Spring Sowing Varietal Evaluation of Wheat, Barley and Triticale for High Rainfall Zones of SE Australia

MONARO FARMING SYSTEMS

Grains Research & Development Corporation

Tender Title - 2.3.03 Southern Agribusiness Trial Extension Network

Tender No. jeff01

FINAL REPORT APRIL 2010

AgriTech Researching Agriculture

Prepared by
Nancy Spoljaric – Project Officer
Monaro Farming Systems
March 2010

TABLE OF CONTENTS

Photo 1 – CSIRO scientists inspect Delegate trial site

TRIAL SUMMARY - COOMA

Agritech Crop Research (NSW) Pty Ltd
Trial Summary Sheet - Cereal Variety Evaluation - Trial ID: W09-257

Trial Details

Co-operator Details
Name: Damien Rudd
Phone No.: 02 6454 6303

Sowing Details

Crop	Wheat/ Triticale/ Barley
Cultivar	Various- as per protocol
Previous Crop(s); Year	Forage Rape; 2008
Date of Sowing	6/08/2009
Rate of Sowing (kg/ha)	As per protocol/ variety
Plot Size	1.34 x 10 m
Method of Sowing	Direct Drill
Sowing Depth	3-3.5 cm
Seeder Make	PJ Green
Row Spacing	220 mm
Soil Moisture - At Surface	Marginal
Soil Moisture - Below Surface	Marginal
Seed Bed Description	Cloddy

Soil Analysis

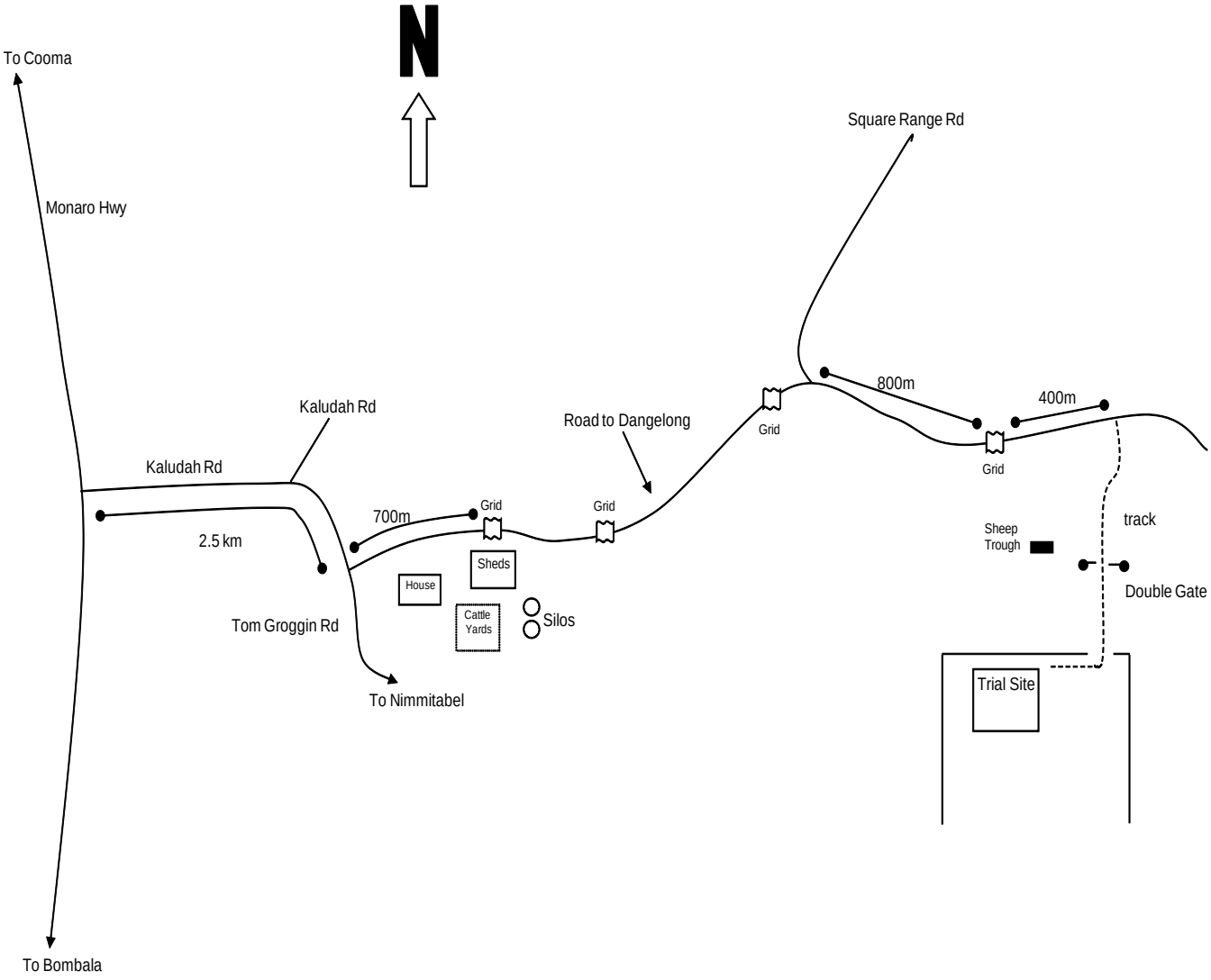
Colour (Munsell)	Dark Grey
Texture	Heavy Clay (3.5)
pH ($CaCl_2$)	6.7
Organic Carbon %	2.46
Nitrate Nitrogen mg/kg	58
Sulphate Sulfur (KCl_40) mg/kg	34.1
Phosphorous (Colwell) mg/kg	121
Potassium (Amm-acet) Meq/100g	1.1
Calcium (Amm-acet) Meq/100g	25.85
Magnesium (Amm-acet) Meq/100g	30.54
Sodium (Amm-acet) Meq/100g	0.53
Aluminium (Amm-acet) Meq/100g	0
Cation Exch Cap Meq/100g	58.02

Deep N Status (0-60 cm)	
Ammonium Nitrogen mg/kg	10
Nitrate Nitrogen mg/kg	39

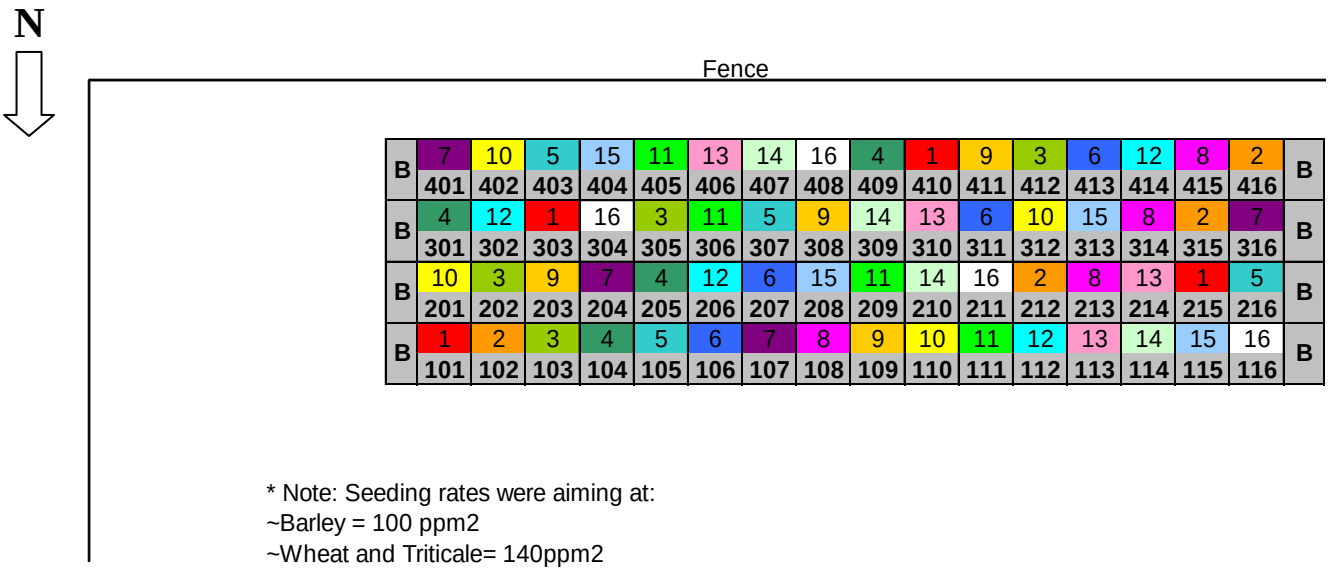
Trial Maintenance

Date	**Crop Stage**	**Products Used**	**Rate/ha**
5/08/2009	Knockdown	Roundup	2 L
		Hammer	75 mL
6/08/2009	Incorporated below seed (IBS)	Granulock Supreme Z (treated with Impact)	100 kg
		Boxer Gold	2.5 L
		Triflur Xcel	800 mL
		Lorsban	1 L
4/11/2009	GS16,24-51	MCPA LVE (Agritone)	650 mL
		Starane 200	300 mL
		Wetter	1000 mL/ 100L
		Slingshot	1 L
		Roundup Powermax (only buffers sprayed)	2 L

Site Directions



Plot Map



B	7	10	5	15	11	13	14	16	4	1	9	3	6	12	8	2	B
	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	
B	4	12	1	16	3	11	5	9	14	13	6	10	15	8	2	7	B
	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	
B	10	3	9	7	4	12	6	15	11	14	16	2	8	13	1	5	B
	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	
B	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	B
	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	

* Note: Seeding rates were aiming at:
~Barley = 100 ppm2
~Wheat and Triticale= 140ppm2

Varietal List

No.	Seed Variety	Sowing Rate (kg/ha)*	
1	Ventura	67	Wheat
2	Espada	70	Wheat
3	Gladius	71	Wheat
4	Waagan	60	Wheat
5	Hunter	69	Wheat
6	Livingston	66	Wheat
7	Axe	78	Wheat
8	Preston	84	Wheat
9	Lincoln	88	Wheat
10	Gregory	92	Wheat
11	Tulla	65	Barley
12	Hindmarsh	63	Barley
13	Flagship	60	Barley
14	Buloke	79	Barley
15	Jaywick	83	Triticale
16	Speedee	79	Triticale

Harvest Bag Numbers

B	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64
	401	**402**	**403**	**404**	**405**	**406**	**407**	**408**	**409**	**410**	**411**	**412**	**413**	**414**	**415**	**416**
B	3	7	11	15	19	23	27	31	35	39	43	47	51	55	59	63
	301	**302**	**303**	**304**	**305**	**306**	**307**	**308**	**309**	**310**	**311**	**312**	**313**	**314**	**315**	**316**
B	2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	62
	201	**202**	**203**	**204**	**205**	**206**	**207**	**208**	**209**	**210**	**211**	**212**	**213**	**214**	**215**	**216**
B	1	5	9	13	17	21	25	29	33	37	41	45	49	53	57	61
	101	**102**	**103**	**104**	**105**	**106**	**107**	**108**	**109**	**110**	**111**	**112**	**113**	**114**	**115**	**116**

		Bag Numbers				
1	Ventura	1	58	11	40	Wheat
2	Espada	5	46	59	64	Wheat
3	Gladius	9	6	19	48	Wheat
4	Waagan	13	18	3	36	Wheat
5	Hunter	17	62	27	12	Wheat
6	Livingston	21	26	43	52	Wheat
7	Axe	25	14	63	4	Wheat
8	Preston	29	50	55	60	Wheat
9	Lincoln	33	10	31	44	Wheat
10	Gregory	37	2	47	8	Wheat
11	Tulla	41	34	23	20	Barley
12	Hindmarsh	45	22	7	56	Barley
13	Flagship	49	54	39	24	Barley
14	Buloke	53	38	35	28	Barley
15	Jaywick	57	30	51	16	Triticale
16	Speedee	61	42	15	32	Triticale

Trial Treatments

No.	Treatment	Sowing Rate (kg/ha)*
1	Ventura	67
2	Espada	70
3	Gladius	71
4	Waagan	60
5	Hunter	69
6	Livingston	66
7	Axe	78
8	Preston	84
9	Lincoln	88
10	Gregory	92
11	Tulla	65
12	Hindmarsh	63
13	Flagship	60
14	Buloke	79
15	Jaywick	83
16	Speedee	79

* Note: Seeding rates were aiming at:
~Barley = 100 ppm2
~Wheat and Triticale= 140ppm2

Yield Analysis of Variance (ANOVA)

Crop Name		Cereals	
Part Rated		Crop	
Rating Date		20/01/2010	
Rating Type		Yield	
Rating Unit		t/ha	
Crop Stage Majority		GS99	
No.	Name		
1	Ventura	1.0	de
2	Espada	1.0	efg
3	Gladius	1.2	cde
4	Waagan	1.4	bcd
5	Hunter	1.1	de
6	Livingston	1.0	de
7	Axe	1.2	cde
8	Preston	0.6	fg
9	Lincoln	1.3	cde
10	Gregory	1.0	def
11	Tulla	1.5	bc
12	Hindmarsh	1.7	ab
13	Flagship	1.5	bc
14	Buloke	2.0	a
15	Jaywick	0.6	fg
16	Speedee	0.6	g
Prob (F)		0.0001	
LSD (P=0.05)		0.426	
CV		25.8	

*Means followed by same letter do not significantly differ (P=0.05, LSD)
*Mean comparisons performed only when AOV Treatment P(F) is significant at mean comparison OSL.

Yield Statistical Analysis

AOV For Cereals Crop Jan-20-2010 Yield t/ha GS99					
SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F	Prob(F)
Total	63	13.884944			
Replicate	3	0.120691	0.04023	0.452	0.717
Treatment	15	9.761029	0.650735	7.315	0.0001
Error	45	4.003223	0.088961		

Grain Quality Data

								Wheat / Triticale						Barley							
Data Entry Order	Treatment Name	Variety	Bag No.	Weight of 100 grains (g)	1000 Grain Weight (g)	Hectolitre weight (kg)	0.5L Weight in agtator	Weight below screen	Screenings (% w/w)	% Cracked	Adjusted Screenings (%)	Moisture (%)	Protein (@ 11% moisture)	Weight above 2.5mm screen	Retention (%)	Weight below 2.2mm screen	Screenings (% w/w)	% Cracked	Adjusted Screenings (%)	Moisture (%)	Protein (@ 11% moisture)
1	Wheat	Ventura	1,58,11		0.00	64.4	322.0	27.5	8.5	5%	8.1	11.0	14.7								
2	Wheat	Espada	5,46,59		0.00	62.8	314.0	28.5	9.1	5%	8.6	10.8	15.3								
3	Wheat	Gladius	9,6,19		0.00	62.4	312.0	25.6	8.2	5%	7.8	10.9	15.8								
4	Wheat	Waagan	13,18,3		0.00	66.2	331.0	57.4	17.3	5%	16.5	11.1	14.8								
5	Wheat	Hunter	17,62,27		0.00	64.4	322.0	40.9	12.7	5%	12.1	10.7	15.7								
6	Wheat	Livingston	21,26,43		0.00	66.8	334.0	37.7	11.3	5%	10.7	10.9	16.1								
7	Wheat	Axe	25,14,63		0.00	64.4	322.0	17.7	5.5	5%	5.2	11.1	14.4								
8	Wheat	Preston	29,50,55		0.00	60.0	300.0	19.5	6.5	5%	6.2	10.6	15.8								
9	Wheat	Lincoln	33,10, 31		0.00	58.8	294.0	59.6	20.3	5%	19.3	10.5	16.1								
10	Wheat	Gregory	37,2,47		0.00	64.0	320.0	36.0	11.3	5%	10.7	11.0	14.0								
61	Barley	Tulla	41,34,23		0.00	57.6	288.0							83.8	29.1	49.7	17.3	5%	16.4	11.3	15.7
62	Barley	Hindmarsh	45,22,7		0.00	59.6	298.0							141.1	47.3	42.1	14.1	5%	13.4	11.5	13.3
63	Barley	Flagship	49,54,39		0.00	58.8	294.0							78.1	26.6	62.0	21.1	5%	20.0	11.1	16.2
64	Barley	Buloke	53,38,35		0.00	57.6	288.0							154.7	53.7	38.3	13.3	5%	12.6	11.3	13.5
73	Triticale	Jaywick	57,30,51		0.00	58.8	294.0	21.2	7.2	5%	6.9	10.5	16.3								
74	Triticale	Speedee	61,42,15		0.00	53.8	269.0	25.6	9.5	5%	9.0	10.7	16.0								

Number	Variety	Bag Numbers				
1	Ventura	1	58	11	40	Wheat
2	Espada	5	46	59	64	Wheat
3	Gladius	9	6	19	48	Wheat
4	Waagan	13	18	3	36	Wheat
5	Hunter	17	62	27	12	Wheat
6	Livingston	21	26	43	52	Wheat
7	Axe	25	14	63	4	Wheat
8	Preston	29	50	55	60	Wheat
9	Lincoln	33	10	31	44	Wheat
10	Gregory	37	2	47	8	Wheat
11	Tulla	41	34	23	20	Barley
12	Hindmarsh	45	22	7	56	Barley
13	Flagship	49	54	39	24	Barley
14	Buloke	53	38	35	28	Barley
15	Jaywick	57	30	51	16	Triticale
16	Speedee	61	42	15	32	Triticale

*Samples tested as composites, bag number is the first replicate (see table above)

TRIAL SUMMARY – DELEGATE

Agritech Crop Research (NSW) Pty Ltd
Trial Summary Sheet - Cereal Variety Evaluation - Trial ID: W09-258

Trial Details

Co-operator Details
Name: John Jeffreys
Phone No.: 0428 588 143

Sowing Details

Crop	Wheat/ Barley/ Triticale
Cultivar	Various- as per protocol
Previous Crop(s); Year	Field Peas; 2008
Date of Sowing	7/08/2009
Rate of Sowing (kg/ha)	As per treatment list
Plot Size	1.34 x 10 m
Method of Sowing	Direct Drill
Sowing Depth	2-2.5 cm
Seeder Make	PJ Green
Row Spacing	220 mm
Soil Moisture - At Surface	Dry
Soil Moisture - Below Surface	Moisture
Seed Bed Description	Friable

Soil Analysis

Colour (Munsell)	Brown- Grey
Texture	Heavy Clay (3.5)
pH ($CaCl_2$)	5.9
Organic Carbon %	1.7
Nitrate Nitrogen mg/kg	36
Sulphate Sulfur (KCl_40) mg/kg	13.1
Phosphorous (Colwell) mg/kg	40
Potassium (Amm-acet) Meq/100g	0.25
Calcium (Amm-acet) Meq/100g	7.76
Magnesium (Amm-acet) Meq/100g	0.94
Sodium (Amm-acet) Meq/100g	0.17
Aluminium (Amm-acet) Meq/100g	0
Cation Exch Cap Meq/100g	9.12

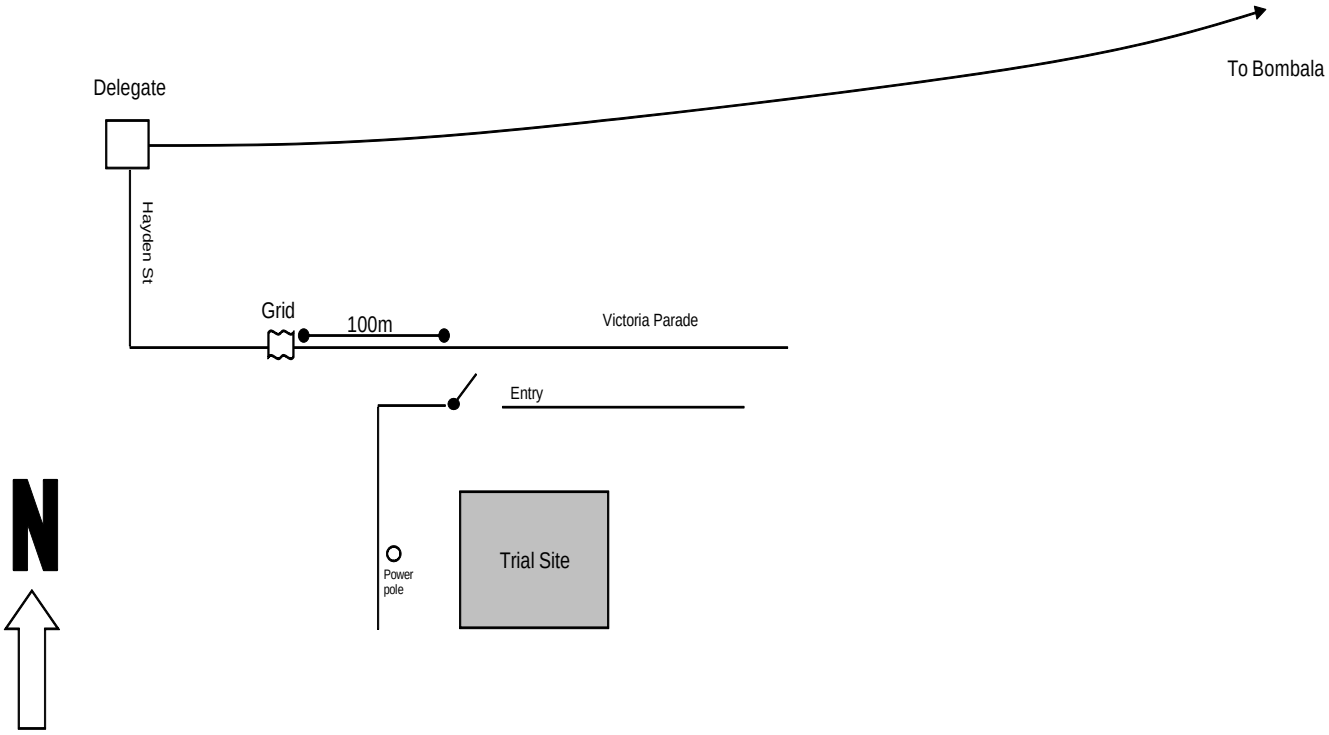
Deep N Status (0-60 cm)	
Ammonium Nitrogen mg/kg	2
Nitrate Nitrogen mg/kg	10

Trial Maintenance

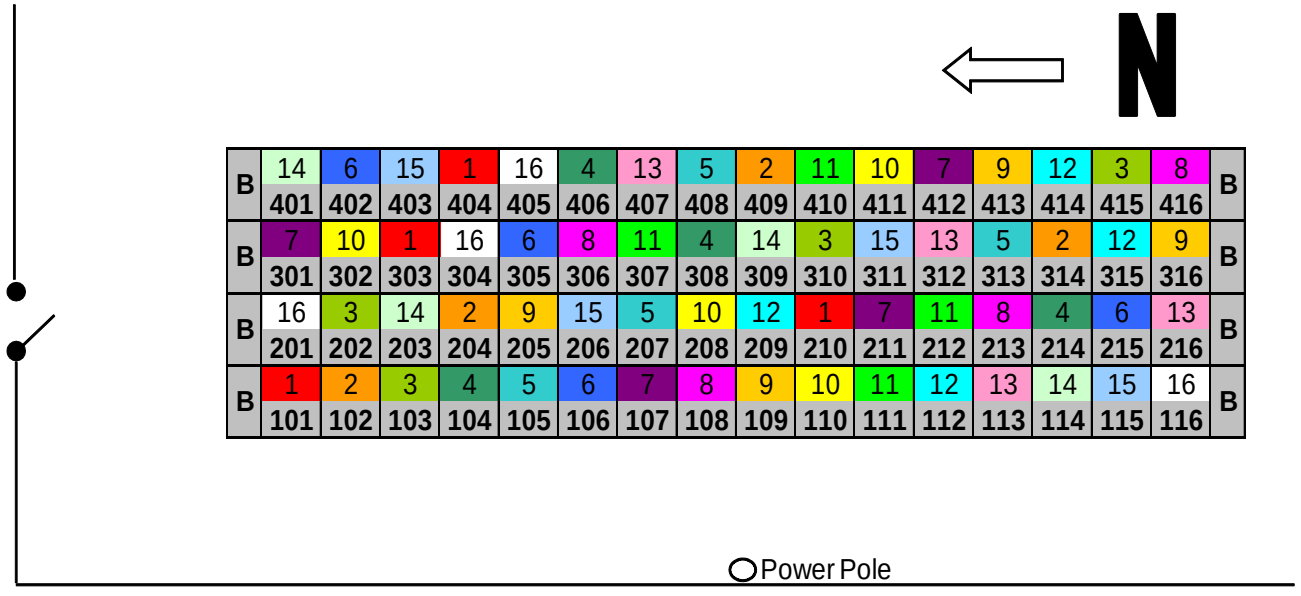
Date	Crop Stage	Products Used	Rate/ha
5/08/2009	Knockdown	Ken-up Dry	800 g
		Goal	75 mL
7/08/2009	Incorporated below seed	Granulock 15 (treated with Impact)	125 kg
	Incorporate before sowing	Boxer Gold	2.5 L
		Triflur Xcel	800 mL
		Lorsban	1 L
4/11/2009	GS16,24-51	Roundup Powermax (only buffers sprayed)	2 L

Not harvested due to hail and sheep damage

Site Directions



Plot Map and Varietal List



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B	7	10	1	16	6	8	11	4	14	3	15	13	5	2	12	9	B
	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	
B	16	3	14	2	9	15	5	10	12	1	7	11	8	4	6	13	B
	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	
B	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	B
	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	

B= Buffer

Varietal List

No.	Seed Variety	Sowing Rate (kg/ha)*
1	Ventura	67
2	Espada	70
3	Gladius	71
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5	Hunter	69
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* Note: Seeding rates were aiming at:
~Barley = 100 ppm2
~Wheat and Triticale= 140ppm2

Trial Treatments

No.	Treatment	Sowing Rate (kg/ha)*
1	Ventura	67
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* Note: Seeding rates were aiming at:
~Barley = 100 ppm2
~Wheat and Triticale= 140ppm2

Photo 2 - Growers inspect Delegate Trial Site

Grower Observations & Recommendations

COOMA TRIAL – Damian Rudd, "Dangelong"

The Cooma (Dangelong) trial was sown early August into dry soil.

Year to date rainfall had been 198.5mm to August. The previous fodder rape crop had used most available subsoil moisture – probing was too hard to access.

Sowing attempted to chase a little moisture around 100mm by planting deeper than normal, however no germination resulted. Some crusting of wheats resulted from this deeper planting on germinating rains around 22nd September 2009.

Barley varieties consistently showed greater vigour and biomass. Barley varieties also booted and flowered earlier than the wheats and trits however the triticales showed good straw height.

A late broadleaf spray did affect some of the early flowering barley varieties a little.
Unseasonably hot November winds did not coincide with any moisture further cruelling the crop. Rain events seemed to fall outside any beneficial growth stages.
In crop rainfall was 155.5mm.

My analysis of the spring crops planted nearby was that it was not profitable for these crops to be taken through to grain in such a low rainfall year and low grain prices. However when looking at the bigger picture these crops provided excellent quality grazing for lambs and cattle prior to the recent break. Now this has resulted in a self sown crop that has provided terrific grazing about 4 weeks earlier than expected from a grazing crop planted after the break allowing pasture a spell.

Also the weed control obtained through the cropping phase again will benefit when it is sown to pasture. In such bad times I see also that it is beneficial to have land that can be quite bare from sparse crops (such as rape) to be tyned and planted so as to reduce wind erosion.

DELEGATE TRIAL – John Jeffreys, "Delegate Station"

(Unfortunately a severe and unseasonable hail storm occurred late in the trial just prior to harvest. Damage was assessed to affect approx. 95% of the crop which prevented any further crop assessments and analysis. This likelihood was included as a risk factor in the project application and was unavoidable.)

Quicker maturing lines appear to have done better as expected with spring sowing. Longer lines such as Preston and triticale lower yield.

My thoughts are that barley may be better suited for the spring window, with more vigorous growth early in cold soil temps and quicker finish. Barley has done well in the trial and may particularly be suited to the heavier basalt soils as per the Cooma site. Also barley associated with slightly lower growing costs (rust control) and sound local feed demand.

There is a need to manage seasonal conditions better with spring cereal crops following brassicas. The benefit is weed control, however in dry years, moisture is limiting. Remember it is only a 5 month crop.

Delegate Station - Results for paddock in which trial plot was located

Costs	
Seed + treatments	$29.20 per ha
Fert	$68.4 per ha
Sprays	$70.57 per ha
Operations	$136.4 per ha
Interest	$12.18 per ha
TOTAL	**$316.75**

Income	
2.2 mt/ha @ $220 pmt	$484 per ha
Gross margin	$167.25 per ha

GSR 234 mm
WUE 9.5 kg/mm (water use efficiency)

Background on the issue of the potential of dual purpose cropping for the HRZ

With recent developments in biotechnology, rising land values and a downturn in the profitability of some traditional grazing enterprises, cropping is increasingly becoming a strategic option of farming systems in the High Rainfall Zone (HRZ) of SE Australia. Currently, farmers in the region are predominantly using long season cereal crops such as winter wheat and triticale for grazing (with some grain recovery) and summer fodder crops such as forage Brassica's. In recent years there has been a growing tendency to manage crops for both grazing and grain production.

It has been identified by some growers and advisers in the region that spring cereals have a real place in the dual purpose system (ie grazing and grain production). Spring cereals have a specific production window in the farming system following a summer Brassica crop, where agronomic ally the cereal is going into a disease and weed free environment. A short season variety can also capitalise on a predominantly spring/summer rainfall pattern typical of the Monaro region and become a vital part of an integrated farming system.
Initial grower results have been encouraging with production results up to 4 – 500 kg of lamb per ha from the Brassica and 4 – 5 mt grain per ha, providing annual gross margins over $1500 per ha.

Other benefits of spring sown cereals in SE HRZ include;

- Proximity to supply established dairy regions of the Bega Valley and East Gippsland (approx $50 pmt freight advantage);
- Water use efficiency of growing cereals in cooler environments (high kg grain per Ha);

- Method of generating additional income and enhancing production by manipulating the predominately spring / summer rainfall of the Monaro Region;
- High adaptability to integrate into a rotation (ie ability to double crop from previous summer and store moisture during low production winter months);
- Maximising production of arable land in the region;
- Achieving cereal production more in line with UK and North American systems where either long season winter wheats are grown (sown prior to winter) or quick maturing spring wheats (sown after winter).

The main issue or limitation for the Monaro region is that (other than limited grower experience), there is no scientific data, or validated, relevant research information available on what cultivars and / or varieties which perform best in this environment. Without this information it is very hard for farmers to build the capacity and improve/acquire knowledge in this area in order to exploit this opportunity and improve the resilience and profitability of their farming enterprises.

Dr John Kirkegaard – CSIRO Plant Industry

The data indicates a classic late water stress scenario. The low yield, small seeds and high protein suggests the crop hit severe stress some time during grain filling. The sowing date was fairly late and that alone will reduce yield potential significantly.

The crop did not emerge until September 2009 and conditions included only 155 mm in-crop rainfall and a hot dry spring.

A simple French and Schultz WUE (water use efficiency) equation would say (155mm rain – 110mm evaporation) x 20 kg/ha/mm = 900kg/ha yield potential.

Probably the evaporation might have been lower than 110mm due to the dry season, but even if we assume only 60mm evaporation (the absolute lowest) then (155mm – 60mm) x 20 = 1.9 t/ha.

Given the hot temperatures that the site experienced, this would have affected and reduced yield potential and taking this into account, the yields achieved were right in the expected yield potential area of 0.9 to 1.9 t/ha.

Income Analysis Report

Monaro Farming Systems – spring cereal trials 2009

Spring sown cereal trials were conducted by the Monaro Farming Systems (MFS) group in 2009 to review suitable varietal options within existing wheat, barley and triticale lines. Trials were established at Cooma on Damian & Anna Rudd's property and on Delegate Station owned by John Jeffreys and family. This is the first time that independent, validated research has been conducted on the Monaro looking at short season cereal crops and their potential profitability. The work has been funded by GRDC.

Long season cereals such as winter wheat and triticale are the dominant crop sown for grazing and grain recovery. Forage brassica is another crop type sown in the region specifically for grazing to finish lambs or feeder cattle, also providing an opportunity to clean up degraded pastures prior to sowing perennial species such as phalaris and sub clover. Spring sown cereals are therefore regarded as a suitable follow-up crop after forage brassica to extend the crop phase for cleaning up weeds and supply feed grain for on-farm purposes or cash sales.

The integration of these crops in a mixed farming system with pasture has become critical to ensure profit from both grazing and grain enterprises. However getting the balance right under variable climatic and market conditions remains an ongoing challenge for producers and the industry.

Agritech NSW from Young was contracted to conduct all activities associated with the trial such as sowing, crop assessments, harvest and statistical analysis. Unfortunately the Delegate trial failed due to hail damage and no results were available. Although the Cooma trial was harvested, a high degree of variability within the trial (CV 25.8%) means results should be interpreted with caution. This report therefore focuses on observations from the site rather than actual trial results.

Table 1. Cooma trial details

Crop type	Wheat, Barley & Triticale
Previous crop	2008 Forage Brassica
Date of sowing	6th August 2009
Conditions at sowing	Marginal moisture, cloddy
Sowing method	Direct drill - knife points/press wheels
Date of harvest	20th January 2010
Soil type	Heavy black clay
Phosphorus (Colwell)	121
pH ($CaCl_2$)	6.7
Soil nitrogen (0-60cm) kg/ha	382
Rainfall (in-crop) June-January	155.5mm

The trial was sown into marginal moisture following a forage brassica crop in 2008 with no subsoil moisture or significant follow-up rainfall. Establishment was patchy in a cloddy seedbed with some crusting of the topsoil from deeper moisture seeking at sowing. The trial germinated on rain in late September and produced good vigour and high dry matter through spring.

The site had a very high nitrogen status of 382 kg/ha of mineral N from a 0-60cm test, which contributed to excessive tillering and dry matter production. Without subsoil moisture or in-crop rainfall, there was limited moisture for grain fill and subsequently grain quality was poor with high screenings but good protein.

Discussion

The trial results were disappointing due to low yields and high screenings, primarily because of dry conditions through spring. Unseasonably hot winds during November also contributed to the low yields which, when combined with the dry subsoil and high biomass, meant many of the varieties were unable to form viable grain and fill properly.

Despite the difficult season, the trial has highlighted a number of **key factors** from which producers in the region can benefit:

- Cropping involves significant investment in inputs and operation costs. Ensure the risk profile is managed by reviewing factors such as previous crop, soil nitrogen and in particular, available soil water which is

critical when sowing spring cereal crops. If in doubt, adopt a lower risk livestock enterprise.

- Avoid sowing spring cereals after forage brassica when the subsoil is dry. In dry seasons the brassica stubble is best fallowed through for sowing winter wheat or pasture in the following autumn. In-crop rainfall for spring cereal crops is still critical for achieving profitable crops, but without subsoil moisture the risk is increased.

- Barley can still achieve moderate yields when sown in spring despite dry seasons. Buloke, Hindmarsh, Tulla and Flagship all yielded better than many of the wheat varieties and provide a high energy feed grain for producers to retain on farm.

- Short season wheat varieties such as Waagan and Lincoln offer an alternative to barley. Long season wheat varieties should be avoided for spring sowing to reduce the risk of flowering during warmer temperatures in late spring and early summer.

- Paddock selection is critical when spring sowing cereals, especially in relation to soil nitrogen. Short season cereals do not need to produce a bulky canopy from high soil N. Unlike winter wheats which are grazed, biomass in spring cereals needs to be managed so that the available moisture is utilised more efficiently for grain production (grain numbers and size), rather than for excessive tiller production.

- Assuming input costs of $300/ha which includes contract sowing, spraying and harvest rates as well as local fertiliser and herbicide prices, the majority of crop types and varieties returned a negative gross margin in this trial.

Table 2. Cooma trial results (in order of gross income)

Crop	Variety	Yield t/ha	LSD*	Grade	Screenings %	Protein %	Price $/t	Gross Income $/ha
Barley	Buloke	2.0	a	F1	12.6	13.5	$185	**$361**
Barley	Hindmarsh	1.7	ab	F1	13.4	13.3	$185	**$316**
Wheat	Waagan	1.4	bcd	HPS1	16.5	14.8	$201	**$283**
Wheat	Axe	1.2	cde	AGP1	5.2	14.4	$212	**$263**
Wheat	Lincoln	1.3	cde	HPS1	19.3	16.1	$203	**$260**
Wheat	Gladius	1.2	cde	AGP1	7.8	15.8	$213	**$258**
Barley	Tulla	1.5	bc	F2	16.4	15.7	$170	**$255**
Barley	Flagship	1.5	bc	F2	20.0	16.2	$170	**$253**
Wheat	Ventura	1.0	de	AGP1	8.1	14.7	$211	**$211**
Wheat	Livingston	1.0	de	HPS1	10.7	16.1	$202	**$206**
Wheat	Espada	1.0	efg	AGP1	8.6	15.3	$212	**$204**
Wheat	Gregory	1.0	def	HPS1	10.7	14.0	$201	**$197**
Wheat	Hunter	1.1	de	Feed	12.1	15.7	$185	**$194**
Triticale	Jaywick	0.6	fg	Feed	6.9	16.3	$200	**$114**
Triticale	Speedee	0.6	g	Feed	9.0	16.0	$200	**$110**
Wheat	Preston	0.6	fg	Feed	6.2	15.8	$185	**$105**

Prob (F)	***0.0001***	
****LSD (P=0.05)***	***0.426***	**Note: yields followed by the same letter do not significantly differ.**
CV	***25.8***	**Note: high CV indicates variability within results (data not reliable).**

Prices derived from Southern Tablelands on-farm values, January 2010 using Grain Trade Australia standards for 2009/2010 season (acknowledgement: Tony Matchett, Delta Grain, Harden)

Greg & Kirrily Condon
Grassroots Agronomy

0428 477 348 mob
02 6924 2338 fax
gbcondon@westnet.com.au
PO Box 73 Junee 2663
ABN 53 386 347 464