



Southern Plant Systems Report

IREC Annual General Meeting – 16th August 2016

The Southern Cropping Unit has continued to deliver on a number of irrigated cropping projects over the past 12 months. The trial results were again published in the Southern Cropping Region Trial results guide 2015 which is available as a hard copy or as a pdf via the web site <http://www.dpi.nsw.gov.au/content/agriculture/broadacre/guides/southern-nsw-research-results-2015/>. The usual flagship rice publications were again updated and published with some additional primefacts produced this year. As usual Officers have presented their research at a variety of local, regional, national and some international forums.

We have seen continued co-investment into irrigated research at Yanco Agricultural Institute and Leeton Field station. Effort is proceeding to improve building infrastructure with the construction of two new sheds and an irrigation infrastructure improvement plan for Leeton Field station is being drafted. A concerted effort is going into updating laboratory and plant equipment where needed. We have seen 2 CSIRO technical staff and 1 clerical staff co-locate to Yanco. We expect to see further expansion and renewal of irrigated research capacity at Yanco Agricultural Institute (YAI) and Leeton Field Station (LFS) over the next 12 months.

NSW DPI Research:

Summaries of Southern DPI projects are summarised in attached table.

New projects:

Quinoa variety and time of sowing trials were delayed a year due to late arrival of seed from WA. David Troidahl will be conducting the trials for quinoa as part of a RIRDC funded project led from WA.

Southern Cotton- Optimising seedling emergence (CRDC 2016-2019) a collaborative project with NSW DPI, CSIRO and CSD E&D team was recently funded to focus on developing management strategies for optimising seedling emergence in southern production regions. We are currently recruiting the lead researcher who will be jointly funded by CRDC and NSW DPI and appointed as an on-going cotton research position.

Cotton Weeds (CRDC 3 years) Eric Koetz has recently been appointed as a Cotton Weeds Researcher to be based in Wagga. The position and project were initially based in Narrabri but with CRDC support has moved south, greatly improving our research capacity in the southern cotton production areas. Eric has over 20 years of experience working in crop and pasture agronomy in southern NSW. For six years of that he was working on integrated weed management under the weeds CRC.

Recent publications

The Rice crop protection guides and new factsheets, the Southern cropping region trial results 2015 and weed management guides are available on the DPI Website:
<http://www.dpi.nsw.gov.au/agriculture/broadacre/summer-crops/rice>
<http://www.dpi.nsw.gov.au/content/agriculture/broadacre/guides>

Staffing

Mathew Dunn, a recent graduate has joined NSW DPI at Yanco to lead the soybean variety evaluation and agronomy projects. Mat is a young and enthusiastic new scientist being mentored by Luke Gaynor, Mark Richards and Technical officer Alan Boulton.

Dr Prakash Oli has joined the Rice Cereal Chemistry team as part of a succession plan for Margrit Martin, the senior technical officer. Prakash has recently completed his PhD working on rice quality and has a background in rice quality and food manufacture from Nepal.

Dr Sandra McDougall, Luke Gaynor and Deb Slinger
Department of Primary Industries, Southern Cropping Systems



Current Irrigated Cropping Projects

Projects	Notes
<p>Irrigated Cereal and Canola "ICAC Project"</p> <p>DPI Team: Deb Slinger, Luke Gaynor, Tony Napier, Glen Morris, (Dan Johnston), Cynthia Podmore, Tania Moore, Neroli Graham, Brian Dunn</p>	<ul style="list-style-type: none"> ▪ GRDC 3 years, April 2014-June 2017 ▪ Trial sites: LFS, Coleambally, Hillston (Barry Haskins), Murray Valley (RAPL), Central West (CWFS), NW Victoria (ICC), SE Sth Australia (MacKillop Farm Management), Tasmania (Sth Farming Systems) ▪ Evaluate agronomic management practices with an aim to increase average yields for irrigated cereal and canola (target yields of 10 t/ha for wheat and 4 t/ha for canola) ▪ Variety, density, nitrogen, time of sowing ▪ Outputs – baseline data; High yielding cereal database, canola database; VSAP; Irrigated wheat manual; Irrigated canola manual.
<p>Double Crop</p> <p>DPI Team: Luke Gaynor, Tony Napier, Daniel Johnston, (Glen Morris)</p>	<ul style="list-style-type: none"> ▪ 2014-2016 GRDC – led by ICC (Another year of trials conducted by NSW DPI 2016-17) ▪ Conduct crop sequencing experiments and agronomy research (LFS) ▪ Summer and winter cropping experiments (Wheat, barley, canola, faba beans; soybean, maize, cotton) vs single crop and fallow ▪ Achieving high yields and high profitability per ML water
<p>MEF</p> <p>DPI Team: Katherine Bechaz, Dionne Wornes, Peter Davidson</p>	<ul style="list-style-type: none"> ▪ Service project for water limited and drought prone cereal variety selection ▪ GRDC (2011 – extension until June 17 –GRDC still deciding on new program after review of the MEF program) ▪ Research collaborators (CSIRO, DAFWA, UA) ▪ Core measurements delivered to relevant research leaders each season ▪ MEF maintained and managed each season
<p>Cotton – Thrips IPM</p> <p>DPI Team: Sandra McDougall, Jianhua Mo, Mark Stevens, Scott Munro, Sarah Beaumont and Alicia Ryan</p>	<ul style="list-style-type: none"> ▪ 3 years CRDC Jul 14-June 17 ▪ Primarily to validate thrips thresholds ▪ Compare southern invertebrate pest & beneficials populations to northern systems ▪ Validate mirid and Green Veg bug thresholds – seasons permitting
<p>Cotton – Optimising seedling emergence</p> <p>DPI Team: Deb Slinger, Principal Researcher (TBA), Andrew Watson, Neroli Graham, TA (TBA)</p>	<ul style="list-style-type: none"> ▪ 3 years CRDC Jul 16- June 19 ▪ Collaboration with CSIRO and CSD E&D team ▪ Management practices to optimise seedling emergence in Sth cropping areas ▪ Replicated trials and statistical analysis of previous related research
<p>Soybean breeding and agronomy projects</p> <p>DPI Team (Southern): Matt Dunn, Alan Boulton, John Dando, Paul Morris</p>	<ul style="list-style-type: none"> ▪ GRDC 4.5 year 2014-2018, two projects – breeding and separate agronomy project ▪ Southern node for Australian Soybean Breeding Program (led by CSIRO) ▪ Evaluating for high yielding, short season, human consumption quality characteristics, good agronomic traits, Phytophthora root rot and Powdery mildew resistance, and non-shattering ▪ VSAP for new and existing varieties, develop management practices for new irrigation systems ▪ Agronomy trials 15-16: Yanco: Time of sowing, plant density, and fungicide



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Rice Breeding / Stability DPI Team: Peter Snell, Ben Ovenden, Greg Napier, Kim Philpot, Kylie Elliot, Fred Ciccia, Minna Russell, Nathan Doss and Dehanne Sparkes	<ul style="list-style-type: none"> Australian Rice Breeding Partnership II (RIRDC 2015-2020) Only breeding program that integrates cereal chemistry and direct link to market intelligence Rice improvement for 7 quality classes and cold tolerance Explore new classes [low GI] Marker Assisted Selection for early generation selection and pure seed validation
Rice – Chem / QEP DPI Team: Laura Pallas, Margrit Martin, Yuki Sims, Leanne Johnston, Prakash	<ul style="list-style-type: none"> Service breeding quality evaluation assessments to assist variety breeding choices Looking to develop GI assessment and Antioxidant methods in new partnership program Support farmers, SunRice and Breeders in delivering world class rice Education on importance of quality in addition to yield
Modernising Rice Data collection DPI Team: David Troidahl Sunrice & Agtrix	<ul style="list-style-type: none"> Sunrice Geographic Information System (GIS) Ricemap (RIRDC 2013– 2016) Final report submitted June 16 Maximise the value from data collected for Sunrice, AGS, DPI, other researchers and growers Improve uptake by growers through training.
Quinoa DPI Team: David Troidahl	<ul style="list-style-type: none"> Component of a RIRDC project led by DAFWA Quinoa variety trials (NSW trials at Yanco, Narrabri & Trangie) [Potential for follow-on project that includes a cereal chemistry component]

Water Projects

<i>Projects</i>	<i>Notes</i>
Irrigation Max DPI Team: John Smith, Sam North, Donald Griffin, Robert Hoogers	<ul style="list-style-type: none"> Rural R&D for Profit, CRDC, RIRDC, 3 years, Jul 2016-June 2018 Collaboration with IREC, ICC and Southern Growers farming groups, Deakin University and Vic DEPI and Murray and Riverina LLS. Assess the ability of precision irrigation to apply defined irrigation depths on time and determine its potential to reduce deep drainage and waterlogging risk, and increase nutrient and water productivity Develop irrigation design criteria to allow precision irrigation to occur.
Impact of irrigation methods and management strategies on nitrogen fertiliser recovery in cotton DPI Team: John Smith	<ul style="list-style-type: none"> QDAFF lead, CRDC 4.5 years, Jul 2015- Dec 2019 Investigate how fertiliser nitrogen (N) recovery is impacted by irrigation system, in-crop irrigation management, fertiliser application strategy and product type within irrigated cotton. Determine the impact of different irrigation systems on nitrogen use efficiency and investigate alternate irrigation practices to improve nitrogen recovery. Determine the impact of alternative fertiliser practices and product types on the recovery of fertiliser N in irrigated cotton.



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Influence of plant population on rice growth and yield. DPI Lead: Brian Dunn	<ul style="list-style-type: none"> ▪ RIRDC July 2013–May 2016 ▪ Determine optimum plant populations and upper and lower economic population thresholds for both aerial and drill sown rice
Rice variety nitrogen and agronomic management DPI Lead: Brian Dunn	<ul style="list-style-type: none"> ▪ RIRDC July 2015- May 2020 ▪ Determine varietal nitrogen management requirements and phenology information for new and soon to be released varieties
Moving forward with NIR and remote sensing DPI Lead: Brian Dunn	<ul style="list-style-type: none"> ▪ RIRDC July 2015- Jun 2018 ▪ Maintain the NIR Instrument and calibrations used for the NIR Tissue Test ▪ Investigate the use of remote sensing to determine mid-season crop nitrogen requirements without the need for physical sampling of the crop.
Benchmarking water use efficiency and crop productivity in the Australian cotton industry DPI Lead: Janelle Montgomery Robert Hoogers (Yanco)	<ul style="list-style-type: none"> ▪ CRDC July 2014- Aug 2019 ▪ Deliver more accurate crop water use information for weather based irrigation scheduling ▪ Develop the IrriSAT system to provide water management information over large areas at low cost
Systems for reducing evaporation from water storages DPI Lead: Harnam Gill	<ul style="list-style-type: none"> ▪ Co-investor CRC for Polymers Jul 2011- June 2016 ▪ Assess the performance of a polymer-based evaporation control system for large water storages

Horticulture projects

<i>Projects</i>	<i>Notes</i>
Citrus – Managing citrus gall wasps in southern citrus regions DPI Team: Jianhua Mo, Scott Munro, Andrew Creek	<ul style="list-style-type: none"> ▪ HIA Aug 2010- Sept 2017 ▪ Understand the phenology of the local populations of citrus gall wasps ▪ Identify effective and IPM-compatible chemical options
Citrus – National strategies to manage citrus gall wasps DPI Team: Jianhua Mo, Scott Munro, Andrew Creek, Steve Falivene	<ul style="list-style-type: none"> ▪ HIA Sep 2015- Dec 2018 ▪ Identify ‘hot-spots’ of parasitic wasp populations on Citrus Gall Wasps (CGW) ▪ Promote wasp establishment in new incursion areas ▪ Develop forecast models for CGW emergence and egg hatching ▪ Develop IPM-compatible insecticide options



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<p>Citrus- Phenology models for California red scale populations in Australia</p> <p>DPI Team: Jianhua Mo, Scott Munro, Andrew Creek, Steve Falivene</p>	<ul style="list-style-type: none"> ▪ HIA Sep 2015- Dec 2018 ▪ Provide a degree-day based timing guide to Australian citrus growers on the applications of petroleum spray oils and Aphytis releases to improve effectiveness
<p>Citrus in Bhutan and Australia</p> <p>DPI: Graeme Sanderson, Val Draper (Yanco)</p>	<ul style="list-style-type: none"> ▪ ACIAR – April 2012- March 2017 ▪ Bhutan focus: is securing germplasm, improving nursery and production practices and the knowledge of key citrus pests and diseases. ▪ Australian component: to strengthen the Australian citrus variety and rootstock evaluation program, assess potential new rootstock for mandarins, and improve field- and laboratory-based diagnostics and strategies for major exotic pests and diseases. ▪ Some trials at Yanco and production of Mandarin management guide
<p>Advanced production systems for the temperate nut crop industries</p> <p>DPI: Jacquelyn Simpson (Walnuts Yanco)</p>	<ul style="list-style-type: none"> ▪ Research for Profit, HIA Jul 2016- June 2020 ▪ Develop and demonstrate higher density plantings using superior performing varieties on size controlling rootstocks ▪ Managed using efficient water/nutrient supply regimes and harvesting using shake-and-catch technologies.
<p>Hazelnuts</p> <p>DPI: Lester Snare</p>	<ul style="list-style-type: none"> ▪ Agri- Australis co-investment with RIRDC 5 years, June 2012- Apr 2017 ▪ Assessment of commercial hazelnut plantings in 3 temperate production areas ▪ Quarantine plots of imported hazelnuts for establishment of new commercial production in Riverina
<p>Vegetable ICM in Philippines and Australia</p> <p>DPI: Sandra McDougall, Andrew Watson, Len Tesoriero, SP Singh</p>	<ul style="list-style-type: none"> ▪ ACIAR 4.5 years Mar 2013- Oct 2017 ▪ Philippines: research capacity building, protected cropping, good agronomic practices, integrated pest management ▪ Australia: melon disease survey, genetic characterisation of fusarium strains in Australia, melon packing line food safety audits

Biosecurity

<i>Projects</i>	<i>Notes</i>
<p>Combining monitoring and incursion surveillance for grains.</p> <p>DPI Team Mark Stevens</p>	<ul style="list-style-type: none"> ▪ Co-invest Plant Biosecurity CRC Jul 2014- June 2017 ▪ Simplify the monitoring of established and exotic stored-grain beetles by determining which pheromone lures are compatible for simultaneous monitoring of multiple species on individual insect traps. ▪ Improve the effectiveness of <i>Cryptolestes</i> and <i>Sitophilus</i> monitoring by investigating plant and fungal volatiles as co-attractants for use with existing and newly developed pheromone lures.
<p>Rice pest and disease biosecurity</p> <p>DPI Team: Mark Stevens, Andrew Watson, Glen Warren, David Gopurenko</p>	<ul style="list-style-type: none"> ▪ RIRDC July 2016- May 2019 ▪ Develop better management strategies for rice pests and diseases (armyworms, bloodworms and stem rot) that will allow growers to minimise water use (through repeat cropping, mid-season drainage, etc.) without compromising pest management outcomes.