GRDC Impact Assessment – 2009

This paper provides a brief summary of the impact assessments undertaken by GRDC during 2009.

GRDC undertook 5 ex-post impact assessments for the second phase of the Council of Rural Research and Development Corporation Chairs joint evaluation. These were based on GRDC portfolio clusters which were randomly selected by consultants Acil Tasman. These clusters were:

- Australian Winter Cereals Molecular Marker Program (Germplasm Enhancement)
- Grain Storage
- Oilseeds Breeding
- Summer Crops Breeding
- Soil Biology (Themes 1-3)

GRDC also undertook 4 impact assessments for internal organisational purposes. These were:

- Western Australia's No Till Farmers Association
- Northern Region Farming Systems
- Weeds Management
- Increasing Profits from Crop Nutrition

Increasing Profits from Crop Nutrition is an ex-ante analysis. Indicators have been developed and will be measured over time to gauge actual impact.

Attachment 1 below provides a summary of the identified economic, environmental and social benefits, net present value, and benefit to cost ratios estimated for each cluster of projects.

GRDC continues to develop its evaluation capability. Valuation of non-economic benefits is still challenging. However GRDC is part of the joint RDC evaluation group which is looking at developing social and environmental indicators to measure R&D impact.

Attachment 1 Summary of impact assessments conducted to date on GRDC investments

GRDC Investment	Economic Benefits	Environmental	Social	Period of investment	Net Present Value	Benefit to Cost Ratio
Australian Winter Cereals Molecular Marker Program	• Increased rate of genetic gain in wheat and barley • Earlier benefits generated from reduced chemical control costs • Access to knowledge generated overseas • Private breeding company intellectual property (end point royalties) • University and state agencies intellectual property (end point royalties)	• Reduced chemicals in the farm environment • Reduced chemicals in the community environment • Reduced risk of toxic contamination from chemicals	• Increased molecular biology capacity in the scientific community • Consumer needs better met • International scientific collaboration and capacity building	2001-2008	$158.7m (30 yrs)	10:1
Grains Storage	• Reduction in grain storage costs due to greater longevity of phosphine and grain protectants • Reduced yield losses and reduced quantity of weather damaged grain • Higher level of cost-effective investment on farm storage infrastructure and on-farm storage practices • Continued maintenance of international market status	• Less protectant chemicals used in storage environments	• More efficient phosphine usage has reduced the potential health impact to fumigators and limited further use of chemical grain protectants • Enhanced skills and capacity in entomology and taxonomy • Australian and foreign consumers continue to receive insect free and chemical residue free grain	2003-2008	$71.2m (30 yrs)	13:1
Oilseeds Breeding	• Yield increases to canola and	• Maintaining canola in rotations can lead to reduced chemical	• Improved farmer well being through avoidance of chemical	2002-2012	$45.4m (30 yrs)	5:1

GRDC Investment	Economic Benefits	Environmental	Social	Period of investment	Net Present Value	Benefit to Cost Ratio
	soybean growers • Maintaining oilseeds in rotations can potentially lead to reduced chemical usage on farms and lower costs of production • Yield increases to cereal growers from maintenance of oilseeds in crop rotations via provision of a disease break • Fertiliser cost reduction from nitrogen supplied by soybeans in rotations • Yield increases to sugarcane growers from maintenance of oilseeds in crop rotations • Maintaining oilseeds in rotations can potentially lead to reduced chemical usage on farms (e.g. fungicides for blackleg in canola crops) and fertiliser usage by sugarcane producers and hence lower costs of production • Marginal contribution to foreign consumers of canola as more canola is exported but with a very small impact on the world price	usage on farms and potentially to lowered chemicals in the farm environment • Maintaining oilseeds in rotations can potentially lead to reduced chemicals/ fertiliser in the cereal/sugarcane farm environments • Increased plant resistance can lead to less chemical/ fertiliser usage on oilseed/other farms and potentially to reduced export of chemicals and nutrients to public waterways	use by farmers • Potential health benefits from high oleic canola oils			
Summer Coarse Grains Breeding	• Yield increases and reduced yield variability for sorghum	• Reduced impacts from insecticides from reduced	• Improved farmer well being through avoidance of chemical	2002-2008	$6.4m (30 yrs)	2:1

GRDC Investment	Economic Benefits	Environmental	Social	Period of investment	Net Present Value	Benefit to Cost Ratio
	growers generally and to Atherton Tableland maize growers • Maintaining disease resistance in sorghum reduces insecticide usage • Maintaining sorghum as a viable crop increases profitability of sustainable crop rotations • Reduced costs and more stable supplies for livestock industries using sorghum as a feed grain • A maize crop is valuable in disease control in the peanut industry • Increased resilience of rural communities from more drought tolerant varieties better adapted to climate change • Marginal contribution to foreign consumers of livestock products based on sorghum.	spraying from maintaining more resistant varieties • Reduced spraying costs for other crops including cotton by reduced spray impacts on beneficial insects • Reduced off-farm export of insecticides from reduced spraying needed for more resistant varieties	use by farmers • Increased industry research capacity through coordination of a national sorghum research program • Avoiding rural adjustment problems on the Atherton Tableland by underpinning dependent communities • Increased resilience of communities from more drought tolerant varieties better adapted to climate change			
Soil Biology	• Increased profits from higher yields resulting from more efficient use of fertilisers, reduced disease, and reduced disease control costs • Benefits resulting from the	• More sustainable agriculture from reduced reliance on manufactured and mined fertilisers • Reduced fungicide use in farm	• Increased industry research capacity resulting from the pioneering leadership role GRDC had in expanding soil biology research • Potential spin-off benefits from	1998-2009	$32.0m (30 yrs)	4:1

GRDC Investment	Economic Benefits	Environmental	Social	Period of investment	Net Present Value	Benefit to Cost Ratio
	pioneering leadership role GRDC had in expanding soil biology research across RDCs • Potential benefits from the research capacity developed in soil microbiology • Potential export markets for inoculants	environment • Potential use of natural inoculants to reduce reliance on manufactured fertilisers • Reduced off-farm export of nutrients • Reduced off-farm export of fungicides • More sustainable agriculture	the research capacity developed in soil microbiology • International scientific collaboration and capacity building			
WANTFA	<u>Short Term</u> • Improved soil moisture storage from reduced soil disturbance and higher level of ground cover leading to higher yields in some years • Ability to grow crops in dry years when otherwise not possible to grow • Increased profitability of crop production from higher average yields, with decreases or minimal increases in operational costs • Potential for increased yields/reduced losses/decreased costs due to improved control of pests and diseases	• Reduced soil and wind erosion from less tillage and increased ground cover leading to more sustainable farming systems and improved water quality in waterways • Reduced level of chemical usage for pest control and less chemical exports off farm • Reduced air pollution from reduced stubble burning and dust • Enhanced soil biological activity and higher level of soil organic matter	• Reduced impact of smoke on air quality in cropping regions • Increased industry, community, and research capacity from student involvement • Improved no-till infrastructure within Western Australia, Australia and overseas countries	1997-2010	$141.4m (25 yrs)	36:1

GRDC Investment	Economic Benefits	Environmental	Social	Period of investment	Net Present Value	Benefit to Cost Ratio
	• Increased uptake of no-till technologies in Western Australia as well as in other cropping regions of Australia <u>Long Term</u> • Higher yields from improved soil structure and higher organic carbon soil content • Potential nitrogen contributions from leguminous cover crops • Potentially improved weed and pest control and increased soil cover from use of cover crops • More robust cropping systems able to cope with any climatic changes • Potentially higher market returns for grain that is produced under best management practices in relation to the environment					
Northern Region Farming Systems	<u>Short Term</u> • Improved profitability from better use of soil water and nitrogen • Yield improvements including in drier years from reduced tillage and improved stubble management.	• Reduction in soil loss due to water erosion resulting from the widespread adoption of reduced tillage, controlled traffic, and opportunity cropping. • Reduction in deep drainage from the adoption of opportunity cropping.	• Increased industry, community, and research capacity. • Increased ownership by graingrowers of approaches to resolving local concerns through action learning and independent decision-making. • More effective social networks	1997-2008	$131m (25yrs)	5:1

GRDC Investment	Economic Benefits	Environmental	Social	Period of investment	Net Present Value	Benefit to Cost Ratio
	• Increased use of more profitable rotations including pulse crops. • Improved access by growers to locally relevant information through Best Management Practice manuals and annual research summaries. Long Term • Higher more sustainable yields from reduced soil loss, improved soil structure and higher organic carbon soil content. • Cropping systems better adapted to climate variability and change.	• Reduced off-site movement of herbicides and pesticides, in particular atrazine (less contamination of surface and ground water) • Less soil fertility rundown and decreased off-site loss of nutrients • Enhanced soil biological activity and higher level of soil organic matter	from grower groups and local demonstrations of Best Management Practices.			
Weeds Management	• Increased profits from higher yields and reduced costs resulting from more effective weed control strategies. • Improved weed management leading to more effective whole farm management on mixed farms. • Strengthening of national coordination in research and policy on weeds. • Contributing to and benefiting from global efforts to combat herbicide resistance.	• More sustainable agriculture from maintaining viability of low-till. • Reduced herbicide use in farm environment • More sustainable agriculture on mixed farms. • Reduced off-farm export of nutrients and herbicides and reduced community concerns. • Contributing to more sustainable agriculture.	• Increased industry research capacity resulting from better coordinated national research. • Increased capacity in rural and regional Australia to manage weed risks. • Increased national capacity in weeds policy for weed incursions. • Improved international scientific collaboration and capacity building.	2003-2009	$41m (25 yrs)	4:1

GRDC Investment	Economic Benefits	Environmental	Social	Period of investment	Net Present Value	Benefit to Cost Ratio
Increasing Profits from Crop Nutrition (ex-ante)	• Reduced fertiliser applications of N and P lowering costs of crop production • Increased profitability of crop production from application of fertiliser quantities, types and timing that are closer to the economic optimum taking into account individual risk profiles of producers • Increased value of nutrients in waste streams through improved recovery and crystallisation processes • Production and use of biochar types that are more suited to soil types and that interact positively with fertiliser regimes and increase soil water holding capacity • Maintenance of cropping profitability in northern regions through improved method for P and K fertilisation of subsoil where nutrients are being run down	• Reduced greenhouse gas emissions and reduced contamination of ground and surface waters due to reduced applications of N fertiliser • Reduced contamination of surface water and sediment with P due to reduced applications of P fertiliser • Potential for sequestering increased amounts of carbon in cropping soils	• Avoidance of widespread decline in crop profitability in some cropping areas with widespread community impacts • Maintenance of a rural workforce /population due to a more profitable cropping sector	2009-2014	$52.9m (25 yrs)	7:1