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PO Box 766
Toowoomba 4350
P: 07 4659 3555
F: 07 4638 4520
E: grain@greenmountpress.com.au
www.ausgrain.com.au

Advertising
Michael Cook
(National Advertising Manager)
P: 07 4659 3555
F: 07 4638 4520
M: 0428 794 801

Editor
Lloyd O'Connell

Production and Design
Mick Allan

Office Manager
Catherine O'Connell

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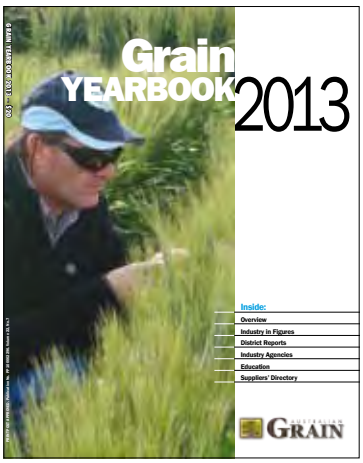
Contents



FRONT COVER:

Greg Giblett of Agromax Consulting in the Liverpool Plains of northern NSW, checking for cereal fungal disease. This season, Greg will be assessing the performance of a new broad spectrum fungicide released by Syngenta. Cogito combines two commonly used active ingredients and targets an earlier suppression of disease development.
(Photo courtesy Syngenta)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Section 1

Overview

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Australia area ('000 ha) and production ('000 tonnes) of major winter and summer crops planted for grain during 2012

	NSW		VIC		QLD		WA		SA		TAS		AUSTRALIA TOTAL	
2012–13	**Area**	**Prodn**	**Area**	**Prodn**	**Area**	**Prodn**	**Area**	**Prodn**	**Area**	**Prodn**	**Area**	**Prodn**	**AREA**	**PROD'N**
Wheat	3820	7105	1600	2670	950	1748	4785	6850	2160	3672	8	32	**13,323**	**22,077**
Barley	840	1546	880	1560	85	157	1102	1950	960	1824	8	25	**3875**	**7062**
Oats (for grain)*													**683**	**1049**
Triticale	115	220	60	77			30	38	69	95	2	7	**276**	**437**
Sorghum#	150	450	1	2	425	1254	1	1					**577**	**1707**
Maize#	30	240	1	6	48	202	1	4					**80**	**452**
Rice#	120	1075	0.5	4	0.5	3							**121**	**1082**
Canola	650	943	420	540			1040	1200	290	406			**2400**	**3089**
Sunflowerseed#	10	12	1	1	17	20							**28**	**33**
Soybean#	30	63	1.1	2.2	20	42							**51**	**107**
Peanuts#	0.3	0.8			11	25							**11**	**26**
Cottonseed#	284	882			159	454							**443**	**1336**
Lupins	58	63	29	26			303	295	61	74			**451**	**458**
Field peas	53	66	52	65			62	59	114	130			**281**	**320**
Chickpeas	280	327	49	52	208	309	6	4	20	22			**563**	**714**
Faba beans	54	123	67	126			4	6	78	122			**203**	**377**
Mung beans#	10	9.6			28	25							**38**	**35**
Navy bean#					5	6							**5**	**6**
Lentils	1	1	77	80					87	103			**165**	**184**
TOTAL	**6505**	**13126**	**3239**	**5211**	**1957**	**4245**	**7334**	**10407**	**3839**	**6448**	**18**	**64**	**23574**	**40551**

Estimate for summer crop harvested in 2013 * State break-up data not yet available for the 2012–13 season. Principal source: ABARES.

Farmers' terms of trade from Australian grain production (base year is 1997–98 = 100)

	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14 (forecast)
PRICES RECEIVED							
Wheat	197.2	142.1	110.4	130.1	127.4	173.2	147.7
Barley	196.9	145.3	108.3	135.8	123.1	164.0	158.9
Canola	140.7	142.2	114.2	141.1	129.6	130.6	129.7
Lupins	171.0	142.9	127.2	136.9	118.8	161.2	141.3
Oats	136.9	158.3	116.9	143.2	147.0	172.6	168.3
Sorghum	152.4	121.3	115.9	125.8	118.6	148.6	135.5
Total grains	**178.3**	**137.5**	**108.7**	**126.2**	**121.9**	**155.0**	**139.1**
PRICES PAID							
Fuel & lubricants	243.7	211.0	191.7	211.3	228.2	212.1	213.6
Fertiliser	220.4	239.6	156.0	157.3	165.5	170.5	176.0
Chemicals	149.7	136.7	116.2	110.4	112.6	112.6	116.2
Seed	135.0	120.7	109.4	120.0	119.3	131.3	126.2
Labour	138.0	142.6	147.3	151.9	155.5	159.3	163.3
Marketing	143.2	137.2	134.0	144.8	154.1	152.2	156.5
Interest paid	142.6	116.8	111.2	122.3	114.9	103.8	102.0
Rates & taxes	137.3	141.6	144.9	149.4	153.0	156.7	160.6
Insurance	143.5	155.6	167.0	173.7	185.8	190.4	195.1
Capital items	136.8	141.2	144.8	149.3	153.2	157.3	161.5
Total prices paid*	**155.1**	**148.9**	**140.8**	**144.8**	**147.5**	**147.5**	**148.6**
TERMS OF TRADE	**115.0**	**92.3**	**77.2**	**87.2**	**82.6**	**105.1**	**93.6**

Note: Terms of trade is the ratio of the index of prices received and the index of prices paid by farmers. * Excludes livestock costs, fodder, breeding stock etc. Sources: ABARES, ABS

Domestic and global grains outlook

By Beth Deards, David Mobsby and Neil Thompson – ABARES

Short-term outlook

Prices to remain firm in 2013–14

The world wheat indicator price (US hard red winter, fob Gulf) is forecast to fall by 12 per cent in 2013–14 to US$320 a tonne, reflecting a strong increase in world wheat production and an increase in world stocks. Despite this forecast decline, the wheat indicator price is expected to remain above the average of US$292 a tonne over the five years to 2017–18.

The world coarse grains indicator price (US corn, fob Gulf) is forecast to decrease by 11 per cent to US$281 a tonne in 2013–14. The world indicator price for barley (French Rouen feed) is forecast to fall by 12 per cent to US$271 a tonne.

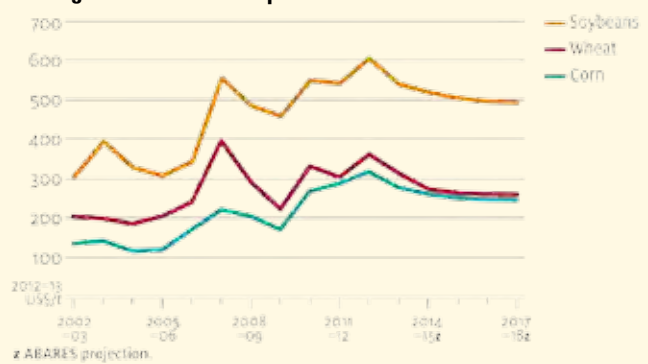
These price falls reflect higher coarse grains production as producers respond to high prices in 2012–13. But despite rising production, increased consumption and low opening stocks will result in the prices remaining above the five-year averages to 2011–12 of US$217 and US$236 for corn and barley, respectively.

The world oilseeds indicator price (soybeans, cif Rotterdam) is forecast to fall by 9 per cent in 2013–14 to US$550 a tonne. This forecast decline reflects an increase in world soybean supplies, driven by forecast record production in Latin America and a recovery in production in the US.

The world canola indicator price (cif Hamburg) is forecast to decline by 4 per cent in 2013–14 to US$605 a tonne, driven by increased supplies available for export as a result of higher canola production in Canada.

The price forecasts for coarse grains and oilseeds in 2013–14 depend on higher production being realised in the US from the drought-affected 2012–13 season. But the possibility of lower US production due to adverse seasonal conditions in major growing regions for corn and soybeans presents an upside risk to the forecasts of world indicator prices for coarse grains and oilseeds in 2013–14. In contrast, wheat production in the US is forecast to decline in 2013–14, based on the current forecast of seasonal conditions.

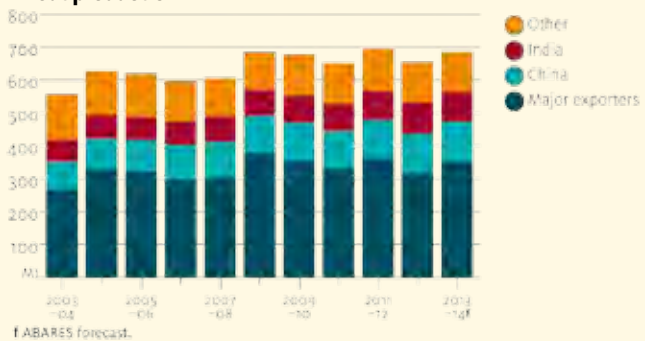
World grains and oilseeds prices



Wheat and other grain production to rise

World wheat production is forecast to increase by 5 per cent in 2013–14 to almost 690 million tonnes, largely driven by forecast higher yields in the Black Sea region and the European Union. Additionally, producers are estimated to have increased the area planted to wheat in response to favourable prices at the time of planting. Planting of northern hemisphere 2013–14 winter wheat crops began in the northern autumn of 2012 when prices averaged around US$374 a tonne.

Wheat production



Wheat production in the Black Sea region, particularly the Russian Federation and Ukraine, is forecast to rebound strongly in 2013–14, following reduced yields in the previous season because of persistent hot and dry conditions. Production in the Russian Federation is forecast to increase by 41 per cent to around 55 mt.

Improved seasonal conditions have underpinned a forecast return to average yields and the area planted to wheat has increased in response to favourable world prices. Similarly, production in Ukraine is forecast to rise by 27 per cent to around 20 mt, while in Kazakhstan wheat production is forecast to increase by 64 per cent to around 16 mt.

In the European Union, wheat production is forecast to rise by 5 per cent in 2013–14 to around 138 mt. This increase largely reflects a forecast improvement in yields, following adverse seasonal conditions last season, and a modest rise in area planted.

Wheat production in Canada is forecast to increase by 3 per cent in 2013–14, to around 28 mt.

Wheat production in Argentina is forecast to increase by 35 per cent in 2013–14 to around 14 mt. This forecast increase is largely driven by a 25 per cent increase in area and an expected modest rise in yields.

Of the major exporters, wheat production is forecast to fall by 7 per cent in the US in 2013–14 to around 57 mt. Despite a 1 per cent increase in area planted to winter wheat, which accounts for around 70 per cent of total US wheat production, the assumed continuation of drought conditions in major producing regions is expected to result in a high abandonment rate and lower yields.

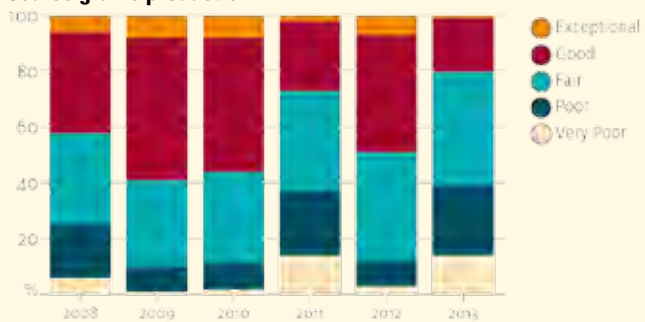
In China, wheat production is forecast to be around 121 mt in 2013–14, largely unchanged from the previous season.

In India, the world's third largest producer of wheat after the European Union and China, wheat production is forecast at around 90 mt in 2013–14. If realised, this will be the second consecutive year of above average production in India, largely reflecting the effect of assumed favourable seasonal conditions.

Coarse grains

World coarse grains production is forecast to rise by 9 per cent in 2013–14 to 1.2 billion tonnes with world corn and barley production forecast to increase.

Coarse grains production



Source: National Agricultural Statistics Service, United States Department of Agriculture

Barley

World barley production is forecast to rise by 6 per cent to 138 mt, reflecting forecast large production increases in the Black Sea region.

In the Russian Federation and Ukraine, barley production is forecast to rise by 17 per cent and 31 per cent in 2013–14 to 16 mt and 9 mt, respectively. This reflects a recovery in yields from the drought-affected crop of 2012–13 and an increase in the planted area in both countries.

In the European Union, barley production is forecast to rise by 1 per cent in 2013–14 to 55 mt, where more favourable seasonal conditions than the previous season are expected to result in improved yields. The area planted to barley is forecast to remain largely unchanged from the previous season.

In Argentina, barley production is forecast to rise by 4 per cent in 2013–14 to 5.7 mt, reflecting an increase in planted area because of expected favourable returns. Argentina has become an increasingly significant producer of barley over recent years, with producers switching to barley because of higher returns compared with wheat.

In Canada, production is forecast to rise by 14 per cent in 2013–14 to 9.0 mt, reflecting an increase in planted area due to favourable returns to producers.

Corn

World corn production is forecast to increase by 11 per cent to 944 mt, predominantly reflecting a forecast recovery in US production.

In the US, corn production is forecast to increase by 30 per cent in 2013–14 to 352 mt. This reflects an expected return to average seasonal conditions in the major corn growing regions and an increase in yields from the drought-affected crop of 2012–13. Additionally, the area planted to corn is forecast to increase by 2 per cent in response to recent high prices.

In China, high domestic prices and the expectation of continued high levels of government support for grain production are expected to encourage producers to increase the area planted to corn. But following record production in 2012–13, an assumed return to average yields is forecast to result in a 2 per cent decline in production to 204 mt in 2013–14.

In Argentina, the area planted to corn is forecast to increase by 9 per cent in 2013–14 largely in response to favourable prices. A return to average yields from the forecast highs of 2012–13 is expected to result in a 6 per cent increase in production to 28 mt.

In Brazil, corn production is forecast to increase by 5 per cent in 2013–14 to 75 mt, driven by an increase in the area planted to the second corn crop.

The second corn crop may be planted after early sown soybean crops are harvested.

In Ukraine, an increase in area planted to spring barley is forecast to result in lower corn area. But corn production is forecast to increase by 4 per cent to 21 mt in 2013–14, reflecting increased yields.

Oilseeds

World oilseeds production is forecast to increase by 3 per cent in 2013–14 to 478 mt, driven by a forecast rise in production of canola, soybeans and sunflower seed.

Canola

World canola production is forecast to increase by 5 per cent in 2013–14 to 62 mt, reflecting record production in Canada.

Canadian canola production is forecast to rise by 13 per cent in 2013–14 to a record 15.2 mt. This increase reflects a 13 per cent recovery in yields from last season when hot conditions during summer adversely affected canola production.

The area planted to canola in Canada is forecast to remain largely unchanged from the record area planted last year, encouraged by favourable canola prices.

Rapeseed production in the European Union is forecast to increase by 3 per cent in 2013–14 to 19.6 mt, largely driven by an estimated 2 per cent rise in planted area. While unfavourable autumn weather caused a decline in the area planted to rapeseed in France and the United Kingdom, this is estimated to be more than offset by an increase in the area planted in Germany, Poland, Denmark, Bulgaria and Romania. The average yield is forecast to increase marginally in 2013–14, following dry conditions in the previous season.

Soybeans

World soybean production is forecast to rise by 5 per cent in 2013–14 to a record 279 mt, which reflects forecast record production in Latin America and recovery in US production.

In Latin America, the 2012–13 harvest is underway with soybean production forecast to increase in Brazil and Argentina. In response to favourable prices during the planting window, producers increased the area planted to soybeans in Brazil and Argentina by 9 per cent and 6 per cent, respectively, to 27 million hectares and 19.7 million hectares. The average yield is forecast to increase significantly in both countries following the drought-affected crop of 2011–12. In 2012–13 soybean production is forecast to increase in Brazil and Argentina by 25 per cent and 32 per cent, respectively, to 82.5 mt and 52.5 mt.

In the 2013–14 season, soybean production in Brazil and Argentina

is forecast to increase by 2 per cent and 5 per cent, respectively, to record levels of 84.5 mt and 55 mt. This forecast increase is largely driven by an increase in the area planted to soybeans in response to expected favourable soybean prices. Additionally, yields are forecast to be marginally higher, reflecting increased use of genetically modified seeds.

Soybean production in the US is forecast to rise by 8 per cent in 2013–14 to 88.7 mt. This increase is primarily driven by a forecast recovery in the average yield, with seasonal conditions expected to return to average in the major soybean growing regions. The area planted to soybeans in the US is forecast to remain largely unchanged from the previous season.

Sunflower seed

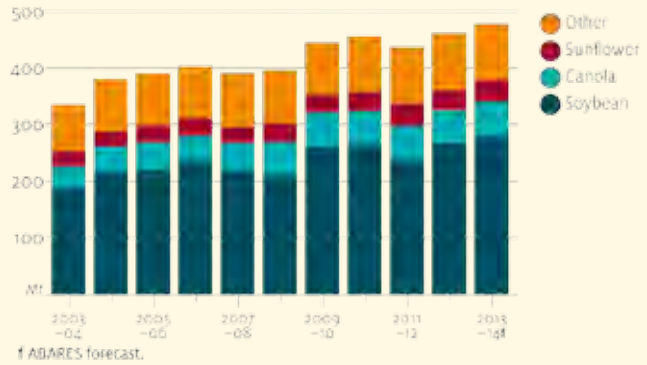
World production of sunflower seed is forecast to increase by 9 per cent in 2013–14 to just over 38 mt. Seasonal conditions are assumed to improve from the unfavourable conditions experienced in many key growing regions in 2012–13.

In Argentina, the 2012–13 sunflower seed harvest was underway in March and production is forecast to have increased marginally to 3.4 mt. This forecast increase reflects an estimated 1 per cent rise in the area planted to sunflowers. Additionally, yields are forecast to be similar to the drought-affected crop of 2011–12, which reflects crop development this season being adversely affected by excessive rain and wind.

In 2013–14 sunflower seed production in Argentina is forecast to increase by 3 per cent to 3.5 mt. This forecast increase is largely driven by a forecast recovery in the average yield, with seasonal conditions in the sunflower growing region assumed to be more favourable than the previous season.

Sunflower seed production in the Russian Federation and Ukraine is forecast to increase by 8 per cent and 13 per cent in 2013–14, respectively, to 8.3 mt and 9.5 mt. Producers are forecast to increase the area sown to sunflowers in response to relatively strong oilseed prices, which partly reflect low closing stocks. The area planted to sunflowers

World oilseeds production



is forecast to increase by 5 per cent in the Russian Federation and 1 per cent in Ukraine to 6.9 million hectares and 6.3 million hectares, respectively. Yields are assumed to increase from last season when production was adversely affected by hot seasonal conditions.

In the European Union, sunflower seed production is forecast to increase by 19 per cent in 2013–14 to 8.1 mt, largely reflecting a forecast 17 per cent increase in the average yield. Last season, yields were adversely affected by above average temperatures and below average rainfall.

Oilseeds crush

World oilseeds crush is forecast to increase by 3 per cent in 2013–14 to 406 mt. Crush of soybeans, canola and sunflower seed are forecast to increase, driven by higher production and continued strong demand for vegetable oils and protein meals.

Soybean crush is forecast to rise by 5 per cent in 2013–14 to almost 244 mt. China will continue to be the largest consumer of soybeans, with domestic crush forecast to increase by 2 per cent to 67 mt.

Canola crush is forecast to increase by 2 per cent in 2013–14 to 59 mt. Canola crush in Canada is forecast to rise by 2 per cent to 6.5 mt, supported by higher domestic demand for canola oil from an extension of the 2 per cent biodiesel mandate to eastern parts of the country in early 2013.

Sunflower seed crush is forecast to rise by 7 per cent in 2013–14 to 35 mt, driven by higher crush in the Black Sea region and the European Union. The European Union is forecast to increase sunflower seed crush by 15 per cent to 6.9 mt, supported by higher domestic production and expanded crush capacity in Hungary, Romania and Bulgaria.

Grain consumption and trade

Wheat consumption to rise

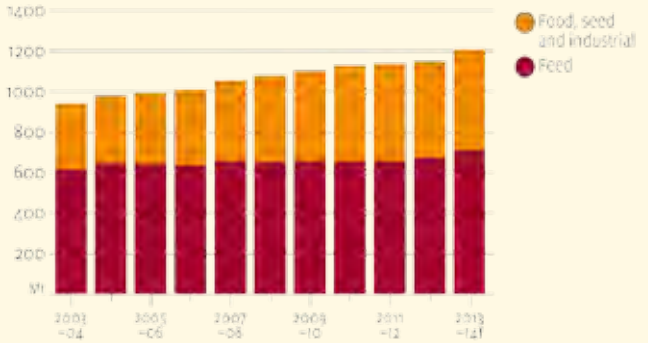
World consumption of wheat is forecast to increase marginally in 2013–14 to 686 mt, largely driven by increased human consumption. Consumption of feed wheat is forecast to rise marginally to 133 mt in 2013–14 in response to forecast lower world prices, but remain below the record use of 146 mt in 2011–12.

US ethanol production and feed to boost coarse grains consumption

World consumption of coarse grains is forecast to increase by 5 per cent in 2013–14 to 1.2 billion tonnes. World feed consumption of coarse grains is forecast to increase by 5 per cent in 2013–14 to 708 mt, supported by falling grains prices and rising livestock production. Food, seed and industrial use of coarse grains is forecast to increase by 6 per cent in 2013–14 to around 502 mt, led by a recovery in US ethanol production.

World corn consumption is forecast to rise by 7 per cent in 2013–14 to 932 mt, reflecting increases in world feed consumption and US ethanol production. A step up of mandated ethanol blending in the US is forecast to contribute to a recovery of US ethanol production in 2013–14. The Renewable Fuel Standard requires the blending of 63 billion litres of biofuel into transportation fuel in 2013 (accounting for around 5 per cent of total US transportation fuel consumption) and 69 billion litres in 2014, of which 52 billion litres and 55 billion litres, respectively, can be sourced from corn-derived ethanol.

Coarse grains consumption



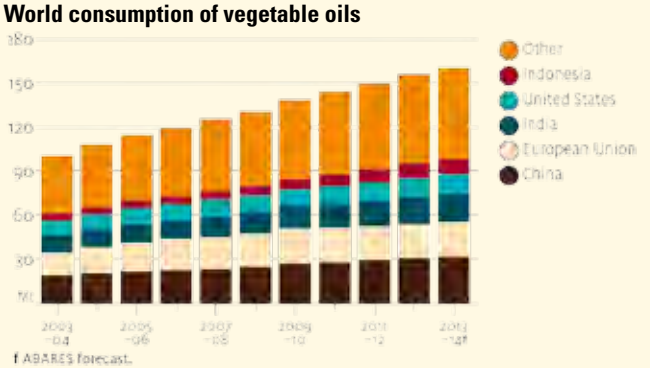
Oilseeds consumption driven by record crush

World oilseeds consumption is forecast to increase by 3 per cent in 2013–14 to 474 mt. This increase is driven by a rise in oilseeds crush, reflecting increased demand for vegetable oils and protein meals.

World vegetable oil consumption is forecast to rise by 3 per cent in 2013–14 to 161 mt, reflecting consumption growth in developing countries, particularly China and India, and industrial demand. World industrial use of vegetable oils is forecast to increase by 2 per cent in 2013–14 to 37 mt, supported by higher biodiesel mandates in several countries, including the US and Thailand. In September 2012 the US Government ruled that biodiesel blending must increase by 28 per cent in 2013 to 1.28 billion gallons. This increase in demand is likely to be met by higher domestic production of biodiesel following reinstatement of the US$1 per gallon biodiesel tax credit in January 2013.

World protein meal consumption is forecast to increase by 4 per cent in 2013–14 to almost 272 mt. China will continue to be the largest consumer of protein meals, reflecting strong demand for feed from the livestock sector. As China recently banned protein meal imports from India, increased Chinese consumption is likely to be at least partly met by higher domestic production.

World consumption of vegetable oils



World trade to rise

World trade in wheat is forecast to increase by 6 per cent in 2013–14 to 138 mt. Lower wheat prices combined with assumed stronger economic activity in developing economies is expected to encourage higher purchases of wheat. A significant rise in exports from some major

exporters, particularly in the Black Sea region, is expected to more than offset lower exports from Australia, Canada, the European Union and the US.

World coarse grains trade is forecast to increase by 17 per cent in 2013–14 to 136 mt, driven by a recovery in coarse grains production in major exporting countries, particularly in the US.

World barley trade is forecast to rise by 7 per cent to 19 mt. Increases in barley exports are forecast for several major exporting countries in 2013–14, including the Russian Federation, Ukraine, Argentina and Canada. Demand for feed barley imports is forecast to remain strong in Saudi Arabia – the world's largest barley importer – and other Middle Eastern countries, reflecting growing demand from expanding livestock production.

World corn trade is forecast to increase by 21 per cent in 2013–14 to 106 mt. A 30 per cent increase in US corn production in 2013–14 is expected to lead to a recovery in US corn trade, with exports forecast to rise by 54 per cent to 45 mt. Corn exports from Argentina are forecast to rise by 3 per cent to 19.5 mt, reflecting higher supplies available for export. In Brazil, despite a forecast 3 million tonne increase in production, growing domestic demand from the livestock sector will result in a forecast rise in exports of only 1 mt to 18.5 mt. On the demand side, China is expected to double its corn imports to 4 mt to meet rising domestic demand for corn from its expanding livestock sector.

World trade in oilseeds is forecast to rise by 5 per cent in 2013–14 to almost 120 mt, reflecting increased production of all three major oilseeds. World trade in soybeans is forecast to achieve the highest growth rate of 6 per cent, rising to 103 mt. This forecast rise is primarily driven by continued strong demand from China, which is forecast to import a record 65 mt of soybeans in 2013–14. World trade in canola is forecast to increase by 5 per cent in 2013–14 to 11.3 mt, largely as a result of increased imports from the European Union and China. World trade in sunflower seeds is forecast to rise by 2 per cent in 2013–14 to 1.6 mt.

SECTION 1 OVERVIEW

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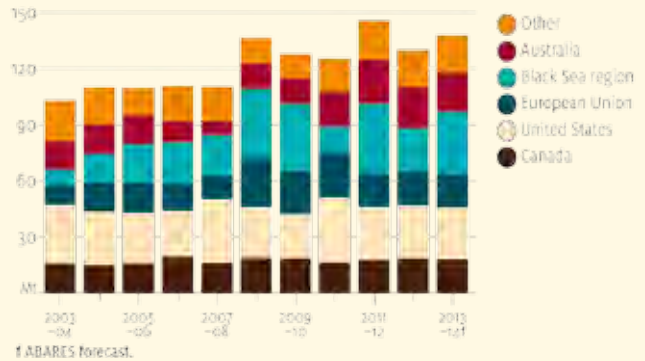
World exports



f ABARES forecast.

World stocks also to rise

World wheat closing stocks are forecast to increase by 1 per cent in 2013–14 to 176 mt. Stocks in most major producers are expected to remain largely unchanged, with the exception of the Russian Federation, where they are forecast to rise by 30 per cent, albeit from a low base. The stocks-to-use ratio of wheat is forecast to remain largely unchanged at 25.6 per cent at the end of 2013–14. This compares with an average of 27.5 per cent over the five years to 2011–12.

World coarse grains stocks are forecast to increase by 8 per cent in 2013–14 to 155 mt. World corn stocks are forecast to increase by 10 per cent to 120 mt, supported by a sharp recovery in US corn production. World barley stocks are forecast to increase by 5 per cent to 21 mt.

The stocks-to-use ratio of barley is forecast to remain largely unchanged at 13.7 per cent, and the ratio for corn is forecast to rise by around half a percentage point to 12.9 per cent. This compares with an average of 12.8 per cent for barley and 17 per cent for corn, over the five years to 2011–12.

World closing stocks of oilseeds are forecast to increase by 7 per cent in 2013–14 to 72 mt and the stocks-to-use ratio is forecast to rise to just over 15 per cent, compared with an average of 16.1 per cent over the five years to 2011–12.

World soybean stocks are forecast to rise by 6 per cent to 62.9 mt, driven by record soybean production. Following a significant decline in 2012–13, canola and sunflower seed stocks are forecast to increase by 11 per cent and 18 per cent, respectively, to 3.2 mt and 1.7 mt in 2013–14.

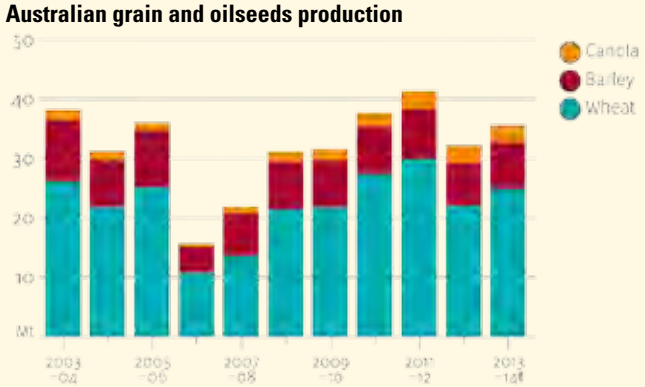
Australian short-term outlook

Wheat production to increase in 2013–14

Australian wheat production is forecast to increase by 13 per cent to around 25 mt in 2013–14. This forecast increase reflects partly improved yields following the generally dry conditions in the 2012–13 growing period, particularly in Western Australia. Additionally, the area planted to wheat is forecast to increase by 4 per cent to 13.8 million hectares in response to expected favourable prices.

Australian wheat exports are forecast to decline by 5 per cent in 2013–14 to around 21 mt. Despite the forecast increase in production, a reduction in stock drawdowns, which are supporting export volumes in 2012–13, are expected to offset the effect of higher production. The value of exports is forecast to fall by 8 per cent to $6.6 billion, reflecting forecast lower world prices.

Australian grain and oilseeds production



f ABARES forecast

In Australia, the total area planted to coarse grains is forecast to rise by 2 per cent in 2013–14 to 5.6 million hectares, with producers forecast to respond to favourable coarse grains prices. Combined with a recovery in yields, total coarse grains production is forecast to rise by 13 per cent to 12.1 mt.

The area sown to barley is forecast to rise by 3 per cent in 2013–14 to 4 million hectares. Production is forecast to rise by 11 per cent to 7.8 mt, reflecting the increase in area and a recovery in yields. The area planted to grain sorghum is forecast to rise by 8 per cent in 2013–14 to 622 000 hectares, largely reflecting an assumed return to favourable seasonal conditions compared with the hot and dry conditions which prevented plantings in 2012–13.

Exports of coarse grains are forecast to increase by 4 per cent in 2013–14 to 6.5 mt. The value of coarse grains trade is expected to increase by 2 per cent to $1.9 billion, of which barley exports are forecast to fall by 2 per cent to $1.5 billion.

The area planted to canola is forecast to decline by 11 per cent in 2013–14 to 2.1 million hectares, following a record planted area in the previous season. Low soil moisture profiles in most states and favourable prices for competing grains are making canola planting less attractive to producers. Assuming average yields, Australian canola production is forecast to decline by 5 per cent in 2013–14 to 2.9 mt. The value of exports is forecast to decline by 13 per cent to $1.25 billion in 2013–14, reflecting an 11 per cent decline in export volume to just over 2.2 mt.

Global medium-term outlook

Prices to remain above historical averages

Over the outlook period, increasing demand for grains and oilseeds is expected to be driven by a growing world population, increasing urbanisation and higher incomes. Given higher expected demand for grains and oilseeds and forecast production, stocks are expected to grow, but only slowly, over the outlook period. This will provide support for prices of grains and oilseeds, which are expected to remain above their long-term averages.

Over the projection period, the world wheat indicator price (US hard red winter, fob Gulf) is projected to ease, declining in real terms from US$362 in 2012–13 to US$260 in 2017–18 (in 2012–13 dollars). Similarly, the world coarse grains indicator price (US corn, fob Gulf) is projected to fall in real terms from US$315 a tonne in 2012–13 to US$245 a tonne in 2017–18 (in 2012–13 dollars). The world oilseeds indicator price (soybeans, cif Rotterdam) is projected to fall in real terms from US$605 a tonne in 2012–13 to US$494 a tonne in 2017–18 (in 2012–13 dollars).

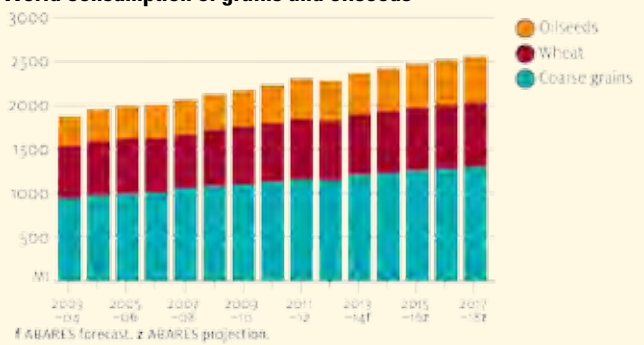
Consumption

World wheat consumption is projected to rise by an average of 1 per cent a year to 726 mt in 2017–18. Consumption of wheat as food, which accounts for around 70 per cent of total wheat consumption, is expected to increase in line with population growth over the projection period, reaching 492 mt in 2017–18.

World coarse grains consumption is project to rise by 2 per cent a year to 1.3 billion tonnes in 2017–18. The key driver behind this growth is an increase in demand for coarse grains as an input into livestock production.

World oilseeds consumption is projected to rise by an average of 3 per cent a year over the outlook period to reach 527 mt in 2017–18. This rise largely reflects projected higher crush of oilseeds, driven by increasing consumption of vegetable oils and protein meals. World oilseeds crush is forecast to increase by 11 per cent over the outlook period to reach 451 mt in 2017–18.

World consumption of grains and oilseeds



Emerging economies to drive feed demand

Over the projection period, growth in feed consumption of grains and oilseeds is projected to be largely driven by developing economies, reflecting faster growth of livestock industries in those economies compared with developed countries. Rising incomes in developing economies are expected to drive substitution from cereals to meat and dairy products.

World feed consumption of coarse grains is projected to increase by an average of 2 per cent a year to 774 mt by 2017–18. Large increases in feed consumption of corn are expected in Asia and Latin America, while feed barley consumption is expected to grow strongest in the Russian Federation, the Middle East and North Africa. Similarly, global consumption of protein meals is projected to increase by an average of 3 per cent a year over the outlook period to 301 mt, while wheat used for feed is projected to rise by 4 per cent a year to 150 mt in 2017–18.

India's demand for vegetable oils to increase

Global consumption of vegetable oils is projected to increase by an average of 3 per cent a year over the outlook period to 184 mt in 2017–18, driven by strong industrial demand and increasing consumption of edible vegetable oils. While per capita consumption of edible vegetable oils in developed countries is projected to remain relatively unchanged over the outlook period, demand is expected to increase in developing countries, particularly in Asia.

India is the third largest consumer of vegetable oils and over the past decade domestic consumption has grown by more than 70 per cent. Although India is a significant producer of vegetable oils, domestic demand outweighs production and almost 60 per cent of consumption is met by imports. But India's per capita consumption of vegetable oils is still well below the world average. Over the outlook period, consumption of vegetable oils in India is projected to rise faster than domestic production, requiring increased imports to satisfy domestic demand.

Declining biofuel growth to slow industrial demand

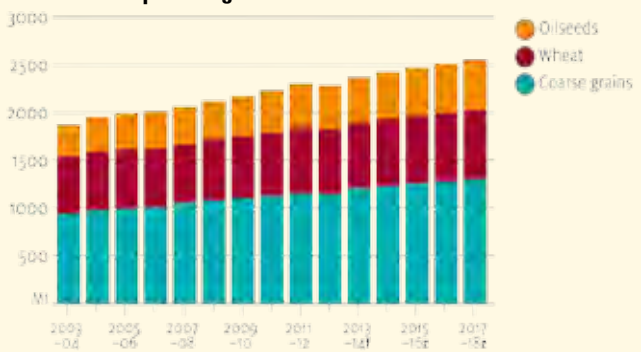
Demand for industrial uses of vegetable oils (primarily for producing biodiesel) is projected to grow over the outlook period but at a slower rate than in previous years when increasing demand was driven by implementation of biofuel mandates. The European Union is the largest consumer of biodiesel in the world, followed by Malaysia, Indonesia, the US and Brazil.

Further potential changes to biofuel mandates may also limit future growth in the industrial demand for vegetable oils.

World industrial use of coarse grains is forecast to grow at a slower rate over the projection period compared with the recent past, driven by a slower rate of growth in US corn-based ethanol production.

Production of corn-derived ethanol drove the growth in US corn consumption from 2005–06 to 2011–12, largely as a result of biofuels policies. Over this time, corn used for ethanol production rose from around 54 mt in 2006–07 to 127 mt in 2011–12, around 40 per cent of US corn production. Over the projection period, corn-derived ethanol production in the US is forecast to rise to around 136 mt. Incremental rises in the Renewable Fuels Standard mandate early in the projection period are expected to support this growth.

World consumption of grains and oilseeds



f ABARES forecast, z ABARES projection.

The maximum amount of ethanol derived from corn that can be counted toward the Renewable Fuels Standard will rise by 5 billion litres from 2013 to 57 billion litres in 2015 and remain at this level until the end of the current mandate in 2022. The remaining portion of the blending mandate rises from 10 billion litres in 2013 to 42 billion litres in 2018, which must be accounted for by 'advanced biofuels', such as sugarcane-based ethanol and biodiesel. A portion of the advanced quota is likely to be met with imported sugarcane ethanol from Brazil.

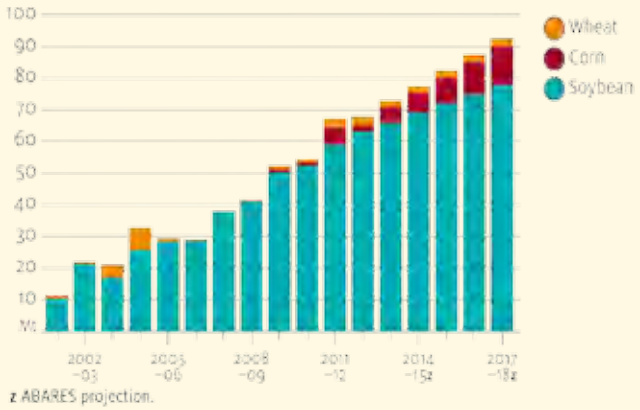
Consumption to grow in China

As a growing consumer of grains and oilseeds, China is forecast to play an increasingly important role in international grains and oilseeds markets over the projection period. Over the past decade China has increased its share of world soybean and corn consumption, largely as a result of growing demand for inputs into livestock production. Between 2001–02 and 2011–12 China's share of world consumption of soybeans increased from 15 per cent to 28 per cent. In line with an expected increase in animal protein demand, corn and soybeans for use as feed is expected to keep growing over the projection period.

A government focus on domestic grain production has helped China become largely self-sufficient in grains over the recent past. Producers of corn, the major feed grain in China, have benefited from increasing levels of government support. But over the medium term Chinese consumption of corn is projected to exceed domestic production, resulting in increased imports to cover this shortfall. Imports of corn are projected to reach 12 mt in 2017–18, making China one of the world's largest importers of corn.

In comparison to corn and other grains, soybeans have received little government support, resulting in stagnant soybean production and reliance on imports to meet increasing domestic consumption. In 2011–12 China imported around 59 mt of soybeans, accounting for more than 60 per cent of world trade. Over the medium term, soybean imports are projected to rise by 4 per cent a year to 76 mt in 2017–18.

Chinese grain and oilseed imports



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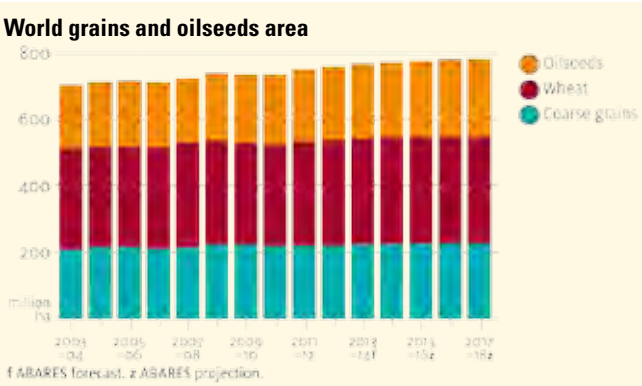
Production

World wheat production is projected to increase by 1 per cent a year over the medium term to around 730 mt in 2017–18. The projected increase reflects the area planted to wheat reaching 228 million hectares in 2017–18 and forecast yield improvements.

World coarse grains production is projected to rise by 2 per cent a year to 1.3 billion tonnes in 2017–18, as a result of rising yields and area planted. Corn production is forecast to contribute most to this growth, rising to 1 billion tonnes in 2017–18, reflecting stronger demand growth for corn over other coarse grains.

Barley production is projected to increase by an average of 1 per cent

World grains and oilseeds area



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a year to 146 mt. Over the medium term, world coarse grains area is forecast to increase to around 321 million hectares. This reflects a supply response, especially from major exporters, to expected favourable coarse grains prices over the projection period. The largest rises in area are projected to come from Latin America and the Black Sea region, which have the most readily available land for crop expansion.

World oilseeds production is projected to rise by 3 per cent a year over the outlook period to 528 mt in 2017–18, reflecting a higher planted area and an increase in yield. The area planted to oilseeds is projected to increase by 1 per cent a year over the outlook period to 234 million hectares in 2017–18, reflecting expected favourable oilseed prices in real terms driven by strong demand for oilseeds and oilseed products. Higher soybean area, particularly in Latin America, is projected to account for most of this rise.

Potential for higher Black Sea production

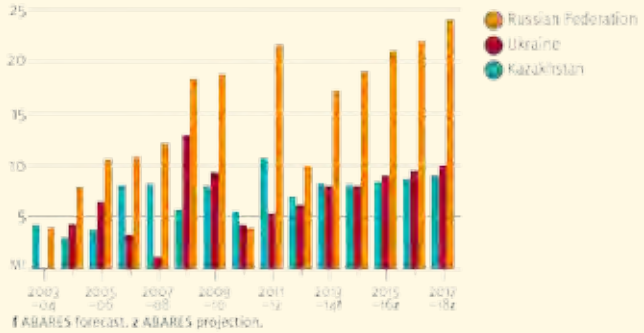
Over the medium term, production of grains and oilseeds in the Black Sea region (the Russian Federation, Ukraine and Kazakhstan) is projected to increase by an average of 3 per cent a year to around 190 mt in 2017–18.

Coarse grains production in the region is projected to increase significantly over the medium term, reaching almost 65 mt in 2017–18. The largest increase is expected to occur in Ukraine, where corn production is projected to rise by 5 per cent a year to 26 mt in 2017–18. Higher production is expected to be driven by increased global demand for livestock feed, particularly in China, which is projected to account for around 9 per cent of world corn imports in 2017–18.

Regional exports for grains and oilseeds are expected to grow strongly over the projection period as higher production outstrips domestic

consumption growth. Exports of wheat, coarse grains and oilseeds are projected to increase by 6 per cent a year to around 71 mt in 2017–18. Exports of wheat, the largest crop produced in the region, are projected to rise by an average of 6 per cent a year to 43 mt in 2017–18. As the largest exporter in the region, the Russian Federation is projected to become the world's second largest exporter, behind the US.

Black Sea wheat exports



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There is potential for Black Sea region production, and hence exports, to rise beyond these projections. Yield growth in the region has lagged behind that of other major producers while the United Nations Food and Agriculture Organization, in a 2008 study, identified significant areas of idle arable land that could be returned to cropping.

But to achieve these production gains, large investments in infrastructure, farm management practices and equipment would be needed and the investment environment in the Black Sea region is presently less than favourable.

Brazil to become top soybean producer

Over the decade to 2011–12 soybean and corn production in Latin America increased by 21 per cent and 57 per cent, respectively, to around 106 mt and 94 mt. For soybeans, this increase was primarily driven by a 40 per cent rise in the area planted to around 44 million hectares in 2011–12. In contrast, the increase in corn production was largely driven by a 30 per cent increase in the average yield as a result of more intensive farm management practices, such as improved seed and fertiliser use.

Latin America has the potential to further expand its agricultural activities, particularly in Brazil. Brazil's Ministry of Agriculture, Livestock and Food Supply estimates that the amount of land used for cropping could expand by up to 119 million hectares, including 69 million hectares in the Brazilian savanna and 50 million hectares of pastureland conversion.

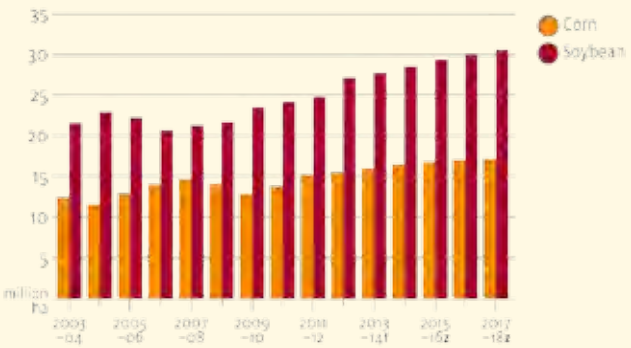
In Latin America, the area planted to soybeans is projected to increase over the outlook period, reflecting favourable returns to producers. In Brazil and Argentina, the area planted to soybeans is projected to rise steadily to reach around 30.6 million hectares and 21.8 million hectares in 2017–18, respectively.

As a result, soybean production is projected to rise to 93.7 mt in Brazil and 61.4 mt in Argentina by the end of the outlook period. At this projected level of production, Brazil would overtake the US as the world's largest producer and exporter of soybeans. This projection depends on assumed improvements in Brazil's transportation infrastructure.

Corn production is also projected to rise in Latin America; the area planted to corn is projected to increase by 2 per cent a year over the outlook period, driven by strong global demand for livestock feed and favourable returns. In some regions of Brazil, corn may be grown as a second crop (often referred to as safrinha corn) and double-cropped with soybeans. The area planted to second crop corn in Brazil has risen since the mid 1980s and in 2011–12 became larger than the area planted to first crop corn. This trend is expected to continue over the outlook period, particularly in the central west region of Brazil, where corn production will increase with a larger area planted to soybeans. But in regions where second crop corn may not be grown and producers have to choose between growing soybeans or corn, expansion of the area planted to corn will be limited as Brazilian farmers generally receive better returns from soybeans.

By the end of the outlook period, corn production is projected to reach 91 mt in Brazil and 33 mt in Argentina.

Soybean and corn area, Brazil



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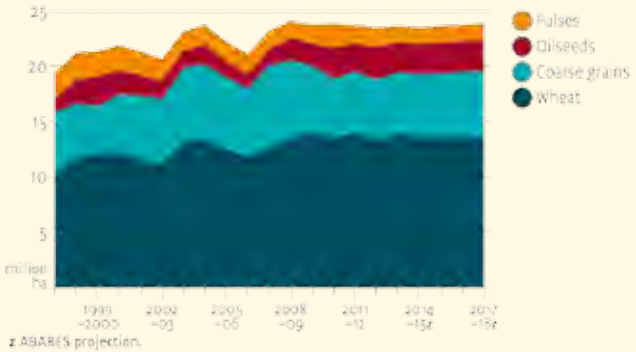
Australian outlook over the medium term

In Australia, the area planted to grains and oilseeds is projected to increase in response to favourable world prices over the outlook period. Given the price outlook, the area planted to oilseeds and coarse grains is projected to increase at a higher rate than wheat. The total area sown to grains and oilseeds is projected to grow by around half a per cent a year to just over 24 million hectares in 2017–18.

Australian grains and oilseeds area



z ABARES projection.

Australian production of grains and oilseeds is projected to rise by 1 per cent a year to 46 mt in 2017–18. Australian production of wheat is projected to rise by 1 per cent a year between 2013–14 and 2017–18 to almost 26 mt, largely as a result of yield growth.

The area planted to wheat is projected to average around 13.6 million hectares over the medium term. Australian wheat exports are projected to be around 19 mt in 2017–18.

Total Australian coarse grains production is projected to increase by 3 per cent a year to 13.3 mt in 2017–18, reflecting rises in area and improved yields. Barley and grain sorghum production are projected to increase by 3 per cent a year and 4 per cent a year, respectively, to reach 8.7 mt and 2.5 mt in 2017–18. Over the medium term, the area planted to coarse grains is forecast to rise by 1 per cent a year to reach 6.0 million hectares in 2017–18, as producers respond to projected favourable world coarse grains prices.

Australian canola production is projected to rise by 3 per cent a year over the outlook period to reach 3.3 mt in 2017–18. The projected rise in production is primarily driven by greater area planted, which is projected to increase by 2 per cent a year to 2.3 million hectares in 2017–18. Additionally, canola yields are expected to improve over the outlook period as a result of increased adoption of genetically modified canola varieties. ■

After devastating losses in the Southern Region last season, frost remains a hot research priority for the Australian grains industry.

Researchers make progress on frost puzzle

By Deanna Lush

THERE can be few sights more disheartening for a grain grower than having a thriving crop wiped out overnight by frost. Frost is estimated to cost the national grains industry $360 million a year and last year alone, frosts in the Southern Region in September and October caused yield losses of 80 per cent or more in some crops.

And the pressure is not likely to ease with latest work by the CSIRO showing there are more frosts across Australia and they are occurring later in the growing season.

GRDC Southern Regional Panel chairman David Shannon says after last season's widespread crop losses to frost, the organisation had received plenty of feedback from growers wanting more information on its projects.

He says while there is no silver bullet solution to combating frost's effects, there is a range of potential solutions under investigation including developing more farm management tools and identifying genes for increased frost tolerance.

The Grains Research and Development Corporation currently has 10 frost research programs on the go or in the contracting phase – a total investment of $7.31 million.

One of the key tools under development to help growers better manage frost risk is the development of frost sensitivity ratings for wheat and barley.

This work is part of the Australian National Frost Program (ANFP) – a joint project between the University of Adelaide, Department of Agriculture and Food WA and GRDC, investing $2.5m over five years.

But developing frost ratings is not as easy as assigning a number. One of the key challenges in frost research has been replicating accurate field frost conditions for varietal evaluation and comparison.

Dr Timothy March.

University of Adelaide researcher Dr Timothy March says while work over the past 10 years has developed more accurate ways to measure variation in frost damage, the ANFP will provide a national frost screening facility to support research.

FROST RESEARCH IN AUSTRALIA – THE STORY SO FAR…

1. The GRDC has invested $13.5 million in more than 60 frost-related projects since 1999.
2. Key findings from previous projects include:
   - Wheat is significantly more sensitive to frost than barley.
   - For barley, a substantial reduction in grain number starts at –2°C and total crop failure can occur at –6°C in all current varieties tested.
   - For wheat, grain number is affected at canopy temperatures below –2°C but some losses can occur at about 0°C even when there are no early–morning signs of frost. Total crop failure can occur at –4°C in all current varieties.
   - There are consistent differences in variety performance during mild frosts – when temperatures are from 0 to –2°C – which cause 10 to 80 per cent of grain sterility.
   - Long–term trials have shown Galleon barley is more sensitive to frost damage than Keel or Fleet while for wheat, Wyalkatchem is more susceptible than Young.
3. The GRDC funded a host of work on frost management in the 2000s which culminated in the publication of *Managing Frost Risk – A Guide for Southern Australian Grains.* It outlines a range of tools available to grain growers to plan for frost, such as variety selection, economic options for sowing time including delayed seeding and paddock management, like clay spreading. It also contains data on how to recognise when a frost has occurred in a paddock through examining temperature records and the crop and options for frost–damaged crops.
4. The GRDC currently has 10 frost research programs on the go – a total investment of $7.31 million – which focus on identifying frost tolerance in current varieties to develop a frost sensitivity rating system for farmers as well as identifying tolerance in other varieties grown overseas (see following article).
5. Latest work by the CSIRO analysed frosts from the 1960s to 2011 and found the number of spring frosts has increased while the period of frost occurrence has changed. Key findings include:
   - The increase in frost occurrence is linked to the southerly shift in position and intensity of a band of high pressure that is usually located over central Australia in spring.
   - The frost window has lengthened by three weeks in the Victorian and eastern South Australian grainbelt and by two weeks in the New South Wales grainbelt. But in western SA, changes in frost are similar to Western Australia, where there are now fewer early–season frosts but more later in the season.
   - Studies into wheat found flowering and maturity occurred seven days earlier for every 1°C of warming.
   - Frost damage is likely to increase in future because of changes in the frost window and plant growth.
6. In Western Australia, a trial last year investigated whether grazing wheat crops in winter to delay flowering would reduce yield losses from spring frosts in low rainfall parts of the state's Great Southern district. While yield losses were reduced, the key message for the region was to graze early and for a short period.

Frost is estimated to cost the national grains industry $360 million a year.

This involves in-the-field frost benchmarking trials at three sites – Loxton in South Australia, Merredin in Western Australia and Narrabri, New South Wales. The first trials were sown last year and evaluated 48 barley and 65 wheat and durum varieties.

This data is being analysed to develop frost sensitivity ratings.

Another two years of benchmarked data is required to validate the ratings before they are released to farmers.

Timothy says another factor the ANFP is considering is whether some varieties are better able to compensate for frost damage, such as by increasing grain size or better filling secondary tillers.

"Future research will examine variety frost ratings in the context of yield loss under different production conditions," he said.

But he says the ultimate goal is to find a genetic solution to frost tolerance through improved plant tolerance.

In future, the national program will further refine screening methods and search for new sources of tolerance from varieties grown overseas to see what genes could be incorporated into Australian lines.

"We are evaluating wheat and barley germplasm from frost prone regions of the world, because we expect this germplasm to have evolved good levels of frost tolerance," he said.

"Recently this has included barley from the Tibetan Plateau and, in the past, from frost prone regions throughout the Middle East and Asia.

"We also plan to further evaluate wild relatives of wheat and barley in an attempt to discover new genetic variation – or old, depending on how you look at it – for frost tolerance."

In wheat, one line (AUS30323), which is derived from wild wheat, has been shown promising levels of frost tolerance over multiple seasons than other dominant varieties, particularly in mild frosts. Work is continuing on developing molecular markers that wheat breeders can use to select for frost tolerance in breeding programs. Two other genetic markers for wheat and barley have been found and future research will validate their potential. ■

International varieties may hold key to higher frost tolerance

The search is on to find solutions to the lack of frost tolerance in cereals but with 30,000 genes in barley and about 90,000 in wheat, it is not proving to be a quick or easy task.

The Australian Centre for Plant Functional Genomics is exploring several cereal genes and promoters that are known to play roles in cold tolerance or the molecular responses of genes to cold stress.

But one of the puzzles still to be solved is why some cereals are highly frost tolerant as young plants but their tolerance genes switch-off before flowering.

Researchers are working to determine whether these genes can be manipulated to express tolerance at flowering – which is when it is most required in Australian cropping conditions.

A frost-affected head of wheat. Australian researchers are studying naturally available tolerances as well as genetic modification of plants to help minimise frost damage. (Photo: ACPFG)

Challenges in research include the low level of natural variation between cultivars for tolerance at flowering, the variable and unpredictable nature of frost in the field and the fact that varieties flower at different times.

Researchers are working on whether a precisely-controlled frost simulation chamber can be used to improve variety screening efficiency.

The ACPFG – co-funded by the GRDC, the Agricultural Research Council and the South Australian Government – has two research approaches to the frost problem:

- Use of naturally-available tolerance, headed by Dr Nicholas Collins; and,
- Engineering tolerance using gene transformation (genetic modification), led by Dr Sergiy Lopato.

Natural tolerance

Frost in Australia damages a plant's spikes, leading to reduced grain set and poor quality seeds.

Nick says breeding barley and wheat varieties with frost tolerance would be the ideal solution but known sources of natural tolerance only offer partial protection.

"It's questionable whether there is any useful natural tolerance out there when it comes to frost at flowering," he said. "Researchers have screened wheat and barley germplasm but the best they've found is partial tolerance."

Some genes in European and North American barley and wheat winter varieties are known to provide strong cold tolerance at the vegetative phase – after germination and before flowering – during winter dormancy, but these genes switch-off before flowering and appear to offer no protection to the spikes.

Nick says an explanation may lie in the domestication process.

"Spring-type wheats grown in Australia essentially have no winter dormancy and represent mutants which flower at a different time to their wild cousins, exposing them to frost at a different stage of their development," he said.

"Perhaps the wild cousins evolved to turn off the cold tolerance genes at flowering because they did not need them at this stage.

"Sergiy's research program aims to test whether these genes can be genetically engineered to express strong frost tolerance at flowering."

But in the meantime, Nick says, in theory, marker-assisted breeding could be used to stack weak tolerance genes together in a variety. But first, their position in chromosomes would need to be found.

The University of Adelaide barley breeding group identified two chromosome regions from Japanese barley varieties which appeared to provide partial frost tolerance at flowering. The ACPFG has developed lines to validate these natural tolerance genes in the field.

"These lines have been incorporated into the university's

RESEARCH TOOLS…

Tools that enable potential tolerance genes to be transferred to new varieties include:

- **Transformation vector:** This is a DNA molecule which is used to carry genetic material into another cell so it can be replicated and expressed.
- **Promoter:** A promoter is a section of DNA that is located at the front of a gene and controls its expression. When genetic engineering is used, a gene product can be combined with a promoter from another gene to achieve desired expression characteristics of the gene.
- **Molecular marker:** A molecular marker is a fragment of DNA with a known location on a chromosome. It can be used to select for a nearby tolerance gene in a breeding program.

GENES TO MAKE A DIFFERENCE …

Researchers have identified a number of genes that could play a role in developing frost-tolerant cereals. These genes are used as a source of gene products that could confer tolerance or of a source of promoters for achieving the desired expression characteristics of the tolerance product.

- TaDREB3: Encodes dehydration-responsive element binding-3 product. Over-expression of this product in GM plants confers cold tolerance at the vegetative developmental stage, when the plant is a seedling.
- Cor39, WRKY71 and LEA: Promoters of these genes turn on expression in the plant, in the presence of stresses such as cold.

GRDC-funded field screening trials at Loxton and we eagerly await the analysis of the data from the first trial season last year," Nick said.

Another aspect of the research has been to assess the Australian Genomics Research Facility (AGRF) frost simulation chamber as a tool for tolerance research and breeding (see Frost chamber box).

The investigation used three wheat and three barley varieties which have shown contrasting frost tolerance in the field, either in the GRDC-funded national frost screening program or in experiments by Queensland's Department of Primary Industries. ACPFG is analysing whether the differences can be reproduced using the chamber.

"The results should be known later this year. Should the chamber prove to be relevant, it could be useful for early-generation testing of genetically engineered lines, screening of wild-relatives which are difficult to handle in the field and for conducting controlled experiments for studies on frost tolerance mechanisms," Nick said.

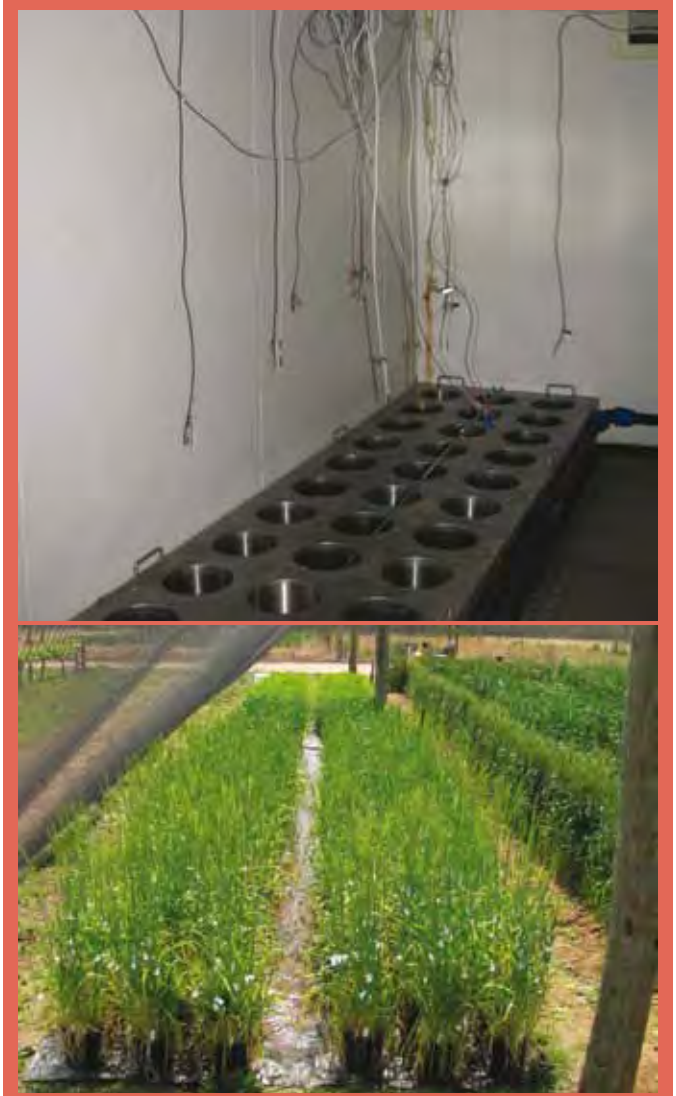
An extra challenge with screening is that tillers vary in their sensitivity to frost based on their growth, which means tillers must be tagged for comparison of those in similar stages of development when assessing the damage.

"Frost research has not been a major focus of ACPFG, and is a challenging area. Nonetheless, we are mindful that it is an important issue for Australian farmers and we hope that our efforts will ultimately bear some fruit," Nick said.

A major puzzle is why some cereals are frost tolerant as young plants but then 'switch off' these tolerance genes before flowering. (Photo: Ben Biddulph)

THE FROST CHAMBER...

The ACPFG grows plants in pots on the ground (bottom photo) then, at the appropriate stage, puts them in the chamber in batches to be frosted overnight. Tillers are tagged according to growth stage for monitoring.



Conventional and transgenic cereal lines can be assessed for frost tolerance in a frost simulation chamber.

The one built for the Australian Genomics Research Facility (AGRF) at the Waite Campus is a 3.3 x 5 metre room and holds 72, 20 cm pots. It has a large radiator containing cooled liquid on its roof and a heater which enables the programming of a temperature profile of an overnight frost, typically including a minimum temperature of about -4°C for two hours.

"It potentially offers an easier and quicker way to screen for frost than field screening," ACPFG's Nick Collins said. "It gives more control than waiting for frost at a field screening site such as the one at Loxton, South Australia.

"We initially grow the plants in pots on the ground outside or in the greenhouse. At the appropriate stage we bring them in batches to be frosted overnight in the chamber. On the morning of the frost treatment, tillers at susceptible growth stages are tagged, so that we know which tillers to assess for damage several weeks later."

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Engineered tolerance

The use of engineered tolerance mainly centres on regulatory genes, called transcription factors, which can control the expression of another whole set of genes, cooperating to produce stress tolerance.

"Most of our opportunities to achieve frost tolerance have actually arisen from our work on drought tolerance," Sergiy said.

There are some similarities between the two stresses – for example, cellular dehydration can either result from a general water shortage or from the growth of ice crystals in the air spaces between plant cells.

As a result, drought and cold trigger some common responses in plants and genes that can confer drought tolerance, often improve freezing tolerance.

"Constant and strong over-expression of these genes in transgenic plants improve the frost tolerance of vegetative tissues but has negative impacts on plant development, such as stunting and delayed flowering," Sergiy said.

"Some finessing of the expression of these genes is needed to achieve frost tolerance without agronomically undesirable growth defects.

"Various combinations of tolerance factors and promoters from different genes are being tried in wheat and barley including promoters that are only active in the presence of cold stress."

Promising results have been found by expressing the wheat TaDREB3 regulatory factor under the control of the promoter from the WRKY71 gene. TaDREB3 is related to genes known to confer vegetative frost tolerance, while the WRKY71 promoter is triggered to act mostly under cold stress. This combination has been transferred to barley lines by genetic modification (GM) – the use of laboratory techniques to insert genetic material from one organism into the cells of another.

The frost chamber can produce bleaching in some barley and wheat heads, which is not usually evident in the field. Trials are continuing on whether the chamber can accurately replicate in-the-field frost tolerance results.

Sergiy says the WRKY71 promoter-TaDREB3 combination has given significant improvement of cold tolerance in tests of seedlings.

"While the plants are cold-tolerant, undesirable growth effects were largely avoided because of the use of cold-inducible WRKY71 promoter instead of a promoter that drives expression all of the time.

"Some other promoter-gene combinations also look good because they provide moderate improvements to vegetative frost tolerance with little or no effect on general plant growth under regular conditions."

He says the most promising lines can be tested for flowering stage tolerance in the AGRF frost simulation chamber, and eventually in the field.

"Our early genetic modification work used the backgrounds of the overseas varieties Bobwhite (wheat) and Golden Promise (barley), although we have more recently moved into using the Australian lines, such as Gladius wheat and the barley breeding line WI4330, which are expected to be more compatible with future field testing and deployment," he said.

"Evidently, using genetic modification of these transcription factors to achieve frost tolerance at flowering is not a simple business, with no guarantee of success. Regulatory requirements would add to the costs of releasing a variety that is genetically modified. But in light of the limited natural variation available for frost tolerance at flowering, and the pressing need for tolerance, this approach is worth trying." ■

Dr Nick Collins and Dr Sergiy Lopato head the centre's natural and engineered frost tolerance breeding work.

Section 2

The grain industry in figures

All figures and tables presented in this Yearbook have been derived from a combination of ABARES, ABS, International Grains Council, AWB and USDA sources. The crop year listed in figures and tables is the year in which the crop was planted.
2012 Australian summer crop figures are therefore forecasts for the harvest during 2013.
(Mt = 1,000,000 tonnes) (Kt = 1000 tonnes)

Ensuring customers for Australian grain get what they want, and order

By Gerard McMullen, Project Manager – Grain Quality, Grain Trade Australia

Significant debate has arisen in recent times on the need for additional measures to be implemented in the industry to meet the requirements of our customers. This is not new for the Australian grain supply chain. Debate on the effectiveness of existing and potential new programs and processes and their place in the grain industry has occurred many times over the last 20 years.

So why have additional regulations and systems such as recognised Quality Assurance (QA) programs been talked about but not adopted widely throughout the supply chain? There are many reasons but one could be that processes have to date been sufficient to supply grain of a quality that meets customer needs.

Processes required

There are a range of activities undertaken when participating in the supply of grain to customers. These can essentially be distilled down to seven key elements:

- Commitment to be a part of a sustainable long term and profitable industry;
- Control of suppliers of products and services;
- Control of production and other activities for an enterprise operating along the supply chain;
- Knowledge of product through inspection, sampling and testing;
- Documentation controls and record keeping;
- Product identification and traceability, and,
- Compliance with regulations and industry standards.

While the grain industry is complex, involving many stakeholders, a key theme is the promotion of industry common good and the desire for self-regulation. Some of the key processes and players involved include:

Pre-production

This sector operates in the supply chain before grain is commercial grown by producers. Technology providers produce grains or material with traits designed to meet market requirements. Potential material is trialled in a range of environments under programs such as National Variety Trials. If judged suitable, the material is developed and seed is eventually made available for commercial sale. A range of promotional material extolling the virtues of each variety, and the opportunities to maximise its quality, are provided with each variety.

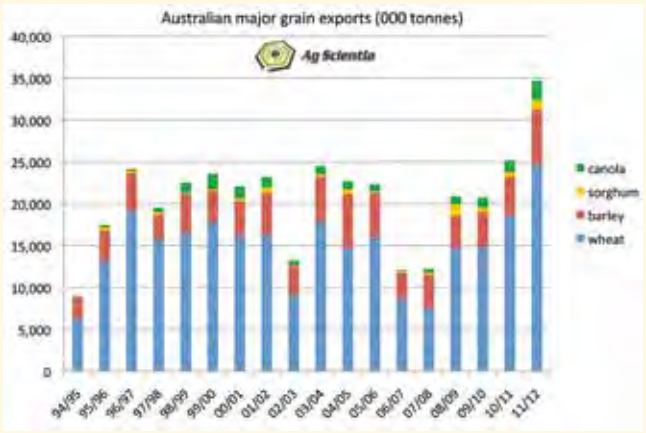
Prior to release of this seed for commercial production, organisations such as Wheat Quality Australia and Barley Australia may require grain to be assessed under their classification guidelines in order to verify the quality of the grain for the marketplace. Strict classification rules exist which ensure new varieties released will meet the needs of the customer.

The Australian Seed Federation has a range of controls over the quality of seed produced, labelled and sold commercially. Companies selling such material generally do so under various legislative controls and may use Plant Breeder's Rights to obtain revenue for their efforts.

Grain production

Producers undertake a range of on-farm activities to maximise the quality and quantity of grain produced. Seed is selected and graded

Australian grain exports have kept pace with production



to maximise the potential of the grain sown. The growing of the crop is managed to minimise contamination and maximise crop yield and quality. Regulations set by various government departments covering a range of activities must be complied with, such as chemical application to the growing crop through Australian Pesticides and Veterinary Medicines Authority (APVMA) governance.

A range of agronomic practices are implemented. Third party providers' knowledge and equipment may assist. Much of this agronomic information is provided through activities of organisations such as the Grains Research and Development Corporation (GRDC), grower groups or state departments of primary industries. A significant benefit to all involved in the pre-farm gate sector arises from co-ordination of a research strategy by the GRDC. (While the range of activities conducted by the GRDC focuses on on-farm grain production, some research, extension and communication is also invaluable to the post-farm gate sector).

Grain is harvested keeping in mind quality standards set by the marketplace and the needs of other sectors of industry. Grain may be stored on-farm, delivered direct to the market or commercial storage providers.

Records are kept to identify parcels of grain and to provide relevant information with the grain as required by the marketplace.

Grain receival, storage and transport

Grain is received and stored according to individual storage providers operating procedures outlining the range of activities conducted at each premises. Some storage providers implement recognised quality assurance systems such as those complying with the International Standards Organisation (ISO). Staff is trained to ensure grain is correctly classified. Equipment used in the sampling and testing process is checked prior to and during use, to comply with regulations such as those set by the National Measurement Institute.

Grain is supplied with a Commodity Vendor Declaration (CVD) form detailing relevant information such as chemical use. Grain is sampled using industry sampling protocols. Grain testing occurs according to methods and standards set by various industry organisations such as the Australian Oilseeds Federation, Pulse Australia and Grain

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† Rated engine hp (ISO) per 97/68/EC.

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Trade Australia (GTA). Most standards define:

- Varieties to be received by grade;
- Quality standards by grade; and,
- Methods and procedures for applying the standards.

During storage, grain is monitored to ensure its quality and integrity is maintained. Grain may be protected from stored grain insect attack using a range of measures including chemical and non-chemical.

The National Working Party on Grain Protection (NWPGP) is a focal point for reference and advice on market requirements and chemical use. It discusses a range of matters to assist industry to safely and effectively store grain. Chemicals are applied to storages and/or grain according to those defined on the registered label by APVMA, and to comply with market limits as documented in the NWPGP document *Australian Grains Industry Post Harvest Chemical Usage Recommendations and Outturn Tolerances 2012/13*.

Meeting Codex and national regulatory levels is a key focus of that document.

Non-chemical insect and quality control measures may be applied in storage. Again, the GRDC provides a range of reference material for industry to consider. Both chemical and non-chemical strategies occur according to industry best practice and legislation on chemical use. For example the CRC for National Plant Biosecurity provides advice to industry on prolonging the use of phosphine through their document *Strategy to manage resistance to phosphine in the Australian grain industry.*

Transport Codes of Practice exist for both road and rail – either industry codes or individual company codes. These include a range of measures to ensure the integrity of grain is maintained and grain is not contaminated by prior loads.

Grain outturn, marketing and processing

Grain is purchased and marketed according to individual customer contracts or using recognised industry contracts and trade rules such as those set by GTA. Grain is supplied with relevant documentation, showing compliance with quality, food safety and other contractual terms, whether documented in the contract or not. Again, CVDs are used where required.

Grain for export must only be shipped from Department of Agriculture, Fisheries and Forestry (DAFF) approved and registered establishments. Prior to loading, all containers or vessel holds must meet DAFF requirements to show the absence of quarantine material such as stored grain insects. Independent inspections may also occur to ensure freedom from material that may compromise the quality of grain loaded.

During loading, grain is inspected by DAFF authorised officers to ensure it meets the quarantine requirements of the importing country (such as freedom from particular pests and diseases). Industry works closely with DAFF Biosecurity and the Trade Marketing Group through organisations such as the Grains Industry Market Access Forum to ensure market requirements for phytosanitary and non-phytosanitary parameters are not unnecessarily restrictive.

All grain outturned must be free of live stored grain insects, as determined by industry in consultation with DAFF and documented in government legislation. Grain is also inspected to ensure compliance with market requirements and industry standards.

Where required, independent service providers are used to sample, test and certify grain outturned. For the majority of exports and for some grain supplied to the domestic market, testing independent of industry is conducted. For example, the National Residue Survey conducts testing for a wide range of chemicals on grain to ensure compliance with regulatory limits set in Australia and overseas (see table).

Once grain is received, end-processors implement a range of systems, including QA systems and codes of practice to produce the end-product prior to consumption.

Meeting the future needs of our customers

The production and marketing of grain in Australia is complex and diverse involving a wide range of stakeholders.

The supply chain is getting better at producing, storing and marketing grain. More robust processes are being developed to show compliance with customer and regulatory requirements. As market requirements continue to evolve there will be an ongoing need for both informal and formal QA systems to be developed and used, especially in niche areas of the industry.

History has shown the industry does not – and should not – rest on its laurels and rely on past performance. It is up to all in the industry to continually strive to meet market requirements through the use and development of whatever systems and processes are required. The grain industry has shown it is highly capable in this area.

It is hoped that the recently drafted GTA Code of Practice, which covers many of the industry best management practices listed above, will be a sound basis for that to continue into the future.

For more information contact Gerard McMullen from GTA on:
Phone: +61 (0)2 9235 2155 – www.graintrade.org.au ■

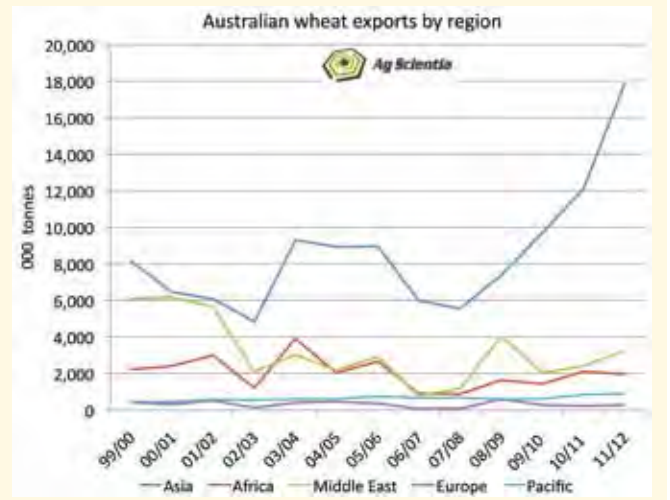
National Residue Survey – grain residue testing program

Commodity	Samples	Compliance (%)
Cereal grains	5415	99.7
Canola & other oilseeds	364	99.2
Pulses	208	97.6
Total	**987**	**99.6**
Program	**Samples**	**Compliance (%)**
Bulk export	4005	99.9
Container / bag export	886	99.0
Milled products	401	100.0
Domestic	427	97.2
Total	**5987**	**99.6**

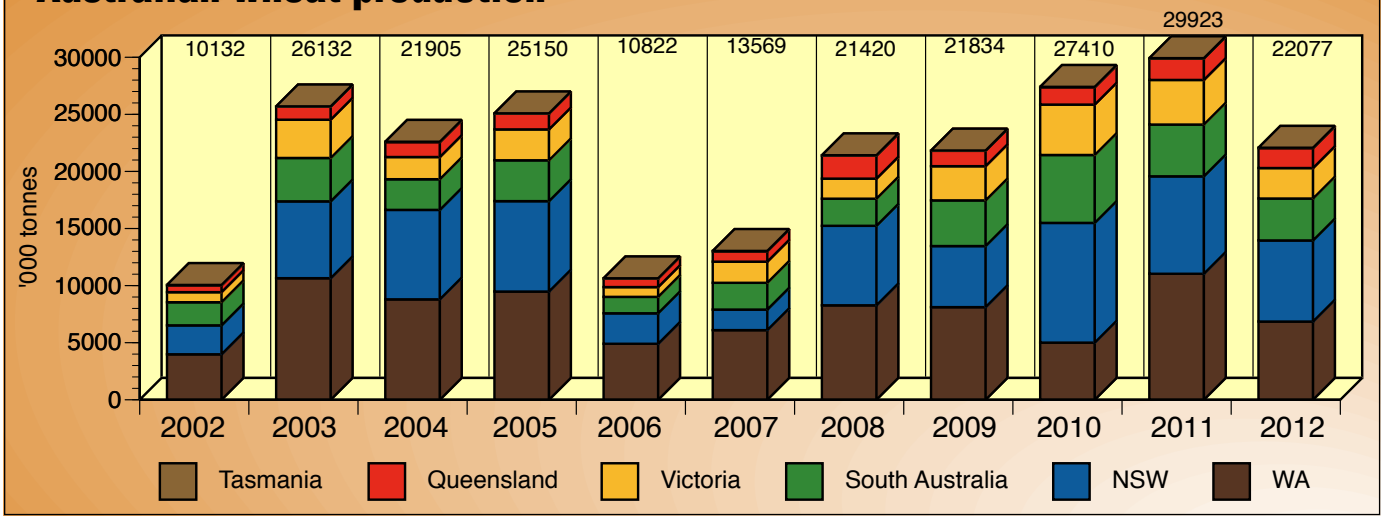
The NRS commenced in 1964. More than 83,000 samples have been tested since 1994 with an overall MRL compliance of 99.7%.

Source: Ian Reichstein, Director – National Residue Survey and Plant Programs – DAFF, 2013

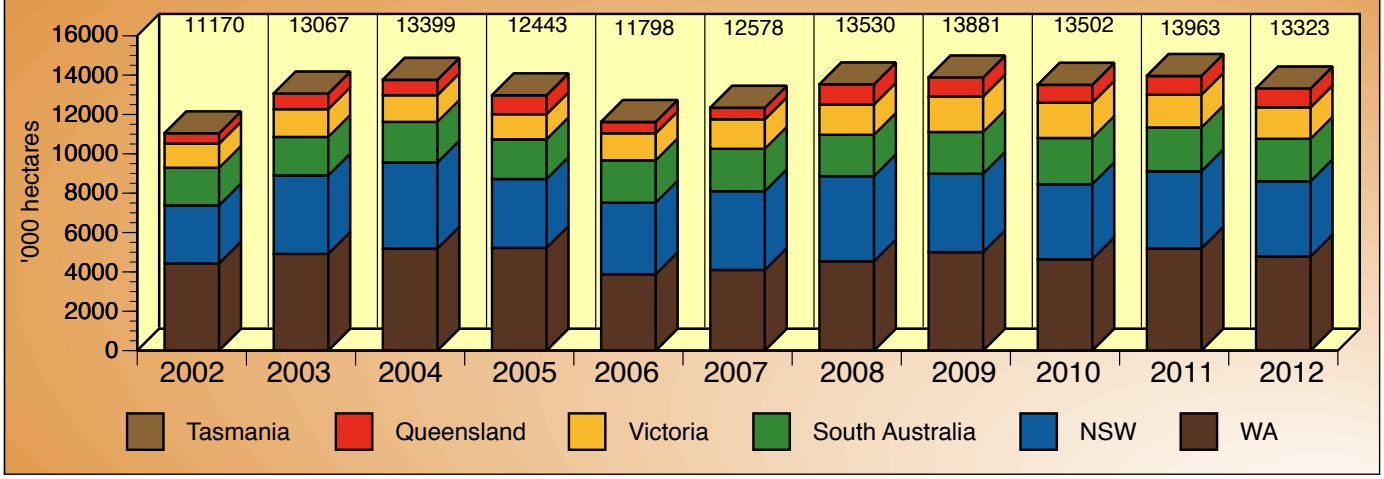
Shift of wheat export markets. Asian destinations now take 90%.



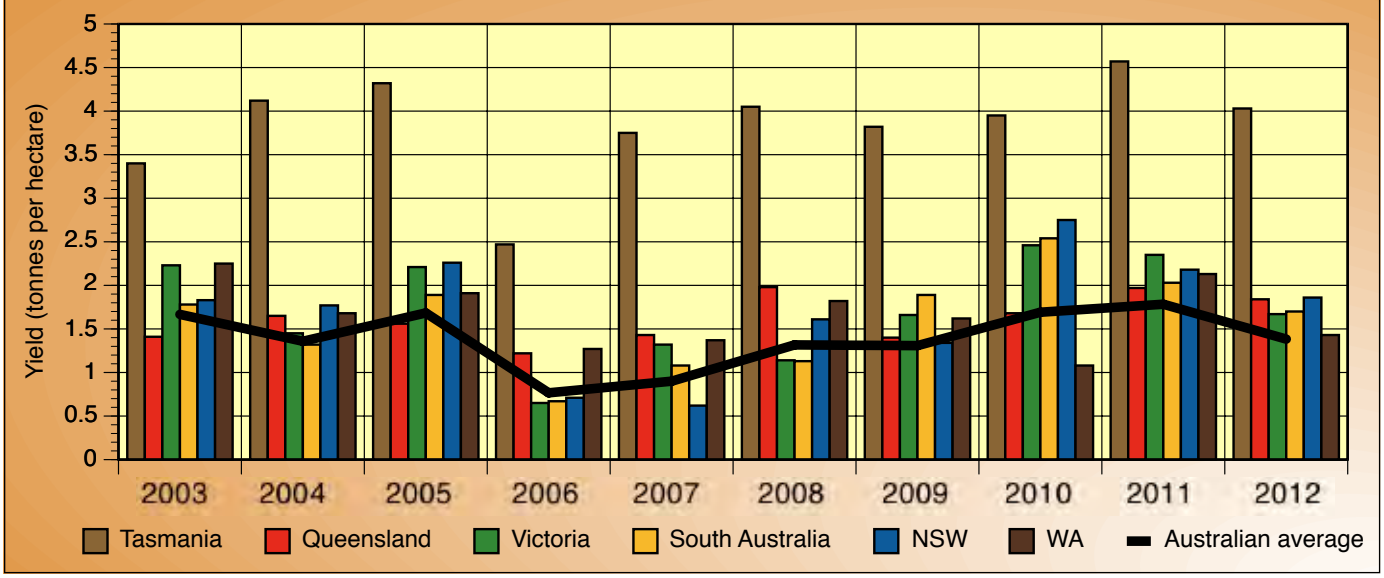
Australian wheat production



Total Australian wheat area



Average Australian wheat yields by state



Australian wheat production, domestic disposal and exports (Kt)

	2008	2009	2010	2011	2012
Opening stocks	4319	3726	5770	8933	7870
Production	21420	21834	27410	29923	22077
Availability	25739	25560	33180	38856	29947
Domestic use	7306	4999	5663	6330	5742
Food/Industrial	2470	2490	2510	2530	2550
Feed	4142	1826	2455	3134	2500
Seed	694	682	698	666	692
EXPORTS					
Wheat (incl. grain & flour)	14707	14791	18584	24656	20900
MAJOR DESTINATIONS					
China	231	745	530	1872	na
Japan	791	1110	1175	1293	na
Korea, Rep. of	712	826	1197	2343	na
Malaysia	793	756	928	894	na
Thailand	336	442	661	1442	na
Indonesia	2728	2854	3892	4066	na
Egypt	449	501	730	618	na
Iran	1577	61	0	208	na
Iraq	531	635	906	522	na
United Arab Emirates	256	207	353	180	na
Yemen	714	648	779	843	na
Kuwait	251	338	372	320	na
Pakistan	0	1	0	0	na
Oceania (NZ, Fiji, PNG)	524	598	688	864	na
CLOSING STOCKS	**3726**	**5770**	**8933**	**7870**	**3305**

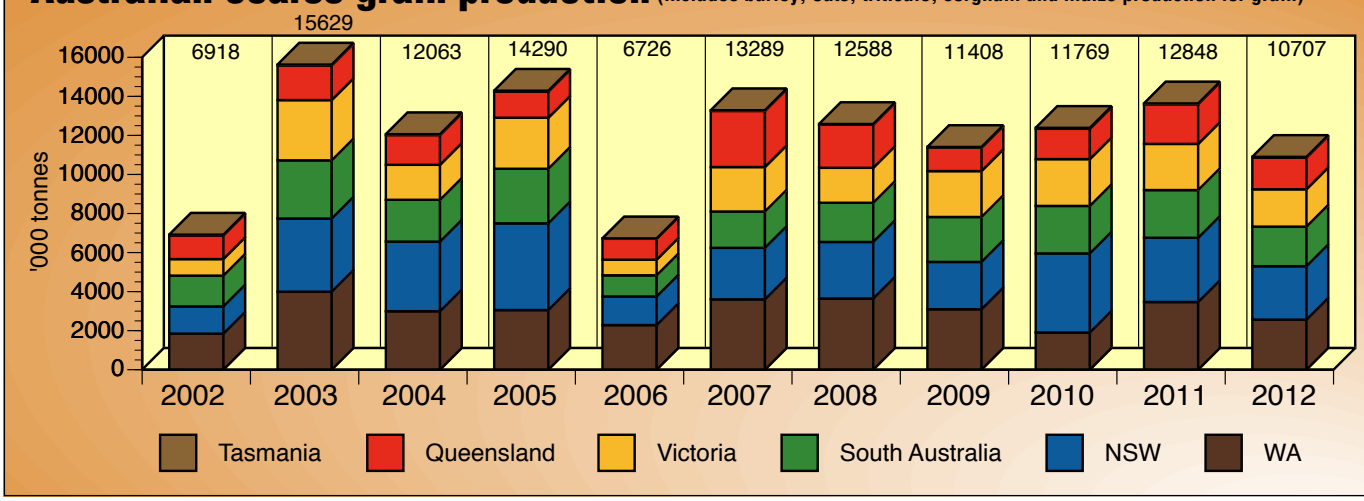
Wheat production & area by state

		2008	2009	2010	2011	2012
NSW:	Prod. (Kt)	6963	5350	10488	8536	7105
	Area ('000 ha)	4322	3983	3815	3923	3820
Vic:	Prod. (Kt)	1756	2995	4412	3908	2670
	Area ('000 ha)	1534	1801	1793	1660	1600
Qld:	Prod. (Kt)	2016	1346	1524	1878	1748
	Area ('000 ha)	1020	962	905	954	950
WA:	Prod. (Kt)	8274	8114	5005	11036	6850
	Area ('000 ha)	4542	5006	4640	5189	4785
SA:	Prod. (Kt)	2376	4001	5949	4534	3672
	Area ('000 ha)	2104	2122	2341	2229	2160
Tas:	Prod. (Kt)	35	27	32	32	32
	Area ('000 ha)	9	7	8	7	8

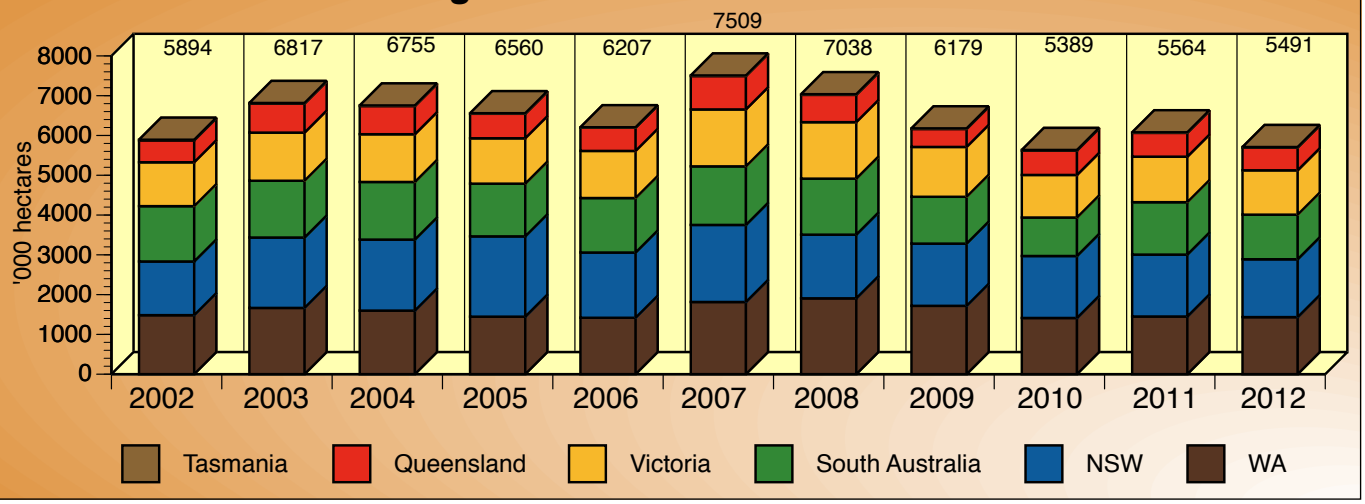
Barley production & area by state

		2008	2009	2010	2011	2012
NSW:	Prod. (Kt)	1449	1236	2194	1437	1546
	Area ('000 ha)	977	951	878	681	840
Vic:	Prod. (Kt)	1461	1865	1945	2012	1560
	Area ('000 ha)	1136	976	802	833	880
Qld:	Prod. (Kt)	173	113	146	180	157
	Area ('000 ha)	92	69	94	74	85
WA:	Prod. (Kt)	3007	2554	1549	2880	1950
	Area ('000 ha)	1559	1420	1101	1298	1102
SA:	Prod. (Kt)	1877	2068	2122	1817	1824
	Area ('000 ha)	1240	997	795	882	960
Tas:	Prod. (Kt)	29	29	39	23	25
	Area ('000 ha)	11	9	11	7	8

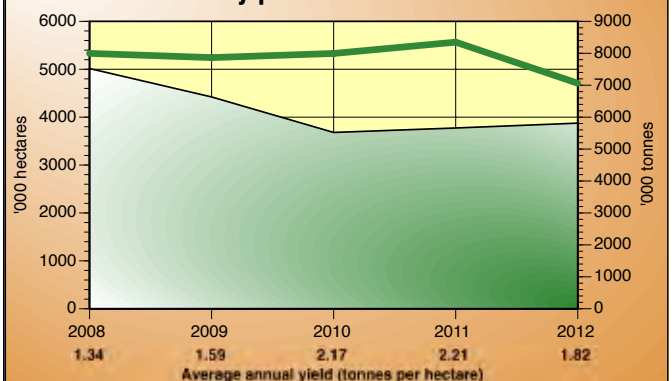
Australian coarse grain production (includes barley, oats, triticale, sorghum and maize production for grain)



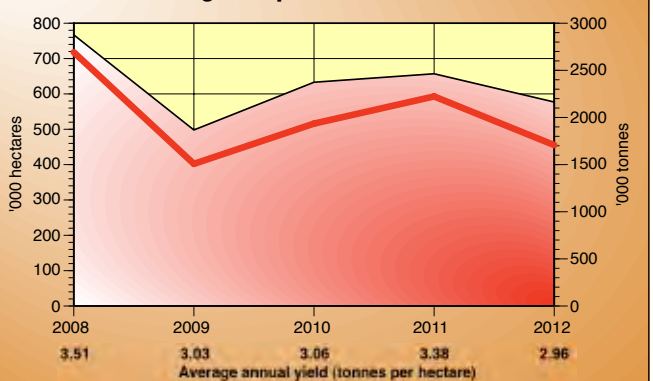
Total Australian coarse grains area (includes barley, oats, triticale, sorghum and maize production for grain)



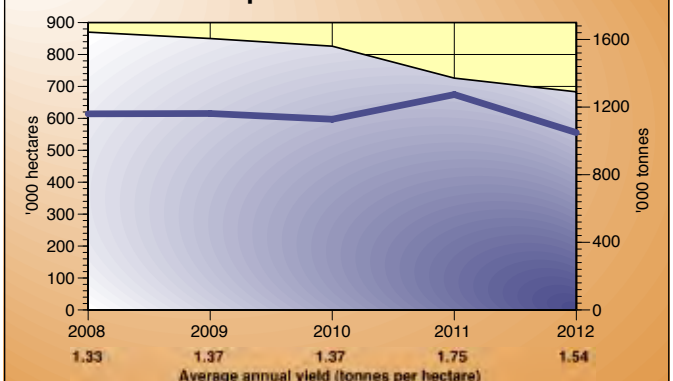
Australian barley production



Australian sorghum production



Australian oats production

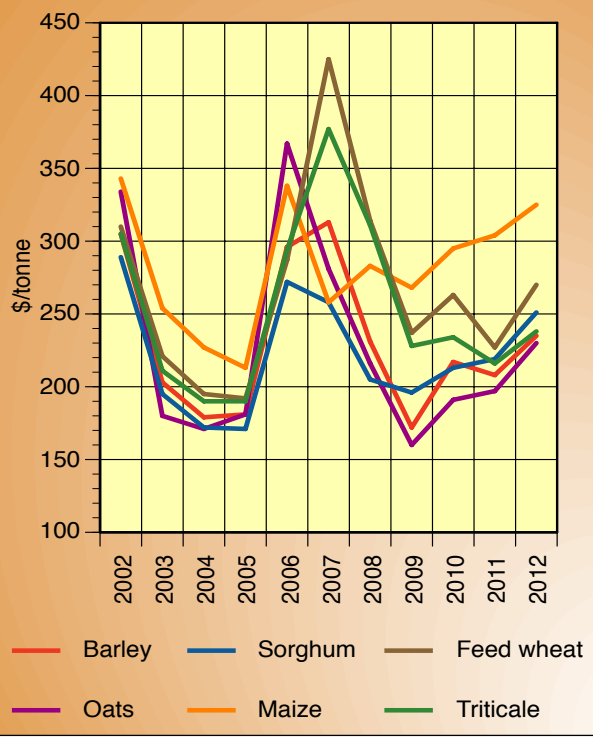


Supply and disposal of Australian coarse grains [Kt]

	2008	2009	2010	2011	2012
BARLEY					
Production	7997	7865	7995	8349	7062
Domestic use	4105	3165	2632	2203	2284
Exports	3891	4634	5363	6146	4778
OATS					
Production	1160	1162	1128	1274	1049
Domestic use	998	954	1009	1099	881
Exports	161	208	118	174	168
SORGHUM					
Production	2692	1508	1935	2223	1707
Domestic use	1694	1167	984	1035	875
Exports	957	998	341	950	1188
MAIZE					
Production	376	328	357	422	452
Domestic use	340	301	312	321	372
Exports	67	13	9	46	101
TRITICALE					
Production	363	545	355	580	437
Domestic use	363	545	355	580	437
TOTAL (production)	**12587**	**11407**	**11769**	**12848**	**10707**

SECTION 2 THE GRAIN INDUSTRY IN FIGURES

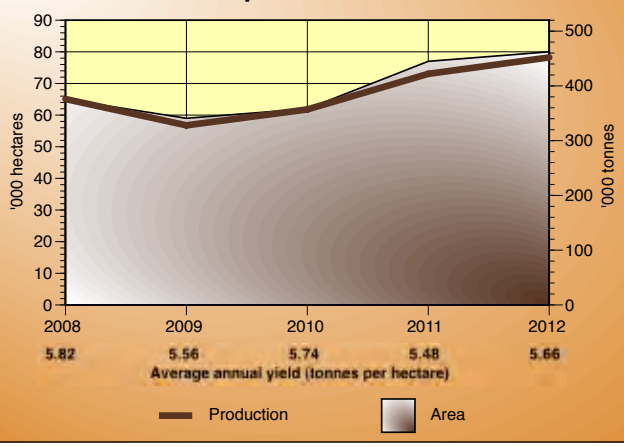
Australian coarse grains domestic feed prices ($/tonne delivered capital city)



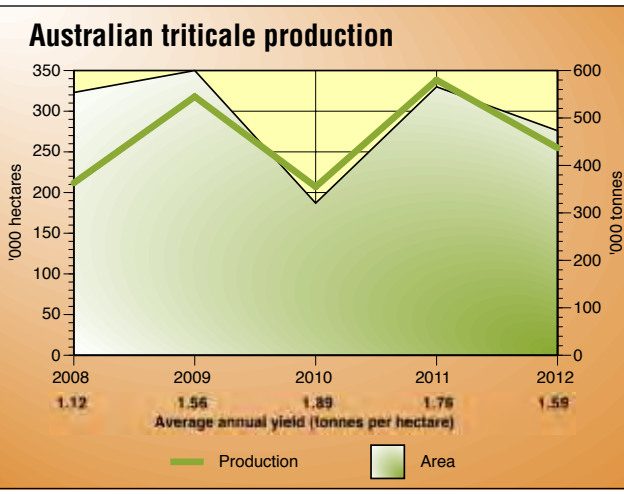
Supply and disposal of Australian pulses (Kt)

	2008	2009	2010	2011	2012
LUPINS					
Production	708	823	808	977	459
Domestic use	404	470	621	607	409
Exports	304	353	186	370	50
FIELD PEAS					
Production	238	356	395	342	320
Domestic use	102	194	92	127	120
Exports	137	162	302	215	200
CHICKPEAS					
Production	443	487	513	485	713
Domestic use	1	1	1	1	23
Exports	506	492	461	598	712

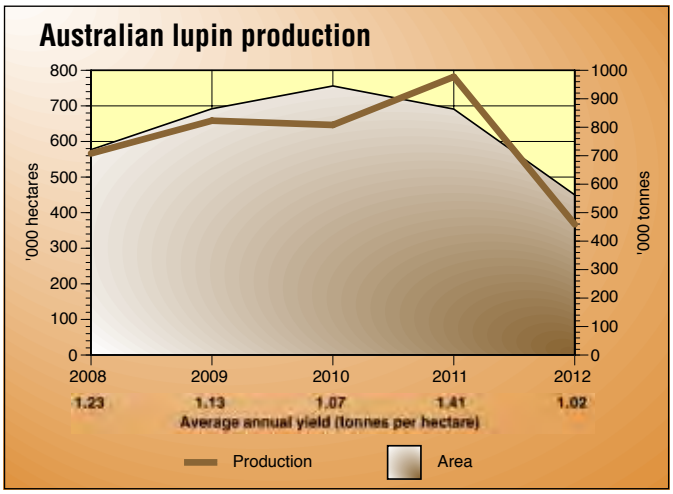
Australian maize production



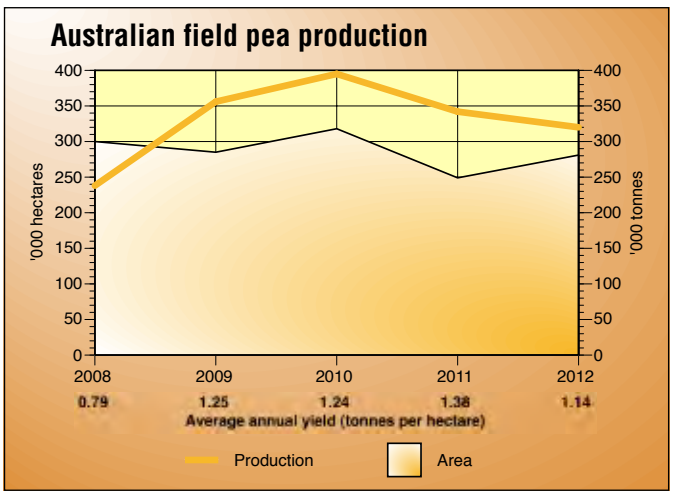
Australian triticale production



Australian lupin production

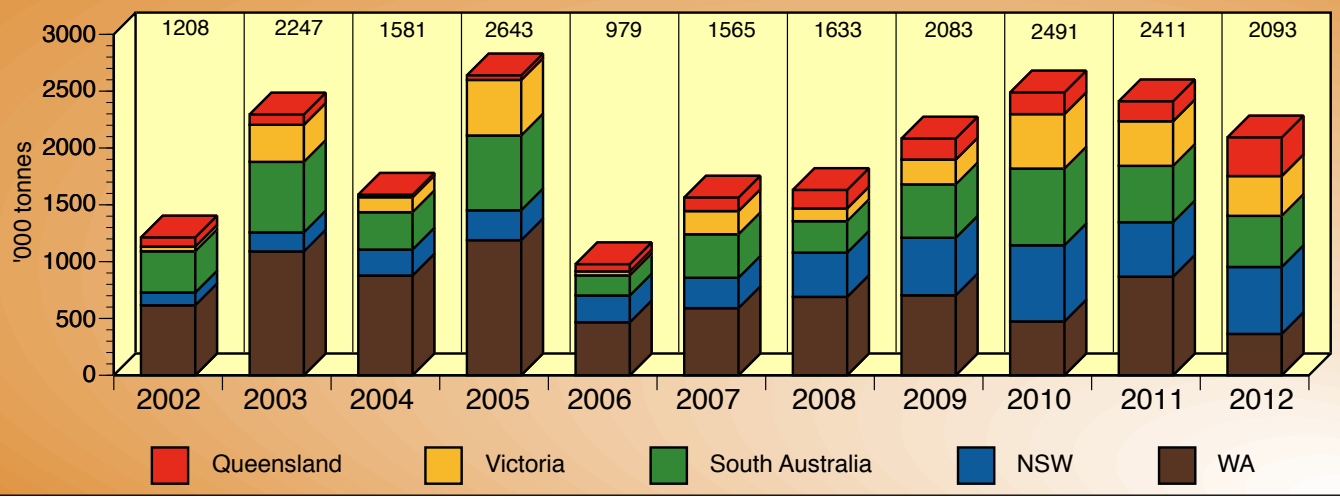


Australian field pea production

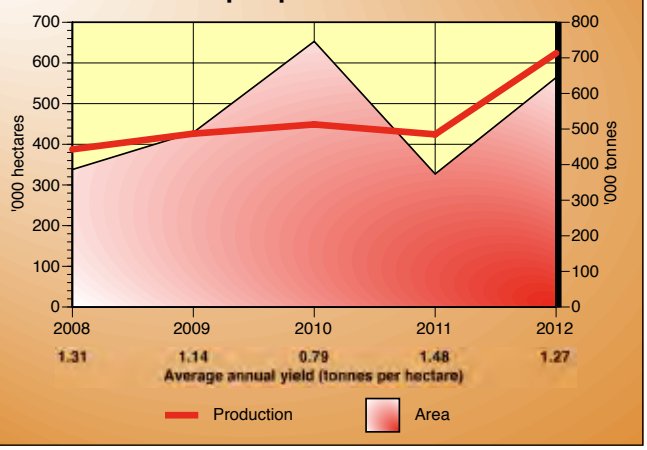


SECTION 2 THE GRAIN INDUSTRY IN FIGURES

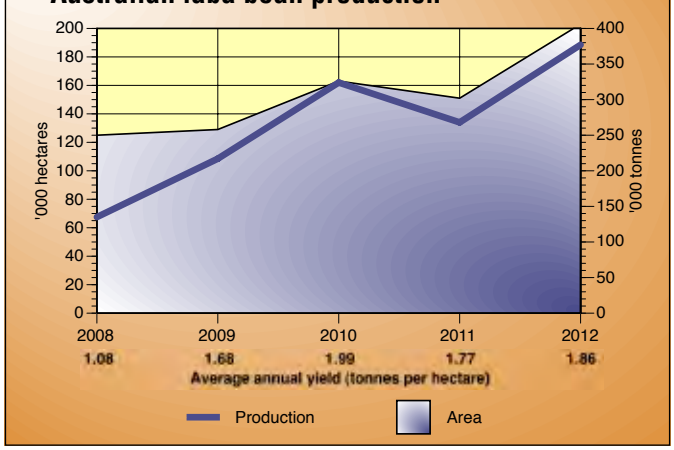
Australian pulse production



Australian chickpea production



Australian faba bean production



SECTION 2 THE GRAIN INDUSTRY IN FIGURES

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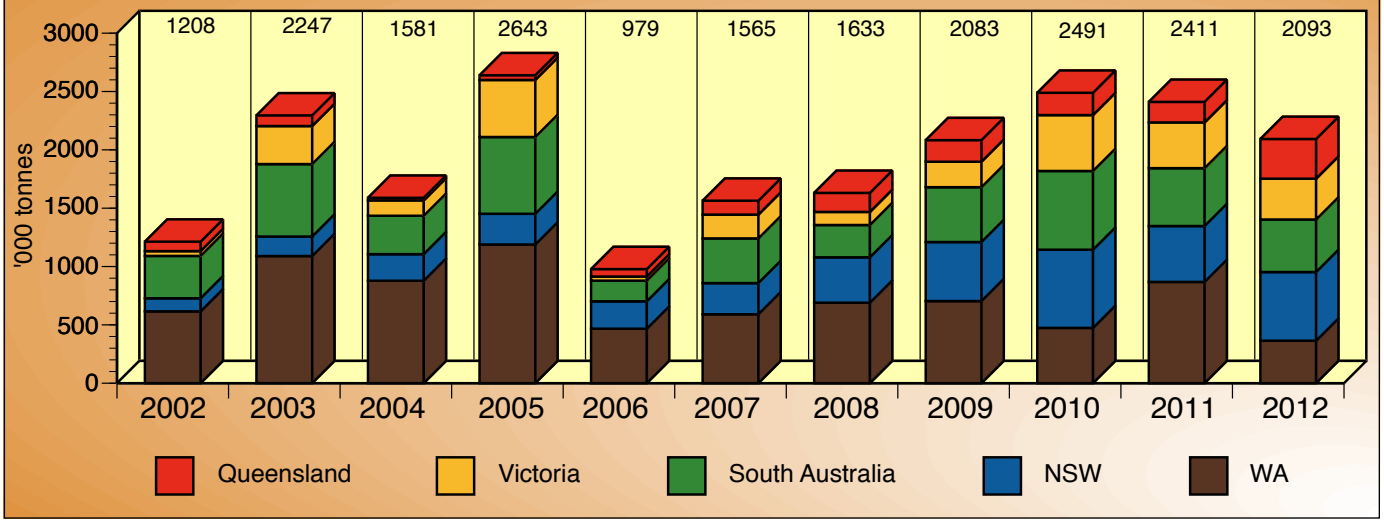
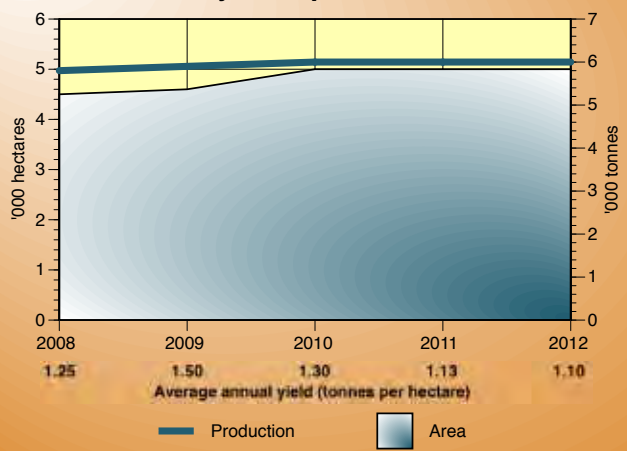
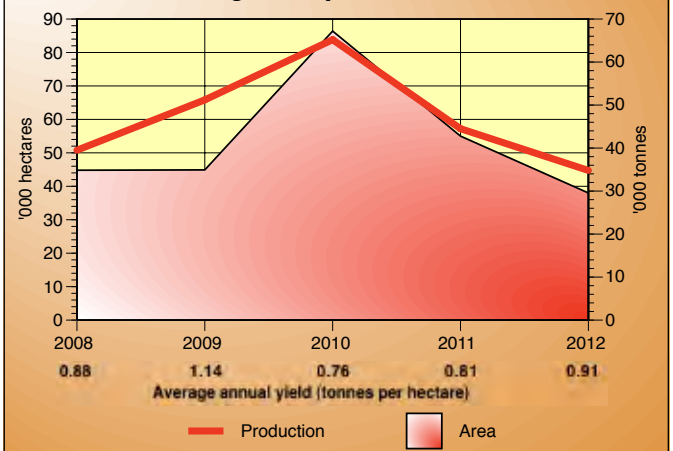
Australian pulse production



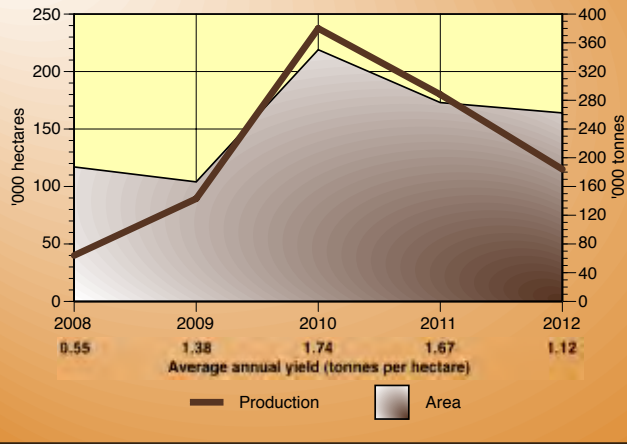
Australian navy bean production



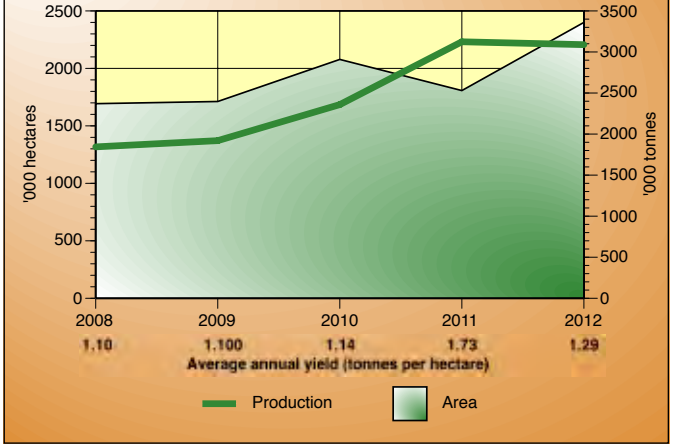
Australian mung bean production



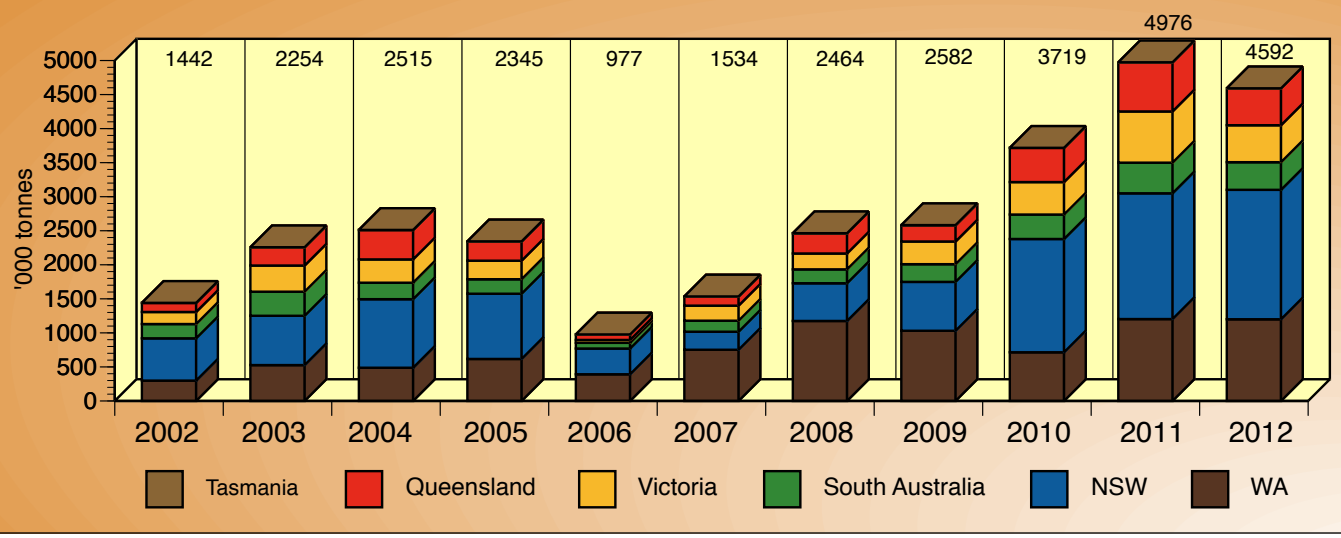
Australian lentil production



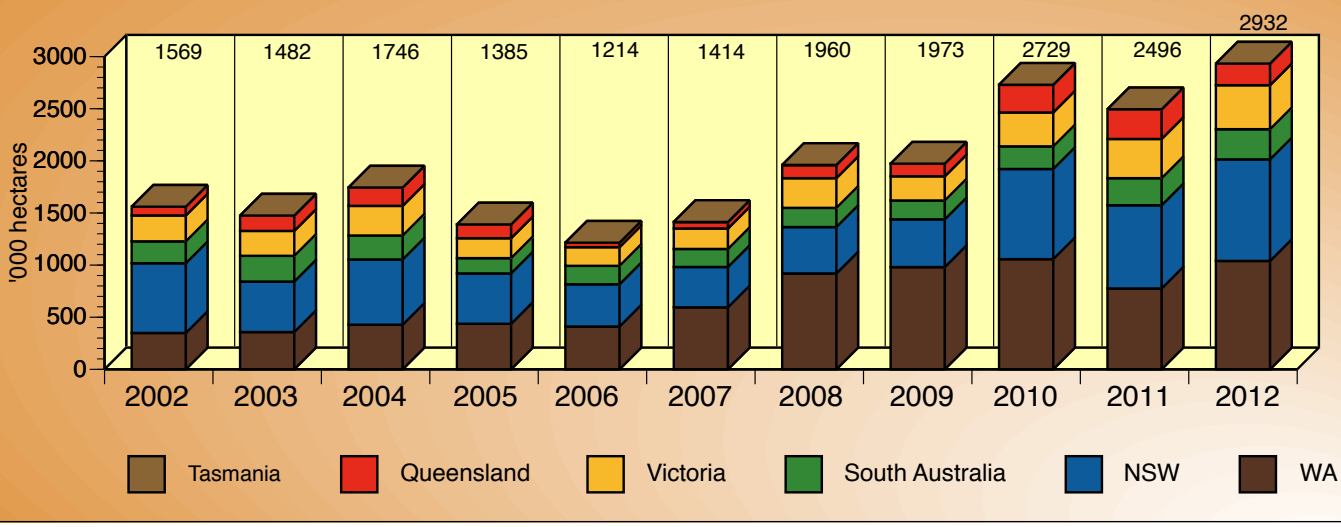
Australian canola production



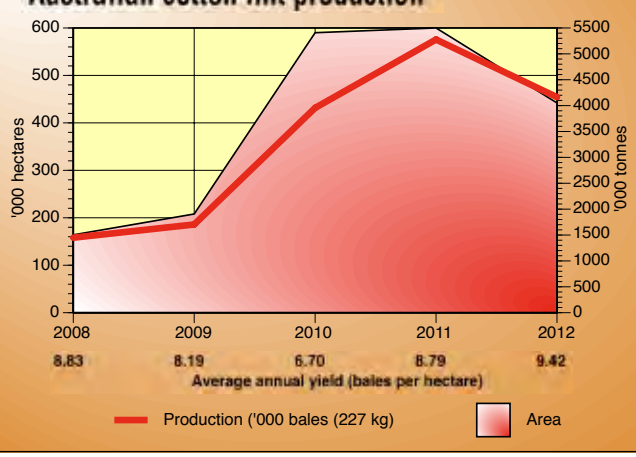
Australian oilseeds production



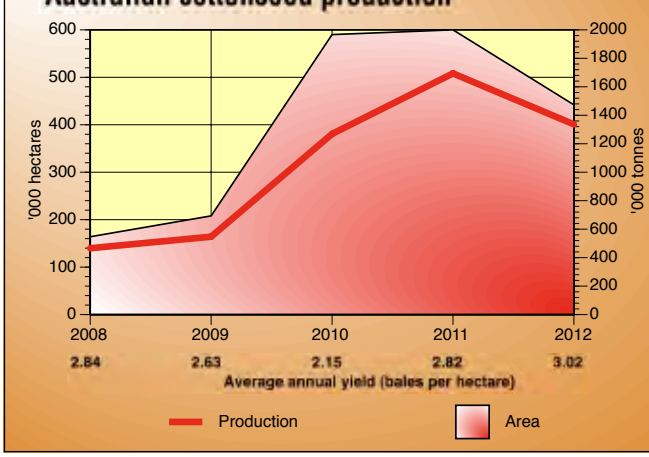
Total Australian oilseeds area

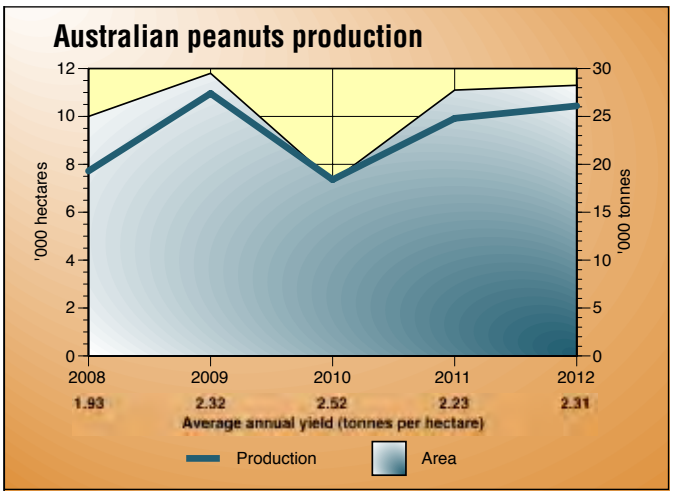


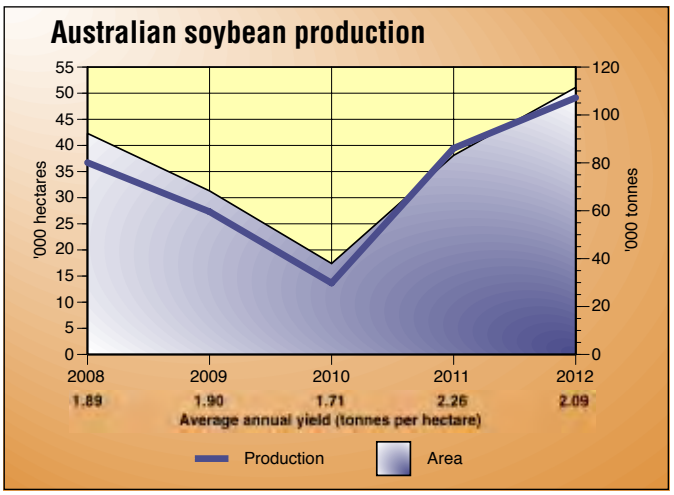
Australian cotton lint production

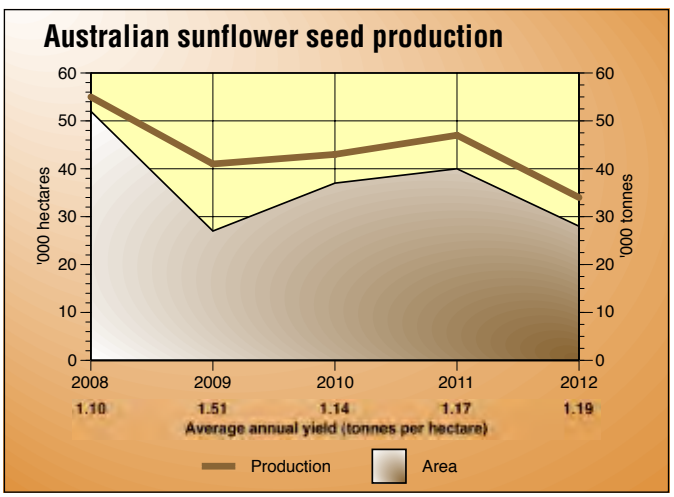


Australian cottonseed production









Australian canola production, domestic use, seed and oil exports (Kt)

	2008	2009	2010	2011	2012
Seed production	1844	1907	2359	3124	3089
DOMESTIC USE	778	721	810	567	607
Crushers	771	613	803	558	596
Seed	7	8	7	9	11
EXPORTS					
Seed	973	1238	1471	2323	2519
Oil	76	87	104	117	na

Australian exports of oilseeds, vegetable oils and meals, by type (Kt)

		2007	2008	2009	2010	2011	2012
OILSEEDS	**Canola**	519.1	973.0	1238.0	1471.0	2323.0	2519.0
	Cottonseed	17.8	37.1	105.5	267.9	653.6	na
	Linseed	0.0	0.0	0.2	0.0	0.0	na
	Peanuts	5.8	5.4	4.9	3.5	2.9	na
	Safflowerseed	0.2	0.1	0.0	0.1	1.2	na
	Soybeans	1.9	1.9	6.8	2.1	1.1	na
	Sunflowerseed	2.8	2.5	1.6	0.9	0.6	0.8
	Total	**547.7**	**1019.9**	**1357.3**	**1745.3**	**2982.3**	**na**
OILS	**Canola**	56.8	76.3	87.1	104.2	117.3	na
	Cottonseed	5.6	10.0	5.4	18.2	2.1	na
	Peanut	0.1	0.1	0.9	0.1	0.1	na
	Safflowerseed	0.0	0.0	0.0	0.0	0.0	na
	Soybeans	1.0	2.2	3.3	1.0	0.2	na
	Sunflowerseed	1.8	1.9	0.0	0.2	0.4	na
	Olive	3.0	4.9	6.9	6.1	5.2	na
	Total	**93.4**	**112.0**	**117.7**	**146.7**	**140.4**	**na**
	Cottonseed & Sunflowerseed	9.2	10.7	12.7	33.5	44.2	na
OILSEED MEALS	**Soybeans**	3.0	1.4	2.2	3.5	6.4	na
	Canola	2.0	1.3	19.0	31.5	21.6	na
	Other	4.7	6.3	27.2	35.4	21.7	na
	Total	**18.9**	**19.6**	**61.1**	**103.9**	**93.8**	**na**

Australian gross grain prices [$A/tonne delivered to principal market/port, averaged across all grades]

	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13 f
Wheat	203	242	390	281	218	257	252	343
Barley (feed)	181	296	313	231	172	216	196	261
Oats	182	369	281	216	160	196	201	236
Triticale	189	297	252	257	220	184	175	228
Maize	213	339	258	283	268	259	223	271
Sorghum	171	272	258	205	196	213	201	251
Rice (Rice Marketing Board)	283	337	414	566	457	240	270	255
Lupins	195	266	335	280	249	268	232	315
Field peas	222	283	407	345	241	266	231	375
Chickpeas	374	598	622	450	432	404	554	610
Sunflowerseed (at crusher)	428	706	814	696	696	567	551	545
Soybeans	301	353	554	551	551	501	472	477
Canola	334	397	543	548	440	544	500	503

Gross value of Australian grain production [$A million]

	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Wheat	5099	2619	5292	6021	4765	7052	7540	7562
Barley	1417	1039	2244	1850	1356	1729	1636	1844
Oats	249	241	423	251	186	221	256	247
Triticale	119	44	113	93	120	65	102	99
Maize	71	60	100	106	88	92	94	122
Sorghum	276	274	977	553	296	412	446	429
Rice	284	55	7	34	90	174	254	276
Lupins	251	125	222	198	205	216	227	145
Field peas	130	40	109	82	86	105	79	120
Chickpeas	57	151	195	199	211	207	269	348
Canola	473	227	659	1011	840	1283	1562	1555
Sunflowerseed	42	15	59	38	29	24	26	18
Soybeans	17	12	19	44	33	15	41	51
Peanuts, linseed, safflower seed	30	21	35	28	34	27	29	31
TOTAL	**8824**	**5122**	**10803**	**10778**	**8662**	**12134**	**12974**	**13224**

Value of major Australian grain exports [$A million, fob]

	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Wheat (incl. flour)	3296	2765	2990	5028	3692	5516	6378	7170
Barley (incl. malt)	1108	833	1496	1321	1093	1295	1875	1487
Oats	47	38	37	64	53	37	47	42
Sorghum	33	13	76	405	116	146	299	276
Rice	171	347	110	143	59	152	452	503
Lupins	99	38	31	61	115	89	86	39
Field peas + Cow peas	43	80	61	62	60	85	93	79
Chickpeas	106	168	139	275	255	213	384	466
Cottonseed	53	31	8	19	46	85	195	206
Canola	331	108	303	595	583	866	1344	1443
Other oilseeds	21	22	27	27	24	14	10	16
TOTAL	**5308**	**4426**	**5278**	**8015**	**6102**	**8503**	**11187**	**11761**

Global grains, oilseeds and pulses

World total supply and demand for wheat and coarse grains (Mt)

	Opening stocks	Production	Imports	Total supply	Total use	Exports	Closing stocks
Argentina							
2010	4.0	47.8	0.0	51.8	15.1	28.7	8.0
2011	8.0	44.2	0.0	52.2	14.6	35.1	2.6
2012	2.6	46.6	0.0	49.2	15.1	30.7	3.3
Australia							
2010	8.2	39.2	0.0	47.5	11.4	25.0	11.3
2011	11.3	42.8	0.0	54.2	12.2	32.0	9.9
2012	9.9	32.9	0.0	42.8	11.8	25.5	5.5
Canada							
2010	13.5	45.9	1.5	60.8	27.8	22.0	11.0
2011	11.0	48.1	1.1	60.2	28.4	22.5	9.3
2012	9.3	51.5	0.8	61.6	29.8	23.5	8.3
EU-27							
2010	47.0	275.9	13.2	336.0	273.0	32.8	30.3
2011	30.3	284.5	14.5	329.2	274.7	26.5	28.0
2012	28.0	270.7	17.2	315.9	264.3	28.6	23.0
Kazakhstan							
2010	4.3	11.7	0.1	16.0	8.2	5.8	2.1
2011	2.1	26.1	0.0	28.2	10.0	11.8	6.4
2012	6.4	12.1	0.0	18.6	9.0	7.0	2.5
Russia							
2010	18.5	58.3	0.5	77.3	57.0	4.3	16.0
2011	16.0	89.7	1.0	106.6	65.4	27.2	14.0
2012	14.0	67.1	2.1	83.3	61.1	14.8	7.4
Ukraine							
2010	4.2	38.5	0.1	42.7	25.1	12.1	5.5
2011	5.5	56.0	0.1	61.6	29.5	23.0	9.1
2012	9.1	45.5	0.1	54.6	26.7	22.5	5.4
United States							
2010	74.7	390.6	5.6	470.8	328.9	86.2	55.7
2011	55.7	378.3	6.4	440.5	322.2	70.1	48.1
2012	48.1	347.8	9.2	405.1	315.6	51.8	37.7
Total of world's major exporters of wheat and coarse grains (above)							
2010	174.2	907.9	20.9	1103.0	746.4	217.0	139.8
2011	139.8	969.8	23.1	1132.7	757.0	248.2	127.4
2012	127.4	874.2	29.5	1031.1	733.5	204.3	93.3
China							
2010	105.7	299.7	4.1	409.6	297.6	0.9	111.1
2011	111.1	319.0	10.7	440.8	324.5	1.0	115.3
2012	115.3	337.0	7.7	460.0	340.9	1.1	118.1
India							
2010	19.3	124.2	0.2	143.7	122.1	3.6	18.0
2011	18.0	128.6	0.1	146.6	118.9	5.6	22.1
2012	22.1	135.1	0.0	157.2	122.2	9.2	25.8
World total							
2010	401.0	1750.2	242.6	2151.2	1785.1	242.6	365.8
2011	365.8	1851.5	269.9	2217.3	1851.2	269.9	366.0
2012	366.0	1780.8	256.6	2146.8	1821.4	256.6	325.4

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Summary of world statistics for wheat

	Area million ha	Production (Mt)	Use (Mt)	CLOSING STOCKS		Stocks to use ratio (%)	Trade (imports) Mt	Price US$ (Hard Red Winter, Gulf)
				World (Mt)	Major exporters (Mt)			
2004	217	628	613	141	67	23	110	154
2005	217	621	623	139	66	22	110	176
2006	211	597	609	127	48	21	111	212
2007	215	607	602	132	48	22	110	362
2008	223	685	645	172	69	27	137	271
2009	222	678	652	199	77	30	128	209
2010	218	653	659	194	74	29	126	317
2011	221	694	692	196	69	28	145	299
2012	220	656	678	174	51	26	138	362

World wheat production by region (Mt)

	EU 27	Ukraine	Russia	Kazak.	Other FSU 12	Turk.	Canada	US	Argen.	Iran	China	India	Pakis.	North Africa	Aust.	TOTAL WORLD
2005	122.7	18.7	47.7	11.0	14.8	18.0	26.8	57.2	12.6	14.5	97.5	68.6	21.7	13.5	25.1	621
2006	125.1	13.8	44.9	12.5	14.1	17.5	25.3	49.2	14.5	14.8	108.5	69.4	21.7	17.3	10.8	597
2007	118.0	13.9	49.4	16.5	13.9	15.5	20.1	55.8	16.4	15.0	109.3	75.8	23.3	11.8	13.6	607
2008	150.7	25.9	63.8	12.5	13.3	17.0	28.6	68.0	11.0	10.0	112.5	78.6	20.1	13.0	21.4	685
2009	138.3	20.9	61.8	17.1	14.2	18.5	26.8	60.4	11.0	12.0	115.1	80.7	24.0	17.0	21.8	678
2010	136.8	16.8	41.5	9.6	13.1	17.5	23.2	60.1	15.9	15.0	115.2	80.8	23.9	16.4	27.4	652
2011	137.4	22.3	56.2	22.7	13.8	18.8	25.3	54.4	14.5	13.5	117.9	86.9	25.0	14.7	29.9	697
2012	130.6	15.8	37.7	9.8	13.9	15.5	27.2	61.8	10.0	14.0	120.6	94.9	23.2	14.0	22.1	655

TABLE NOTES...

European Union 27 (EU 27) consists of Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany (originally West Germany), Great Britain, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, and Sweden.

Former Soviet Union 12 (FSU 12) consists of Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russian Federation, Tajikistan, Turkmenistan, Ukraine and Uzbekistan.

Near East Asia refers to Iran, Saudi Arabia, Syria and Turkey.

Far East Asia refers to China, Afghanistan, India and Pakistan.

Southeast Asia refers to Indonesia, Malaysia, Philippines, Thailand and Vietnam.

Major world wheat trading regions/countries [Mt]

	2008	2009	2010	2011	2012
IMPORTS					
EU 27	7.7	6.0	4.7	7.4	6.0
FSU 12	6.5	5.6	5.7	8.0	6.9
Northern Africa	23.5	19.8	24.3	24.2	20.9
Middle East	20.4	17.3	13.6	16.2	20.0
Southeast Asia	11.9	12.8	15.7	17.4	15.1
Mexico	3.3	3.2	3.5	5.0	4.2
Brazil	6.4	6.5	6.7	7.3	7.7
Japan	5.2	5.5	5.9	6.3	6.1
EXPORTS					
Argentina	8.5	5.1	9.5	12.9	5.0
Australia	14.7	14.8	18.6	24.7	20.9
Canada	18.3	18.2	16.6	17.4	18.5
EU 27	24.5	20.8	22.9	16.6	20.5
US	27.3	23.9	35.1	28.6	27.9
Russia	18.3	18.8	4.0	21.6	10.7
Ukraine	12.9	9.3	4.3	5.4	7.0
Others	12.3	16.8	21.9	30.2	22.6
Total wheat trade	**136.8**	**127.7**	**132.9**	**157.4**	**133.1**

World durum wheat production and trade

	2008	2009	2010	2011	2012
PRODUCTION (Mt)					
EU 27	10.1	8.7	9.1	8.2	7.9
Kazakhstan	2.5	2.6	1.7	3.0	1.4
Canada	5.5	5.4	3.0	4.2	4.6
Mexico	2.0	2.2	2.2	2.2	2.1
US	2.3	3.0	2.9	1.4	2.2
Algeria	0.9	2.9	2.2	2.5	3.0
Syria	1.2	1.8	1.6	1.7	1.5
Turkey	3.0	3.1	2.9	3.0	3.0
India	1.1	1.0	1.0	1.1	1.2
Australia	0.5	0.5	0.5	0.6	0.5
Other	5.9	9.7	7.8	8.8	7.7
WORLD TOTAL (Mt)	**35.0**	**40.9**	**34.9**	**36.7**	**35.1**
MAJOR IMPORTERS (Kt)					
EU 27	1585	2159	1928	1860	1950
US	653	534	474	614	580
Venezuela	333	349	403	405	420
Japan	201	234	230	273	220
Morocco	563	548	773	661	830
Algeria	2131	1534	1335	1821	1300
Other	2087	1980	2226	1661	1974
MAJOR EXPORTERS (Kt)					
Canada	3516	3675	3117	3859	4185
EU 27	1726	1054	2060	1379	1000
US	510	1045	1051	554	700
Mexico	1130	892	770	918	1070
Turkey	1	428	20	2	5
Australia	296	246	233	348	250
WORLD TOTAL TRADE (Mt)	**7553**	**7338**	**7369**	**7295**	**7274**
Semolina component	250	263	360	360	350

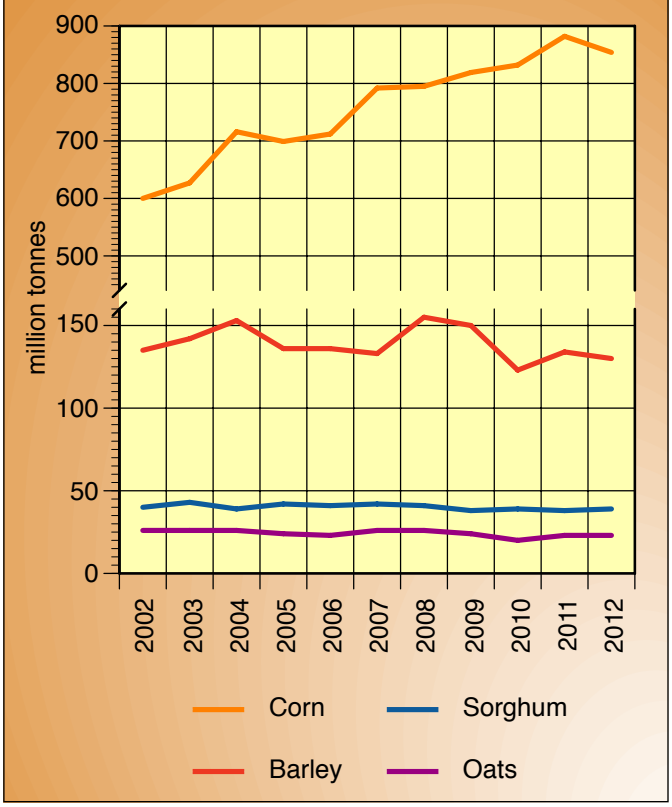
Summary of world statistics for coarse grains

	2008	2009	2010	2011	2012
Area (million ha)	313	309	304	312	318
Production (Mt)	1110	1114	1097	1155	1125
Total use (Mt)	1079	1107	1126	1159	1146
Closing stocks: World (Mt)	196	196	173	169	148
Closing stocks: US (Mt)	47.2	48.1	32.3	22.9	21.9
S.T.U.R. (%)	18	18	15	15	13
Trade (Mt)	113	123	117	125	119

World coarse grains production by region and country (Mt)

	2008	2009	2010	2011	2012
EU 27	161.6	155.0	139.5	147.2	141.6
Russia	40.7	31.8	16.4	32.8	28.7
Ukraine	26.2	24.1	21.4	32.9	29.3
Canada	27.2	22.5	22.7	22.9	24.3
Mexico	32.3	27.2	29.4	25.8	29.1
United States	325.9	348.8	330.2	323.7	286.0
Argentina	18.6	28.5	33.2	30.1	37.6
Brazil	53.6	58.4	60.4	75.9	76.0
Turkey	10.3	11.1	12.2	12.5	12.4
China	173.2	169.7	183.4	199.0	214.4
India	39.0	34.2	43.4	42.5	41.4
Southeast Asia	24.6	21.9	23.2	25.1	25.7
South Africa	13.1	14.5	13.9	11.5	13.0
Nigeria	26.7	28.0	22.4	22.1	22.6
Australia	12.6	11.4	11.8	12.8	10.7
Other	124.4	126.9	134.5	139.2	132.2
TOTAL	**1110**	**1114**	**1098**	**1156**	**1125**

World coarse grain production [Mt]



World coarse grains trade by region and country (Mt)

	2008	2009	2010	2011	2012
IMPORTS					
EU 27	3.0	3.0	8.6	7.0	10.7
United States	3.0	2.3	2.5	2.9	5.5
Mexico	10.5	11.0	10.8	12.8	10.4
Southeast Asia	5.2	4.6	7.8	6.6	6.2
Japan	19.6	19.2	18.6	17.7	18.1
South Korea	7.2	8.5	8.2	7.7	7.6
China	1.7	3.8	2.7	7.9	5.0
Saudi Arabia	8.7	9.2	7.4	10.5	9.5
Nth'n Africa & Middle East	23.2	20.1	21.6	24.9	20.9
Others	31.9	28.3	36.8	44.0	22.1
EXPORTS					
Argentina	13.5	18.8	19.7	23.9	25.9
Brazil	7.1	7.5	8.4	24.3	19.5
Australia	5.1	5.9	5.8	7.3	6.2
Canada	3.9	3.1	4.5	3.7	4.8
China	0.2	0.2	0.2	0.1	0.1
EU 27	5.6	3.0	6.2	6.5	5.7
Ukraine	11.9	11.0	7.8	17.6	15.7
Russia	4.8	2.4	0.3	5.8	4.8
FSU 12	17.1	14.0	8.7	24.5	21.1
United States	51.2	54.7	50.7	41.0	22.5
TOTAL WORLD TRADE	**114**	**110**	**125**	**142**	**116**

World barley trade by region (Mt)

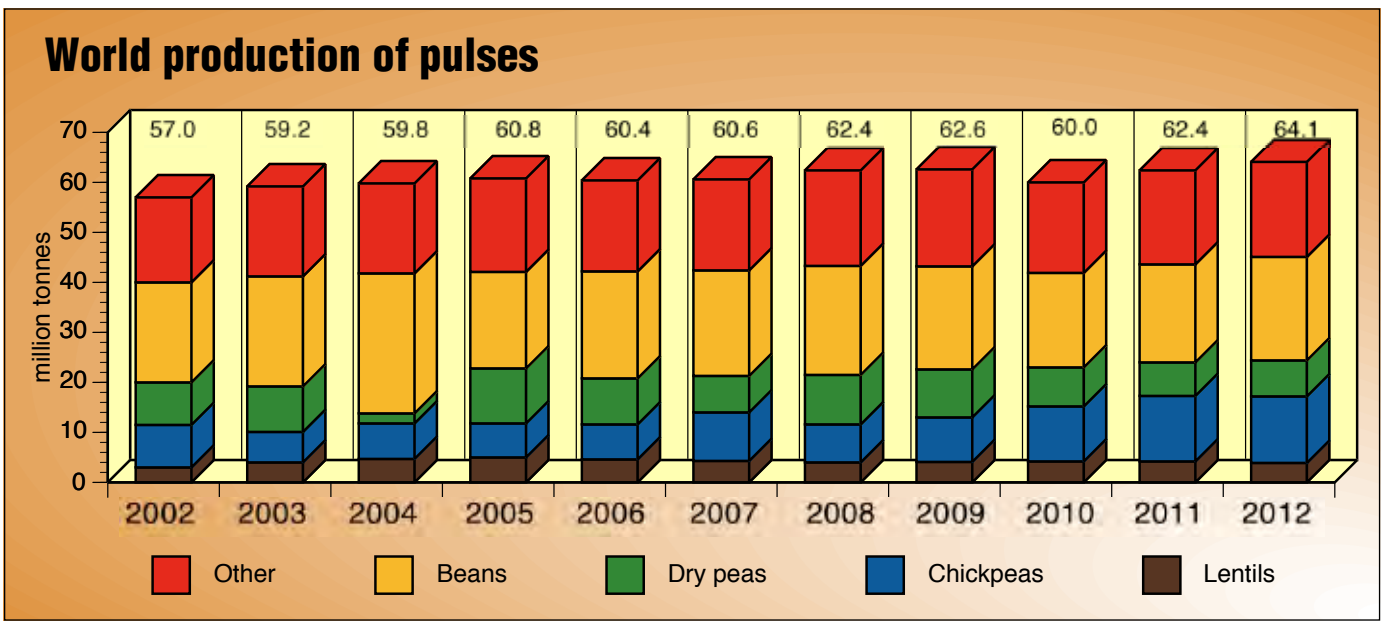
	2008	2009	2010	2011	2012
IMPORTS					
Europe	0.6	0.4	0.4	0.9	0.4
FSU 12	0.2	0.1	0.6	0.7	0.4
Saudi Arabia	7.1	7.4	5.4	8.6	7.5
Other Near East Asia	5.7	3.0	2.3	3.4	3.2
United States	0.6	0.3	0.2	0.4	0.5
Brazil	0.3	0.4	0.3	0.2	0.3
Mexico	0.1	0.2	0.1	0.1	0.2
China	1.3	2.1	2.0	2.3	1.9
Japan	1.2	1.4	1.4	1.2	1.4
Others	2.4	1.6	2.0	2.5	1.9
EXPORTS					
Australia (feed & malting)	3.9	4.6	5.4	6.1	4.8
Canada	1.4	1.3	1.4	1.2	1.7
EU 27	3.5	1.1	4.7	3.1	3.9
United States	0.3	0.1	0.2	0.1	0.3
Ukraine	6.3	6.2	2.8	2.5	2.3
Russia	3.4	2.8	0.3	3.5	2.0
Argentina	0.9	0.6	1.2	3.2	3.2
Others	0.0	0.2	0.0	0.6	0.0
TOTAL EXPORTS (Mt)	**19.5**	**16.9**	**14.7**	**20.3**	**17.7**

SECTION 2 THE GRAIN INDUSTRY IN FIGURES

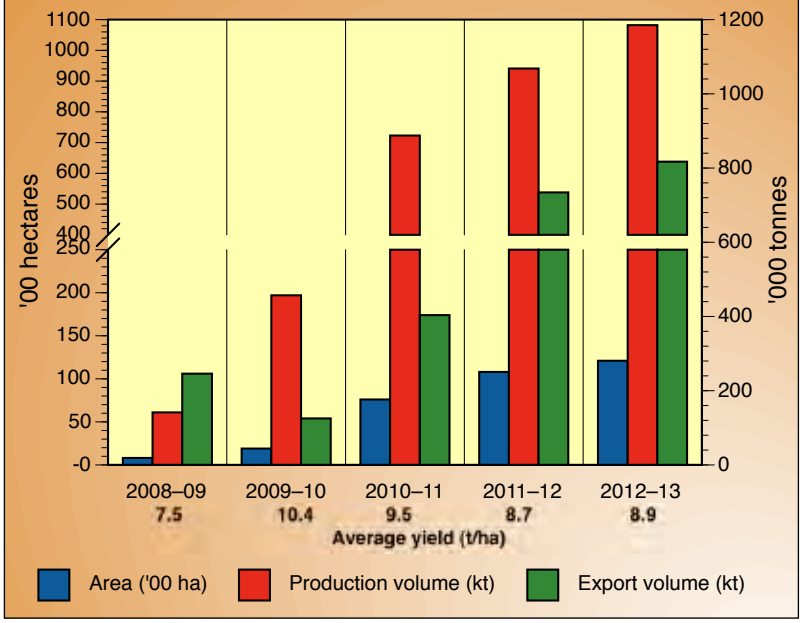
Major world oilseeds trade and production (Mt)

	2006	2007	2008	2009	2010	2011	2012
IMPORTS: Canola	6.92	8.51	11.23	11.11	10.49	13.00	11.40
Japan	2.20	2.30	2.15	2.31	2.32	2.39	2.00
Soybeans	71.50	79.43	76.84	93.10	90.00	91.79	96.00
China	28.73	36.50	41.10	53.90	52.51	57.10	59.00
EXPORTS: Canola	6.92	8.51	11.23	11.11	10.49	13.00	11.40
Australia	0.23	0.47	1.07	1.19	1.47	2.32	2.52
Canada	5.41	5.45	7.32	7.35	7.21	8.69	7.20
Soybeans	63.75	71.50	79.43	93.10	90.90	91.79	96.00
Brazil	25.91	23.49	25.36	28.58	29.95	36.31	36.20
United States	25.58	30.39	31.60	41.70	40.18	38.40	36.70
Sunflowerseed	1.94	1.33	2.16	1.68	1.74	2.51	2.51
Total world oilseeds trade	**75.80**	**93.23**	**93.91**	**111.42**	**106.32**	**109.21**	**109.21**
PRODUCTION: Canola	48.50	45.09	57.92	60.81	59.83	59.81	59.81
Australia	1.42	0.57	1.21	1.92	2.36	3.12	3.09
Canada	9.70	9.10	12.61	12.94	12.82	14.23	14.23
Soybean	220.54	237.44	221.14	260.85	264.18	251.47	251.47
Brazil	57.00	59.00	61.00	69.12	75.50	72.00	72.00
US	83.37	87.00	72.86	91.42	90.61	83.17	83.17
Sunflowerseed	30.09	46.00	32.00	26.50	36.65	37.20	35.00
Total world oilseeds production	**391.81**	**403.98**	**391.69**	**442.32**	**456.05**	**442.03**	**468.76**

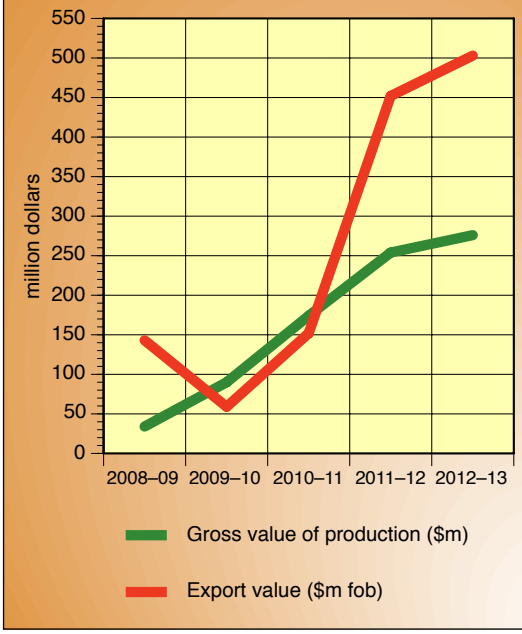
World production of pulses



Summary of Australian rice statistics (paddy) by area and volume



Australian rice export value and gross value of production



Summary of world statistics for rice

	Area million ha	Production (Mt, milled)	Use (Mt)	Closing stocks (Mt)	Stocks to use ratio (%)	Trade Mt	Av. price US$/t (Thai 100%)
2007–08	155	434	426	81	19	29	551
2008–09	160	448	435	92	21	30	609
2009–10	157	441	438	94	21	31	532
2010–11	162	448	445	99	22	36	518
2011–12	165	466	458	107	23	38	590
2012–13	166	467	468	107	23	37	575

World rice production, by country [Mt, milled equivalent]

	Aust.	B-desh	Brazil	China	EU-27	India	Indon.	Japan	Myan.	Pakis.	Philip.	Thail.	US	Viet.	TOTAL
2007–08	0.02	28.80	8.20	130.20	1.70	96.70	35.80	7.90	10.7	5.7	10.5	19.3	6.3	24.4	**434**
2008–09	0.04	31.00	8.60	134.30	1.60	99.20	38.30	8.00	10.2	6.9	10.2	19.9	6.5	24.4	**448**
2009–10	0.12	31.70	7.90	136.60	1.90	89.10	36.40	7.70	10.6	6.8	9.9	20.3	7.1	25	**441**
2010–11	0.72	33.20	9.30	137.00	1.90	96.00	35.50	7.70	10.7	4.8	10.5	20.3	7.6	25.9	**451**
2011–12	0.94	33.70	7.90	140.50	1.90	105.30	36.40	7.60	10.5	7.2	11.1	19.3	5.9	25.8	**463**
2012–13	1.08	34.00	8.10	142.50	1.90	101.50	36.80	7.80	10.5	7.2	11.1	19.3	5.9	25.8	**463**

SECTION 2 THE GRAIN INDUSTRY IN FIGURES

In this section the rice crop is the year of planting.
(The 2012–13 figure is therefore a forecast of the Australian rice harvest in March–April 2013.)

Section 3

District Reports

Reviews of the 2012–13 season and plans for 2013–14

Western Australia

Northern

The 2012 season in review

Dry conditions prevailed over most of the region from January through to March 2012. Some of the eastern area had thunderstorms with up to 40 mm in small strips in late summer that required some weed control. Seeding operations started for most at the standard mid to late April timing.

Two rainfall events on April 27 and May 6 got most crops up and away – but the rainfall was extremely variable.

Mid and late May gave hot and dry weather which reduced prospects dramatically while the patchy April rain gave some areas good soil moisture. It was one of the patchiest starts that I have seen in this region with good falls on one property and next to none on the neighbour's.

Seeding was about half done by late May 2012. Many growers in the drier parts of the region stopped sowing and waited for rain. Some kept seeding after a knockdown weed spray and put seed into dry soil which required more rainfall to germinate.

Some crops emerged and grew fast where there was good moisture and then struggled to survive where there was only a small amount of rain. Some crops died and needed to be reseeded.

The prospects for the season by mid May were promising but the prolonged dry spell for four weeks from early May to early June reduced the potential for many districts.

Rainfall on June 8 was solid across the whole region. This allowed a restart of seeding which finished by around June 20. Some growers with 40 to 60 mm in the two rainfall events prior to May 10 were able to get most of their crops sown and growing during the dry spell. A small number of these crops subsequently died and had were resown.

Some lupin crops that were sown down onto marginal moisture emerged poorly due to insufficient soil moisture to complete germination. Very few crops had been resown but 20 per cent of the regions lupins had lower than ideal plant density.

Best crops were flowering by late July while the late sown were six to eight leaf at this stage.

Wheat crops generally looked very good through June and into late July but dry conditions again set in and reduced crop growth and yield potential.

August was also hot and dry with one good rain event on the last day of July giving crops a welcome drink. Warm and dry conditions then continued through August. Early September had a rainfall event that delivered 10 to 25 mm across the region but temperatures started to increase at this time. Some crops that got away in early May finished flowering in early September and matured very early due to very high temperatures.

Crops were generally thin and yields followed closely the rainfall the area had received for the year.

Budworm and aphids were a problem in canola crops but diamond back moths were hard to find in 2012. Lupin crops were sprayed for budworm in most areas.

September rains did eventually arrive for most but high temperatures at this time had crops stressed and finishing quickly. Harvest started early in most areas and was all over by early December. Growing season rain across the region was in the order of 135 mm in the north east to about 300 mm in the south west.

There were some severe hail storms in late October and early November that did significant – and in some paddocks – total damage. But only a small area was affected by hail.

Wheat: Yields followed growing season rain and how well paddocks were set up. Paddock averages ranged from around 0.7 tonnes per hectare with the lowest rainfall through to around 3.2 tonnes in the wettest areas. Generally, grain quality was very good but screenings were an issue in some paddocks. Most growers were fairly happy with the performance of wheat crops given the tough conditions 2012 delivered.

Canola: Yields were disappointing for many across the landscape. The hot temperatures and stressed crops in late August had crops finishing early with limited pod-fill. Yields were from around 0.4 tonnes per hectare up to the best of around 1.8 tonnes – but 90 per cent of paddocks would have been between 0.6 and 1.0 tonnes per hectare. Grain oil was lower with most crops 40–42 per cent. Big responses came from well timed aphid sprays of 250 kg per hectare in the Walkaway area. Most were disappointed with the performance of 2012 canola.

Lupins: Probably the surprise crop in 2012 with yields meeting expectations for most. Yields ranged from around 0.7 tonnes per hectare up to around 2 tonnes for the best crops. Most growers were pretty happy with lupin performance.

Barley: Most crops were below expectations and the hot weather knocked yields. Crops ranged from around 0.9 tonnes per hectare in the north up to 3 tonnes in the south west. Not much barley around now.

Many northern growers had 10–20 mm more rain in 2012 than 2006 but managed to produce three to five times as much grain!

AVERAGE YIELD ESTIMATES FOR 2012

Crop (t/ha)	Western Zone	Central Zone	Eastern Zone
Wheat & barley	1.5–3.0	1.0–2.2	0.5–1.5
Lupins	0.8–2.0	0.5–1.0	0–1.0
Canola	0.5–1.8	0.5–1.0	0.3–0.7
Rainfall April–Sept	200–300 mm	170–220 mm	135–200 mm
2011–12 summer rainfall	15–30 mm	5–40 mm	10–40 mm

Trends

Wheat will dominate the landscape again. Lupin area may come down slightly in favour of canola. Livestock numbers are still on the decline.

Land prices are steady in most areas. Foreign companies seem to be the main buyers of larger land parcels.

Peter Norris
WA Northern Ag
Agronomy For Profit and Synergy Consulting, Geraldton

South Coast

The 2012 season in review

The 2012 winter cropping season on the South Coast was again mixed. Areas within 60–70 km of the coast had an average to slightly better season, whereas growers greater than 70 km from the coast had a very much below average year.

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NEW HOLLAND
AGRICULTURE

Own a bright future

Some blue gum plantations have been ripped up in the South Coast region and returned to cropping.

Liming under way in the South Coast region.

The 2012 year generally started quite well with a 50 mm rainfall event around March 20, after this the season generally bumped along at Decile 3 to 4. Some areas were more fortunate in mid to late August recording 30–50 mm – this rain generally finished crops quite well. Rainfall for the 2012 growing season was well below average, but interestingly, the annual rainfall ended up being close to average.

The major agronomic issue for the season was the battle in controlling fungicide-resistant powdery mildew in Baudin barley which was then followed by widespread outbreaks of barley leaf rust. As a consequence, there will be very little Baudin barley sown in 2013. This variety has largely been replaced by Bass.

Harvest was quite early and was underway by mid October with most growers being all wrapped up by the middle of December.

Cereals

Barley yielded between 0.5 and 6.0 tonnes per hectare – higher yields were from coastal areas. Quality was generally good, however screenings and high protein were the major reasons for quality downgrades.

Hindmarsh barley yielded exceptionally well. More farmers will be growing Hindmarsh in 2013 instead of malt varieties especially as the price premiums for malt barley seem to narrow.

Wheat yielded between 0.5 and 4.0 tonnes per hectare – grain quality was very good with very little down-grading. Protein levels were high and screenings were low, which was quite remarkable considering the dry finish to the season. Mace continues to be the dominant wheat variety. This trend will continue in 2013 with Mace to account for over 70 per cent of wheat sown in the region.

Oilseeds

Canola yielded between 0.2 and 2.8 tonnes per hectare – higher yields were again from the coastal areas. Grain quality was good and oil per cent generally 42 per cent or higher. More canola is being grown in the low rainfall areas. Growers are accepting lower canola yields as it is still a more profitable break crop than legumes. Dry sowing of canola is becoming the norm and is allowing for better crop establishment and higher yields.

Pulses

Field peas yielded between 0.2 and 2.5 tonnes per hectare. Grain quality was good with the higher yields from the medium rainfall areas. Field pea yields were effected by frost and the dry finish to the season.

Lupins yielded between 1.5 and 3 tonnes per hectare. Lupin yields are becoming more consistent as the crop is now only grown on soil types that guarantee the success of the crop. Lupins were quite profitable for 2012 with the price getting over $350 per tonne.

Faba beans yielded between 1.5 and 2.5 tonnes per hectare while vetch harvested between 0.8 to 1.8 tonnes per hectare.

Trends

The major cropping trend in the region will be an increase in area sown to canola. This will be at the expense of legume crops. Canola is favoured in 2013 due to the early break and very good stored soil moisture.

Some farmers have begun clearing first generation blue gum plantations to convert them back to agricultural land. One grower is hoping to establish a canola crop this season between the cleared blue gum windrows.

Property values

Property values have generally remained steady. Most property sales have been in the medium to high rainfall zones where land continues to be in demand. A large property east of Esperance in the 475–550 mm

rainfall zone is rumoured to have sold for between $3200–$3500 per hectare. This area has cereal averages of 3.5 tonnes per hectare and canola averages of 1.7 tonnes.

Seasonal conditions in early 2013

March 2013 has been the wettest on record for the majority of the region with rainfall totalling between 100 and over 200 mm for the month. It all started with ex-cyclone Rusty at the beginning of March and then this was followed by two other favourable systems. The soil moisture profile is now full. In some places there is surface water still lying in paddocks and in the deeper depressions, black swans and ducks have moved in for the winter.

There have been massive germinations of both summer and winter weeds, and needless to say, most growers have been very busy on boom sprays. Seeding canola began around mid April. Most growers held off seeding cereals to at least Anzac Day when longer season barley varieties were sown.

The 2013 season has certainly had one of the best breaks ever. Growers are now very optimistic and hopeful that the season will be OK, especially in the northern Mallee areas where – to say the least – the previous five to six seasons have been very challenging.

Quenten Knight
Precision Agronomics Australia, Esperance

South Australia

Overview of the 2012–13 season

Thanks to good, dry weather, the 2012–13 season grain harvest was completed around two weeks earlier than normal in all districts. The last of the harvest was completed in the South East in mid-January, 2013.

Crop yields varied from above average in the South East – despite the dry finish to the season – to below average in the Upper North and parts of Eyre Peninsula.

Overall, the state's crop production is near the long term average. Production is estimated at 6.69 million tonnes from 3.99 million hectares (see 2012–13 SA Winter Crop table).

- All districts, except the later finishing areas (mostly south east), completed harvest by the end of December.
- Yields were variable across the state, with most districts reporting yields above expectations given the below average rainfall for the season.
- Many parts of the state recorded close to average yields for cereals. Those areas were yields were significantly below average included Western Eyre Peninsula, the Upper North and parts of the Mallee, which were affected by frost.
- Most areas reported exceptional water use efficiency due to good crop husbandry in addition to increased stored soil moisture from improved farming practices.
- Wheat screening levels were generally low despite the dry finish. Protein was lower than normal due to lower nitrogen fertiliser applications and reduced soil nitrogen mineralisation in the dry spring conditions.
- Most barley was classified into the premium grades despite the dry finish to the season.
- Canola yields were generally below average in most districts. Oil content of 44 to 46 per cent was common in some districts.
- Pea yields were below average in most districts, although yields in the later district were close to average with low levels of disease.
- Bean yields were below average, with good grain quality and minimal staining.

- Lentil yields were variable. Most crops were below average, but some early sown crops yielded above average on Yorke Peninsula.
- Snail contamination continues to be a problem in a number of districts across the state, although numbers were generally lower than in 2011.
- Oaten hay yields were below average in the Upper, Mid and Lower North, but average on Yorke Peninsula and the South East. Hay quality was generally very good with minimal weather damage.

2013 cropping trends

The dry conditions in the last half of the 2012–13 cropping season, and lack of summer rainfall, has left minimal stored soil moisture in all districts coming into this season.

Some thunderstorms in the northern part of the agricultural districts in late February 2013 resulted in patchy germination of summer weeds

SOUTH AUSTRALIA 2012–13 WINTER CROP PRODUCTION (tonnes) AND AREA (hectares) AGAINST THE 5 YEAR AVERAGE

		5 year average	2012–13
Wheat	Area	2,143,700	2,176,300
	Prod'n	3,778,800	3,556,500
Durum	Area	63,700	77,200
	Prod'n	161,200	181,240
Barley	Area	1,108,200	907,100
	Prod'n	2,197,300	1,912,900
Oats	Area	77,700	85,800
	Prod'n	116,400	128,740
Rye	Area	9,700	9,500
	Prod'n	8,000	7,900
Triticale	Area	86,300	69,200
	Prod'n	117,300	95,920
Peas	Area	127,900	103,700
	Prod'n	169,200	116,100
Lupins	Area	7,700	63,200
	Prod'n	88,700	75,110
Beans	Area	71,600	69,400
	Prod'n	124,500	105,510
Chickpeas	Area	10,700	19,700
	Prod'n	13,400	20,810
Lentils	Area	71,400	88,800
	Prod'n	107,600	97,720
Vetch	Area	14,100	13,100
	Prod'n	9,700	6,800
Canola	Area	198,100	302,700
	Prod'n	292,000	385,200
Total SA crop	**Area**	**4,053,700**	**3,985,700**
Total SA crop	**Prod'n**	**7,184,100**	**6,691,100**

and self-sown crops in those regions. But the hot dry summer enabled growers to control snails in districts where numbers have built-up over the past few years. The hot dry conditions also reduced the carryover of other pests and diseases.

The risk of herbicide residue carryover is high as a result of the well below average spring and summer rainfall. Careful consideration will be needed regarding crop choice fro 2103 where herbicide residues are apparent.

The low levels of stored soil moisture in many districts will impact on the area sown to higher risk crops in 2013, particularly in medium and lower rainfall districts.

PIRSA Rural Solutions contributors

Victoria

Victorian Mallee

Overview of 2012

The Mallee returned to its reputable state in the 2012 cropping season delivering 'hand to mouth' rainfall all year. Of the 220 mm total rainfall in the Central Mallee in 2012, around 130 mm fell in the growing season.

Some areas had as little as 100 mm GSR (growing season rainfall) and this impacted on the harvest. There was little stored moisture leading up to sowing with only 20 mm falling in the summer months. While less than ideal on the rainfall calendar, there was a harvest and grain prices helped many to break even or surpass the cost of production. But there was great variability.

Cereals were well below average with wheat yielding around 1.4 tonnes and barley 1.6 tonnes per hectare. We would normally aim for a tonne greater than this.

Dodgshun Medlin Ag Management (Swan Hill) conducted a seeder demonstration day on April 10 this year. Conditions were hot (30°C) and dusty and hopefully not a taste of things to come for the 2013 winter cropping season.

Canola has become an important tool in the grass weed and disease break rotation. Yield wise, although variable it averaged out at around 0.7 tonnes per hectare. At a gross return of $350 it is still profitable and crops will have yielded well above and below this. We would need to allow $330 per hectare to grow canola and the price seems to hold strong. But the 2013 canola area will be less than half of last year due to no subsoil moisture at sowing.

Chickpeas and lentils were the outstanding legumes in 2012. Chickpeas were selling for over $500 per tonne at harvest and lentils have made it to $600 in April this year. These crops still addressed the big three issues: Grass weeds; disease; and, nutrition. Yields varied and averaged out to one tonne per hectare.

Moving in to the 2013 season, many growers see legumes as a safe and necessary option.

2013 cropping trends

Only 75 mm of rain has fallen since the conclusion of spring 2012 to the second week of April, 2013. Soils are now dry and growers will adopt a conservative approach. Some canola has been removed from the rotation and a number of growers will opt for a fallow or a green manure legume crop. One challenge has been herbicide plantback periods from applications made to last year's crop. This has restricted some of the original plans and compromises have been made.

Legumes are again popular in 2013.

Herbicide resistance testing has provided some interesting results. There have been some patterns and some surprises which are timely reminders not to be complacent. The Western Australia experience has shown the need to be on the front foot. We have used non-cereal crops to clean up grasses, but we now need to focus on wild radish to ensure sustainability of these break crops.

It really comes back to the challenge of controlling grass weeds in grass crops and broadleaf weeds in broadleaf crops.

While we can't make it rain, the big lesson from last year was that prior to no-till, there would barely have been a harvest in a year as dry as 2012. In addition, the subsequent soil erosion would have amplified the problem.

Property values

Of the few property sales, land values aren't at previous peaks but they have remained strong. This is due to increasing farm sizes, and the competition to secure the recognised productive land. Prices of $1200 to $1500 per hectare are common. I would call this strong when I speak to farmers telling me "dad paid $250 a hectare for that block".

Leasing seems to be more common now driven by convenience and ease of administration. It also gives landholders the capacity to remain landholders while getting a reasonable price for their lease. Either side of $80 per hectare is paid, depending on production factors.

Simon Severin
Dodgshun Medlin Agricultural Management

Wimmera

Get out of jail in 2012

The cropping year in the Wimmera in 2012 was described by many astute growers as a 'get out of jail' year. Most areas received just enough rain to get an above average yield – but unfortunately not the spring rain required for a bumper result.

The season started with a little bit of soil moisture with late summer

rains adding to that. A May rain allowed crop emergence to happen in a timely fashion. It was mid season when world grain prices began to head north and most growers began to wish they had stuck to their usual rotations.

Good winter rains in July and August set the Wimmera up for what was potentially a bumper crop, but that is when the tap turned firmly off. Subsequent rainfall was in small, ineffective falls which did little to benefit the district crops. It is probably the remnants of the March rain in stored soil moisture which got them through in the end.

One benefit of the dry spring was the considerable savings in fungicide and time due to the relatively disease free crops. Harvest was able to go ahead with minimal interruption from rain and grain quality was very good. Over 70 per cent of barley received at Donald was of Malt 1 quality.

Since harvest we have seen the dry conditions continue resulting in more savings from little or no summer weed growth.

Good harvest grain prices coupled with above average yields have made 2012 one of the most bountiful ever.

As a result, quite a few farmers have taken the opportunity to retire from farming. We have seen several properties change hands over the summer period at prices which would indicate the value of land is still increasing. Most sales have gone to neighbours which continues the trend of fewer, but larger farming operations, in the Wimmera.

As we head into 2013 the dry conditions have continued making it an ideal season for the beach. Donald has received less than 70 mm of rain since that mid August fall which set up our spring. Tanks are empty, dams are empty and the weather seems to be back to normal. Many growers have spent their summer spray savings on a new ute and are now getting geared up for the new season.

The seasonal forecast is for above average spring rains so if we can get a break in the next six weeks it will be just the way it used to be before all this global warming started!

Mike Laidlaw
Harberger Farm Supplies, Donald, Victoria.

New South Wales

Central West

The 2012 winter cropping season in the Central West was its normal, very challenging self. After a wet 2012 summer and good mid-year rains we were looking pretty good. But then the tap was turned off and a harsh winter set in with plenty of frosts to boot.

The early sown wheat crops looked solid throughout the year but the late sown crops did it tough. Ironically, many of these crops were sown late due to wet conditions (mainly in the Collie region) and these crops were hammered by frosts and a lack of follow-up rain to get the secondary roots really pumping.

Summer sins came back to bite many with worked paddocks showing up the moisture stresses more acutely than their no-till cousins.

After two consecutively big crops in 2010 and 2011, depleted nitrogen reserves probably played as big a part as low rainfall in 2012.

The canola area expanded exponentially in the region in 2012 due to its price at sowing versus that of wheat and for the weed control options created by canola. The end result was about a 'normal' Central West canola yield with again, nutrition and frost issues.

But the chickpeas loved the dry conditions – a good reason to have a mixed cropping portfolio in our region. Disease levels were low, no doubt helped by the dry conditions.

Evie Duggan in a flowering canola crop on July 7, 2012 at Summerlea, Nyngan.

Gregory wheat at Collie.

Ryegrass escapes in canola wheeltracks at Warren.

Herbicide resistance reared its ugly head with gusto in 2012. In many cases, sprays just did not work with some growers looking at non-chemical options such as windrow burning and the like. The rise of the popularity of TT canola is primarily due to weed control – be it grasses in-crop or residual on our summer nemesis – fleabane.

Outlook for 2013

It is a mixed bag in the Central West as far as summer rainfall has gone. In the western 'desert' (Warren to the west), no significant rain was received from July 2012 until the last day of February 2013. Levels recorded in this widespread rainfall event varied from 23 to 80 mm which started a flurry of summer spraying. To the east of the desert, many were lucky enough to receive decent rainfall from summer showers with some falls around the Gulargambone region up to 175 mm for the summer and good starting moisture for this year's winter crop.

Crop mix will depend on how much more of the wet stuff we get. Canola to the west is starting to lose favour due to lack of stored moisture but would have continued to increase in area if conditions were favourable. Pulse crops should increase in area, especially considering the region's nitrogen concerns.

The biggest issue for this year's crop, apart from low starting moisture, will be low N levels. Lack of nitrogen last year was just about as big a limiting factor to yield as was moisture. Around 60 per cent of wheat delivered to Graincorp's Dubbo zone was under 11.5 per cent protein – so there is nothing left in the tank from last year. Couple this with little summer rainfall for mineralisation of N, means growers are starting from a very low base. Trying to work out how to get N on at a decent level at planting seems to be our biggest logistical challenge at the moment.

Penny Heuston
Delta Agribusiness, Warren

Queensland

Darling Downs

Overview

There was a switch in winter 2012 from cereals to chickpeas, due to strong prices and favourable soil moisture conditions. Later increases in wheat prices also saw late wheat planted. The dry spell and cold conditions in the second half of the season led to average yields although prices remained good.

The summer weather had been difficult, with few early planting rainfalls and a dry spell until good rain on Christmas Day. Further rain at the end of January and through February has led to better than expected yields, particularly for sorghum.

Winter 2012

Cereal plantings in 2012 were about 70 per cent of the large 2011 area, whilst the chickpea area was up with the record 2010 area.

The early wheat crops had some yellow spot, but overall the dry conditions through the season meant that leaf diseases were not as big a problem as anticipated. There was a little stripe rust in susceptible varieties, but generally disease was low. The main difficulty was the run of heavy frosts from mid June to mid August, which burnt leaves, killed branches and even killed some plants. They also knocked flowers and killed pods in chickpeas, and to top it off, a late September frost caused more damage.

Dry conditions meant crops had to grow on stored soil moisture, and there were some aphid issues in cereals. There were no reported cases of ascochyta in the chickpeas – the first time for many years. The end result was yields from low to fairly good, but there were issues with screenings, especially in the western areas, and protein was down on expectations.

The one disease that did re-appear was crown rot, which was extensive over the Downs for the first time in many years, and accentuated by the hard dry finish.

Chickpeas yields were disappointing, as they were expected to make good use of the stored soil moisture, but the frosts caused too many delays to the crop and too much damage. The main disease issue was phytophera in the susceptible varieties, which kept killing plants and reducing plant population all through the season.

Planting time was not easy and plant populations were not as high nor as even as desired, and this particularly affected the chickpea yields. Of the minor crops, canola and linseed did perform reasonably well.

Summer 2012–13

The cotton area suffered a 50 per cent reduction in area due mainly to its poor price. This allowed a return for many dryland growers to sorghum. Pre-season nitrogen application was made difficult by supply issues. There was just one early planting rain in early October, and this led to a less than ideal plant population in the sorghum.

The next planting rain was on Christmas Day which saw a significant area of mungbeans and some soybeans planted, along with maize, sorghum, sunflowers and millet.

The early sorghum survived the dry and hot conditions to late December and then tillered out under the improved conditions. Heliothis numbers were enough to warrant control in some areas which worked well.

The dry and hot conditions in the first half of the season did make controlling hard to kill weeds, such as fleabane and feather top Rhodes grass, a tough job, and these weeds quickly stressed and seeded.

The late January/early February rain and floods did cause crop losses near creeks and river systems, but overall boosted yields. And even though there was rain just before many crops were due to be harvested,

the sprouting levels in sorghum have been less than feared and yields have generally been between 5.0 and 9.0 tonnes per hectare. Later crops have filled well but are uneven for dessication.

Early sunflowers also suffered from sprouting whilst the mungbeans appear to have their best potential for some years, although lodging issues will require careful harvesting.

Dryland soybeans have enjoyed the conditions and look to have a good yield potential as they approach drydown. Insect pressure has been constant in the pulses but good control has been achieved.

Cotton yields are expected to be average to good with crops approaching their second defoliation.

The maize area was reduced this year with fewer gritting contracts available and early crops are at the drying down stage. The summer planting of maize has enjoyed the rain and looks good at present.

Winter outlook for 2013

Moisture profiles are very good after the late summer rain, and many growers are planning to double crop into their sorghum country. Chickpeas again will be a large area of the winter crop, especially with

more favourable prices anticipated than wheat at present. The better than usual barley prices have renewed interest in feed barley.

There is strong interest in the newer varieties of wheat this winter, especially with growers assessing disease resistance after the significant issues experienced last season.

Hugh Reardon-Smith, Agronomist
Landmark, Pittsworth

Central Queensland

The yield potential of the 2012 winter crop on the central highlands was set up early by above average late summer rain, especially a very wet March 2012. Excellent final yields were realised when above average rain fell in July 2012. The highest rainfall fell in districts north of Emerald.

The Dawson received average rain in summer 2011–12 whereas the Callide was much drier and dry at optimal planting time with much of their winter crop planted late. The Dawson did receive good rain in June 2012 whereas the Callide was again drier.

Winter crop 2012

Wheat: Record yields were harvested by many farmers with their best paddocks yielding greater then 5.0 tonnes per hectare and top end farms averaging 3.7 tonnes. The district average was probably up from 1.7 to 2.3 tonnes. Quality was generally low in all paddocks. Wheat quality was an issue with ASW and APW the most common grading for wheat in northern areas and PH and H2 only common in the Callide where water, not nitrogen, was the limiting factor for yield. Grain weights were generally high.

Some wheat crops in the Callide, Dawson and areas south of Emerald were frosted with damage ranging from complete loss of the crop through to 10 per cent reduction in yield. Despite frost, farmers were frequently surprised at how well crops did yield. Areas north of Emerald suffered some frost damage but only in frost prone areas. A couple of farms baled large areas of frosted wheat.

Chickpea: Frost, particularly the frosts that occurred in early August, resulted in the loss of early flowers in the CQ chickpea crop. This generally made harvest a whole lot easier as the lowest pods were high in the plant. Good soil moisture enabled the chickpea plant to compensate for frost damage and continue to set flowers and pods for longer resulting in a record yield. Best paddock yields of greater then 3.0 tonnes per hectare were common and farm averages of better then 2.0 tonnes were not uncommon.

As a result of improved varieties and good seasonal conditions, the district average rose from 1.2 tonnes to 1.9 tonnes per hectare.

Rainfall summer 2012–13

This summer rainfall across CQ farming districts has more frequently fallen as local storms and been variable rather then monsoonal and general.

Rainfall on the central highlands during January 2013 was about average except in districts to the east (Middlemount, Dysart) where they received massive rainfall events. In the Dawson and Callide, rainfall was also extreme with two to five times the monthly average (Baralaba 426 mm – monthly average 92 mm).

February 2013 was drier with most districts receiving below average except Emerald the wettest on the central highlands (103 mm – monthly average 82 mm) and Jambin the wettest in the Dawson/Callide (125 mm – average 110 mm).

Rainfall for March 2013 for the central highlands was about average and was well above average in the Dawson and Callide with Banana the wettest (157 mm – average 69 mm).

Current soil moisture profiles to either finish summer crop or to plant winter crop are mostly pretty good. North of Clermont is fairly dry; Clermont to Emerald is generally very wet; Emerald to Rolleston is OK to wet; and, Dawson and Callide are very wet to recovering from flooding.

Winter crop 2013

I expect a very large winter crop will be planted (possibly 300,000 hectares) given a smaller area planted to summer crop this season and with good to excellent soil moisture profile the norm. An increased area will be planted to chickpeas (over 100,000 hectares) and this will reduce the area planted to wheat (180,000–200,000 hectares). Some wheat has been planted but the major planting of wheat will occur between mid April to mid May and later where frost risk is higher. Most chickpea planting will start early May.

Summer crop 2013

Sorghum: About 100,000 hectares of sorghum have been planted in CQ this summer. Sorghum crops range from heads just emerging to flowering. Cooler weather will be a concern for later crops with ergot a possible consequence. In-crop rain has been fairly frequent and has set up high yield potential for most of the crop. Low grain protein (less than 8 per cent protein) is a concern for some Japanese grain buyers. Low proteins are again likely this season in many sorghum crops.

Many farmers are reluctant to apply nitrogen fertiliser to sorghum crops but fail to realise that they are forfeiting yield when sorghum is harvested at proteins below 9.5 per cent.

Mungbeans: Puffy pod caused serious yield loss in most late mungbeans crops in 2012. This drastically reduced many growers'

Andrew Erbacher, an experimentalist with the Central Queenland Grower Solutions project, inspecting a well grown mungbean crop at 'Lorraine', near Jambin.

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enthusiasm for the crop. Despite this, a moderate area of mungbeans was planted this summer, especially in the Callide and to a lesser extent the Dawson and central highlands, as many farmers decided by the time the rain stopped the planting window for sorghum had closed. I estimate the total area for CQ mungbeans at about 15,000 hectares. Yields are generally looking good to above average.

Sunflower: Late rain meant the area planted to sunflower was greater than previous years, but still not particularly big (about 5000 hectares). Low prices and the need to transport to Newcastle for crushing are the major reasons for the low area planted to sunflower in CQ.

Cotton: There was no dryland cotton grown in CQ during the 2012–13 season and only about half the area normally planted to cotton was sown in the CQ irrigation area. Hot, dry, frequently cloudless days provided good growing conditions although farmers were forced to either bring forward scheduled irrigation or introduce an extra watering to cope with the extreme heat. Lack of water flow in the Dawson and Mackenzie River systems resulted in irrigation being stopped at a critical time for some crops. Yield and quality was generally good with most of the crop harvested prior to wet weather

Weeds: Feathertop Rhodes grass remains a major weed management issue for CQ grain farmers although increased use of residual herbicides has reduced the problem from a 'complete ground cover' to shattered plants. Flaxleaf fleabane is increasing in importance as another hard to control weed and is most common where glyphosate-only sprays are used.

CQ fertiliser needs increase: Soil fertility in CQ has reached a watershed in many paddocks. A run of good seasons, better farm practice and higher yielding varieties leading to consistent higher yields – coupled with the fact that many paddocks have been farmed for 40–60 years – has resulted in low grain protein; which is a sure sign that yield is also being compromised.

A widespread change in fertiliser practice will be necessary to maintain grain production and quality. Currently most farmers apply some P fertiliser, generally about 20–30 kg per hectare of MAP and about 20–40 kg per hectare of nitrogen to wheat crops. Higher nitrogen fertiliser rates will be needed across a wide area, more phosphorus fertiliser in some paddocks – perhaps applied at depth – and a few paddocks will also need potash or sulphur.

Livestock and pastures: A very wet couple of months in the Dawson and Callide have resulted in the best grass pastures for many, many years. Some paddocks in the Callide and Dawson are currently dominated by Rhodes grass, an indicator of wet seasons in this part of the world. I can't remember the forest country in the Dawson (Rannes Station) ever looking this good. Much of the central highlands have recovered from chewed out pasture in mid summer and looking grim for winter, to excellent pasture going into winter.

The crash of the live export market has forced high numbers of western and northern cattle either into paddocks for backgrounding for feedlots or onto the sale and abattoir market at a time when CQ cattle numbers are also high. This has resulted in very low prices which is putting beef enterprises under extreme financial pressure.

Water: Flooding of many river and creek systems has restored stock water in most of CQ but water will be a major issue for some properties north of Clermont and west of the Gemfields during winter as dams dry.

Maurie Conway,
Central Queensland Grower Solutions, Sustainable Farming Systems, Department of Agriculture, Fisheries & Forestry.
Emerald.

South Burnett

"I love a sunburnt country,
A land of sweeping plains,
Of rugged mountain ranges,
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This Dorothea Mackellar poem describes our last 12 months perfectly. But at times, it certainly stretches the definition of 'love'.

Overview of a difficult season

Wet, wet and more wet summed up parts of the 2012–13 season. July, November, late January, February and March all had rainfall totals well above average. But August, September, October, December and early January were well below average.

About 80 per cent of the expected summer crop area was eventually planted. Crops that were planted around November (2012) suffered severe waterlogging and many never recovered. They were then hit with heat and drought through early to mid-January. Another week of drought and those early crops would have been written off. They were saved by the late January rains.

The floods of Australia Day weekend caused significant damage to soil, crops and infrastructure. Some areas had their highest flood levels since 1893, and certainly higher than 2010–11. It was not just one flood – there were three. The last one generally did the most damage due to the speed of the water. The same areas that were flood-damaged this year were those that were hit in 2010–11.

Some growers managed to get crops planted after the first flood only to be wiped out in subsequent floods.

Considering the 400 to 500 mm of rain that fell over the Australia Day weekend, it was surprising the damage was not greater. The damage was worse two years ago, particularly on the sloping country, due to higher intensity rain.

The positives are that the underground aquifers and Bjelke-Petersen Dam are now full.

A significant amount of corn and beans were planted late in February 2012 and will not want an early frost.

Peanuts

The 2012–13 peanut crop is about 75 per cent of the anticipated planted area due to the dry December and early January.

The protracted dry had a very big impact on early growth of most crops. The plants were small and stunted and almost ready to give up, then when it rained the crops really took off. These crops now have moderate to good yield potential.

Leaf diseases have been severe. Net blotch started early during the wet weather, where that has been a traditional autumn disease. Some of the newer peanut varieties are quite susceptible to net blotch and a fungicide program is needed under the prolonged wet conditions of years like this.

Peanut yields in general will be down due to the wet conditions. Continuous wet weather and then waterlogging took its toll on yield

potential. Yields will be variable from 1.0 to 4.0 tonnes per hectare. As many crops will be late due to lack of heat units, we are hoping our first frosts arrive later than the typical Anzac Day chill.

Corn

The area of corn is about 70 per cent of that expected. Of that area, about 30 per cent was planted in February – this is very late!

This will make the third February in a row that we have had a significant amount of corn sown in that month. For one grower whose family has been growing corn near Kumbia for nearly 100 years, it will be the first time ever they have not planted corn. Planting in February was considered too risky.

So we are hoping that there will be none of the traditional Anzac Day frosts. It will be another six weeks before many corn crops reach the safe stage, and some will need frost free months until the end of May.

Yield potential at this stage looks reasonable at 2.5 to 4.0 tonnes per hectare.

Sorghum

Sorghum plantings are well down this summer season.

When planting opportunities arose it was too late to plant sorghum due to the risk of ergot.

Pulse crops

Pulses have struggled with the wet conditions and quite a few crops have been lost.

Soybeans: Despite many crops being planted late, many soybean crops have reasonable yield potential. Soybean loopers were the main insect pests. Heliothis and green vegetable bugs have been quiet.

Mungbeans: The area planted to mungbeans increased due to the late plant. Bean pod borers have been the biggest pest. Heliothis numbers have been low. Powdery mildew has required control through fungicides. Crop maturity has been slow and some flower abortion has occurred. Many crops will struggle to mature before the frosts come.

Navy beans: Navy bean crops have surprised everyone with how well they have coped with the saturated soils. Crop potential looks OK at this stage but they too may struggle to be mature before the frosts arrive.

Chickpeas: Chickpeas did surprisingly well in 2012. Planted in June they had a wet July and then virtually no rain until harvest. Bush size was almost ideal and the dry conditions meant no disease.

Trends

More cropping country is going under pasture by both cropping farmers and blocks bought by 'life stylers'.

Prices for bare cropping land can be $5000 to $6000 per hectare. With the current returns from cropping, it is impossible to justify these prices.

Ian Crossthwaite
BGA AgriServices, Kingaroy

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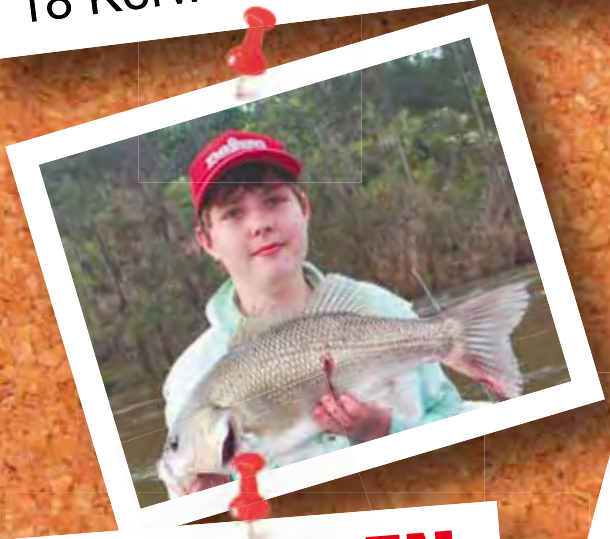

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President: Duncan Fraser
Chief Executive Officer: Matt Linnegar

Grain Producers Australia

Website: www.grainproducers.com.au
GPA Board of Directors
Northern Region: Pete Mailler (Chairman)
Mob: 0427 265 707
Email: pete.mailler@grainproducers.com.au
Western Region: Barry Large
Mob: 0427 549 023
Email: barry.large@grainproducers.com.au
Western Region: Terry Enright
Mob: 0427 958 015
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Southern Region: Andrew Weidemann
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Email: agforce@agforceqld.org.au – Web: www.agforceqld.org.au
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Western Australia

Council of Grain Grower Organisations (COGGO)

26 Winthrop Drive, WINTHROP WA 6150
Ph: 08 9310 2636
Email: hugh.lennerts@coggo.net.au
Independent Chairman: Bruce Piper
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Grain Industry Association of Western Australia (GIWA)

PO Box 7097, CLOISTERS SQUARE PO WA 6850
Ph: 08 6189 2457
Email: info@giwa.org.au
Executive Officer: Johanna Gastevich

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1st Floor, Pastoral House, 277–279 Great Eastern Highway
BELMONT WA 6104
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Email: grains@pgaofwa.org.au – Web: www.pgaofwa.org.au
Policy Director: Ian Randles
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PO Box 6291, EAST PERTH WA 6892
Ph: 08 9486 2100 – Fax: 08 9361 3544
Email: reception@wafarmers.org.au
Chief Executive Officer: Andy McMillan
Email: andymcmillan@wafarmers.org.au

WA Grains Group (WAGG)

C/- PO, LAKE GRACE WA 6353
Ph: 0428 654032
Email: wagrainsgroup1@bigpond.com – Web: wagrainsgroup.com
Chairman: Doug Clarke

South Australia

Grain Producers SA

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Web: www.grainproducerssa.com.au
Chief Executive Officer: Darren Arney
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Victoria

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Email: emailus@nswfarmers.org.au – Web: www.nswfarmers.org.au
Chief Executive Officer: Matt Brand
Grains Committee: Mark Hoskinson

Government Bodies

Federal

Minister for Agriculture, Fisheries and Forestry – Senator the Hon Joe Ludwig

Parliament House, CANBERRA ACT 2600
Ph: 02 6277 7520 – Fax: 02 6273 4120
Email: joe.ludwig@maff.gov.au

Minister for Sustainability, Environment, Water, Population and Communities – The Hon. Tony Burke MP

Parliament House, CANBERRA ACT 2600
Ph: 02 6277 7640 – Fax: 02 6273 4120
Email: tony.burke.mp@environment.gov.au

Shadow Minister for Agriculture and Food Security – The Hon. John Cobb MP

Parliament House, CANBERRA ACT 2600
Ph: 02 6277 4721 – Fax: 02 6277 8543
Email: John.Cobb.MP@aph.gov.au Web: johncobb.com.au

Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES)

Department of Agriculture, Fisheries and Forestry
18 Marcus Clarke Street, Canberra City
GPO Box 1563, CANBERRA ACT 2601
Ph: 02 6272 2000 – Fax: 02 6272 2001
Email: info.abares@daff.gov.au – Web: www.daff.gov.au/abares
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AusIndustry

Industry House, 10 Binara Street, Canberra
GPO Box 9839, CANBERRA ACT 2601
Ph: 13 28 46
Email: hotline@ausindustry.gov.au – Web: www.ausindustry.gov.au

Australian Pesticides and Veterinary Medicines Authority (APVMA)

18 Wormald Street, Symonston, ACT, 2609
PO Box 6182, KINGSTON ACT 2604
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Email: contact@apvma.gov.au – Web: www.apvma.gov.au
Chief Executive Officer: Ms Kareena Arthy

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Assistant Secretary Plant Biosecurity – Grains and Forestry
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Assistant Secretary Plant Export Operations
GPO Box 858, CANBERRA ACT 2601
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Email: plant@daff.gov.au
Email: pr@daff.gov.au
Web: www.daff.gov.au

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Email: leviesmanagement@daff.gov.au Web: www.daff.gov.au/levies

National Residue Survey

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18 Marcus Clarke Street, Canberra City
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Director National Residue Survey: Ian Reichstein
Email: ian.reichstein@daff.gov.au – Web: www.daff.gov.au/nrs

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State Agriculture Departments

NSW Department of Trade and Investment, Regional Infrastructure and Services

161 Kite Street, Orange
Locked Bag 21, ORANGE NSW 2800
Ph: 02 6391 3100 – Fax: 02 6391 3336
Email: nsw.agriculture@industry.nsw.gov.au – Web: www.dpi.nsw.gov.au
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Department of Environment and Primary Industries Victoria

1 Spring Street, Melbourne VIC 3000
GPO Box 4440, MELBOURNE VIC 3001
Customer Service Line: 136 186
Ph: 03 9658 4000 – Fax: 03 9658 4006
Phone from outside Australia +61 3 5332 5000
Email: customer.service@dpi.vic.gov.au – Web: www.dpi.vic.gov.au

Department of Agriculture, Fisheries and Forestry (QLD)

80 Ann Street, Brisbane
GPO Box 46, BRISBANE QLD 4001
Customer Service Centre: 13 25 23
Interstate – Ph: 07 3404 6999 – Fax: 07 3404 6900
Email: callweb@dpi.qld.gov.au – Web: www.deedi.qld.gov.au
Deputy Director-General: Beth Woods

Primary Industries and Regions SA (PIRSA)

L 14, 25 Grenfell Street, Adelaide
GPO Box 1671, ADELAIDE SA 5001
Ph: 08 8226 0995 – Fax: 08 8226 0476
Chief Executive: Scott Ashby
Web: www.pir.sa.gov.au
General Manager PIRSA Strategic Communications: Julie Gregory
Ph: 08 8226 0230 – Fax: 08 8226 0027
Email: julie.gregory@sa.gov.au

SA Research and Development Institute (SARDI)

Climate Applications: Dr Peter Hayman, Ph: 08 8303 9729
Crop Improvement: Dr Klaus Oldach,
Ph: 08 8303 9434 – Fax: 08 8303 9669
Crop Pathology: Dr Hugh Wallwork, Ph: 08 8303 9382
Entomology: Greg Baker, Ph: 08 8303 9544
Farming Systems: Dr Nigel Wilhelm, Ph: 08 8303 9353
Grains Research: Dr Phil Davies, Ph: 08 8303 9494
Food Safety: Dr Andreas Kiermeier, Ph: 08 8303 9400
Oilseeds Development: Andrew Ware, Ph: 08 8688 3417
New Variety Agronomy: Rob Wheeler, Ph: 08 8303 9480
Pulse Development: Larn McMurray, Ph: 08 8842 6265
Pastures: Dr Alan Humphries, Ph: 08 8303 9651
Email: pirsa.sardi@sa.gov.au – Web: www.sardi.sa.gov.au

Department of Agriculture and Food, WA

3 Baron-Hay Court, South Perth
Locked Bag 4, BENTLEY DELIVERY CENTRE WA 6983
Ph: 08 9368 3333 – Fax: 08 9474 2405
Email: enquiries@agric.wa.gov.au – Web: www.agric.wa.gov.au

Tasmanian Department of Primary Industries, Parks, Water and Environment

1 Franklin Wharf Hobart
GPO Box 44, HOBART TAS 7001
Ph: 1300 368 550 – Fax: 03 6344 9814
Email: Information@dpipwe.tas.gov.au
Web: www.dpipwe.tas.gov.au

Northern Territory Department of Resources – Primary Industry, Fisheries and Minerals and Energy

General enquiries
Phone 08 8999 5511
GPO Box 3000, DARWIN NT 0801
Email: info.dor@nt.gov.au – Web: www.nt.gov.au/d/

Research & Development

Research and Development Corporations

Grains Research & Development Corporation

1st Floor, 40 Blackall Street, Barton
PO Box 5367, KINGSTON ACT 2604
Ph: 02 6166 4500 – Fax: 02 6166 4599
Chairman: Keith Perrett

SECTION 4 INDUSTRY AGENCIES

THIS SECTION BROUGHT TO YOU IN ASSOCIATION WITH

Managing Director: John Harvey
Email: grdc@grdc.com.au – Web: www.grdc.com.au

Rural Industries Research & Development Corporation

Level 2, 15 National Circuit, Barton
PO Box 4776, KINGSTON ACT 2604
Ph: 02 6271 4100 – Fax: 02 6271 4199
Email: rirdc@rirdc.gov.au – Web: www.rirdc.gov.au
Managing Director: Craig Burns

Cotton Research & Development Corporation

2 Lloyd Street, Narrabri NSW 2390
PO Box 282, NARRABRI NSW 2390
Ph: 02 6792 4088 – Fax: 02 6792 4400
Email: crdc@crdc.com.au – Web: www.crdc.com.au
Chair: Mike Logan
Executive Director: Bruce Finney

Dairy Australia

Level 5, IBM Centre, 60 City Road, Southbank, Victoria 3006
Locked Bag 104, FLINDERS LANE VIC 8009
Ph: 03 9694 3777 – Fax: 03 9694 3733 – Web: www.dairyaustralia.com.au
Farm Productivity & Delivery: Chris Murphy

Meat & Livestock Australia (MLA)

Level 1, 165 Walker Street, North Sydney NSW 2060
Locked Bag 991, NORTH SYDNEY NSW 2059
Ph: 02 9463 9333 – Free call: 1800 023 100 – Fax: 02 9463 9393
Email: info@mla.com.au – Web: www.mla.com.au
Managing Director: Scott Hansen

Australian Pork Limited

Level 2, 2 Brisbane Avenue Barton ACT 2600
PO Box 4746, KINGSTON ACT 2604
Ph: 1800 789 099 – Fax: 02 6285 2288
Email: apl@australianpork.com.au
Web: www.australianpork.com.au
Chief Executive Officer: Andrew Spencer

Sugar Research & Development Corporation

Level 16, T&G building, 141 Queen Street, Brisbane QLD 4000
PO Box 12050, George Street, BRISBANE QLD 4003
Ph: 07 3210 0495 – Fax: 07 3210 0506
Email: srdc@srdc.gov.au – Web: www.srdc.gov.au
Executive Director: Annette Sugden

Australian Wool Innovation Limited

Level 30, HSBC Centre, 580 George St, Sydney NSW 2000
GPO Box 4177, SYDNEY NSW 2001
Ph: 02 8295 3100 – Fax: 02 8295 4100
Email: info@wool.com – Web: www.wool.com
Chief Executive Officer: Stuart McCullough

CSIRO Divisions

CSIRO Plant Industry

GPO Box 1600, CANBERRA ACT 2601
Ph: 1300 363 400
Email: enquiries@csiro.au – Web: www.csiro.au/plantindustry
Chief of the Division: Dr John Manners

CSIRO Ecosystem Sciences

GPO Box 1700, CANBERRA CITY ACT 2601
Ph: 1300 363 400 – Fax: 03 9545 2175
Email: enquiries@csiro.au – Web: www.csiro.au/org/
Chief of the Division: Dr Mark Lonsdale

CSIRO Land and Water

GPO Box 1666, CANBERRA ACT 2601
Ph: 1300 363 400 – Fax: 03 9545 2175
Email: enquiries@csiro.au – Web: www.csiro.au/org/CLW.html
Chief of the Division: Dr Paul Bertsch

CSIRO Animal, Food and Health Sciences

Ph: 1300 363 400
Email: enquiries@csiro.au – Web: www.csiro.au/cafhs
Chief of the Division: Professor Martin Cole

Grain-related CSIRO Flagships

Food Futures, Director (acting) – Nigel Preston Ph: 07 3833 5957
Sustainable Agriculture, Director – Brian Keating Ph: 07 3214 2261
Water for a Healthy Country – enquiries Ph: 02 6246 4565
Climate Adaptation, Director – Andrew Ash Ph: 07 3214 2346

Related Cooperative Research Centres

Future Farm Industries CRC

University of Western Australia MO81
35 Stirling Highway, CRAWLEY WA 6009
Ph: 08 6488 1952 – Fax: 08 6488 2856
Email: peter.zurzolo@futurefarmcrc.com.au
Web: www.futurefarmonline.com.au
Chair: Andrew Inglis **Chief Executive Officer:** Peter Zurzolo

Plant Biosecurity CRC

Level 2, Building 22, Innovation Centre
University Drive, University of Canberra, BRUCE ACT 2617
LPO Box 5012, BRUCE ACT 2617

Ph: 02 6201 2882 – Fax: 02 6201 5067
Web: www.pbcrc.com.au
Chief Executive Officer: Michael Robinson
Communications Manager: Max Knobel
Email: m.knobel@pbcrc.com.au

CRC for High Integrity Australian Pork

PO Box 466, WILLASTON, SA 5118
Ph: 08 8313 7683 – Fax: 08 8313 7686
Email: roger.campbell@porkcrc.com.au – Web: www.porkcrc.com.au
Chief Executive Officer: Dr Roger Campbell

International agencies

Australian Centre for International Agricultural Research (ACIAR)

GPO Box 1571, CANBERRA ACT 2601
Ph: 02 6217 0500 – Fax: 02 6217 0501
Email: aciar@aciar.gov.au – Web: aciar.gov.au
Chief Executive Officer: Nick Austin

International Center for Agricultural Research in the Dry Areas (ICARDA)

PO Box 114/5055, BEIRUT, LEBANON
Ph: +961 1 813301 / 3 – Fax: +961 1 804071
E-mail: icarda@CGIAR.ORG Web: www.icarda.org
Director General: Mahmoud Solh

International Maize and Wheat Improvement Center (CIMMYT)

Apdo. Postal 6-641, 06600 Mexico, D.F., MEXICO
Ph: +52 55 5804 2004 – Fax: +52 55 5804 7558
Web: www.cimmyt.org
Director General: Thomas Lumpkin

Associated Industry

Agrifood Awareness Australia Limited

PO Box E10, KINGSTON ACT 2604
Ph: 02 6269 5620 – Fax: 02 6273 3968
Email: info@afaa.com.au – Web: www.afaa.com.au
Office Manager: Anthea Solomon

AgriFood Technology

260 Princes Highway, Werribee
PO Box 728, WERRIBEE VIC 3030
Ph: 1800 801 312 – Fax: 03 9742 4228
Email: lab.vic@agrifood.com.au – Web: www.agrifood.com.au

Australian Herbicide Resistance Initiative

School of Plant Biology
The University of Western Australia
35 Stirling Highway, CRAWLEY WA 6009
Ph: 08 6488 7870 – Fax: 08 6488 7834
Director: Professor Stephen Powles
Ph: 08 6488 7833 – Fax: 08 6488 7834
Email: stephen.powles@uwa.edu.au
Centre Manager: Ms Lisa Mayer
Email: lisa.mayer@uwa.edu.au – Web: www.ahri.uwa.edu.au

Australian Lot Feeders' Association

Level 5 131 Clarence Street, Sydney
GPO Box 149, SYDNEY NSW 2001
Ph: 02 9290 3700 – Fax: 02 9290 2808
Web: www.feedlots.com.au
President: Don Mackay
Chief Executive Officer: Dougal Gordon

Australian Oilseeds Federation

PO Box H236, AUSTRALIA SQUARE NSW 1215
Ph: 02 8007 7553 – Fax: 02 8007 7549
President: Robert Wilson
Treasurer: Charles Aldersey
Web: www.australianoilseeds.com

Australian Research Council

Level 2, 11 Lancaster Place, Majura Park ACT 2609
GPO Box 2702, CANBERRA ACT 2601
Ph: 02 6287 6600 – Fax: 02 6287 6601
Email: info@arc.gov.au – Web: www.arc.gov.au
Chief Executive Officer: Professor Aidan Byrne

Australian Seed Federation Limited

Unit 1, 20 Napier Close, Deakin ACT 2600
PO Box 3572, MANUKA ACT 2603
Ph: 02 6282 6822 – Fax: 02 6282 6922
Email: enquiry@asf.asn.au – Web: www.asf.asn.au
CEO: Bill Fuller

Barley Australia

PO Box 422, VERMONT VIC 3133
Ph: 0408 178 872
Web: www.barleyaustralia.com.au
Executive Chairman: Andrew Gee
Email: andrew.gee@barleyaustralia.com.au

Bean Growers' Australia Limited

River Road, Kingaroy QLD 4610
PO Box 328, KINGAROY QLD 4610
Ph: 07 4162 1100 – Fax: 07 4162 4706
Managing Director : Lloyd Neilsen
Email: lneilsen@beangrowers.com.au
Finance and Administration Manager: Rebecca Williams
Email: info@beangrowers.com.au
Web: www.beangrowers.com.au

Centre for Legumes in Mediterranean Agriculture (CLIMA)

The University of Western Australia,
35 Stirling Highway, CRAWLEY, WA 6009
Ph: 08 6488 2505 – Fax: 08 6488 1140
Email: reception-clima@uwa.edu.au – Web: www.clima.uwa.edu.au
Director: Prof. William Erskine

CropLife Australia

Level 2, AMP Building, 1 Hobart Place, Canberra ACT 2601
Locked Bag 916, CANBERRA ACT 2601
Ph: 02 6230 6399 – Fax: 02 6230 6355
Web: www.croplifeaustralia.org.au
President: Lachlan McKinnon
Chief Executive Officer: Matthew Cossey

Farmsafe Australia

Head Office: 5 Greenbah Road, Moree
PO Box 256, MOREE NSW 2400
Ph: 02 6752 8210 – Fax: 02 6752 6639
Email: info@farmsafe.org.au – Web: www.farmsafe.org.au
Executive Officer: John Temperley
Farmsafe State Offices:

NSW	Ph: 02 6752 8218	Fax: 02 6752 6639
SA	Ph: 0418 829 873	
QLD	Ph: 07 4774 0522	Fax: 07 4774 0289
WA	Ph: 08 9359 4118	Fax: 08 9359 3468
VIC	Ph: 03 9207 5511	Fax: 03 9207 5500
TAS	Ph: 03 6398 6212	

Fertilizer Australia

Level 2 1 Hobart Place, Canberra
Locked Bag 916, CANBERRA ACT 2601
Ph: 02 6230 6987
Email: info@fertilizer.org.au – Web: www.fertilizer.org.au
Chairman: James Whiteside
Executive Manager: Nick Drew

Grains & Legumes Nutrition Council

1 Rivett Road, NORTH RYDE, NSW 2113
Ph: 02 8877 7877 – Fax: 02 9888 5421
Email: contactus@glnc.org.au – Web: www.glnc.org.au
Managing Director: Georgie Aley

Grains Research Foundation Ltd (GRFL)

PO Box 299, SOUTHTOWN, QLD 4350
Mob: 0447 763 852 – Fax: 07 4632 2689
Email: admin@grf.org.au
Email: secretary@grf.org.au – Web: www.grf.org.au
Chairman: Damien Scanlan
Company Secretary: Michael Burgis

Landcare and Sustainable Agriculture

18 Marcus Clarke Street, Canberra City
GPO Box 858, CANBERRA ACT 2601
General Manager: Michelle Lauder
Ph: 02 6272 4624 – Fax: 02 6272 4526

Nuffield Australia

PO Box 586, MOAMA NSW 2731
Ph: 03 5480 0755 – Fax: 03 5480 0233
Email: enquiries@nuffield.com.au – Web: www.nuffield.com.au
Chief Executive Officer: Jim Geltch AM
Chairman: Terry Hehir

Peanut Company of Australia

Haly Street, Kingaroy QLD 4610
PO Box 26, KINGAROY QLD 4610
Ph: 07 4162 6311 – Fax: 07 4162 4402
Email: peanuts@pca.com.au – Web: www.pca.com.au
Managing Director: John Howard

Plant Health Australia

Level 1, 1 Phipps Close, DEAKIN ACT 2600
Ph: 02 6215 7700 – Fax: 02 6260 4321
Email: admin@phau.com.au – Web: www.planthealthaustralia.com.au
Chairman: Dr Tony Gregson
Executive Director and CEO: Greg Fraser
Toll Free Exotic Plant Pest Hotline 1800 084 881

SECTION 4 INDUSTRY AGENCIES

Pulse Australia Ltd

Level 10, Farrer House 24–28 Collins Street, MELBOURNE Vic 3000
Chief Executive Officer: Tim Edgecombe
Ph: 03 9004 4081 – Mobile: 0425 717 133
Email: tim@pulseaus.com.au – Web: www.pulseaus.com.au
Senior Industry Development Manager (Northern Region):
Gordon Cumming
Mob: 0408 923 474 – Fax: 07 4696 8505
Email: gordon@pulseaus.com.au
Industry Development Manager (Southern Region):
Wayne Hawthorne
Mob: 0429 647 455
Email: wayne@pulseaus.com.au
Industry Development Manager (Western Region): Alan Meldrum
Mob: 0427 384 760
Email: alan@pulseaus.com.au

Puragrain Pty Ltd

PO Box 6363, NORTH RYDE NSW 2113
Ph: 0419 693 078
Email: info@puragrain.com – Web: www.puragrain.com
Managing Director: Professor Robert Henry

Ricegrowers' Association of Australia

NIP 37, Yanco Avenue, Leeton
PO Box 706, LEETON NSW 2705
Ph: 02 6953 0433 – Fax: 02 6953 3823

Email: rga@rga.org.au – Web: www.rga.org.au
President: Les Gordon
Executive Director: Ruth Wade

Ricegrowers' Limited – trading as SunRice

NIP 37, Yanco Avenue, Leeton
PO Box 561, LEETON NSW 2705
Ph: 02 6953 0411 – Fax: 02 8916 8350
Email: mdelgigante@sunrice.com.au – Web: www.sunrice.com.au
Chairman: Gerry Lawson
Chief Executive Officer: Rob Gordon

Sustainable Resource Management

18 Marcus Clarke Street, Canberra City
GPO Box 858 CANBERRA ACT 2601
Ph: 02 6272 4623
First Assistant Secretary: Ian Thompson

Tractor and Machinery Association of Australia

Level 4, 434 St Kilda Road
MELBOURNE VIC 3004
Ph: 03 9867 4289 – Fax: 03 9867 4061
Email: info@tma.asn.au – Web: www.tma.asn.au
Executive Director: Richard Lewis

Grain Marketing & Handling Organisations

AWB

Ph: +61 3 9268 7200
Toll Free Grower Services Centre 1800 4 GRAIN (1800 447 246)
GPO Box 58, MELBOURNE VIC 3001
Web: www.awb.com.au

Cargill Australia

Ph: +61 3 9268 7200
GPO Box 58, MELBOURNE VIC 3001
Web: www.cargill.com.au

GrainFlow

Ph: +61 3 9268 7200
Toll Free Grower Services Centre 1800 4 GRAIN (1800 447 246)
GPO Box 58, MELBOURNE VIC 3001
Web: www.grainflow.com.au

GrainCorp Operations Ltd (Sydney)

Level 26, 175 Liverpool Street, Sydney NSW 2000
GPO Box A268, SYDNEY SOUTH NSW 1235
Ph: 02 9325 9100 – Fax: 02 9325 9180
Email: inquiries@graincorp.com.au – Web: www.graincorp.com.au
Chairman: Don Taylor
Managing Director and Chief Executive Officer: Alison Watkins

Viterra Ltd

124–130 South Terrace, Adelaide
GPO Box 1169, ADELAIDE SA 5001
Ph: 08 8211 7199 – Fax: 08 8231 1249
FreeCall: 1800 018 205
Email: viterra.aus@viterra.com – Web: www.viterra.com.au

Australian Grain Exporters Association (AGEA)

PO Box R1826, Royal Exchange NSW 1225
Executive Officer: Rosemary Richards
Ph: 02 9427 6999 – Fax: 02 9427 6888
Email: agea@agea.com.au
President: Chris Aucote

Cooperative Bulk Handling Limited (WA)

Gayfer House, 30 Delhi Street, WEST PERTH WA 6005
GPO Box L886, PERTH WA 6842
Ph: 08 9237 9600 – Fax: 08 9322 3942
Email: info@cbh.com.au – Web: www.cbh.com.au
Chairman: Neil Wandel
Deputy Chairman: Vern Dempster

Australian Securities Exchange (ASX) Limited

20 Bridge Street, Sydney
PO Box H224, AUSTRALIA SQUARE NSW 1215
Ph: 02 9227 0197 – Fax: 02 9227 0667
Email: grainfutures@asx.com.au – Web: www.asx.com.au/grainfutures
Enquiries: Dougal Hunter, Business Development

Namoi Cotton Commodities Pty Ltd

1B Kitchener Street, TOOWOOMBA QLD 4350
Ph: 07 4631 6100 – Fax: 07 4631 6184
Grain Marketing and Logistics: John Haigh
Ph: 07 4631 6118, Mob: 0428 146 318, Fax: 07 4631 6184
Email: jhaigh@namoicotton.com.au
Web: www.namoicotton.com.au

Grain standards/rules/contracts

Grain Trade Australia Ltd

PO Box R1829, Royal Exchange, NSW 1225
Suite 1, Level 10, 66 Hunter Street, SYDNEY NSW 2000
Ph: 02 9235 2155 – Fax: 02 9235 0194
Email: admin@graintrade.org.au – Web: www.graintrade.org.au
Chief Executive Officer: Geoff Honey

Grower Groups

AgVance Farming Pty Ltd

PO Box 51, Quirindi NSW 2343
48 Station Street, QUIRINDI NSW 2343
Ph: 02 6746 2336
Email: office@agvance.com.au – Web: www.agvance.com.au
Contact: Natalie Eade

BCG (Birchip Cropping Group)

PO Box 85, BIRCHIP Vic 3483
Ph: 03 5492 2787 – Fax: 03 5492 2753
Email: info@bcg.org.au – Web: www.bcg.org.au
Chief Executive Officer: David Chamberlin

Conservation Agriculture & No-till Farming Association (CANFA)

PO Box 276, WELLINGTON NSW 2820
Executive Officer: Neville Gould
PH: 02 6845 1044 – Fax: 02 6845 1099 – Mob: 0427 452 488
Email: canfa@bigpond.com – Web: www.canfa.com.au

Conservation Agriculture Australia (CAA)
Formerly CAAANZ

Chief Executive Officer: John Rochecouste
Ph: 07 4635 0824 – Mob: 0419 790 747
Email: rochecouste@iinet.net.au

Corrigin Farm Improvement Group Inc. (CFIG)

Box 2, CORRIGIN WA 6375
Email: cfig@cfig.asn.au – Web: www.cfig.asn.au

Central West Farming Systems – Farmers Advancing Research

PO Box 171, CONDOBOLIN NSW 2877
Ph: 02 6895 1025 – Fax: 02 6895 2688
Chief Executive Officer: Diana Parsons
Ph: 02 6895 1007 – Fax: 02 6895 2688 – Mob: 0408 655 205
Email: diana.parsons@industry.nsw.gov.au
Administration Officer: Diana Fear
Ph: 02 6895 1016 – Email: cwfs@industry.nsw.gov.au
Trials & Extension Agronomist: Caroline den Drijver
Ph: 02 6895 1016 – Mob: 0487 051 084
Email: caroline.den.drijver@industry.nsw.gov.au
Research Agronomist: James Mwendwa
Ph: 02 6895 1050 – Mob: 0427 951 050
Email: james.mwendwa@industry.nsw.gov.au
WUE Extension Officer: John Small
Ph: 02 6895 1001 – Mob: 0488 951 001
Email: john.small@industry.nsw.gov.au
Technical Assistant Carbon: Julie Low
Ph: 02 6895 1015 – Email: julie.low@industry.nsw.gov.au
Project Coordinator: Lisa McFadyen
Ph: 02 6895 1025 – Mob: 0448 366 395
Email: lisamcfadyen@hotmail.com
Finance Officer: Jenny Shepard
Ph: 02 6895 1015 – Email: jenny.shephard@industry.nsw.gov.au
Web: www.cwfs.org.au

Conservation Farmers Inc (CFI)

PO Box 1666, TOOWOOMBA QLD 4350
Ph: 07 4638 5356 – Fax: 07 4632 2689 – Mobile: 0428 385 356
Email: michael.burgis@cfi.org.au – Web: www.cfi.org.au
Executive Director: Michael Burgis

Eyre Peninsula Agricultural Research Foundation (EPARF)

SARDI, Minnipa Agricultural Centre
Box 31, MINNIPA SA 5654
Project Manager: Naomi Scholz
Ph: 08 8680 5104 – Fax: 08 8680 5020
Email: naomi.scholz@sa.gov.au

Facey Group

40 Wogolin Rd, WICKEPIN WA 6370
Ph: 08 9888 1223
Email: admin@faceygroup.asn.au – Web: www.faceygroup.asn.au
Executive Officer: Felicity Taylor

FarmLink Research

17 Denison St (PO Box 240), JUNEE NSW 2663
Ph: 02 6924 4633 – Fax : 02 6924 4677
Email: farmlink@farmlink.com.au – Web: www.farmlink.com.au

Grain Growers Limited

PO Box 7, NORTH RYDE NSW 1670
Ph: 02 9888 9600 – Fax: 02 9888 5821
Email: enquiry@graingrowers.com.au – Web: www.graingrowers.com.au
Chief Executive Officer: Mark Allison
Grower Interests Manager: Georgie Aley
Grower Engagement Manager: Michael Southan

Grain Orana Alliance Inc (GOA)

PO Box 2880, DUBBO NSW 2830
Ph: 0400 066201 Email: admin@grainorana.com.au
Chief Executive Officer: Maurie Street

Grower Group Alliance

Faculty of National and Agricultural Science UWA – (MO82)
35 Stirling Highway, CRAWLEY WA 6009
Project Leader: Susan Hall
Ph: 08 6488 7937 – Mobile: 0400 889 036
Email: susan.a.hall@uwa.edu.au – Web: www.gga.org.au

Hart Field Site Group Inc.

Hart Field Site Group Inc.
PO Box 939, CLARE SA 5453
Ph: 0427 423 154
Email: admin@hartfieldsite.org.au – Web: www.hartfieldsite.org.au
Chairman: Justin Wundke
Mobile: 0429 708 772
Email: chairperson@hartfieldsite.org.au

Trials Manager: Sarah Noack
Mobile: 0420 218 420
Email: trials@hartfieldsite.org.au
Secretary: Ms Sandy Kimber
Email: admin@hartfieldsite.org.au
Mobile: 0427 423 154

Kondinin Group

Head Office: 613–619 Wellington Street, Perth WA 6000
PO Box 78, LEEDERVILLE WA 6902
Free Ph: 1800 677 761 – Ph: 08 6316 1355 – Fax: 08 6263 9177
Web: www.farmingahead.com.au

Liebe Group

PO Box 340, DALWALLINU WA 6609
Ph: 08 9661 0570 – Fax: 08 9661 0575
Executive Officer: Chris O'Callaghan
Email: chris@liebegroup.org.au – Web: www.liebegroup.org.au

Mallee Sustainable Farming Inc

2/152 Pine Avenue, Mildura
PO Box 5093, MILDURA VIC 3502
Ph: 03 5021 9100 – Fax: 03 5022 0579
Web: www.msfp.org.au
Executive Manager: Gemma Walker
Ph: 03 5021 9106
Email: gemma@msfp.org.au

MacKillop Farm Management Group (MFMG)

Limestone Coast, SA
Nyroca Road, PADTHAWAY SA 5271
Executive Officer: Krysteen McElroy
Ph: 0408 655 108
Email: admin@mackillopgroup.com.au
Web: www.mackillopgroup.com.au

Mingenew Irwin Group

PO Box 6, MINGENEW WA 6522
Ph: 08 9928 1645 – Fax: 08 9928 1540
Executive Officer: Sheila Charlesworth
Mob: 0427 281 007 – Email: sheila@mig.org.au
Web: www.mig.org.au

Northern Grower Alliance

Chief Executive Officer: Richard Daniel
Ph: 07 4639 5344 – Fax: 07 4639 2373 – Mobile: 0428 657 782
Email: richard.daniel@nga.org.au – Web: www.nga.org.au

Partners in Grains

National Coordinator: Kim Blenkiron
Mobile: 0427 592 243
Email: sa@partnersingrain.org.au – Web: www.partnersingrain.org.au

Riverine Plains Inc

Executive Officer: Fiona Hart
PO Box 386, YARRAWONGA VIC 3730
Ph: 03 5744 1713 – Fax: 03 5743 1740
Email: info@riverineplains.com.au – Web: www.riverineplains.com.au

SANTFA (South Australian No-Till Farmers Association Inc)

Web: www.santfa.com.au
Executive Officer: Alex Milner-Smyth
Mob: 0412 633 370 – Email: alex@santfa.com.au
PO Box 923, CLARE SA 5453
Ph: 08 8842 4278 – Fax: 08 8842 1875

South East Premium Wheat Growers Association (SEPWA)

PO Box 365, ESPERANCE WA 6450
Executive Officer: Niki Curtis
Ph: 08 9083 1125 – Fax: 08 9083 1100 – Mob: 0447 908 311
Email: eo@sepwa.org.au – Web: www.sepwa.org.au

Southern Farming Systems Ltd

23 High Street, INVERLEIGH, VIC 3321
Ph: 03 5265 1666 – Fax: 03 5265 1678
Chief Executive Officer/Business Manager: Jon Midwood
Email: jmidwood@sfs.org.au – Web: www.sfs.org.au

SPAA Precision Agriculture Australia

PO Box 3490, MILDURA VIC 3502
Ph: 0437 422 000 – Fax: 1300 422 279
Executive Officer: Nicole Dimos
Email: info@spaa.com.au – Web: www.spaa.com.au

Victorian No-Till Farmers Association (VNTFA)

PO Box 1397, HORSHAM VIC 3402
Ph: 03 5382 0422 – Mob: 0429 820 429
Email: info@vicnotill.com.au – Web: www.vicnotill.com.au

Walgett Special One Grain (WSOG)

PO Box 496, WALGETT NSW 2832
Ph: 1300 28 12 28 – Fax: 02 6828 1249
Email: admin@specialonegrain.com.au – Web: www.wsoc.com.au

WANTFA

PO Box 1091, NORTHAM WA 6401
Ph: 08 6488 7465
Web: www.wantfa.com.au
Executive Director: David Minkey – Mob: 0417 999 304
Email: david.minkey@wantfa.com.au

Yorke Peninsula Alkaline Soils Group

61–63 Main Street, MINLATON SA 5575
Ph: 08 8853 2241 – Fax: 08 8853 2269
Project and Funding Coordinator: Kristin McEvoy
Mob: 0400 283 015
Email: kristin.asg@netyp.com.au – Web: www.alkalinesoils.com.au

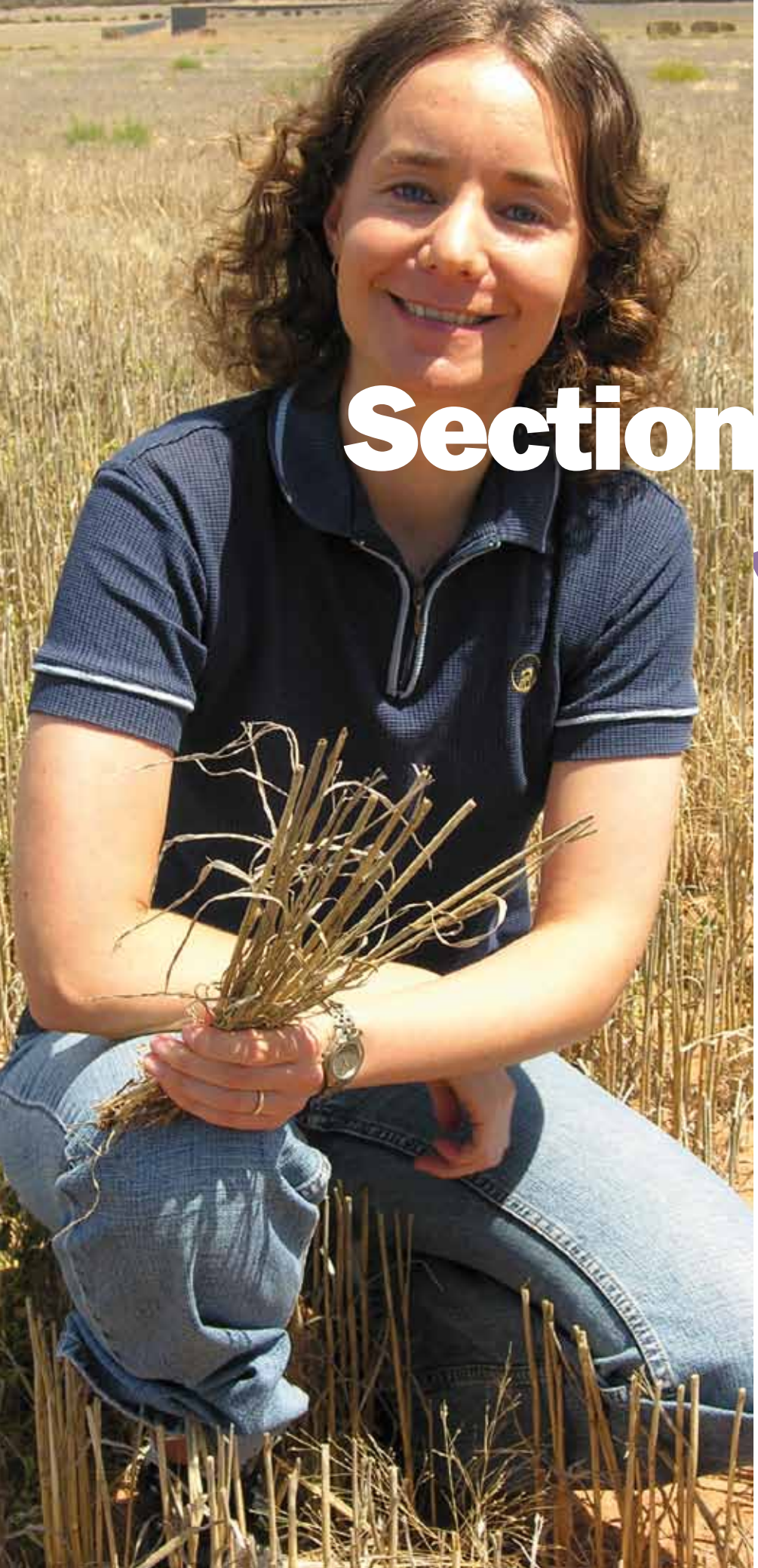
Government Grants

For special circumstances assistance administered by DAFF go to:

Web: www.daff.gov.au/agriculture-food/drought

GrantsLINK (for assistance with federal grants for community projects) see:

Web: www.grantslink.gov.au
Ph: 1800 026 222
Web: www.business.gov.au



Section 5

Education

Name of school	Address	Phone	Fax	Enrolment contact
CO-ED SCHOOLS				
Ballarat Clarendon College	1425 Sturt Street BALLARAT VIC 3350	03 5330 8312	03 5333 1513	Dennis Moneghetti
Ballarat Grammar	201 Forest Street WENDOUREE VIC 3355	03 5338 0700	03 5338 0991	Bruce Pipkorn
Bunbury Cathedral Grammar School	5 Allen Road GELORUP WA 6230	08 9722 6000	08 9722 6191	Kathy Schulze
Cabra Dominican College	PO Box 57 MELROSE PARK SA 5039	08 8179 2400	08 8272 9810	Helen Telford
Clayfield College	23 Gregory Street CLAYFIELD QLD 4011	07 3262 0220	07 3262 0225	Ross Thomson
Concordia Lutheran College	154 Stephen Street TOOWOOMBA QLD 4350	07 4688 2700	07 4688 2799	Anne Antonio
Dalby Christian College	2A Mary Street DALBY QLD 4405	07 4672 4222	07 4672 4250	Melissa Burt
Downlands College	72 Ruthven Street TOOWOOMBA QLD 4350	07 4690 9609	07 4690 9610	Debbie Carpenter
Gippsland Grammar	PO Box 465 SALE VIC 3853	03 5143 6388	03 5143 6347	Marji Craven
Great Southern Grammar	244 Nanarup Road LOWER KALGAN WA 6330	08 9844 0300	08 9844 0380	Jane Rushton
Guildford Grammar School	11 Terrace Road GUILDFORD WA 6055	08 9377 9247	08 9377 3140	Tamara Laurito
Hills College	Lot 1 Johanna Street JIMBOOMBA QLD 4280	07 5546 0667	07 5547 9677	Paul Warfield
Monivae College	PO Box 423 HAMILTON VIC 3300	03 5551 1200	03 5571 1074	Kaylene Mailes
Red Bend Catholic College	PO Box 312 FORBES NSW 2871	02 6852 2000	02 6852 3768	Toni Lennane
Scotch College Adelaide	PO Box 271 MITCHAM SA 5061	08 8274 4209	08 8274 4346	Jane Bourne
Snowy Mountains Grammar School	6339 Kosciuszko Road JINDABYNE ACT 2627	02 6457 1022	02 6457 1023	Joan Herringer
The Rockhampton Grammar School	Archer Street ROCKHAMPTON QLD 4700	07 4936 0700	07 4922 1552	Debra Sullivan
The Scots PGC College	60 Oxenham Street WARWICK QLD 4370	07 4666 9808	07 4666 9812	Wendy Persse
The Toowoomba Prepartory School	2 Campbell Street TOOWOOMBA QLD 4350	07 4639 8111	07 4639 8100	Karen Morris
Yanco Agricultural High School	259 Euroley Road YANCO NSW 2703	02 6951 1500	02 6955 7180	Student services
GIRLS' SCHOOLS				
Canberra Girls' Grammar School	Melbourne Avenue DEAKIN ACT 2600	02 6202 6420	02 6273 2554	Barbara Connoly
Calrossy Anglican School	140 Brisbane Street TAMWORTH NSW 2340	02 6766 2965	02 6766 2438	Miriam Knight
Loreto Normanhurst	91–93 Pennant Hills Road NORMANHURST NSW 2076	02 9487 3488	02 9489 2348	Angela Kerr
Penrhos College	6 Morrison Street COMO WA 6152	08 9368 9508	08 9368 9677	Sue McCulloch
PLC Armidale	Crest Road ARMIDALE NSW 2350	02 6770 1727	02 6772 5697	Fiona Mullen
Pymble Ladies College	Avon Road PYMBLE NSW 2073	02 9855 7799	02 9855 7766	Vickii Scott
Somerville House	17 Graham Street SOUTH BRISBANE QLD 4101	07 3248 9200	07 3846 5553	Diana Chaundy
St Ursula's College Yeppoon	Queen Street LMB 600 YEPPOON QLD 4703	07 4939 9600	07 4939 9610	Gina Loader
The Glennie School	246A Herries Street TOOWOOMBA QLD 4350	07 4688 8807	07 4688 8847	Annie Muller
BOYS' SCHOOLS				
Calrossy Anglican School	140 Brisbane Street TAMWORTH NSW 2340	02 6766 2965	02 6766 2438	Miriam Knight
Christ Church Grammar School	Queenslea Drive CLAREMONT PERTH WA 6010	08 9442 1555	08 9442 1690	Registrar
Farrer Memorial Agricultural High School	585 Calala Lane TAMWORTH 2840	02 6764 8607	02 6764 8648	Kerry Hussey
Guildford Grammar School	11 Terrace Road GUILDFORD WA 6055	08 9377 9247	08 9377 3140	Geoffrey Hickling
Ipswich Grammar School	Darling Street IPSWICH QLD 4305	07 3813 9600	07 3280 1311	Lesley Abra
St Brendan's College	139 Adelaide Park Road YEPPOON QLD 4703	07 4939 9485	07 4939 5273	Kylie Hedges
St Joseph's College Hunters Hill	Mark Street HUNTERS HILL NSW 2110	02 9816 0900	02 9879 6804	Stephen Litherland
St Joseph's Nudgee College	2199 Sandgate Road, BOONDALL QLD 4034	07 3865 0555	07 3865 0500	Enrolments office
The King's School	Pennant Hills Road NORTH PARRAMATTA NSW 2151	02 9683 8405	02 9683 8415	Bruce Hilliard
Toowoomba Grammar School	PO Box 2900 TOOWOOMBA QLD 4350	07 4687 2519	07 4687 2582	Ben Foley
Tudor House	6480 Illawarra Highway MOSSVALE NSW 2577	02 4868 0008	02 4868 0003	Registrar
Wesley College	40 Coode Street SOUTH PERTH WA 6151	08 9368 8000	08 9368 8127	Celli Milton/Kelli Henning

Religious affiliation	Day/ Boarding enrolments	Boarding years/ Courses	Tuition fees *Denotes sibling discounts	Boarding fees *Denotes sibling discounts	Website
Uniting Church	1150/150	7–12	$11,000–$16,000*	$9,500–$14,500*	www.clarendon.vic.edu.au
Anglican	1300/250	7–12	Yr 7 $11,800*	Yr 7 $7900* PA	www.bgs.vic.edu.au
Anglican	900/100	7–12	$14,340–$16,740*	$18,012	www.bcgs.wa.edu.au
Catholic	1080	No boarders	$5,800–$9,700*	—	www.cabra.catholic.edu.au
Uniting & Presbyterian	805/110	Pre-Prep–12	$12,500 - $14,580*	$19,384.60*	www.clayfield.qld.edu.au
Lutheran (but all welcome)	480 total	7–12	Starts at $4800*	$17,824* PA	www.concordia.qld.edu.au
Non-denominational	268/13	7–12	$2,750–$4,825*	$9,600–$11,800*	www.dalbycc.qld.edu.au
Catholic	450/240	8–12	$8,700–$9,400*	$16,800–$17,200	www.downlands.qld.edu.au
Anglican	1000/50	7–12	$12,020*	$16,300*	www.gippslandgs.vic.edu.au
A christian school	777/100	Pre-Prep–12	$4080–$10,920*	$18,720	www.gsg.wa.edu.au
Anglican	734/135	7–12	See website*	See website*	www.ggs.wa.edu.au
None	400/75	7–12	Approx $5000*	$9000* PA	www.hills.qld.edu.au
Christian – Catholic	660/75	8–12	$5150*	$12,000*	www.monivae.com
Catholic	630/150	7–12	$3050–$3410*	$10,125–13,950*	www.redbendcc.nsw.edu.au
Uniting Church	840/106	7–12	$18,200–$21,480*	$17,720*	www.scotch.sa.edu.au
Anglican	180/52	7–12	$9030–$10,238*	$15,385*	www.smgs.nsw.edu.au
Non-denominational	1000/360	7–12	$8120 PA	$13,940 PA	www.rgs.qld.edu.au
Uniting Church	314/158	Prep-12	$3,591 - $9,641	$16,719*	www.scotspgc.qld.edu.au
Anglican	333/91	Kindergarten–7	$3,460–$9,748	$18,156	www.tmbaprep.qld.edu.au
None	Nil/381	7–12	Nil	$9,105	www.yanco-h.schools.nsw.edu au
Anglican	1505/95	7–12	Refer website	Refer website	www.cggs.act.edu.au
Anglican	420/220	7–12	$12,520 - $13,860*	$16,800*	www.calrossy.nsw.edu.au
Catholic	700/215	7–12	$17,778–$20,130*	$20,175*	www.loretonh.nsw.edu.au
Uniting Church	1100/100	7–12	na	na	www.penrhos.wa.edu.au
Presbyterian	260/70	5–12	—	—	www.plcarmidale.nsw.edu.au
Uniting Church	2030/130	7–12	$14,000–$23,700*	$19,720* PA	www.pymblelc.nsw.edu.au
Uniting Church	1135/110	7–12	$17,776*	$19,245* PA	www.somerville.qld.edu.au
Catholic	308/76	8–12	$4,460–$4,640*	$12,970*	www.stursulas.qld.edu.au
Anglican	710/168	Kindergarten–12	See website*	See website*	www.glennie.qld.edu.au
Anglican	420/220	7–12	$8,980–$12,795*	$16,800*	www.calrossy.nsw.edu.au
Anglican	1490/110	7–12	$21,520	$19,680 PA	www.ccgs.wa.edu.au
None	250/350	7–12	$417 (day students)	$9,284 - $18,571	www.farrer.nsw.edu.au
Anglican	650/125	7–12	See website*	See website*	www.ggs.wa.edu.au
Not affiliated	990/110	Prep–12	$7,420–$13,670*	$16,140	www.ipswichgrammar.com
Catholic	370/290	8–12	$4660*	$13,410*	www.sbc.qld.edu.au
Catholic	471/590	7–12	$36,363* inclusive		www.joeys.org
Catholic	1200/300	6–12	$10,970–$12,900*	$15,400–$18,940*	www.nudgee.com
Anglican	794/362	5–12	$25,068*	$17,792*	www.kings.edu.au
Non-denominational	1210/300	7–12	$12,464–$12,700*	$17,676–$18,120*	www.twgs.qld.edu.au
Anglican	100/45	3–6	$16,000–$18,000*	$15,500* PA	www.tudorhouse.nsw.edu.au
Uniting Church	1250/158	7–12	$19,707	$19,887	www.wesley.wa.edu.au

Making the sciences more sexy

In her presentation to the 2013 ABARES Outlook Conference, Roslyn Prinsley from the Office of the Chief Scientist, warned that unless the maths/science subjects were made more attractive to students all along the education pathway, our agricultural industries will struggle to produce enough food and fibre to satisfy ever-increasing demand.

Farmers worldwide are having to produce more with increasingly scarce resources. And to continue to do this, clever innovation and productivity gains are constantly needed. Farmers do a remarkable job in lifting their on-farm productivity seemingly every year, but agricultural research breakthroughs are where the significant productivity gains are achieved.

It follows that Australia needs a talented and increasing pool of researchers, agronomists and other maths/science savvy people involved in agriculture to keep these breakthroughs and innovations coming. But Roslyn pointed out that the reality is somewhat different. Recent surveys have shown that we only have around 700 agriculture graduates per year but there are more than 4000 professional agriculture jobs available.

To turn this around Roslyn argues that the agricultural industry needs to present attractive and well defined career pathways.

New strategies needed at all education levels

Roslyn says that we need to become more proactive in the entire education process. In primary school we need to make science and maths interesting, fun and relevant. We need to engage children's natural curiosity and give our teachers confidence and the tools to teach science and maths subjects well. We also need programs at this early stage of a child's education to help create a better understanding of agriculture.

At the secondary school level in Australia, enrolments in the sciences and maths subjects are in steady decline – particularly at the higher levels. Secondary students tend to have a lack of appreciation of maths/science and of its relevance and generally regard the subjects as boring and difficult.

To help overcome the maths/science doldrums at the secondary level, Roslyn suggests a range of initiatives including support for teachers to teach more interactive and inspiring classes rather than a collection of facts. It follows that we need to ensure teachers are adequately qualified and passionate. We also need to provide the right incentives to science graduates to become teachers. Programs such as PICSE and PIEF are invaluable.

Roslyn points out that at the uni level, the current situation – although bolstered by a recent lift in agricultural courses' enrolment figures – is of major concern. Only 0.5 per cent of all uni students study agriculture.

Turning this around

- **SUPPLY –** Create a larger pool of highly skilled students who are maths and science literate and are attracted to agriculture;
- **DEMAND –** Develop and widely communicate well-defined and attractive career paths in agriculture; and,
- **COLLABORATE –** We need a coordinated strategic national approach involving all stakeholders to help address the issue of emerging science, technology, engineering and mathematics (STEM) skill shortages.

Roslyn Prinsley is the National Advisor, Maths & Science Education & Industry at the Office of the Chief Scientist, Canberra. See www.chiefscientist.gov.au ■

6 Suppliers' Directory

AGRICULTURAL CHEMICALS

Achieve – Crop Care: www.cropcare.com.au
Axial – Syngenta: www.syngenta.com
Barrack 720 Fungicide – Crop Care: www.cropcare.com.au
Barrack Betterstick – Crop Care: www.cropcare.com.au
Boxer – Syngenta: www.syngenta.com
Cognito – Syngenta: www.syngenta.com
Deluge – Victorian Chemicals: www.vicchem.com
Envoy – Victorian Chemicals: www.vicchem.com
Hammer – Crop Care: www.cropcare.com.au
Hasten – Victorian Chemicals: www.vicchem.com
Hot-Up – Victorian Chemicals: www.vicchem.com
Ken-Up Dry – Kenso: www.kenso.com.au
Pentagon – Farmoz: www.farmoz.com.au
Precept – Bayer CropScience: www.bayercropscience.com.au
Rancona – Chemtura: www.chemturaagrosolutions.com.au
Roundup PowerMax – Nufarm: www.nufarm.com.au
Sakura – Bayer: www.sakuraherbicide.com.au
Spray Seed - Syngenta: www.syngenta.com
Speedy 250 – Kenso: www.kenso.com.au
Steward EC – DuPont: www.dupont.com
Valor – Sumitomo: www.sumitomo-chem.com.au
Velocity – Bayer CropScience: www.bayercropscience.com.au

AG MACHINERY PARTS

Alloy & Stainless Products: www.asproducts.com.au
ITC National: www.itcnational.com.au
Neil's Parts: www.neils.com.au

CONTAINER RECYCLING

drumMuster: www.drummuster.com.au

EDUCATION

Rockhampton Grammar School: www.rgs.qld.edu.au
Toowoomba Grammar School: www.twgs.qld.edu.au

ELECTRONIC EQUIPMENT/PRECISION AG

Advanced Farming Systems – Case IH Agriculture: www.caseih.com
Agmaster: www.agmaster.com
Graintec Scientific: www.graintec.com.au
Infratec Sofia: www.foss.com.au/sofia
John Deere: www.johndeere.com.au
Omnistar: www.omnistar.com.au
Outback Guidance: www.outbackguidance.com
Sparex: www.sparex.com
TACS Australia: www.tacs.com.au
Trimble: www.trimble.com/agriculture

ENERGY

Ergon: 1300 736 349
Mobile Energy: www.mobileenergyaustralia.com.au

FERTILISERS & SOIL HEALTH SERVICES

Amorsil – Nutrifert: www.nutrifert.com.au
Bioag: www.bioag.com.au
Big N – Incitec Pivot: www.incitecpivot.com.au
Charlie Carp: www.charliecarp.com
EasyATS – Incitec Pivot: www.incitecpivot.com.au
Easy N – Incitec Pivot: www.incitecpivot.com.au
Granulock – Incitec Pivot: www.incitecpivot.com.au
Hibrix: www.hibrix.com.au
Nutrilab: 07 4671 5155
Phosyn Analytical: www.yaraphosyn.com
Zinc – Yarra: www.yarra.com.au

FERTILISER STORAGE

Bushmans: www.bushmantanks.com.au

GRAIN STORAGE & HANDLING

Agridry: www.agridry.com.au
Allied Grain Systems: www.alliedgrainsystems.com.au
Assorted Bag Closers: 03 9399 9171
Convey-All: www.convey-all.com
Cyclone Silos (One Steel): www.onesteelcyclone.com.au
Darling Downs Tarps: www.ddt.com.au
Jaylon: www.jaylon.com.au
Kotzur: www.kotzur.com.au
Polytex: www.polytex.com.au
Silo Ventilation Systems: www.silovent.com
Tapex: www.tapex.com.au
Westfield Augers: www.grainaugers.com

HARVESTERS & COMBINES

Case IH Agriculture: www.caseih.com
Chesterfield: www.chesterfieldaustralia.com.au
Claas: www.landpower.com.au
John Deere: www.johndeere.com.au/combines
Neil's Parts: www.neils.com.au
New Holland Agriculture: www.newholland.com

INSECT MANAGEMENT

Bioglobal: www.bioglobal.com.au

IRRIGATION

Valmont Irrigation: www.valley-au.com

LP GAS

Kleenheat Gas: 1300 135 111

MACHINERY MANUFACTURERS & DISTRIBUTORS

Case IH Agriculture: www.caseih.com
Claas: www.landpower.com.au
Flexicoil: www.flexicoil.com.au
John Deere: www.johndeere.com.au
Neil's Parts: www.neils.com.au
New Holland Agriculture: www.newholland.com

SEED SUPPLIERS & PLANT BREEDERS

Australian Grain Technologies: www.ausgraintech.com
Canola Breeders: www.canolabreeders.com.au
Nufarm: www.nufarm.com.au
Nuseed: www.nuseed.com
Nuseed Roundup Ready Canola – Nufarm: www.nufarm.com.au
Pioneer: www.pioneer.com
Roundup Ready Canola – Monsanto: www.monsanto.com.au

SEED TREATMENT

CRT Seed Treatment: www.cropcare.com.au
Dividend – Syngenta: www.syngenta.com.au
Emerge – Syngenta: www.syngenta.com.au
Nodulaid – Becker Underwood: www.beckerunderwood.com.au
Nodulator – Becker Underwood: www.beckerunderwood.com.au

SOIL & PLANT ANALYSIS

Phosyn: www.yaravita.com

SPRAYERS & SPRAYER EQUIPMENT

Case IH Agriculture: www.caseih.com
Croplands: www.croplands.com.au
Goldacres: www.goldacres.com.au
Hardi: www.hardi.com.au
Integrated Transfer Solutions: www.its-aust.net
John Deere: www.johndeere.com.au

TILLAGE MANUFACTURERS & DISTRIBUTORS

Boss: www.bosseng.com.au
Bourgault: www.bourgault.com
Case IH Agriculture: www.caseih.com
Excel Agriculture: www.excelagr.com.au
Flexicoil: www.flexicoil.com.au
Gessner Industries: www.gessner.com.au
John Deere: www.johndeere.com.au
K-Line: www.k-line.net.au
Manutec: www.manutec.com.au
Serafin: www.serafinmachinery.com.au

TANK CLEANERS

All Clear – Agnova: www.agnova.com.au

TRAVEL & RECREATION

Barcoo Ski Lodge – Victorian Alps ski and summer resort
Dinner Plain Central Reservations: 1800 670 019
Charlton's Tackle & Bait: 07 3818 1677
Greenmount Travel: 07 4659 3555 www.greenmounttravel.com.au

WEED MANAGEMENT AT HARVEST

Accufire: www.accufire.com.au

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