

Soil Management for Australian Irrigated Agriculture

SRP026



NPSI Case study

April 2011



Situation

Subject: James Cornish

Location: Murray Valley

Enterprise: Horticulture

Size: 430ha

Irrigation:

Permanent under tree sprinklers or drippers on peaches, pears and apples.
Permanent overhead sprinklers on lemons.

Improving soil preparation and management to increase orchard yields

Link with NPSI

James Cornish became involved with the NPSI project – **Soil Management for Australian Irrigated Agriculture** – after hearing about the work Dr Bruce Cockroft was doing on soil improvement through the DPI Tatura station. A group of likeminded growers, including James, banded together to privately fund their own soil research and has since applied many of Dr Cockroft's soil and irrigation recommendations. They are now waiting the outcomes of his next stage of research.

This objective of this project was to increase yields by two to three times of current output and at the same time improve the soil resource. It aimed to develop a solution that is cheap and simple to set up and manage, is applicable to all Australian irrigation including row crops and the dairying industry and is equal in productivity to the very best of the best soils overseas - including those referred to as 'super soils' in California and Yangtze delta.

The project was looking to achieve this through the development of a new system of soil preparation and management for irrigated orchards, row crops and pastures, enabling large inputs of stable soil organic matter, through incorporation of stable soil sheaths (rhizosheaths) formed on ryegrass roots. The purpose being to increase the water use efficiency and productivity of irrigated crops.



Soil adhering to grass roots. The adhering soil is called rhizosheath. The rhizosheath is the main centre of biological activity that builds soils into super soil.

Changes made as a result of NPSI influence

As a result of his involvement, James has applied many techniques in line with Dr Cockroft's soil management research. Modifications made to his on farm practices apply the 20 practices listed by Dr Cockroft as important to improve soil structure and ultimately improve yield potential. Changes implemented to date include:

- The use of lime and gypsum pre-planting for fruit trees.
- Deep ripping using a modified ripper to open the soil without degrading structure. The ripper wings are modified to fluff up soil without bringing clays to the surface.
- Banking soil onto tree lines for increased growing medium and improved drainage.
- Slashing grass in tree lines and throwing onto tree row, to ensure minimal cultivation of soils.
- Minimal traffic on tree lines to avoid compaction.
- Use of irrigation sprinklers with flow rates that do not compact soils and are compatible with soil permeability.
- Avoiding the use of tree line herbicide sprays in autumn in order to encourage the establishment and growth of winter grasses. The objective being to improve soil structure and assist drying the soil through winter.

James notes that any further changes will depend on the reported findings of trial outcomes (conducted by Dr Cockroft). It is anticipated these changes will impact at least 70% of irrigable land on his property.

Costs of making changes

Although exact figures on costs and profits are not readily available, James explains that changes made to soil management practices means that he is now growing trees to produce fruit quicker and with greater yield potential. He notes that an outcome of improved soil management practices is that he is now *running a more productive orchard, which grows fruit of good quality and size*. This is because changes made have resulted in good strong healthy trees.

Benefits of making changes

This project investigates one of the main causes of low productivity - poor soil structure. Australian soils rapidly deteriorate when put under crops. They go hard, restrict crop roots, yield falls off and the crops become uneconomic after two years.

As a result of changes made through this project, James has noticed improved soil texture and quality as well as improvements in irrigation efficiency. He explains that practices such as deep ripping in conjunction with lime and/or gypsum, banking tree lines and subsequent changes (as above) *are effectively creating a greater amount of good quality top soil for our trees to develop their roots and increase their yield potential*.

This improved soil structure has resulted in reduced irrigation run off and improved soil permeability ensuring better irrigation penetration. In addition to improved water use efficiency, earlier production and anticipated longer bearing life span of crops, changes have also resulted in:

1. Less tractor hours, resulting in less pollution and environmental impact. As a flow on effect this has also resulted in reduced input costs, in particular fuel.
2. A cheaper cultivation system. James notes increased yields of marketable products have resulted in better revenue.

"We are running a more productive orchard which grows fruit of good quality and size"



“We are making more informed decisions about runoff and soil compaction”

Impacts of making changes

James notes that improved soil structure and irrigation penetration will have a major impact on his enterprise over time through improved tree health, with an outcome of improved yields for a longer period of time. He also highlights that as a result of this project and the research being conducted, he has come to realise *how easy it is to degrade soils and how little change is required to protect and improve soils.*

This project is working not only to investigate the impacts of soil on productivity, but also to improve water use efficiency, reduce costs, reverse land degradation and markedly increase carbon sequestration into the soil.

Relevance to others

The information coming out of NPSI is a real plus as there is a lot of horticulture in the region. The findings about improving soil techniques will assist most agricultural industries and help to deliver sustainable benefits.

Supporting Material

SRP026 NPSI Milestone Report 4

Further information

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