

A new paradigm for growers

Professor **John Fielke**, School of Engineering, University of South Australia

Australian almond growers have traditionally adopted the Californian methods of growing, harvesting and processing of almonds, however Australian growers and processors are now starting to question what until now, has been accepted theory.

Professor John Fielke of the University of South Australia (UniSA) has just completed a six-year project funded by Hort Innovation, using the almond research and development levy, contributions from the Australian Government and the University of South Australia. Interestingly, it is the Californians that are also looking closely at the findings.

There is a new paradigm on the horizon for almond growers including;

Shake early

Work at UniSA by Dr **Michael Coates** in his PhD showed that after the hulls had split and fully butterflied open there is no further accumulation of dry matter in the kernels. In fact, using the early harvest 'shake, catch and dehydrate' technique did not affect the calcium, magnesium or iron levels and the altered fatty acid and alpha-tocopherol profiles in earlier harvested almonds are likely to be beneficial for longer shelf life.

The work consistently saw that the sooner the fruit was harvested after hull split and brought in from the orchard the less the amount of insect damage. Also getting the almonds out of the orchard quicker reduces the chance of spoilage from rain and other pests.

Shake and catch

Growers are starting to change their orchard layouts and planting selections to accommodate shake and catch harvesting.

The US has just had its first use of an over the row Tenias shake and catch harvester this past season. There the almonds were still dropped onto the ground in a windrow to finish dry. Similar Tenias equipment is planned to arrive in Australia soon.

With the introduction of shake and catch, even if the almonds are placed on the ground in windrows the almonds are not mixed with the soil, as the traditional sweeping process is avoided. However, there is the opportunity to collect the almonds without even being placed on the ground and taking them directly to a dedicated finish drying facility.



Over the row shake and catch almonds harvester from Tenias.

On-farm hulling

Work at the University is continuing to develop their patented huller and separator to fit onto a harvester so that only in-shell almonds are brought in from the orchard.

The hulls and harvested sticks would be milled and returned to the orchard floor.

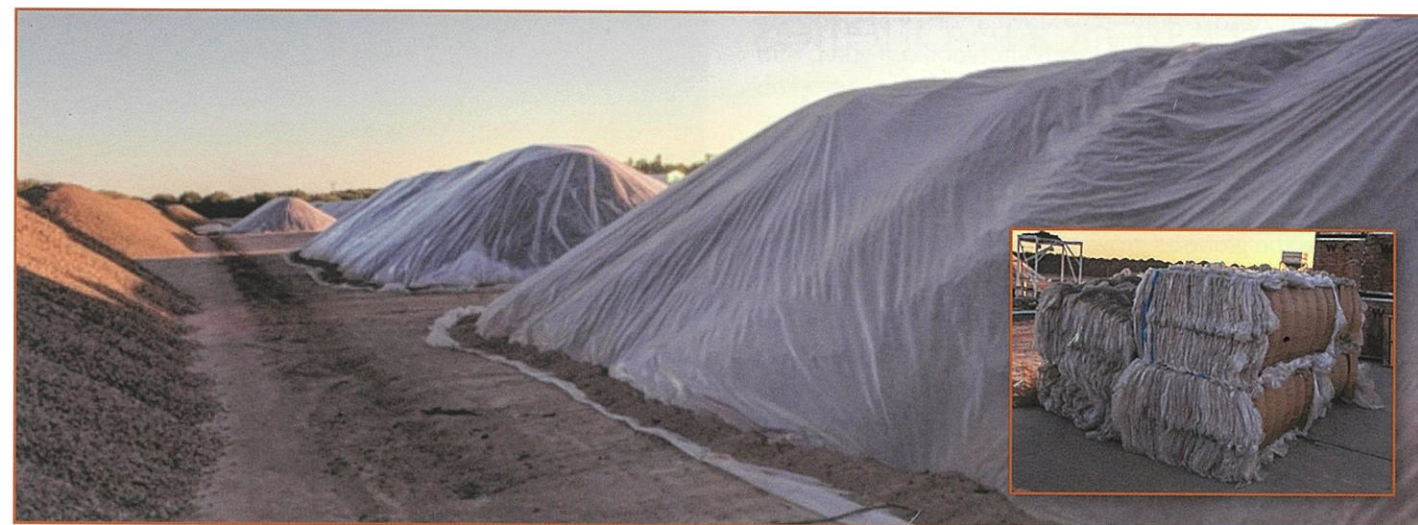
This huller was designed to efficiently take off the hulls from soft-shelled almonds using multiple low energy impacts and not dislodge the kernels.

It works best on green almonds that have fully butterflied open and over 95 per cent of almonds can be harvested as an in-shell product but is also effective for dried almonds with more than 60 per cent in-shell almonds created without loose kernel.

Taking the hulls off on-farm will reduce by half the volume of almonds that subsequently need to be stored and transported to a processor. The hulls are a good nutrient source so the on-farm hulling may also lead to other uses for the hulls, particularly if they have not been mixed with soil.



Example of milled hulls and sticks that can be produced during on-farm hulling.



Traditional stockpiles of almonds (above) and the waste plastic (inset) from current methods.

Silo storage

Currently almonds are placed in outdoor stockpiles and covered with plastic to protect them from rain and pests.

This leads to a range of issues such as sweating and moulding under the plastic, roasting of the almonds on the surface, rainfall infiltration at the base and leaks.

There is a large amount of time and effort spent in sealing the plastic cover to allow for effective fumigation against insects. Finally, the plastics used for covering the almonds must be disposed of and/or recycled at a further cost to the almond grower.

With the Australian almond industry now moving to larger silo manufacturers such as Kotzur at Walla Walla a range of almond specific silos are being developed with appropriate let-downs to avoid damage during filling and discharge geometries to handle both in-hull and in-shell almonds without damage or blockages.

These silos will vary in size from 100 to 2000m³.

A 2018 survey of growers showed that practical sizes for silos would be 500 and 1000m³ to allow economies of scale while maintaining variety and site segregation.

Importantly the silos can be sealed to allow for effective fumigation and/or the use of controlled atmospheres for non-chemical insect control.

Aerated silos

Tests at the University of South Australia has shown that aeration can be used to both dehydrate and re-humidify almonds.

The key to modifying moisture in a deep depth of almonds such as a 10m high silo is to aerate the almonds with air at the required equilibrium relative humidity which is in the range of 55 to 60 per cent RH.

With this humidity the almonds from top to bottom of the silo are brought to the required kernel moisture content over a period of several days to several weeks, depending on the starting moisture content and ambient conditions.

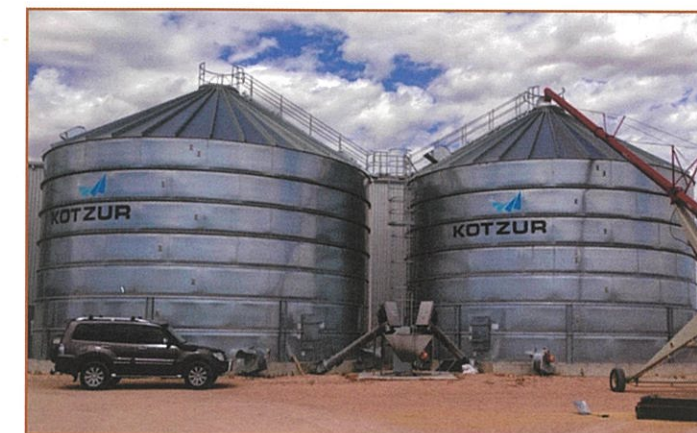
In this way almonds can be brought in from the orchard before they are fully dried, avoiding rain, insect and pest damage that reduces the quality and value of the crop.

Also, the quality of the almonds can be protected with earlier harvest from extremes in high temperature whilst wet which darkens the skin and causes skin flaking, and extremes in high relative humidity which can lead to rancidity/concealed damage which shows up when roasted.

After moisture modification in the silo, the almonds can be delivered to processors at the required moisture content.

There are now sensors available for placement in the silos to measure the temperature and relative humidity of the almonds at various depths and provide a continuous monitoring and automated control of the conditions in the silos.

For further information contact john.fielke@unisa.edu.au



Example of 1000m³ silos that could be modified for aerated almond storage.

A U S T R A L I A N TREE CROP

THE MAGAZINE FOR THE TREE CROP INDUSTRY

WWW.TREECROP.COM.AU

DECEMBER /
JANUARY 2019

TREE CROP NEWS

Environmental efforts
recognised

Striking a rich vein with
Honey Gold

New Trans-Tasman
biosecurity alliance

Genome mapping for
Aust horticulture

The appeal of seedless
citrus

FEATURED CROPS

Almonds & Olives

FRUIT FLY

TREE CROP INSIGHTS

FEATURES

Post Harvest

Business Solutions
& Labour

PRODUCTS & SERVICES NEWS



AUSTRALIAN
TREE CROP

Tree Crop is now digital.
Visit our website
treecrop.com.au