

Final Report

Advanced production systems for temperate nut industries

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Delivery partner:

Almond Board of Australia

Project code:

ST16000

Project:

Advanced production systems for temperate nut industries (ST16000)

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Summary

The Almond Centre of Excellence orchard located at Loxton, South Australia is contributing to the Australian almond industry's research and extension capacity by establishing a purpose built experimental and demonstration orchard as the site for production trials. This is directly contributing to the long-term sustainability and profitability of the industry and the regional communities they help support.

The growth of the almond industry and other permanent horticulture crops is putting pressure on surety of supply of inputs and the industry is seeking ways to use inputs such as water, nutrients, and chemicals in an efficient and sustainable manner. Trials at the Almond Centre of Excellence orchard lie at the heart of achieving significant results in this area.

The Almond Board of Australia staff have worked closely with the other research providers conducting projects as part of ST16000 Advanced production systems for temperate nut industries. The ABA orchard staff have implemented the instructions of the SARDI researchers conducting their trials at the Almond Centre of Excellence orchard.

Alongside the development of the orchard with the SARDI trials as part of this project other providers have established trials and conducted their research within the orchard. This has facilitated cross collaboration between researchers of various R&D organisations as well as a close linkage with industry.

Thirty eight hectares of the 60 hectare orchard site is now planted to trials being conducted by SARDI, Adelaide University, Plant and Food Research, the ABA, and commercial companies trialing nutrient and disease management products. Other smart technology companies are also providing their products for assessment and demonstration including plant based sensing of tree irrigation requirements, and laser bird scaring.

The orchard trials are signposted on a row by row and trial patch basis to facilitate the education process for those visiting the orchard. The pandemic has required COVID-19 safety plans to be implemented that has impacted on more recent visitations to inspect the trials and limited the ability to hold events at the orchard. Prior to the 2020 and 2021 the orchard hosted an Almond Industry R&D Forum and Field Day attended by 250 participants, including 12 from the Spanish almond industry.

Other visitors during the period of the project have included the Ambassador to Nepal, soil health scientists, participants of the "One Basin CRC" bid, and numerous grower groups including one from the USA organised by the almond, pistachio and pomegranate producer Wonderful.

The guidance of the orchard's development by the Almond Centre Committee comprising experienced producers has been very valuable. The contribution of Brendan Sidhu, as Chair of the Committee, has been particularly important to its successful development.

Videos showing the orchard's development have been produced regularly. A link to the latest video showing the orchard's development can be found at the following link:

https://australianalmonds.com.au/industry_resource/ace-farm-update-2017-2021/?v=6cc98ba2045f

The ABA's Board of Directors at its strategic planning event held in May 2021 committed to the ongoing research required to further develop an advanced production system for Australian almonds to better suit Australian conditions than those of California where most of the current growing methods have been adopted.

This project has laid the foundation for this work to deliver a leap forward in the competitiveness of the Australian almond producers in a global industry that is going from strength to strength in terms of consumer demand.

Keywords

Almonds, Production systems, Experimental orchard, and Extension model.

Introduction

The Australian almond industry has grown from producing 16,000 tonnes in 2006 to 124,000 tonnes in 2021 and with the recently planted orchards maturing the industry tonnage is forecast to be more than 180,000 tonnes by 2025. The industry's 2020 plantings data shows the orchard area was 58,000 hectares spread across four States but mainly concentrated on the Murray Basin in the Riverland, Sunraysia and Riverina irrigation regions.

The competitiveness of the Australian industry is based on being able to outperform other producing countries in terms of yield and input efficiency as our costs are considerably more than those borne by Californian almond producers. The Spanish industry is also modernising with enhanced irrigation and new varieties. It is crucial the Australian industry develops technologies that improve input efficiency, particularly for water, bees and labour that are limited and increasingly in demand.

The Australian almond industry is a viable horticultural industry holding its own in establishing strong domestic and export markets. Almond consumption has grown at around 10% annually in Australia and globally for many years.

The Australian industry is at the forefront of best practice but much of the current technology has been imported from California and there is an opportunity to develop advanced production systems that will provide a leap forward in terms of crop yields, water use efficiency, reduced fertiliser inputs, harvesting efficiency, disease and pest management, product quality and diminished food safety risk.

To implement this plan for the industry, several key challenges must be resolved through research. The industry is concerned about the available scientific base that currently supports the industry and has developed a new model wherein strong industry involvement drives the delivery of the necessary knowledge, technologies and services required to implement the almond industry's strategic plan. At the heart of this is the establishment of the Almond Centre of Excellence which has an experimental orchard to conduct the trials to prove the concepts and optimise them.

This field laboratory will work to modify current orchard production systems that exist on over 58,000 hectares of plantings by focusing on new varieties, use of size limiting rootstocks, higher density plantings, soil health, new spray and harvesting technologies, dehydration practices, and hull biomass utilisation.

Current practices use large volumes of water and nutrient inputs to grow large trees in the hope that they will carry more fruit rather than focusing on maximising the yields from the orchard area by focussing on bud fruitfulness, optimised light interception and tree architecture. Smaller, heavily laden trees planted closer together opens the way to achieving a substantial increase in yields.

In developing a higher yielding orchard based on modified plantings, the advanced production system will also focus on all aspects of the system to achieve gains in efficiency in the year-round operations and inputs, pest and disease control, product quality and food safety.

The Almond Centre of Excellence will have training facilities to support the teaching of production skills necessary to have knowledgeable producers and develop a skilled and motivated workforce for the industry.

The ABA has secured a 60 hectare site at Loxton and developed the infrastructure on the site along with plantings for the trials for ST15032 Advanced production systems for temperate nut industries.

The ABA's Almond Centre Committee is the industry reference group overseeing the development of the experimental orchard. The Committee draws its membership from the industry's leading producers. This group provides a strong industry link for researchers with trials at the Centre. The group's members are also early adopters of emerging knowledge and technologies that assists to drive uptake across the industry.

The almond industry producers support the experimental and demonstration orchard as the best mechanism to allow research to push the boundaries of innovation and develop new technologies to enhance the competitiveness of the Australian industry.

Methodology

The infrastructure design at the Almond Board of Australia's experimental and demonstration orchard has been guided by the ABA's Almond Centre Committee liaising with SARDI researchers. The establishment of the trial plantings for ST15032 Advanced production systems for temperate nut industries has been undertaken to the design provided by the SARDI researchers.

A timeline for the development of the experimental orchard at Loxton by the ABA relevant to the project follows:

2016/17

- Pre-planting survey of physical, chemical and microbiological soil parameters across the experimental orchards undertaken.
- Design for establishment of the experimental orchard prepared ensuring installation of a flexible irrigation delivery system, suited to research trials and any additional irrigation treatments that may be added into the future.
- Meteorological station installed.
- Soil water and nutrient monitoring systems installed.

2017/18

- Design prepared for the establishment of plantings for Horizons 1, 2 and 3 research in the Loxton experimental orchard.
- Planting undertaken and tree training commenced.

2018/19

- Design prepared for establishment of further plantings in the experimental orchard.
- Plantings maintained and general operation of the experimental orchard undertaken including machinery and further infrastructure development.

2019/20

- Orchard trial maintenance and operation undertaken including harvest machinery acquisition and further infrastructure development.

2020/21

- Orchard trial maintenance and operation undertaken including harvest machinery acquisition and further infrastructure development.

The extension aspect of the project involves:

- Orchard visitations.
- On-site extension events.
- Publication of articles.
- Videos.
- Electronic media.
- Social media platforms.

Outputs

- Development of the Almond Centre of Excellence 60 hectare experimental and demonstration orchard at Loxton to conduct the trials to develop new production practices, optimise them, and extend the knowledge and technologies to the almond and other horticultural industries.
- Extension activities at the orchard during the period of the project have included individual and groups of Australian almond and pistachio growers, the Ambassador to Nepal, soil health scientists, participants of the "One Basin CRC" bid, and grower groups from the USA and Spain.
- The 2018 Almond R&D Forum and Field Day was conducted at the orchard attended by 250 participants.
- Interaction and collaboration of researchers conducting trials at the Loxton experimental orchard.
- Promotion of the project was undertaken via media platforms.
- A series of videos showing the time lapse development of the Almond Centre of Excellence orchard. The latest is at the link: https://australianalmonds.com.au/industry_resource/ace-farm-update-2017-2021/?v=6cc98ba2045f
- A video showing the project trials by SARDI and other almond project research providers as at October 2021. indicates the successful uptake of the field laboratory model. The link is:

Outcomes

The Almond Centre of Excellence experimental and demonstration orchard provides a site for the industry's research trials in future that is closely linked to industry, is expertly managed to the requirements of the researchers, and is integrated into the industry's extension of best practice and training programs for growers and their workforce.

The uptake of the field laboratory model by researchers from a number of organisations including agriculture departments, universities, private R&D providers and commercial companies has been established.

Monitoring and evaluation

The orchard's development was reported to the ABA's Board of Directors at its quarterly meetings. The ABA Board represents 98% of the industry's production with grower representation from all producing regions and four major marketers.

The trial management and further orchard development proceeded well throughout the project although the lack of seasonal backpacker labour due to the pandemic made finding suitable harvest hands more difficult than is usually the case in 2021.

The pandemic also restricted the number of on farm visitations during the project as strict workplace safety plans were introduced and adhered to.

Recommendations

The Australian almond industry at its strategic planning event held in May 2021 committed to further investment in the research to develop an advanced production system that has commenced with this project and supported by other Horticulture Innovation Australia projects on tree architecture and on farm impact hulling. It is recommended to continue project work on the trials established under this project.

Refereed scientific publications

Nil refereed scientific publications.

References

Nil references involved in this report.

Intellectual property, commercialisation and confidentiality

No project Intellectual Property was developed by the Almond Board of Australia element of this project.

Acknowledgements

The ABA's Almond Centre Committee acted as the industry reference group overseeing the development of the experimental orchard providing astute guidance on the infrastructure requirements and orchard planting design. Brendan Sidhu, the Committee Chair, contributed countless hours to ensuring the orchard's establishment and operation is of the highest standard and an ongoing asset to the Australian almond industry.