Changing Climate ~ Changing Practices

A newsletter of BCG climate research and demonstration work
Edition 1 – June 2010

Boom or Bust

Farming in Australia has always been uncertain because of the weather. Our weather and longer term climate have never been consistent or predictable and Australian farmers have learnt to cope with this variability and become highly efficient producers of grains and livestock.

We know that we struggle to produce viable crops or grow enough feed in very dry years, with a rainfall of decile 3 or less (on average these occur in 3 out of 10 years). To compensate for those inevitable dry years we need to make the most of the wetter years.

The problem we have at the moment is that it has been dry for a long period of time (since 2001) and we have not had a wet year since 1996. We are not sure if this current pattern of dry years is permanent and due to changing climate or if it is just due to variability. If it is due to climate change we have to adapt and cope with the shift in rainfall and temperatures otherwise we may not be viable. If the current weather patterns are due to normal variability we can still learn from what has happened so that we are better prepared the next time we have a run of dry and warmer years.

What work is BCG undertaking

The BCG are partners in two national projects which are aimed at identifying and developing adaptation practices which assist farmers to cope with our changing weather – be they long term (climate change) or more immediate (variability) changes.

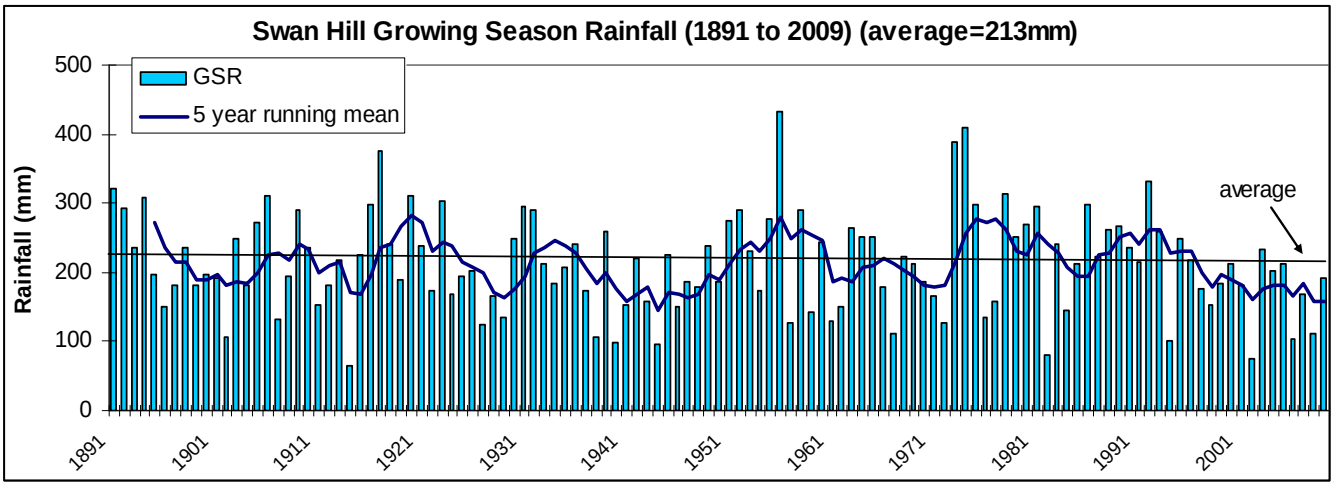
This newsletter is to inform you of current activity within the projects and outcomes being achieved. This first newsletter is to provide some historical background information on the climate in north-western Victoria – what has happened in the past and what is happening now. The next newsletter will discuss some of the in-paddock adaptations we are trialling and also highlight some of the ideas that other farmer groups have in dealing with this issue.

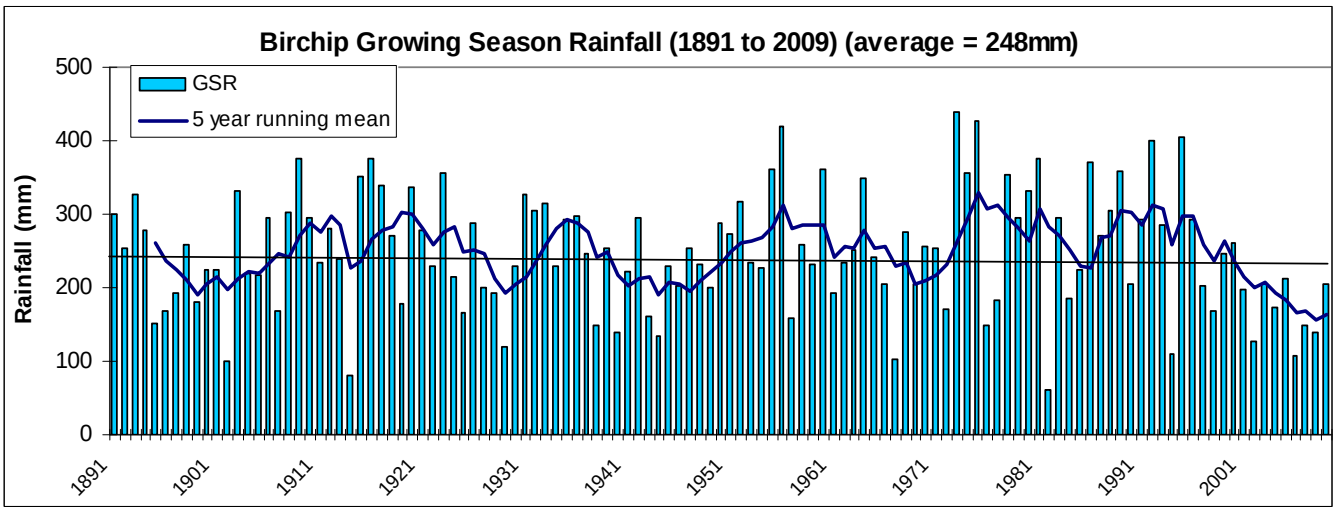
The projects are supported by funding from GRDC, the Australian Government under its Climate Change Research Program, and CSIRO Climate Adaptation Flagship.

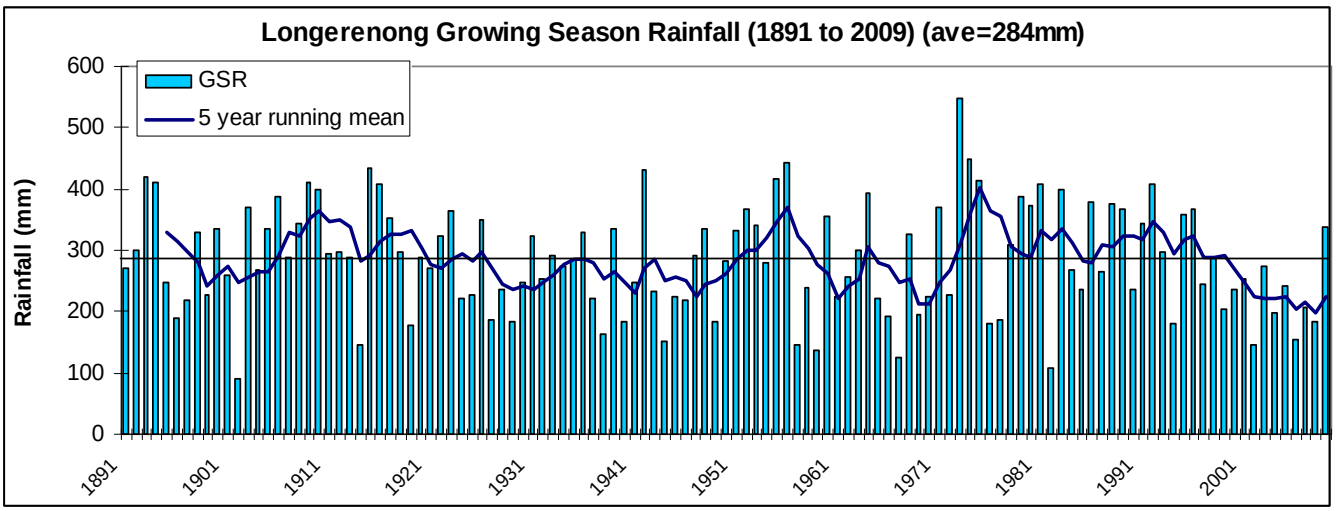
BCG
shared solutions

Historical growing season rainfall

Growing season rainfall is the main driver of potential yield in our region. To represent rainfall in our region we have shown the growing season rainfall (GSR) for Swan Hill (average 213mm), Birchip (average 248mm) and Longerenong (average 284mm) from 1891 to 2009.







The south-east of Australia has been in three serious droughts over the last 120 years: the Federation (~1897 to 1902), WWII (~1937 to 1945), and the current Millennium drought (~1997 to present). Each of these long term droughts can be clearly seen in the above figures. One off droughts (such as 1982) are also very evident. The current Millennium drought started in the late 1990s and is the longest and driest period experienced (at least for the limited data we have). The current dry period is also warmer compared to previous droughts and the evaporation rates are higher – both of which exacerbate the dry conditions and make it more difficult to grow crops and pastures.

The relatively long wet period experienced in the 1970s and 1980s (average or above rainfall for about two decades) was a great time to farm! We could see these as the golden years for growing crops and pastures (not withstanding very dry years such as 1982).

Why the current long dry spell?

Is this long dry spell due to climate change or is it due to normal variability? We can work out how probable it is to have such a long dry period based on what we know has happened over the last 120 years (the term of good rainfall records). An example using Birchip rainfall records for working out the probability of having of having a long spell of dry years:

- For the last nine years (since 2001) growing season rainfall has been less than 215mm (decile 3 or less which we regard as the minimum amount of rain to be profitable)
- Since 1891 (119 years) there have been 41 years with growing season rainfall of 215mm or less, roughly 1 in 3 years
- Based on a probability of 1 in 3 (1/3) of having a dry year, the probability of having two dry years in a row is 1 in 9 years (calculated as 1/3 x 1/3). Actual rainfall records since 1891 show this has in fact occurred 1 in 14 years.
- The probability of having three dry years in a row is 1 in 27 years (1/3 x 1/3 x 1/3). The actual record shows it has occurred 1 in 83 years since 1891.
- To get nine dry years in a row the probability is 1 in 19,683 or one in every 20,000 years that such an event will occur! Which has obviously not occurred since 1891.

We need wet years to make enough money to compensate for the poor yielding dry years. The last wet year (decile 7 or more) was 1996 which is thirteen years ago. Our region has experienced a period of nine consecutive dry years and has not had a wet year for thirteen years. It is not impossible that the current long dry spell without any wet years is purely due to chance but from simple mathematics we know it is highly improbable. Does that answer the question of whether it is climate change or normal variability? No, it does not, but it does point the finger to a changing climate!

Shift in winter to summer rainfall

There has always been a large variability in summer and winter rainfall – the question is 'has the pattern changed'?

At Swan Hill there is on average 100mm less rainfall in summer (November to March) than in winter (April to October). Since 1998, there have been only two years which had the normal rainfall distribution between summer and winter, whereas in 10 of the 12 years it was wetter during summer than the long term average.

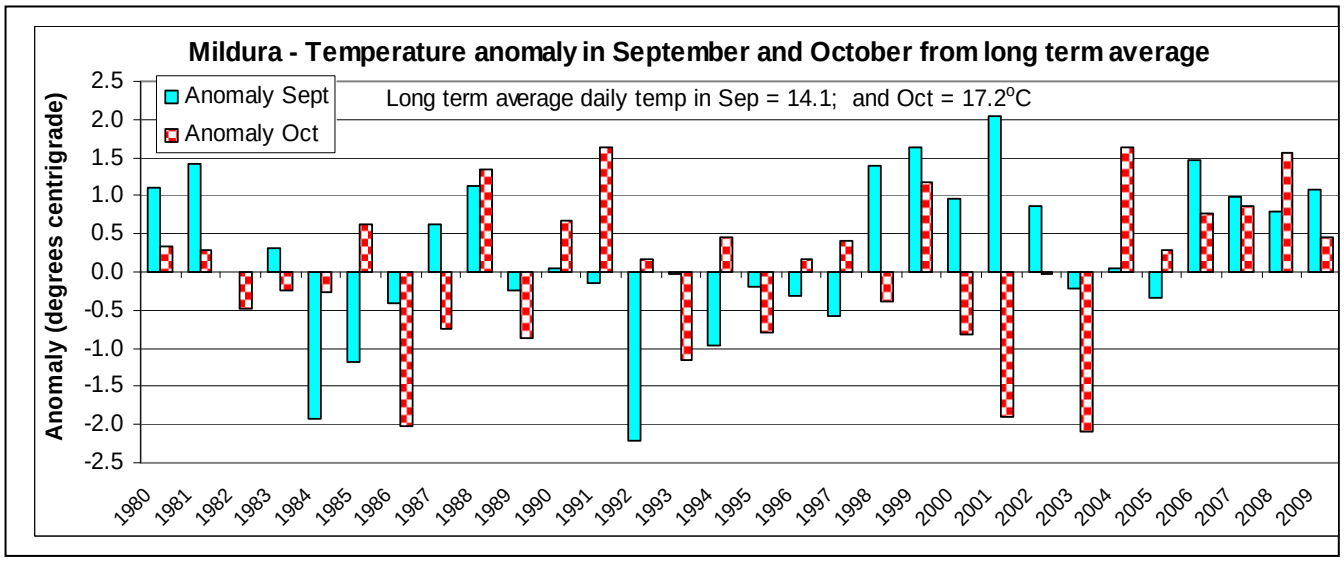
The same has occurred in Birchip with a trend towards more summer rain at the expense of winter rain. At Longerenong the trend was not as strong.

Change in temperature

Average daily temperature in September and October (the critical months for flowering and grain-filling) has increased by 1 to 1.5^{o}C compared to the long term average. The trend in increasing temperature over the last 20 to 30 years has been fairly consistent (see www.bom.gov.au under climate).

Actual differences in temperature in the Mallee for September and October can be seen in the next figure. For example the daily temperature in September 2009 was a just over 15 degrees. That is 1 degree warmer compared to the long term average of 14.1 degrees.

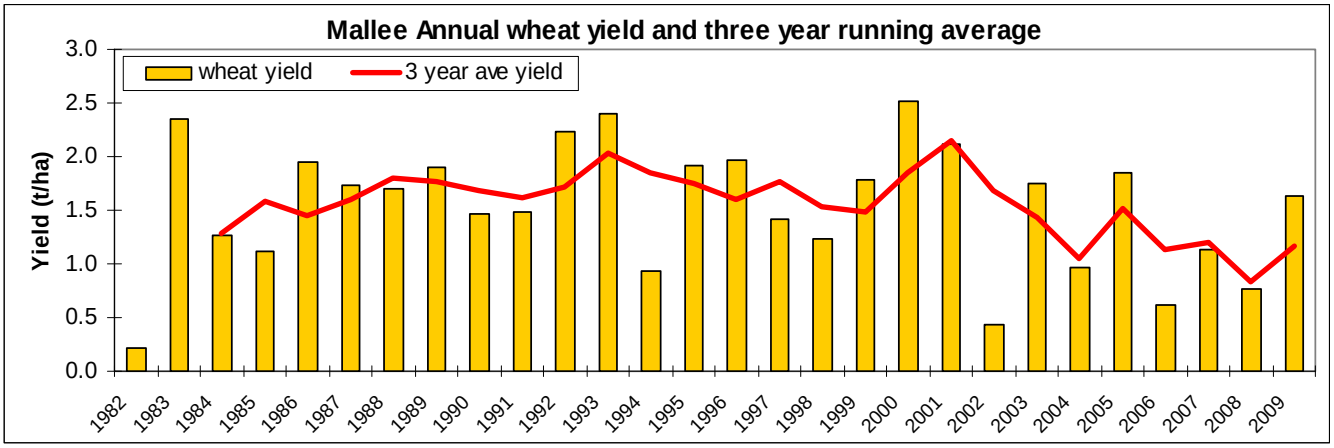
These small differences in temperature may not seem like much but it will mean crops grow and mature faster. The frost risk does not appear to have changed significantly over the last thirty or so years – so even though our crops will be maturing faster they are still susceptible to the same level of frost risk as occurred previously.

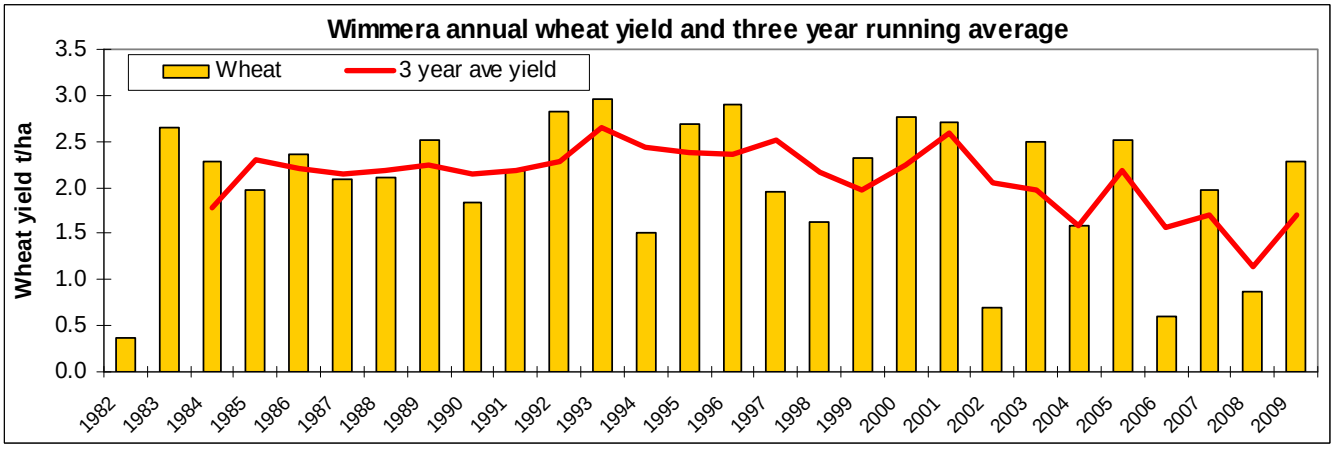


Wheat yield

Using ABS (Australian Bureau of Statistics) data we plotted the annual wheat yield since 1982 (first year with data available).

- The average wheat yield from 1982 to 2001 in the Mallee was 1.7 t/ha and the Wimmera, 2.2 t/ha.
- Since 2002 the average in each region has only been 1.1 and 1.6 t/ha respectively for the Mallee and Wimmera. We would argue that these yields at current prices are economically unsustainable!





Summary

- Winter rain (GSR) has been consistently less than average for close to a decade
- Crop yields have declined in both the Wimmera and Mallee
- The long dry spell could be due to chance but it is very unlikely
- It has been warmer in the critical flowering and grain filling months of September and October
- There has been a shift towards more summer rainfall at the expense of winter rainfall in the Mallee.

Management options

The BCG together with researchers and farm groups in other states have been working on identifying the financial impact of the current conditions on farm profitability and designing adaptations in the paddock which may alleviate some of the impacts of the current climatic conditions. More on this in the next newsletter.

This project is supported by funding from GRDC, the Australian Government under its Climate Change Research Program, and CSIRO Climate Adaptation Flagship.

For further information contact BCG
(03) 54922787 info@bcg.org.au www.bcg.org.au