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Directions for Grains R&D infrastructure in QLD



To: Interested parties in the Northern Grains Region.
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Summary:

Since the announcement of the QPDI&F's Fresh Approach strategy in July 2008 AgForce Grains has been working to develop a strategy for future R&D capacity and infrastructure provision in the state on behalf of QLD's grain growers. In the past 4 months members of the AgForce Grains board have travelled around almost all major centres where Grains R&D is conducted in QLD. In conjunction with these visits many meetings have occurred with growers and researchers. Meetings have occurred with staff and management of QDPI&F, GRFL, GRDC and NSW Farmers Association. Representatives of AgForce were present at QDPI&F planning meetings and a broad picture has now been developed by AgForce.

This paper outlines a broad but by no means definitive position with regards to the future provision of R&D infrastructure in QLD. It should be used as a basis for further discussion and further development of a strategic plan for R&D for the Northern Grains Region.

This paper is AgForce's broad view of the future of Grains R&D and will be one of a number of reports on the topic including the GRDC Northern Panel's Fellowes Report, QDPI&F's Centres of Excellence Discussion Paper, and a GRFL concept paper.

Future R&D needs:

What R&D will be needed in the future?

Over the next 20 to 30 years there will be an increasing emphasis on biotechnology and genetics for crop improvement, but a continually variable climate will mean that work on areas such as farming systems, soil science, crop protection and biosecurity will be needed. Traditional breeding methods of physically crossing varieties will still be needed as varieties move closer to commercialisation from biotechnology studies.

Therefore the QLD grains industry will need:

- Access to world class genetics developed for QLD conditions.
- Access to quality research in farming systems and crop protection and this will require access to crops which are physically growing in the regions in which they will be commercially produced.

Funding Research in the Future:

There is wide spread acknowledgement that the State Government will reduce their investment in agricultural R&D in the future. The Federal Government is likely to maintain their investment, though the focus of their investment is likely to move towards climate change and natural resource management and the industry must adjust its funding bids accordingly.

Therefore the only likely increase in real terms is going to come from growers themselves.

Currently growers, through GRDC, invest around one third of the R&D effort in the Northern Region. This takes into account actual annual on-ground investment and maintenance of assets. The other two thirds comes from the Federal Government's investment in GRDC and CSIRO and from the State Government and universities.

The view of AgForce is that farmers are becoming more dissatisfied with the amount of involvement and control they have over the investment they make in R&D. Without increasing grower 'ownership' we have little chance of increasing the level of investment individual growers make into their R&D.

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The QLD Government needs to outline its plans for the next 20 to 30 years as part of this process. If that plan involves further reductions in investment they should be prepared to develop an exit strategy from the business.

What do we need to provide the R&D listed above?

1. We need to improve grower ownership of R&D at all levels.
2. A high level *plant science*¹ centre of excellence will be needed to provide biotechnology and genetic traits and undertake cross commodity soil and entomology studies.
3. A regional *field crops*² C.O.E which delivers crop protection, farming systems and traditional breeding with collocation of laboratory facilities and field site.
4. Regional nodes to deliver research on the Darling Downs, in the coastal sub-tropics, CQ and the tropics
5. Use private commercial farms as locations for genotype by environment (GxE) studies wherever possible.
6. Complete collaboration and seamless investment in activities across the Northern Region.
7. A need to maintain not only the \$ invested in assets by the state government, but also the annual operating budget at least for a transitional period at a minimum of ten years.
8. Improved linkages and involvement of rural training providers (AACC's) and universities at all levels.

1. Improving Grower Ownership.

Grain producers do not have a close enough association to and control of R&D investment and activities to provide them with confidence to increase their individual investment in grains R&D.

To improve this situation the following must occur:

- **Corporatise GRDC**

GRDC is the major funder of grains R&D, but is still under the control of the Federal Government and a small group of elected farmer representatives. This opens the door for political appointments to important positions and political manipulation of R&D investment. It also means GRDC can not act in an efficient manner whilst serving what amounts to 'two bosses' and has its activities restricted under the *PIERD Act*.

A GRDC controlled by the investors, similar to MLA or AWI, would improve the linkage between investor, investment portfolio and outcomes.

AgForce Grains has had a policy supporting this position for many years and will again bring that to the National table at Grains Council of Australia.

- **Improve grower ownership of state and local investment**

In conjunction with a corporatised GRDC consideration should also be given to improving the grower involvement and ownership of local/State investment.

Two models which have been put forward are the Farming Systems Institute (with lessons to be learned from the past) and BSES. Whilst the FSI was probably ahead of its time, the interaction between the State Government and growers under that system was excellent and the model holds many ideas for the future. The BSES model is a recently completed (2002) model that provides industry with complete ownership of R&D facilities and activities with QDPI&F acting as an outside funder.

Under any new arrangement in field crops R&D, growers will need improved involvement similar to that in the models above.

- **Locate the regional R&D C.O.E in the grains heartland**

There are two sides to locating R&D facilities in regional areas, firstly it can be hard to attract good scientists to regional centres, creating the possibility of reduced research capacity. However, locating

¹ 'Plant science' refers to all plant related sciences for the field crops, horticulture and sugar industries.

² 'Field crops' is a term used by QDPI&F to refer to grain and cotton production. Grain and field crops are interchangeable terms in this document as almost all grain and cotton research is complementary to the other.

major facilities in regional areas provides the industry with a greater ownership of the facility and activities occurring there.

Narrabri has been criticised for its isolation and inability to attract good scientists, but its location in grain and cotton heartland means the recognition of the work undertaken there is very high and therefore the satisfaction of results are better articulated and connected to scientists.

It is clear we need a major regional facility in QLD to undertake field crop research. A regional QLD facility will need to be maintained to provide grower ownership. See below for further details.

2. A Plant Science C.O.E

In order to ensure the provision of quality genetics and biotechnology traits relevant to QLD field crops a plant science centre of excellence needs to be developed in QLD. The logical place for this to occur is at the St Lucia campus of the University of QLD or in the Boggo Road precinct of QDPI&F.

The size of the field crops industry in QLD does not warrant a sole high level/'blue sky' research centre and therefore we need to work with the sugar and horticulture industries to provide a critical mass for this high level research.

Research at such a facility would focus on biotechnology, cross industry entomology and pathology, basic soil science and development of suitable genetic traits for QLD conditions.

This centre needs to then feed seamlessly into the regional C.O.E where applied research on farming systems, crop protection and breeding can occur.

- Involving the Universities

Development of R&D for field crops or plant science cannot be done in QLD without the increased involvement of UQ. Other universities will provide support and some research, but it is widely recognised that UQ is best placed to invest in field crops. This investment needs to mostly happen at a high level, but the universities also need to be involved at the Regional C.O.E.

A high level research C.O.E would require investment from State and Federal Governments, CSIRO, Universities, GRDC, CRDC, the sugar and horticulture industries.

3. Develop a Regional C.O.E

To ensure the continued and improved investment in grains R&D in QLD we will need a facility which:

- a. Is located close to the major regional centre of Toowoomba (within 30 minutes drive, maximum 45min.).
- b. Has major highway exposure
- c. Has a minimum of 100ML of secure water supply for irrigation with extra in good years.
- d. Has laboratory and field facilities on the same site
- e. Black cracking clay soils, though not completely necessary

This centre is likely to replace a number of other research stations. It will require investment from the State Government from funds freed from the sale of field crop research assets, QLD Treasury, GRDC and possibly from growers directly.

Gatton is an animal science C.O.E and not in the grains region and AgForce Grains does not believe it is in the interest of the industry to put a facility at Gatton.

4. Regional delivery and research nodes

To ensure delivery of relevant research across the state there will be a continued need to undertake research in regional centres. These will include Central Queensland and access to facilities in the tropics.

- CQ Regional Research

The Central QLD region is a difficult one for which to make a decision on the future focus of research in the region. Whilst Emerald seems like it is the logical place to concentrate research in CQ with the

proximity to town, the facilities and natural resources (large water supply) of Emerald AACC, the facilities and resources in Biloela are also good.

Focusing on the Emerald AACC for CQ research will require a large amount of investment to ensure the office and laboratory facilities are of a standard needed to conduct research and will link the students into the research effort better, but Biloela already has good facilities and would not require great levels of investment.

Far more detailed costings and plans need to be developed before AgForce will agree to moving all CQ grains research from Biloela to Emerald or vice versa.

- Grains Research for the Tropics

Field crop production in the tropics is small compared to other areas, but it is widely agreed that there will be a large increase in production of field crops in the tropics.

To ensure this happens smoothly R&D will need to focus on and occur in the tropical regions. However, this is probably best done in conjunction with research being undertaken in the predominating industries of sugar and horticulture.

There are opportunities for tropical research on the Atherton Tablelands and at the Ayr Research Station.

The coastal sub-tropics is another area for expansion of the current grain growing area and research in the region should continue.

5. Private farms for representative adaption and expression studies

Research under commercial farming conditions is a vital part of any current and future efforts to improve grain yields and quality. Whilst some on-farm trials already occur there is scope to better utilise the land of private farms to undertake trials.

The cotton industry has a good record of keeping a low asset base and uses commercial private enterprises to run its trial activities. This needs to be replicated in the grains industry immediately. There are a number of farmers willing to lease, even on a long term basis, land for trials and research.

6. Seamless delivery of R&D in the Northern Region

Field crops R&D activities occurring in NSW and QLD need to be completely complementary. It is unlikely that in the near future we will see one R&D delivery model or system for the Northern Grains Region, some state based activities will always occur given state funding bases.

However, it is likely that under the National R&D Framework and GRDC investment strategy, research in the North is likely to trend towards a nationally coordinated system under which one state based program leads the research and is supported by others. Barley Australia and Pulse Australia are models of how R&D efforts across the country can be managed in a complementary manner to provide greater benefits for all.

According to the QDPI&F we may see something similar for winter and summer cereals where QLD focuses on summer crops and NSW on winter crops reflecting the level of production of crops in those states. Table 1 below comes from a QPDI&F document entitled 'Centres of Excellence – Building Queensland's R&D capacity in a national framework' and shows how DPI is preparing itself under the National R&D Framework.

Table 1. Proposed DPI&F investment priorities for future R&D in the context of the national primary industries RD&E framework (Source www.dpi.qld.gov.au)

LEAD <input type="checkbox"/> High priority areas for recurrent and infrastructure funding (including Joint leadership)	PARTICIPATE <input type="checkbox"/> Recurrent funding for tightly specified or geographically based areas of R&D in the context of a national program <input type="checkbox"/> Limited infrastructure investment; disinvestment might be considered	LINK <input type="checkbox"/> Recurrent funding focused on linking national program outcomes with services for Queensland agribusinesses <input type="checkbox"/> Infrastructure disinvestment to be considered
Beef (joint) Sugar (BSES) Summer grains Summer pulses Tropical & subtropical fruit and nuts Tropical vegetables Tropical forestry Integrated pest & disease management (tropical) Weeds (tropical) Climate change adaptation Modelling & predictive systems	Wheat Cotton Dairy Pigs Poultry Tropical aquaculture Tropical amenity horticulture Fisheries Animal welfare Animal health technologies Plant health Irrigated water use management Fragmented landscapes (peri-urban) Pastures (farming) Platform technologies (Biotechnology etc) Food science	Winter pulses Oilseeds Barley Rice Sheep Temperate aquaculture Temperate vegetables Temperate fruit and nuts Temperate amenity horticulture Viticulture, wine & grapes Temperate forestry Dryland water use management Salinity

No matter how the investment is set out we must have minimal duplication and maximum complementarity of research in the North.

7. Maintain investment from QDPI&F

Whilst we recognise that the level of investment from the State Government into field crops research is likely to fall in the future we need to maintain the investment for as long as possible.

The commitment by State Cabinet to partition any funds arising from the sale of QLD R&D assets for an industry to be reinvested in that industry is integral to our future ability to provide R&D outcomes for agriculture.

However, this commitment needs to be extended to the annual operating investment by QDPI&F to ensure a seamless transition towards our R&D vision over at least the next 5 to 10 years. This level of investment should be maintained not only in dollar terms, but in real terms.

8. Improve linkages with our future research providers – the students

The number of students undertaking studies in agriculture at an agricultural college and university level has been falling for some time and the level is now critically low. To improve the intake of students and output of research providers the educators must be more closely involved in field crops R&D at all levels.

Without linkages to commercial research and service provision in agriculture it will be difficult for industry and educators to express the opportunities agriculture has to offer. Therefore the agricultural colleges and the universities must be involved at all levels of field crops research.

This is easily achieved by building a C.O.E at St Lucia for high level biological research and undertaking TAFE style activities at Emerald AACC, but more difficult to develop at a Regional C.O.E. To ensure the Regional C.O.E is involved in training, there must be strong linkages between universities and R&D providers.

AgForce Grains supports the moves to place the School of Land and Food in the Science Faculty in the hope that this move may provide students entering a science degree more access to a path towards commercial agricultural research and service provision. That is, students entering a science degree who don't really know what they want to do can be shown a pathway to jobs in agriculture once in their degree studies.

A regional C.O.E provides the opportunity for on-ground, hands on research for students undertaking science degrees majoring in agriculture. A regional facility should be used in a similar way to the veterinary science centre at Goondiwindi where students go there on medium term placements as part of their studies.

A regional centre also provides a continuing opportunity for research staff to mentor and manage post-graduate students.

GRAINS LOCATION OVERVIEW- Queensland (courtesy of QPDI&F).

- There are a total of 17 sites where grains R & D and associated vocational training is currently undertaken (excluding Universities) in Queensland
 - This includes 9 research stations and 2 field experimental sites throughout Qld (all agencies).
 - DPI&F also undertakes grains R & D at a further 2 laboratories/office sites.
- There are a further 4 Australian Agricultural College Corporation properties/campuses where some form of grains-related training is undertaken.

Property	Lead agency	Land area (Ha)	Physical characteristics	Current research	Estimated Land Value \$M	Est Buildings, Improvements Value \$M
Ayr Research Station	DPI&F	43	<p>Research Station</p> <p>Ayr Research Station is located 5 km from Ayr (100 km south east of Townsville). The Station undertakes R,D&E in tropical tree crops, dry tropics horticulture, beef, and the integration of rotational crops within a sugarcane system. The research station supports sorghum research during the winter period. The development of farming systems for cotton is under investigation along with developing rotational crops with sugar cane as important issues for Sustainable Farming Practices.</p> <p>Following closure of Little Drysdale St Office, a new glasshouse and technical facilities to support R&D were constructed on this site. It now supports all R&D Staff onsite together with conference, laboratory and administration facilities.</p>	<ul style="list-style-type: none"> • GRDC Wheat pre-breeding project to determine adaptation in non-traditional areas • Contract maize and sorghum breeding trials • Contract sorghum and sunflower breeding trials <p><u>Other Plant science projects on-site</u></p> <ul style="list-style-type: none"> • CCCRC 1.03.30. Burdekin cotton <p>[plus 6 projects supporting tropical horticultural industries]</p>	0.340	0.374
Biloela Research Station	DPI&F	281	<p><u>Research Station</u></p> <p>The Research Station was established in 1923 by the Queensland Government and the Queensland Cotton</p>	<ul style="list-style-type: none"> • GRDC Sorghum Breeding, CQ Component • improvement, CQ component 	1.512	5.389

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Bundaberg Research station	DPI&F	32	<p>Corporation to assist the development of newly opened land for agricultural crops, especially cotton. The Station consists of 280 ha of irrigable, alluvial land on the Callide flood plain just to the north of the town of Biloela. Biloela is currently the base in CQ for Plant Science Research associated with crop improvement programs in sorghum, pulses (chickpea & mungbean), wheat, barley and oats. It is also the location for the Tropical Crops and Forages Collection (TCFC) – part of Australia's National genetic resources collection.</p>	<ul style="list-style-type: none"> Breeding food & livestock wheats, CQ component Reinvestment fund: Sorghum reverse genetics, CQ Component CQ Farming Systems (row configurations) MLA Breeding oat varieties, CQ component GRDC DAQ00110 Barley Breeding Australia Contract wheat & durum breeding trials & wheat physiology (CSIRO) GRDC DAS0052 Genetic resources for crops <p><u>Other Plant science projects on-site</u></p> <ul style="list-style-type: none"> GRDC Australian chickpea breeding, CQ component GRDC National mungbean 		
Dalby AACC main campus	AACC	1289	<p><u>Research Station</u></p> <p>Bundaberg research station was established in 1985 to undertake research into small crops, tree crops and grain crops in the form of glasshouse and field trials. Grains-related R & D is currently restricted to 1 staff member.</p> <p>Horticultural production in the Bundaberg has continued to increase in recent years, and this site is likely to incur future growth as a consequence of increased R & D investment by industry and associated stakeholders.</p> <p><u>AACC property (training)</u></p> <p>The Dalby campus specialises in board acre and crop production; intensive and extensive livestock production; rural business and engineering. The</p>	<ul style="list-style-type: none"> GRDC Red soils farming systems imitative, component GRDC Wheat and barley grain defect <p>[plus 9 projects supporting tropical horticultural industries]</p> <p>None</p> <p>Current activities restricted to AACC training purposes</p>	1.970	12.318

				campus incorporates four commercial properties that are used as both demonstration and teaching resources. The campus caters to several specialities including: broad acre crop and grain production; irrigated and dry-land cotton production; intensive livestock production; rural business management; and agricultural engineering.				
Dalby AACC – railway property	AACC	220		<u>AACC property (training)</u> Railway - a 220-hectare cropping block on the Jandowae road		None Current activities restricted to AACC training purposes	Incorporate in Dalby campus value	
Dalby/Moola – Crystal Brook [14km east of Dalby]	AACC	116		<u>AACC property (training)</u> A 116-hectare mixed cropping/grazing farm		None Current activities restricted to AACC training purposes	Incorporate in Dalby campus value	
Emerald Research Station	DPI&F	40		<u>Research Station</u> The station has 40ha of land with approximately 25 ha irrigation (flood & spray) suitable for experiments (supply of water is unreliable in the winter months). The station is utilised by DPI&F staff from the Emerald town office in combination with numerous producer co-operative sites for experimental work. The major soil type is Bug (heavy open cracking clay) with an average rainfall is 634 mm per annum (rainfall pattern is extremely erratic) and there are an average of 7 frosts per year.		<ul style="list-style-type: none"> • CQ Farming Systems (Wheat and Barley phenology) <u>Other Plant science projects on-site</u> <ul style="list-style-type: none"> • GRDC DAQ00105. Applied solutions to weed issues in CQ • GRDC National mungbean improvement, CQ component – C. Douglas (CID 885) 	0.325	0.214
Emerald AACC main campus	AACC	1200		<u>AACC property</u> Mixed purpose site with horticulture (table grapes, and mangoes), cropping (cotton, grain and forage for hay) and 43ha of irrigated pasture. The water resources include 3266ML allocation from the river and a 200ML Ringtank; 500t of grain storage and an extensive range of row cropping machinery.		<ul style="list-style-type: none"> • GRDC/CRDC performance of enhanced integrated cotton/grain production systems in CQ Plus activities associated with AACC training role	3.100	13.392

Gatton Research Station	DPI&F	49	<p><u>Research Station</u></p> <p>Gatton Research Station is at the centre of the major horticultural production areas of Qld, close to major population and supply areas. The climate is suited to wide range of crops and pastures, with a range of quality well drained soil types. The site is across the road from the University of Queensland campus and benefits from increasing collaborative opportunities.</p>	<ul style="list-style-type: none"> • GRDC Sorghum Breeding • Breeding livestock wheats • Core wheat pre-breeding • GRDC DAQ00106 Herbicide tolerance of barley & wheat • Disease progress nursery (rust) • MLA Breeding oat varieties • GRDC DAQ00096 Emerging foliar disease issues • GRDC DAQ00110 Barley Breeding Australia 	1.228	2.817
Hermitage Research Station	DPI&F	228	<p><u>Research Station</u></p> <p>Hermitage Research Station is a major centre for plant breeding and agronomic studies on agricultural crops grown in Queensland and northern New South Wales. The station is located 6 km east of Warwick, and 160 km west of Brisbane. Total area of 228 ha comprising some 80 ha of rich black alluvial clay, 90 ha of sloping arable soils derived from Walloon coal measures, and 60 ha of non-arable timbered slopes of basalt derivation. Facilities include office block, conference rooms, biotechnology laboratory, three controlled environment plant growth rooms, five glasshouses, three cold storage rooms, six insulated cool seed stores, automatic rainout shelters, drying ovens, gas fired drying barn, and seed store with range of threshing, grading, and grinding equipment.</p> <p>Programs conducted by Hermitage staff include barley breeding; pathology and biotechnology; sorghum breeding, physiology and biotechnology; pulse breeding and agronomy (chickpeas and mungbeans); soybean varietal/strain evaluation, and rural water use efficiency studies. Other research conducted at Hermitage includes a long-term fallow management study, wheat frost tolerance studies, oat variety testing, herbicide studies and information</p>	<ul style="list-style-type: none"> • GRDC -Sorghum Breeding • Reinvestment fund, Sorghum reverse genetics • GRDC DAQ00085 Sorghum stay-green physiology • GRDC DAQ00110 Barley Breeding Australia • GRDC DAQ00094 Barley grain defects • GRDC DAN00106 Barley agronomy • GRDC Maize germplasm enhancement • GRDC DAQ00077 Pedigree based genome mapping (barley) • GRDC DAQ00106 Herbicide tolerance of barley & wheat. <p>Plus contracted wheat & barley trials</p> <p><u>Other Plant science projects on-site</u></p> <ul style="list-style-type: none"> • GRDC Australian chickpea breeding, SQ component • GRDC National mungbean improvement, SQ component • DAQ00122 Nationally coordinated frost trials • GRDC DAQ00096 Emerging foliar 	1.880	3.833

			systems evaluation and development.		disease issues		
Kairi Research Station	DPI&F	245	<u>Research Station</u> Kairi was initially established to supply to supplying vegetables and eggs to allied troops in North Queensland, New Guinea and the Pacific theatre, and was converted to a research Station at the end of the war. Today, it occupies 244 ha undertaking research programs for the peanut, maize, potato and sundry agricultural and horticultural industries. Plant science activities include peanuts, maize, sweet corn and cropping systems. The site also has an operational dairy and associate dairy herd.		<ul style="list-style-type: none"> GRDC Maize germplasm enhancement Wheat pre-breeding project to determine adaptation in non-traditional areas <u>Other Plant science projects on-site</u> <ul style="list-style-type: none"> GRDC Peanut breeding & pathology support to PCA Plus contracted peanut seed increase for PCA	2.450	2.327
Kingaroy Research Station	DPI&F	53 plus 56 ha @ Redvale site NE of Kingaroy	<u>Research Station</u> Kingaroy Research Station was established in 1971, and lies about 5km outside Kingaroy in the South Burnett region. Research facilities include: offices, laboratories, glass houses, a peanut processing plant, and many machinery and storage sheds. The Redvale site associated with Kingaroy Research Station is currently under-utilised		<ul style="list-style-type: none"> GRDC Red soils farming systems initiative GRDC DAQ00086 Integrated pest management for Pulses CRDC DAQ131 Mirids and stinkbugs In-crop spatial variability assessment (remote sensing) ACIAR Pulse agronomy project - RCN <u>Other Plant science projects on-site</u> <ul style="list-style-type: none"> ACIAR 2441 Enhancing peanut agronomy GRDC Agronomic packages for peanuts 	0.310	3.623
Kingsthorpe property	DPI&F	12	<u>Experimental property</u> A 12 ha block for trial purposes containing fairly level cultivation, deep brown clay soils ideally suited for intensive agriculture. No accommodation facilities or staff located on-site.		<ul style="list-style-type: none"> Reinvestment fund, Irrigation Strategies for wheat and Cotton DAQ00122 Frost project GRDC DAQ00119 Genetic approaches to Fusarium and 	0.215	0.027

Roma Research Station	DPI&F	67	<u>Research Station</u> Research activities at Roma Research Station have declined in recent years due to drought conditions. The site provides office and very basic lab facilities.	Bipolaris	0.350	0.470
Wellcamp	DPI&F	24	<u>Experimental property</u> A 24 ha plant science experimental block. No accommodation facilities or staff located on-site. Research has been limited by drought in recent years.	<ul style="list-style-type: none"> NO current work at Roma. 'Grain & Graze' project activity during last 6 months (CSIRO/DPIF) MLA Breeding oat varieties GRDC Wheat pre-breeding GRDC DAV00076 Synthetic wheats CR GRDC DAQ00119 Genetic approaches to Fusarium and Bipolaris GRDC DAQ00106 Herbicide tolerance of barley & wheat cultivars in NR 	0.365	0.125

Footnote: Other locations where facilitates such as drying ovens and lab space is utilised for R/D for farming-systems related experiments include: Ayr, Roma, Emerald DPIF complex, Biloela, Bundaberg and Kingaroy

LABORATORIES OR OFFICE COMPLEX SITES WHERE R & D UNDERTAKEN

Toowoomba Leslie Centre	DPI&F	7	<u>Laboratory</u> The Toowoomba Leslie specialises in winter cereal plant breeding. Structural facility to cater for these breeding programs include: PC2 biotechnology laboratory, barley quality laboratory, wheat quality laboratory with baking and noodle making facility. Glass houses, growth rooms and growth cabinet facility for early generation disease testing, seed processing and storage capacity of up to 100 tonne, dehumidified long term seed storage and various cereal testings labs. LRC acts as service provider with comprehensive farming capabilities to the cereal breeding programs throughout NSW, Southern and central Queensland. It also provides limited research farm facility with full irrigation capacity.	<ul style="list-style-type: none"> Wheat pre-breeding Breeding livestock wheats GRDC DAQ00104 Sponge & dough bread quality MLA Breeding oat varieties GRDC DAQ00110 Barley Breeding Australia GRDC DAQ00094 Barley grain defects DAQ00122 Frost project GRDC DAQ00096 Emerging Diseases GRDC DAQ00107 Cropping 	Listed above
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Toowoomba Tor Street	DPI&F		<p><u>Office complex</u></p> <p>Established in the early 1970's. Multi functional office, glasshouse and laboratory research facility containing plant science R & D staff, South Regional office, and other Government agencies such as DNRW who have constructed office blocks for 200 staff. Also on the site is the Animal Disease Surveillance Laboratory, entomology and plant pathology laboratories and a conference facility.</p>	<p>Options for nematodes</p> <ul style="list-style-type: none"> • GRDC DAQ00106 Herbicide Tolerance of barley and wheat varieties • GRDC Herbicide resistance strategies • GRDC/CRDC Modelling for sustainable glyphosate use • GRDC DAV00076 Synthetic evaluations • GRDC DAQ00119 Genetic approaches to resistance to Fusarium and Bipolaris • GRDC Defect elimination in wheat • GRDC Biotech disease resistance phenotyping • GRDC New pre-breeding projects x 4 • AGT – Wheat disease evaluations • Wheat & forage oats molecular biology 	5.831	13.941
				<ul style="list-style-type: none"> • GRDC DAQ00108 Reducing impact of pulse diseases • GRDC / CRDC DAQ00074 Facilitating adoption of IPM • CRDC DAQ0006 Silverleaf whitefly insecticide resistance monitoring • CRDC_DAQ134 Managing cotton aphids with parasitoids • CRDC_DAQ003_Cotton Fusarium wilt management 		

			<ul style="list-style-type: none">• Bioinformatics support for plant improvement• GRDC National Statistics project• Reinvestment fund, Irrigation projects use of ovens & labs for plant and soil data• Cotton Farming Systems – use of precleaner and delinting machine				
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