established with international and institutions in other States for future collaborative research projects.

I am excited about the future directions of CLIMA and look forward to your continued support.

**Professor Kadambot Siddique**  
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# Genetic Resource Centre Welcomes Collaboration

■ by Richard Snowball,  
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The Australian Trifolium Genetic Resource Centre (ATGRC), hosted by the Western Australian Department of Agriculture, is one of seven Centres making up the Australian genetic resource centre network. The ATGRC has the mandate for *Trifolium* (clover), *Ornithopus* (serradella), *Biserrula pelecinus* (biserrula) and other species generally adapted to acid soils. In the last 12 months a number of other taxon have been added to the mandate including *Dorycnium* (canary clover), *Coronilla*, *Securigera*, *Cytisus* and *Sutherlandia*. The Centre also maintains working collections of *Trigonella balansae* and *Lotus ornithopodioides*.

**“the experience of the Centre’s staff should be of value to potential partners”**

In 1986 when the Centre was officially established it inherited a number of existing collections. The subterranean clover collection consisted of approximately 7,000 accessions and made up the majority of the holdings. A range of other clover species were added to the Centre and originated predominantly from collections held by Eric Bailey of the CSIRO in Perth and Sephi Katznelson of Israel. A collection of yellow serradella held by John Gladstones was also added to the Centre at the time of its establishment. Later in 1991 clover collections from other Australian states were added to the Centre. Of particular significance was the acquisition of a sizable clover collection from South Australia developed to a large extent by the efforts of Eric Crawford.

Between 1986 and 1995 Australian Wool Innovation funded genetic resource work in the Centre. The Grains Research and Development Corporation continued funding the Centre from 1996 to the present day. Genetic resource

work includes growing, identifying and characterising mostly priority species, preparing seed for conservation, and distribution of seed to bone fide researchers. The entire collection now consists of approximately 8,000 accessions of subterranean clover, 5,000 accessions of other *Trifolium* species (mostly annual), 3,000 accessions of *Ornithopus* species (mostly *O. compressus*), and 250 accessions of *Biserrula pelecinus*. Since 1986 there have been many collecting missions undertaken, particularly by Western Australian scientists and mostly to Mediterranean countries.



Stelios Samaras of the Greek Gene Bank in Thessaloniki and Harriet Shackle former student from the University of Birmingham collect pasture germplasm along side a barley crop on the Island of Lemnos in the East Aegean Sea in 1998.

Characterisation of the germplasm has been either routine or more detailed in the case of select priority species. Routine morphological characters include qualitative assessments of growth habit, leaf size, stem thickness, flower colour and pod or seed head characters. More detailed characters have been assessed in species including *Trifolium michelianum* (balansa clover), *T. resupinatum* (Persian clover), *T. isthmocarpum* (Moroccan clover), *T. vesiculosum* (arrowleaf clover), *T. purpureum* (purple clover) and *T. dasyurum* (eastern star clover). Preliminary agronomic assessments are also made including flowering times, winter and spring vigour, and seed production.

Results from preliminary genetic resource work have contributed enormously to the selection of cohorts of species for field testing across southern Australia. The Centre’s work

is credited in part for the development of a number of very successful pasture cultivars including Cadiz (*Ornithopus sativus*), Santorini, Charano and King (*O. compressus*) Prima (*Trifolium glanduliferum*), Cefalu (*T. vesiculosum*), Prolific, Nitro and Morbulk (*T. resupinatum*), and several cultivars of subterranean clover, the most recent being York.

The Centre has developed an extensive germplasm collection which may be of value to pasture researchers outside of Australia. We are keen to establish collaborative projects with other researchers where there is likely to be benefit to both parties. Collaboration may simply involve the exchange of germplasm, either the selection of suitable germplasm from the ATGRC, or collection of ex situ germplasm from the partner country, and the sharing of associated research results. A collaborative project might involve plant characterisation, selection and seed multiplication by either partner with the aim of further field evaluation and cultivar development.

Non-Australian partners may see a benefit from discovering more about their native legume species through joint botanical surveys, seed collecting missions and eco-geographic studies. The experience of the Centre’s staff in identification and characterisation of pasture legume species should be of value to potential partners. Clearly the availability of new, novel germplasm will be of great benefit to Australia. The Centre itself would seek to share in the responsibility of safe, long-term conservation of newly collected germplasm as well as the practice of free exchange of seed and associated public information to other researchers. More detailed information about the ATGRC collection can be found at the following web site: <http://www.agric.wa.gov.au/progserv/plants/pasture/improvement/>

To discuss new opportunities for collaboration, contact Richard Snowball on phone: 61 8 9368 3517 fax 61 8 9474 2840, rsnowball@agric.wa.gov.au.

# Genetic evaluation of physiological adaptation of chickpea to dryland farming systems of Western Australia

■ by **Shahal Abbo**,  
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**Dr. Shahal Abbo** from Hebrew University, Jerusalem spent a year at CSIRO / CLIMA working with Neil Turner, Jens Berger and Kadambot Siddique. Dr. Abbo was supported by a GRDC Visiting Fellowship. He provided this summary of his work.

## Project aims

- 1] Analyse the genetic control of osmotic adjustment (OA) in chickpea
- 2] Determine the genetic correlations between OA, seed weight, flowering time, and chickpea yield in dryland environments

## Background

One mechanism that maintains plant physiological activity into a stress period is the accumulation of solutes by means of osmotic adjustment (OA). OA is positively correlated with wheat yield under terminal drought. In chickpea, genetic variation in OA has been demonstrated but its genetics and bearing on yield are unclear. The aim of our work is to understand the genetic control of osmotic adjustment in chickpea. Current chickpea cultivars grown across the Australian wheat belt suffer from terminal drought. Reasons include absence of adapted early-flowering and early-podding germplasm, and the indeterminate growth habit of the plant. This means that not only flowering and subsequent pod set occur relatively late in the season, but concurrent vegetative development continues along with the reproductive development. In wheat, for example, leaf area declines right after heading, thereby minimising water loss during grain development. In chickpea, the peak of leaf area index is attained well into the middle of the reproductive stage, exposing the developing grain to terminal drought. Unlike the situation in wheat, no information on the genetic basis of chickpea OA is available.

## Results & Discussion

We looked at the distribution pattern of OA in F2 populations of chickpea grown in a glasshouse. Crosses were performed between a low OA line (Kaniva) as the female parent and two high OA lines (Tyson and CTS) as male parents. Leaf samples before the onset of stress were taken, with relative water content values of the parental lines as follows: Kaniva  $80.3 \pm 0.9$ , CTS  $81.5 \pm 1.0$ , Tyson  $79.0 \pm 0.7$ .

After harvest, all pods were threshed and the seeds counted and weighed (excluding shrivelled seeds). Mean seed yields (g/plant) of the parental lines were as follows: Kaniva  $2.4 \pm 0.6$ , Tyson  $4.7 \pm 0.5$ , CTS  $7.0 \pm 1.1$ . Mean seed weight values of the stressed parental lines (g/seed) were lower than the values typical for these genotypes when non-stressed: Kaniva  $0.28 \pm 0.02$ , Tyson  $0.12 \pm 0.005$ , CTS  $0.14 \pm 0.007$ .

The OA of plants (parents and F2), was calculated as the difference between the osmotic potential value on day 0 and the respective value 14 days after withholding water. By 14 days after withholding water the plants showed considerable stress symptoms. The mean OA values (Mpa) of the parental lines were as follows: Kaniva  $0.45 \pm 0.04$ , Tyson  $0.55 \pm 0.05$ , CTS  $0.39 \pm 0.06$ . The relatively high OA ability of Kaniva was a surprise and did not correspond with previous observations made in the field at Merredin, WA.

We observed a range of seed yield values ranging from 0 to 15 g/plant. The distribution was skewed towards the lower values with 50% of the population yielding less than 5.8 g. The frequency distribution of the OA values (OP day 0 minus OP day 14), and that of mean seed weight show a normal pattern. All three OA parental values fell within a small range, between 0.39 and 0.55 (Mpa).

An interesting (and not surprising) observation is the occurrence of a large number of individuals with higher as well as lower values compared with the three parents. This distribution pattern suggests a polygenic control of OA in chickpea.

It is interesting that a considerable seed yield range was obtained for nearly all the OA values (0.6 to 0.1). The correlation between osmotic adjustment 14 days after stressing the plants and seed yield  $-0.42$  with  $p(r) < 0.0001$ . Note that the correlation between seed yield and OA is negative. That

is, non-adjusting individuals mainly obtained high yields. This suggests that OA was not a major factor that determined seed yield in this experiment.

We suggest that early podding, regardless of the degree of OA, was far more important in securing seed yield in this experiment. Alternatively, if OA in the field increased yield by enabling deeper and greater water extraction from the soil, as it does in wheat, this would not be expressed in a pot experiment (fixed root volume). There was no correlation between mean seed weight and the osmotic adjustment. Likewise, there was no relationship between seed yield and mean seed weight. Nevertheless, the experiment has shown that we can select for OA in the glasshouse.

One possible way to reduce the strong effect of podding time on yield is to minimise the flowering and podding gap between the genotypes by extending the day-length. In our situation, forcing more simultaneous flowering and podding will minimise any phenotypic effect of early podding (earliness *per se*) on yield. Likewise, comparing all genotypes with and without stress will enable us to determine the contribution (or deleterious effect) of other determinants (total biomass production, early vigour, phenology, etc.) relative to OA genes. Finally, the selected lines can be evaluated under field conditions with a rainout shelter to ensure terminal drought conditions.

A similar set of F2 individuals was grown in Merredin during the 2000 season. Due to the early cut of the rain season we could not have evaluated those plants for OA. However, individual plants were harvested, threshed and their mean seed weight was calculated.

In April 2001, we germinated selected F3 progeny from the glasshouse-grown material (high and low OA individuals). For an unclear reason, the germination rates of those progeny were near zero. This may have to do with the quick and severe onset of water shortage during October 2000. Therefore as a follow up experiment we planted a replicated experiment in both the glasshouse and Merredin holding progeny from 25 F3 families from the material harvested in Merredin. OA measurements and seed size analyses will take place in Floreat Park and in Merredin (with assistance from Dr R French, DAWA), after pod set and will be analysed later in the summer of 2002.

# Summary of the 4<sup>th</sup> European Grain Legumes Conference, 2001

■ by Jon Clements,  
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Heather Clarke, Jon Clements, Oonagh Byrne and Patrizia Gremigni from CLIMA joined several other Australians who attended the 4<sup>th</sup> European Grain Legumes Conference in Cracow, Poland this year to present research and to get an update on the major areas of world grain legume activity.

Europe is a centre for advanced research on legumes, especially with



Heather Clarke, Jon Clements and Oonagh Byrne enjoy the conference dinner.

respect to breeding and grain quality aspects and the conference attracted key legume scientists from around the world. Many of the delegates stayed at hotels within the walls of the old part of the city which was the capital of the country from the 12<sup>th</sup> century.

The program examined different aspects relating to grain legume production and utilisation with the overall target of improving quality of life. The opportunities for grain legumes in the areas of human and animal nutrition and non-food uses are expected to increase significantly in the coming years and CLIMA intends to play an important part in the advances.

There were 56 plenary talks and 200 poster/papers at the conference and topics included: potential of grain legumes in food and feed, novel products, seed composition including protein and starch properties, seed processing, yield and yield stability, plant genetic resources, and breeding and molecular biology.

Many of the talks dealt with pea as it is grown on a large scale in Europe but lupin, chickpea, lentil, faba bean, soybean and *Phaseolus* bean were also discussed. Heather Clarke gave a talk at the conference on improving resistance to low temperature at flowering in chickpea. Patrizia Gremigni spoke about alkaloid content in lupin seed as influenced by nutrition and other environmental factors. Jon Clements contributed a poster/paper on developing thinner seed coats in narrow leafed lupin and Oonagh Byrne contributed a poster about developing molecular markers for pea weevil resistance.

One session at the conference outlined the world scene in terms of legume production and consumption. These and other details can be found at the European Association for Grain Legume Research website:

<http://www.grainlegumes.com/aep/default.asp>

It highlighted that Canada and Australia together are the world's largest exporters of legumes, holding 60% of the world export market. The biggest importers are the Indian subcontinent, the Middle East, the EU, Africa (eg. Algeria) and South America.

**“Canada and Australia together are the world's largest exporters of legumes, holding 60% of the world export market”**

The EU is the world's major producer of dry peas (3.2 million t in 2000), grown essentially for the European animal feed market. In recent years, Canada (2.9 million t) has increased pea production continuously and, in 2000, overtook France (1.9 million t) for the first time. Canada is the world's major exporter for animal feed to the EU, and human food mainly to the Indian subcontinent. Dry pea production in the former Soviet

Union (about 1.4 million t in 2000) has fallen since the beginning of the 1990's.

China has become the world's major producer of faba beans but the crop



L to R: Sofia Sipsas, DAWA. Michael Materne, VIDA. Jon Clements, CLIMA. Joe Panozzo, VIDA. Patrizia Gremigni, CLIMA. Chris Pittock, VIDA. Heather Clarke, CLIMA. Jan Bert Brouwer, VIDA.

(about 2 million t) is consumed within the country and not exported. Australia and the UK are the main exporters of faba beans, primarily to the Middle East and the Maghreb which are traditional consumers.

Lupins are grown mainly in Australia (on average, 85% of the world crop), with two-thirds of production exported, to Europe (feed) and Asia (food).

India is the world's major producer of pulses (13.5 million t in 1999/00), particularly of chickpeas (5 million t), lentils (0.9) and dry beans (6.7) which are the main source of protein for its population, a large proportion of whom are vegetarian. However, the supply in terms of production plus imports is not keeping abreast of the increase in demand due to population growth. Pulse imports reached 1.2 million t in 1999/00.

Canada, Australia and Turkey are the main world suppliers of chickpeas and lentils. The outlook is that Canada, Australia and South America are the main places in the world likely to increase their production of legumes.

# Temporal dynamics of BYMV spread in lupins

■ by Y Cheng, R Jones and D Thackray,  
CLIMA, DAWA, Murdoch

Spread of necrotic and non-necrotic strains of *Bean yellow mosaic virus* (BYMV) was compared when aphid vectors moved both types from external or internal virus sources to plots of lupins. When both types spread from adjacent naturally infected pasture into a large *Lupinus angustifolius* (narrow-leafed lupin) plot, necrotic BYMV was initially more abundant but non-necrotic BYMV then spread faster reaching a greater final incidence. In three field experiments, clover plants infected with non-necrotic BYMV (one experiment) or both types of strain (two experiments) were introduced as virus sources. In the experiment with only non-necrotic sources introduced, necrotic BYMV still spread into the plots from background external sources. Its plots consisted of two *L. angustifolius* genotypes differing in their necrosis responses to different BYMV strain groups, and one genotype of *L. luteus* (yellow lupin) giving only non-necrotic responses. Spread was faster in *L.*

*angustifolius* with non-necrotic than necrotic BYMV, and overall BYMV spread was greater in *L. angustifolius* than *L. luteus*. Presence of two distinct strain groups of necrotic BYMV was revealed by the differing symptom reactions of the two *L. angustifolius* genotypes. In the two experiments with both types of strains introduced, only one *L. angustifolius* genotype was present. Here, whether sources were removed or left in place, non-necrotic BYMV always spread faster than necrotic BYMV both within plots with homologous foci and across buffers to plots containing the opposite kind of foci, reaching an overall final incidence that was approximately twice the size. In plots without infection foci, spread was also faster with non-necrotic BYMV. In all four situations, spread of non-necrotic BYMV in *L. angustifolius* was polycyclic regardless of whether the initial virus source was internal or external. In contrast, especially when it came initially from external sources, spread of necrotic BYMV was largely monocyclic. The introduced non-necrotic isolates were not seed transmitted in *L. angustifolius*.

When the effects of virus infection on growth and seed production were examined in individual *L. angustifolius* plants infected with necrotic BYMV, plants were killed by early infection so there was no seed production. With late infection, shoot dry wt, seed yield, and seed number were still decreased by >57%, >83% and >81% respectively. With non-necrotic BYMV, shoot dry wt, seed yield, and seed number diminished with increasing duration of plant infection, these decreases ranging from 18 to 88%, 56 to 99% and 40 to 99% for late to early infection respectively. With both types of strain, yield loss in infected plants was mainly due to failure to produce any seed or to fewer seeds being produced but smaller seed size also contributed. In partially infected *L. angustifolius* stands in which both types of BYMV strain were spreading, an additional incidence of 28% in plots with introduced non-necrotic strain foci over that in plots without introduced foci was sufficient to decrease overall seed yield significantly but an additional incidence of 10% was insufficient to do so in plots with introduced necrotic strain foci.

## Temporal spread of viruses within mixed species pastures.

■ by B Coutts and R Jones  
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Six mixed species, perennial pastures at two locations, A (4 pastures) and B (2 pastures), were sampled at regular intervals over periods of 10 to 22 months. The predominant plant species present were white clover (*Trifolium repens*), perennial ryegrass (*Lolium perenne*) and kikuyu grass (*Pennisetum clandestinum*), and samples of each species were taken at random on every visit. Samples of white clover were tested for presence of alfalfa mosaic (AMV) and white clover mosaic (WCMV) viruses, ryegrass for barley yellow dwarf (BYDV) and ryegrass mosaic (RyMV) viruses, and kikuyu grass for BYDV and potyvirus infection. AMV and WCMV were detected in white clover, and BYDV and RyMV in ryegrass at both locations but often with wide incidence fluctuations for the

individual viruses. AMV incidences in white clover ranged from 0 to 19% at A, and from 27 to 100% at B. WCMV incidences in white clover fluctuated between 9 and 46% at B, but never exceeded 1% at A. RyMV incidences in ryegrass fluctuated between 3 and 34% at A, and 19 and 73% at B. BYDV incidences in ryegrass ranged from 0 to 6% at A and 4 to 17% at B. In kikuyu grass, an unknown potyvirus and BYDV were detected twice (1% incidence) and once (4% incidence) respectively at B, and the unknown potyvirus only once (2% infection) at A. During repeated trapping of aphids in four pastures (2 each at A and B), numbers of aphids caught varied widely between trapping dates and between individual pastures on the same trapping date. The species caught were *Acyrtosiphon kondoi*, *A. pisum*, *Aphis craccivora*, *Rhopalosiphum padi* and *Therioaphis trifolii*. Except in summer when only *T. trifolii* was caught, *A.*

*craccivora* was the most abundant. The trends in incidence for each virus within each pasture were compared with those from the other pastures sampled over identical periods to determine whether there was any commonality. For RyMV in ryegrass, overall incidence trends within the different pastures at both locations resembled each other during the same sampling periods. Within adjacent pastures at the same location there was commonality in incidence trends for RyMV and BYDV in ryegrass, but with AMV in white clover periods of commonality were rare.

Unraveling the individual effects of alterations in season, vector numbers, mowing, intermittent heavy grazing and pasture species composition on virus incidence proved difficult due to complex interactions between these and other factors influencing new spread or declining occurrence.

## New Kabuli Chickpeas For Ord

**Chickpea growers in the Ord River Irrigation Area will have a new superior large-seeded variety within two years leading to a major boost in production.**

New varieties are being developed by the Department of Agriculture and CLIMA with support from the Grains Research and Development Corporation and the Ord chickpea industry.

CLIMA Director Kadambot Siddique said basic seed production had commenced for five new chickpea lines to determine the best performing variety for release in the Ord. Professor Siddique said the five new lines had been selected from more than 60 extra large-seeded kabuli chickpeas introduced from Spain and Mexico in 1998 through the International Centre for Agricultural Research in Dry Areas (ICARDA) Syria.

“The Ord chickpea industry is based on the kabuli chickpea variety Macareena which was introduced from Mexico in 1983, and is valued at about \$1.5 million per year,” he said. “Five of the newly introduced lines are showing up to 25 per cent more seed yield and 10 per cent greater seed size than Macareena. These lines will be further evaluated and fast tracked for possible release as commercial varieties for the Ord within the next two years.”

Improved seed yield and quality will benefit the chickpea industry in the region. Current production could be increased from about 1,000 hectares up to 5,000 hectares, especially with the commencement of Stage 2 of the Ord River Irrigation Area. The new varieties under investigation will be quality and market tested with the help of Ord River Grain Pool, a local marketing group for chickpeas. Other private investors are discussing further development of new varieties in partnership with CLIMA.

Professor Siddique said the research was also identifying the cause of yield and quality variation in kabuli chickpeas and developing optimum management

packages.

“Dry season trials and germplasm evaluation over the last four seasons in the Ord has produced some interesting results,” he said.

“Rotations, crop establishment, and height of the seedbed and timing of the irrigation appear to be the critical factors contributing to yield and quality of chickpeas in the Ord.

“The research also shows that continuous crops of chickpeas can result in increased root disease and yield decline. Chickpea crops following cotton also shows more root diseases in some paddocks.”



(left to right) Prof. Kadambot Siddique, Noel Wilson and Peter Smith, from the Department of Agriculture, inspecting the most promising kabuli chickpea line at the department's Frank Wise Research Institute, Kununurra.

Professor Siddique said the results indicated that growers should follow a rigorous crop rotation, which included sorghum, maize, sugar cane, melons and sunflower.

He said inclusion of chickpeas in the rotation was essential for the successful production of other high value crops in the Ord.

A Farmnote detailing an improved agronomic package for chickpeas in the Ord River Irrigation Area will be available soon to growers from the Department of Agriculture Western Australia.

## Attitudes of Pulse Farmers in Western Australia Towards Genetically Modified Organisms in Agriculture

D. J. McDougall<sup>1,2</sup>, N. E. Longnecker<sup>2</sup>, S. P. Marsh<sup>2,3</sup> and F. P. Smith<sup>2\*</sup>

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### Abstract

A survey of pulse farmers in Western Australia in April 1999 found high levels of awareness of and interest in genetic engineering. Farmers' willingness to use or consume a range of crops genetically modified for on-farm production or input benefits (such as pest and herbicide resistance) was generally high. Acceptability of a range of other potential products specifying cross-species or cross-kingdom gene transfer was less. Labelling of GM foods was rated as important.

Concern over a number of GM issues was highest with regard to the corporate ownership and marketing of the technology, and the potential lack of demand for GM produce. Farmers also noted concern about a range of environmental and human health and safety issues. We conclude that pulse farmers in Western Australia are highly aware of and generally (but not entirely) accepting of GMOs in agriculture. Attitudes are most positive where a direct benefit to farm production is indicated. Nonetheless significant concerns over socio-economic, environmental and human health issues are present.

Australasian Biotechnology 2001, 11 (3): 36 - 39. The full article can be downloaded from:

[www.clima.uwa.edu.au/research](http://www.clima.uwa.edu.au/research)

## Renuka Shrestha from Nepal begins postgraduate studies at CLIMA

■ by Renuka Shrestha,  
NARC, Nepal  
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I have been a researcher in the Agronomy Division of the Nepal Agricultural Research Council (NARC) since 1987. I am involved with varietal improvement and agronomic research on legumes (lentils, soybean and blackgram) for the mid-hill regions of Nepal. Soybean varietal work is coordinated from the Agronomy Division to other agricultural research stations at Lumle, Pakhribas, Surkhet and Zinger Research Station, Kapurkot. In addition to NARC research projects, I have been involved with CLIMA's ACIAR lentil project from the beginning of its implementation and also collaborate with AVRDC for vegetable soybean variety testing and ICARDA for lentil variety testing.

I have been awarded the John Allwright Fellowship to undertake PhD studies (Plant physiology) at the University of Western Australia under the supervision

of Professor Kadambot Siddique, Adj. Professor Neil Turner and Dr David Turner. The project is entitled "Adaptation of lentil to dryland environments- response to water deficits," with the objectives of:

- identifying genotypic variation in the adaptation of diverse lentil genotypes to soil moisture stresses at growing period
- examining the effect of soil moisture stress on growth and yields
- characterizing morphological and physiological traits associated with high biomass and seed yield components.

Field evaluation of diverse genotypes will be carried out at two sites in Nepal while glasshouse experiments will be done at UWA (with measurements of soil-plant water relations, photosynthesis, stomatal conductance, osmotic adjustment, carbon isotope discrimination).

Lentil is a major winter legume of Nepal and is sown as a rainfed crop in the winter season; moisture stress during the

growing season is one of the main limiting factors for lentil production. An ACIAR project on lentil drought and disease resistance in Nepal (PN 9436) has identified lentil genotypes with improved adaptation to dryland conditions for terai and hill regions. My detailed morpho-physiological studies on lentil under rainfed conditions will help



Renuka and Professor Kadambot Siddique inspect a field of lentils at Meckering WA.

further to identify superior-drought adapted genotypes. I hope that their incorporation in the national breeding program will improve lentil production in Nepal.

## WALG is finalist in State Landcare Awards

The West Australian Lucerne Growers group (WALG), coordinated by **Sharon Dawson**, was a finalist in the recent State Landcare Awards, presented as part of the State Landcare Conference at Mandurah on 13 September.

WALG was 'pipped at the post' in the Alcoa Landcare Community Group category by the South Mortlock Catchment Group, but it is a credit for the group to receive ongoing recognition after research staff associated with WALG were State winners and National finalists in the research category in 1999.

In 2001, the 7 lucerne growers who comprise the Executive steering Committee were nominated for their ongoing dedication to sharing their experience and knowledge to further the development of the lucerne industry in WA as an economically viable salinity prevention tool. These innovative lucerne "champions" saw a growing interest in lucerne across the agricultural

region, but a lack of focus and structure to encourage its adoption and development. Thus they formed the "WA Lucerne Growers" in 1996 with the help of lucerne researchers - Lisa-Jane Blacklow (former UWA Research

and were awarded funding through CLIMA to employ Tom Bailey as a Field Technician for the extension of lucerne research generated from UWA and WA Department of Agriculture projects.



**Tom Bailey** (CLIMA employed field technician for the West Australian Lucerne Growers Group) and Jeff Patterson (Dumbleyung farmer & WALG Chairman) receiving a Finalist Certificate from Alcoa CEO Geoff Hayward.

Officer based at Katanning), Roy Latta (WA Department of Agriculture) and Phil Cocks (UWA). In 1998, they applied to the National Heritage Trust

Now WALG is a group of over 400 growers and industry representatives with an estimated 50 000 ha of lucerne grown in WA. WALG has regular field days & seminars which feature the experiences of these champion growers and the latest results from lucerne research. Tom conducts individual on-farm visits to support and advise new growers for maximum establishment success.

For more information on WALG, contact:

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KATANNING WA 6317  
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## Ballard Seed's Annual Pastures Field Day

Associate Prof. John Howieson, CLIMA Legume Pasture Program Leader, officially opened Ballard Seeds annual pastures field day in Tincurrin in September. The day attracted about 220 people who were keen to learn about techniques in establishing and using pasture legumes in WA farming systems.



Neil Ballard addresses the crowd at the Ballard Seeds Field Day in a paddock of Prima Gland clover.

Ballard Seed, winner of CLIMA's Legume Award of Excellence in 1999, has a long association with CLIMA. Principal, Neil Ballard is a strong proponent of legume pastures in WA, has participated in research field trials and has 25 demonstration sites around the state this year.

One new pasture on display at the field day was silver snail medic which has potential for use in weed control in the cropping phase; it is unpalatable as green feed but if sown and stocked heavily, can be used to force stock to eat weeds.

## Postcard from Milne Feeds, Welshpool

It has now been just over four years since I left CLIMA (and research) and took the plunge into agribusiness, and there have been no regrets.

I initially left CLIMA to take up a position as Technical Services Manager at Milne Feeds Pty Ltd. Milne Feeds is the largest manufacturer of stockfeed in the state and is also one of the largest exporters of oaten hay in the state. My initial role with the company was to manage all technical aspects of the operation - animal nutritionists, laboratory staff, quality assurance, alternative ingredients etc. The position provided me with the stepping stone I was looking for to make the transition between research and agribusiness.

In the last year or so my position has changed to become more agribusiness orientated. I now manage the Supply and Logistics Division of the company. What this essentially means is that I oversee the raw material acquisition

program for the company (80,000 tonnes of grain, 35,000 tonnes of straw, 35,000 tonnes of oaten hay, 20,000 tonnes of grain by-product), as well as inventory management, storage and transport. This is in addition to my responsibilities on the technical side of the business.

The new role keeps me pretty busy, but I am enjoying it. I have some good staff in place now, including Jane Malden who many of you might remember used to work for me at CLIMA. Jane manages the Laboratory and QA side of the business, and basically makes my job a lot easier.

If anyone is passing by Milne Feeds at any time (corner of Leach Highway and Welshpool Road) please don't hesitate to drop in and look us up. You might even get a tour of the mill!

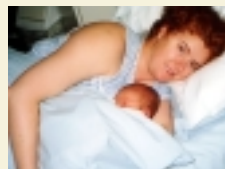
**Brett Thomson**  
thomsonb@milne.com.au  
Phone: 9351 0700

## More Bundles Of Joy

Nadine Bussell-Ali  
Born to **John Bussell**  
& **May Ali**  
Born 24 August, 2001  
Weighing 3.84 kg



Morgan Alan Fletcher  
Born to **Natalie** and  
**Ben Fletcher**  
Born 16 July, 2001  
Weighing 4kg



Yves Nicholas Diggle  
Born to **Art Diggle**  
and **Anna Hepworth**  
Born 21 December,  
2000



## New Appointments

There are currently over forty CLIMA appointed staff working at CLIMA's four research alliance organizations. New additions to the fold include:

- Dr. Janine Croser, Research Officer working with Professor Kadambot Siddique
- Dr. Graham Taylor, Honorary Research Fellow working with NAPLIP
- Mr. Greg Madson working in the main office for CLIMA and CRC-Salinity
- Dr. Steve Carr, Senior Research Officer working with Assoc Prof. Mike Ewing
- Ms. Patrizia Gremigni, Research Officer working with Dr. Susan Barker

## Newsletter Credits

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