

Controlled traffic farming and soil quality

We're not carting soil to the shed

There are many reasons to cultivate the soil ahead of planting vegetable crops. However, regular and intensive cultivation affects soil physical quality by breaking down aggregates. In the process organic matter is often lost, which can eventually lead to poorly structured soils which are less productive and more prone to erosion. One of the keys to reducing cultivation for planting is to limit compaction damage during the previous season.

In Pukekohe, A.S. Wilcox & Sons focus on breaking the link between compaction and cultivation by adopting controlled traffic farming (CTF) methods.

Crop manager Simon Wilcox recalls when they first started to introduce controlled traffic approaches. "We cultivate our soils to get them ready for planting. This took more effort as we lost organic matter and tried to remove compaction damage caused by random trafficking. We knew we had to break the cycle, and started by controlling our traffic more closely – especially at harvest. In addition to the improving soil structure, there were some obvious opportunities to reduce our fuel use by cultivating less."

To get to grips with the change, Simon and his team set up a split paddock comparison. With the support of LandWISE they compared conventional traffic and cultivation practice against a new controlled traffic approach. There weren't any guidelines on how to do it, so they developed their own system by building on the experience of others in New Zealand and also Tasmania.

Dirk Wallace of Plant & Food Research has been monitoring soil quality. "One of the big questions was how quickly the soils would recover in the paddock. So we've been tracking various physical indicators for the past two seasons to see how they are responding to less cultivation and traffic. Changes in soils don't typically happen overnight, but we expect that with less compaction they can cultivate less, and by cultivating less they can gradually rebuild soil condition."

At the end of the first season with an onion crop, there was no difference in yield achieved using either controlled traffic or conventional random traffic. Water infiltration under controlled traffic increased by about 30%, an encouraging observation which appeared linked to differences in bed forming practice. This was consistent with visual observations made by the Wilcox team. They also noticed the effective soil depth was much greater under controlled traffic.

By the end of the second season with a potato crop there were differences in aggregate size between the conventional and CTF approaches. "When we assessed visual condition, aggregates under the conventional approach were much bigger. We put this down to the effects of random traffic that compressed aggregates together, especially at harvest. The aggregates were also very angular and blocky, a sign of compaction damage," notes Dirk.





Of interest to Simon and his team was the amount of soil still attached to potatoes after harvest. “The clay soil has amazing stickability,” says Simon. “It gums up the harvesters, slows down operations, and then after trucking it to the packhouse, we have to take it away again.”

“We ran 12 tonne batches through the packing shed. Potatoes grown under controlled traffic had only half as much soil still attached as under conventional. We put this down to better soil conditions at harvest. This reduces costs, as we’re not carting soil to the shed where we firstly have to remove it, and then dispose of it. The washing crew reported big efficiency gains.”

When the trial was harvested, weather and soil conditions were dry. “We needed rain to see the full effect of controlled traffic on harvest conditions,” Simon said. “For once the rain never came! But we saw enough to know that controlling traffic is a good thing for our business, from paddock to packhouse”.

The next challenge for A.S. Wilcox & Sons is to decide how to integrate cover crops into the rotation and still maintain controlled traffic. “We want to keep the same traffic lanes for as long as we can. That can be a challenge when equipment has different wheel centres, or you rely on contractors. To date we’ve managed with some minor equipment modifications. In the future we’ll make sure new equipment purchases meet our needs around CTF.”



Support for this work was provided within the ‘Holding it Together’ project, which was funded by MAF Sustainable Farming Fund, Fresh Vegetable Product Group, Potatoes New Zealand, Ballance Agri-Nutrients, Hawke’s Bay Regional Council, Auckland Regional Council, Horizons Regional Council and Environment Waikato.

For more details contact:

Dr. Lindsay Fung (Lindsay.Fung@hortnz.co.nz), Vegetable Research and Innovation Manager, Horticulture NZ.