

With the assistance of a GRDC travel grant, Victorian Department of Primary Industries pulse agronomist Dr Jason Brand, attended the 5th International Crop Science Congress held in South Korea in April 2008. Prior to the conference, Jason was also part of a Pulse Breeding Australia (PBA) team which visited Dubai, Syria and Turkey to discuss near-to-release Australian pulse varieties with local processors and marketers. While in Syria, pulse agronomy and breeding discussions were also held with researchers from the International Centre for Agricultural Research in Dry Areas (ICARDA).

CHECKING FOR A GOOD AUSTRALIAN PULSE

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AUSTRALIAN PULSES ON THE WORLD STAGE

Lentil and chickpea

Australia produces a preferred clean, quality product, that is marketable. A consistent supply of a reasonable quantity of one type (around 20,000 tonnes) will help to maintain a presence in the market place. Current demand for lentils and chickpeas is very high and likely to remain so into the foreseeable future.

From an agronomic and breeding research perspective it is important that we maintain our focus on yield improvement and yield and quality stability so that we can maintain supply to key traders throughout the world. To meet this yield and quality stability we need to ensure we focus on producing, significant quantities of a few varieties, and to understand and implement management strategies that maintain consistent quality of a variety across environments and cropping seasons.

For example, from a marketing perspective it appears important that variation in seed size, seed coat colour and cotyledon colour should be minimised within a sample and across cropping regions and seasons.

Chickpeas

Similar to lentils, the Australian chickpea varieties are generally well accepted by marketers. New desi varieties, such as CICA 505 and 503 are of acceptable quality, with further improvement in the pipeline of future varieties.

In terms of kabulis, the smaller kabulis (such as, Genesis 090) appear to have a market particularly in products such as hommus.

There is also a demand for the larger kabulis (9–10 mm). This is currently being addressed through PBA with the release of varieties such as Genesis 114. But further agronomic and breeding research is required to ensure we produce a consistent product across regions and seasons.



PBA researchers inspecting chickpea research plots at ICARDA, Syria.

Lentils

The lentil breeding program in Australia appears to be heading in the right direction in terms of quality for our international markets. The new variety Nipper was well received by most marketers. In addition, several breeding lines with potential for release were regarded as suitable for markets. In particular, CIPAL 611 was identified as having excellent quality – consistent size, good splits and futbols (dehulled, whole unsplit lentils).

Overall, traders appeared happy with most of the lines presented. Futbols has become the preferred product for marketing.

The Australian lentils are generally considered to be among the best in terms of dehulling. One issue that was mentioned by traders in relation to Australian was that their cooking time is greater than lentils from other countries and the product tends to sediment out from solution. Further investigation of this issue is required.

PULSE AGRONOMY AND BREEDING ISSUES

We met with world-renowned pulse researchers from various organisations to discuss many agronomy and breeding issues. We also detailed the progress of Australian research and explored the potential for future collaborations.

ICARDA, Syria

A key area where we can link with ICARDA is in weed management. In particular we may be able to gain access to germplasm (through Australian researcher Ken Street) which will improve herbicide tolerance of future varieties. In addition, we may be able to contribute to improvements in Syrian weed management systems.

Herbicide use in Syria is relatively low and the identification of suitable herbicides for use in lentil and chickpea cropping systems needs to be revisited. As Australia's climate and soil type is similar to Syria and other regions throughout the Middle East, research conducted here could provide valuable guidance.

Utilisation of conservation tillage practices also needs to be further investigated throughout the Middle East, particularly under the political and social structure of the zone.

Development of PhD studies in agronomic issues with the agronomic team at ICARDA may be an effective method of further advancing knowledge in these areas.

Turkey

There is potential to develop interactions with researchers in Turkey and traders at the Arbel group (a large pulse and grain milling, processing and trading company) particularly with respect to chalky spot management in lentils. Chalky spot is a seed abnormality caused by insect damage – localised areas of the

lentil seed have a chalky white, mealy texture. Chalky spot has been seen in Australia and can have a significant impact on the marketability of grain. The issue is likely to need both agronomic and breeding input to achieve a successful outcome.

Maintain our structured R&D system

Australia generally has a well organised agricultural research and development sector. But it is important we continually achieve the importance of this sector in maintaining national and international food security.

It appears that many countries have lost focus on the importance of agricultural R&D and are now beginning to pay the price with increasing food shortages.

The structure of pulse research in Australia is world leading as it encompasses the whole chain from pure, basic research through to applied, practical solutions.

WHERE TO FOR AUSTRALIAN PULSE RESEARCH?

- Maintain and improve our R,D&E whole chain focus. This helps us to remain at the forefront of worldwide research and to meet the needs of our customers.
- We need to actively promote and demonstrate to traders here and around the world, the quality of our pulses – and the direction our pulse development is heading. This has the added benefit of allowing us to constantly monitor market demands for quality and quantity.
- Australia has the ability to educate and assist pulse growers throughout the semi-arid regions of the world, and to help ensure the world can meet its food demands. It is important that we continually monitor and review this education process so it is a win-win situation for all parties.



Dr Larn McMurray (Pulse Breeding Australia) discussing trade issues with a representative from the Arbel pulse processing and marketing company at a trade fair in Turkey.

PULSES IN AUSTRALIA

In Australia, pulses are grown for their many rotational benefits and as a high value crop in intensive cropping systems. Over the past 20 years, independent enhancements in agronomy and variety development have led to increased yields for Australian pulses. But maintaining this rapid progress in sustainability and productivity of pulses in Australia, requires more concurrent development of genetics and agronomy.

Breeding programs continually develop new varieties with higher yield, improved quality and more reliable yield through improved resistance to diseases or tolerance to abiotic stresses.

It has been recognised that pulse varieties vary significantly in their response to changes in agronomic management. To fully realise the potential of new pulse varieties in Australia, agronomic packages are now developed for new varieties prior to release to farmers.

CONGRESS THEMES

A key theme of the 2008 International Crop Science Congress was the need to address world food security. World population growth has increased at a greater rate than agricultural food productivity. At the time of the Congress it was estimated that there was less than 30 days' worth of grain stocks in the world – a situation that will come under increasing pressure. In addition, food prices have increased dramatically due to increased demand, making it harder for the poor to access sufficient quantities of quality food.

The Congress also identified a lack of research into cropping systems and application of genetic improvements in the system (that is, linking genetics–breeding–phenotyping–physiology–modelling–agronomy). It was generally agreed that internationally, there was a weakness in getting advances at the genetic level realised in the field. This needs to be addressed.

Australian pathway among the best

From an Australian pulse perspective it appears that we have begun to address these issues. The integrated research pathway from genomics through to markets is as good or better than others in the world; many countries do not have a complete pathway or are not funding parts of it. It is important that the strong linkages between agronomic and breeding programs are enhanced to ensure we continue to maximise productivity of systems here in Australia.

New technologies and modelling

Information was presented on the use of remote sensing equipment for phenotyping in germplasm enhancement programs. This type of technology could be used in agronomic programs and various components of the science will be tested over coming seasons. Several presentations were given at the conference on the use of computer modelling. As models progress and are better able to cope with genotypic differences, it is likely that they will become useful in agronomic programs to initially test concepts and add additional datasets.

On a world scale Australia can contribute substantially to improvements in farming systems and agronomic practices in many regions of the world where grain yields are significantly below potential. Unfortunately, the limitations to agricultural production in many countries are often political and social.

Develop and enhance research links

From a technical perspective – by developing/enhancing linkages with international research agencies and government extension programs – we can encourage the implementation of techniques to enhance agricultural production. But ultimately,

until political barriers are reduced (or eliminated) and growers and industry are more educated, many of the improved techniques will not be implemented.



Dr Jason Brand and his poster paper at the 2008 International Crop Science Congress.