Sustainable Vegetable Systems

Quarterly Report - Programme Governance Group

Quarter 3, January – March 2021

Contract Agreement Number: 21859

Potatoes NEW ZEALAND

Ministry for Primary Industries
Manatū Ahu Matua

Sustainable In partnership with:

Horticulture™ New Zealand

Vegetable RESEARCH+ INNOVATION

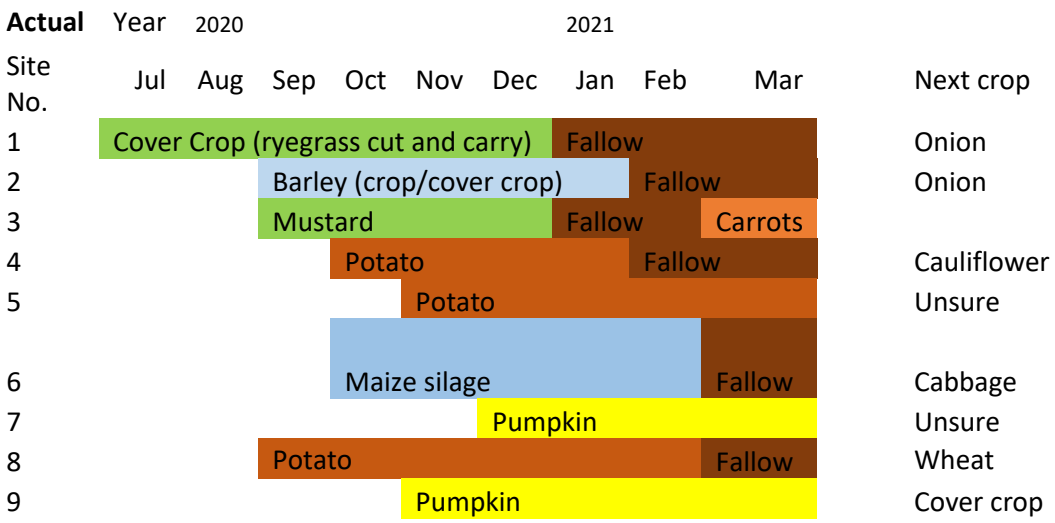
1.1 Summary of progress during this quarter

Workstream 1 – Controlled experimentation to quantify nitrate leaching

- Literature review completed. This showed a scarcity of data on nitrate leaching in vegetable crops in New Zealand. The review found that much of the available data was out of date and often based on estimations of leaching rather than empirical data.
- At PFR, Lincoln, Rotation 1 has completed the potato and wheat part of the rotation, and the subsequent crop of broccoli has been planted. The Rotation 2 pak choi has just finished, and data compilation is being completed. The subsequent cover crop of oats has been sown.
- The initial analysis of the potato – wheat crop of Rotation 1 indicates that there was no effect of previous potato crop nitrogen (N) treatment on yield of the subsequent wheat crop. However, the uptake of N by wheat was higher in the N4 treatment, due to higher soil N at the time of sowing wheat. Soil N decreased during the growth of wheat crop, and at final harvest averaged 12 kg N/ha for treatments N1, N2 and N3, but 24 kg N/ha for treatment N4. Thus, it appears that wheat used the soil N available well, but leaching data are still to be completed before a final conclusion can be made.
- In Hawke's Bay, the pak choi crop of Rotation 2 has been sown, and measurements are under way. Preparations are being made for sowing onions in Rotation 1 in early spring 2021.

Workstream 2 – Regional on farm monitoring

- Monitoring continues on the 9 sites. All sites have, or are just about to, complete their first crop, and are now in fallow or have recently had their 2nd crop planted.



- All sites are being monitored monthly following the soil and plant sampling protocol developed in consultation with the Technical Panel.
- The regional monitors meet on the last Monday of the month, along with PFR, to raise any H&S issues, update progress, and discuss any issues and ideas amongst the widely dispersed group.
- A database of all monitoring records has been created. This includes soil chemical analysis, bulk density, soil moisture, plant analysis, grower inputs (fertiliser, irrigation, cultivation practices, yields), weather station data, and NIWA virtual climate station data back to 1972.

- Individual growers, and the wider Technical Panel, has provided input into the cropping plans for pak choi in both Lincoln and Hawke's Bay. There was considerable discussion on the proposed fertiliser programme and the balance between meeting the modelling objectives versus relatable grower practice.

Workstream 3 – Farmer facing tool(s)

- The Community of Practice, a group of 11 agronomist, has been moved from Workstream 3 to Workstream 4 – Dissemination. This is considered a better fit. Their first workshop is in June 2022.
- Meetings have been held between Hamish, agronomists, and a Technical Panel email discussion to define a priority list of vegetable crops to be reviewed and modelled within Overseer.
- A pilot review of crop physiology assumptions and coefficients was completed using pak choi as the example crop. Based on this a process has been developed by PFR for reviewing the other priority crops by a wider group of agronomists. This is the precursor to further crop modelling.
- PFR has undertaken initial modelling of the potato – wheat rotation. This has been undertaken in Simple Crop Resource Uptake model operating with the Agricultural Production Systems sIMulator (SCRUM–APSIM). The model represents yield changes over time well, but does not capture water movement or soil N well. This has highlighted the need to improve water flow modelling within SCRUM–APSIM, which is important for leaching calculations and further model development.

Workstream 4 – Developing a change landscape

- The WS4 leadership team met several times as part of the disseminating planning.
- PFR presented their work programme to ensure that it dovetails into the industry led work within this workstream.
- The decision was made to conduct a baseline survey around grower knowledge of nitrogen leaching and its impact on the environment. This will feed into the dissemination planning as well as inform PFR's workshop based grower engagement as part of their social science objectives.
- The dissemination plan will be finalised following the PFR planned grower engagement in July and August.
- An external contractor has been engaged to conduct the baseline survey. Planning and execution is being conducted in Q4.
- A draft individualised benchmarking report has been prepared. As the database becomes more robust in Q4 it will be tested amongst the monitoring site growers.

1.2 Key highlights and achievements

- Workstream 1. The first crop has been completed, pak choi, in Lincoln. This is being followed by oats and then potatoes. The wheat in Lincoln was harvested and broccoli planted. This will be followed by onions. Hawke's Bay's first crop, also pak choi, has been planned and about to be planted.
- Workstream 2. All nine monitoring sites continue with first crops completed. Grower surveys are being conducted and data collated.
- Workstream 3. A set of priority vegetable crops was developed for review within Overseer. This includes physiology assumptions and coefficients. The first crop was reviewed, with the full list of 10 crops to be part of an agronomy and then modellers workshops in Q4. While Overseer focused the modelling will have wider applicability including any more management focused grower facing nutrient budgeting tools.
- Workstream 4. Leaders met to develop the dissemination plan and ensure industry activities aligned with PFR work as part of their social practice objective. A baseline survey has been commissioned, to be executed in Q4.

1.3 Collaboration with other programmes *(optional)*

- Being an extremely busy time of the year from a crop trial perspective, there was minimal contact between projects that were discussed in the previous quarterly report. A joint presentation is being planned for the National HortNZ Conference between SVS and the SFF 'Mineralisable N to improve on-farm N management' (Hot-water N) project.
- The PFR led SFF 'Mineralisable N to improve on-farm N management' project, is working with the PFR SVS Leadership Team to ensure data and knowledge is shared across the two projects. These projects have shared stakeholders and PFR has aligned the two projects by adding the relevant N mineralisation measurement protocols (field and lab) to the SVS trial plans. The N mineralisation SFF project is also conducting other N fertiliser response trials with arable and vegetable crops that do not include direct measurements of N leaching losses and this information will be shared between the projects.
- Overseer continues to be informed on progress through the quarterly reports. Hamish is working closely with Overseer on the WS3 modelling, 10 vegetable crop priority list.

1.4 Upcoming

- WS1 trials in Hawke's Bay Rotation 2 will commence with onions.
- WS1 trials in Lincoln include the planting of broccoli following wheat, and a cover crop of oats following pak choi. These are very intensive plantings, in order to get the most from the time available, and so therefore require careful planning to ensure compatibility of the following crops.
- WS2 will complete the first round of grower surveys and collate the monitoring data into the database. This will be tested to ensure it meets the requirements of PFR and the subsequent modelling groups use of these sites.
- WS2 individualised benchmarking reports will be presented to monitoring site growers for their feedback.
- WS3. Two workshops are to be held in Q4. This includes an agronomists' workshop in May to ensure the crop physiology is being captured correctly. Opinions will also be sort on the modelling tools and the best approach to take with regards to grower engagement. A crop modellers workshop, which will include the agronomists from the first workshop, will be held in June. This modelling workshop is Overseer focused but has wider benefits in terms of modelling crops and nitrogen leaching.
- WS4. A baseline survey of growers will be conducted to understand their knowledge on nitrogen leaching and grower problem recognition.

1.5 Investment (Cash & In-kind)

Investment period	Co-investor contribution	MPI contribution	Total investment
During this quarter	$0.162m	$0.312m	$0.473m
Programme to date	$0.521m	$1.116m	$1.637m

Soil Nitrogen Tracking & Benchmarking Report

Season	**2020/21**
Farm Name	
Region	

How does this affect me?

Nitrogen leaching and runoff is an important issue in New Zealands horticulture and wider agriculture industry. Leaching into aquifers and runoff into surface water can lead to large decreases in freshwater quality and can be destructive to the freshwater environment.

As part of the Sustainable Vegetable Systems (SVS) program, you will have access to a large series of soil and plant test results over the course of the project. This will help increase your knowledge of nitrogen flows on your farm system across your different crop types.

This report summarises the soil test results from your property up to this point in time, and benchmarks these results to the average results from the program.

This report is currently a Work in Progress.

1 Grower soil test results - your average, range and monthly tracking

Crop	Total samples	Potentially Available N (kg N/ha)				Mineral N (kg N/ha)							
		0 - 15 cm		15 - 30 cm		0 - 15 cm		15 - 30 cm		30 - 60 cm		60 - 90 cm	
		Average	Range	Average	Range	Average	Range	Average	Range	Average	Range	Average	Range
Crop X	14	26.5	23-34	20.3	17-24	8	5 - 13	6	2 - 9	13	6 - 25	27	19 - 35
Fallow	9		0-0		0-0	14	8 - 25	14	9 - 20	14	6 - 19		0 - 0
-	-												
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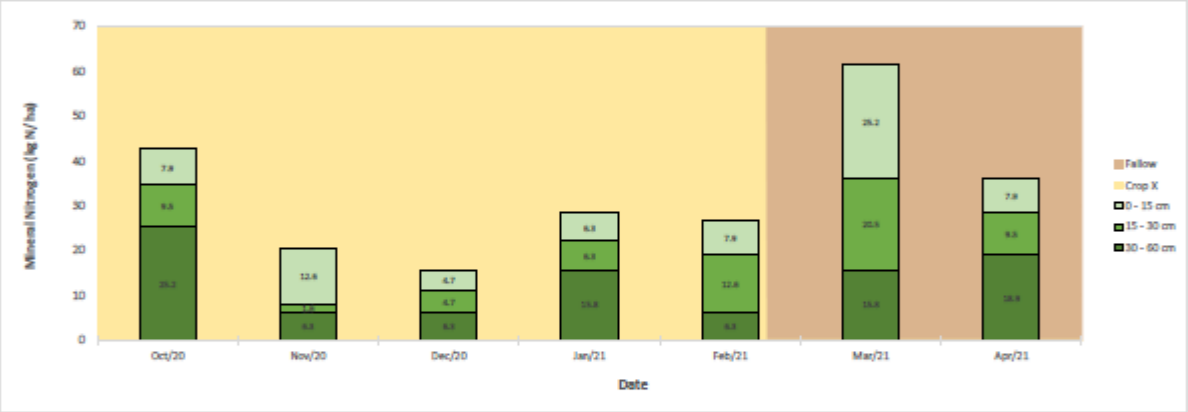
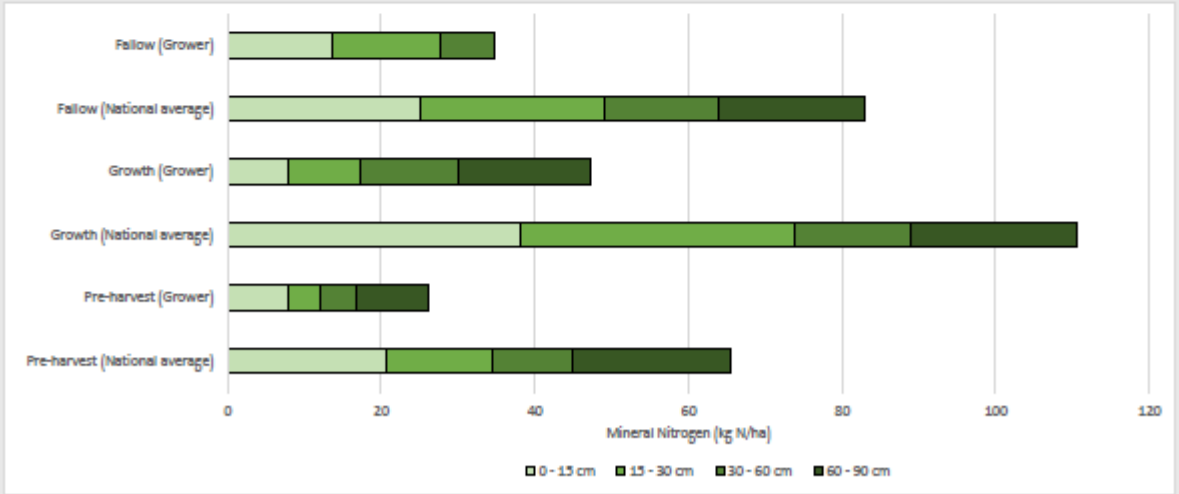


2 Benchmarking by growth stage



Prepared by:
Henry Stenning & Andrew Barber
AgriLink NZ

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