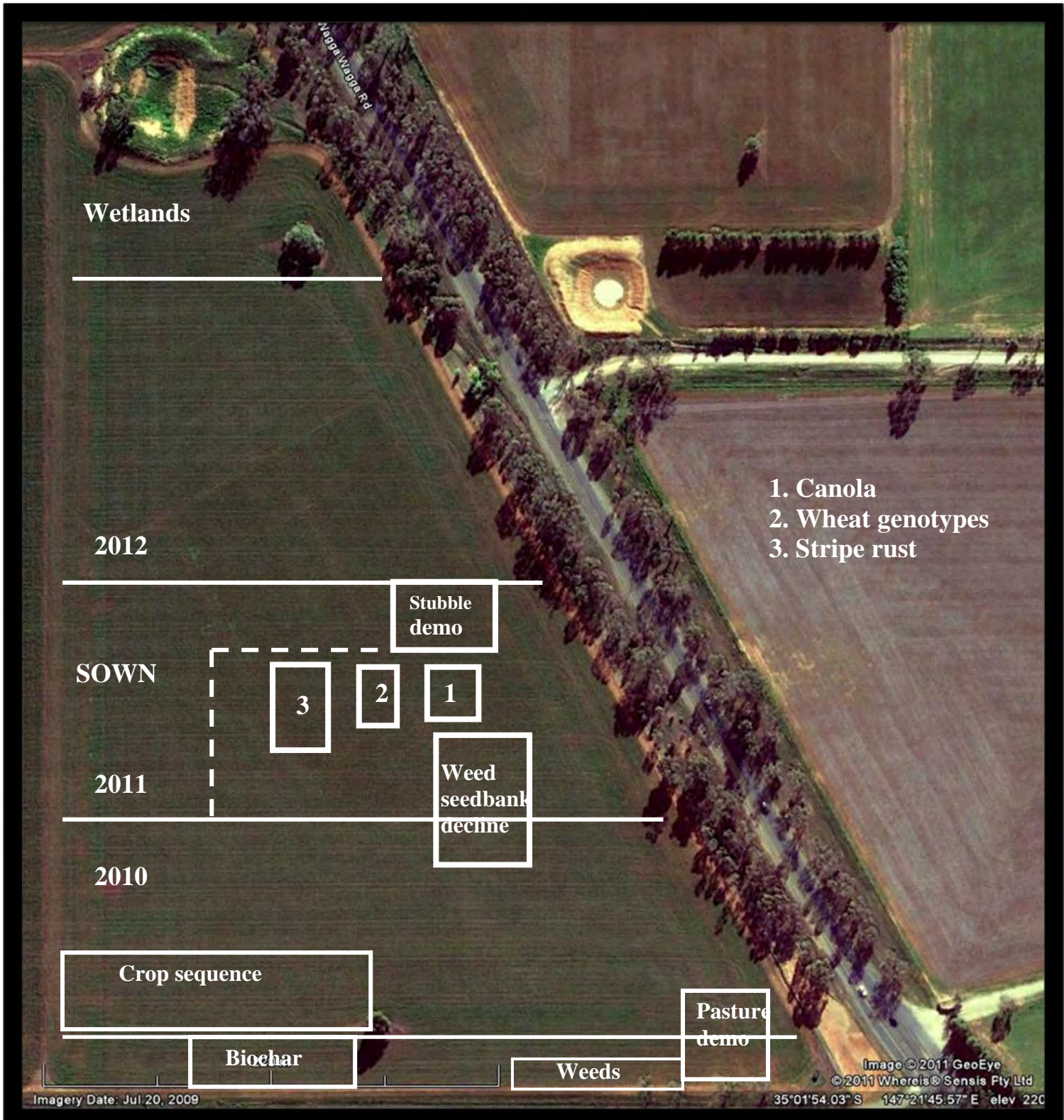


## 2011 Graham Centre Field Site







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## Welcome to our 2011 annual field day

This 15 hectare field site was established in 2010 to showcase research outputs from the Graham Centre to assist growers, advisers and natural resource managers to develop and maintain robust and sustainable farming systems. The site also promotes agriculture and its contribution to every day life to the wider community.

The demonstrations this year focus on weed and disease management, the importance of diverse rotations – particularly canola, stubble in cropping sequences, and the behaviour of water movement and availability within the soil profile.

The Wetland Area is under construction in partnership with the Murrumbidgee Catchment Management Authority and local schools. It is located at the northern end of the site next to the dam, and will be planted with local native species over the next 12 months.

The aim is for this to be YOUR field site and we look forward to heated discussion and debate with you today and in the future about the constraints and opportunities facing our production systems. The Yield Profit prediction will be updated regularly, with reports available on our website. We encourage you to visit the site during the remainder of the growing season and observe the crop and pasture development.

Regards

Deirdre Lemerle, Director - Graham Centre and Mark Harris, Chair - Field Site Industry Steering Committee



## **Overcoming abiotic constraints to agricultural productivity: mixed farming systems for climate, soil, water and nutrient constraints**

Agriculture is under pressure as never before, with world population predicted to increase from 6.9 billion in 2010 to 9.1 billion in 2050. At the same time, urbanisation will increase from the current 49 percent to 70%, while productive land is being degraded by erosion, leaching, acidification and salinisation, or taken out of agriculture for industrial development. Fewer rural people will be engaged in producing food for more urban people from less land, less water, increasing pressure on supply of nutrients such as phosphorus and nitrogen, and on availability of energy.

Rising incomes will increase demand for meat, and grain for feeding animals. Carbon dioxide levels will rise to 390 parts per million (ppm), compared with pre-industrial 280 ppm. Temperatures are rising 0.13 degrees Celsius per decade, with some areas such as North Africa and Western Australia becoming drier. While climate change seems mild in comparison, the challenge is increasing variability and risk, especially associated with greater terminal drought and higher temperatures during grain filling.

Our research must include integrative research with our evolving mixed farming systems, and focus on underpinning science directed to addressing critical abiotic stresses, including soil water, frost and heat, nutrients, soil surface management, subsoil constraints, and soil carbon.

Our next challenge is to more closely demonstrate the linkage from our underpinning research into field demonstrations, so their importance and potential impact are better appreciated for what they may deliver, how they should be of benefit, and when that may occur.

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## Future Graham Centre weed science research initiatives

Producers in Australia are encountering increasing environmental and social challenges associated with the implementation of existing farming practices. Some of the current challenges that directly impact a producer's choice and sustainability of tools for effective weed management include: broad changes in land usage patterns, increasing size of broadacre farms, climatic change and year to year variation, globalisation of international markets and trading of agricultural commodities, increasing regulation of pesticide application and distribution and continued development and spread of herbicide resistant weeds.

There has also been a marked trend towards increased utilisation of genetically modified (GM) crops, both globally and in Australia. Decreased crop diversity in farming systems has also been coupled with increased farm size. At the same time, the agrichemical industry has reduced investment in new product development.

As a result, Australian growers are encountering new weed incursions, increasing herbicide resistance in existing weed species, fewer effective chemical options for weed management and increased public pressure for the development of effective non-chemical alternatives for weed management.

The recent consult of stakeholders across the southern region has pointed to increased interest in adoption of integrated weed management strategies for long term or sustainable weed management in broadacre crops, mixed farming systems and feed base systems including pastures and rangelands.

The focused development of effective and timely integrated weed management strategies for Australian cropping systems, based on crop genetics and management choices in the face of declining pesticide availability, is an important consideration for stakeholders in the southern region. Interviews and teleconferences with stakeholders in 2011, showed a need for greater research focus on:

- Management of new weed incursions, particularly summer fallow weeds.
- Enhanced weed control and an understanding of crop/weed interactions in stubble till production systems.
- Continued management of herbicide resistance and prevention of resistance in newer herbicide chemistry.
- Long-term studies on mixed cropping systems involving livestock and pasture rotation.
- Management strategies emphasising the reduction of weed seedbank numbers over time through site specific weed control strategies.
- Improved application technology for herbicides and pesticides
- An understanding and response to social drivers that impact successful adoption of integrated weed management strategies.

An important focus for future weed research investment is to increase the diversity of weed management options for producers managing broadacre crops, mixed cropping systems or pastures/rangelands.

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## Fence line glyphosate resistance

There are now over 190 confirmed sites with glyphosate resistant ryegrass in Australia. These come from four states and a variety of situations, with an increasing number reported from fence lines and other un-cropped parts on properties.

Glyphosate resistant ryegrass occurs when populations are treated intensively with glyphosate and no other herbicides are applied, and where there is little or no tillage. Relying solely on glyphosate for weed control is the greatest risk factor for glyphosate resistant weeds

Management of glyphosate resistant ryegrass on crop margins is necessary in order to stop resistance moving into cropped areas.

This trial was established to look at the ability of glyphosate mixtures and alternative herbicides to control a glyphosate-resistant population of ryegrass along a fence. A combination of glyphosate based products with some mixtures has been used to enhance residual control.

Some mixtures with glyphosate were more effective. Mixtures with Spray.Seed or diuron were effective, as was a double knock of glyphosate and Spray.Seed 7 days apart.

### ***Treatments:***

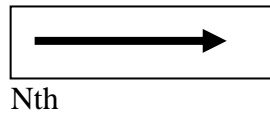
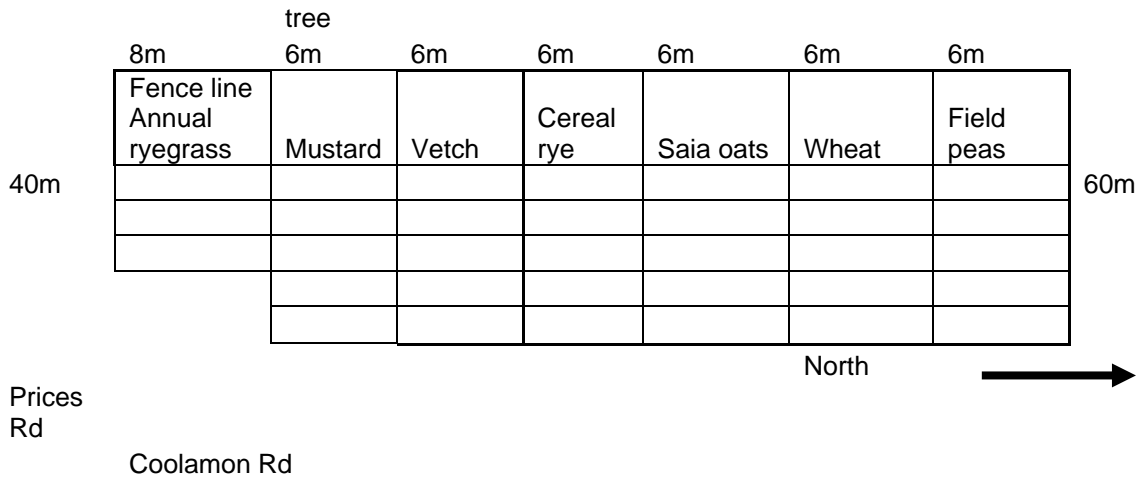
1. Control
2. 1 l/ha Glyphosate
3. 1 l/ha Glyphosate + 20 ml/ha Imazapic
4. 1 l/ha Glyphosate + 6 l/ha Amitrole T
5. 1 l/ha Glyphosate + 6 l/ha Diuron
6. 1 l/ha Glyphosate + 1 kg/ha Atrazine
7. 3.2 l/ha Sprayseed
8. 3.2 l/ha Sprayseed + 6 l/ha Diuron
9. Double knock 1 l/ha Glyphosate + 3.2 l/ha Spray.Seed (5 days later)



**Plot design:**

The trial is in 3 replicates adjacent to the fence line.

Double gate



	Zero	Zero
5m		1. Glyphosate 1 L/ha
	9. Glyphosate 1L/ha + Logran 25g/ha	2. Glyphosate + Imazapic 1 L/ha + 20 ml/ha
	8. Glyphosate 1 L /ha + Sprayseed 3.2L/ha	3. Glyphosate + Amitrole T 1 L /ha + 6 L/ha
	7. Sprayseed + Diuron 3.2 L/ha + 6 /ha	4. Glyphosate + Diuron 1 L/ha + 6 L/ha
	6. Sprayseed 3.2L/ha	5. Glyphosate + Atrazine 1 L/ha + 1 kg/ha
	Zero	Zero

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## **Brome grass control on wheat and field peas using pre- and post-emergent herbicides**

Brome grass is a difficult to control weed and an emerging issue in winter cropping systems. A range of pre- and post-emergent herbicides in cereal and pulse crops is being evaluated. The site was selected from a wheat field in 2010 which had a moderately high population of Brome grass (>10 plants /m<sup>2</sup>). The area was excluded from post-emergent control in 2010 allowing the brome grass to senesce and return seed to the soil seedbank.

The area was sprayed with 2L Roundup + 500ml Kamba 500 on 20 January 2011, with follow up control on 8 March 2011 (2L Roundup + 800ml Ester 800) and 4 May 2011 (2L Roundup + 50ml Hammer). The trial area was burnt on 2 June 2011.

IBS herbicides were applied on 27 June 2011 and Lincoln wheat was sown at 80kg/ha + 100kg DAP and Morgan field peas were sown two hours later at 110kg/ha + 100kg DAP. The trial was sown using Janke knife points and press wheels. Mouseoff was spread around the trial on 30 June 2011.

Chemicals were applied using Lechler IDK 120 015 air induction nozzles, 3 bar, with 100L water/ha.

Initial observations indicate that brome grass numbers are low in the trial area. Burning may have had a very good effect on controlling seed.

### ***Treatments:***

*Wheat 80kg/ha + 100kg DAP*

- 1= Control
- 2= 3 l/ha TrifluX IBS
- 3= 2.5 l/ha Boxer Gold IBS
- 4= 118 g/ha Sakura IBS
- 5= 3 l/ha TrifluX IBS and 500 ml/ha Crusader (POST emergent)
- 6= 2.5 l/ha Boxer Gold IBS and 500 ml/ha Crusader (POST)
- 7= 2.5 l/ha Boxer Gold IBS and 2.5 l/ha Boxer Gold (POST)
- 8= 118 g/ha Sakura IBS and 500 ml/ha Crusader (POST)
- 9= 500 ml/ha Crusader (POST)

*Field Peas 110kg/ha + 100kg DAP*

- 10= 3 l/ha TrifluX IBS
- 11= 380 g/ha Sencor IBS
- 12= 3 l/ha TrifluX IBS and 500 ml/ha Select + 100 ml/ha Verdict (POST)
- 13= 380 g/ha Sencor IBS and 500 ml/ha Select + 100 ml/ha Verdict (POST)
- 14= 500 ml/ha Select + 100 ml/ha Verdict (POST)

**Plot design:**

Plots 4m wide and 12m long, 3 replicates = 42 plots

B u f f e r	12	14	2	10	3	9	1	11	5	7	6	13	4	8	1	Bu f f e r
	1	10	6	8	13	9	12	2	3	14	4	11	5	7	1	
	13	9	2	4	5	14	11	8	10	3	12	1	7	6	1	

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## Incorporation method and its effect on wheat using common IBS herbicides

The efficacy of many pre-emergent herbicides relies on the ability to incorporate them into the soil at sowing. But in no-till systems knife points and to a greater extent, disc openers, provide minimal soil disturbance at sowing to limit moisture loss. This consequently also limits herbicide incorporation. Crop damage has been reported as a result and this trial is examining these reports.

The trial is a comparison of double disc versus tynes on crop safety across a number of common IBS herbicides. Common IBS treatments and some mixtures were applied on 28 June 2011 and Lincoln Wheat was sown into the plots.

The plots were sown to wheat (Lincoln) at 80 kg/ha with 100kg DAP on 28 June 2011.

Assessments of crop safety will be done between the controls and the herbicides. At sowing the double disc seemed to throw almost as much soil as the tyne implement. Mouseoff was applied post sowing.

Crop establishment numbers are lower in the disc seeder treatments, and greenseeker measurements are being conducted to assess crop vigour.

Chemicals were applied using Lechler IDK 120 015 air induction nozzles, 3 bar, with 100L water/ha.

### **Treatments:**

- 1 = 3 l/ha TriflurX
- 2 = 35 g/ha Logran
- 3 = 2.5 l/ha Boxer Gold
- 4 = 118 g/ha Sakura
- 5 = 1.8 l/ha Stomp + 1.6 l/ha Avadex
- 6 = Control

T = tyne, sown at 5km/hr  
D = double disc, sown at 5 km/hr

### **Plot design :**

Plots 2m x 12m, 3 replicates

5	5	1	1	3	3	4	4	2	2	6	6
4	4	2	2	1	1	6	6	3	3	5	5
6	6	4	4	1	1	5	5	2	2	3	3
D	T	T	D	D	T	D	T	T	D	D	T

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## Fleabane management

Fleabane has emerged as one of the major difficult-to-control weeds in Australia. During the last summer there has been an explosion of fleabane in southern New South Wales. For many growers, fleabane is a new weed added to their control list.

The fleabane problem is thought to have arisen from the adoption of no-till farming systems. A single mature flaxleaf fleabane plant produces over 110,000 seeds. This weed has a high dispersal capability due to a pappus. The light-weight seed is easily dispersed long distances by a combination of strong wind and surface run-off, and through water movement in irrigation channels and waterways, resulting in the rapid spread of fleabane across large agricultural landscapes.

Dr Hanwen Wu will share his previous experience on fleabane research and discuss an integrated approach to address this emerging weed issue.

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## Soil pit - water infiltration and root growth

The soil pit shows a typical red earth or red kandosol of the Wagga region.

Last year we talked about climate change on a geological time scale and how it has influenced the properties of Riverina soils. We noted that there was lack of roots in the buried soil (yellow clay) that started at about 80 centimetre depth. Questions were raised about water use efficiency in this soil type, so recent information from a nearby trial and a 'show and tell' on water infiltration will be provided.

Topics to be addressed include:

- How easily does water move through the A horizon?
- How easily does water move through the plough pan?
- How easily does water move through the B horizon?
- How easily does water move through the buried soil?

Dye has been allowed to infiltrate the soil at different depths to show the pattern of water flow.

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## Selecting the right pasture species for your farm

Resilient and productive pastures underpin livestock production. They also underpin crop production enterprises by reinvigorating the soil.



It is estimated that for optimal productivity, the legume content of pastures should be 20-40 percent of total pasture biomass. But recent research has shown the legume content of many pastures across the South West Slopes is closer to 5%.

Selecting the right pasture for the climate, soils and management of the property is a key step in optimising pasture productivity.

### **Research Information:**

Over the past 20 years, Department of Primary Industries (NSW DPI) and other institutions around the country set about developing and releasing a greater range of annual legume species and cultivars to help increase the legume component of Australian pastures.

Farmers are now benefitting from this exhaustive research program with an unprecedented range of annual legume species and cultivars commercially available. Each species has been developed for a unique set of environmental and farming system circumstances.

Broadly speaking, pasture plants developed for the cropping zone cover a rainfall range of 250-600 millimetres of average annual rainfall and are either targeted at ley (eg. one crop year one pasture year rotation), forage (one pasture year of forage legume to extend the cropping phase) or phase farming systems (a sequence of pasture years followed by a sequence of crop years). Conversely, species targeted at high rainfall (>600 mm) permanent pastures are designed to persist for long periods of time (>10 years).

A range of pasture legume species are described below for different environmental and farming system circumstances.

### **Low to medium rainfall cropping systems:**

Annual legume varieties in this group flower between 80 and 115 days after a mid May sowing. The early maturity is designed to ensure seed set under adequate moisture conditions while trying to also maximise the growing season length. In these plants, hard seed levels between 40-70% are most suitable for phase farming and include subclover varieties such as Izmir, Nungarin, Losa, Dalkeith, Urana and Coolamon, along with the French serradella varieties Margurita and Erica, gland clover variety Prima, balansa clover variety Frontier and rose clover variety Hykon.

In ley farming systems the pasture varieties need to have much higher hard seed levels (>70%). Examples include, barrel medic varieties Caliph and Jester, burr

medic varieties Scimitar and Cavalier, stand Medic variety Herald, biserulla variety Casbah, yellow serradella varieties Charano and Santorini, and bladder clover variety Bartolo. These varieties can be also be used in phase farming but in some cases second year regeneration is poor due to their high levels of hard seed. To manage the high hard seed levels some farmers sow the legumes in year 1, crop the area in year 2 and then return the area to pasture in years 3, 4 and 5 before returning to a cropping phase.

Increasingly, farmers are experimenting with these hard-seeded species, establishing them by 'twin-sowing', planting un-scarified seed under a crop in year one to have the legume regenerate by itself in year two.

**Medium to high rainfall cropping systems:**

Annual legume varieties in this group flower between 115 and 145 days after a mid May sowing. These varieties often have lower levels of hard seed and are subject to more pest and disease pressure. In phase farming systems these include subclover varieties such as Seaton Park, Bindoon, York, Junee, Riverina, Campeda and Goulburn, and balansa clover varieties Paradana and Bolta.

In ley farming systems the pasture varieties chosen need to have higher hard seed levels than the varieties suitable for phase farming. Examples of these varieties include biserulla variety Mauro, and barrel Medic variety Jester.

**Speciality varieties:**

There are a number of niche environments that require specific adaptation:

- (i) Those suitable for waterlogged soils include subclover cultivars Riverina and Gosse, balansa clover varieties Frontier, Paradana and Bolta.
- (ii) Those suited to heavy clay soils such as subclover cultivars Clare, Rosedale, Antas and Mintaro, and Burr medic varieties Scimitar and Cavalier, as well as the varieties adapted to waterlogging listed above.
- (iii) Those suited to forage systems (one year option sown at high sowing rates) such as French serradella variety Cadiz, subclover variety Antas, balansa clover variety Bolta, arrowleaf clover varieties Zulu and Cefalu, Persian clover varieties Prolific, Nitro plus, Leeton and Laser, crimson clover variety Caprera and berseem clover variety Elite II.
- (iv) Other specialty varieties include biserulla varieties Casbah and Mauro which can be grazed at high stocking rates to remove problem weeds such as herbicide resistant ryegrass, or
- (v) Yellow serradella variety Santorini which can be sprayed out shortly after the season break and germination with Spray.Seed or Glyphosate to kill problem weeds. In this example Santorini will continue to germinate seed after weed kill has occurred leaving the paddock with a pure serradella pasture.

**Soil pH:**

Soil pH is also an important consideration when choosing pasture varieties as many NSW soils are acidic. As a general rule Strand and Barrel medic need a pH >5.5 (CaCl<sub>2</sub>) while Burr medic requires a soil pH >5.0 (CaCl<sub>2</sub>). The clovers are the next most tolerant of acid soils, while yellow serradella varieties are the most tolerant of acid soils. But caution must be used when soils are acidic, as not all acid soils are the same. For example, many acid soils in NSW are susceptible to manganese toxicity and whilst yellow serradella is tolerant of very acid soils, it is less tolerant of manganese toxicity. Growers should also be aware that some legume species are tolerant of acid soils, but the nitrogen-fixing bacteria they rely on for nitrogen are less tolerant.

**Companion species:**

Annual legume species will typically be planted as part of a mixture, particularly where the pasture stand is to last more than one year. This can be a mixture with;

- i) Other legume species to ensure the range of conditions experienced within a paddock and across years is better managed. For example, recent research shows that small-seeded species such as balansa or gland clover should be included with more traditional species such as subclover to help ensure legume seed-set in the establishment year. Smaller seeded species are prolific seeders and are more tolerant of dry spring conditions than species such as subclover, where the seed size is about five times greater. In this example using a mixture of species better manages climate variability, but other variable factors including soil type, pH and waterlogging variation within certain paddocks can be addressed using a similar approach.
- ii) Other forage species, such as lucerne, phalaris, chicory or cocksfoot. Where annual legumes are planted with non-legumes such as grasses or chicory, they fulfil a dual role of increasing productivity for livestock as well as feeding nitrogen to the non-legumes. The principles for using annual legumes in a mixture with other classes of species is the same as described in (i). But take care to ensure the mixture of annual legumes do not out-compete the perennial species that are typically slower to establish. A lower seeding rate of annual legumes may be necessary when including them in mixtures with perennial species. Alternatively monoculture row spacings of legume and non-legume plans could be undertaken to reduce between species competition.



**Plot design:**

Gate ↑

<b>12</b>	<b>11</b>	<b>10</b>	<b>9</b>	<b>8</b>	<b>7</b>	<b>6</b>	<b>5</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>
Gland Prima	Eastern Star Sothis	Berseem Elite II	Arrowleaf Zulu II	Balansa Bolta	Bladder Bartolo	Biserrula Casbah	Yell. Saradella Avila	Pink Saradella Erica	Subclover Riverina	Subclover Urana	Subclover Izmir

**Walkway**

<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>	<b>17</b>	<b>18</b>	<b>19</b>	<b>20</b>	<b>21</b>	<b>22</b>	<b>23</b>	<b>24</b>
Barrel Medic Jemalong	Snail Medic Silver	Lucerne L56	Lucerne Sardi 10	Chicory Puna II	Plantain Lancelot	Phalaris Landmaster	Phalaris Atlas	Cocksfoot Kasbah	Cocksfoot Currie	Mixture Kas/Luc/Sub	Rows Tedera Lotus

Road ↑

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## Crop sequencing

Most grain growers recognise they should be including broadleaf species in their cropping program to reduce disease incidence for cereals, control weeds, and improve soil nitrogen fertility. But the area sown to pulse legume crops or canola has dramatically declined in the past 8-10 years.

This project examines the productivity and financial implications of growing break crops and pastures legumes in various genotype × environment × management (G×E×M) combinations in cereal-based systems, to re-evaluate the full value of integrating broadleaf species in the sequence.

### **Project aims:**

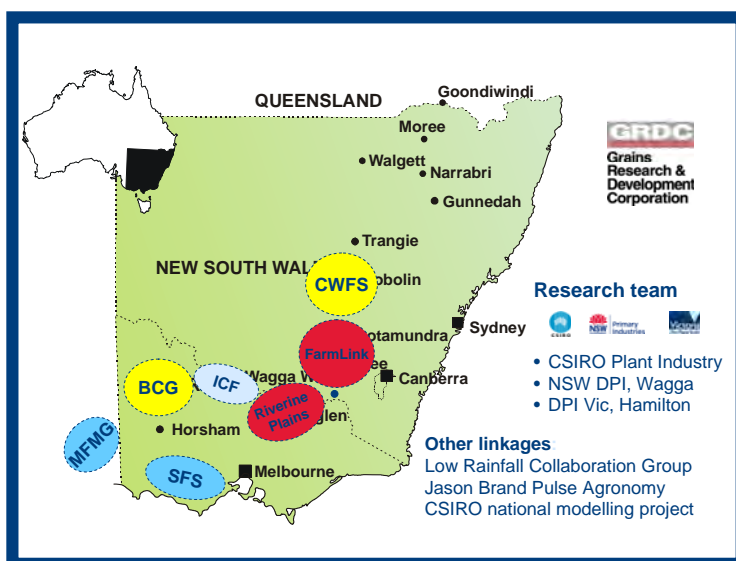
1. To quantify the rotational **benefits of broadleaf crops** or pastures for cereals through **participatory research**.
2. To identify whether **profitable broadleaf cropping sequence** are available as **alternatives** to continuous cereal cropping.
3. To provide **guidelines** for grain growers and their advisers **when** and **where** to include **what** break crops to achieve the best outcome.
4. To increase the **diversity** of species grown in cropping sequences.

### **Break crops:**

- Canola
- Lupins
- Field peas
- Vetch
- HD legumes (Berseem, Balansa and Subclover)

### **Break crop benefits to be measured:**

- Soil available nitrogen to crop at sowing
- Problem weeds control
- Disease break
- On-farm profit over three years

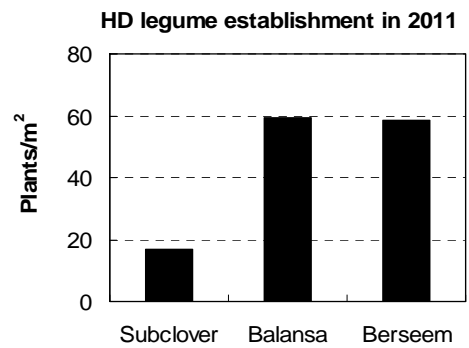
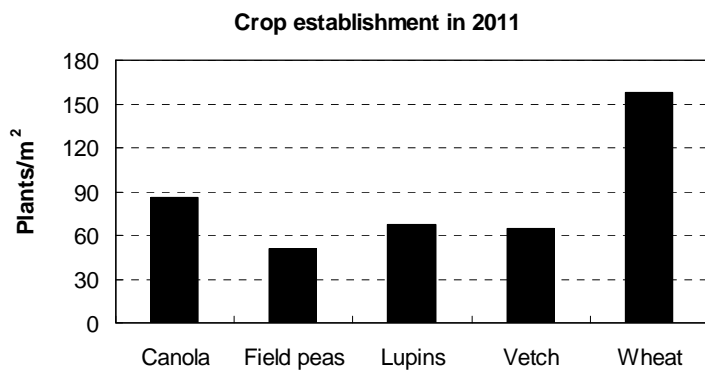


The expected outcome is an increased frequency of inclusion of broadleaf species in the farming systems of the southern region to improve the stability of grain production and system profitability.

### Crop sequence over next 3 years

	2011	2012	2013
Single break	Break crops	Wheat	Wheat
	Wheat	Break crops	Wheat
Double breaks	Canola	Break crops	Wheat
	Break crops	Canola	Wheat
Control	Continuous cereals		

- Field pea treatment will be split into grain harvest and brown manure
- Vetch and HD legumes treatments will be split into hay cut and brown manure



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**Plot design:**

Crop sequence experiment at Graham Centre Demo site

1m	11m	22m	32m
1 T3 Field peas Gunnyah	18 T15 Canola Hyola 555	35 T11 Lupins Jenabillup	1m
2 T7 Wheat Lincoln	19 T8 Wheat Lincoln	36 T10 Wheat Lincoln	7
3 T12 Field peas Gunnyah	20 T13 Pastures	37 T8 Wheat Lincoln	14
4 T5 Pastures	21 T14 Canola Hyola 555	38 T1 Canola Hyola 555	21
5 T2 Lupins Jenabillup	22 T4 Vetch Morava	39 T9 Wheat Lincoln	28
6 T17 Wheat Lincoln	23 T16 Canola Hyola 555	40 T4 Vetch Morava	35
7 T4 Vetch Morava	24 T5 Pastures	41 T17 Wheat Lincoln	42
8 T10 Wheat Lincoln	25 T9 Wheat Lincoln	42 T12 Field peas Gunnyah	49
9 T13 Pastures	26 T7 Wheat Lincoln	43 T15 Canola Hyola 555	56
10 T8 Wheat Lincoln	27 T8 Wheat Lincoln	44 T14 Canola Hyola 555	63
11 T1 Canola Hyola 555	28 T11 Lupins Jenabillup	45 T3 Field peas Gunnyah	70
12 T11 Lupins Jenabillup	29 T2 Lupins Jenabillup	46 T16 Canola Hyola 555	77
13 T16 Canola Hyola 555	30 T1 Canola Hyola 555	47 T13 Pastures	84
14 T14 Canola Hyola 555	31 T12 Field peas Gunnyah	48 T2 Lupins Jenabillup	91
15 T9 Wheat Lincoln	32 T3 Field peas Gunnyah	49 T6 Wheat Lincoln	98
16 T15 Canola Hyola 555	33 T10 Wheat Lincoln	50 T5 Pastures	105
17 T8 Wheat Lincoln	34 T17 Wheat Lincoln	51 T7 Wheat Lincoln	112
			118

## Genetic improvement in Brassica

Plots have been established to demonstrate some basic principles around canola genetic improvement and agronomy. Trial plots were sown on 26 May 2011 and 15 June 2011.

The demonstration shows a small range of commercial varieties released between 1987 and 2008. It demonstrates the move from open-pollinated canola varieties to F<sub>1</sub> hybrids and also highlights the move from public-sector to private-sector breeding for both canola and *B. juncea* (mustard).

Other key points of the demonstration include:

1. Mustard with canola quality is an alternative to canola in drier areas as shown in the demonstration plots.
2. Release of herbicide tolerant and GM-herbicide tolerant canola varieties (no RoundUp Ready varieties are included in this demonstration).
3. Poor seed quality in sample sown for TAWRIFFIC-TT has resulted in poor emergence.
4. Later sowing has delayed development (both sowings were later than the surrounding CB-JARDEE crop sown on 6 May 2011).
5. The varieties have different levels of blackleg resistance, some of which have been very durable, others which have not.
6. Blackleg resistance can come from closely-related species to canola, such as the *Brassica rapa* genotype NU-41737-502 selected in the GRDC-funded "National Brassica Germplasm Improvement Program" (NBGIP).
7. NBGIP project is working particularly on drought tolerance and blackleg resistance, to provide new genes for breeders to incorporate into varieties.



**Plot design:**

→ N

NU-41737-502	46C76	Tawriffic-TT	Hyola50	CB_Trigold
Oasis-CL	Surpass400	Dunkeld	Oscar	Wesbarker

Block 1

sown: 26 May

NU-41737-502	46C76	Tawriffic-TT	Hyola50	CB_Trigold
Oasis-CL	Surpass400	Dunkeld	Oscar	Wesbarker

Block 2

sown: 15 June

<b>Species</b>	<b>Common Name</b>	<b>Name</b>	<b>Type</b>	<b>Herbicide tolerance</b>	<b>Origin</b>	<b>Release year</b>
B. napus	Canola	WESBARKER	Open-pollinated	Conventional	AgWA	1987
B. napus	Canola	OSCAR	Open-pollinated	Conventional	NSWAg	1992
B. napus	Canola	DUNKELD	Open-pollinated	Conventional	AgVIC	1993
					Pacific	
B. napus	Canola	SURPASS400	Open-pollinated	Conventional	Seeds	2000
B. napus	Canola	46C76	Open-pollinated	Conventional	Pioneer	2004
B. napus	Canola	CB-TRIGOLD	Open-pollinated	Triazine-tolerant	CBWA	2004
					Pacific	
B. napus	Canola	HYOLA50	Hybrid	Conventional	Seeds	2007
					Canola	
B. napus	Canola	TAWRIFFIC-TT	Open-pollinated	Triazine-tolerant	Alliance	2008
	Canola-quality					
B. juncea	mustard	OASIS-CL	Open-pollinated	Clear-Field	VicDPI	2008
B. rapa	Rapa	NU-41737-502	Open-pollinated	Conventional	Unknown	Not a cultivar

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## Managing disease in pulse and canola crops in 2011

Higher than average rainfall over much of southern New South Wales during the growing season of 2010 resulted in mixed fortunes for pulse and oilseed crops. Early breaking rains in autumn allowed crops to be sown at the recommended sowing times and continued rainfall events during winter and spring provided excellent growing conditions for crops. But the frequent rainfall events also provided ideal conditions for disease to develop, especially foliar diseases. This is despite very low levels of disease being observed in crops in previous years. The late rains that persisted into harvest resulted in high levels of pod and subsequent seed infection by pathogens.

### **Pulse crops**

Pulse disease pathogens can survive in seed, stubble and soil. Lessons from 2010 have shown that each of these can be a significant inoculum source for a disease outbreak under favourable conditions, so every effort should be made to lower the potential for disease before the crop is sown and ensure disease levels are kept to a minimum. The following strategies will be important in southern NSW in 2011, and are relevant to all southern regions.

- 1. Crop rotation:** Ensure an adequate break between pulse crops in the same paddock. The pathogens that cause brown leaf spot of lupin and blackspot of field pea can survive in the soil for extended periods. Allow a break of at least three, but preferably four years, between these crops to allow spore numbers in the soil to decline.
- 2. Paddock selection:** Where possible separate this year's lupin, field pea or chickpea crop from the paddock of the same crop last year. Old trash and dust from harvest, which can harbour disease pathogens, can easily be blown into adjoining paddocks and increase the potential for disease epidemics to develop. Air-borne spores of the blackspot pathogen can also be released from old trash, which can be readily blown into adjoining paddocks and initiate disease outbreaks in new season crops.
- 3. Seed for sowing:** Use of good quality seed for sowing will be important in 2011. Late rains in southern NSW in 2010 resulted in high levels of seed infection by disease pathogens. This may not always be obvious, with apparently healthy seed often harbouring low to moderate levels of infection. Sowing sub-standard seed can result in the early development of disease and reduced plant establishment. If seed is to be retained for sowing on farm in 2011 it would be preferable to grade seed to remove small or discoloured grains. Most often it is the small, shrivelled, discoloured seed that will be heavily infected by any plant pathogens and will succumb to disease pressure first. Grading seed can also remove sclerotes which may be present. These are the survival bodies for the sclerotinia stem rot pathogen.
- 4. Use a fungicide seed dressing:** Use a registered seed dressing on seed for sowing. Seed dressings provide 6-8 weeks protection from disease and can reduce levels of transmission of seed-borne pathogens.
- 5. Strategic use of foliar fungicides:** There are foliar fungicides registered for use on field pea, lupin and chickpea to control a number of diseases. Best results from use of foliar fungicides rely on correct identification of the target pathogen; correct timing of application and selection of the most appropriate fungicide product.
- 6. Select the appropriate variety:** Use crop varieties that are appropriate for the district and have levels of disease resistance that are adequate.
- 7. Follow recommendations:** Follow the recommended sowing dates, rates and agronomy information for your variety in your district. Years of research have been conducted in the development of new crop varieties to ensure performance is maximised.
- 8. Monitor crops regularly:** Inspect crops regularly for both plant and disease development. If disease symptoms appear early in a crop, this can serve as a

warning that a disease epidemic may develop and that management strategies may have to be implemented. Foliar fungicides work most effectively when applied early and disease levels are low. This is critical to allow penetration into the crop canopy and to suppress the disease. Observations from 2010 showed that even low levels of disease can develop very quickly into a disease epidemic and cause yield loss.

### **Canola disease**

Blackleg and sclerotinia are the main diseases of concern in southern NSW. Blackleg should be considered the main threat to canola production every year and the management of this disease is integral to canola production. The variability of strains within the blackleg pathogen population is huge, which enables the fungus to evolve with the release of new canola cultivars. This results in the 'breakdown' of resistance genes within canola cultivars with time and the continual need to monitor for disease within crops.

The disease cycle of sclerotinia stem rot is complex compared to other plant diseases, hence the sporadic appearance of the disease between years and districts. For sclerotinia stem rot to develop within a canola crop a series of events have to coincide including germination and production of fruiting structures (apothecia) that release spores, infection of flower petals and senescence of infected flower petals into the crop canopy. Spores of the sclerotinia pathogen cannot infect canola leaves and stems directly. They require petals as a food source for spores to germinate, grow and colonise the petal. When the petal eventually drops, it may become lodged in a leaf axil or at branch junctions along the stem. If conditions are moist the fungus grows out of the petal and invades healthy stem tissue which will result in a stem lesion and production of further sclerotia within the stem which will be returned to the soil after harvest.

So for sclerotinia stem rot to develop, soil moisture and temperature conditions have to be favourable. This has to occur in the presence of a flowering canola crop, and there has to be moisture present for the spores to settle on and colonise flower petals, and moisture has to be present for fallen flower petals to become lodged and invade canola stems.

### ***Recommendations for managing blackleg in 2011***

- In 2011 growers and advisors can consult a number of information sources regarding regional blackleg severity (NVT website), the regional performance of commercial cultivars (NVT website) and management practices to decrease blackleg severity – Blackleg Risk Assessor (see GRDC website). This information is in addition to the National Blackleg Ratings that are published each year.
- Separating this year's canola crop from last year's stubble, rotating to a different canola cultivar every two years, and using either a fungicide seed dressing or fungicide amended fertiliser are all effective strategies for managing blackleg.
- In the future this existing information will also include recommendations for foliar fungicide usage in high disease risk areas and information on the rotation of canola cultivars and resistance grouping of cultivars.

### ***Recommendations for managing sclerotinia in 2011***

- Canola crops grown in high rainfall areas should be monitored closely for sclerotinia stem rot. Good growing conditions for canola usually mean good conditions for disease. If apothecia are detected within crops, this is a warning that the sclerotinia pathogen is present.
- Management of sclerotinia will not be needed every year and only high yielding crops in high disease risk districts will require foliar fungicides and give an economic return

from application. If foliar fungicides are to be applied for managing sclerotinia, consider two applications (first at 20 – 30% flowering and the second 10 days later).

- Dense crops, grown in high rainfall districts with a history of sclerotinia stem rot are at most risk.
- If canola crops developed sclerotinia in 2010, the 2011 canola crop should be regarded as a risk of developing disease.

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**Main paddock crop details**

<b>Date</b>	<b>Activity</b>
2 March 2011	Gypsum spread @ 300 kg/ha
26 April 2011	Harrow burn
27 April 2011	Paddock sown with airseeder (375mm row spacing/tynes) Canola Jardee TT @ 2.20 kg/ha Urea @ 30 kg/ha MAP @ 80 kg/ha
17 July 2011	Urea spread @ 55 kg/ha
4 August 2011	Urea spread @ 70 kg/ha
	Mouseoff spread at varying times (April-June) to manage mouse populations.

# EH GRAHAM CENTRE

*for Agricultural Innovation*

The Graham Centre field site is developed in consultation with the Industry Steering Committee.

- Mark Harris, Chair (Rural Management Strategies Pty Ltd)
- Greg Condon (Grassroots Agronomy)
- Warwick Nightingale (Delta Agribusiness)
- Peter McInerney (3D-Ag)
- Ross Henley (Bayer Australia)
- Mike O'Hare (FarmLink and farmer)
- Neil Durning (Ag/n/Vet Services)
- Terry Edis (Elders)
- Ben Hogg (Landmark)
- Phil Bowden (NSW DPI)
- Jim Mellor (CSU)
- Sergio Moroni (CSU)
- Deirdre Lemerle (Graham Centre)
- Helen Burns (Graham Centre)
- John Angus (farmer)

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