

# Review of current vegetable irrigation technologies



**Team members:**

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Lead)

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NOTE: This project has been funded by Horticulture Innovation Australia Limited using the Vegetable levy and funds from the Australian Government.

**Horticulture  
Innovation**  
Australia

# Presentation Overview

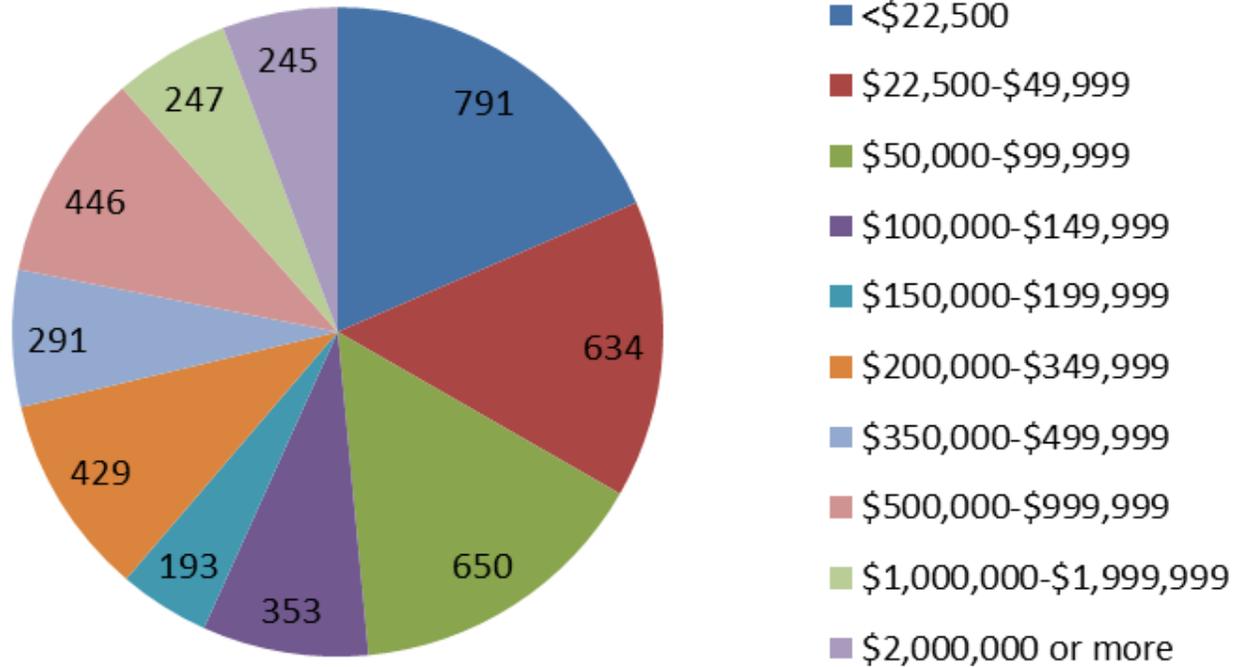
- Industry context
- Consultation
  - Method
  - Results
- Extension
  - Workshops
  - Communications
- Recommendations



Jeff McSpedden Bathurst sweetcorn grower

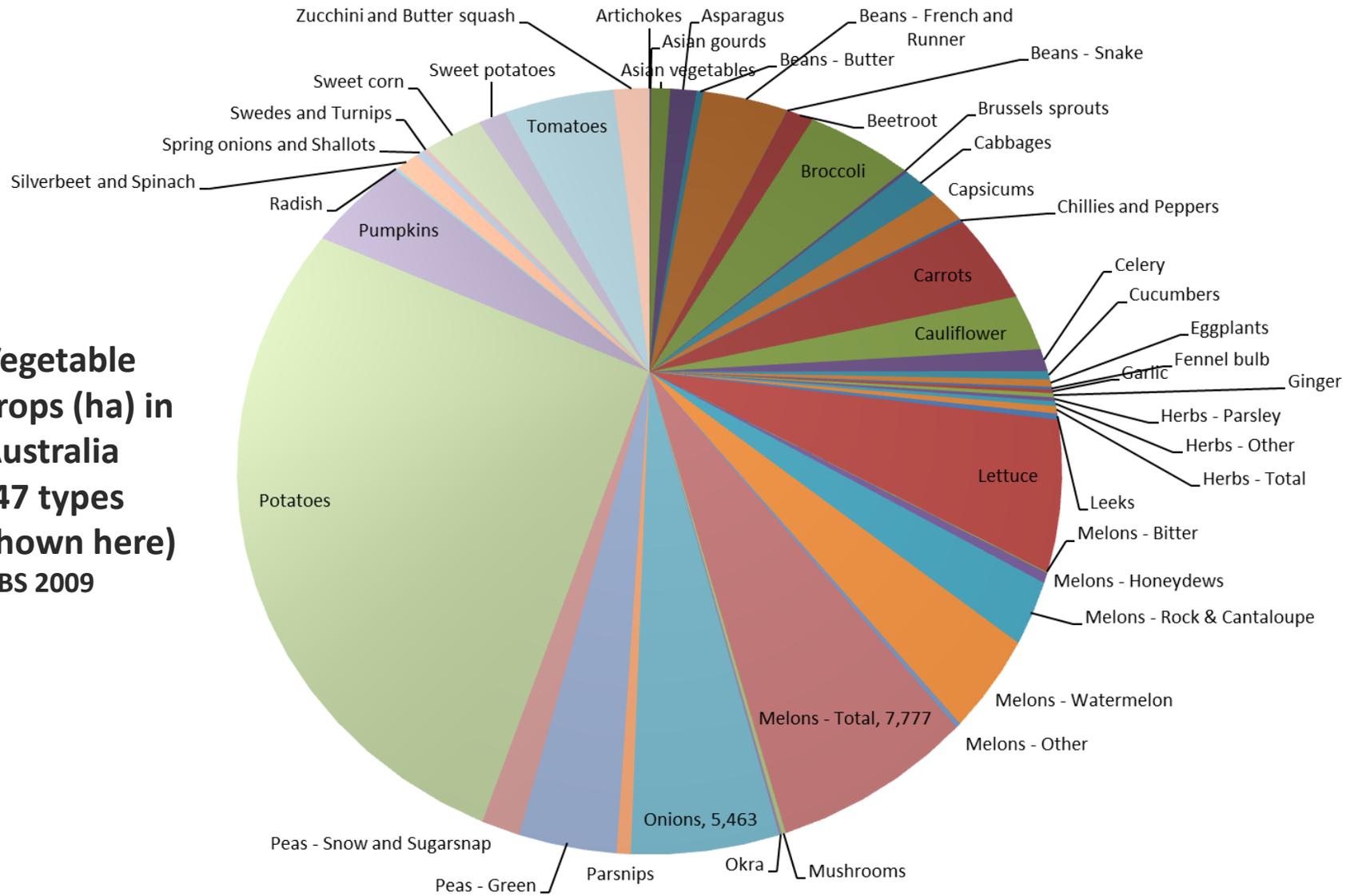
# What is the 'vegetable industry'?

Number of growers x turnover



Source: ABS Catalogue 7121.0 - Agricultural Commodities, Australia, 2009-10

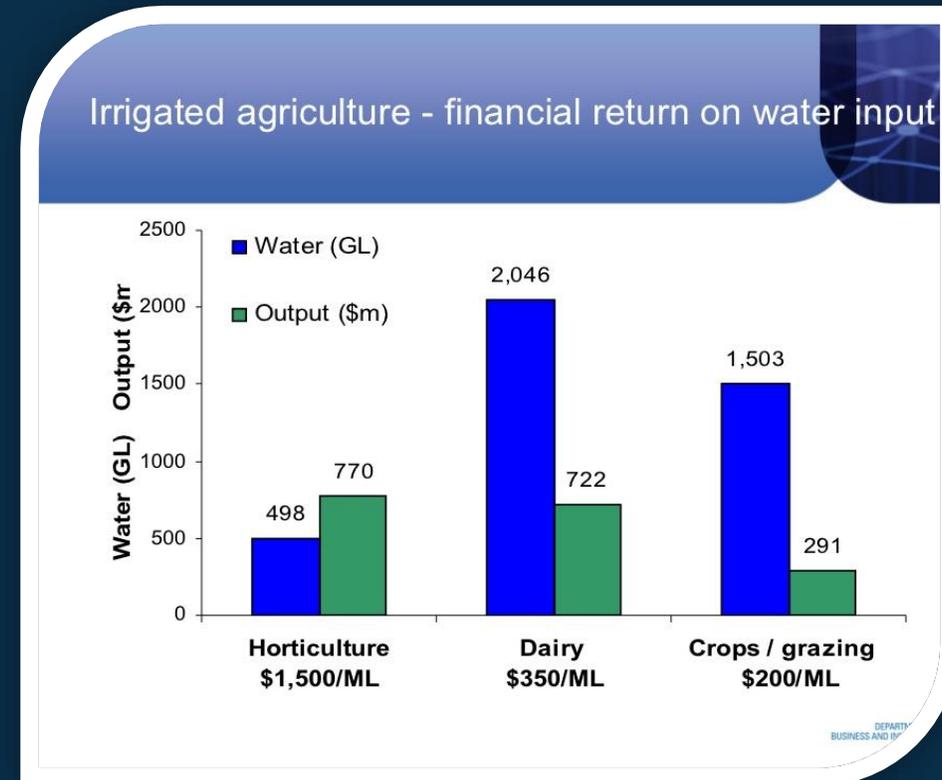
**Vegetable  
crops (ha) in  
Australia  
(47 types  
shown here)  
ABS 2009**



# Industry context

## Relative value of water

- Average use 4 ML/ha
- Avg. gross return \$8,874 per ML
- Very high return per ML
- Cost of water vs return is tiny



Victorian Water Use data –  
Source: Downie, D. ( 2012) Australia's Water Story.

# Desktop review

## Consultation

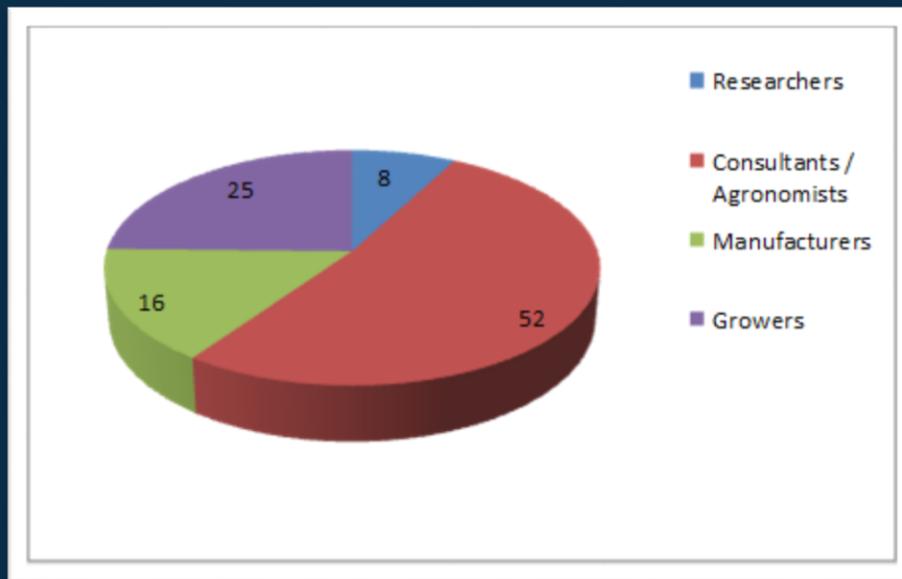
- Three groups of interviewees
  - Researchers
  - Manufacturers/suppliers
  - Advisors and growers
  - 50 in total



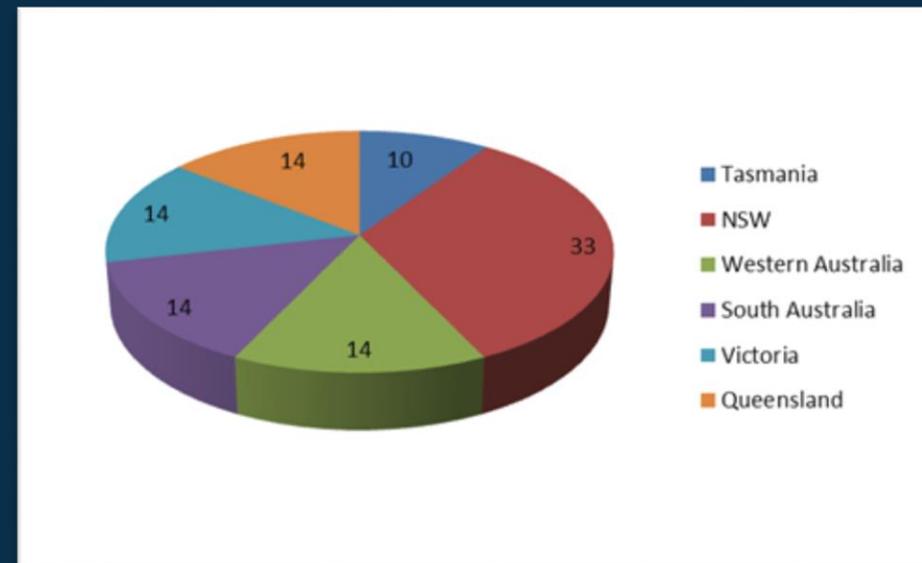
Edgar and Charlie Grech – Camden farm.

# Desktop review

## Consultation



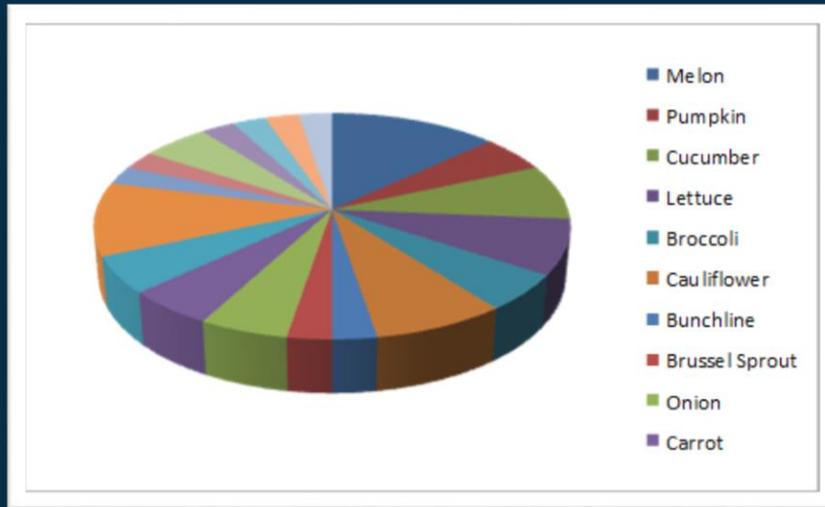
Groups by percentage



Interviewees (%) by state

# Desktop review

## Consultation



Growers x crop type



# Results

## Major themes

- Holistic approach to technology adoption and water management on farms
- Adoption/dis-adoption of irrigation technology
- The need for technical support
- Soil moisture monitoring
- Variable Rate Irrigation (VRI)



Andrew Fyffe – Bundaberg cucurbit grower

# Major themes

## Holistic approach

- Poor design is not improved by new technology.
- Precision irrigation wont work to optimum if all aspects of farm system are not considered.
- Drip irrigation trialled but rarely adopted (other than in traditional longer term crops) due to degree of farm system change needed.

*"precision irrigation is holistic, it should combine seamlessly the optimal performance of the application system with the crop, water and solute management" – USQ & NCEA researchers.*

*'VRI is awesome technology, all users' love it, but not all are using to its full potential'*

*Agronomist*

# Major themes

## Adoption of irrigation technology

- Relatively poor levels of adoption
- Why?
  - High risk of \$ loss
  - Low cost of water
  - Too complex
- 'Dis-adoption' of monitoring & scheduling tools is not always a negative.

*'What has a grower got to gain by being efficient? Better insurance to just apply more'*

Grower

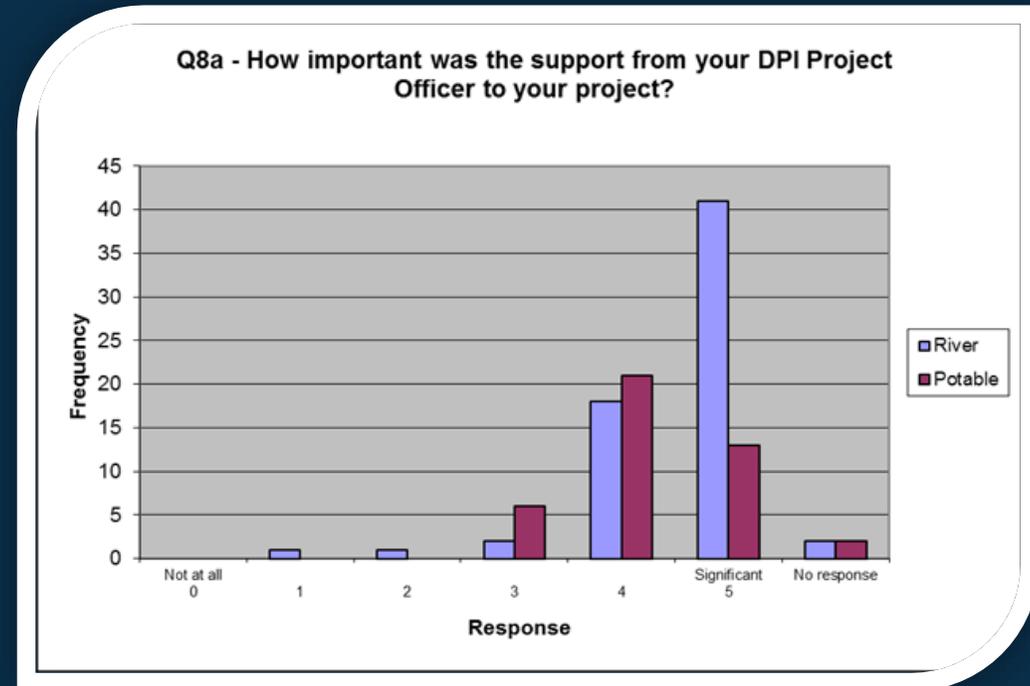
*The overwhelming majority (>90%) of those interviewed were of the opinion that vegetable growers were generally low adopters of irrigation technology*

Project leader

# Major themes

## Need for technical support

- New technologies dis-adopted
- Support and maintenance tapers over time
- Systems never at optimum
- Post-installation audits lacking
- Consultants can fill this need



# Major themes

## Soil moisture monitoring & irrigation scheduling

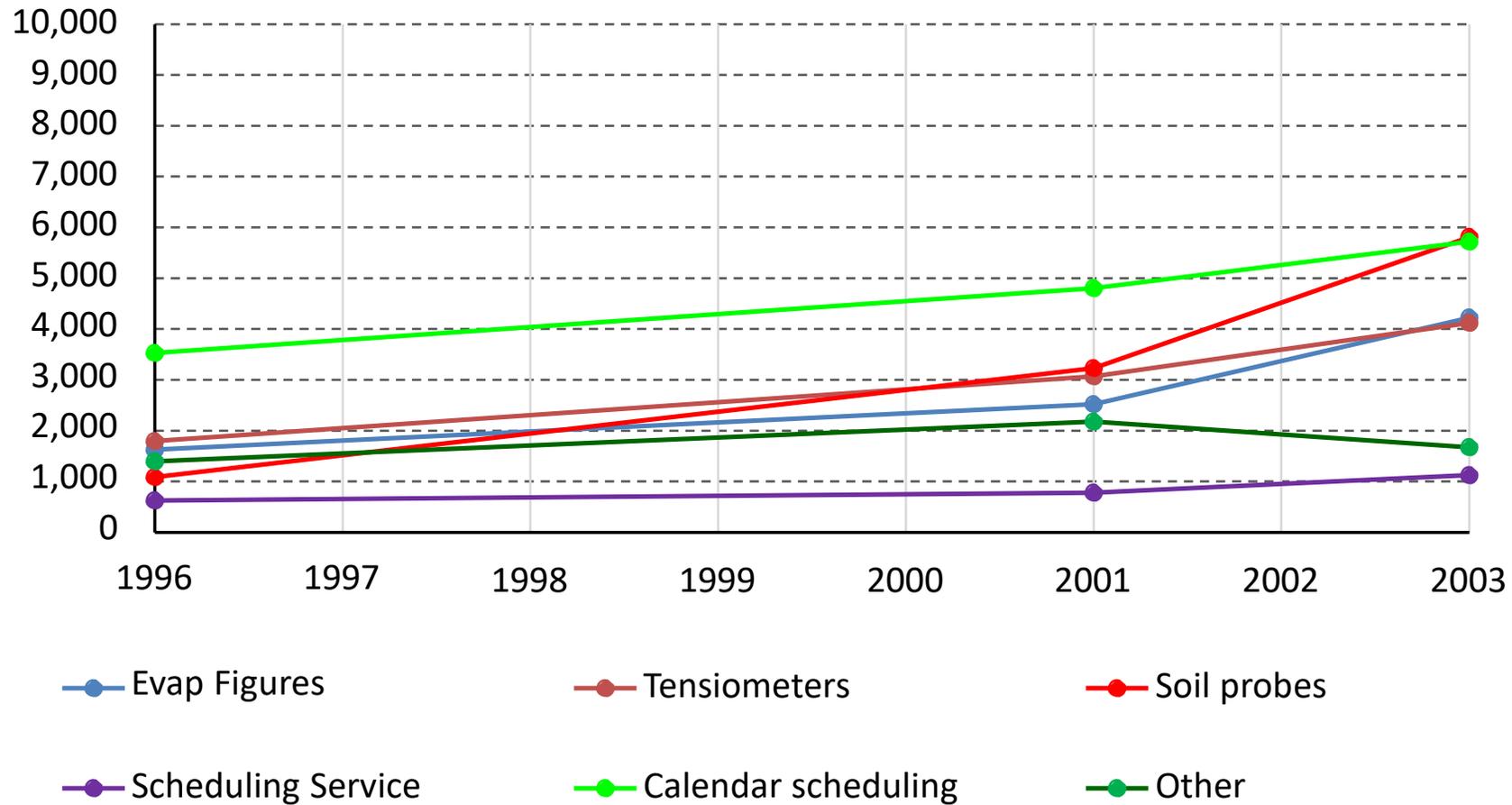
- Overall use of tools is dropping
- Short crop cycles limit installations/time to manage
- Longer term high value crops use capacitance & other probes more frequently
- Simpler lower cost probes increasingly used

*ABS data shows that in 2009 25% adoption of soil moisture monitoring had occurred, but declined to only 14% in 2014.*

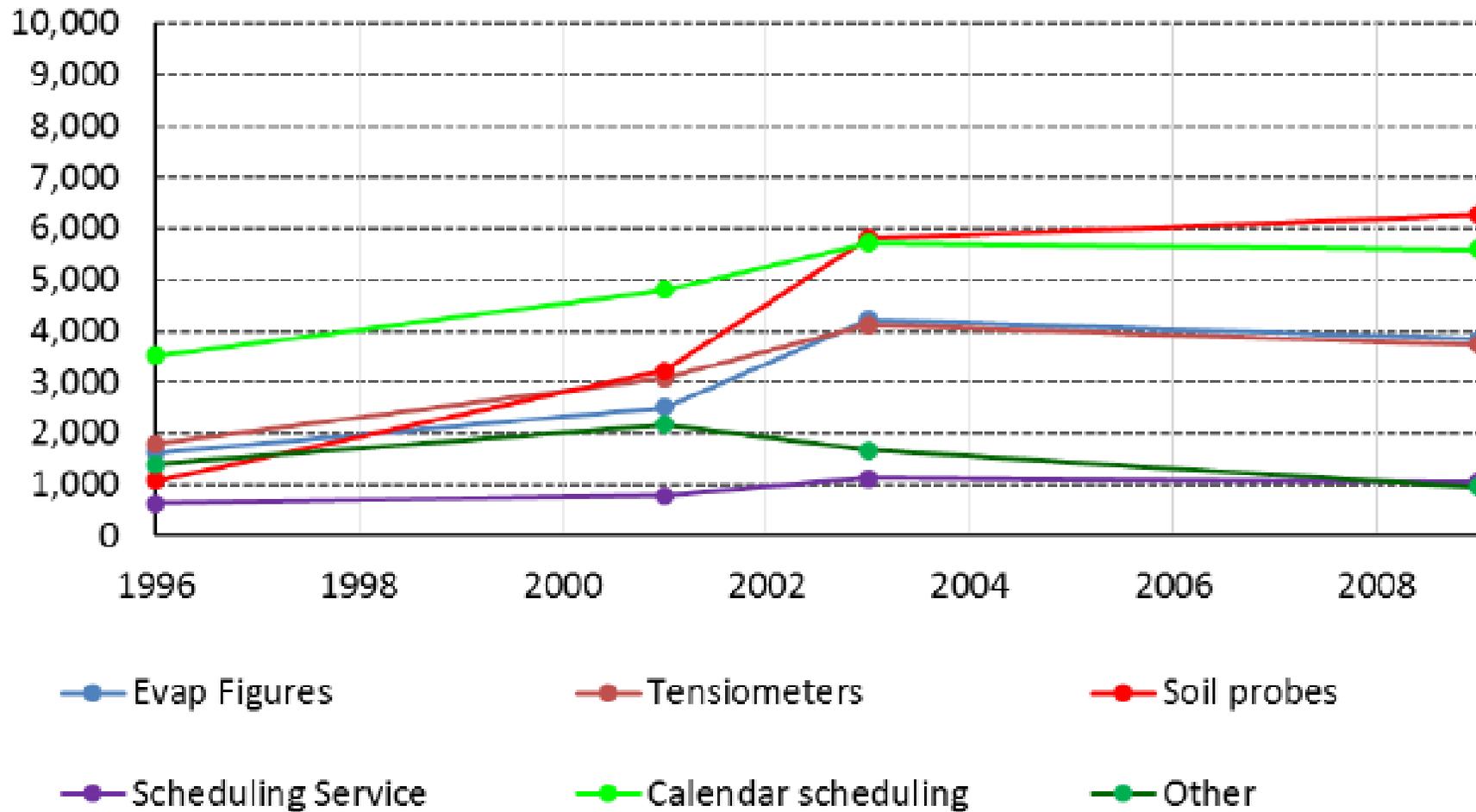


G-dot™ soil probe in eggplant crop at GSLLS Vegetable Demo Farm in Richmond.

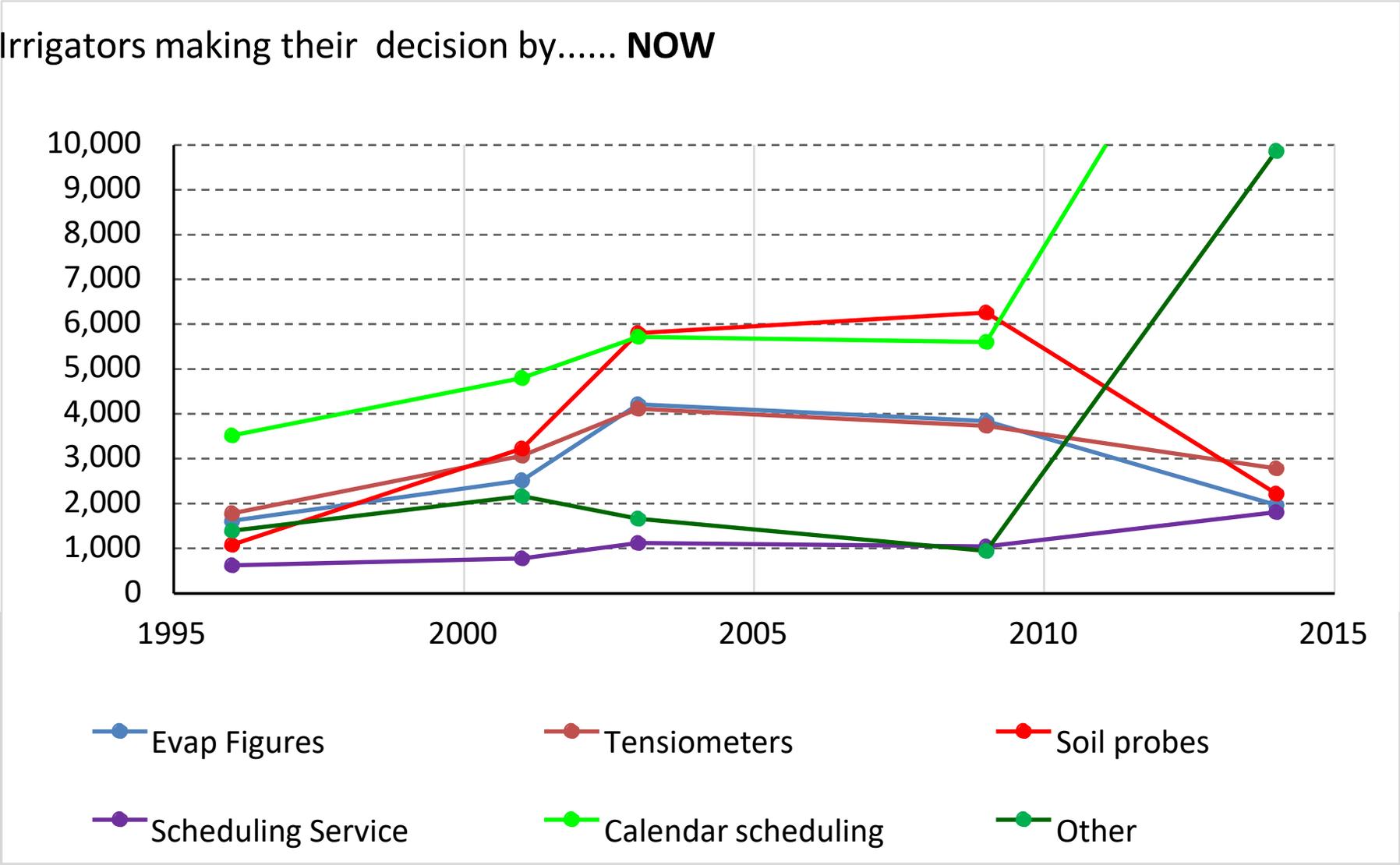
## Number of Irrigators making their decision by..... **BEFORE THE DROUGHT**



## Number of Irrigators making their decision by..... AFTER THE DROUGHT



# Number of Irrigators making their decision by..... NOW



# Major themes

## Variable rate irrigation

- 20 years of research but limited application.
- Tasmanian growers adopted but only 10-15% of new pivots use it.

*'Although currently underutilized, VRI technology has the potential to positively impact crop water productivity, water and energy conservation, and the environment' (Evans et al 2013)*



Will Bignell – grower/drone operator TAS

# Extension activities

## Workshops

- 26 workshops across the country 6 in Qld and NSW, 3 in Vic, Tasmania, SA, and WA and 2 in NT
- Local industry professional lead the workshops
- Workshops disseminated the desktop review findings in key veg growing districts
- Coordinated by GSLLS



Workshop on VFD pumps and filtration at GSLLS vegetable demo farm.

# Extension activities

## Communications

- Integrated media launch
  - Regional & national pressers
  - You Tube videos
  - Industry publications
- Conference presentations

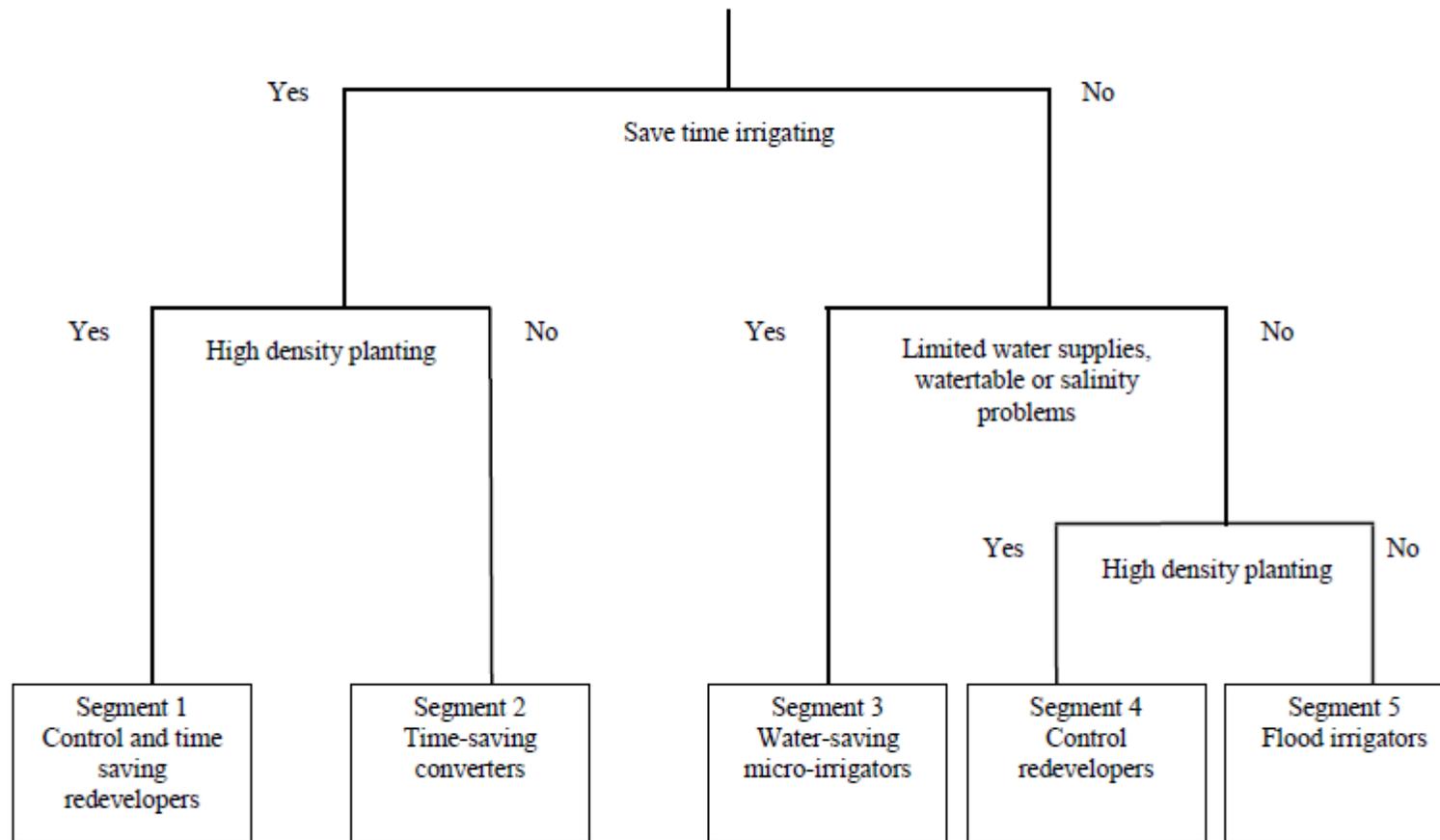


Matt Plunkett delivers a workshop in Bathurst NSW

# Recommendations

## Social research

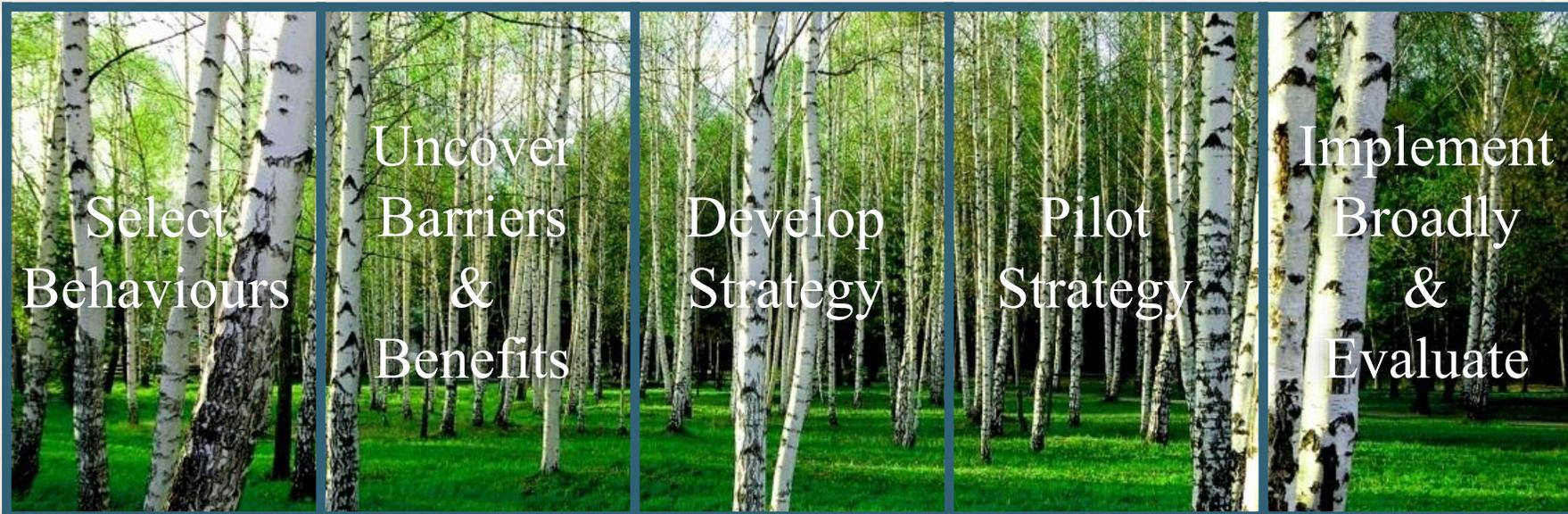
- 1. It is strongly recommended that a comprehensive social research program be undertaken to identify the specific barriers to adoption of irrigation technologies and management practices in the Australian vegetable industry.**
  - Vegetable industry regional pilot studies to identify the specific barriers to adoption of BMP and technologies.
  - Use of 'adoption market segmentation' (Kaine et al) to enable targeted cost effective extension activity.
  - Use of Community Based Social Marketing (Doug McKenzie-Mohr) to drive on ground practice change.



**Figure 5.2** Classification of benefit segments for irrigation in horticulture  
 Source: Kaine and Bewsell (2002a: 11)

# Community-Based Social Marketing

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# Recommendations

## On and off farm water and nutrient losses

1. **The Australian vegetable industry needs to take a proactive stance on off-farm water and nutrient impacts to ensure it can continue to enjoy a licence to operate and avoid potentially onerous regulation of farm inputs.**
  - **Other irrigation industries are investigating solutions for nutrient and pesticide run-off (cotton).**
  - **Same issue with lack of adoption/use of monitoring tools – the nutrient goes into either through drainage or runoff.**
  - **Enviroveg may be in a position to incorporate some user friendly monitoring process in their system for vege growers?**
  - **Applied research around the fate of nutrient and pesticides in key regions is needed.**

# Recommendations

## Drip irrigation

1. **Drip irrigation, if carefully integrated into the crop and farm context, offers the potential for greatly improved control of water and nutrient use efficiency. Renewed applied research into its applicability, costs and benefits in a wider range of vegetable crops is warranted.**
  - **Again adoption market segmentation will be key.**

# Recommendations

## Education

1. **Capacity building in the area of irrigation design is critical to the success of all irrigation technology installation and sustainable use. The Australian irrigation industry needs a suitably resourced centrally recognised centre of excellence to drive increased levels of certification of irrigation professionals as well as education of growers.**
  - **The centralisation of education for the broader irrigation sector and associated certification and auditing of practitioners is key if the full scope of irrigation management from design through installation to audit to maintenance.**