

Assisting the Almond Harvest

Soil Management with the Model 1204 Kelly Tillage System

Model 1204 Kelly Tillage System Case Study

Subject: Aroona Farms orchard, South Australia

Orchard size: 1450ha, light red sand to heavy clay loam

Produce grown: Almonds

Kelly model: Model 1204 Prototype with CL1 & Spiked Disc

In The Orchard

The Aroona Farms Group manages an almond orchard near Lyrup in South Australia's Riverland. The orchard spans 1450 ha and has just shy of 503,000 almond trees; measured together, it has 2100km of rows. With 15 tractors moving around on any given day, it's a busy environment in which soil health and quality are rigorously monitored and optimised.

Almond production requires a high level of care and precision. Weeds like fleabane, Rhodes grass and marshmallow thrive in the moist environment created by the irrigation. The range of herbicides available for use in young almond orchards is limited, exacerbating the challenges of controlling these weeds. As well as competing for moisture and nutrition, the weeds reduce harvest efficiency, making it difficult to recover mature nuts from the orchard floor.

Orchard Manager Kelvin Trezise says that the land has "pretty much every type of soil you can think of," ranging from light red sandy soils to heavy clay loam. The orchard uses cover crops, alternating in rows between canola, peas and vetch. The cover crops are sprayed in December and mown later. Residue is managed in a 2.5m strip between rows.



Model 1204 Kelly Tillage System

The orchard uses small 100hp Kubota and Fendt tractors which are fitted with cages to protect them from almond branches. They require five X-Plane graders and three harrows, which work together to level the ground post and pre-harvest.

Narrow Margins

The end goal of any and all soil management action in the orchard is the creation of a level harvest bed to expedite almond collection. Regular orchard work disturbs the soil, so it's necessary to level the ground to repair accumulated damage before each harvest. However, the specific needs of the almond orchard make it difficult to find suitable machinery. Each soil management procedure has to take into consideration:

- The limits imposed by irrigation and sprinkler infrastructure
- The physical limits imposed by the planting rows
- The need to protect the root zone of the trees

Working within this framework limits deep tillage and herbicide use, making soil management difficult. The Model 1204 Kelly Tillage System works exceedingly well in this niche, able to control weeds and level soil without disturbing the root zone.



Interrow management

Using the Model 1204

The Aroona Farms orchard first trialed the Model 1204 with aim of using it for weed control and levelling row centres after harvest. With only short windows of time between the flowering of the trees, the almond harvest and the December removal of cover crops, they needed an efficient tool with higher working speeds. They trialed the machine with both Spiked Disc and CL1 Disc Chain; though the Spiked Disc was effective in newer plantings, the CL1 better suited their conditions and was able to completely level large mounds of material left after harvest.

When compared to the other soil management options used by the orchard, the Model 1204's versatility and efficiency stand out. Levelling after harvest was previously done with a combination of the X-Plane and the harrows, but both tools presented some issues. The X-Plane grader needed dry soil conditions to work effectively, and wouldn't function well when passing over weeds or other obstructions. The harrows dragged uprooted weeds to the end of the planting row. Chemical weed control prior to levelling means making an extra pass, with herbicide creating inefficiencies and requiring suitable weather conditions.

In contrast, the Model 1204 effectively controlled weeds and levelled soil with just one pass in a range of conditions. The Kelly was also effective in incorporating organic matter straight back into the soil, which helps with orchard sanitation and insect control while potentially improving soil carbon and water retention.



Above: CL1 Disc Chains



"Labour costs will reduce because we can do one pass with the Kelly at 9km/h compared to 2 to 3 passes with the X-Plane at 4km/h and 5 to 6 passes with the harrow at 8km/h."

- Kelvin Trezise, Orchard Manager

More for Less

The Model 1204's key advantage for almond production is an increase in efficiency. With higher working speeds and more powerful soil-engaging technology, the Model 1204 is able to cover more ground than the orchard's other soil management tools. Working productivity has increased from 0.8 ha per hour with the X-Plane to 6 ha per hour with the Model 1204.

Trezise was surprised by how much land the Model 1204 could cover, and how quickly. "We can cover four times as far with the Kelly compared to an X-Plane or harrow," he says. "Labour costs will reduce because we can do one pass with the Kelly at 9km/h compared to 2 to 3 passes with the X-Plane at 4km/h and 5 to 6 passes with the harrow at 8km/h."

Trezise expects significant fuel savings with the Model 1204. The orchard's tractors are using the same 75-78 litres per day that they did with the X-Plane, but are now able to complete the work in a quarter of the time. Maintenance costs are expected to stay minimal.

Controlling Weeds

One of the biggest issues faced by the Aroona Farm orchard is controlling weeds in the row centre after summer rains. The orchard is very restricted in how they can spray herbicides, and often has to wait for poor wind or rain conditions to pass. Using the Model 1204 for weed control mitigates this issue, giving the orchard more control over their weed management options.

Since the Model 1204's effectiveness isn't reliant on perfect weather conditions, the orchard can use it to control weeds whenever it suits their production timeline. "You are very restricted when spraying to kill your weeds, you have to do it in the right weather conditions," says Trezise. "With the Kelly, you can use the machine anytime for weed control (rain, hail or shine)."

As well as alleviating weather restrictions, the Model 1204 has been effective in reducing weed pressure. Trezise was surprised with its impact, stating that it had achieved "100% weed kill" in most areas. The Model 1204 was able to remove most weed varieties with great effectiveness, faltering only in large patches of pre-established marshmallow, where it achieved closer to 75% weed kill with Spiked Disc Chain. Since it had no issues removing younger marshmallow, regular monitoring of weed levels would make this a non-issue.



Results

- Increase in driver productivity due to higher working speeds and ease of use.
- Reduction in fuel and labour costs due to only having to make one pass.
- Improved soil conditions and levelling in row centres.
- Trezise states that the Model 1204 Kelly Tillage System has been able to get "100% weed kill".

Overall, Trezise feels that the Model 1204 is a sustainable option for the Aroona Farms orchard and recommends it to other almond producers.

"We currently require five X-Planes and three harrows. Three Kellys could replace all eight machines."

Contact Kelly Tillage for more information about the Model 1204 Kelly Tillage System

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Data for this case study was provided by Kelvin Trezise and collated by Kelly Tillage