

## Climate change

Global average surface temperature has risen by 0.8 °C over the past century and greenhouse gas concentrations in the atmosphere have increased by almost 40% since 1750. The Intergovernmental Panel on Climate Change (IPCC) estimates that the likelihood of the observed warming being human induced (i.e. linked to increases in greenhouse gas emissions) is around 90%. But what does this actually mean?

In the 2007 Garnaut Climate Change Review – Global climate change impacts on Australia's wheat crops (available on the web), modelling was conducted for a number of sites nationally; the main northern site was Dalby in Queensland.

One of the authors of the report and CSIRO researcher Steven Crimp said "Using APSIM modelling at Dalby, Qld and varying rainfall and temperature, just increasing CO<sub>2</sub> alone (increasing from current 388 ppm) to 650 ppm (and no change in temperature or rainfall) resulted in a 32% increase in potential yields. However with every degree increased temperature (between 1 to 3°C) there was a 6% average decrease in yield. Based on the CSIRO 2007 best estimate of climate change by 2050 ( 550ppm CO<sub>2</sub>, +2 °C - +2.5 °C and -5 to -10% rainfall change), wheat yields were estimated to change between -7% and 3% depending on the combination of temperature and rainfall."

"Adapting to climate change can have an impact on the yield outcomes. For example in the above modelling, if you modified the planting window (earlier due to reduced frost risk), the estimated yield difference was between -2% to 8% yield response with the modified window."

"In addition, a range of studies indicate that grain protein contents are likely to fall in response to combined climate and CO<sub>2</sub> changes, so changes to fertiliser and/or pasture to compensate for this may need to result".

"One of the things that the modelling did not consider was that rainfall events might be more severe and therefore adapting to capture more rainfall when it falls and a system that can quickly utilise rainfall when it does come will be key".

"Many climate adaptation options are similar to existing 'best practice' such as stubble retention, short /long fallowing and minimum tillage and are good natural resource management, and do not require farmers to make radical changes to their operations and industries in the near term. These options can, and should, be prioritised as part of a 'no regrets' or win-win strategy for agriculture because they will provide immediate and ongoing benefits, as well as preparing the sector for climate change" said Dr Crimp.

For further information, CSIRO has available on their website a number of articles and books. In particular a free eBook or PDF entitled Climate Change: Science and Solutions for Australia. This publication provides the latest scientific knowledge on a series of climate change topics relevant to Australia and the world. It draws on peer-reviewed literature contributed to by thousands of researchers <http://www.csiro.au/resources/Climate-Change-Book.html>

Other information and publications can be found at <http://www.csiro.au/science/Climate-Change.html>

*Further information:*

**Steven Crimp, 02 6242 1649 [Steven.crimp@csiro.au](mailto:Steven.crimp@csiro.au)**

## Climate Champions

A national network of farmers have been recruited by the national Climate Champion program to help improve communication between scientists and farmers about managing climate risk.

This 3-year program is supported by Grains Research & Development Corporation, Managing Climate Variability and Meat & Livestock Australia and aims to:

- get climate-related research information out to farmers about new technologies and practices for dealing with climate variability and climate change.
- feed information from farmers back to researchers about what farmers need to better manage climate risk on their properties

*For more information and to read case studies of the Climate Champion farmers, visit:*

**<http://www.climatekelpie.com.au/ask-a-farmer/climate-champion-program>**

# ADAPT OR DIE – How grass weeds adapt to our farming systems

Speaking at recent Grains Research and Development Corporation (GRDC) and Syngenta supported 'What's new in weed management workshops', Professor Gurjeet Gill of the University of Adelaide showed new data on how weed populations adapt to survive our farming systems.

Dr Gill's work showed how changing germination patterns in key 'southern' grass weeds of brome and barley grass enabled these weeds to escape control and prosper in our farming system. While these are not key weeds in the north, the principles of weed evolution are likely to also apply to weeds in Northern farming systems.

What Dr Gill was able to show is how great brome (*Bromus diandrus*) and barley grass (*Hordeum glaucum*) grown under continuous cropping have changed their emergence patterns compared to the same species collected in fence lines no more than 50m away. These weeds used to have negligible seedbank dormancy and were thus well controlled by early season control tactics. Now they have been selected by our cropping system and have developed significant seedbank dormancy with a much later season emergence pattern that is likely to escape traditional early season control measures.

Seed samples recently collected from fence line populations are still behaving in the same manner with little to no seed dormancy and a single major early season flush.

This increase in seedbank dormancy in cropped paddocks appears to be a response to our farming systems that have effectively controlled the 'typical' populations with early season strategies. This has selected individuals that germinate later in the season, after the knockdown application has been applied. With limited effective residual options currently available in cereals, growers now need to apply more post emergent Group A and B selective herbicides, which are now under resistance pressure from these weed species.

During the workshops, Dr Gill explained that the mechanism the plant uses to confer this dormancy is very similar in great brome and barley grass. In both species seed dormancy is broken by exposure to chilling with barley grass populations requiring longer exposure to chilling than brome grass. Interestingly, weed seeds from populations of these two weed species sampled from cropping paddocks need more cold days before they can germinate as compared to those from fence-lines of the same paddock.

Northern versions of the 'What's new in weed management' workshops are planned to be hosted by ICAN in 2012 in the northern grains region, with agenda's tailored to regional issues and needs.

*For further information on brome or barley grass:*

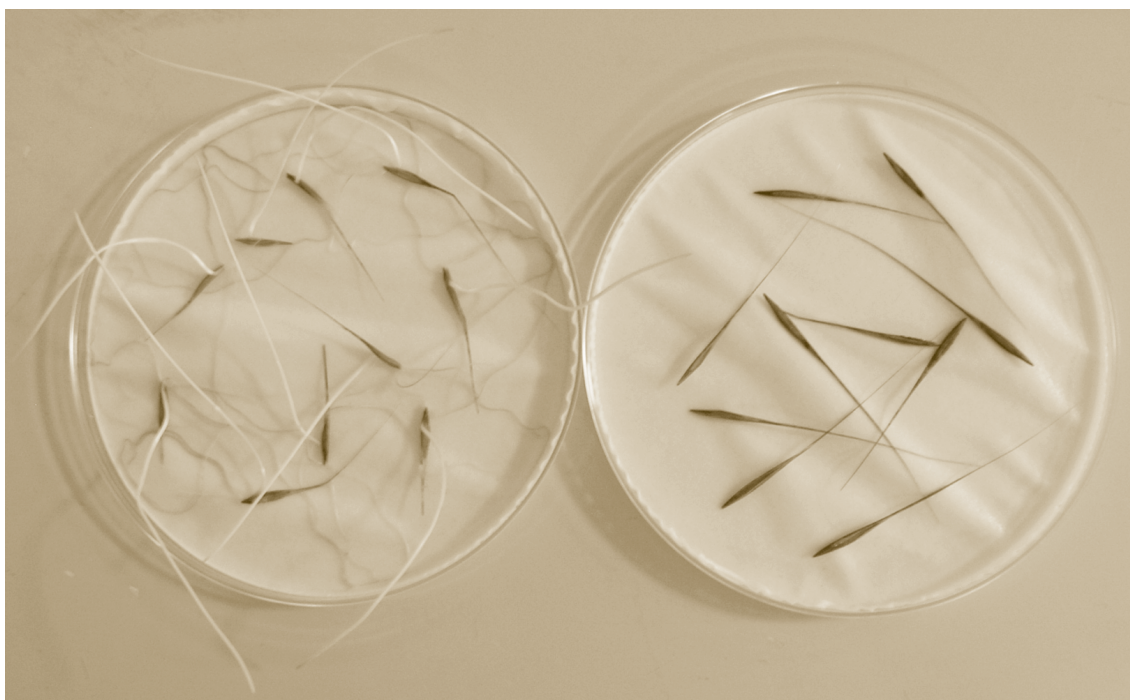
**Professor Gurjeet Gill, University of Adelaide**  
**08 83037744 [gurjeet.gill@adelaide.edu.au](mailto:gurjeet.gill@adelaide.edu.au)**

**GRDC code: UA00105**

*Further information or to express interest in a 'What's new in weed management workshop':*

**Mark Congreve 0427 209 234**  
**[mark@icanrural.com.au](mailto:mark@icanrural.com.au)**

**GRDC code: ICN00009**



*Great brome seeds collected from the same field and exposed to simulated autumn germination conditions. 100% germination of the seeds collected from the fence line (traditional population) (left) and no germination from the infield sample (right) as dormancy was not yet broken.*

## Local rainfall data improves accuracy of weather forecasts

Most growers monitor their rainfall and know that when the Bureau of Meteorology (BoM) predicts 5mm for their area, it doesn't always equate to 5mm on their farm. However, work done at the University of Sydney by PhD student Derek Yates, is using local on-farm data to refine the predictions given by the BoM. Derek is analysing on-farm rainfall records and developing a system that will enable growers to predict with greater accuracy what a Bureau forecast means for them.

For example, said Mr Yates "if the BoM predicts that there is likely to be 5mm of rain in the next three days, by analysing the on-farm rainfall records I want the grower to be able to have greater confidence that the forecast is relevant directly to their farm rather than to the nearest weather station. Improved local forecasting should assist growers to plan and adjust management with greater confidence that the forecast is as relevant to their farm as possible."

"To do this, farm data is needed to get the system tested and further refined. Interested growers who maintain long term records are encouraged to make contact and get involved".

*Further information:*

**Derek Yates, 02 86271139,  
derek.yates@sydney.edu.au**

## 5 minutes with northern panel member William Martel

New to GRDC's northern panel is Wellington grower William Martel. A mixed crop, wool, sheep meat and beef grower, Mr Martel holds a degree in Agricultural Economics from the University of New England. After a period working for a grain trading company in Quirindi, he joined the Brisbane office of Resource Consulting Services (RCS).

As an adviser with RCS, he spent a number of years benchmarking some 400 growers across Australia on their performance. "That experience certainly made me appreciate the benefits of looking at profitability across the farm rather than at individual gross margins per enterprise," he said.

As a member of the GRDC northern panel, Mr Martel would like to ensure investments by the GRDC assist

growers to have environmentally sustainable, profitable farms producing healthy food for our nation and the world.

"On a broader scale the GRDC needs to be able to invest in the areas that are going to benefit growers to keep them economically and environmentally sustainable.

"We need to invest in looking at whole farm systems that lead farmers to being profitable and long term sustainable, not just producing good gross margins," Mr Martel said.

## Subscribe to new Northern IWM e-news

Keep up to date with northern crop weed research by subscribing to the new 'Northern E-News'.

The new GRDC supported e-newsletter covers weed management strategies on issues such as glyphosate resistance, difficult-to-control and emerging weed problems in Northern NSW, Central and Southern Queensland.

The Northern IWM e-news newsletter will be regularly distributed and replaces the hardcopy Northern Herbicide Resistance Reporter which you may have previously received.

**To subscribe, please contact Michael Widderick at michael.widderick@deedi.qld.gov.au**

## Carbon a key topic at February/March Grower Updates

Carbon sequestration and farming systems - how much carbon can northern cropping systems store and the implications of the carbon tax for growers are key topics at this year's February/March GRDC Grower Grains Research Updates.

Jeff Baldock from CSIRO Land & Water will be speaking on the science of carbon sequestration - what can and can't be achieved in our climate and soil types.

"There have been a lot of numbers bandied about the industry about the amount of carbon that can potentially be stored in the soil under cropping systems" said Dr Baldock.

Mr Mick Keogh from the Australian Farm Institute will be adding to discussions with his insights on the carbon tax, carbon trading and what it means for grain and livestock producers.

“The carbon tax is a change in the political and economic landscape and it is important for growers to be able to understand the implications of this for their farming business,” said Mr Keogh.

For further information and full agendas or to register for the GRDC Grains Research Updates, go to:

<http://www.icanrural.com.au> or contact **John Cameron** or **Erica McKay** on **02 9482 4930**

GRDC code: **ICN00011**

## February/March Northern Grains Research Updates – Add them to your diary!

Dates are set for the February/March 2012 Grains Research Updates in the north. Add these details to your diary! More details soon.

Location	Venue	Date	Target audience*
Coolah	Coolah Sports Club	Monday 27th February 2012	Growers
Coonamble	Coonamble Bowling Club	Tuesday 28th February 2012	Growers
Nyngan	Nyngan RSL & Civic Club	Wednesday 29th February 2012	Growers
Dubbo	Dubbo RSL	Thursday 1st, March 2012	Advisers
Goondiwindi	Goondiwindi Community Centre	Tuesday 6th & Wednesday 7th March, 2012	Advisers
Surat	New Royal Hotel	Thursday 8th, March 2012	Growers

\* Note: Growers are welcome to attend Updates targeted to advisers and visa versa

Further information:

**John Cameron** or **Erica McKay**, **02 9482 4930**,  
[northernupdates@icanrural.com.au](mailto:northernupdates@icanrural.com.au), <http://www.icanrural.com.au>

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[www.grdc.com.au](http://www.grdc.com.au)**

**Editor :**

John Cameron  
Ph: (02) 9482 4930,  
PO Box 718, HORNSBY NSW 1630

**Research writers:**

Erica McKay & Mark Congreve (02) 9482 4930

**Layout and design:**

Lightning Designs: (08) 8274 1648

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