

Future Farm Industries CRC

Profitable Perennials™ for Australian Landscapes

P2 Future Cropping Systems

Profitable perennials improving performance of annual based cropping systems

What the Program will deliver

EverCrop - perennials in rotations for mixed farming regions

- Perennial pasture (non-crop) options fitted against soils and cropping constraints within regions
- Rotation structure optimised - yield, hydrological benefits, weed and nutrient management, and seasonal risk minimisation
- Agronomy packages refined (particularly integrated weed management)

EverCrop Decide

- Decision tool to get perennials in the right places in systems within farms for maximum profit/environmental benefit

New plants – perennial legume

- New perennial pasture legume for the crop dominated low rainfall zone (current options very limited)



New plants - salt tolerant wheat cultivars for markets

- Feed quality (rapid delivery)
- Bread quality (mature market)
- Bio-energy (emerging new opportunity)
- Target adoption 500,000 ha by 2020

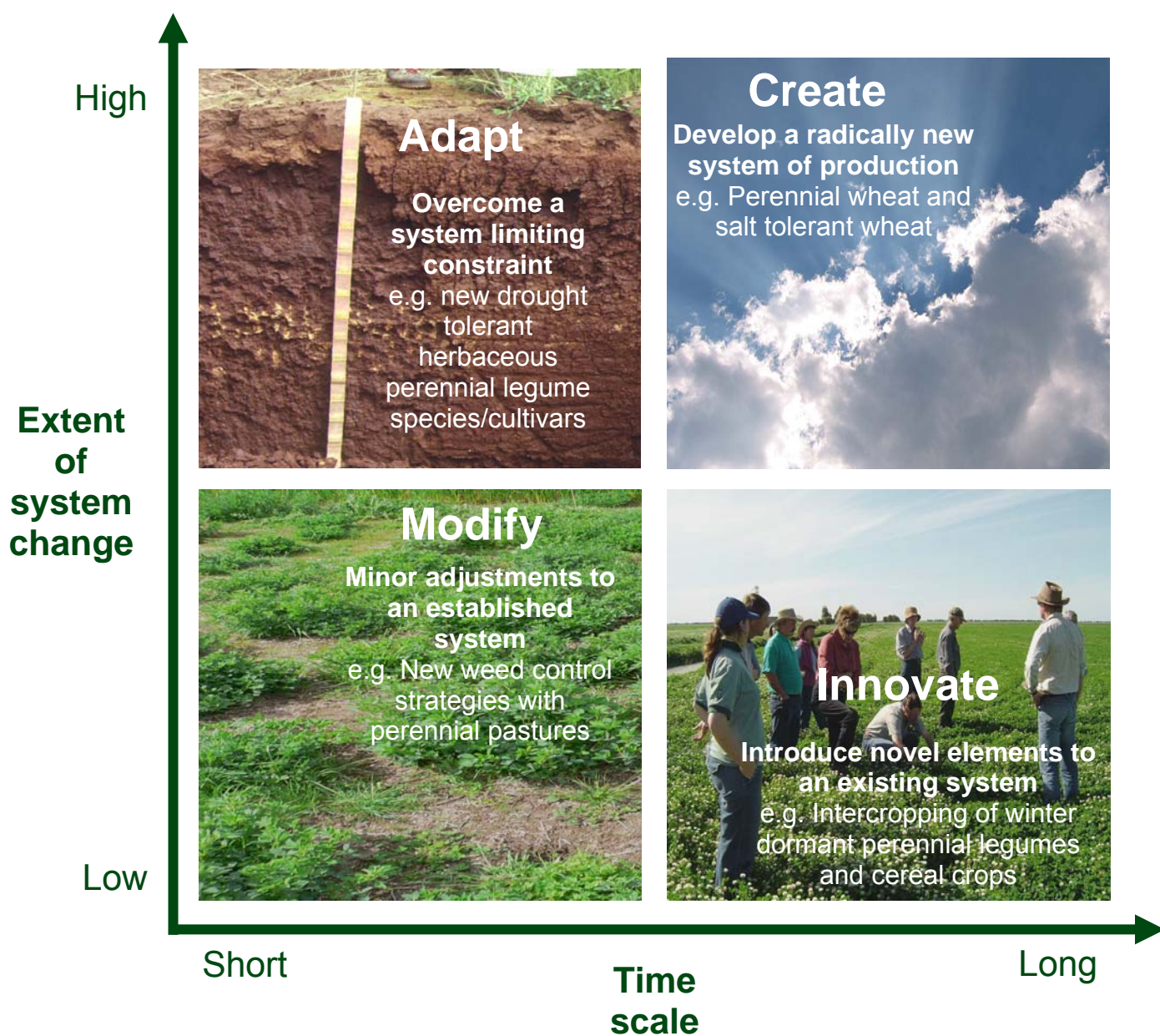
Perennial wheat

- Concept and germplasm pioneered

Future Farm Industries CRC

Profitable Perennials™ for Australian Landscapes

Diverse Research Portfolio



Evercrop – regional focus

| Zone | | Characteristics | Drivers for perennials | R&D opportunity | Key CRC researchers |
|--|----------------|---|--|--|--|
| Winter dominant Low rainfall | WA, SA, Vic | <ul style="list-style-type: none"> • Large crop dominant region • Low perennial status • New plants needed to widen adaptation | <ul style="list-style-type: none"> • Salinity • Weed management and herbicide resistance • Seasonal risk management | Perennial plant as alternative to lucerne. Integration at paddock and farm scale | <ul style="list-style-type: none"> • Revell • Ferris • Llewellyn • Robertson • Whitbread • Latta • Ridley |
| Winter dominant Medium rainfall | WA, SA | <ul style="list-style-type: none"> • Perennials more established • Management strategies needed to widen impact | <ul style="list-style-type: none"> • Salinity • Weed management and herbicide resistance • Waterlogging | Integration of current and new options at paddock and farm scale | <ul style="list-style-type: none"> • Dear • Angus • Kirkegaard • Young • Lodge |
| Uniform & summer dominant Medium rainfall | Vic, NSW | <ul style="list-style-type: none"> • Perennials well established • New options needed to overcome emerging constraints | <ul style="list-style-type: none"> • Weed management • Synergistic livestock production • Salinity & waterlogging • Soil fertility decline • Seasonal risk management | Refining current and new perennial options in system | <ul style="list-style-type: none"> • Dear • Angus • Kirkegaard • Young • Lodge |

Role and methodology

- Complementary R&D focus for Grain and Graze involving key CMA partners and other activities in each region
- Driving innovative approaches for validation and integration by farmer groups
- Science conducted within context of “change on ground” activities with farmer groups/CMA’s. Regional-based teams including agribusiness
- Pre-experimental modelling & local knowledge → gaps & opportunities → on-farm participatory experimentation & monitoring → extrapolation via *EverCrop Decide* and other systems analysis tools

Evercrop Decide

- Decision support to locate the right perennial, in the right place, for the right amount of time with the right management, to address the right problem
- Adoption tools using EverCrop results and output
- Spatial (farm enterprise and catchment) and temporal (rotations, seasonal variability) dimensions
- Strong economic focus
- Addresses all perennial options and systems relevant to grain growers that the CRC is covering: pastures, shrubs, trees
- Locally-relevant versions for each region
- State-of-the-art salinity risk assessment.



- *Designed in partnership with farmers and advisers*
- *Accounting for differences in learning style*
- *Multiple delivery pathways*
- *Public and private sectors*

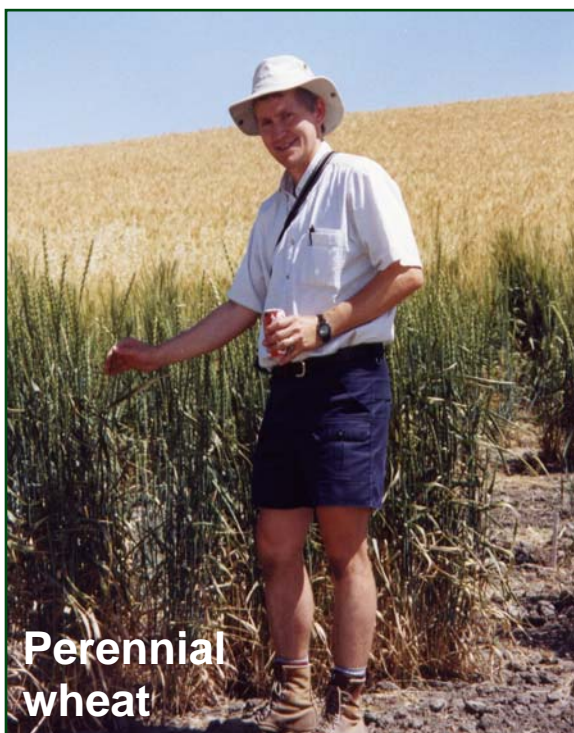
Evercrop and EverCrop Decide

What's in it for grain growers?

- New perennial-based systems with:
 - increase profit
 - higher yield (resistant weeds managed)
 - lower costs (N fertilized and lime inputs reduced)
 - greater sustainability
 - salinity & waterlogging managed
- The ability and confidence to locate and manage perennials on the farm
- Explicit economic drivers for use of perennials at paddock, farm and catchment scale
- Tool to assist with complex decisions around “farming sustainably in the landscape”

New plants for cropping systems

- Salt-tolerant wheat - feed, bread and bio-energy cultivars
- Potential for perennial wheat
- Low rainfall, drought-tolerant forages for dry Mediterranean zone cropping systems



New wheat cultivars for saltland

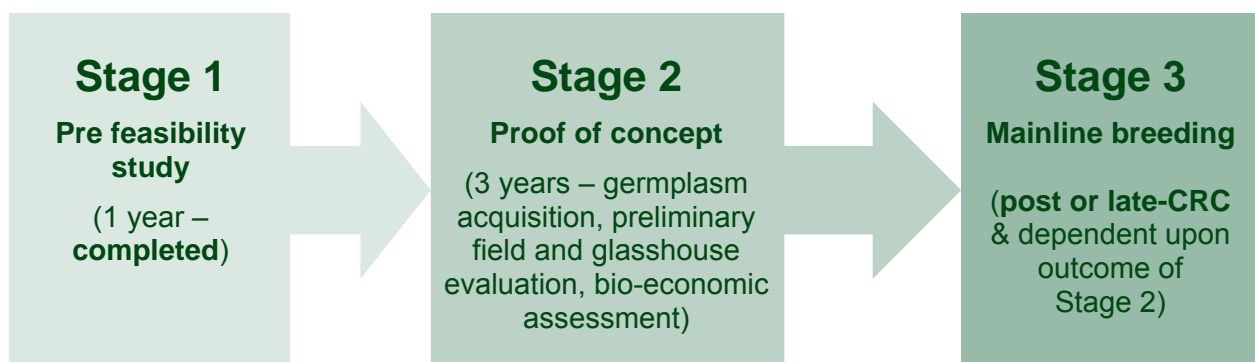
- Feed quality (rapid delivery)
- Bread quality (mature market)
- Approach that combines conventional plant breeding, molecular plant breeding and eco-physiology
- Low risk conventional breeding effort with “runs on the board” but complementary to other GRDC investments (CSIRO Plant Industry, CRC MPB, ACPFG)
- International market for germplasm
- Bio-energy (emerging new opportunity).

What's in it for grain growers?

- Increases area of wheat and increased total grain production (500,000ha by 2020)
- More profitable use of mildly saline land (substantial yield advantages over barley)
- Broadens the options for saline land productions systems – complementary to drainage and an alternative to pasture only systems.

Perennial wheat

- New driver for expanded crop production in high and medium rainfall zones.
- Production and profit stability from mixed crop/livestock systems in low and variable rainfall zones.
- At stage 2 of a three stage process
- Involves field and glasshouse evaluation accompanied by economic and biological modeling.



What's in it for grain growers?

- Expanded cropping area and more stable yields
- Greater water use efficiency - able to take advantage of out-of-season rainfall
- Lower costs of production (reduced input costs)
- Enhanced ground cover (wind and water erosion protection) and better weed management including summer weeds
- Increased stubble value for livestock.

New perennial legume to support grain production in low rainfall zone

- New species and varieties for the crop-dominant low rainfall zone
- Current options limited (lucerne)
- Several prospective species available from natives & exotics (e.g. Lotononis, Cullen).

Systems role and profit and environmental benefit will be evaluated via *EverCrop* and *EverCrop Decide*.

What's in it for grain growers?

More reliable and adapted perennial legume in drier areas to support low rainfall grain growing:

- Another option to manage herbicide resistant weeds
- Cheap source of nitrogen for grain production
- Salinity and waterlogging management of cropping lands
- Cheaper costs of grain production
- Improvements to the productive potential of cropping lands.

GRDC transition from CRC Salinity to FFI CRC Ltd

GRDC a core partner in the new CRC

Existing GRDC commitments in 2007/08 to CRC Salinity:

- - Lucerne adoption (Perry Dolling, DAFWA) (\$138k)
- - Rotational pasture evaluation, national field testing project (Brian Dear NSW DPI) \$250k

GRDC has committed \$750k pa to FFI CRC Ltd, this means \$350k is uncommitted to projects in 2007/08. On-going commitment is \$750k likely in 5-7 projects.

Possible projects on:

1. EverCrop – region 1
2. EverCrop – region 2
3. EverCrop – region 3
4. EverCrop Decide
5. Salt-tolerant wheat
6. Perennial wheat
7. Perennial legume for low rainfall regions.

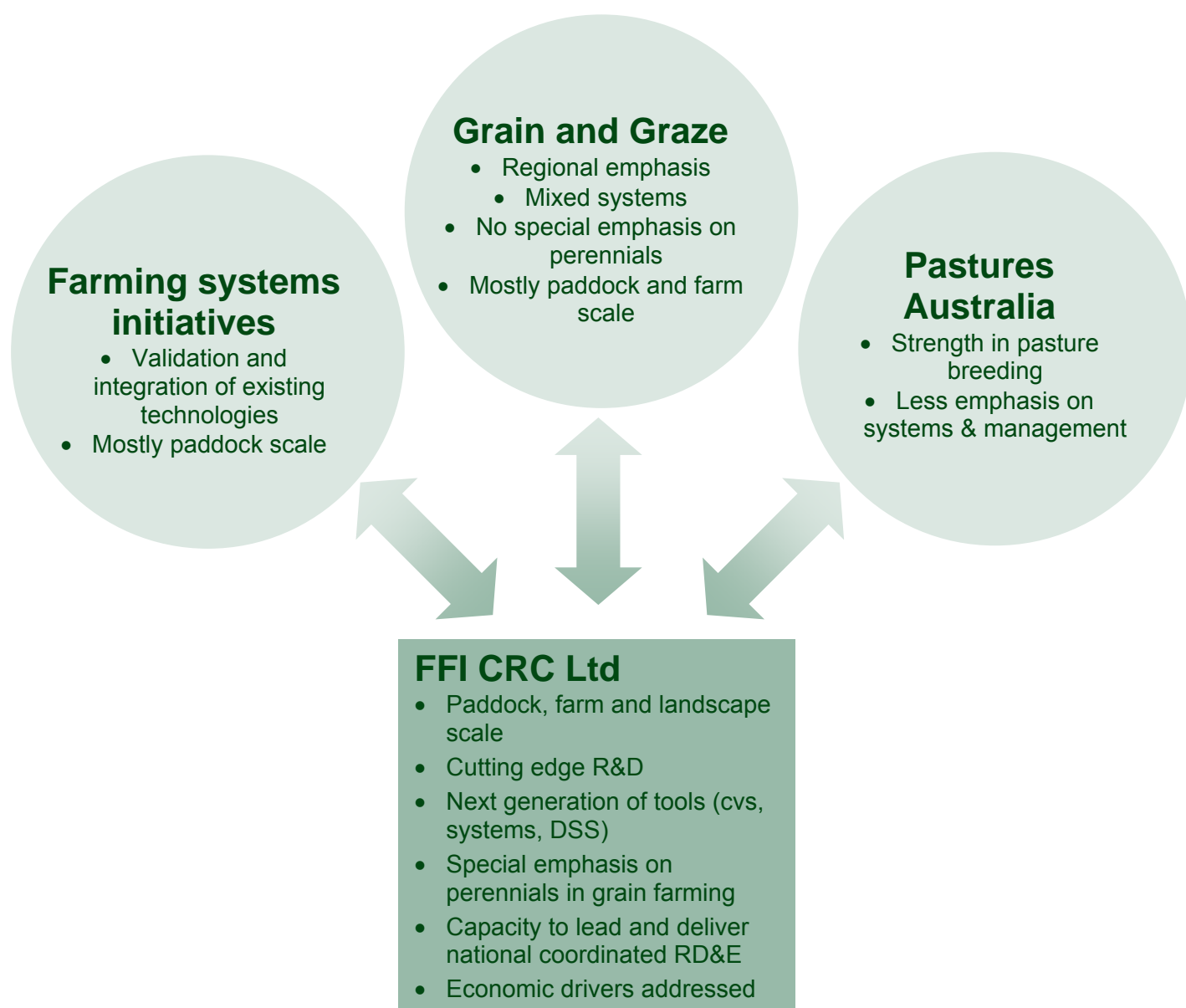
Size of projects will depend upon priority and emphasis

Resource Summary

| Program | Future Cropping Systems | Notes |
|-------------------------------|--|----------------|
| Cash resources | \$3.395m – FFI CRC investors \$3.575m – CRC Program | |
| Inkind FTE | 12.8 FTE per annum | |
| Inkind \$ resources | \$10.1m | 17.2% of total |
| Total Resources | \$17.1m | 15.1% of total |
| Key Industry Investors | GRDC - \$3.15m | |

Fit of FFI CRC Ltd with related activities

Complementary and adding value to existing activities



Key Scientists

| | | |
|--|-----------------------|-----------------------------|
| Dr Anna Ridley | Time Committed: 0.6 | Organisation: VIC DPI |
| Skills and expertise: Anna's key technical expertise is in the area of plant nutrition (soil acidity and water and nutrient loss) and agronomy (perennial pastures). However, her key contribution has been in research and extension developing environmentally acceptable farming systems based on perennial species in grazing and cropping enterprises. Her leadership has been in knowledge integration and working with multi-disciplinary teams | | |
| Refereed Journal: 40 | Conference papers: 30 | Industry publications: >100 |
| Dr Michael Robertson | Time Committed: 0.5 | Organisation: CSIRO |
| Skills and expertise: Michael is a researcher and leader on sustainable agriculture and nature conservation in the crop/livestock zone. He has spent 14 years working in farming systems research, agronomy, crop physiology and simulation modelling with CSIRO, including 4 years in sugarcane systems in North Queensland, 8 years in southern Queensland with the grains industry and 1 year in WA. He has a strong record of performance working closely with producers and industry. | | |
| Refereed Journal: 62 | Conference papers: 61 | Industry publications: |
| Dr Michael Francki | Time Committed: 0.3 | Organisation: DAFWA |
| Skills and expertise: Michael is a plant biotechnologist with wide skills and experience in the application of molecular techniques to plant breeding in general and cereals in particular. His key interest is in providing the pre-breeding linkage and integration between molecular approaches such as molecular marker identification and application that compliment more traditional breeding approaches with cereals. | | |
| Refereed Journal: 27 | Conference papers: 5 | |
| Dr Phillip Larkin | Time Committed: 0.3 | Organisation: CSIRO |
| Skills and expertise: Philips career has focussed on developing biotechnological and genetic solutions to real world breeding problems. This has ranged across: various crop and pasture species (wheat, white clover, lucerne, opium poppy); a variety of problems (viruses, insects, nematodes, salinity, alkaloid yields); different technologies (genetic engineering, chromosome engineering, somatic hybridisation, somaclonal variation). The research has encompassed laboratory research, including gene cloning and generation of alien chromosome translocations, as well as field research, including wheat breeding and yield loss assessments. | | |
| Refereed Journal: 83 | Conference papers: 55 | Patents: 7 |

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Profitable Perennials™ for Australian Landscapes

Dr Tim Colmer

Time Committed: 0.4

Organisation: UWA

Skills and expertise: Tim's research has been focused on the physiology and improvement of plant adaptation to salinity and waterlogging. Research ranges from cellular to eco-physiological processes, given that elucidation of mechanisms at several levels of organisation is essential to gain an integrative understanding of whole plant adaptation. He provides leadership to a multi-disciplinary team including PhD students, and has spread his influence by established projects with key local, national and international scientists. He is on the Editorial Board of 3 International Journals.

Refereed Journal: 62

Conference papers:

Industry publications: