

Southern Regional Cropping Solutions Network (RCSN) - MEDIUM Rainfall Zone

Categorised list of issues (opportunities and constraints) which have the greatest impact on the profitability of growers in the medium rainfall zone of the Southern Region

as at January 2020

Issue outside of GRDC remit, not aligned to GRDC purpose and/or strategy or commercial issues identified

Rank No.	Issue	Description
3	Evaluation and pre-breeding of canola varieties for tolerance levels to dim herbicide chemistry could lead to improved annual ryegrass control and reduce the risk of crop damage resulting in increased profitability and increased area of canola production	In states where Roundup Ready® canola technology is not available, options for managing herbicide resistant annual ryegrass are limited and tolerance to higher rates of dim chemistry (butroxydim or clethodim) are a useful tool. However, tolerance of varieties and herbicide damage varies across environments and seasons. The risk, damage and impact are higher for less tolerant canola varieties. Knowledge of tolerance levels would enable growers to avoid damaging sensitive cultivars at current label rates. The information could also be used to support label rate variations on specific tolerant varieties and support pre-breeding programs for improved tolerance to dim herbicide chemistry.
4	Social licence - perception (not evidence) and expectations of wider community which will impose restrictions or greater obligations which will ultimately increase cost of production for example, restricted access to agri-chemicals etc.	
13	Variability in seed supply and limited choice of canola varieties, particularly high yielding, open pollinated varieties with durable disease resistance increases production risk, compromises weed control and herbicide residue management and reduces profitability	The relatively low cost of open pollinated (OP) varieties and the opportunity to retain seed compared to hybrid varieties reduces the production cost and financial risk of growing canola. Seed supplies of OP varieties have been unreliable. Added to this is the dominance of hybrid canola systems and the unreliable seed supply and high cost structure. Currently there is only a single company breeding OP varieties for Australia. Growers require continued access to a range of OP canola varieties for a range of environments with a range of robust blackleg and sclerotinia resistance a range of herbicide tolerance systems.
16	The current processes for pesticide legislation and governance within APVMA restrict timely access to pesticides which negatively impacts crop production and profits	The current regulatory process for the registration of new and/or an extension of chemical use patterns is lengthy which limits access to tools that growers require to cost-effectively manage risks. A lack of registered products and timely permit renewals impacts on product supply, the management of weeds, pests and disease and resistance. Growers perceive that regulators do not fully comprehend the financial impact of restricted or delayed access to chemicals e.g. fungicides.

26	Limited influence on barley variety development which may lead to a lack of varietal choice	
36	Registration of short residual imi-herbicides to control of problem weeds in lentils reduces the risk of herbicide residue damage in cereals and the off-label use of other short residual Group B herbicides in lentils	
41	Identify and test alternative pasture options, including annual, perennial and hard seeded varieties (compared to vetch) to provide a range of options which will produce feed throughout the whole year across variable environments	
43	The commercial structure of plant breeding in Australia is leading to monopolies and reducing customer choice in varieties	
57	There is a paucity of grazing with-holding periods for chemicals which are commonly used on cereals	
84	Understand the impact of weather damage on oaten hay varieties – independent evidence for a range of varieties over number of years is required to assist growers to select varieties	
88	Quantify “unusual frost” damage in grain growing areas near wind farms	
90	Lack of independent product evaluation	
95	Perennial crops - Is there a place for these crops e.g. perennial wheat in broadacre dryland cropping systems?	

New or additional GRDC investment in R,D&E

Rank No.	Issue	Description
2	Nitrogen decision-making – technology to measure nitrogen in real-time and improved nitrogen budgeting tools, better rules of thumb for nitrogen (N) mineralisation, N budgeting and management, improve N use efficiency	Growers and advisors find making in season N management decisions difficult because there is uncertainty around the amount of N available in the soil (mainly due to low uptake of deep soil N testing), the amount of N required by the crop (yield potential) and the financial risk associated with meet crop N demand if there is a dry spring or a frost or heat stress event.

6	High value pulse and legume varieties (e.g. lentils and chickpeas) bred for a wider range of soil types and rainfall zones will improve farm profitability on a broader scale	There is an opportunity to expand and intensify the production of high value (>\$600/t) lentil and chickpea crops and increase the profitability of farm businesses. The development and adoption of improved varieties and agronomic packages are essential to capitalise on this opportunity.
17	Cereal leaf diseases - genetic solutions and integrated management strategies to manage Yellow Leaf Spot (YLS), Eyespot and Septoria tritici blotch (STB)	The risk of fungal pathogens developing pathotypes to with resistance to commonly used fungicides is increasing. An opportunity exists to mitigate this risk through development of genetic solutions and integrated management strategies for the major cereal foliar diseases.
20	The continual breakdown of genetic resistance to Blackleg in canola impacts on yield and profit of growing canola	
20	Spatial monitoring of farms using sensor technology and digital platforms may improve crop scouting efficiencies and enable site specific management including crop nutrition, weed and pest control	
37	Soil amelioration techniques for specific situations to improve crop establishment, nutrition and production on non-wetting sands resources for growers for soil amelioration – extension and resources for growers	
47	Poor understanding of soil water use in pulses leads to poor yield predictions	
51	Management of (cereal, canola and pulses) diseases e.g. Septoria tritici blotch, aerial blackleg and sclerotinia, ascochyta and grey mould in pulses in medium to high rainfall seasons	
51	Soil acidity is increasing as liming programs and rates are not keeping up with rates of acidification	
61	Quantify nutrition (N, P,K, S, Cu, Zn and Mn) responses for a range of crop types including pulses, canola and cereals for a range of diverse environments across the medium rainfall zone	
67	The efficacy of zinc phosphide wheat bait on mice at registered rates is not providing adequate control and late season control strategies are unclear	

67	Enabling flexible phenology in cereals through chemical application or breeding to match flowering date to emergence date and seasonal conditions would mitigate the risks associated with of dry sowing e.g. heat stress or frost	
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Current GRDC investment in R,D&E

Rank No.	Issue	Description
1	Developing new food-based markets for pulses to help growers manage price volatility	Pulse commodity price is highly influenced by demand in the Middle East (e.g. faba beans) and the Sub-continent (e.g. lentils). Developing new markets through novel food uses for pulses or gaining market through greater market access of trade agreements may reduce price volatility of pulses.
4	Profit focused cost and productivity management can increase profit	<p>Many farm businesses are not aware of their own drivers of financial or production performance and therefore do not understand what drives profit in their business. Farm business potential is being constrained by decisions influenced by perceptions of what drives profit rather than intimate business knowledge.</p> <p>There are unrealised gains in production and profits in the southern grain region that can be achieved with minimal impact on business risk. Evidence from GRDC Project RDP00013 suggests the average business is performing at half the profit level as the top 20% performer.</p> <p>Solutions include initiatives that empower growers to better understand the drivers of revenue, costs and therefore profit at the individual farm level, supported by an understanding of the qualitative traits and management strategies that lead to improved profit.</p>
6	Long term no-till cropping farms may not have the infrastructure, tools or knowledge to effectively integrate livestock into the business	Many no-till grain growers recognise the advantages of integrating livestock into their farming system to provide income diversity, reduce input costs and increase profits. Paddock size, fencing, water points are often inadequate to manage grazing without causing damage to the soil resource. A range of new and modern tools may offer potential solutions which would allow growers to capture this opportunity.
8	Level of knowledge and skills of advisers, farmers and staff is critical to the profitability, risk management and/or compliance of farm businesses	<p>Growers depend on the skills, knowledge and recommendations of advisers which guide their decisions and contribute to the management of their farm businesses. Hence, the knowledge and abilities of advisers and agronomists may inadvertently be limiting the profitability, risk management and/or compliance of farm businesses.</p> <p>Growers and staff new to grain growing require learning opportunities to upskill in all technical, operational and business aspects of grain growing. Extension methodology research and recent evaluation of discussion groups for inexperienced growers indicates that peer discussion groups are the preferred and most effective learning method for growers.</p>

9	Efficacy of glyphosate is declining due to over-use and increased incidence of glyphosate resistant weeds including Fleabane, Wild Radish, Tares, Milk Thistle and Canary Grass in addition to Annual Ryegrass	Glyphosate has multiple and ever increasing use patterns- knockdowns, fence-line hygiene summer weed control, in-crop weed control in Round Up Ready Crops and spray-topping. The extent and number of weed species developing glyphosate resistance is also rapidly increasing. The efficacy of glyphosate is quickly declining. Glyphosate resistance threatens the viability of no-till systems. It is the key non-selective tool used to manage weeds during fallow periods. Hence, the urgent need to develop alternative tools and systems to manage weed without glyphosate.
9	Stubble retention has increased the risk of economic damage from pests including but not limited to insects e.g. lucerne flea, slugs, snails and mice	Crop establishment is increasingly being affected by a range of pests that proliferate in retained stubble farming systems. The pest spectrum has shifted and not only includes traditional stubble loving foes such as lucerne flea, snails and mice, but includes slaters, millipedes and earwigs and slugs. There are few products registered for use on the emerging pests and limited knowledge on successful management strategies.
14	Updated variety specific agronomy packages (VSAPs) to ensure successful adoption and growing of pulse crops	Updating and dissemination of key pulse agronomy and disease management strategies is essential. Information is required as new varieties are adopted and inexperienced advisers and growers may not have the level of knowledge required to effectively manage pulse crops in variable soils types and seasonal conditions.
14	Cost-effective non-chemical weed control systems such as robotic weeders in broadacre crops will prolong the life of important herbicide chemistry such as glyphosate and minimise the economic impact of difficult to control weed species such as Fleabane	The over-use and reliance on herbicide strategies increases the rate at which resistance develops and reduces the efficacy of herbicides. This has resulted in an increase in the number and distribution of “hard to kill” weeds. Adoption of integrated weed management packages which include non-chemical strategies may be re-energised by developing novel technologies and tools to identify and implement targeted control of hard to kill weeds.
19	Growers cannot easily predict the likelihood of pest and disease incursions which is important for planning and management	Understanding and being aware of the risk of a range of pests and diseases e.g. Russian Wheat Aphid, Beet Western Aphid Virus etc. would enable growers and advisors to better plan and implement timely strategies to proactively and more effectively manage identified risks. This could be achieved by modelling and communicating climate conditions which are generally the major pre-cursors that influence the risk of disease and insects invasions. This information could be used to assess the risks and provide an early warning system to enable growers and advisors to develop and implement strategies to cost-effectively manage insect and diseases.
22	Nitrogen requirements to maximise profitability of wheat and canola in a long term no-till system are not well understood	
22	Over-reliance on chemicals i.e. herbicides, insecticides and fungicides has reduced sensitivity and increased resistance which limits cost-effective management options	

30	Sub-soil constraints — understanding how acidity, sodicity, nutrients and structure limit yield, quantifying the economic impact of amelioration techniques, management of sub-surface and sub-soil acidity, genetic advancements, soil amelioration and drainage strategies to reduce the impact of waterlogging	
30	Opportunity to improve the mitigation of frost risk via pre-sowing risk assessment, new monitoring tools, better frost identification skills and shared learning	
30	Compaction – What is the impact, which soil types are impacted and which soils will be responsive to tillage?	
33	What are the practical strategies that can make best use of precision agriculture (PA) data and technology to maximise profit by reducing or re-allocating costs and/or increasing yields	
37	Profit from cereals sown on early autumn rainfall events could be enhanced by clearly defined management packages which include variety selection, canopy management and crop protection strategies.	
37	Rhizoctonia	
41	Growers and advisers cannot make informed decisions about adopting a new variety as non-biased National Variety Trials (NVT) data is not available or accessible until after a variety is released	
45	Precision seeding to improve crop establishment and yield and profitability	
51	Insecticide resistance especially in aphid species and the need to reduce prophylactic use of insecticides particularly neonicotinoids	
57	Lack of grass control options in pulses (faba beans and others)	

61	Conical snails reduce harvest efficiency, contaminate grain and reduce marketability	
61	On-farm storage to maintain the quality of product to optimise price	
64	Profitable pulse or grain legume crop options and agronomy packages for sandy soils with a pH < 6 or > 8	
67	Crop yields are declining on non-wetting sands after a number of years of no-till cropping	
71	Uncertainty in the rotational break time required for Eyespot inoculum breakdown in stubble, reduces confidence and leads to prophylactic fungicide applications in cereals	
76	Strategies to stop and manage the increasing area affected by seeps and soaks i.e. dryland salinity and waterlogging	
81	Solutions including drainage to reduce the impact of waterlogging on trafficability, management and profitability of crops	
84	Practical engineering solutions are required to cost-effectively to inject animal waste, lime and gypsum at depth to ameliorate sub-soils	
94	Irrigated cropping, including maize requires a different set of crop and/or cultivar selection and specialised management to maximise the profitability and return on investment in irrigation water and infrastructure	

Past GRDC investment in R,D&E

Rank No.	Issue	Description
9	Access to local spray application training for local operators including in the border areas of Victoria and New South Wales to increase spray efficiency and reduce off-target damage	

9	Using soil moisture information to make better decisions; tactical management to optimise the use of plant available water	
22	Summer weed spraying in conditions conducive to inversions and/or with inappropriate spray quality (droplet size) creates a high risk of drift and off-target damage	
22	Canola variety specific agronomy packages (VSAP) to optimise yield potential and maximise profit	
26	Increased incidences of fires when harvesting pulses, particularly lentils and/or when harvesters have an in-built seed destruction could have consequences for insurance e.g. exclusions and higher premiums	
33	Pre-emergent herbicides do not work effectively in heavy stubbles	
43	Succession planning for R,D&E expertise and capacity plus building the skills of growers	
45	Opportunity to expand dual purpose crops (grain, graze or silage/hay options)	
47	Soil health – increasing organic matter to address declining levels and consequences by understanding the impact of inputs on soil biology and soil health plus understanding the impact of practices such as controlled traffic farming (CTF) and growing cover crops	
57	Cover crops, green and brown manuring crops are options to increase inclusion of legumes and other broadleaf species which provides the opportunity to increase the diversity and sustainability of farming systems	
90	Growers have difficulty controlling Blanket Weed (Toadflax) after wet years with standard summer weed control herbicide mixes	
93	Multi-peril crop insurance - is it peril or a pearl?	

GRDC investigating issue and appropriate R,D&E response

Rank No.	Issue	Description
33	Harvester set-up to increase efficiency and effectiveness to reduce losses	
37	Vetch variety improvement and grain market development would enhance the profitability of farms with soil types which are not suitable for growing lentils	
47	More effective extension of valuable research and development findings to enable adoption and practice change	
51	Stem frost caused by regular or extended periods of frost or cold temperatures limits yields and profitability	
51	The accumulation of herbicide residues in soils, especially low organic carbon sands over several seasons may be impact crop health and yield and restricts crop options	
57	Foliar diseases and poor agronomy of oats reduce hay yields and quality	
84	It is difficult to estimate plant available water (PAW) and yield potential of calcareous soils and limestone of rubble sub-soils	
89	Accuracy and consistency of virus testing in pulse seed	

No action or investment by GRDC

Rank No.	Issue	Description
17	Increased seasonal climate variability creates extremely contrasting growing seasons which requires adaptive, agile and flexible management options to optimise yield and maximise profit, including but not limited to a "menu" of crop species and cultivars	The medium rainfall zone experiences a high level of variability. Being able to quickly adapt from one season to the next is difficult for example a decile 1 season requires vastly different management tactics for crop and variety choice; in season crop nutrition, weed, pest and disease management than a rainfall decile 7 season. Supporting growers to be adaptive and agile for each season type will enable yield and profit optimisation while managing risk. This can be done with decision support tools

		and extension tailored to specific agro-ecological zones within the southern region.
20	Which is the more economically sustainable option in high land price areas - a crop rotation dominated by high value crops or a more balanced rotation with a mix of cereals, pulses and other land use options?	Growers perceive that it is more profitable to generate income and achieve an acceptable return on investment on highly valued land by growing high value crops such as lentils in close rotation than having a more balanced rotation that manages weeds, disease, pest and chemical residues. Increasing grower understanding of the impact of crop choice on risk and return may lead to more informed crop choice decision-making.
26	Soil residual herbicide used to control weeds on fencelines and "voids" can damage vegetation if they move through the soil from the target area	
47	Growers can optimise price received by improving their grain marketing knowledge and skills and/or accessing quality grain marketing advice	
51	Identify and understand the constraints which limit the yields and profitability of lupins, including Black Pod Syndrome and Phomopsis Blight	
65	Faba Beans - evaluation of varieties and agronomy to maximise the value which faba beans provide to farming systems and businesses in the lower rainfall districts (of the medium rainfall zone)	
65	The development of integrated strategies which includes bio-control options for the management of Sclerotinia in pulses and canola plus a quick test to accurately distinguish sclerotes from Sclerotinia from ryegrass ergot to avoid product being unnecessarily downgraded are required	
67	Identify alternative options for frosted pulses and legumes	
71	Benefits and long term consequences of not retaining stubbles i.e. declining organic carbon levels given the benefits are out-weighed by the significant challenges of heavy stubble loads and the increased risk of frost with increased stubble load	
73	Updated variety specific agronomy packages (VSAPs) to increase durum yields	

74	Too much information prevents the message from being received	
74	Minimising downside/maximising up-side	
76	Effectiveness of liquid systems to deliver crop inputs, including granular versus liquid fertiliser delivery	
79	Annual Ryegrass and later germinating Brome Grass limit crop choice, hay quality and grain yield and therefore price and returns – require locally relevant data to quantify impacts and demonstrate and support adoption of best management practices	
79	High pH subsoils and compaction limits the yield potential of canola crops	
81	Strong demand means hay is a profitable option but alternative uses for frosted crops is required because cutting frosted crops for hay is not without risks and the area or amount of hay that can be made is limited by the narrow window, machinery and logistics required to make hay	
83	The risk of growing lentils close in an intensive rotation could be reduced with specific and targeted weed, disease and pest management guidelines to address the key risks	
87	Biomass is critical for dual purpose wheat varieties and awnless varieties may provide a more productive option compared to the currently available cultivars and the cultivars that are being tested	
90	Risk and impact of frost on canola and limited uses and market for canola hay has caused growers to reduce the area planted to canola or to not grow canola which has limited the break crop options and diversity in rotations which has consequences particularly where pulses are not adapted which means there are no suitable break crops	