

Durum Breeding Australia (DBA): Southern Region



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seek LIGHT

Southern Region: 2014

'Snapshot' – Main Activity Highlights

Released DBA-Aurora

Technical team sowed and harvested 11 trial sites (13 in total, 2 contracted)

Implemented further operational systems changes successfully (e.g. Field-MAS)

Continued Horsham trials and now have confirmed grower adoption for 2015

Evaluated DBA-Aurora in SNSW (ADR Grade Confirmed)

Crown rot collaborations with AM & HW

Rust screening through the ACRCP (HB)

Further built international linkages (e.g. Italy – Carla Ceoloni, submit paper 2015)

Submitted peer-reviewed journal articles (under review)

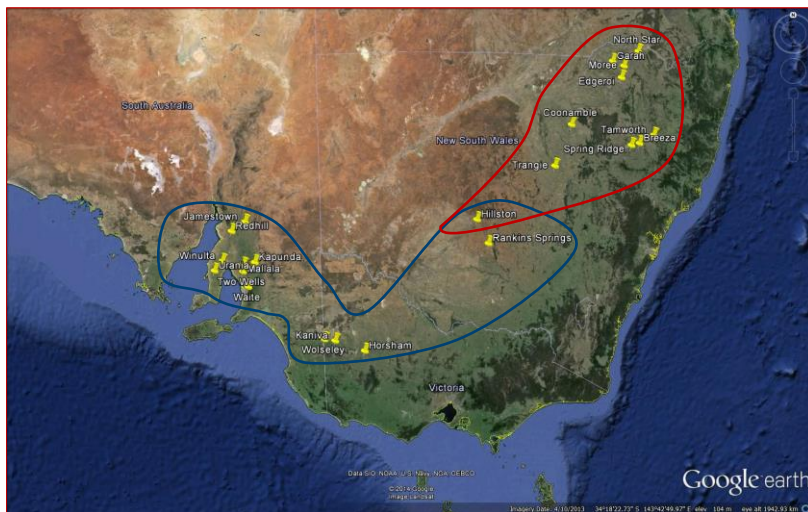
Southern Region: Other News....

- SAGIT funding – *GMSAT & Heat Tolerance projects!*
- PI – *National GRDC-funded 'Dispersive Soils' project (G. McDonald lead, UA)*
- EWG Durum Genomics & Breeding – *elected vice-chair*
- International congress – *Jason + Mike asked over as invited speakers*
- Technical Officers
 - *Alistair Pearce & Stuart Hentschke*

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DBA Trials: 2014

— Southern
— Northern



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Southern Region: Output 2

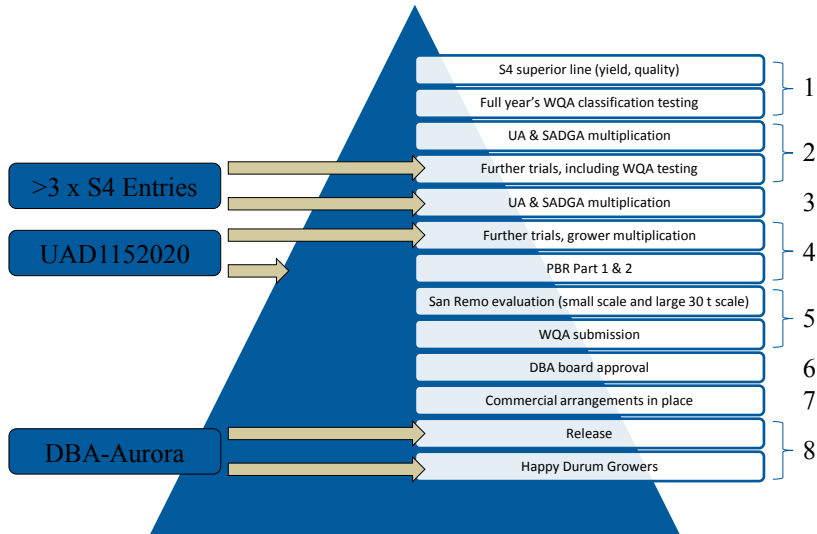
- Two (2) new ADR varieties developed and released



Compared to Tjilkuri:

- 5% or better increased yield potential
- Equivalent or better quality attributes
 - (> semolina yellowness/brightness, > TGW, < screenings)
- Equivalent or better rust ratings
 - (leaf rust, R-MR; stem rust, MR; stripe rust, MS)
- Crown rot susceptibility similar

Variety Pipeline



Southern Region: Trial Network

- Conduct a field trial program
 - 10 (2013), 11⁺² (2014), 15⁺² (2015)
 - Agrobase II
 - NVT ME BLUP Analysis

- Achieved
 - 13 sites




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Southern Region: Other Trials

- **National**
 - Rob Launder (AgriTech Rural, Horsham)
 - Simon Goss (Rye Grass Trials, SARDI)
 - Matt Gardner (AMPS, Liverpool Plains/Moree)
 - 2 x ToS (20/05 & 13/06)
 - DBA-Aurora ranked 1st in both trials
 - » Screenings <5% (3.75), protein 12.1% with #1 ToS
 - Caparoi top NSW variety @ 18% & 19% behind DBA-Aurora yield with the 2 x ToS
 - » Screenings <5% (3.10), protein 12.7% with #1 ToS
 - 2 x UAD additional entries came in 2nd, 3rd for the #1 ToS
 - Grain'n'Graze (GRDC)
 - Results not yet available
 - Barry Haskins (AgGrow, SNSW)
- **International**
 - Chile
 - Yawa for the 3rd year significantly out-yields all varieties
 - Progress to license 1 variety this year – likely Yawa (subject to GRDC + partners)

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Southern Region: All S4 DBA Trials

Variety	2013 OVERALL (Rank) [t/ha]	2014 OVERALL (Rank) [t/ha]	Tjilkuri = 0 (Base) Green = > + 5% Red = > - 5%
Yawa	(2) [5.25]	(1) [5.23]	
DBA-Aurora	(1) [5.30]	(3) [5.07]	
Tjilkuri	(8) [4.94]	(35) [4.69]	
WID802	(27) [4.68]	(7) [5.00]	
Tamaroi	(43) [3.80]	(46) [4.21]	

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NVT Disease Consensus

	DBA-Aurora	Caparoi	WID802	Tjilkuri	Saintly
Leaf	RMR	MRMS	RMR	RMR	MRMS
Stem	RMR	MR	RMR	MR	MR
Stripe	RMR	MR	MR	MR	MR
YLS	MRMS	MRMS	MS	MS	MRMS
Powdery	MR	MS	MRMS	S	S
Bunt	MRMS	S	MS	S	SVS
Prn	MRMS	MSS	MS	MRMS	MS
Prt	RMR	MR	MS	MR	RMR
Blackpoint	MS	MSS	MSS	MSS	MS
CR	SVSp	VS	SVS	VS	VS

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NVT BLUPs: SAGI (5 Years)

Variety	NSW			QLD			SA		VIC
	N/E	N/W	S/W	CQ	SEQ	SWQ	MN	YP	Wimm
Caparoi	3.51	2.84	4.43	3.31	4.00	2.82	4.07	4.13	3.85
DBA-Aurora	3.80	3.18	4.81	3.59	4.20	2.99	4.31	4.32	4.31
EGA Bellaroi	3.22	2.49	4.17	3.03	3.69	2.50			3.63
Hyperno	3.74	3.14	4.60	3.54	4.23	3.12	4.24	4.10	3.97
Jandaroi	3.33	2.63	4.01	3.15	4.02	2.93	3.87	3.77	
Saintly							4.22	4.31	4.13
Tamaroi							3.97	3.96	
Tjilkuri	3.55	2.94	4.49	3.34	3.83	2.79	4.13	4.14	3.97
WID802		3.12					4.25	4.22	4.09
Yawa	3.98	3.34	4.96				4.41	4.35	4.38
RegMeanYield	3.50	2.86	4.31	3.31	4.00	2.93	4.05	3.97	3.65
YldDiffvsMSVar	+14%	+21%	+20%	+14%	+4.5%	+2%	+1.7%	+5.4%	+5.4%

Expressed as $t\ ha^{-1}$

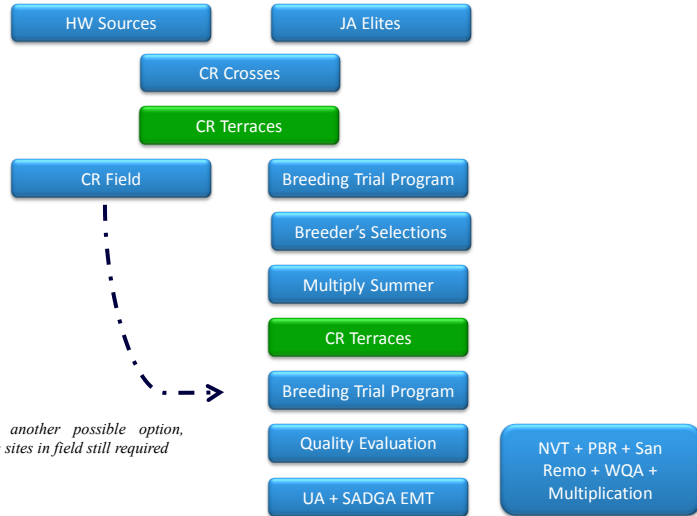
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Crown Rot: What are we doing?

- Crossing blocks have integrated UAD12CR001 (2-49/B31-10), UAD12CR002 (2-49/B1-6, aka 188967) and UAD12CR003 (WID902, aka UAD1153303)
 - With elites
 - S1 trials 2014 (simple BC combinations)
 - F2 trials 2014 (top-crosses, BC2 with/without favourable quality, abiotic combinations)
 - F1 bulking stage 2014 (CR x quality)
- UAD1151096
 - Top 10-15 of the S4 southern elite entries
 - Potential new source confirmed by Hugh over 3 years (terraces), RAC results field 2014
 - GK confirmed as having potential in field in northern trials (2013)
 - Confirming across multiple sites in northern regions
 - Hugh to continue evaluating and use in crossing, as material is S4 elite
 - Jason using as a parent in crossing blocks with highest yielding S3 and S4 lines
 - May progress further to variety consideration pending 2015 trial results

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Crown Rot: What are we doing?



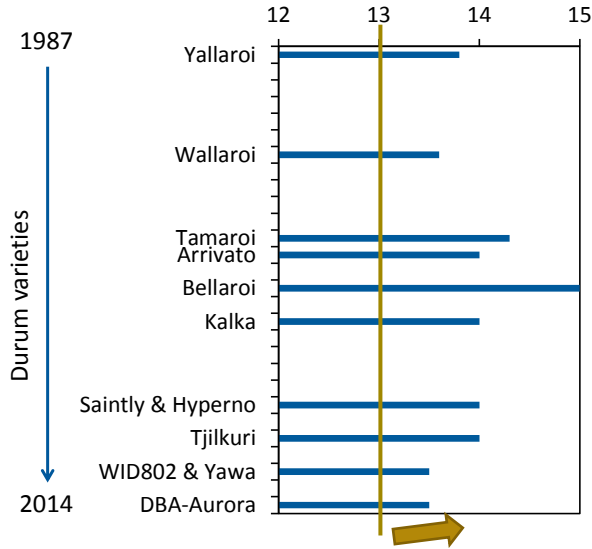
Not a short-cut but another possible option, multiple years, multiple sites in field still required

Rust: Where are we?

Tested (S4 Entries)	YR (<4)	LR (<4)	SR (<2)
48	39	48	48
	* = 2/9 checks		

- 1 = Very resistant
- 2 = Resistant
- 3 = Resistant-Moderately resistant
- 4 = Moderately resistant
- 5 = Moderately resistant-Moderately susceptible
- 6 = Moderately susceptible
- 7 = Moderately susceptible-Susceptible
- 8 = Susceptible
- 9 = Very susceptible

Quality: Where are we now?

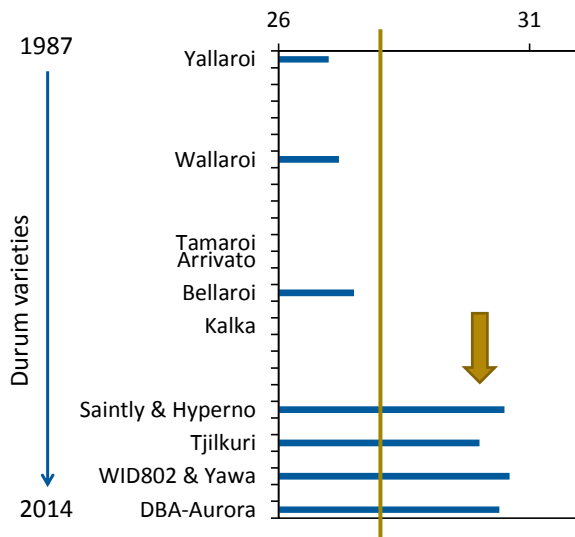


- Grain protein % at or above industry standard



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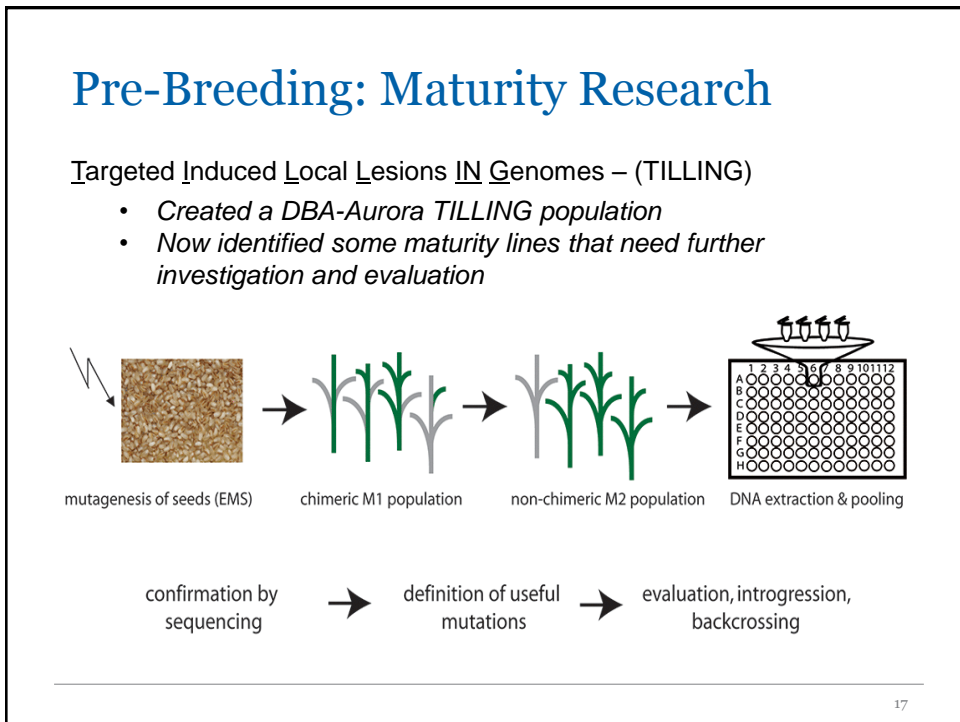
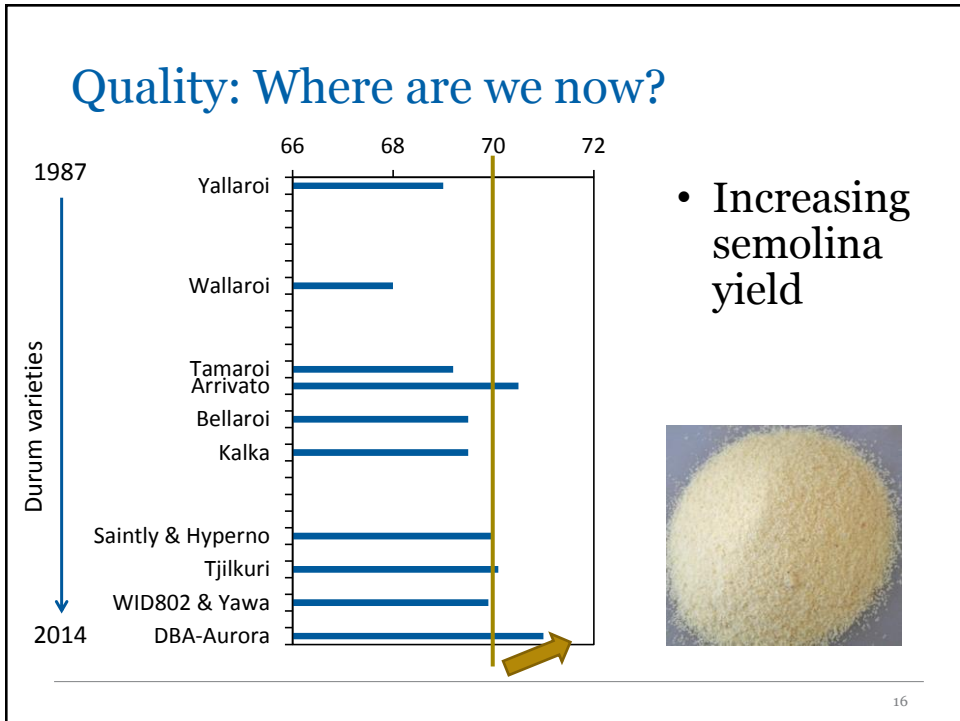
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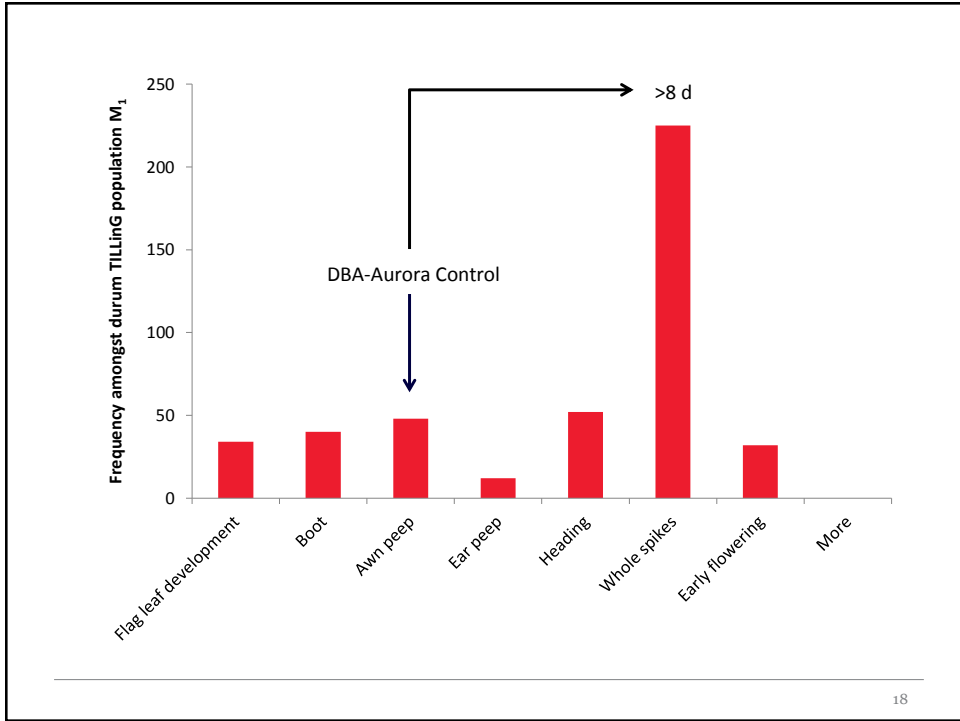


- Semolina colour (b*) is best in later varieties

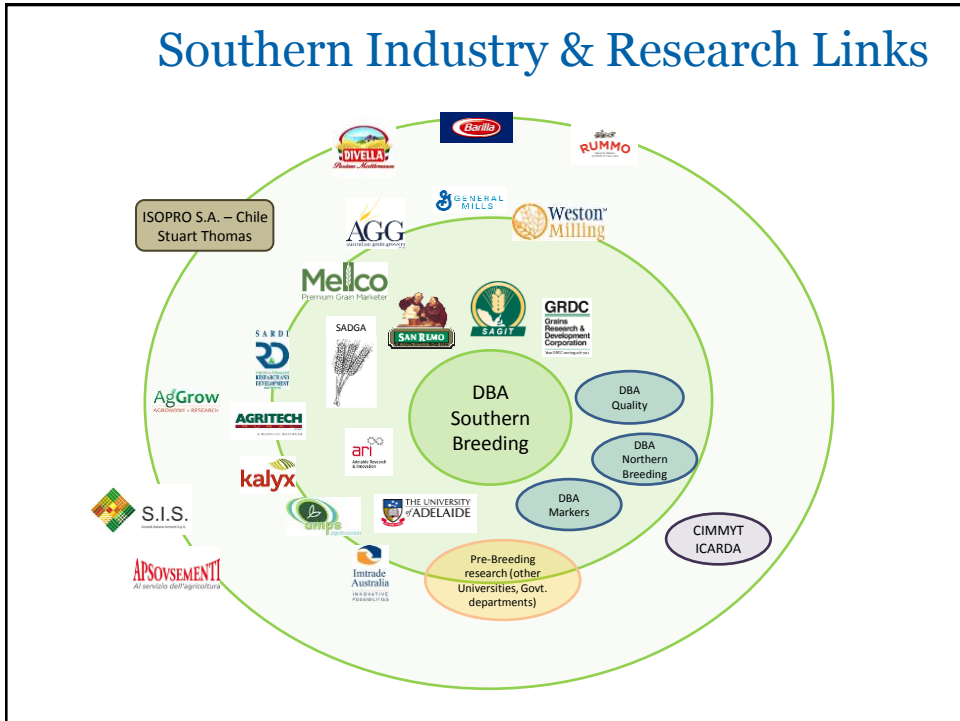


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Southern Region: 2015

- Breeding program trials – *further expand SNSW*
 - SAGIT GMSAT project – *further expansion for trial network*
 - SAGIT Heat tolerance project – *screening, ID valuable germplasm*
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- DBA-Aurora – *ADR for SNSW = promotion event(s) later in season*
 - UAD1152020 – *Decision on multiplication progression (SADGA, MS, HW)*
 - Growers/Consultants – *results @ updates/forums/field days/crop walks*
 - Crown rot – *continue collaboration with Anke Martin*
 - Crown rot – *continue strong links with Hugh and on-going screening*
 - National relationships – *further strengthen pre-breeding collaborations*
 - International relationships – *further develop (Italy & Canada)*
 - Publications – *physiology WUE, miRNA WUE, Italy introgression*


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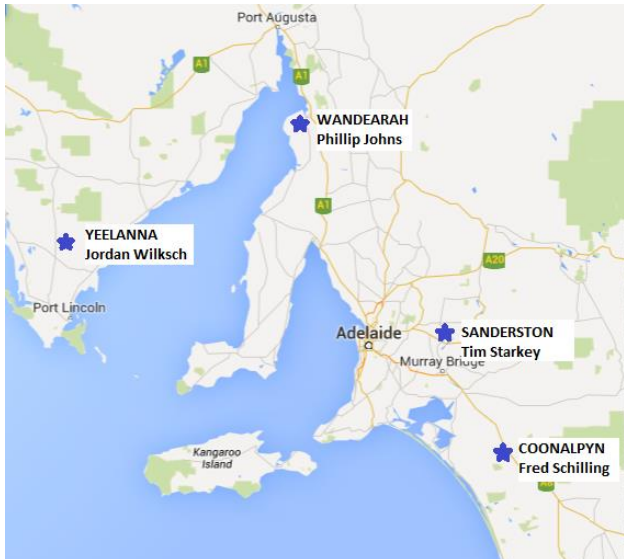
SAGIT: GMSATs


- Establish a series of coordinated trials in areas that are not yet known for widely growing durum and/or have grown durum historically
- Evaluate leading durum varieties against leading bread wheat varieties in the same trials
 - *DBA-Aurora, WID802, Tjilkuri, Saintly*
 - *E.g. Mace, Trojan, Corack, Wallup*
- Opportunity to evaluate a selected advanced breeding entry in years 2 and 3
- Promote durum as an alternative high value crop through field day events in these areas, updating growers and consultants with the trial results as they come to hand






SAGIT: GMSATs




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SAGIT: Heat Tolerance

- Screen durum varieties and selected elite entries against heat tolerant and heat sensitive bread wheat varieties
 - 35 durum entries (varieties, selected S4 and S3) along with Halberd (heat tolerant) and Wyalkatchem (heat intolerant)
- Compare and evaluate the relative heat stress tolerance and physiological responses of durum
 - Post-anthesis heat stress 10 days after main tiller finishes anthesis
 - Plants stressed for 3 consecutive 8 hr days, at 36 °C and 40 km hr⁻¹ winds
- Identify elite heat stress tolerant durum parents for further exploitation
 - Crossing blocks and breeding pipeline
- Disseminate the heat chamber trial results by updating growers at appropriate forums, field days, website
 - E.g. Field day visit to RAC heat chamber

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Carnevale: 2015



- 2 day Italian festival – San Remo is the Patron
 - Honours durum growers
 - Breeding program strongly associated since 2011



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Acknowledgements

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- Durum Growers & Consultants
- Fil & John @ San Remo
- Steve Mellington (Melco)
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- Anke Martin (CR)
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- Rob Launder & Team (AgriTech)
- Harbans & Team (Rust)
- Simon & Rob (SARDI)
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