DPI Tatura

Our history and environment
Where are we?

Shepparton Irrigation Region

Goulburn Broken catchment
Our climate

Evaporation exceeds rainfall for 9 months of the year.
Due to rainfall deficit, a reliable supply of irrigation water is important for our local farmers.
Our soils

The dominant soil types in the Goulburn Valley are duplex soils from the red-brown earth Great Soil Group.

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Australian Soil Classification</th>
<th>Northcote Factual Key</th>
<th>Soil Profile Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lemnos loam</td>
<td>Calcic, Subnatric, Red SODOSOL</td>
<td>Dy 2.13</td>
<td>Non-sodic moderately acid A1 horizon; sodic &amp; very strongly alkaline at 1 m.</td>
</tr>
<tr>
<td>Goulburn loam</td>
<td>Sodic, Hypocalcic, Brown CHROMOSOL</td>
<td>Dy 2.13</td>
<td>Sodic, slightly acid A1 horizon; sodic, strongly alkaline subsoil at 1 m.</td>
</tr>
<tr>
<td>Shepparton fine sandy loam</td>
<td>Haplic, Eutrophic, Red CHROMOSOL</td>
<td>Dr 2.33</td>
<td>Non-sodic to 1 m; slightly acid A1 horizon and moderately alkaline subsoil at 1 m.</td>
</tr>
</tbody>
</table>
Tatura Research Centre: History

1929  104 acres (approx. $6000) purchased
1936  Experimental blocks established
      2 staff, 4 horses, budget $2000
1937  Canning peach variety breeding & selection began
1940-70 Processing tomato varieties developed
      Physiology of fruit trees & Orchard Pest management research
      Permeability/drainage of soil types
      Irrigation based on evaporation data
      1st series of Tatura peaches released
1970s  New crops
        Biological control of insect pests
        Minimum pruning
        Mechanical harvesting
        Tatura Trellis orchard system
1980  Regulated Deficit Irrigation
       Tatura 211, 222, 204 peaches
       Arcadia fresh tomato variety
       Soil Science
       Crop Physiology
       Crop Agronomy
       Plant Protection
       Salinity research

1990s  Expansion of the functions performed here followed the relocation of staff from other, related government departments.
       Irrigation water use efficiency projects gained importance, along with Agroforestry and whole farm planning
       Quality Assurance programs for plants, animals and chemicals
       E.g. Plants Standards staff enforce the Plant Health & Plant Products Act & Regulations; prevent the introduction of exotic plant pests and disease into Victoria; ensure early detection and control of exotic and specific endemic plant pests and diseases within Victoria; and ensure that the interstate movements of plant products meet plant health requirements.
2000+ list of research activities has grown to include:
  social research
  bio-diversity
  greenhouse gases

We have 96 hectares

230 staff includes 80 scientists and technical officers working on R&D projects and 60 staff involved in implementation of catchment management plans, horticulture advisory services, social research, community education, and Agriculture Quality Assurance projects.

budget of $22 million (compare with 1936)

**Financial support** for research projects conducted at Tatura comes from:

- State Government, through recurrent funding and special initiatives
- Rural Industry Research Corporations
- some commercial activities
Shepparton Irrigation Region

- **GROSS VALUE OF PRODUCTION $6 BILLION:**
  - 18% directly from agriculture (farmgate)

- **MAJOR PRODUCER OF:**
  - Dairy Products ($534m)
  - Stone and Pome Fruits ($231m)
  - Tomatoes ($37m)

- **MAJOR FOOD PROCESSING CENTRE: ($4 b)**
  - Value adding
  - Employment

**THESE INDUSTRIES DEPEND ON THE DEVELOPMENT AND IMPLEMENTATION OF SUSTAINABLE FARMING PRACTICES**
### State perspective

Percentage of national fruit, nut and berry crops produced in Victoria

<table>
<thead>
<tr>
<th>Fruit</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apples</td>
<td>28</td>
</tr>
<tr>
<td>Nectarines</td>
<td>37</td>
</tr>
<tr>
<td>Apricots</td>
<td>36</td>
</tr>
<tr>
<td>Nashi</td>
<td>84</td>
</tr>
<tr>
<td>Almonds</td>
<td>58</td>
</tr>
<tr>
<td>Peaches</td>
<td>59</td>
</tr>
<tr>
<td>Cherries</td>
<td>41</td>
</tr>
<tr>
<td>Plums</td>
<td>20</td>
</tr>
<tr>
<td>Chestnuts</td>
<td>83</td>
</tr>
<tr>
<td>Rubus</td>
<td>74</td>
</tr>
<tr>
<td>Citrus</td>
<td>18</td>
</tr>
<tr>
<td>Strawberry</td>
<td>42</td>
</tr>
<tr>
<td>Pears</td>
<td>87</td>
</tr>
<tr>
<td>Table grapes</td>
<td>61</td>
</tr>
</tbody>
</table>
Importance of DPI Tatura Centre

- Agricultural enterprises and rural communities across the state benefit from research conducted at DPI Tatura.
- We specialise in irrigated agricultural activities, particularly on Victoria’s northern plains.
- We have forged close relationships with the region’s Catchment Management and Rural Water Authorities.
- We work with agricultural industry groups.
DEPARTMENT OF
PRIMARY INDUSTRIES

DPI Tatura Research:
Plant Breeding
Plant Protection Projects at DPI Tatura
Integrated Pest and Disease Management

- IPDM is Government policy
- IPDM ≠ organic farming
- IPDM ≠ biological control
- IPDM ≠ magic formula
- IPDM is not new
Bacterial Blast Cankers
Bacterial Spot - Nectarine
ORIENTAL FRUIT MOTH

*(Grapholita molesta Busck. Lepidoptera:Tortricidae)*

Oriental Fruit Moth

OFM damage on peach shoot tips

OFM adult moth, larva and pupa

OFM damage on peach fruits
CODLING MOTH
(*Cydia pomonella* L. Lepidoptera:Tortricidae)

- **Larva**
- **Damaged pear**
Isomate OFM Plus

Isomate OFM Rosso

Isomate C (Codling moth)

Isomate CTT (Codling moth)
Attract and kill technology for managing beetle pests in orchards without spraying the crop.
Integrated Fruit Production

“Economical production of high quality fruit giving priority to ecologically safer methods, minimising the undesirable side effects and use of agrochemicals, to enhance the safeguards to the environment and human health”.
The IFP system developed for Australian pome fruit

It incorporates a cost-effective combination of:

- whole farm planning
- site specific selection of scion/rootstock combinations
- IPM
- best practice irrigation and nutrition
- crop management
- Quality Assurance
- Food Safety
- Occupational Health and Safety
How far have we progressed?

- **National guidelines for IFP**
  - completed for apples
  - being developed for stone fruit

- **Grower survey**
  - 43% with whole farm plan
  - 90% base fertiliser program on test results
  - 88% use orchard sanitation/ cultural controls
  - 92% base spray decisions on monitoring results
  - 86% select pesticides with predator compatibility
  - 84% select pesticides on efficacy against pest
  - 82% select pesticides by environmental effects
Success Factors

- Formal, audited system requires higher levels of monitoring and documentation
  - this encourages growers and their staff to take a greater interest in orchard ecology.
- Practical training programs conducted by DPI
  - growers get greater understanding and confidence in the biological systems they are managing.
Plant Physiology Projects at DPI Tatura
Improved irrigation management in orchards and vineyards

Ian Goodwin
Mark O’Connell
Yasmin Chalmers
Glenda Kelly
Mark Krstic
How much “shade”?
Crop Agronomy projects
at DPI Tatura
Improving Below Ground Processes for Precise & Efficient Production Systems

Dr. Peter Fisher
Alternative Crops:
Natural Resources Management Research
Improving Water Use Efficiency

- **Soil hydraulic properties**

![Soil Map of Shepparton Irrigation Region]

- **Alternative irrigation technologies**

![Eddy Correlation: direct measurement]

- **Subregional water use efficiency mapping**

![Median Saturated Hydraulic Conductivity of Surface Soil (Error bars show 5 and 95 percentiles)
Managing groundwater and salinity

♦ Systems for farm groundwater and re-use water management

♦ Deep drainage reduction

♦ Plant salt tolerance

*Distichlis spicata growing in highly saline soils at the Serial Biological Concentration site at Undera, Northern Victoria.*
Catchment Management

- Geographic Information systems to support implementation

- Catchment management models

- Irrigation futures
Communicating research results
Field days bring groups of farmers together for observation of new methods and informal discussion of results.
Sustainable Irrigated Landscapes Team

- Focus is on working with communities to change attitudes and behaviours.
- Multicultural Program
- Developing and implementing sustainable land use practices using an integrated program
- 2,400 whole farm plans (170,000 ha or 53% of irrigated SIR)
- 420 ha remnant vegetation protected on private land
- 340 ha native vegetation re-established on private land
- Over 275 ha of private wetlands and 2,700 ha of public wetlands have now been protected by environmental works
- Over 2.8 million trees established
- Farmers are spending more than $40 million each year on salinity mitigation and waterways nutrient reduction alone

FOR EACH $1 THE GOVERNMENT INVESTS IN ON-GROUND WORKS, THE COMMUNITY INVESTS $4
Innovative Extension & Social Research

- Understanding information needs of farmers
  - Determine the drivers and barriers for farmer involvement in a Government extension program
  - Develop a targeted extension (communication & training) project for growers

- Future Farming systems
  - Describe catchment demographics & current irrigation practices
  - Develop program of approaches to increase adoption of Best Management Practices

- Collaboration with Non Government Organisations to achieve Natural Resource Management outcomes.
  - Develop strategies to increase the role of NGOs in delivering natural resource outcomes

- Communities creating profitable and sustainable rural landscapes
  - Develop a strategy to work in a multi stakeholder environment
Managing Native Biodiversity in the Shepparton Irrigation Region
Threatened Fauna of the Northern Plains

- **Bush stone curlew**
  - Needs: Woodlands. Little grass, lots of fallen branches
  - Threats: High weeds, cats, foxes

- **Grey-crowned Babbler**
  - Needs: Woodlands
  - Threats: Clearing

- **Brolga**
  - Needs: Wetlands, meadows, shallow marshes, sticks/grass for nests
  - Threats: Cats, foxes, cattle

- **Squirrel Glider**
  - Needs: Eucalypts, silver wattle, shrubs, tree hollows
  - Threats: Cats, foxes

- **Superb Parrot**
  - Needs: Hollows in forest, wattles, shrubs
  - Threats: Clearing
Regulatory
CAS Plant Standards

- Enforce the Plant Health & Plant Products Act & Regulations.
- Prevent the introduction of exotic plant pests and disease into Victoria.
- Ensure early detection and control of exotic and specific endemic plant pests and diseases within Victoria.
- Ensure that the interstate movements of plant products meet plant health requirements
CAS Animal Health

- Enforce the Animal Health Act & Regulations.
- Prevent the introduction of exotic diseases of animals into Victoria.
- Ensure early detection and control of exotic and specific endemic animal diseases within Victoria.
CAS Chemical Standards

- Enforce the Agricultural and Veterinary Chemicals (Control of Use) Act 1992 & Regulations.
- Victorian Produce Monitoring Program
- Audit commercial spray contractors

Fisheries compliance