

# SPot Farm South West Results 28 November 2017

Mark Stalham



# SPot Farm West 2017 Nitrogen \* Irrigation Trial Dillington Joe S field (50.945947 N, 2.8803044 W)



# SPot Farm West 2017 Dillington Joe S field Irrigation layout



# Irrigation treatments

- Follow reduced scab control regime for (resistant) Electra
- Standard = irrigated according to NIAB CUF schedule for Electra (20 mm applications, 20 mm SMD during scab control)
- Dry = irrigated at same timing as above but only 12-15 mm applications
- Boom-irrigated
- Aiming to minimise number of different visits to field with boom for the different schedules to simplify



# SPot Farm West 2017 Dillington Joe S field Nitrogen layout



# Nitrogen treatments

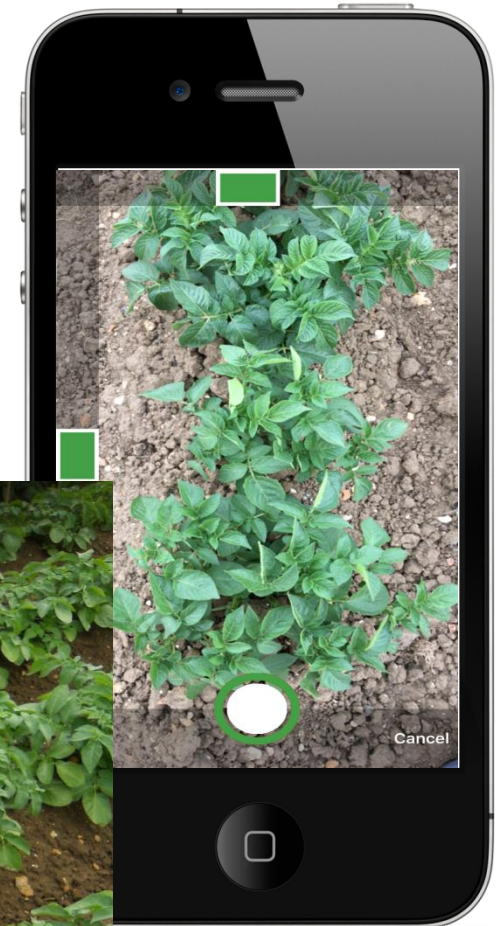
- Levels
  - 90 kg N/ha
  - 120 kg N/ha
  - 150 kg N/ha
- 90 kg N/ha as base on applied as liquid N on 18 April (pre-planting) and incorporated.
- Balance to be applied as top-dressing before emergence. Actually not applied until w/e 25 June as too hot and sprayer broken. Resulted in crop scorch in 120 N and 150 N visible on first Farm Walk on 4 July
- Hand-fertilized area to demonstrate visual effects on canopy of 60, 90, 120, 150, 180 kg N/ha? **Not done**

# Basic crop details

- Planted 28 April
- Emerged 30 May
- 50 % GC 20 June
- 100 % GC 19 July
- 1 l/ha Reglone 2 September
- 3 l/ha Reglone 7 September
- Topped 25 September
- Harvested 28 October

# Potato Crop Management

- Use IOS or Android devices to supply ground cover data





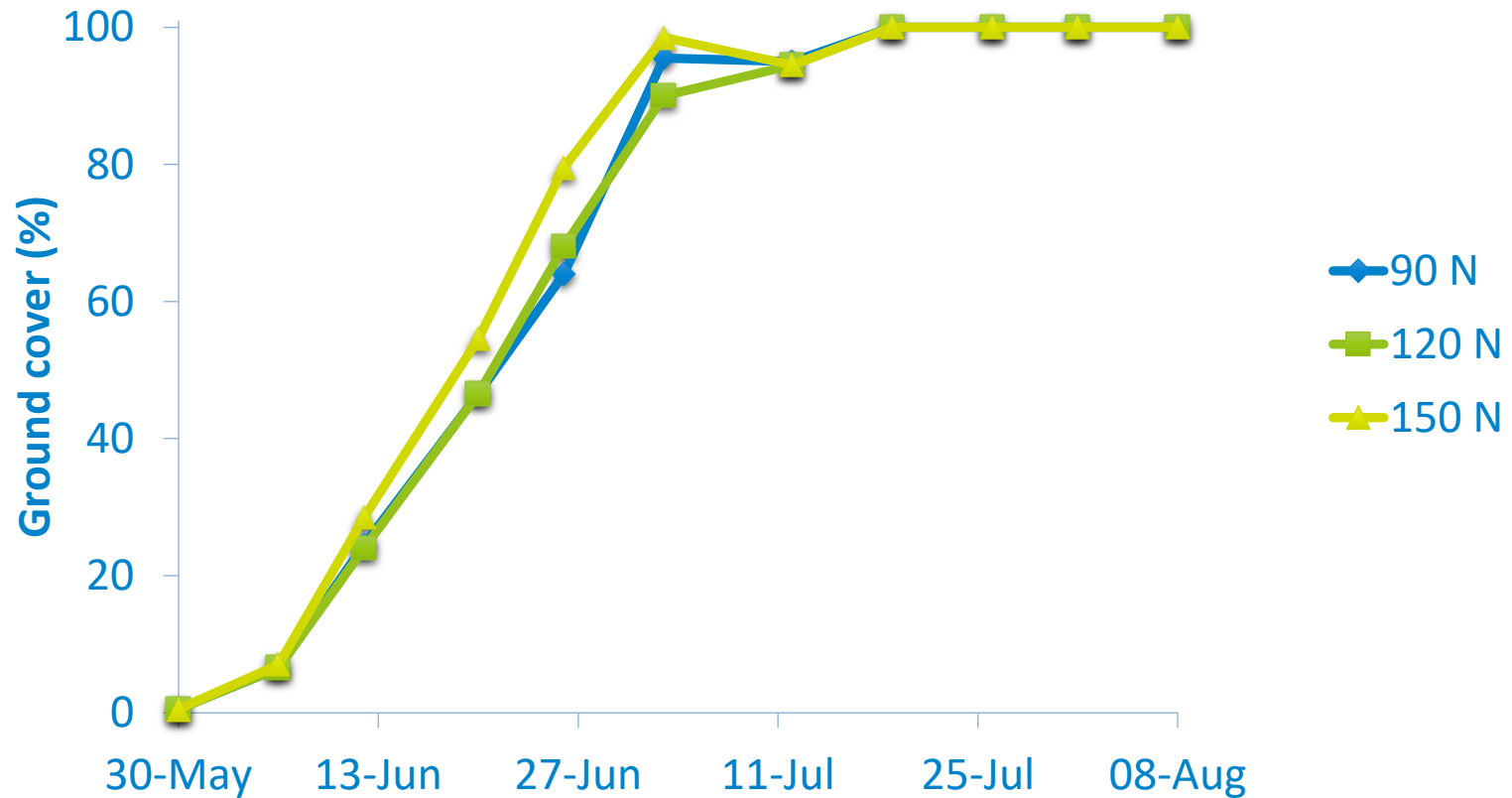
# Potato Crop Management

- Photos of crops are uploaded automatically and processed to calculate the percentage ground cover



# Ground cover

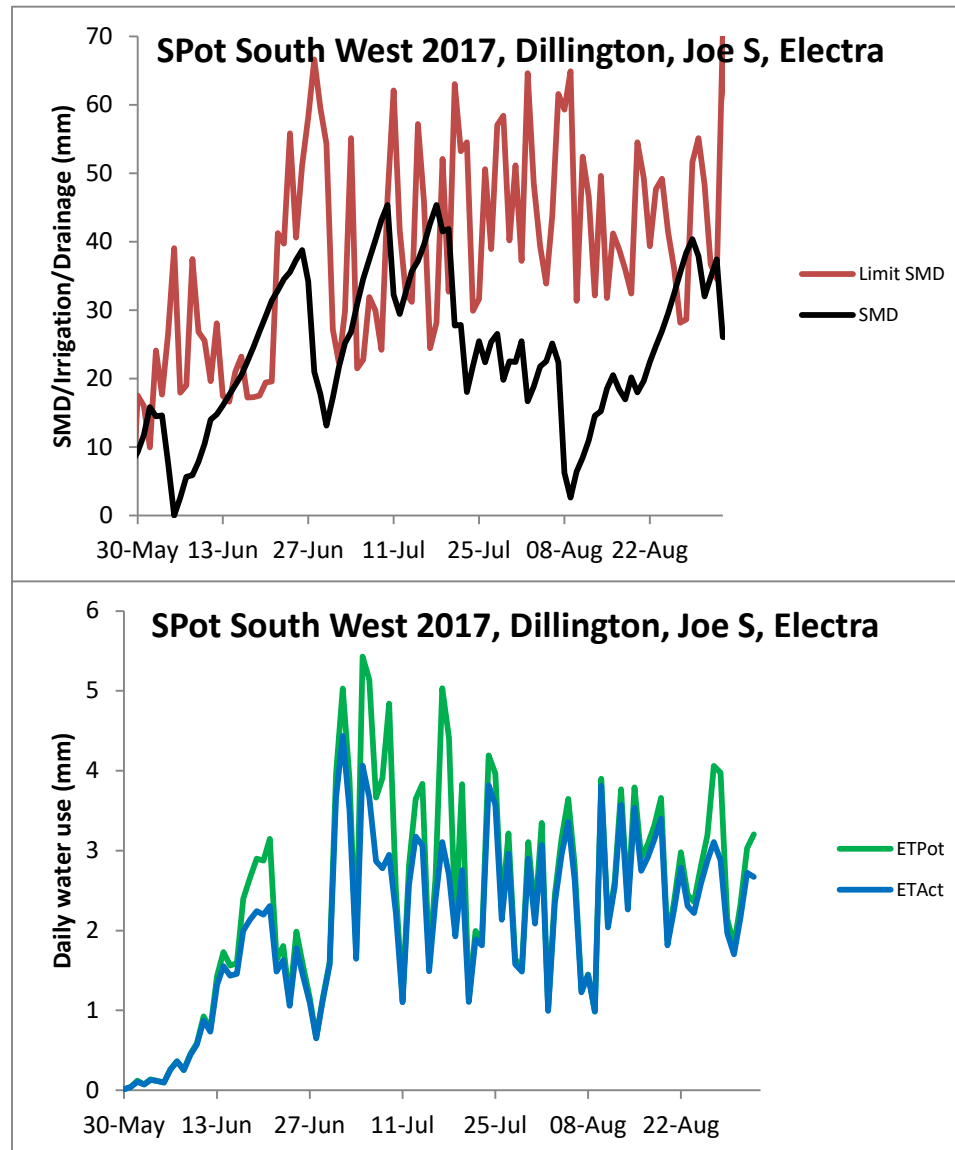
## SPot South West 2017, Dillington, Joe S, Electra



# Irrigation scheduling recommendations

					Soil moisture deficit (mm)		Amount	Delay irrigation by 1 day for every x mm	Irrigation interval (days)	
Date issued	Ref	Field	Treatment	Variety		Next irrigation	(mm)			
28-Jun	88.01	Joe S	Standard	Electra	21	01-Jul	20	2.4	8	
	88.02	Joe S	Dry	Electra	21	01-Jul	12	2.4	8	
05-Jul	88.01	Joe S	Standard	Electra	27	05-Jul	20	4.0	5	
	88.02	Joe S	Dry	Electra	27	05-Jul	12	4.0	5	
12-Jul	88.01	Joe S	Standard	Electra	32	12-Jul	20	2.8	7	
	88.02	Joe S	Dry	Electra	33	12-Jul	12	2.8	7	
19-Jul	88.01	Joe S	No irrigation applied. But only 204 mm rain					20	2.2	9
	88.02	Joe S						12	2.3	9
26-Jul	88.01	Joe S						20	2.2	9
	88.02	Joe S						0	2.3	
02-Aug	88.01	Joe S	Standard	Electra	25	06-Aug	15	3.0	5	
	88.02	Joe S	Dry	Electra	25	No irrigation	0	3.0		
09-Aug	88.01	Joe S	Standard	Electra	6	18-Aug	15	3.0	5	
	88.02	Joe S	Dry	Electra	6	No irrigation	0	3.0		
16-Aug	88.01	Joe S	Standard	Electra	21	FINISH				
	88.02	Joe S	Dry	Electra	21	No irrigation				

# Irrigation scheduling: no irrigation applied

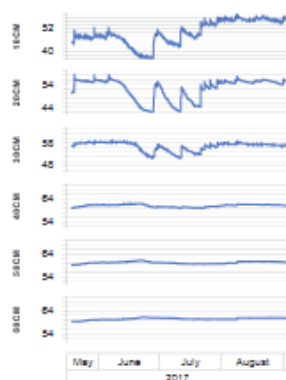




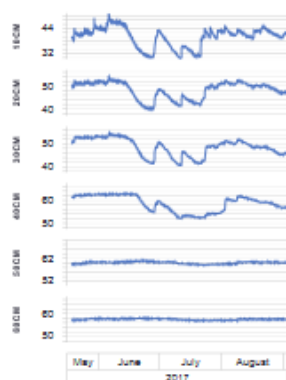
# RMA Soil Water Probes

## Standard

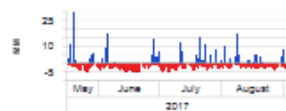
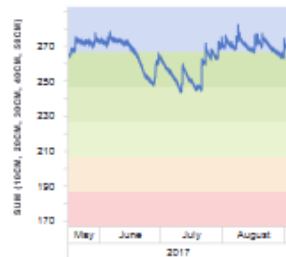
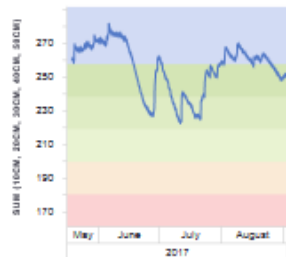
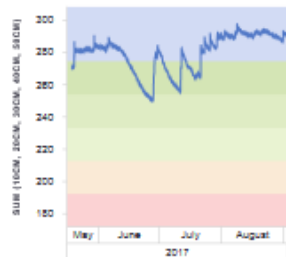
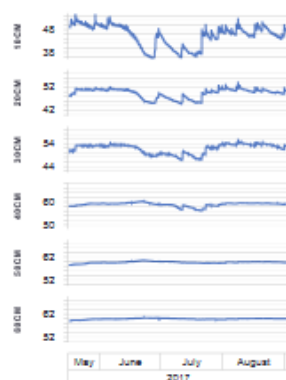
46824 - Standard - Back (left)



56092 - Standard - Front (left)

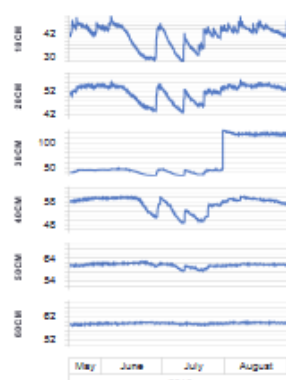


46802 - Standard - Middle (left)

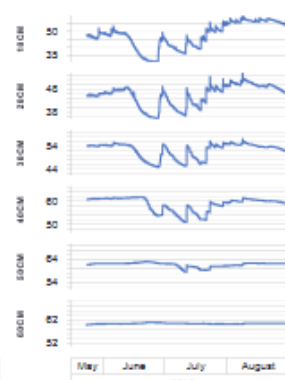


## Dry

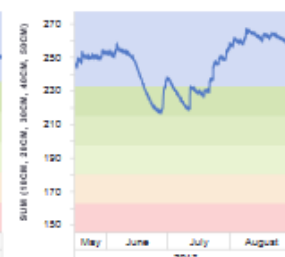
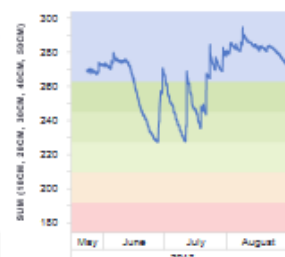
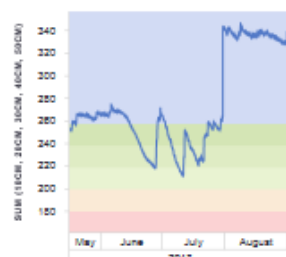
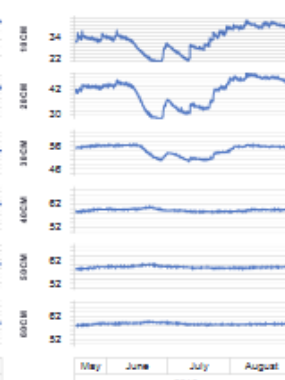
46835 - Dry - Back (right)



50212 - Dry - Front (right)

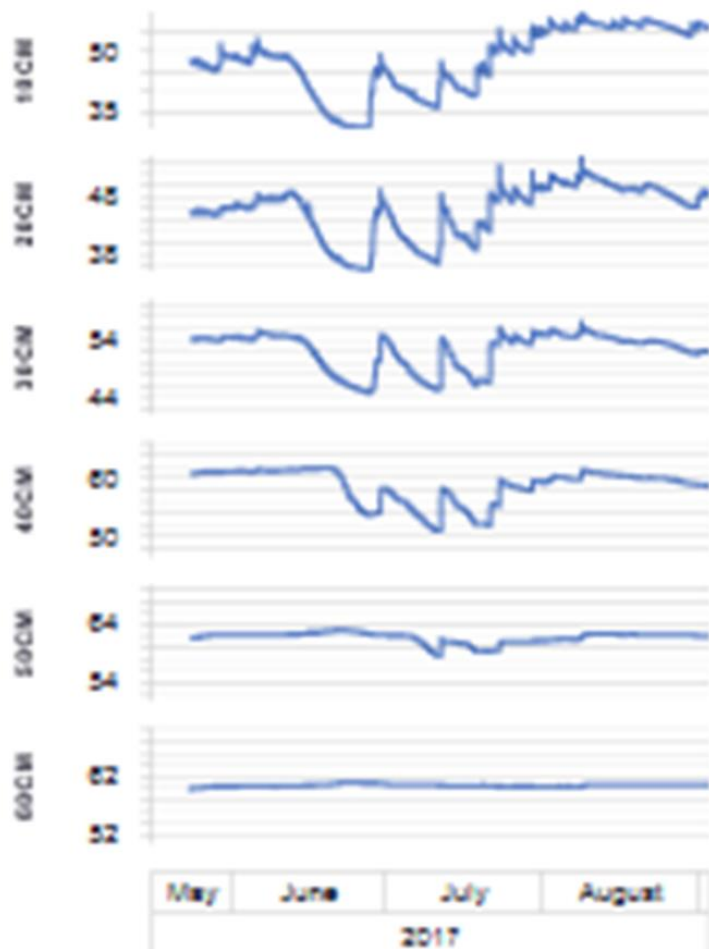


56097 - Dry - Middle (right)



# RMA Soil Water Probes

## ☀ 50212 - Dry - Front (right)



## 16-23 June

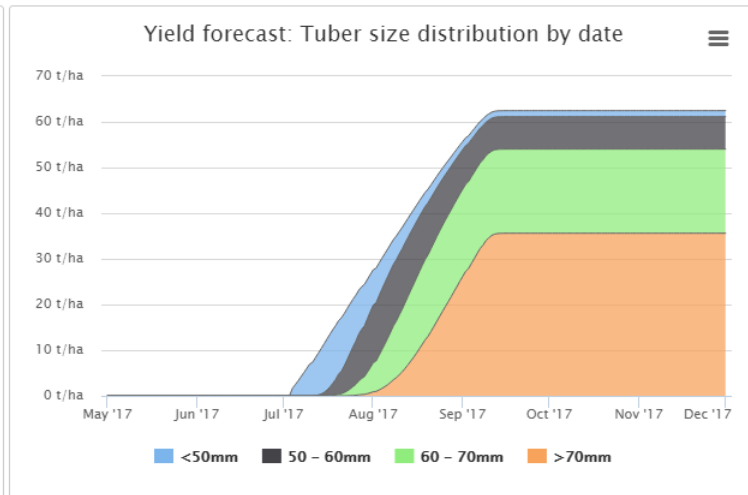
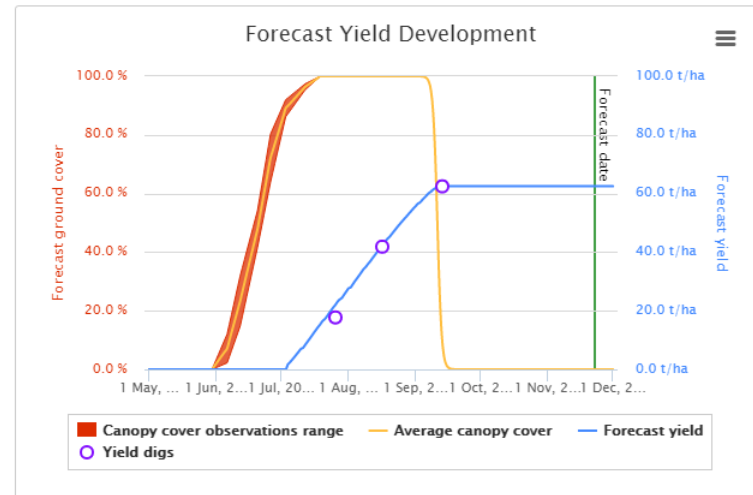
- Slowing of water use at 10, 20 and 30 cm during period
- Water exhausted at 10, 20 and 30 cm by 23 June
- Extraction at 40 cm but nothing at 50 cm as roots only just reaching this horizon
- Water uptake at 50 cm delayed until early July
- 87 % of potential water use satisfied
- 7 t/ha yield loss

# Hand-harvested yields

	< 40 mm				40-90 mm		Total			
N (kg/ha)	No. plants	No. stems	No.	Yield	No.	Yield	No.	Yield	DM %	DM Yield
90	35	142	39	0.7	248	58.7	287	59.4	17.1	10.2
120	34	147	52	0.8	238	61.7	290	62.4	16.3	10.1
150	31	175	81	1.1	275	61.3	356	62.5	16.4	10.2
			< 40 mm		40-90 mm		Total			
S.E.	No. plants	No. stems	No.	Yield	No.	Yield	No.	Yield	DM %	DM Yield
90	4.2	19.3	25.1	0.31	26.1	1.16	20.3	1.09	0.51	0.36
120	4.6	27.2	15.6	0.32	29.4	4.42	16.2	4.32	0.67	0.48
150	2.1	14.3	26.0	0.41	28.6	5.67	30.7	5.57	0.54	0.78

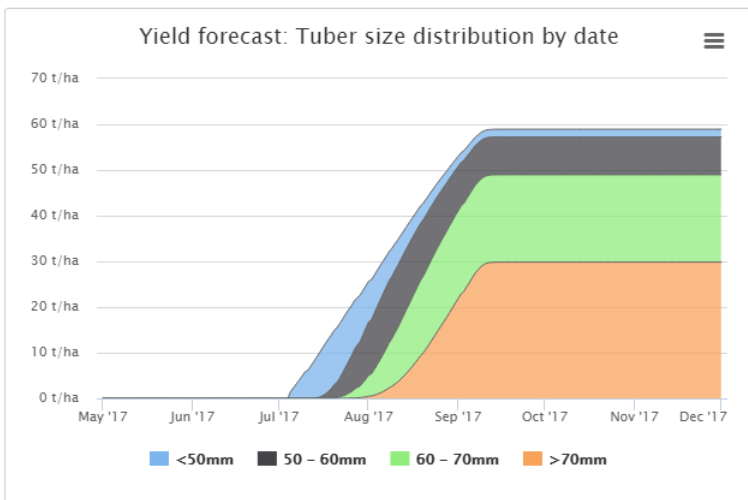
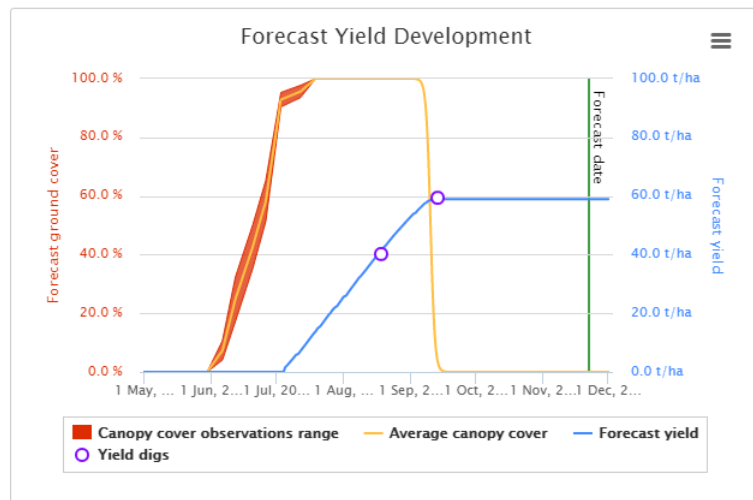
# Modelled yields

Yield model output



150 N

Yield model output



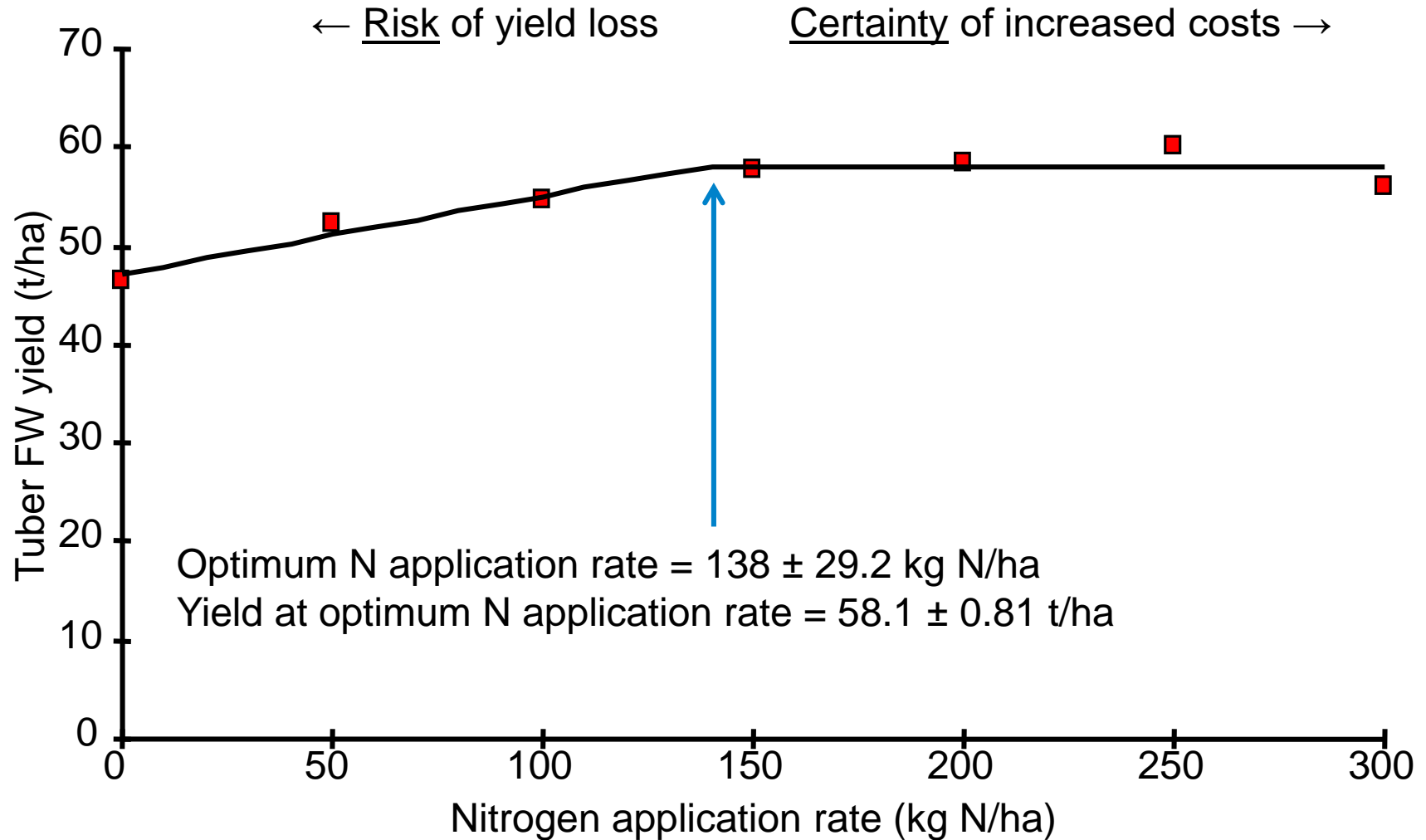
90 N



# DM % and skinset timelines

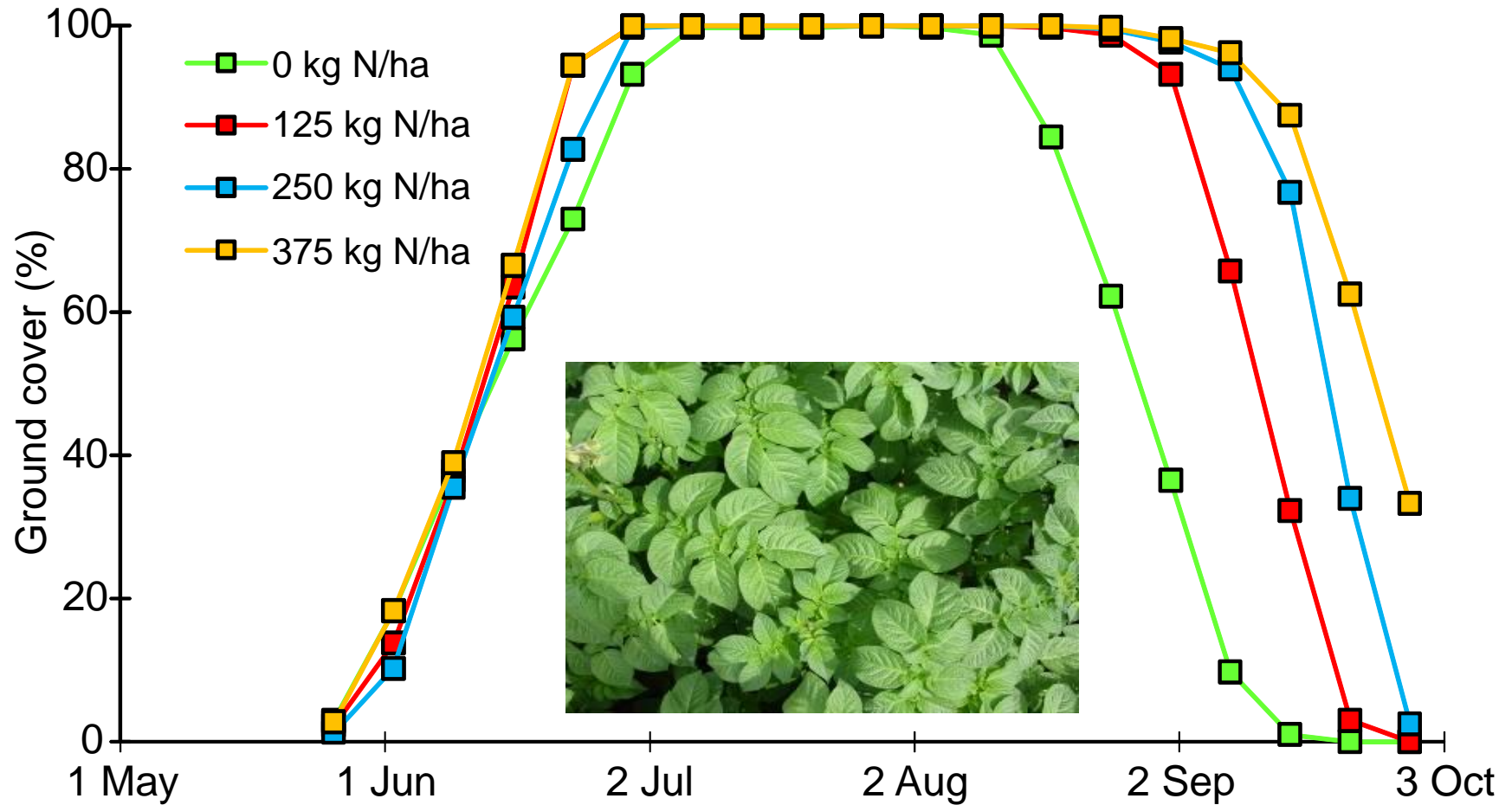
N	24-Jul	14-Aug	13-Sep	25-Sep	04-Oct	24-Nov	22-Sep	27-Sep	04-Oct	11-Oct
90	14.9	17.1	17.1	18.2	17.6	17.9	Not set	Set	Set	Set
120	16.0	16.0	16.3	17.9	16.9	16.8	Not set	Not set	Set	Set
150	16.3	15.5	16.4	16.8	15.9	16.6	Not set	Not set	Not set	Set

# The principles of N management



Maris Piper, after peas (SNS Index 2,3,4); silt-textured soil; season length 120 days

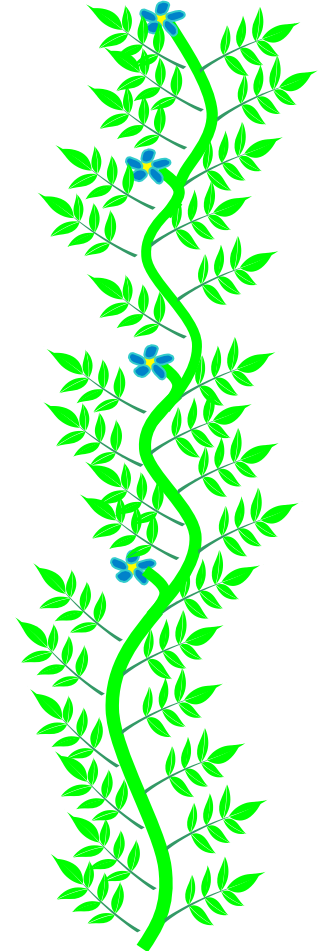
# Effect of N application rate on canopy persistence in Broccoli, CUF 2009



# What is determinacy in potato varieties?

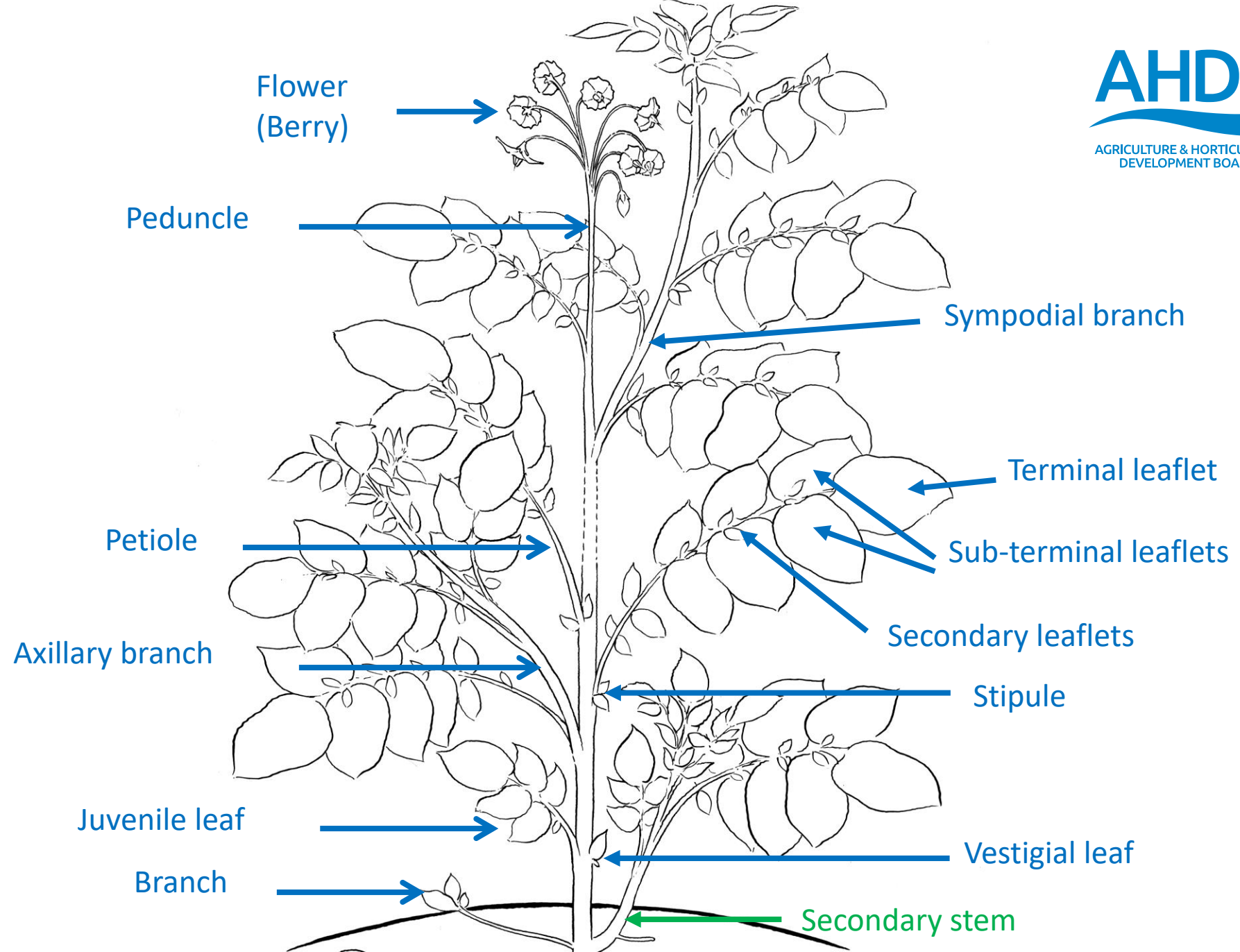


Determinate  
variety

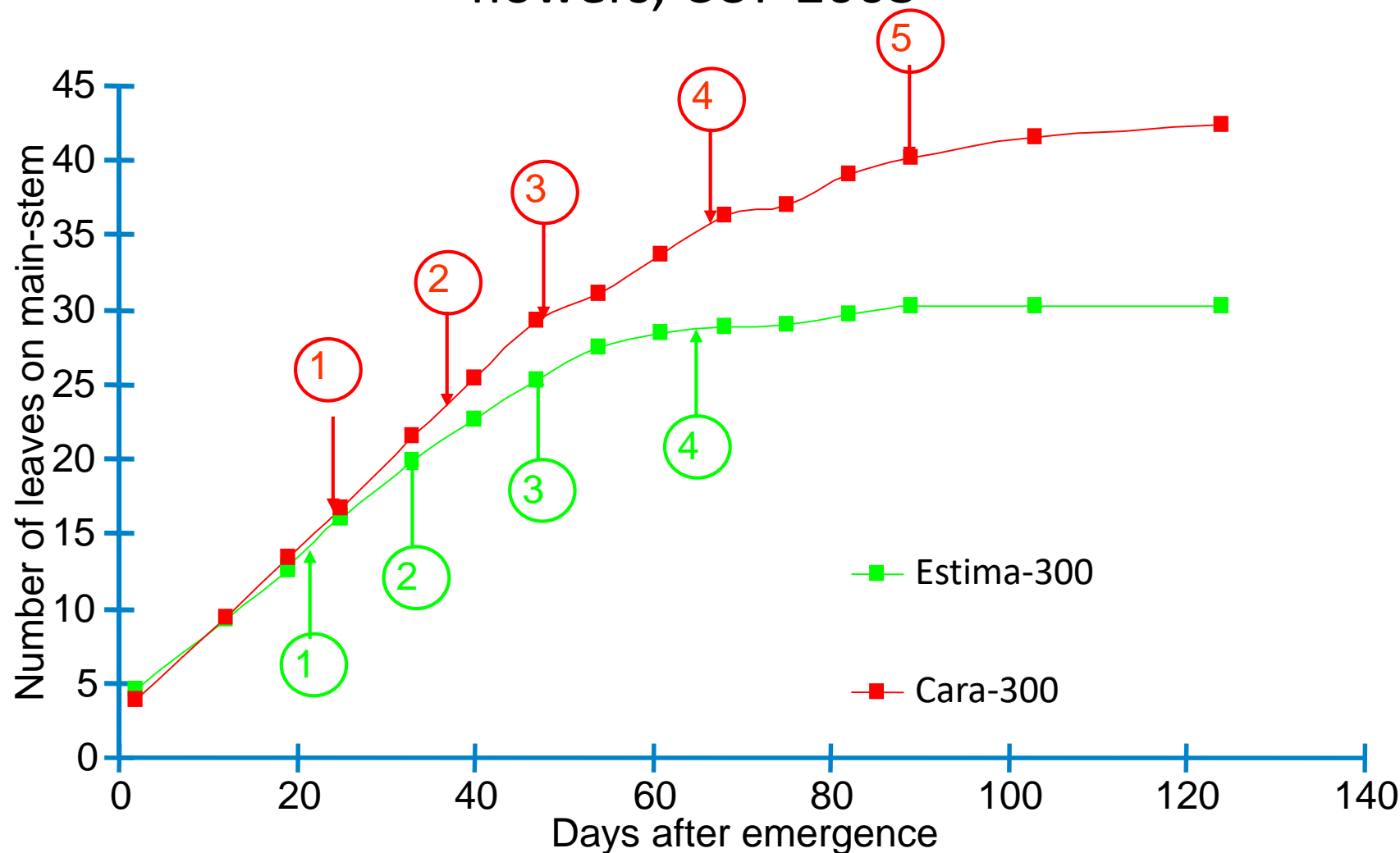


Indeterminate  
variety

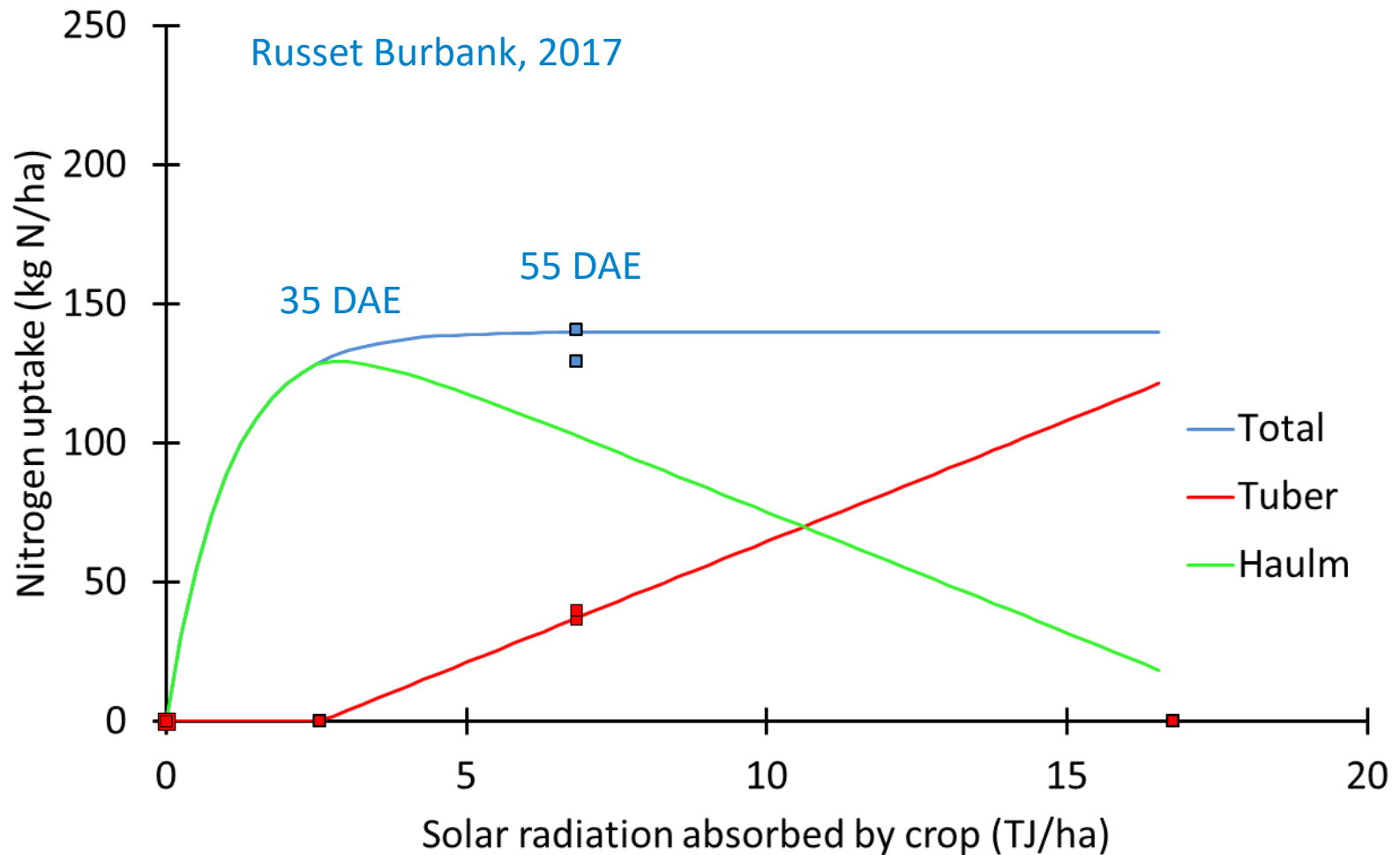




# Effect of variety on number of main-stem leaves and flowers, CUF 2003



# Timecourse and partitioning of N





# SPot West Cover Crop Trial Dillington Pump House field (50.947100 N, 2.904400 W)

- Standard: grazed and sprayed
- Undeveloped: left until primary cultivation, sprayed 2-3 days prior to cultivation
- Measure rate of work and fuel for primary cultivation in each treatment

2017 Dillington Pump House Cover Crop

B3168



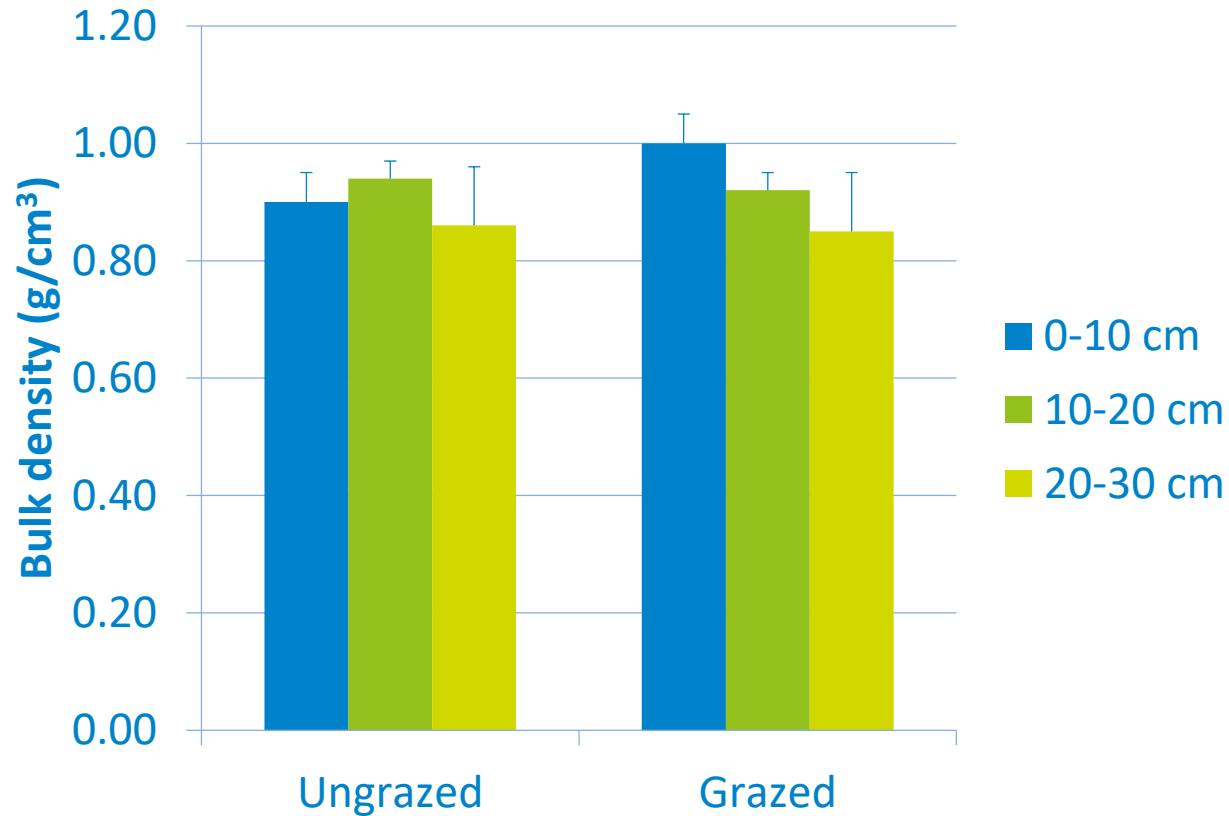


# Benefits of cover crops

- Soil stability and nutrient capture function between cash crops or over-winter
- OM contribution
- Bio-fumigation
- Soil mining to overcome compaction
- Soil drying to aid spring cultivation



# Soil bulk density (4 July)



# Hand-harvested yields

	< 40 mm				40-90 mm		Total			
Cover crop	No. plants	No. stems	No.	Yield	No.	Yield	No.	Yield	DM %	DM Yield
Grazed and sprayed	32	215	52	1.1	276	56.4	328	57.5	16.4	9.4
Ungrazed	33	205	50	1.0	278	58.5	328	59.5	16.7	9.9
			< 40 mm		40-90 mm		Total			
S.E.	No. plants	No. stems	No.	Yield	No.	Yield	No.	Yield	DM %	DM Yield
Grazed and sprayed	3.5	33.0	24.6	0.49	22.3	5.31	31.9	5.12	0.58	0.56
Ungrazed	3.0	52.2	20.0	0.46	22.9	11.26	29.3	11.03	0.37	1.62

# SPot Farm West 2016

## Manure and cover crop available N

OM rate t/ha	Total N (kg N/t)	Total N applied (kg N/ha)	RB209 availability (%)	Crop available N (kg N/ha)
42	4.04	170	20	34

Also supplied: 23 P<sub>2</sub>O<sub>5</sub> and 189 K<sub>2</sub>O kg/ha (available)

Cover crop defoliation	FW (t/ha)	DM (%)	DW (t/ha)	N (%)	N (kg/ha)	RB209 availability (%)	Crop available N (kg N/ha)
12 Feb	6.9	18.0	1.24	3.03	38	40	15
4 Apr	8.8	25.7	2.25	1.43	32	40	13



8 March  
(desiccation)

# Soil water content

23 April  
(ploughing)

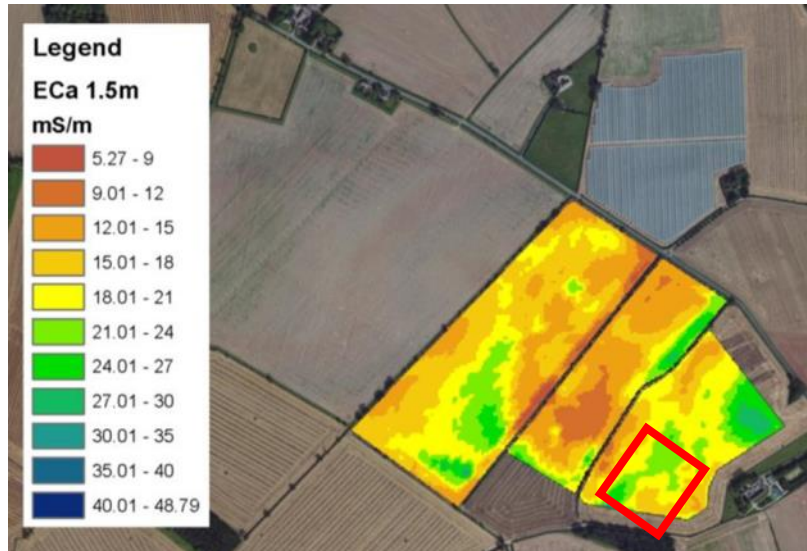


Defoliation treatment	Depth (cm)	Gravimetric SWC (%)
Undesiccated	10	16.1
	20	16.3
	30	16.3
Desiccated 8 March	10	17.0
	20	17.4
	30	17.5

Undesiccated: 1.2 % lower SWC at 20-30 cm than cover crop  
desiccated 6 weeks earlier: small but important



# Differences in soil structure where cover crop allowed to grow until ploughed (left) and where cover crop desiccated on 8 March (right).



## Rates of work (ha/h)

	Plough	Bedform	Bedtill	Destone
Desiccated	3.7	3.7	1.0	0.48
Undesiccated	4.5	4.1	1.2	0.59
Change	+22 %	+12 %	+19 %	+24 %

# Cover crop\*manure trial: yield

	Yield >40 mm (t/ha)	S.E.	Total yield (t/ha)	S.E.	>90 mm length (% no.)	S.E.	>90 mm length (t/ha)	S.E.
Cover Crop, No Manure, No adjustment	<b>58.4</b>	3.95	<b>60.8</b>	4.16	<b>29</b>	11.5	<b>26.3</b>	9.03
Cover Crop Undeveloped, No Manure, No adjustment	<b>68.0</b>	5.93	<b>69.9</b>	6.07	<b>44</b>	5.6	<b>40.6</b>	6.82
Cover Crop + Manure, Adjusted for Manure and Cover Crop	<b>63.9</b>	4.52	<b>66.0</b>	3.89	<b>38</b>	3.1	<b>35.5</b>	5.34
Cover Crop + Manure, No adjustment	<b>66.1</b>	4.13	<b>67.5</b>	4.32	<b>52</b>	7.5	<b>46.4</b>	6.26
Cover Crop, No Manure, Adjusted for Cover Crop	<b>48.2</b>	1.86	<b>52.9</b>	1.33	<b>44</b>	2.2	<b>32.4</b>	2.98

## Conclusions:

- Manure increased yield?
- Late-defoliated cover crop aided cultivation and increased yield?



Potato Crop Management

Marc Allison  
David Firman  
Mark Stalham



The James  
**Hutton**  
Institute

Blair McKenzie  
Tracy Valentine  
Jean Robertson  
Yakubu Abdul-Salam



ROTHAMSTED  
RESEARCH

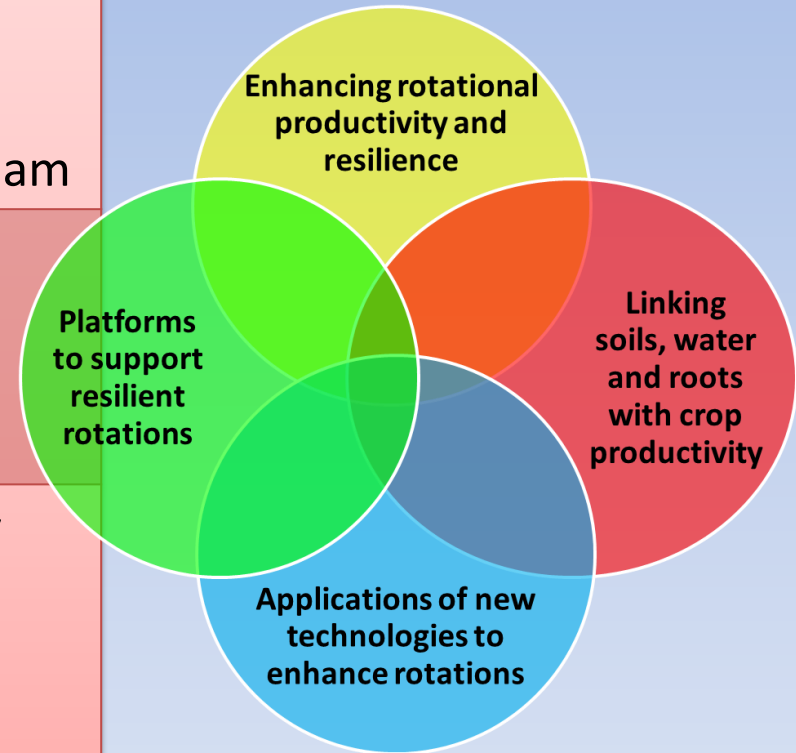
Andy Whitmore  
Alice Milne



Katherine Preedy



Andy Binley  
(Ian Dodd)



# Summary of cover crop experiments in 2017

		Control (t/ha)	+Cover crop 1 (t/ha)	+Cover crop 1 (t/ha)	+Cover crop 2 (t/ha)
2	Back of Yard	55.7	56.4	-	-
4	Poor Walk	55.9	55.1	-	-
5a	18A	-	36.3	36.3	35.9
5b	Dear Bought	-	52.6	52.6	53.9
6a	Bypass	-	66.8	66.8	49.4
8	Cranesgate 10	71.6	69.8	-	-
10	MC1	67.0	68.9	-	-
11	Big Wood South	44.3	41.6	41.6	35.5
12	Pump House	57.5	59.5	-	-
17	Blotter Hill	43.5	46.2	-	-
	<b>Mean</b>	<b>56.5</b>	<b>56.8</b>	<b>49.3</b>	<b>43.7</b>

# Summary of FYM and compost experiments in 2017

		Control (t/ha)	+FYM/Comp. Rate 1 (t/ha)	+FYM/Comp. Rate 1 (t/ha)	+FYM/Comp. Rate 2 (t/ha)
1	Brome Pin	69.6	75.0		
2	NIAB F24	58.8	62.6	62.6	65.7
4	Poor Walk	55.9	55.7		
6b	Lane Field	66.5	72.5	72.5	63.9
9	Allotments	28.5	29.9		
15	VF40	72.0	77.7		
18	F16	31.8	52.7		
	<b>Mean</b>	<b>54.7</b>	<b>60.9</b>	<b>67.6</b>	<b>64.8</b>



