Hyper Yielding Cereal Project
A FEED GRAIN INITIATIVE

Thursday 15 November 2018

10:00am – 4:00pm including barbeque lunch and afternoon tea
Badcock Lane, Hagley, Tasmania

Trial site courtesy of

Botanical Resources AUSTRALIA

The project steering committee would like to thank the following event sponsor:

Roberts
A RURALCO BUSINESS

TIMETABLE

GRDC HYPER YIELDING EVENT: THURSDAY 15 NOVEMBER 2018

Opening address by Dr Steve Jefferies, Managing Director, GRDC

In-field presentations	Station No.	10:00	10:20	10:45	11:15	11:45	12:15	12:45	1:45	2:15	2:45	3:15	3:45
Tasmanian growers on the frontline of fungicide resistance issues – why is this the case and what can growers and advisers do to manage the problem? **Dr Fran Lopez Ruiz, Research Leader, Centre for Crop & Disease Management (CCDM), Perth, WA**	1	Morning tea	Welcome and opening address					Lunch (kindly sponsored by Roberts)					Afternoon tea and close
What are the important quality parameters in feed grain cereals for optimising productivity in Aquaculture? **Tom Fox-Smith, Product Manager, Biomar, Tasmania**	2												
Tasmanian cereal feed grain – how does it stack up in terms of quality for the end user? **John Spragg, JCS Solutions and Denis McGrath, Feed Grain Partnership**	3												
The quest for improved cereal yields in Tasmania – what has worked on farm? **Michael Nichols and Michael Chilvers, Tasmanian growers**	4												
Keeping 12 t/ha wheat crops standing – how important are PGRs relative to germplasm and canopy structure? **Darcy Warren, Field Research Officer, FAR Australia and Ian Herbert, SFS Tasmanian Manager**	5												
Nutrition for high yielding cereals – how important is soil fertility and rotation position when determining fertiliser rates and tmings for high yielding cereal crops? **Jon Midwood, CEO, Southern Farming Systems**	6												
Achieving high cereal yields in two contrasting seasons – what results were consistent over both seasons and which were not? **Nick Poole, Managing Director, FAR Australia**	7												
Septoria tritici blotch, leaf rust and powdery mildew control in wheat – what have we learnt in two years of research? **Darcy Warren, Field Research Officer and Nick Poole, Managing Director, FAR Australia**	8												
Winter barley – does it have a place in regions with higher yielding potential compared to spring germplasm? **Dr Kenton Porker, Research Scientist, SARDI**	9												
Optimising agronomy for barley crops with yield potential over 10t/ha. **Katherine Fuhrmann, Field Research Officer, FAR Australia**	10												
Panel discussion: What's the value proposition for the breeder and breeder's agent bringing new feed grain cultivars to Tasmania? **Denis McGrath, Feed Grain Partnership, Phil Jobling, GrainSearch and Geoff Dell, Seed Force**	11												
Grain use in the Tasmanian Dairy Industry - An end user's perspective. **Ray King will facilitate a panel discussion with dairy producers Grant Archer, Hugo Avery and dairy researcher Mark Freeman**	12												
In-field presentations	**Station No.**	**10:00**	**10:20**	**10:45**	**11:15**	**11:45**	**12:15**	**12:45**	**1:45**	**2:15**	**2:45**	**3:15**	**3:45**

GRDC HYPER YIELDING RESEARCH CENTRE
SITE PLAN 2018

SPEAKING SESSIONS 1 - 12 (Refer to timetable)

Timing of sowing
TOS 1 - 5th April
TOS 2 - 26th April

TOS 2 Barley Nitrogen Management	TOS 2 Barley Germplasm Seed Rate Trial	TOS 2 10 Barley Fungicide Management Strategies	WC 2 11 12 HOSPITALITY & SPONSORS' AREA		TOS 2 3 Barley Screening Trial	TOS 2 Winter Barley Germplasm Evaluation Trial (Late April sown)	TOS 1 Winter Barley Germplasm Evaluation Trial (Early April sown) 9	TOS 1 Wheat Nitrogen Management 6
TOS 2 Barley Fungicide Management	TOS 2 4 Wheat Germplasm Seed Rate Trial	TOS 2 8 Wheat Germplasm Disease Evaluation Trial (Late April sown)			TOS 1 1 Wheat Germplasm Disease Evaluation Trial (Early April sown)	TOS 1 Wheat Germplasm, PGR and Seed Rate Evaluation Trial	TOS 1 Wheat Screening Trial	
TOS 2 Barley Disease Evaluation Trial	TOS 2 Septoria tritici Management Trial	TOS 2 Wheat Germplasm PGR Evaluation Trial			TOS 1 Wheat Fungicide Management Strategies	TOS 1 5 Wheat PGR Evaluation Trial	TOS 1 Wheat Grazing and Canopy Management Trial	TOS 1 7 Wheat Screening Trial
CAR PARKING	CAR PARKING	CAR PARKING	CAR PARKING	CAR PARKING				

Fenceline

VISITOR INFORMATION

We trust that you will enjoy your day with us at the Hyper Yielding Cereals Project Field Day. Your health and safety is paramount, therefore whilst on the property we ask that you both read and follow this information notice.

HEALTH & SAFETY

- All visitors are requested to follow instructions from FAR and SFS staff at all times.
- All visitors to the site are requested to stay within the public areas and not to cross into any roped off areas.
- All visitors are requested to report any hazards noted directly to a member of FAR or SFS staff.

FARM BIOSECURITY

- Please be considerate of farm biosecurity. Please do not walk into farm crops without permission. Please consider whether footwear and/or clothing have previously been worn in crops suffering from soil borne or foliar diseases. ***In addition, for visitors from the mainland please remember that clothing and shoes worn today may harbor disease spores from rust pathotypes or diseases not found on the mainland. Please change this clothing prior to returning to the mainland and or ensure it is changed and cleaned before inspecting crops on the mainland.***

FIRST AID

- We have a number of First Aiders on site. Should you require any assistance, please ask a member of FAR or SFS staff.

LITTER

- Litter bins are located around the site for your use; we ask that you dispose of all litter considerately.

VEHICLES

- Vehicles will not be permitted outside of the designated car parking areas. Please ensure that your vehicle is parked within the designated area(s).

SMOKING

- There is No Smoking permitted inside any marquee.

Thank you for your cooperation, enjoy your day.

WELCOME TO THE 2018 HYPER YIELDING PROJECT FIELD DAY

On behalf of the industry steering committee and project team, I am delighted to welcome you to the 2018 Hyper Yielding Cereals Project Field Day. This is our third and penultimate Field Day for the project. For those that have attended previously, welcome back, to those visiting for the first time it's great to have your interest in the project and we trust you will enjoy the day. Last year we welcomed over 130 growers, advisors and researchers to the event with over 40 travelling to the event from the mainland.

Led by the Foundation for Arable Research (FAR) Australia in collaboration with Southern Farming Systems (SFS), the Hyper Yielding Cereals (HYC) Project is funded by the Grains Research and Development Corporation (GRDC) and is aimed at boosting Tasmania's production of high quality feed grain cereals, thereby reducing its reliance on supplies from the mainland.

What's happening on the HYC research site in 2018?

With two contrasting seasons (2016 & 2017) as a backdrop to our research the project has moved into a phase of more specific agronomy studies. These studies are being conducted on a range of cereal germplasm that represent different development classes and that have performed well over the last two years. Research work in wheat is being conducted on slower maturing northern European UK types, such as RGT Relay through to faster developing shorter season Australian winter wheats such as DS Bennett. Studies are up and running on all of these representative plant types at two sowing dates April 5th and April 26th.

In 2017 despite much warmer grain fill conditions barley research yields increased from a top of 10.5t/ha in 2016 to 11.4t/ha in 2017. This was in contrast to wheat plot yields that peaked at 13t/ha in 2017 compared to 16-17t/ha in 2016. For the first time the HYC project team has established research trials sown April 5th which have included a number of winter barley lines. These predominately French lines are being compared to RGT Planet which has been the highest yielding spring germplasm to date. Today we are really pleased to

have Dr Kenton Porker from SARDI to talk about the characteristics of these European winter barleys.

The GRDC recognised some time ago that a huge opportunity exists for Tasmania to produce much greater volumes of feed grain cereals with new irrigation schemes coming online. It also recognised that with favourable quality attributes there was a growing market in the state's livestock sectors. Engagement with the end users is a key element of the research at the centre and of presentations at today's event.

Speakers and Demonstrations at today's event

The event will feature a range of research trial demonstrations, two facilitated panel discussions and a line-up of mainland and Tasmanian speakers who will discuss various aspects of improved germplasm and agronomy, grain quality and livestock nutrition strategies.

Disease management in longer season irrigated or HRZ crops remains an essential element in maximising productivity, however keeping cereal crops clean in these environments has to be based on sustainable practices. If we overuse our fungicide chemistry then we will lose the ability to use these products effectively. With this in mind our keynote speaker today is Dr Fran Lopez Ruiz who leads the fungicide resistance studies at the Centre for Crop & Disease Management (CCDM) at Curtin University in Perth. Principally due to our longer season and high rainfall Tasmania finds itself on the front line in the battle against fungicide resistance. Today Fran will address the extent of the fungicide resistance issues in the state and what we can do to manage the situation.

The HYC event has had a focus of making sure we hear from the end users of cereal grains, today's event is no exception. Following recent announcements regarding the intention to establish an aquaculture feed processing mill on the North West Coast we are pleased to welcome Tom Fox-Smith Biomar's Product Manager to the event. Tom will discuss what's important to the aquaculture sector in terms of feedstuff raw materials.

There are two facilitated panel discussions in the marquee at this year's event, the first examines the use of cereal grains in the dairy sector and the second looks at the issues that breeders and breeders' agents face in commercialising new feed grain cereal crops. Both sessions will be well worth attending.

Should you require any assistance throughout the day, please don't hesitate to contact a member of the FAR or SFS team who will be more than happy to help.

Thank you once again for taking the time out of your busy schedule to join us today; we hope that you find the presentations useful, and as a result, take away new ideas which can be implemented in your own farming business. Have a great day and we look forward to seeing you again at future project events.

I would like to thank Dr Steve Jefferies from GRDC for taking the time out of his busy schedule to formally open the event and to GRDC more widely for investing in the research programme on display today. I would like to place on record my personal thanks to the sponsors for today's event Roberts and TP Jones. Finally, on behalf of the project team I would like to thank Botanical Resources Australia, in particular their farm manager Alan Steven and the landowner Don Badcock for the tremendous practical support given to the team.

Nick Poole
Managing Director
FAR Australia

Funding Acknowledgements
The Hyper Yielding Cereals Project steering group would like to place on record its grateful thanks to the Grains Research & Development Corporation (GRDC) for their funding support for this event and project.

Sponsorship acknowledgement
The Hyper yielding cereal project steering group would also like to acknowledge the sponsorship support given by Roberts to assist with the catering for today's event and TP Jones for their support of the day.

Project Background

How did the project originate?

Despite a more favourable climate for grain production compared with the mainland, and greater yield potential, Tasmania remains a net importer of cereal grains. The average yield of red grain feed wheat in Tasmania is less than 5t/ha and the state imports approximately 150,000-200,000 tonnes of cereal grains compared to a domestic production of 60,000-80,000 tonnes. The HYC project aims to make Tasmania more self-sufficient in its capacity to supply feed grain to the State's dairy industry and other livestock users.

The project aims to bridge the gap between actual and potential yields through genetic improvement of cereal crops, best practice in terms of management of those crops and recognition of quality for the key end users. To that end, much progress has already been made in the initial screening of new cultivars for high yields, disease resistance and traits suitable for the Tasmanian environment.

Project objectives

With input from national and international cereal breeders, growers, advisers and the livestock industry, the project is working towards setting record yield targets as aspirational goals for growers of feed grains. In year one we achieved this in the research plots, now the project team has to translate this into

commercial yield gains. The newly established focus farms which are trying out high flying candidates from 2016 are the first steps towards commercial gains but dare I say establishing a new Australian wheat yield record for commercial crops here in Tasmania would be a great way to build on the objectives of this project. With the right incentives, the project steering group believe it will be possible to encourage breeders to place greater focus on the needs of Tasmanian growers and the more general needs of the long season High Rainfall Zone (HRZ).

To focus on these objectives, the project has been set the challenge of:

- *Increasing average Tasmanian red grain feed wheat yields from 4.4t/ha to 7t/ha by 2020;*
- *Delivering commercial wheat crops which yield 14t/ha by 2020;*
- *Identifying and endorsing the value of metabolisable and digestible energy in feed grain cereals through engagement and collaboration with the dairy and other end users in the Tasmanian industry.*

Station 1

10:45am and 1:45pm

Dr Fran Lopez-Ruiz
Centre for Crop & Disease Management

Tasmanian growers are on the frontline of fungicide resistance issues – why is this the case and what can growers and advisers do to manage the problem?

Key messages

- Poor disease management practices, including misuse of fungicides, have an impact on everybody.
- Overuse of fungicides with the same mode of action will speed up fungicide resistance.
- We can limit the development of fungicide resistance by using appropriate fungicide rotations and by employing IDM practices aimed at minimising disease pressure.
- Fast (and cheap) monitoring of pathogen populations for fungicide resistance is central for the sustainable chemical management of diseases.

Fungicides have been in the forefront of control of fungal pathogens of humans, animals and plants for nearly 40 years. The direct consequence of the undeniable success of fungicides in controlling crop diseases has been the rise of fungicide resistance due to continuous exposure of fungal populations to these compounds. Fungicide resistance is now common around the world and has become a serious problem in agricultural systems.

The widespread adoption of the use of multiple fungicide treatments in Australian agriculture did not begin in earnest until about 15 years ago. One consequence was that a small number of actives from a single mode of action (MOA) group – the DMIs or Group 3 fungicides - dominated the market. So far seven cases of fungicide resistance and four cases of reduced sensitivity (resistance does not reach the level of field failure) have been identified in Australia since 2012 (table 1).

Table 1. Fungicide resistance cases identified in Australia during the period 2012 – 2018.

Disease	Fungicide Group	Detected in TAS
Barley powdery mildew	Group 3 (DMI)	√
Wheat powdery mildew	Groups 3* and 11 (QoI)	√
Barley net-form of net blotch	Group 3*	-
Barley net-form of net blotch	Group 3	-
Barley spot-form of net blotch	Group 3	-
Canola blackleg	Groups 2 (MAP-Kinase) and 3*	-
Wheat septoria tritici blotch (STB)	Group 3*	√
Chocolate spot	Group 1 (MBC)	-
Ascochyta blight	Group 1	-

*Reduced sensitivity that does not reach the level of field failure

I will try to provide an overview of the situation in Tasmania, the reasons that drive the resistance and the easy steps that we all have to follow if we want to mitigate its impact and avoid the development of new cases in the future. During the presentation, we will also run a demonstration of the technology we use to detect fungicide resistance in the field and will explain how this technology can help in the fight against fungicide resistance.

Fungicide resistance is a problem that affects us all due to the ubiquitous nature of diseases and only a united common front against it will guarantee the sustainability of current chemical control strategies.

Station 2

11:15am and 2:15pm

Tom Fox Smith
Biomar, Tasmaia

What are the important quality parameters in feed grain cereals for optimising productivity in Aquaculture?

Cereals and other vegetable crops as raw materials in Aquaculture

The requirements for cereals and other vegetable crops in Aquaculture are varied and evolving rapidly along with the aquaculture feeds themselves.

To describe the requirements for vegetable crops in aquaculture, a quick summary of the diets themselves and the drivers for their evolution is required, as it is a rapidly developing field, with significantly different requirements to most terrestrial production feeds. When I go on to describe the feed requirements, I'll be referring to the key species the Australian Biomar factory will be catering to; Barramundi, Salmon, Trout, Kingfish, and King Salmon (or Chinook), all of which are carnivorous. The requirements of the feeds can be broadly broken down into nutritional and physical categories.

Nutritional requirements are the most rapidly evolving aspect of Aqua-feeds, with a constant drive to have very high nutrient density and performance and low environmental impact. To put the nutrient density into perspective, it is not unusual to have salmon diets with up to 36% digestible protein and 39% digestible fat, leaving little room in a recipe for non-digestible products, which need to include vitamins, minerals, and functional ingredients. The drivers for this increasing nutrient density include customers looking for increased yield for the same production time, Environmental Protection Authority regulation (many sites are limited on the amount of nitrogen put into the location as feed) and a desire to shorten production cycles in order to reduce risk (disease / disaster), OPEX, and treatment for biological challenges such as amoebic gill disease or sea lice. In summary, from a nutritional perspective a raw material must be highly digestible and have either a high protein or fat level, as carnivorous fishes are inefficient at digesting starches and fibre. Increasingly protein concentrates, or air-classified vegetable proteins are being utilised. As the species in question are obligate carnivores, there are essential amino acids they cannot manufacture and good levels of any of these amino acids will increase the value of a given vegetable protein.

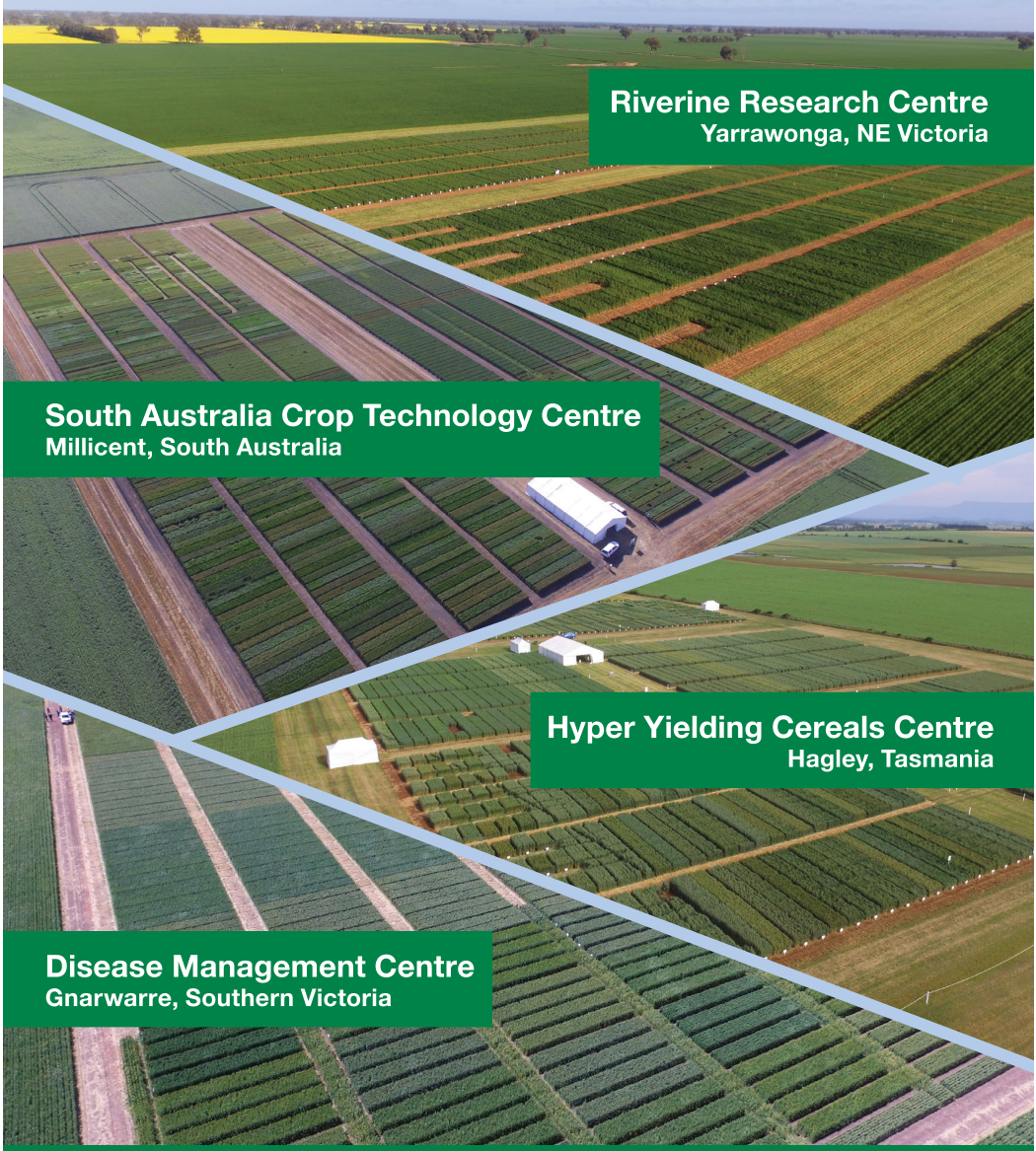
Functional requirements for aquaculture feeds are also quite varied; some need to float, some need to sink fast or slow and others need a low percentage float. Atlantic Salmon require feeds that are not too hard for their stomachs yet can survive being transported in 40t bulk trucks, conveyed, blown into a silo in a barge and then blown up to a kilometre through pipe before being fed out to fish in pens. King salmon feed needs to be resilient enough to survive being soaked for 24 hours and subsequently mixed for 20 minutes, representing holding together for a long time in the fish's

stomach. As there is little room in the diet for functional ingredients to enable all the required flexibility required in the extrusion process, these need to be high quality and efficient in the space utilised. A few different characteristics are useful. For expansion, it is often useful to have a concentrated and easily gelatinised starch to catalyse the cooking process through the extruder. For the main source of durability and expansion, a high quality, high protein wheat is often used, with the gluten providing good strength and durability along with a range of starch gelatinisation temperatures. Other functional ingredients can provide a mixture of high nutritional value and binding capability. Legumes such as lupins, faba beans and field peas fit into this category. Finally, feed safety is a priority, with negative results for multiresidue screening and mycotoxins critical requirements. This is because fish can be extremely sensitive to some mould toxins and environmentally persistent pesticides are unacceptable as the feed is producing for the human food consumption market.

In summary, as aquaculture feeds are becoming increasingly nutrient dense and high performance, high quality raw materials are an imperative, creating opportunity for more bespoke, high performance and higher value raw materials.

Providing excellence in field applied research

FAR AUSTRALIA



Riverine Research Centre
Yarrawonga, NE Victoria

South Australia Crop Technology Centre
Millicent, South Australia

Hyper Yielding Cereals Centre
Hagley, Tasmania

Disease Management Centre
Gnarwarre, Southern Victoria

ADDING VALUE TO THE BUSINESS OF CROPPING

Follow FAR Australia: @far_australia email: faraustralia@faraustralia.com.au

John Spragg, JCS Solutions
Denis McGrath, Feed Grain Partnership

Tasmanian cereal feed grain quality

AusScan - near infrared reflectance spectroscopy (NIRS) feed grain quality calibrations – recent Tasmanian Harvest Results

One of the challenges of the Hyper Yielding Cereals Project is to identify and endorse the value of metabolisable and digestible energy in feed grain cereals through engagement and collaboration with the dairy and other end users in the Tasmanian industry.

The AusScan technology was developed in Australia and provides NIR calibrations for feed grain quality measures including pig digestible energy (DE), poultry apparent metabolisable energy (AME) and ruminant metabolisable energy (ME) for cereal grains, as well as soybean and canola meal protein quality.

Following the licensing of AusScan to the company Aunir in 2015, the use of the NIR technology is gaining momentum globally. AusScan scan numbers have increased from 2200 in the 2015 to 11,882 in 2016 and on target to eclipse 22,000 scans in 2017. These numbers indicate customers are valuing AusScan's world first calibrations for Assessing grain and protein meal quality.

The Feed Grain Partnership, a collaboration of Australian R&D funding agencies (GRDC, Agrifutures Australia (Chicken Meat), Australian Eggs, Australia Pork Limited, Dairy Australia, Meat and Livestock Australia and the Pork CRC) and the Stockfeed Manufacturers Council of Australia have been funding annual AusScan testing of wheat and barley grain samples for the past 5 harvests.

Wheat and barley samples from the Hyper Yielding Cereals Project have been tested to compare their feeding value against grains from other States. The table below (Table 1a & b) provides a summary of some of the data that will be presented at the Field Day. In summary, wheat and barley grown in Tasmania is nutritionally equivalent to grain grown in other parts of Australia. It is predicted to perform as well as mainland grains in pig, poultry and dairy feeding.

Table 1a & 1b. A comparison of feed grain quality in samples taken from the Hyperyielding Project (Hagley, Tasmania) and those from other mainland states – 2016/17 & 2017/18

WHEAT	2017/18	HYC WHEAT SAMPLES 2017/18	2016/17	HYC WHEAT SAMPLES 2016/17
Protein % as is basis				
Min	8.1	7.8	7.4	8.3
Mean	**12.3**	**12.3**	**10.0**	**10.9**
Max	17.7	14.9	14.8	12.7
Std Dev	1.99	*1.16*	*1.33*	*0.81*
Starch % as is basis				
Min	53.3	58.6	59.1	61.5
Mean	**62.9**	**62.8**	**63.0**	**64.5**
Max	67.1	66.3	66.2	67.3
Std Dev	*2.10*	*1.31*	*1.59*	*1.15*

WHEAT	ALL WHEAT 2017/18	HYC WHEAT SAMPLES 2017/18	ALL WHEAT 2016/17	HYC WHEAT SAMPLES 2016/17
Pig DE MJ/kg as fed				
Min	13.5	13.5	13.5	13.5
Mean	**14.0**	**14.0**	**13.8**	**13.8**
Max	14.5	14.3	14.4	14.3
Broiler AME MJ/kg as fed				
Min	12.5	12.6	12.2	12.9
Mean	**13.2**	**13.2**	**13.0**	**13.4**
Max	13.8	13.7	13.6	14.3
Cattle ME MJ/kg DM basis				
Min	12.5	12.2	12.6	12.6
Mean	**12.8**	**12.8**	**12.9**	**12.8**
Max	13.1	13.0	13.1	13.1

HYC – samples taken from the Hyperyielding Cereal Project.

Station 4

Michael Nichols
Tasmanian Grower

11:15am and 2:15pm

The quest for improved cereal yields in Tasmania – what's worked on farm?

These are some of the tips from Michael Nichols on growing wheat over 12 tonne/ha that have worked well on his farm on the North West coast of Tasmania.

Drilling

- Know your varieties (winter, spring, grazing) this will help in the initial management plan and planting dates/disease resistance package.
- Know what density plants per m^2 you are after, if aiming for 12 tonne normally around 150-170 plants per m^2 (*aiming for 600-700 heads per m^2*).
- 1000 grain weight, this should be provided with seed but is normally not, grains can vary from 30 gram to 55 gram / 1000 grains which will change drilling rates from 90-135 kg/ha.

Early growing tips GS10-GS24

- When wheat emerges do plant counts, wheat is a great compensator, if low plant number you can encourage tillers with nitrogen.
- Be timely with herbicides, if known ryegrass pressure (*ex spud ground will have very high winter grass*) use Sakura, winter grass can take 20% of yield.
- Do a soil N test around GS24, this lets you know what is in the ground.

Mid growing tips GS24-GS39

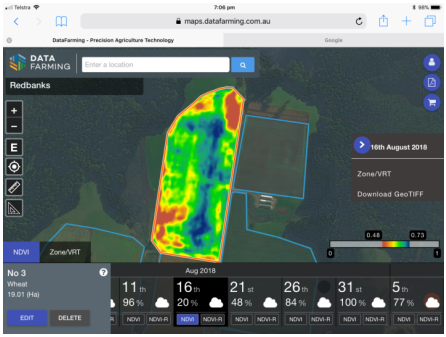
- **NITROGEN** is the biggest way of increasing yield; one ton of wheat needs 25 units of N, 12 ton needs 300 units. The majority of this needs to be put on between GS24 and GS39 (flag leaf); you have about 6-8 weeks. After GS39 you will be adding to protein levels in your wheat.
- PGR *(plant growth regulators*) if you are going to grow 10 tonne plus you will need PGR's.
- Know your fungicides and mix the chemistry to stop resistance building up (*only use one SDHI and one Strobilurin over the growing season*).

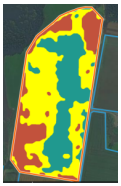
End growing tips GS39-GS92

- Flowering fungicide to prevent Fusarium head blight; this has the potential to take 20%-40% of yield in the final stages (particularly on the North West with 700-800mm growing season rainfall).
- Water at the milky dough stage if you can only water a few times 1-2 big watering's 30-50mm is better than 10-20mm. If you can get grain to 50 gram compared to 30 gram 1000 grain weight this is a huge way to increase yield without taking up much more room.
- Look out for Armyworm.

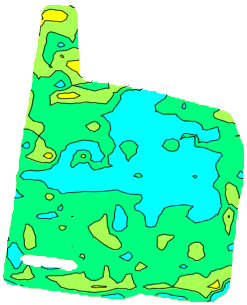
Some other techniques

Variable rate NDVI images to even up crops

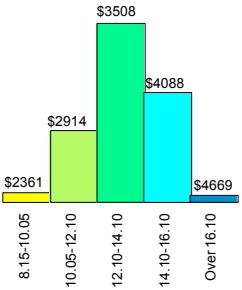




Yield Maps and benchmarking



13 tonne average over 16.6ha



Michael Chilvers
Tasmanian Grower

The quest for improved cereal yields in Tasmania – what's worked on farm?

Michael and Fiona Chilvers farm 1200ha at Nile in Tasmania's Northern Midlands. It is a winter dominant rainfall area, averaging around 550mm per year. Growing season rainfall is around 350mm however waterlogging occurs to a greater or lesser degree every year, making water use efficiency difficult to calculate. Irrigation is an important element to producing high yields, guaranteeing a long, soft finish.

Having been held in the family nearly 40 years, Winburn has undergone significant land use change and intensification. Expanded irrigation via centre pivots since the early 2000s has delivered greater reliability and allowed for high value crop production whilst raising yield expectation and changing the risk profile.

The saying "yield is king" holds true to every enterprise run by the business. Healthy, high yielding crops may provide an excellent barometer of soil condition and nutrient cycling as well as providing a competitive environment for weeds. Yield tends to drive gross margin and thus the return on investment on business assets.

Whilst the long term trend for productivity improvement in the Australian grains industry is just under 2%, the high rainfall zone has seen a significant increase over the last 20 or so years. An Isis wheat crop grown dryland in the early 90s yielded 6t/ha, Rosella was slightly behind but returns were greater than oats or Franklin barley. These were good yields and as Lawson and Patterson were released as the first red winter types from the CSIRO there was a further jump in productivity.

With increased expectation comes increased input and therefore risk. Wheat changed from a low input, low risk crop to a high input crop with potentially high return. Disease control, crop nutrition, stubble and canopy management has become complex and dynamic; it is becoming more important to understand the phenology of particular varieties and how they fit in your production system and your environment.

Careful observation, attention to timing and detail, and striving to continually update knowledge and skill is a key to success in pushing yields and returns. In 2016 an Einstein wheat crop yielded 12.46t/ha setting a new benchmark within the business and while costs to achieve this are high, they are only marginally greater than targeting 10t/ha.

Targeted R&D across the farming system is essential to deliver enduring profitability and there will be efficiencies from technology employed in the future. The Hyper Yielding Cereals project leads the way and has shown what can be achieved by matching variety with environment and management in order to express genetic potential. There is opportunity to extend the concept into other regions, rainfall zones and irrigated areas.

Station 5

11:45am and 2:45pm

Darcy Warren HYC Field Research Officer, FAR Australia
Ian Herbert, SFS Manager, Tasmania

Keeping 12t/ha wheat crops standing - how important are PGRs relative to germplasm and canopy structure?

Key Points

- Crop lodging is a key constraint to high cereal crop yields and becomes a greater constraint under irrigation, particularly with earlier sowing.
- In the majority of seasons later sown crops of wheat (mid-May onwards) are less lodging prone than early sown crops (April sown).
- Earlier sown crops of winter wheat planted in April (1^{st} – 20^{th}) produce greater biomass (more tillers) in the autumn that leads to a higher risk of crop lodging in weaker strawed cultivars or where the yield potential is very high due to fertility.
- Plant growth regulators have been shown to play a key role in keeping crops standing in HYC research when crops are sown early.
- Like fungicides Plant Growth Regulators (PGRs) are insurance inputs that are applied early in stem elongation before lodging arises. Therefore PGRs just like insurance premiums have to be matched to the risk of lodging.
- Over the last two seasons working with early April sown crops HYC research has illustrated positive yield responses to low rate experimental sequences of PGRs that have both kept the crop standing and improved yield.
- However to control lodging PGRs are just one component of a bigger management approach which includes stiffer strawed germplasm and canopy management through sowing date, plant population and nutrition.
- In 2018 our key cultivars have been classed as either early developers (DS Bennett & Annapurna), intermediate (RGT Accroc & Calabro) or late developers (RGT Relay) and are being subject to different crop management combined with PGR application and sowing date.
- A key difference between PGRs and fungicides is that their yield effects on the crop are far less predictable in the absence of lodging and can be negative.
- In 2017 when grain fill conditions were more stressful there was evidence that earlier PGR application could cause over regulation in some cultivars particularly where crops were sown later (27^{th} April).
- Therefore it's important to consider PGRs as just one part of the management strategy to keep crops standing that is particularly important when sowing early.

PGR application on early sown crops – where lodging is a greater yield constraint

Two years of research have shown that early April sown crops of Manning yielding upwards of 12t/ha are economically responsive to PGRs. Significant yield responses in 2017 from the best management approaches were about 1t/ha compared to 2.5t/ha in 2016. However over both seasons the same PGR approaches gave the most consistent results in terms of lodging control and yield response. These approahes came from experimental sequences of PGRs based primarily on the active ingredients chlormequat (e.g. Errex) and trinexapac ethyl (e.g. Moddus Evo). These sequences are timed at GS30 (start of stem elongation) and at GS32 (second node) (Table 1 & Figure 1).

Sown: 6 April 2017 **Harvested:** 23 January 2017
Rotation position: 1st Wheat after Pyrethrum

Table 1. Grain yield (t/ha), % Site Mean, protein (%), test weight (kg/hl) and screenings (%)

TRT	Seeds	Product and Rate	Timing	Yield		Mean	Protein		Test wt		Screen	
	/ m^2	(L/ha)		(t/ha)		(%)	(%)		(kg/HL)		(%)	
1	200	Moddus Evo 0.2 + Errex 1.3	GS31-32	12.07	ab	101.9	10.9	ab	76.1	a	4.0	a
2	200	Moddus Evo 0.1 + Errex 0.65	GS30	12.14	ab	102.5	10.8	ab	76.3	a	3.6	a
		Experimental Trt 1	GS32									
3	200	Moddus Evo 0.2 + Errex 1.3	GS16	11.86	bc	100.2	10.8	ab	74.6	ab	3.8	a
4	200	Moddus Evo 0.1 + Errex 1.3	GS16	12.48	a	105.4	10.8	ab	74.9	a	4.0	a
		Experimental 2	GS32									
5	200	Moddus Evo 0.1 + Errex 1.0	GS16	12.02	ab	101.5	11	ab	74.6	ab	3.6	a
		Experimental Trt 1	GS32									
		Experimental Trt 3	GS37									
6	200	Moddus Evo 0.2 + Errex 1.3	GS31-32	12.44	ab	105.1	11	ab	74.1	ab	4.1	a
		Experimental Trt 2	GS37									
7	200	Moddus Evo 0.1 + Errex 0.65	GS30	12.39	ab	104.6	10.7	b	75.2	a	3.8	a
		Experimental Trt 1	GS32									
		Experimental Trt 2	GS37									
8	200	Experimental Trt 2	GS37	11.24	de	94.9	11.2	a	74.4	ab	4.3	a
9	50	No PGR		10.7	e	90.4	11.0	ab	71.8	b	4.0	a
10	100	No PGR		11.92	abc	100.7	11.0	ab	74.8	ab	4.0	a
11	150	No PGR		11.42	cd	96.4	10.8	ab	76.4	a	3.8	a
12	200	No PGR		11.43	cd	96.5	10.8	ab	74.8	ab	4.3	a
		Mean		11.84		100	10.9		74.8		3.9	
		LSD P=0.05		0.59			0.44		3.1		1.1	
		P val		<0.001			0.614		0.283		0.950	

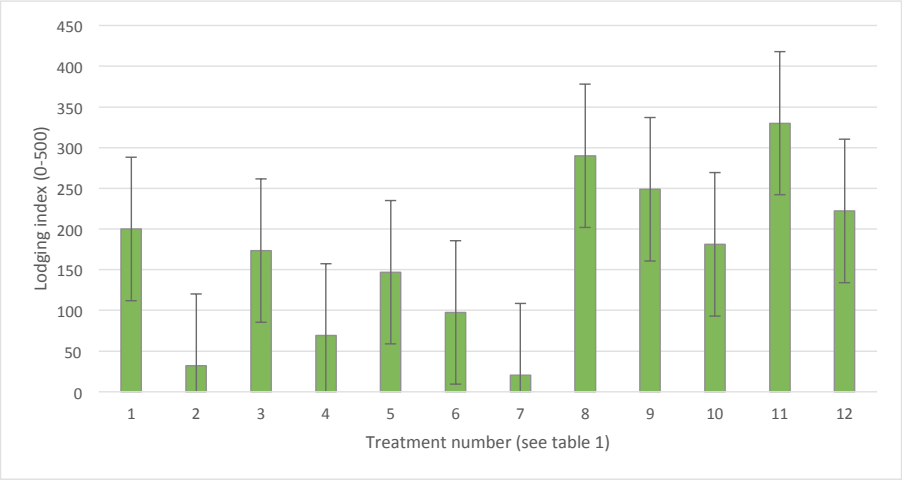


Figure 1. % Crop lodging index (lodging area x lodging severity) at grain maturity (GS99), 23 January.

PGRs as part of the whole management approach

Unlike fungicide application which should be regarded as an essential ingredient of cereal growing in Tasmania, PGRs should only be considered as part of the management strategy when the risks of lodging are high. So what are the main drivers of lodging risk in cereal crops that are irrigated? Factors influencing lodging are many and varied but can be classified as those for which the grower has no control and those that are under the control of the grower. In a GRDC guide generated for the northern region, factors were split into these two groups and weighted. They are presented in Table 2 and although the environmental conditions are different the principles are the same.

In 2018 the HYC research looks at five winter wheats from slower to faster developing categories and looks at how lodging is influenced by both canopy management and PGRs and the combination of the two.

Table 2. Factors associated with lodging risk deduced from trials run in the project (higher star ratings confer greater influence over lodging risk) – (extracted from GRDC Better Irrigated Wheat Agronomy – Peake A., Poole N., Bell K. Gairdner M. & Das B. - 2017)

Factors not under the grower's control	Lodging risk rating	Factors under the grower's control	Lodging risk rating
1. Inherent fertility – high fertility that is long standing for that paddock in the rotation without reference to fertiliser applied for the crop	*****	1. Varietal resistance to lodging – Wheat varieties have different root architecture and stem strengths that increase or decrease lodging risk	*****
2. Windy and wet weather (ear emergence to harvest)	*****	2. Irrigation (1) Irrigation timing in relation to expected weather conditions is a key factor in lodging risk (2) total irrigation applied increases yield potential and hence lodging risk	*****
		3. Total N rate applied – Higher N rates increase lodging risk particularly when superimposed on high inherent fertility	***(*)
		4. Nitrogen (N) timing - Earlier (at sowing) nitrogen application can increase lodging risk, particularly if inherent fertility is already high.	***
		5. Sowing date – Earlier sowing dates, particularly combined with high seed rates and longer season varieties can increase lodging risk.	**
		6. Seeding rate – Higher seed rates can increase lodging particularly combined with earlier sowing and inherent fertility.	**

These factors have different weightings and different consequences for lodging risk depending on seasonal environmental conditions. Irrigation is a very large driver of lodging risk since the size of the crop canopy and grain yields supported by the crop canopy are much larger than those achieved on dryland.

JOIN the winning team

Southern Farming Systems (SFS) is an independent, farm-driven, non-profit organisation helping growers with practical research and information that produces sustainable results.

Become an SFS member and reap the benefits:

- exclusive access to the latest cropping trial results from across the southern high-rainfall zone
- free and preferential access to crop walks, field days, technical workshops and industry events
- access to a network of leading-edge growers and industry experts
- timely and relevant updates on local research projects and industry-wide findings.

SFS
Southern Farming Systems

Explore SFS membership options online: www.sfs.org.au

For more information contact Ian Herbert:
M: 0400 006 095 | E: iherbert@sfs.org.au

Notes:

TIMETABLE

GRDC HYPER YIELDING EVENT: THURSDAY 15 NOVEMBER 2018

Opening address by Dr Steve Jefferies, Managing Director, GRDC

In-field presentations	Station No.	10:00	10:20	10:45	11:15	11:45	12:15	12:45	1:45	2:15	2:45	3:15	3:45
Tasmanian growers on the frontline of fungicide resistance issues – why is this the case and what can growers and advisers do to manage the problem? **Dr Fran Lopez Ruiz, Research Leader, Centre for Crop & Disease Management (CCDM), Perth, WA**	1	Morning tea	Welcome and opening address					Lunch (kindly sponsored by Roberts)					Afternoon tea and close
What are the important quality parameters in feed grain cereals for optimising productivity in Aquaculture? **Tom Fox-Smith, Product Manager, Biomar, Tasmania**	2												
Tasmanian cereal feed grain – how does it stack up in terms of quality for the end user? **John Spragg, JCS Solutions and Denis McGrath, Feed Grain Partnership**	3												
The quest for improved cereal yields in Tasmania – what has worked on farm? **Michael Nichols and Michael Chilvers, Tasmanian growers**	4												
Keeping 12 t/ha wheat crops standing – how important are PGRs relative to germplasm and canopy structure? **Darcy Warren, Field Research Officer, FAR Australia and Ian Herbert, SFS Tasmanian Manager**	5												
Nutrition for high yielding cereals – how important is soil fertility and rotation position when determining fertiliser rates and tmings for high yielding cereal crops? **Jon Midwood, CEO, Southern Farming Systems**	6												
Achieving high cereal yields in two contrasting seasons – what results were consistent over both seasons and which were not? **Nick Poole, Managing Director, FAR Australia**	7												
Septoria tritici blotch, leaf rust and powdery mildew control in wheat – what have we learnt in two years of research? **Darcy Warren, Field Research Officer and Nick Poole, Managing Director, FAR Australia**	8												
Winter barley – does it have a place in regions with higher yielding potential compared to spring germplasm? **Dr Kenton Porker, Research Scientist, SARDI**	9												
Optimising agronomy for barley crops with yield potential over 10t/ha. **Katherine Fuhrmann, Field Research Officer, FAR Australia**	10												
Panel discussion: What's the value proposition for the breeder and breeder's agent bringing new feed grain cultivars to Tasmania? **Denis McGrath, Feed Grain Partnership, Phil Jobling, GrainSearch and Geoff Dell, Seed Force**	11												
Grain use in the Tasmanian Dairy Industry - An end user's perspective. **Ray King will facilitate a panel discussion with dairy producers Grant Archer, Hugo Avery and dairy researcher Mark Freeman**	12												
In-field presentations	**Station No.**	**10:00**	**10:20**	**10:45**	**11:15**	**11:45**	**12:15**	**12:45**	**1:45**	**2:15**	**2:45**	**3:15**	**3:45**

GRDC HYPER YIELDING RESEARCH CENTRE
SITE PLAN 2018

SPEAKING SESSIONS 1 - 12 (Refer to timetable)

Timing of sowing
TOS 1 - 5th April
TOS 2 - 26th April

TOS 2 Barley Nitrogen Management	TOS 2 Barley Germplasm Seed Rate Trial	TOS 2 10 Barley Fungicide Management Strategies	WC  2 11 12	FIRST AID Roberts HOSPITALITY & SPONSORS' AREA	TOS 2 3 Barley Screening Trial	TOS 2 Winter Barley Germplasm Evaluation Trial (Late April sown)	TOS 1 Winter Barley Germplasm Evaluation Trial (Early April sown) 9	TOS 1 Wheat Nitrogen Management 6
TOS 2 Barley Fungicide Management	TOS 2 4 Wheat Germplasm Seed Rate Trial	TOS 2 8 Wheat Germplasm Disease Evaluation Trial (Late April sown)			TOS 1 1 Wheat Germplasm Disease Evaluation Trial (Early April sown)	TOS 1 Wheat Germplasm, PGR and Seed Rate Evaluation Trial	TOS 1 Wheat Screening Trial	
TOS 2 Barley Disease Evaluation Trial	TOS 2 Septoria tritici Management Trial	TOS 2 Wheat Germplasm PGR Evaluation Trial			TOS 1 Wheat Fungicide Management Strategies	TOS 1 5 Wheat PGR Evaluation Trial	TOS 1 Wheat Grazing and Canopy Management Trial	TOS 1 7 Wheat Screening Trial

CAR PARKING | CAR PARKING | CAR PARKING | CAR PARKING | CAR PARKING

Fenceline

Jon Midwood, CEO, Southern Farming Systems
Nick Poole, Managing Director, FAR Australia

12:15pm and 3:15pm

How important is soil fertility when determining fertiliser rates and timings for high yielding cereal crops?

Key Points

- High yield potential appears to come from higher fertility where the extra N required to realise that potential is provided by the soil.
- Analysis of HYC yields and grain proteins suggest that large quantities of nitrogen, exceeding applied nitrogen fertiliser, are being removed to produce high yields.
- In 2016 yields of 14-17t/ha were achieved with no more than 150-220kg N/ha applied, yet nitrogen offtakes in the grain alone indicated the removal of approximately 258 – 336kg N/ha. In 2017 nitrogen offtake in the grain was double the nitrogen fertiliser applied (241kg N/ha in the grain for 120 N/ha applied).
- Nutrition trials run at the HYC research centre have shown that higher application of applied nitrogen (above 200-240kg N/ha) have not been beneficial despite yields over 12t/ha and crop nitrogen offtakes in excess of these quantities.
- Although the research is not sufficiently detailed to track the fate of applied nitrogen fertiliser it would suggest that nitrogen recovery in Tasmania, with the addition of irrigation is higher than 50%.
- In longer season HRZ environments (subject to wet winters) testing for soil available nitrogen at the start of spring is likely to be more reliable than autumn testing, since leaching and denitrification of soil nitrogen over winter are key losses.

Soil Fertility and the relationship with high yields

In 2016 yields of early April sown wheat peaked at 14.44t/ha (cv RGT Relay) and over 17t/ha (cv RGT Calabro) with late April sowings. In both cases these yields were achieved with 220 and 150kg N/ha of applied nitrogen respectively.

From the protein contents of the grain, 10.2% for RGT Relay and 11.1% for RGT Calabro it is possible to estimate the nitrogen offtake in the grain, using the conversion factor of 5.7 for calculating nitrogen content from protein.

- For RGT Relay there was the equivalent of 258kg N/ha in the grain at harvest (10.2/5.7 conversion factor = 1.79% N x yield 14440kg divided by 100). In the case of RGT Calabro the total was 336kg N/ha in the grain.

These amounts of nitrogen in the grain far exceeded the levels of nitrogen fertiliser that were applied to the research trials as Urea (46% N). In addition, the offtakes only represent what was removed in the grain and do not include the nitrogen content of the crop canopy to support it. If one uses the common assumption that 75% of the

nitrogen taken up by the crop resides in the grain at harvest it's logical to suggest that nitrogen offtakes are much greater.

- Therefore using this assumption (that there is an additional 25% nitrogen in crop canopy at harvest on top of nitrogen in the grain) it's possible to calculate that the actual total nitrogen offtake at harvest would be nearer to 344 kg N/ha for RGT Relay (sown 6th April) and 446kg N/ha for RGT Calabro (sown 27th April).

These enormous nitrogen uptakes represent the fact that often more nitrogen came from the soil than was supplied from applied fertiliser. Therefore high yields were achieved in 2016 as result of high soil fertility and the ability of the soil to provide 37 - 66% of the nitrogen required for the high yields at those two sowing dates. Since the two sowing dates were side by side in the same paddock its interesting speculate why there appeared to be less nitrogen coming from soil in the first sowing when it may have had a larger root system to take up nitrogen. Clearly with lower yields in the RGT Relay, the overall offtake was not as great and so the nitrogen applied (220kg N/ha) was a greater proportion of the offtake. However, it was also notable that the harvest indices of early sown crops was not as high as in the second sowing date suggesting that more nitrogen may have resided in the crop canopy rather than the grain at harvest (since the above calculations assume 25% of the nitrogen resided in the straw and chaff).

Nitrogen responses at HYC in 2016 & 2017

Although only trialled at the early sowing date (6th April) the nutrition trials conducted at HYC over the last two years (cv Manning in 2016 & cv RGT Relay in 2017) have shown that the optimum applied level of nitrogen fertiliser was no more than 176kg N/ha in 2016 with a maximum yield of 12.76t/ha (trial lodged badly which may have lowered optimum) and no more than 234kg N/ha in 2017 with a maximum yield of 13.07 t/ha (note in 2017 there was no significant yield difference between 130 – 250kg N/ha applied nitrogen in the trial with yields ranging from 12.72 – 13.07 t/ha). The unfertilised plots in 2017 illustrated that high yields could be achieved in the absence of nitrogen fertiliser (Figure 1) albeit with lower protein. In addition, the lower protein achieved with these unfertilised plots still indicated that more yield potential was available in the paddock as grain protein levels tend to be in the range of 10.5 – 11.0% when yield potential can be said to be optimised for a given season. These protein levels were produced by fertiliser applications of 130kg N/ha and above.

Nutrition for high yielding cereal crops in the UK

In the UK, recent analysis of independent NIAB TAG trials show similar findings to the HYC research over the last two years (Figure 2). Results from a large series of wheat trials indicated that high yield potential usually comes from higher fertility where the extra N required to realise that potential is provided by the soil, such that the total applied N needn't be significantly higher than for crops with lower potential. The analysis of trials on wheat from the UK put forward "that for every tonne of nitrogen fertilised grain/ha, two thirds of a tonne comes from the yield without nitrogen". This was put forward to explain "why the additional amounts of nitrogen required for very

high yields in field trials is less than would logically be expected" (NIAB TAG 2018). As the work at HYC has shown yields of 14-17t/ha result in offtakes of 350-450kg N/ha yet there was little need to apply more than 220kg N/ha of nitrogen fertiliser. Similar findings have been found in New Zealand with crops yielding 15-16t/ha with harvest offtakes of 450kg N/ha but applied nitrogen optimum rates no greater than 240kg N/ha.

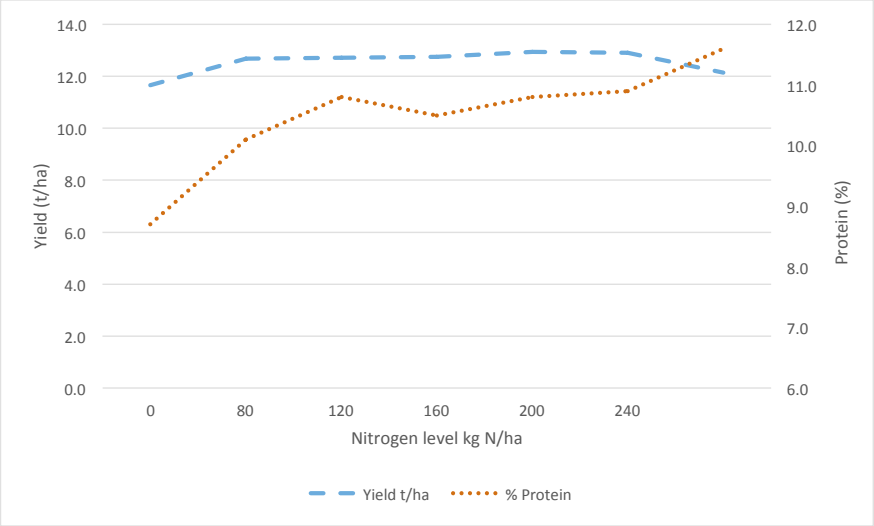


Figure 1. Influence of nitrogen rate on yield and protein at the HYC centre, Hagley, TAS – cv RGT Relay 2017. *An additional 10kg N/ha was applied to plots as MAP in the autumn (Starting spring nitrogen (14 August) – 15kg N/ha (0-60cm), Soil Organic Carbon 2.01%)*

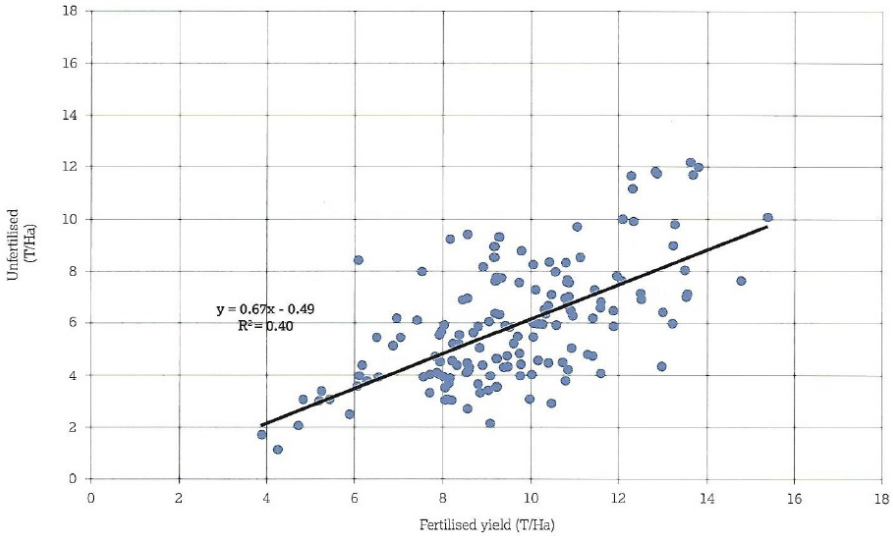


Figure 2. Relationship between yields for fertilised and unfertilised wheat crops – (source NIAB TAG, UK 2018)

N. Poole, FAR Australia, & Jon Midwood, Southern Farming Systems - November 2018

Nick Poole
Managing Director, FAR Australia

What have learnt about achieving high wheat yields from two contrasting seasons of the HYC project?

Key Points

- Higher final harvest dry matter is essential for higher grain yields. Warmer grain fill conditions in 2017 reduced final harvest dry matters and yields.
- In 2016 wheat crop canopies producing 30-35t/ha dry matter at harvest produced plot yields of 15-17t/ha. In 2017 yields peaked at 13t/ha with final harvest dry matter production of 20-25t/ha (yields expressed at 12.5% moisture).
- From the 2017 results it was difficult to establish a clear relationship between optimum flowering date and final yield since cultivars flowering from late October – mid November produced yields in the range of 12-13t/ha, however late November flowering for longer season germplasm such as RGT Relay and Manning sown later limited yields to 10-11t/ha in 2017.
- The lack of a clear relationship between optimum flowering window and yield may in part be related to the impact of irrigation which tends to assist later developing cultivars that might otherwise be penalised in a dryland system.
- Shorter season winter wheat cultivars Annapurna and AGTW001 performed well irrespective of sowing date with similar or higher yields to last year's high fliers (RGT Relay, RGT Accroc, Genius, Conqueror and RGT Calabro) at the first sowing date in early April and superior yields at the second sowing date in late April.
- Lodging and leaf rust infection are key constraints to high yields of wheat and barley in Tasmania.
- The longer season winter wheats RGT Relay again showed good adaption to earlier April sowing with good standing power and excellent Septoria tritici blotch (STB) *Zymoseptoria tritici* resistance, however substantial economic responses to late season leaf rust *Puccinia triticina* were observed in 2017.
- The early - intermediate winter wheat developer RGT Accroc produced high yields in both 2016 and 2017, but again showed a weakness in straw strength at 10t/ha, which needs to be actively managed with canopy composition, nitrogen timing, PGR's and or grazing.

Seasonal contrasts
The 2017 growing season differed in three principal ways from 2016 at the Hyperyielding research centre;

Firstly instead of warmer temperatures over autumn and early winter, cooler minimum temperatures prevailed. One of the primary initial effects was to slow down growth from late April sown crops (27 April) relative to those sown early in April (6 April). It also resulted in significantly less leaf rust infection (*Puccinia triticina*) being carried into winter in the early wheat sowings.
Secondly, the temperatures for the grain fill period for the wheat crops in particular, was well above the long term maximums for Tasmania. In November these high temperatures combined with below average rainfall, made it difficult for on farm irrigation systems to keep up with soil water demand.
Lastly, although regions were affected by frost during flowering and early grain fill, frosts were not as severe at the research site as elsewhere in the state.

Against the backdrop of seasonal contrasts although wheat dry matters and grain yields were down there were some consistent performances amongst the germplasm tested. There were also some excellent contrasts that have given good learnings for the future.

Impact of sowing date and irrigation on optimum flowering dates
Although the exact timing of the late frosts (early November) may explain some of the differences observed in 2017 it is worth noting that high wheat yields of 12-13t/ha were achieved from crops sown in both early and late April with flowering dates that varied from late October to late November (Table 1). In dryland scenarios on the mainland there are proven benefits to optimising flowering date in a specific window in order to balance frost risk (risk of flowering too early) and heat stress (flowering too late). In 2017 at the HYC the relationship between optimum flowering date and optimum yield appeared to be less strong, a factor that may be linked to irrigation which could favour later sowings of longer season wheats that would not normally perform in a dryland scenario, unless favoured by later rainfall events in December. However although it cannot be statistically compared it did appear that flowering in late November from a late April sowing was a disadvantage with late heading germplasm such as Manning, an observation also noted with RGT Relay the late heading northern European wheat. The shorter season cultivars AGTW001 (now discontinued) and Annapurna which both yielded over 14.8t/ha in 2016 performed well in 2017 at both sowing dates, despite very early flowering when sown on 6 April. RGT Calabro and Accroc which outperformed AGTW001 and Annapurna in 2016 were both slightly inferior (0.5 - 1.0t/ha) in 2017 indicating a general shift in favour of shorter season material in 2017, particularly when sown in late April with generally cooler autumn temperatures.

Standing power is essential to push yields above 8t/ha

With a cereal yield potential over 8t/ha standing power is a key requirement of cereal germplasm, particularly if we are to sow early in April where crops produce more autumn biomass and there is greater competition for light between the tillers. In 2017 despite crops with lower overall biomass at harvest (20-25t/ha) the yield performance of the weaker strawed cultivar RGT Accroc was significantly influenced by lodging suggesting that if it were to be sown early (April) it would need to be actively managed in terms of canopy structure (plant population), nitrogen timing, PGR's and or grazing.

Leaf rust (*Puccinia triticina*) is a key constraint to high yields of wheat in Tasmania

Over the last two seasons leaf rust infection has played a major role in restricting the productivity from high yielding irrigated wheat crops. In 2016 germplasm susceptible to this disease was heavily penalised by this disease when sown in early April as higher autumn temperatures carried high levels of infection into the winter. In 2017 levels of the disease were lower in early spring but early December rainfall and warmers temperatures encouraged the disease in irrigated crops late in the season when with dryland crops green leaf had already senesced. This is a key constraint to productivity in high yielding cereal crops that are susceptible to this disease.

Table 1. Grain yield (t/ha), Site Mean (%), grain protein (%) and screenings (%) of the top five cultivars sown in trials on 6th & 27th April (data subset of larger trial).

Cultivar/Line	Yield (t/ha)		% Site Mean	Protein (%)		Screenings (%)		Estimated Flowering (GS65)
Sowing date 1 (6th April)								
Annapurna	13.01	a	113	11.3	bcd	5.4	bcd	L.Oct
AGTW-001	12.66	ab	110	11.3	bcd	4.8	cd	L.Oct
RGT Calabro	12.47	abc	108	11.7	a-d	5.1	bcd	E.Nov
Genius	12.44	abc	108	12.3	ab	5.7	a-d	M.Nov
Manning (control)	12.25	bc	106	10.8	d	5.6	bcd	M.Nov
RGT Accroc	12.17	bcd	105	11.8	a-d	7.4	abc	L.Oct
Conqueror	11.99	b-e	104	12.6	a	6.0	a-d	E.Nov
SQP Revenue (control)	9.95	h	86	11.6	a-d	4.7	d	E.Nov
Mean	**12.1**			**11.7**		**5.6**		
LSD	(0.7)			(1.1)		(2.6)		
Sowing date 2 (27th April)								
AGTW - 001	13.10	a	116	12.7	abc	3.3	b-f	M.Nov
Annapurna	12.81	a	113	12.3	b-f	3.5	a-f	E.Nov
RGT Accroc	12.14	bc	107	12.0	c-f	3.3	b-f	M.Nov
AGTW - 002	12.03	bcd	107	12.6	a-d	3.8	a-f	E.Nov
RGT Calabro	12.01	b-e	106	12.4	a-e	2.8	ef	M.Nov
Conqueror	11.53	ef	102	12.3	a-f	2.7	ef	M.Nov
Manning (control)	10.80	hi	96	12.3	a-e	3.0	b-f	L.Nov
SQP Revenue (control)	10.00	j	89	11.8	ef	4.2	a-d	M.Nov
Mean	**11.8**			**12.3**		**3.3**		
LSD	(0.74)			(0.6)		(1.1)		

Darcy Warren & Nick Poole
FAR Australia

Septoria tritici blotch, leaf rust and powdery mildew control in wheat – what have we learnt in two years of research?

Key Points

- Foliar disease is a major agronomic constraint of irrigated wheat in HRZ farming systems.
- The constraint is particularly problematic in Tasmania where crops require protection for longer period as a result of growing season length.
- Fungicide resistance issues in the Septoria tritici blotch (STB) and Powdery Mildew pathogens conspire to make disease management strategies more complicated.
- As a consequence HYC has not only been addressing the most effective fungicide strategies but also searching for germplasm that can be sown early (April) and that has good disease resistance for this environment.

Germplasm resistance screening

A large part of HYC's screening research over the last two years has been to look for germplasm candidates in wheat and barley that have three key features for the Tasmanian environment if crops are sown in April.
These features are;

i) The correct phenology "development time clock" suitable for producing high yields from April sowing.
ii) Good standing power in order to support yields in excess of 10t/ha.
iii) Good all round disease resistance in order to reduce fungicide use in this long season HRZ environment.

In wheat good disease resistance to Septoria tritici blotch (*Zymoseptoria tritici*), leaf and stripe rust (*Puccinia sp*) and powdery mildew *(Blumeria graminis)* will be essential if we are to maximise the yield potential of irrigated wheat in this long season environment. The need for good genetic resistance in our cereal germplasm has been made even more important due to the discovery of fungicide resistance to Group 3 DMI (azoles) in the STB pathogen and Group 11 QoI resistance in the powdery mildew population (Dr Fran Lopez Ruiz paper & session). In 2016 and 2017 screening work where cultivars and lines were grown without fungicide or PGR suggested that there were a number of more disease resistant candidates that offer promise (Figure 1a & 1b). In 2018, 10 of the cultivars that have shown either good phenology, yield, disease resistance and or standing power are being grown with full fungicide protection and no fungicide input. This trial has been established on April 5th and 26th in order to examine which of our most promising candidates are the least expensive to grow in terms of fungicide input. In the latest assessments of this trial the cultivars Annapurna and

Kittyhawk showed great promise in terms of disease resistance (Table 1). A further five cultivar candidates representing susceptible to resistant cultivar categories are also being studied in more detail with exposure to five fungicide strategies covering a single fungicide through to three fungicide applications.

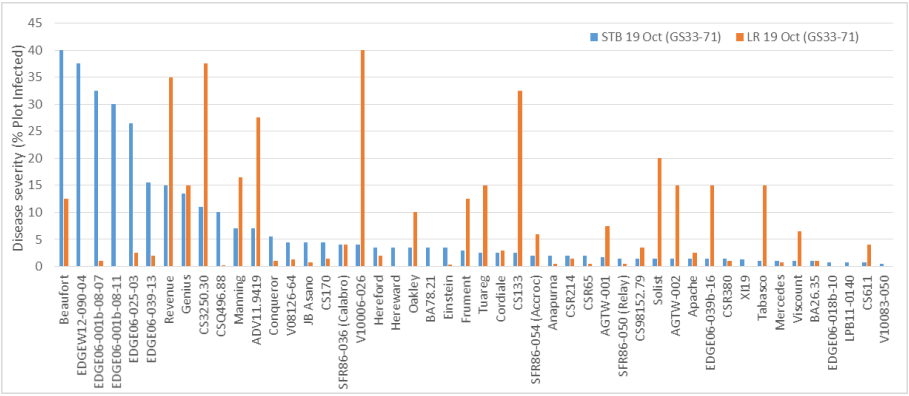


Figure 1a. 2016 Germplasm screening - Disease severity of Septoria tritici blotch (STB) and leaf rust (whole plot score), assessed 19 October (GS33-71) – STB & leaf rust (LR)

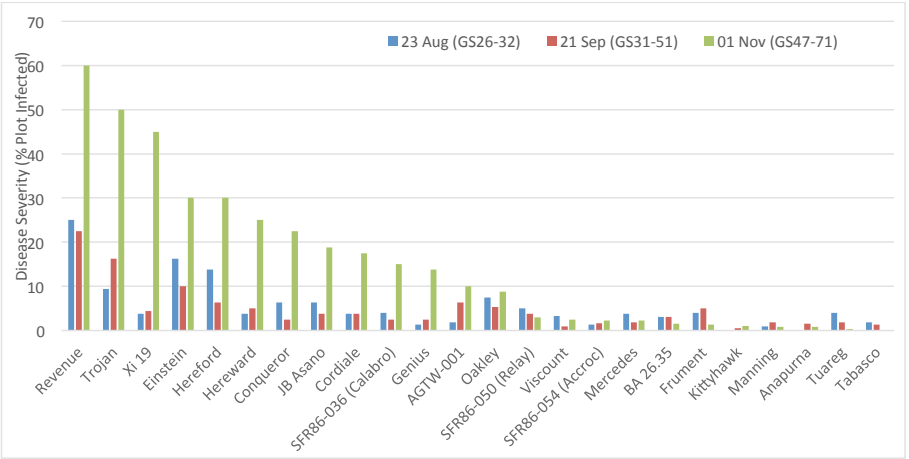


Figure 1b. 2017 Germplasm screening - Disease severity of Septoria tritici blotch (STB) (whole plot score), assessed on 23 August (GS26-32), 21 September (GS31-51) and 01 November (GS47-71)

Leaf rust (*Puccinia triticina*) is a major constraint to high yields of wheat in Tasmania

Over the last two seasons at HYC leaf rust infection has been a major constraint in the productivity of high yielding irrigated wheat crops. In 2016 germplasm susceptible to this disease was heavily penalised by this disease when sown in early April as higher autumn temperatures carried elevated levels of infection into the winter. In 2017 levels of the disease were lower in early spring but early December rainfall and warmer temperatures encouraged the disease in irrigated crops late in the season when with dryland crops leaves had already senesced. This is a key constraint to productivity in

high yielding cereal crops that are susceptible to this disease. In 2016 RGT Relay was very resistant to the leaf rust, however in 2017 it was not and gave large 2t/ha responses to better leaf rust control based on three fungicides containing Group 11 QoI strobilurin and Group 7 SDHI chemistry (one application of each in the growing season).

Table 1. Severity (% plot severity) of Septoria tritici blotch (STB) in ten cultivar/lines of wheat with and without full fungicide protection applied– assessed GS39, HYC 2018.

Cultivar/Line	No fungicide applied	Full Fungicide Protection
RGT Accroc	0.2	0.1
Annapurna	0.1	0.0
RGT Calabro	3.9	5.5
RGT Relay	1.8	1.1
DS Bennett	32.5	5.8
Conqueror	16.3	5.8
Genius	30.8	8.0
Kittyhawk	0.0	0.0
Manning	20.0	3.3
SFR 86-044	4.3	1.8

Septoria tritici blotch control (Zymoseptoria tritici) – optimum strategies for susceptible crops in the face of fungicide resistance

The presence of the isoform 11 (or R8) strain of STB means that upfront control options based on flutriafol will not be as effective as that experienced on the mainland, although on the mainland this is changing. In 2017 and 2018 seed treatments based on fluquinconazole (Jockey) and the experimental SDHI seed treatment fluxapyroxad gave superior control of STB compared to in furrow flutriafol (the advantage of Jockey over Impact was not statistically significant in 2018) (Figure 2).

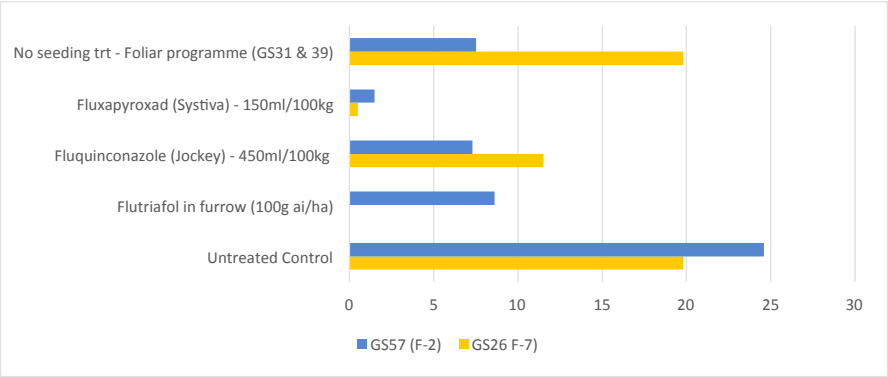


Figure 2. Influence of at sowing measures for control of STB – cv SQP Revenue HYC 2018 *(note that sowing treatment comparisons at GS57 received the same foliar fungicides applied at GS31 (Opus 500ml/ha) and at GS39 (Amistar Xtra 400ml/ha)*

TP Jones&Co
A RURALCO BUSINESS

TAS-AG SERVICES

CRT

DISTRIBUTORS OF HIGH PERFORMANCE CEREALS

TP Jones & Tas Ag Services are distributors of high performance cereals which are agronomically backed and trialled under local conditions.
Full production services available.

Contact us at any of our branches:

YOUNGTOWN
321 Hobart Road
P | 03 6343 1666

LATROBE
1 Speedway Drive
P | 03 6426 4000

LONGFORD
13 Marlborough Street
P | 03 6391 3140

CAMPBELL TOWN
116 High Street
P | 03 6381 1206

WWW.TPJONES.COM.AU

Kenton Porker
SARDI, New Variety Agronomy Group

Winter barley – does it have a place in regions with higher yield potential compared to spring germplasm?

What's the difference - spring barley versus Winter Barley?

- Winter barley varieties must experience a prolonged period of cold in order to flower (Vernalisation).
- Spring barleys do not have a recognised vernalisation requirement so flowering is dependent on photoperiod (daylength) and temperature.

Spring barley in the higher rainfall zones

- Recent spring barley releases RGT Planet and Rosalind have set new potential yield benchmarks. Westminster is a Malt option but its yield is limited relative to RGT Planet, and Oxford barley is now outclassed.
- Many spring barley varieties that perform well in the lower rainfall zones are prone to lodging and have poor partitioning of biomass when moved to the HRZ.
- Low rainfall benchmarks such as Compass are genetically constrained in terms of yield potential in the HRZ.
- Limited opportunity for dual purpose grain and graze.
- Spring barley develops fast and may not make use of the available growing season.
- Not suited to pre May planting dates in frost prone environments.

Why Winter Barley?

- Lengthening the crop life cycle is the simplest way to improve potential yield.
- Slower developing cultivars combined with earlier sowing offer opportunity to make use of the available growing season.
- To date, slower developing barley genotypes with greater vernalisation and/or photoperiod have not been evaluated for early sowing (prior to April 20).

Winter Barley History

The first 'modern' winter barley in Australia was Ulandra, selected and released in 1987 by NSW DPI (Read and Macdonald 1987) followed by Urambie in 2005, a semi-dwarf feed barley aimed at both dual purpose and grain only situations suited to early March to mid-May sowing in NSW. Urambie lacks potential yield compared to the winter material being trialled here. European winter material has been made available for evaluation in 2018 yield trials in collaboration with FAR Australia, SARDI, SAGIT and SECOBRA Plant Breeders.

Potential benefits of Winter Barley?

1. Earlier sowing.
2. Improved grain number and potential yield, greater biomass and tiller production from a longer vegetative phase.
3. Improved disease resistance and lodging tolerance.
4. A longer vegetative phase provides opportunity for dual-purpose use for livestock.

Challenges:

It is still early days – there has been limited selection in Australia for yield and flowering date, the current introductions may develop too slow for many med – high rainfall zones and grainsize stability is unknown.

Katherine Fuhrmann
Field Research Officer, FAR Australia

Barley agronomy for crops over 10t/ha – keeping barley standing and disease free

Key Points

- Foliar disease and crop lodging are major constraints to high yielding crops of barley in the Tasmanian environment, particularly where irrigated.
- Do not overlook yield reductions and losses of harvest efficiency from brackling and necking in addition to crop lodging.
- Germplasm selected, nutrition and PGR management all have a role to play in minimising crop lodging, brackling and necking.
- Where large barley acreages and uncertain weather patterns affect harvest, PGRs can act as a harvest aid generating a wider harvest window through preventing head loss.
- Wet weather diseases such as Scald and or net blotch are widespread weaknesses in high yielding germplasm in HYC trials.
- In higher risk disease scenarios, such as irrigated crops, these disease weaknesses need to be addressed with comprehensive fungicide packages, starting with seed treatment and foliar fungicide timings at GS31 (1st node) and GS49 (1st awn emergence).

Barley yields of over 10 t/ha have been achieved during the first two years of the Hyper Yielding Cereals project with three varieties; RGT Planet, Rosiland and RGT Conquest. These yields were achieved by growing barley as the first cereal after a break crop, post vining peas in 2016 and post pyrethrum in 2017. There are however two key agronomic constraints for high yielding barley that need to be considered when pushing the yield potential of this crop. Firstly, the crop needs to stand for the duration of the season and secondly, we need to limit the impact of foliar disease, which in an irrigated long season environment is much more damaging. The objective of disease control being to enhance the green leaf retention and duration.

Preventing losses from lodging, brackling and necking

Grain losses and yield reductions due to straw strength in barley can be broken into three distinct issues; lodging, brackling and necking, all of which can result in yield reductions. With lodging the earlier it occurs the greater the yield reduction since it interferes with light interception during grain fill. In the case of both brackling and necking the losses can result in head loss at or prior to harvest, often after the crop has finished grain fill.

- ***Lodging,*** is caused either by the bending of the stem at the lower internodes (stem lodging) or the plant losing its soil anchorage and falling over exposing its roots (root lodging). If it occurs early in grain fill or before it can significantly reduce yield.
- ***Brackling***, bending of the stem in the upper internodes, is often seen later in the grain fill period or at maturity. It frequently results in the crop losing heads at harvest since heads can hang down below the height of the cutter bar. The longer the barley crop stands in the paddock waiting for harvest the greater the losses.
- ***Necking*** (head loss) results in the peduncle bending and then breaking below the head resulting in head loss. This is frequently seen in crops in exposed locations but is strongly influenced by cultivar.

Lodged crops not only impact the profitability of the crop (yield loss) but reduce harvest efficiency with slower forward speeds.

Plant Growth Regulator (PGR) products when correctly timed not only keep barley crops standing through shortening and strengthening the straw, but can also increase the harvest window of the crop. Although the impact of brackling and resultant head loss is relatively small if barley crops are harvested promptly, the losses can increase if harvest is delayed. In research conducted by FAR Australia in SW Victoria there was a yield penalty of half tonne when harvest was delayed by 16 days. This yield reduction was associated with increased brackling resulting in higher head losses (Figure 1).

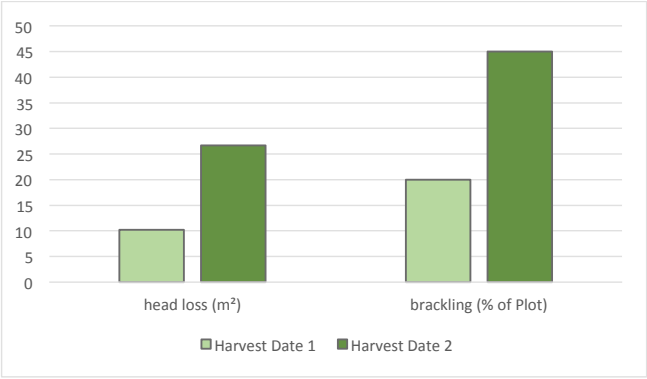


Figure 1. Influence of harvest delay (16 days) on head loss (heads/m^2) and % brackling (reduction in yield 0.57t/ha) - Gnarwarre, Victoria cv Westminster

Though many of the PGR management strategies trialled at the HYC were experimental in 2017 they produced significant differences in brackling (Table 2), however these differences did not produce significant yield differences (Table 3). The details underpinning the different management levels are featured in Table 4.

Table 2. Influence of cultivar and management on % brackling in HYC trials 2017 – Hagley, Tasmania

	Brackling (%)				
Variety	**High Input**	**High Input 2**	**Standard Input**	**Standard Input 2**	**Mean**
RGT Planet	58	19	38	25	35.0
Conquest	31	31	54	35	37.8
Rosalind	50	10	11	20	22.8
Mean	**46.3**	**20.0**	**34.3**	**26.7**	
Site Mean		27.3			
LSD		22			

Table 3. Grain yield of the variety x management interaction trial (t/ha).

	Management level Yield (t/ha)				
Variety	**High Input**	**High Input 2**	**Standard Input**	**Standard Input 2**	**Mean**
RGT Planet	11.39 a	11.16 ab	11.36 a	10.66 bcd	**11.14 a**
Conquest	10.81 a-d	10.97 abc	10.87 abc	10.39 cd	**10.76 b**
Rosalind	10.18 d	10.53 bcd	10.35 cd	10.51 bcd	**10.39 c**
Mean	**10.79 a**	**10.88 a**	**10.86 a**	**10.52 a**	

Site Mean	10.76		
LSD (mgmt.)	0.39	**P Val (mgmt.)**	0.226
LSD (variety)	0.34	**P Val (variety)**	0.001
LSD (mgmt. x variety)	0.67	**P Val (mgmt. x variety)**	0.397

Figures followed by different letters are considered to be statistically different (p=0.05)
Note letters following mean figures in bold are only comparable to other bold letters in the column/row.
Plot yields: To compensate for edge effect a full row width has been added to either side of the plot.

Table 4. Detail of high input, high input 2, standard input and standard input 2 management levels

	High Input	High Input 2	Standard Input	Standard Input 2
Seed Rate:	200 seeds/m^2			
Sowing Fertiliser:	100kg MAP + Flutriafol			
Nitrogen:				
27 July	46kg N/ha	46kg N/ha	46kg N/ha	46kg N/ha
25 August	40kg N/ha	80kg N/ha	---	40kg N/ha
31 August	92kg N/ha	92kg N/ha	92kg N/ha	92kg N/ha
PGR:				
15 June	Experimental 1	Experimental 1	---	---
29 August	Moddus Evo 0.2L/ha	Moddus Evo 0.2L/ha	Moddus Evo 0.2L/ha	Moddus Evo 0.2L/ha
22 September	Moddus Evo 0.2L/ha	Experimental 2	---	---
Fungicide:				
1 September	Prosaro 0.3L/ha	Prosaro 0.3L/ha	Prosaro 0.3L/ha	Prosaro 0.3L/ha
22 September	Radial 0.42L/ha	Radial 0.42L/ha	---	---
13 October	Amistar Xtra 0.2L/ha	Amistar Xtra 0.2L/ha	Amistar Xtra 0.3L/ha & Opus 0.15L/ha (excl. Surge)	Amistar Xtra 0.3L/ha & Opus 0.15L/ha (excl. Surge)
23 October			Amistar Xtra 0.3L/ha & Opus 0.15L/ha (Surge only)	Amistar Xtra 0.3L/ha & Opus 0.15L/ha (Surge only)

Disease management in barley

An integrated disease management approach to barley diseases is vital in Tasmania with scald, the net blotches (spot and net form), leaf rust, powdery mildew and the first Australian incidence of Ramularia all being found in Tasmania. Managing previous year's stubble loads and green bridge volunteers (inoculum sources) and utilising cultivar resistance are essential control measures before any fungicide applications are considered. Ensure that you understand which diseases are likely to be most prevalent in your region in your cultivar by consulting the resistance ratings.

Currently RGT Planet has been widely adopted both in Tasmania and on the mainland. Disease ratings for RGT Planet include, susceptibility (S) to spot form net blotch (SFNB), susceptible to very susceptible (SVS) to net form net blotch (NFNB) and moderately susceptible to scald (MS). These wet weather diseases, particularly NFNB and scald can be particularly prevalent in an irrigated Tasmanian environment. In a high disease pressure scenario where the cultivar is predisposed to these diseases (earlier sown or on infected stubble), early season fungicide protection can be achieved using a seed treatment such as fluxapyroxad (Systiva), however this protection typically runs out during stem elongation depending on the product used, with the requirement for one or two follow up foliar fungicides. Alternatively a foliar fungicide program of two sprays will generally be required.

Key points when making decisions around a fungicide programme:

1. Rotate between different fungicide modes of action particularly the QoIs (strobilurins) and SDHIs. Limit the use of QoI (strobilurins) and SDHI applications to **one** per season. This includes the use of the SDHI seed treatment Systiva, which applied to the seed counts as a SDHI application within the season since it has activity on foliar diseases.
2. The ideal timing for a two spray programme is GS31 (first node) and GS49 (1st awns emerging). The second spray ideally being applied after the flag sheaf has extended which occurs in the booting phase.
3. However, do not allow the gap between the first spray and the second spray to exceed four weeks regardless of the crop growth stage after the first application. If the crop has not reached flag leaf – 1st awns by the time of the second application a third spray may be required if the pressure is sufficient to warrant it.

Through keeping barley crops greener for longer, disease free and standing yields of over 10t/ha with a first cereal rotation position are attainable in the Tasmanian growing climate.

Station 11

11:45am and 2:45pm

Phil Jobling
Business Manager, GrainSearch

The Value proposition for a breeder's agent bringing new feed grain varieties to Tasmania

GrainSearch began in 2012 as a grower owned business in the Western Districts of Victoria, with the primary aim of seeking out and commercialising wheat and barley varieties especially suited to the HRZ (High Rainfall Zone) environments. Since its inception, GrainSearch has relied solely on the End Point Royalties (EPR) generated from the production of grain, from a number of varieties including - SQP Revenue, Manning and Beaufort Wheats and Westminster Barley. All of these varieties have been very successful in Tasmania, generating new maximum yield potentials and in the case of Manning, opening up opportunities for February sowing Grain and Graze techniques – allowing farmers to generate even higher gross margins per hectare (GM's/Ha) than ever before.

GrainSearch is committed to continuing to search both internationally and locally for the next high yielding, high quality wheats and barley varieties. However to achieve this, we do need an income to do this successfully and to also provide a return to the plant breeders to fund their R&D program, which leads to improved cultivars.

End Point Royalties are the best and fairest method of collecting a very small share of growers' production income. It is important to note that by using the EPR system, we ride the seasonal outcomes as much as the grower. We have to work within a budget that accounts for both a good 2016 season and the much lower income years of 2015 and now 2018 seasons. EPR's are not a huge money making opportunity, they simply allow us to continue our work effectively.

For the EPR system to work - we rely on ALL farmers to do the right thing. By providing the breeder agent with accurate and complete harvest declarations, each and every season, it allows us to maximise our efforts in searching for the next generation(s) of improved wheat and barley varieties for Tasmania. If a new feed wheat can deliver an additional 500kg of grain/ha, the approx. $4/tonne EPR investment, will see the grower at least $150/ha better off growing the improved variety (2018 wheat prices). That is a great Return on Investment (ROI)!

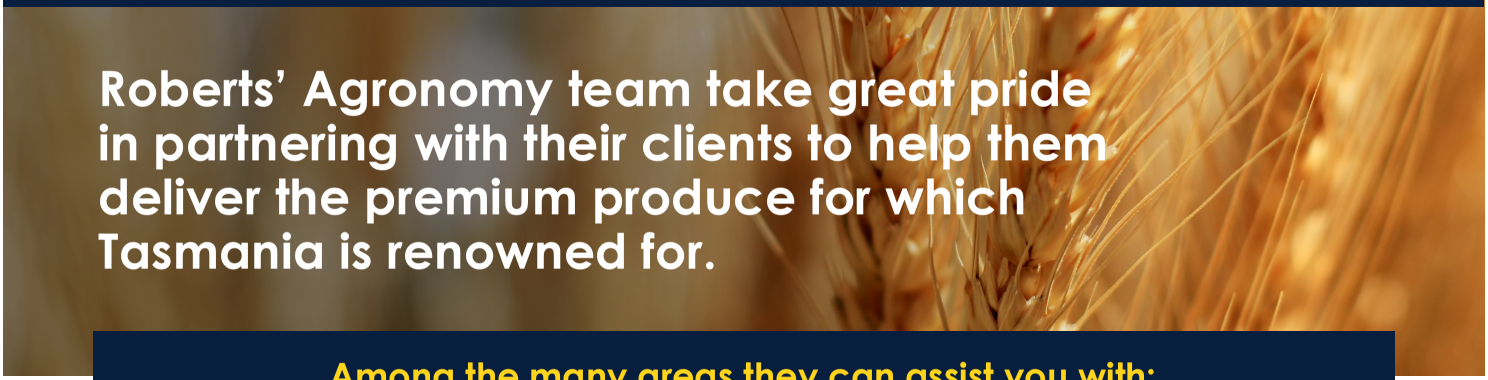
That is the Value Proposition "EPR's MAKE YOU MORE MONEY! "

- Buy seed only from authorised agents in Tasmania. Farmer to farmer seed sales are usually only allowed on a small number of milling wheats
- Complete your Harvest Declarations accurately and on time

- Cross check any/all of your grain delivery dockets – as inaccuracies can create lots of extra follow up work for us and you as the grower
- Pay your EPR Invoice by the due date
- Update company records as/when they happen, so we can continue to process things correctly
- Continue to support those companies who are working hard to deliver new material into Tasmania
- EPR's provide future investment of new varieties for the future, to increase productivity and profitability to you, the farmer

Roberts

A RURALCO BUSINESS



Roberts' Agronomy team take great pride in partnering with their clients to help them deliver the premium produce for which Tasmania is renowned for.

Among the many areas they can assist you with:

- Crop Selection
- Paddock Selection
- Seed Solutions
- Fertiliser Programs
- Crop Establishment
- Crop Monitoring
- Crop Protection
- Weed, Disease & Pest Identification
- Herbicide/Fungicide & Spray Programs
- Irrigation Design & Moisture Monitoring

For more information visit www.robertsltd.com.au

Station 12

10:45am and 1:45pm

Hugo Avery and Grant Archer, Dairy Producers
Mark Freeman, Dairy Researcher

Grain Use in the Tasmanian Dairy Industry

Hugo Avery is Acting General Manager for 25 farms at Woolnorth (Van Dairy Group - North West Tasmania) and believes in a proactive farming approach. Hugo was feeding pellets and crushed grain to varying farms last year and has now changed to feeding crushed grain as he felt pellets didn't provide enough fibre in the cows' diet. High usage of pellets in the winter period when cows were fairly limited in fibre intake resulted in a measurable fat suppression. Hugo believes pellets are finely ground and they pass through a cow's rumen without providing adequate fibre to generate the volatile fatty acids that promote fat production in milk and this made them consider other feeding options. Winter is the period of highest demand for supplements on the autumn calving farms and pushing higher milk yields with high components makes good economic sense in the higher milk price periods.

Using their buying power and inherent capacity to leverage good pricing deals, they tender for grain supply each year and currently are being supplied by Tasmanian Stockfeed Services.

In addition to the crushed wheat, canola meal was added to increase the protein content. With the price of canola rapidly rising and increasing scarcity there has been a recent change to substituting soy bean meal in place of the canola, a bit cheaper but not as good a protein source. Additives such as salts, lime stone, bentonite, sodium bicarbonate, magnesium sulphate (Epsom salts) and biotin are added to the mix as required.

All the decisions around grain purchases are price and quality dependent, and Hugo is happy to alter what is purchased and the relative mix of the product depending upon what is readily available and its price. Wheat and barley are currently very close in their pricing with a $10 a tonne difference, so currently Hugo prefers to use wheat as it has a better nutritive value, if the margin was $40 or more they would potentially change to a barley mix. Hugo has a clear focus on the starch content of the purchased product. The current price being paid for straight wheat is $480, without the crushing. They are currently purchasing pre-crushed grain, to get consistency of product, at an added cost. Hugo believes if you don't crush it properly you can miss out on a whole lot of energy and value from over or under milling. Grain supplied is ASW feed grade and when using barley, it is F1 standard. The farms also feed a pellet to young stock until they are at age when they can easily eat grass.

Grant Archer is a farmer from Bracknell who also owns another large farm located in Smithton currently being share farmed. Grant is a fan of evidence-based research weighing up all options when it comes to grain feeding and loves supporting the local grain industry.

Grant currently is buying whole grain, mainly comprised of locally grown red wheat. A large proportion of the feed fed can be sourced directly off local grain growers when heading or is sourced from TapAgrico or from Tas Stockfeed Services.

Grant has his own disc mill at the Cressy farm and all grain is crushed on farm. Grant typically feeds 1-1.5 tonnes a cow per year, but the feeding decision depends upon the season and whether or not the economics of feeding stack up. Grant currently buys additives to aid with animal health but again, this is dependent on the price of the additives and the current milk value. For most of the year Grant will add magnesium as caus-mag, calcium as lime flour and canola meal. Canola meal is added when it is considered the cows' diet is low in protein. Currently they are adding a lower rate of canola meal as the price of canola meal has risen rapidly. The protein mineral mix is roughly 0.5-1kg a day, per cow.

During the last 5 years they have found the addition of a mineral mix is critical to the health of the herd, as they have had issues with downer cows and the additives are a great source of the required essential elements. Particularly, the addition of calcium which helps with calving, so the aim is to build the calcium levels in their bones throughout the year.

Grant employs the services of a nutritionist, Kristy Evans, and conducts regular feed tests to determine the diets energy and protein levels. The amount of protein added (mainly as canola meal) is adjusted as a direct response to the feed tests. Feed tests are conducted on all forages and some of the pastures and grain deliveries.

The price currently being paid for the local whole grain wheat is $400/tonne delivered and Grant has been proactive, given the current supply and pricing outlook, and has locked in wheat from January onwards at $450 /tonne.

Hyper Yielding Cereal Project
A FEED GRAIN INITIATIVE

Meet the HYC Project Team - 2018

Nick Poole, Tracey Wylie and
Darcy Warren
FAR Australia

Ian Herbert, Gayle Hendricks Cox and
Emily Triffitt
Southern Farming Systems, Tasmania
(Jon Midwood not pictured)

Foundation for Arable Research Australia
Address: 23 High Street, Inverleigh, Victoria, 3321, Australia
Ph: +61 3 5265 1290 ● Fax: +61 3 5265 1601 ● Email: faraustralia@faraustralia.com.au
Web: www.faraustralia.com.au

ADDING VALUE TO THE BUSINESS OF CROPPING