PNZ Agronomist's Forum

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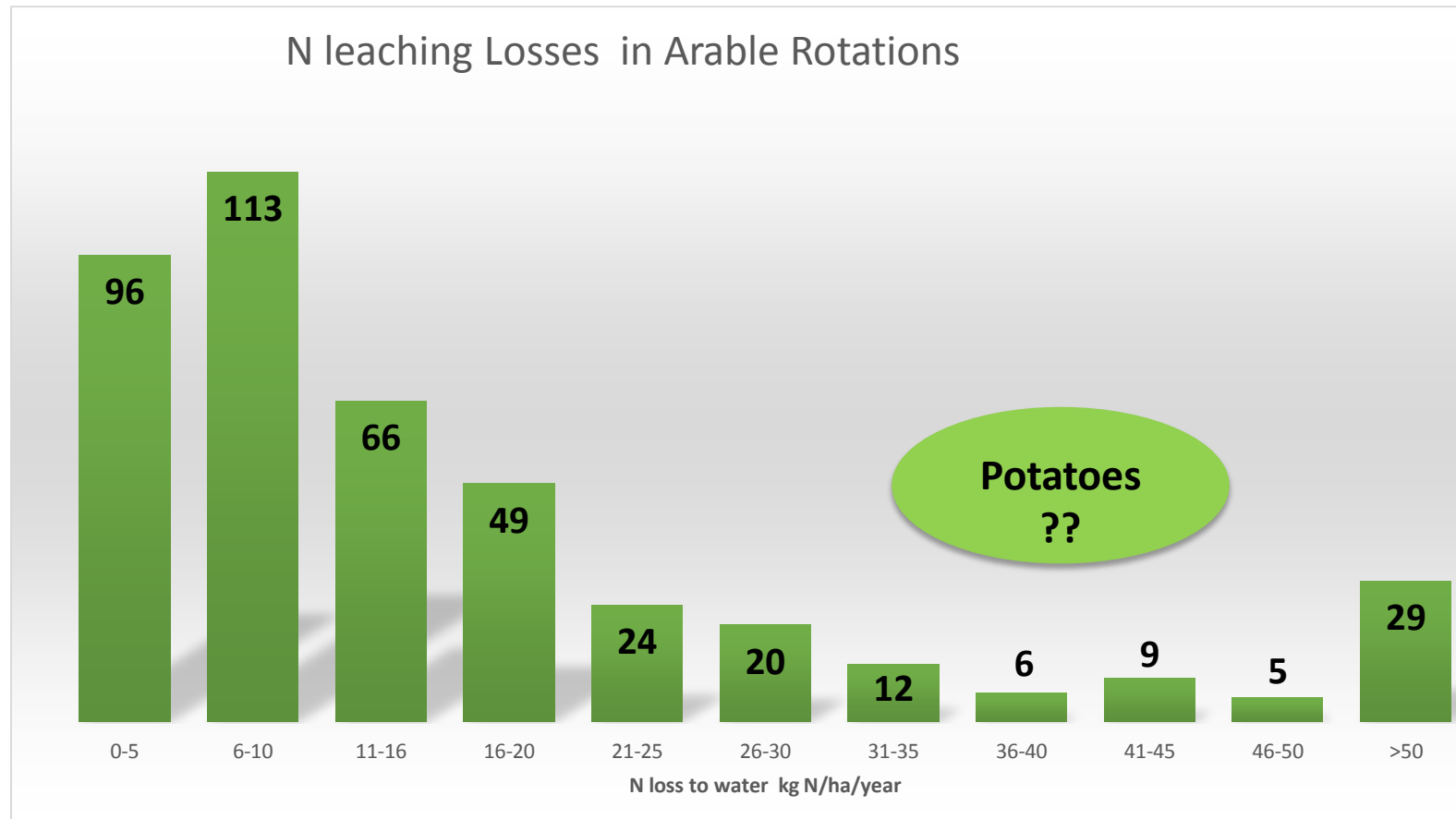
Overseer™ and Other Models

- **Overseer and Potatoes**
- **The Overseer Validation Project**
- **The Fluxmeter Project**

Nitrogen Losses from Arable Rotations

N leaching Losses in Arable Rotations

Category	Value
0-5	96
6-10	113
11-16	66
16-20	49
21-25	24
26-30	20
31-35	12
36-40	6
41-45	9
46-50	5
>50	29

Potatoes ??

N loss to water kg N/ha/year

Overseer benchmarking results from 430 arable rotations

S-map Soil Information for Pukekohe

Soil facts

Landcare Research Manaaki Whenua

Auckland Council Te Kaunihera o Tāmaki Makaurau

Patumahoe or Pukekohe (Patumahoe_3a.1)

This information sheet describes the typical average properties of the specified soil to a depth of 1 metre, and should not be the primary source of data when making land use decisions on individual farms and paddocks.

Key physical properties		Smap ref: Patum_3a.1
Depth class (diggability)		Deep (> 1 m)
Texture profile		Loam Over Clay
Potential rooting depth		Unlimited
Rooting barrier		No significant barrier within 1 m
Topsoil stoniness		Stoneless
Topsoil clay range		22 - 28 %
Drainage class		Moderately well drained
Aeration in root zone		Slightly limited
Permeability profile		Moderate Over Slow
Depth to slowly permeable horizon		80 - 85 (cm)
Permeability of slowest horizon		Slow (< 4 mm/h)
Profile available water	(0 - 100cm or root barrier)	Very high (212.5 mm)
	(0 - 60cm or root barrier)	Very high (138.0 mm)
	(0 - 30cm or root barrier)	Moderate (69.0 mm)
Dry bulk density, topsoil		1.09 (g/cm3)
Dry bulk density, subsoil		1.53 (g/cm3)
Depth to hard rock		No hard rock within 1 m
Depth to soft rock		No soft rock within 1 m
Depth to stony layer class		No significant stony layer within 1 m

Key chemical properties	
Topsoil P retention	Medium (46%)

Ah

Bt

BC

FAR

Soil Information for Overseer

Patumahoe or Pukekohe (Patumahoe_3a.1)

Soil information for Overseer ™	Smap ref: Patum_3a.1

The following information can be entered in Overseer Nutrient Budget model v6.1. This information is derived from the S-map soil properties which are matched to the most appropriate Overseer categories.

Soil description page

Click the 'Select soil by order' option. From the 'Order' dropdown box select: Granular

Soil profile page

Top soil (0 - 10 cm)

Top soil texture: Clay loam

Is stony: False

Is compacted (this depends on management so cannot be obtained from S-map)

Lower profile

Maximum rooting depth:	Leave as 0
Depth to impeded drainage layer:	Leave as 0
Soil texture group:	Medium
Non-standard layer (depth in brackets):	leave blank

Drainage/runoff page

Profile drainage class (in natural state): Moderately well drained

A Pukekohe Winter Potato Rotation

Crop	Planted	KgN/ha	Fertiliser timing	Harvest	Yield T/ha
Mustard	Feb	0	May		
Onion	June	50 50 40	Evenly spaced	Dec/Jan	45T
Oats	February			April	
Potatoes	May	200 75 75	Planting Side dressing at 6 week intervals	October	35T

Crop rotation

Your crop rotation begins with the prior land use you specified on the crop history page.

Use the table below to enter activities that describe management of the crop during the year of interest (Reporting) year and the previous year (Year 1).

Add Crop

| Crop | Vegetable crop | Onions | | | | | | Oats and rye | | Potato (short) | | | | Squash | | | |
| Cultivate |
| Fertilise |
| Irrigate |
| Cut/Graze |

Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar

Year 1   Reporting year

The Overseer Nutrient Budget

Nutrient budget

(kg/ha/yr)	N	P	K	S	Ca	Mg	Na
Nutrients added							
Fertiliser, lime & other	421	140	0	168	0	0	0
Rain/clover N fixation	2	0	3	5	3	7	36
Irrigation	2	0	1	2	6	1	6
Nutrients removed							
As product	140	24	172	7	16	8	7
As supplements and crop residues	0	0	0	0	0	0	0
To atmosphere	77	0	0	0	0	0	0
To water	69	0.9	10	159	124	26	50
Change in block pools							
Standing plant material	118	22	182	13	67	22	6
Root and stover residuals	10	2	-17	2	-3	-1	-1
Organic pool	-125	-6	0	-6	0	0	0
Inorganic mineral	0	19	-25	0	-2	-1	-6
Inorganic plant available	136	78	-318	0	-194	-46	-14

Environmental Losses

To atmosphere	77
Volatilisation - fertiliser	0
Volatilisation - other	0
Denitrification - background	76
Volatilisation from urine	0
Denitrification from urine	0
To water	**69**
Leaching - urine patches	0
Leaching - other	69
Runoff	0
Direct (animals, drains)	0
Direct pond discharge	0
Border dyke outwash	0
Septic tank outflow	0
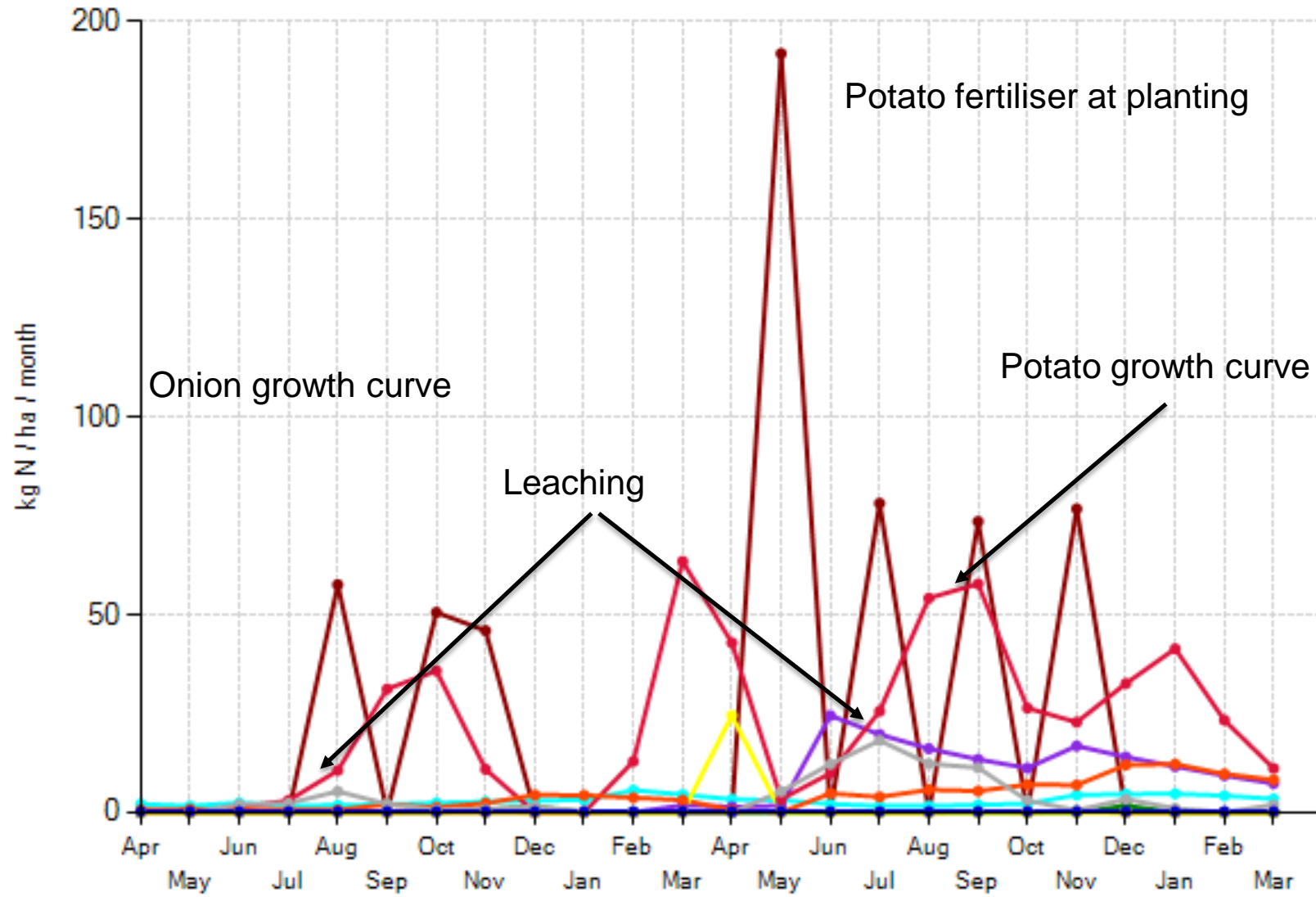
Soil Information for Canterbury Potatoes

Lismore stony silt loam   (Lismore_23a.1)

Family: Lismore*f*

Smap ref: Lism_23a.1

Soil information for Overseer ™

The following information can be entered in Overseer Nutrient Budget model v6.1. This information is derived from the S-map soil properties which are matched to the most appropriate Overseer categories.

Soil description page

Click the 'Select soil by order' option. From the 'Order' dropdown box select: Brown

Soil profile page

Top soil (0 - 10 cm)

Top soil texture: Silt loam

Is stony: False

Is compacted (this depends on management so cannot be obtained from S-map)

Lower profile

|	
Maximum rooting depth:	Leave as 0
Depth to impeded drainage layer:	Leave as 0
Soil texture group:	Medium
Non-standard layer (depth in brackets):	Stony (41cm)

Drainage/runoff page

Profile drainage class (in natural state):   Well drained

A Canterbury Potato Rotation

Crop	Plant Date	Kg N/ha	Fertiliser Timing	Harvest	Yield T/ha
Wheat	May	101 78 69	Planting November December	February	12T
Fallow					
Potato	September	122 (DAP) 68 (CAN) 115 (urea)	Planting November December	March	55T
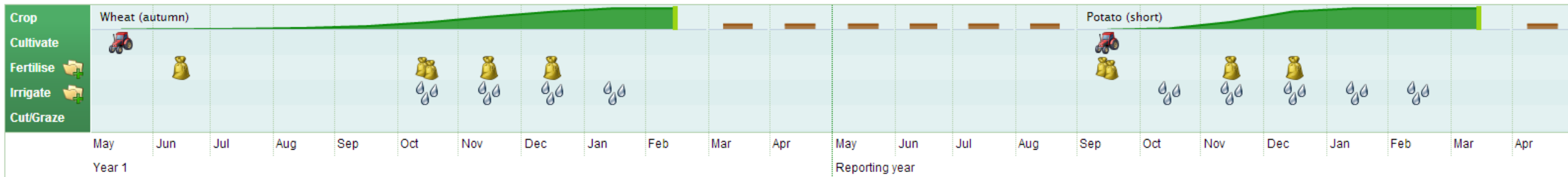
Overseer Nutrient Budget

Nutrient budget

(kg/ha/yr)	N	P	K	S	Ca	Mg	Na
Nutrients added							
Fertiliser, lime & other	304	135	231	161	20	41	0
Rain/clover N fixation	2	0	3	5	2	5	30
Irrigation	8	0	5	8	31	7	31
Nutrients removed							
As product	219	37	270	11	25	12	11
As supplements and crop residues	0	0	0	0	0	0	0
To atmosphere	41	0	0	0	0	0	0
To water	15	0.2	17	165	40	8	28
Change in block pools							
Standing plant material	0	0	0	0	0	0	0
Root and stover residuals	30	7	26	0	2	1	0
Organic pool	-23	-2	0	-2	0	0	0
Inorganic mineral	0	13	-20	0	-1	-1	-2
Inorganic plant available	32	81	-54	0	-13	34	24

Environmental Losses

To atmosphere	41
Volatilisation - fertiliser	25
Volatilisation - other	0
Denitrification - background	16
Volatilisation from urine	0
Denitrification from urine	0
To water	**15**
Leaching - urine patches	0
Leaching - other	15
Runoff	0
Direct (animals, drains)	0
Direct pond discharge	0
Border dyke outwash	0
Septic tank outflow	0
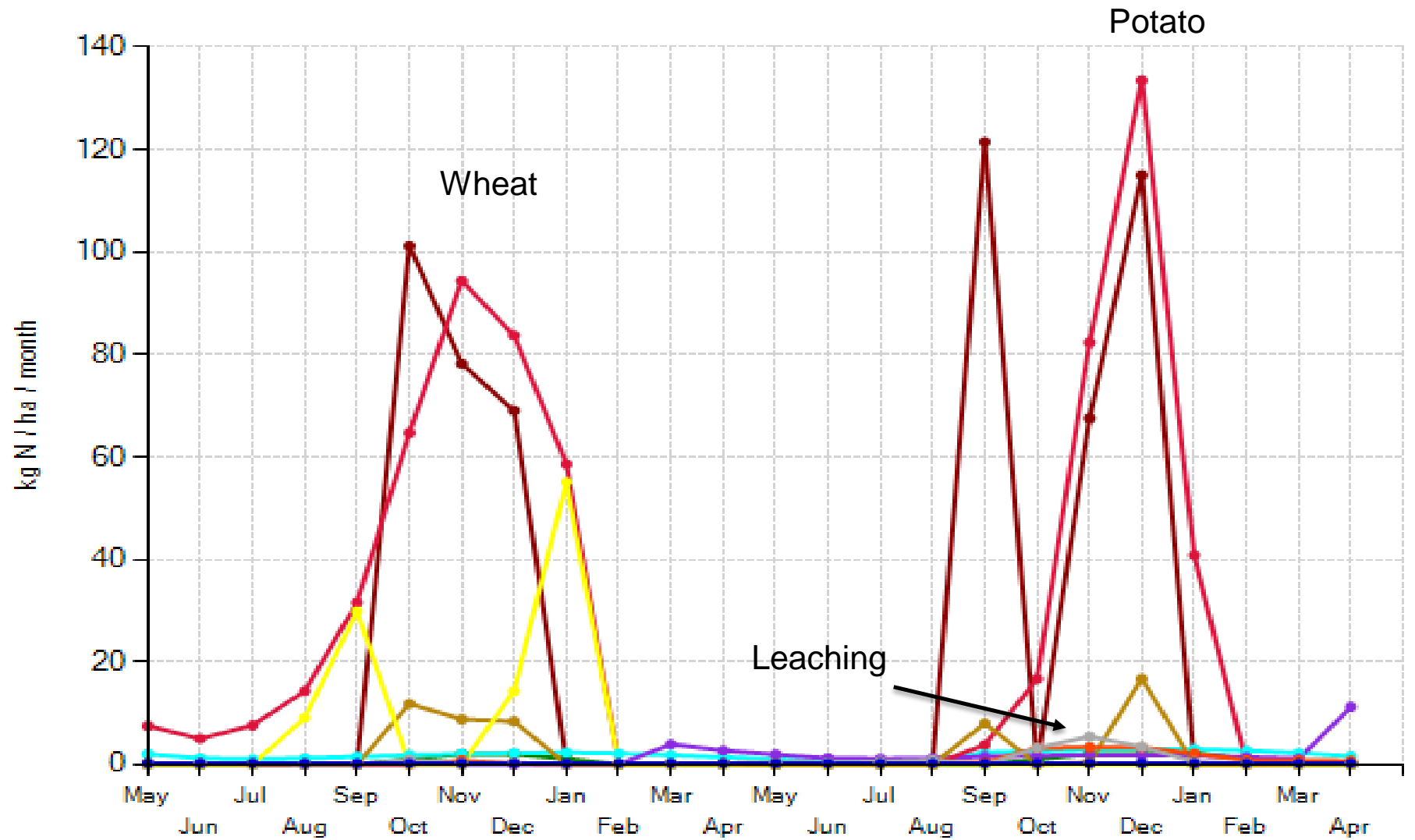
Models

APSIM	Overseer™
Agricultural production system simulator	
• It is used to model crop, pasture and tree systems.	✓
• It has plant, soil and management modules.	✓
The soil processes include:	✓
Water balance,	
N and P transformations,	✓
Soil pH,	✓
Erosion	✓
A full range of management controls.	✓
• It simulates biological and physical processes in farming systems.	✓
• The user specifies the management options	✓
• It works on a daily time step and area basis	✘

Validation of Overseer Cropping Model

History

- **2005   SFF project Nitrogen management for Environmental Accounting**

- **2012   Version 6 Overseer released – A new approach to modelling a rotation.**

- **2013   FAR led the review of the cropping model in Overseer: - A set of recommendations around governance and validation were developed.**

The Validation Project

- **What needs to be done?**

- **Test Overseer against measured N leaching losses .**

- **Use existing datasets – N leaching at 1.5m over a 12 month period.**

- **Use the associated agronomic data to generate Overseer N leaching predictions.**

This is not a definitive test because Overseer generates a long term, average prediction of nutrient flows rather than a yearly prediction of N leaching in specific situations.

The Validation Project Approach

Existing crop and agronomic data and 12 month leaching data from arable and vegetable crops.
Crop Loss # 1

Using the same crop and leaching data sets, generate leaching predictions for individual crops using APSIM.

Crop Loss #2

If APSIM produces leaching loss numbers similar to the actual losses
i.e. #1 = #2
Run APSIM with the same data set with 30 years of weather data. Average these to get a long-term average leaching loss.
Crop Loss #4

Use the same agronomic data in Overseer to predict a long term average leaching loss.

Crop Loss #3

FAR

If all the Validation Numbers Match

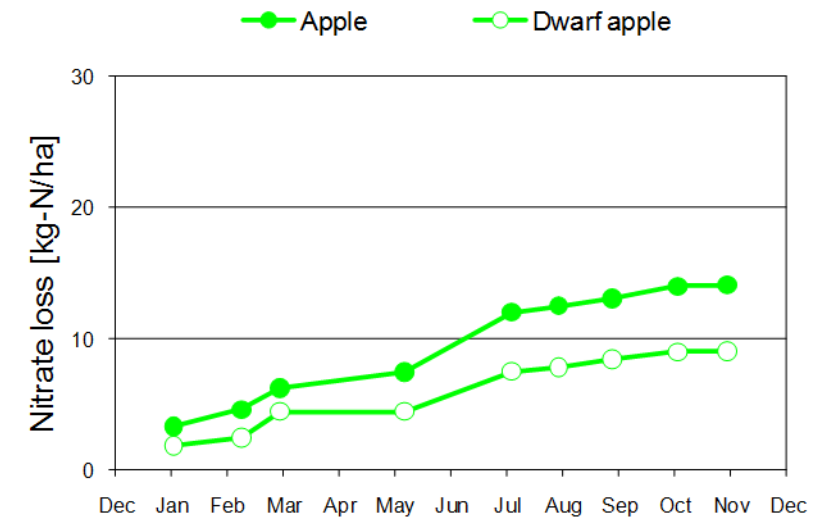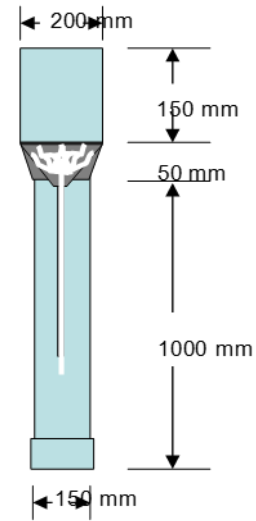Develop a range of cropping scenarios – different crop rotations, soils and locations

Use APSIM to run simulations over 30 years of differing weather data – long term average leaching loss.

Run the same scenarios through Overseer – long term average leaching loss.

Fluxmeters

Installation

12 fluxmeters/site
Measuring;
Soil water flow in mm/day
and
Leaching losses NH_4^+ and NO_3^-

FAR

Questions