AHDB Agronomists’ Conference 2019

Tuesday 3 – Wednesday 4 December 2019

AHDB Agronomists' Conference 2019

Session Three – Crop protection in potatoes

Agronomists' Conference 2019

Blight & phenotypic traits of new populations

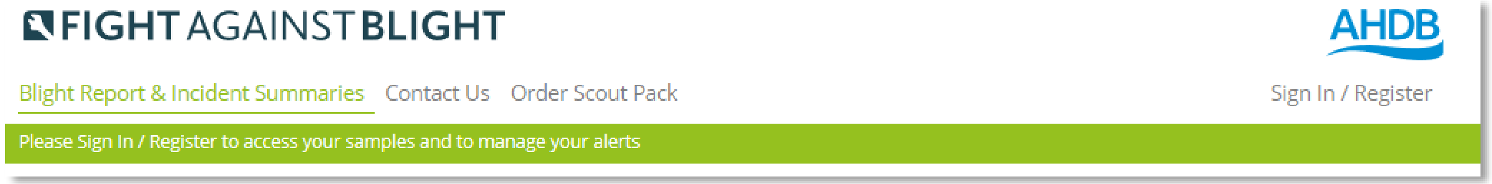
David Cooke

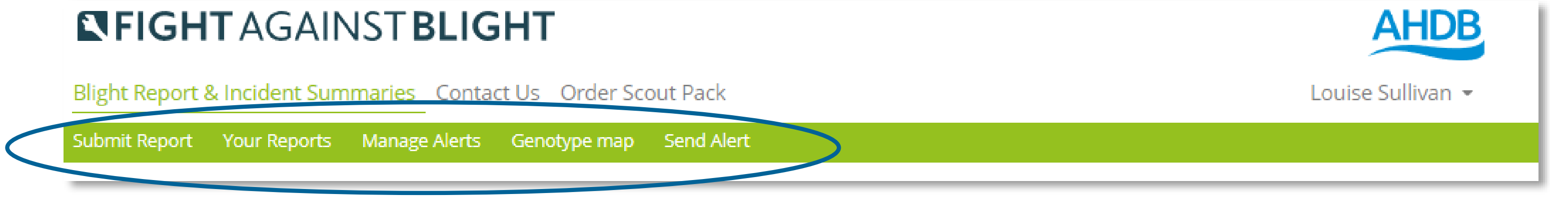
Faye Ritchie

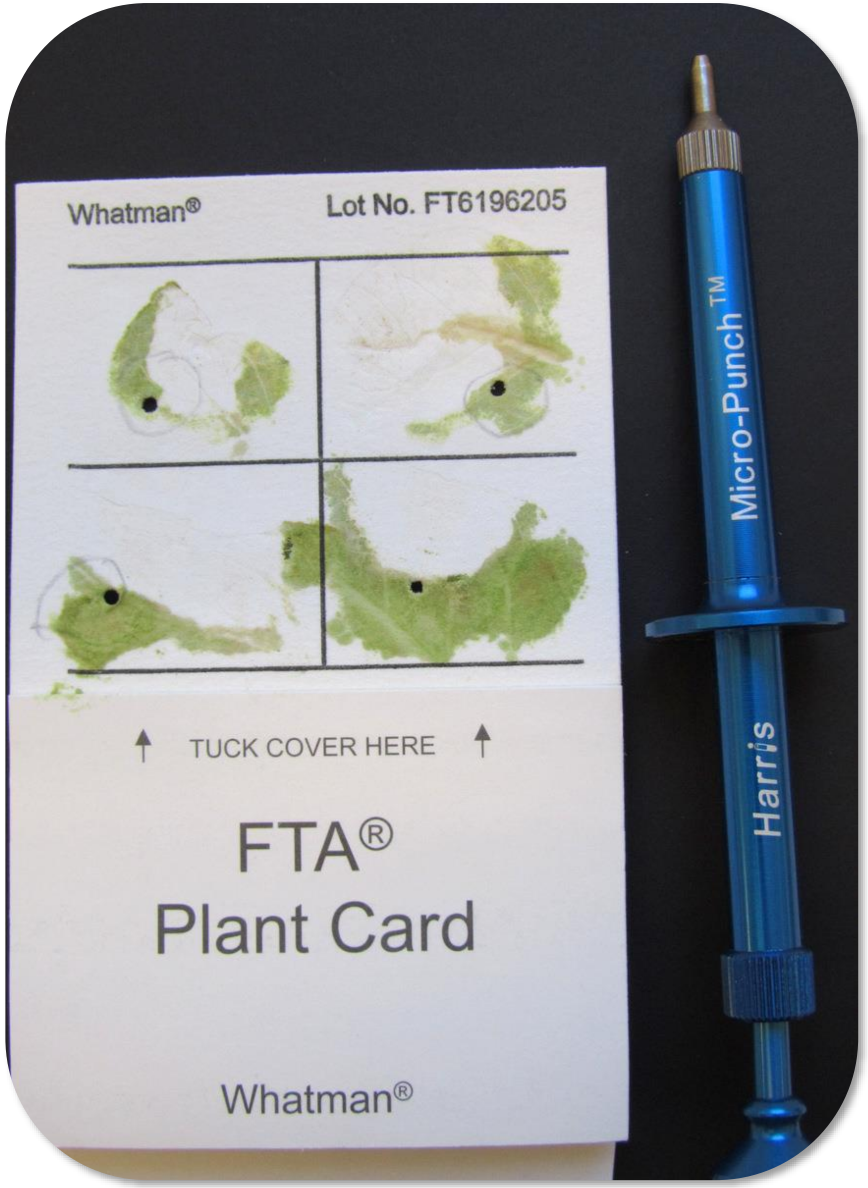
Alison Lees, James Lynott, Louise Sullivan

2019 season – What's new?

- 3 year AHDB project 2019-2021 (Hutton and ADAS)
- Use of FTA (Flinders Technology Associates) card for within-season results. Informed fungicide testing
- Revisions to FAB web site – work in progress
- Please register = efficient feedback







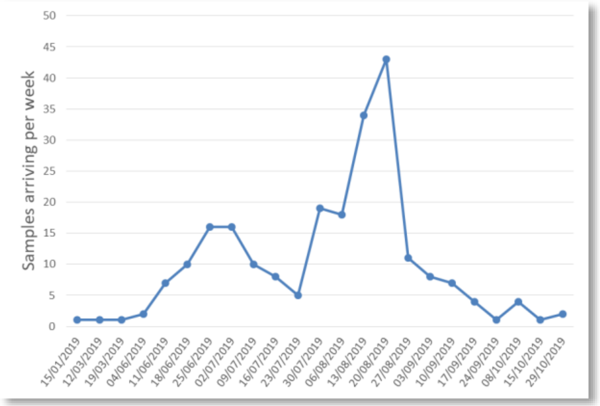
Sampling tips for 2020

- No leaves please
- OK to use last season's cards

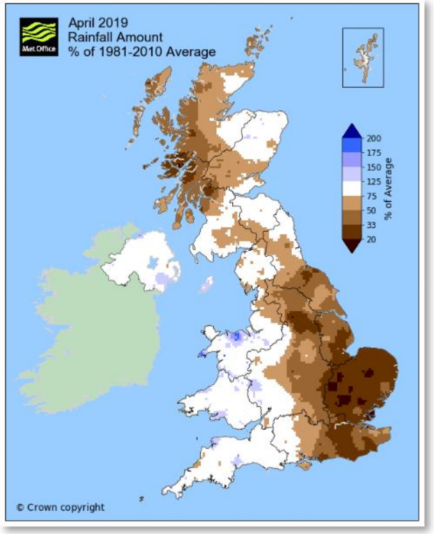
- Single lesions – dry tissue
- In fridge over the weekend if sampled on a Friday

The 2019 season - mixed

- Rainfall (1981-2010 anomaly)
- Relatively warm – increased blight activity
- Wet May in north more generally wet June and July
- Wet Aug in north
- Wet Sept in many places
- Oct & Nov – grim in most parts



April



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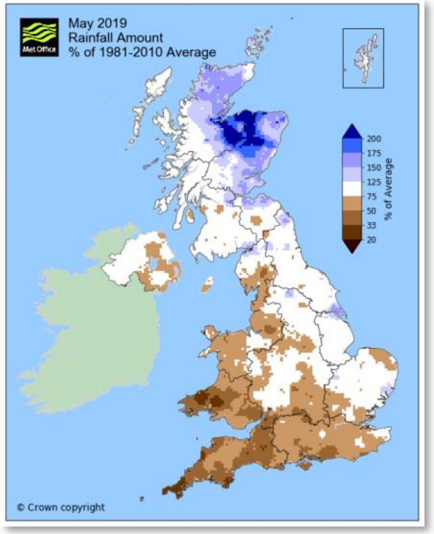

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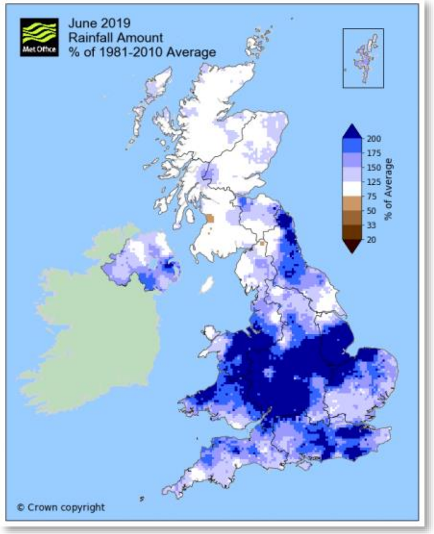
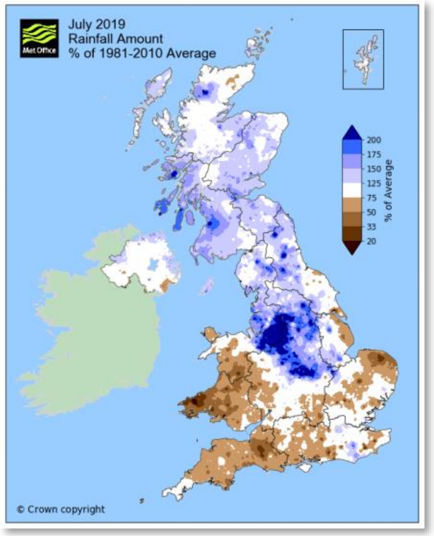
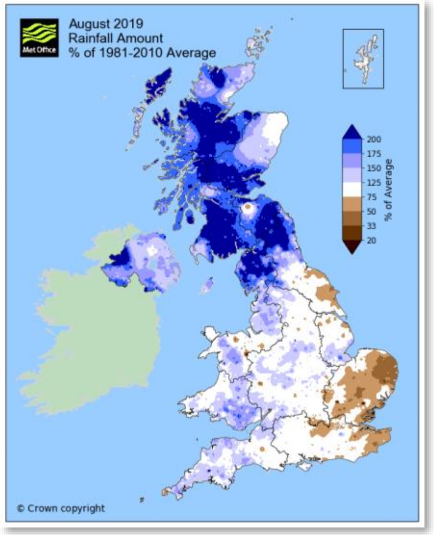


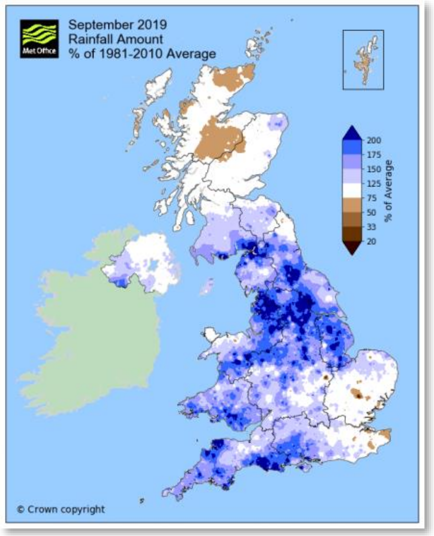
July



August



September



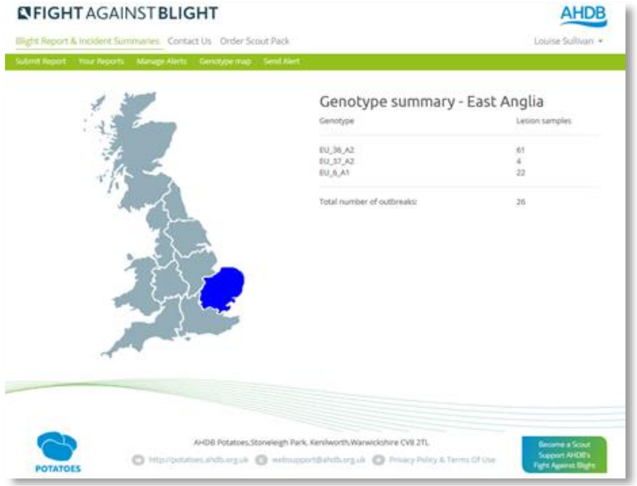
2019 season – challenging conditions

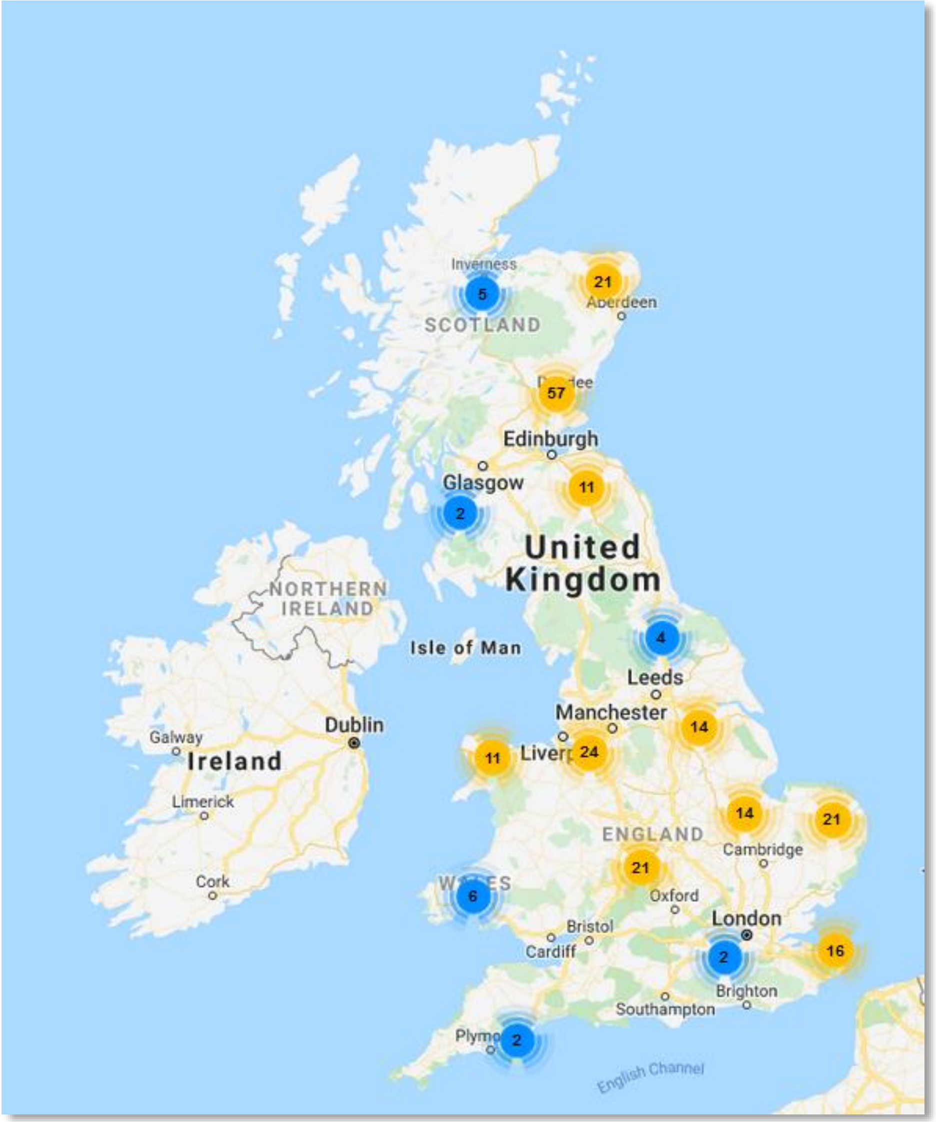
2019 season – challenging conditions

- Organic crops without copper

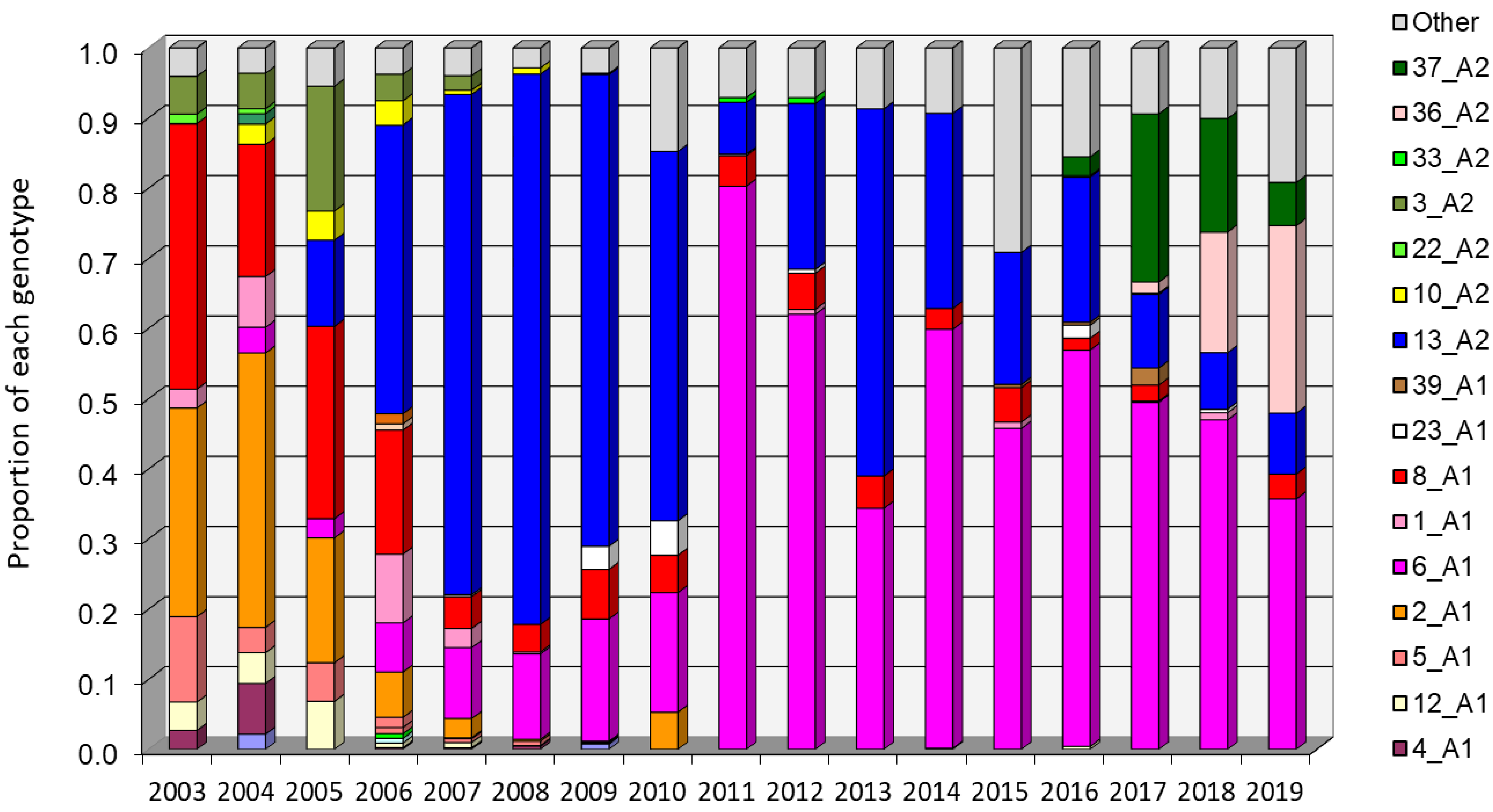
GB Fight Against Blight outbreaks - 2019

- 63 (33 in 2018) blight scouts
- 229 (40) outbreaks reported
- 68 varieties (top 3 M. Piper, K. Edward, Rooster)
- 1434 (262) samples to James Hutton Institute
- 977 (185) genotyped
- Mapped via FAB website



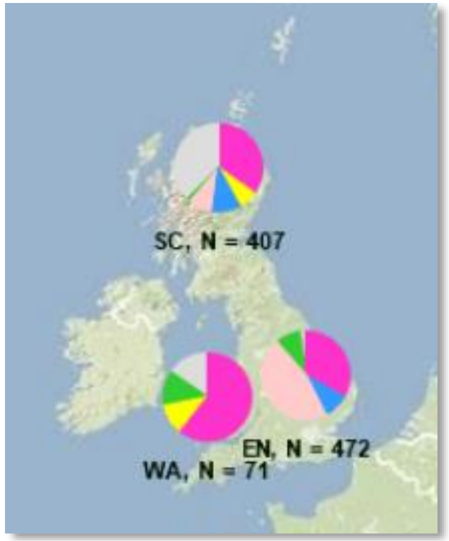


GB *P. infestans* population change

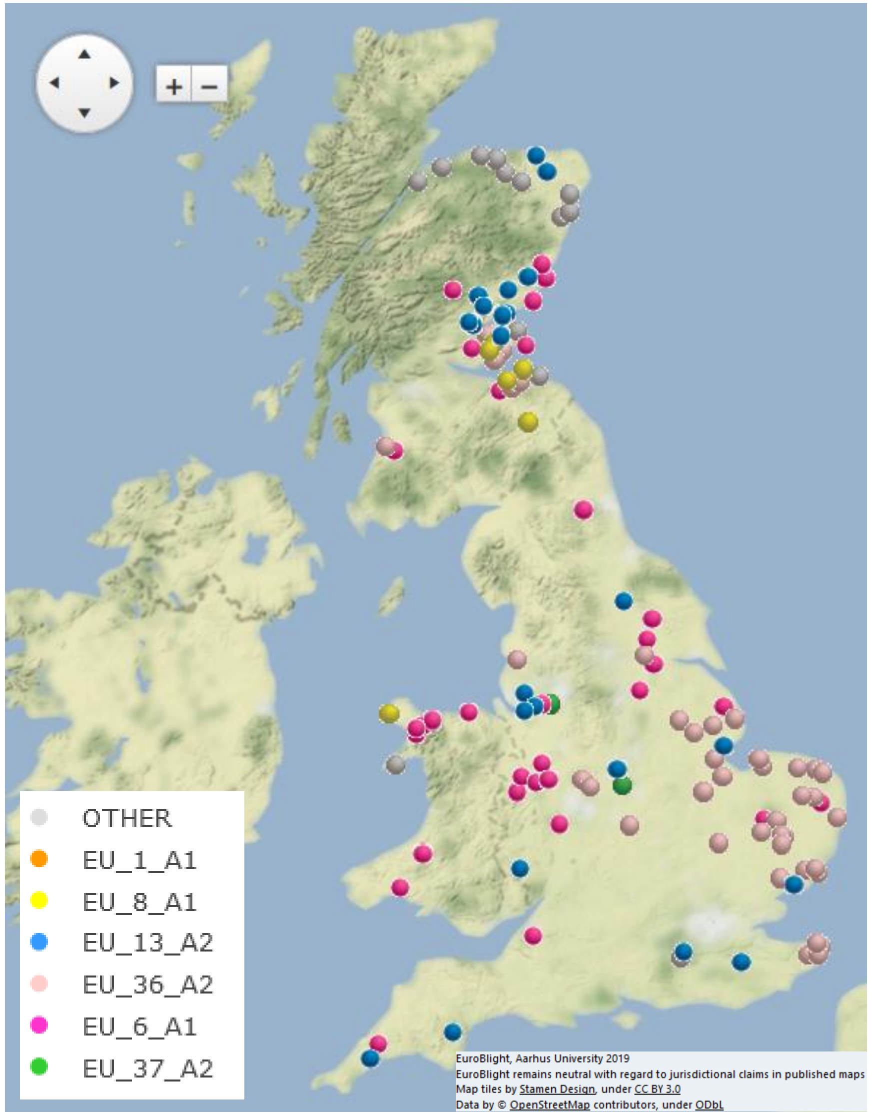


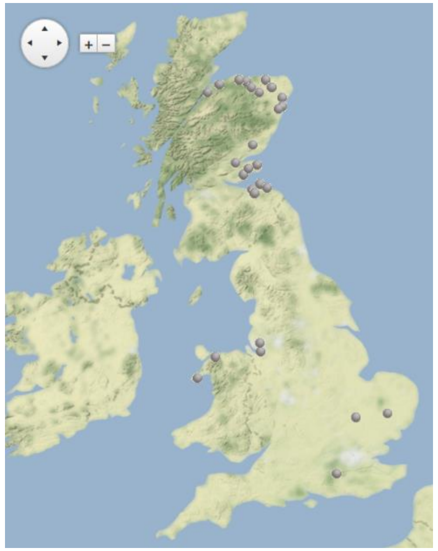
Isolate no. **74 138 73 899 1452 1118 522 247 426 716 196 705 222 500 495 185 958**

- 36_A2 17 to 27%
- 37_A1 16 to 6%
- 6_A1 47 to 36%
- 13_A2 8 to 9%
- ‘Other’ 10 to 19%

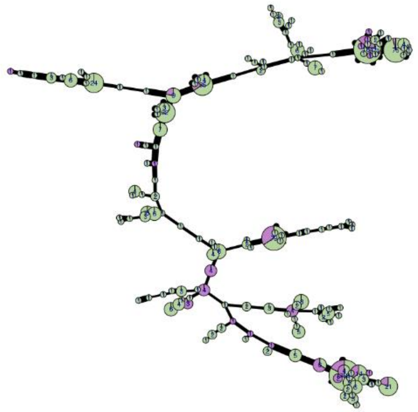


GB *P. infestans* genotype mapping



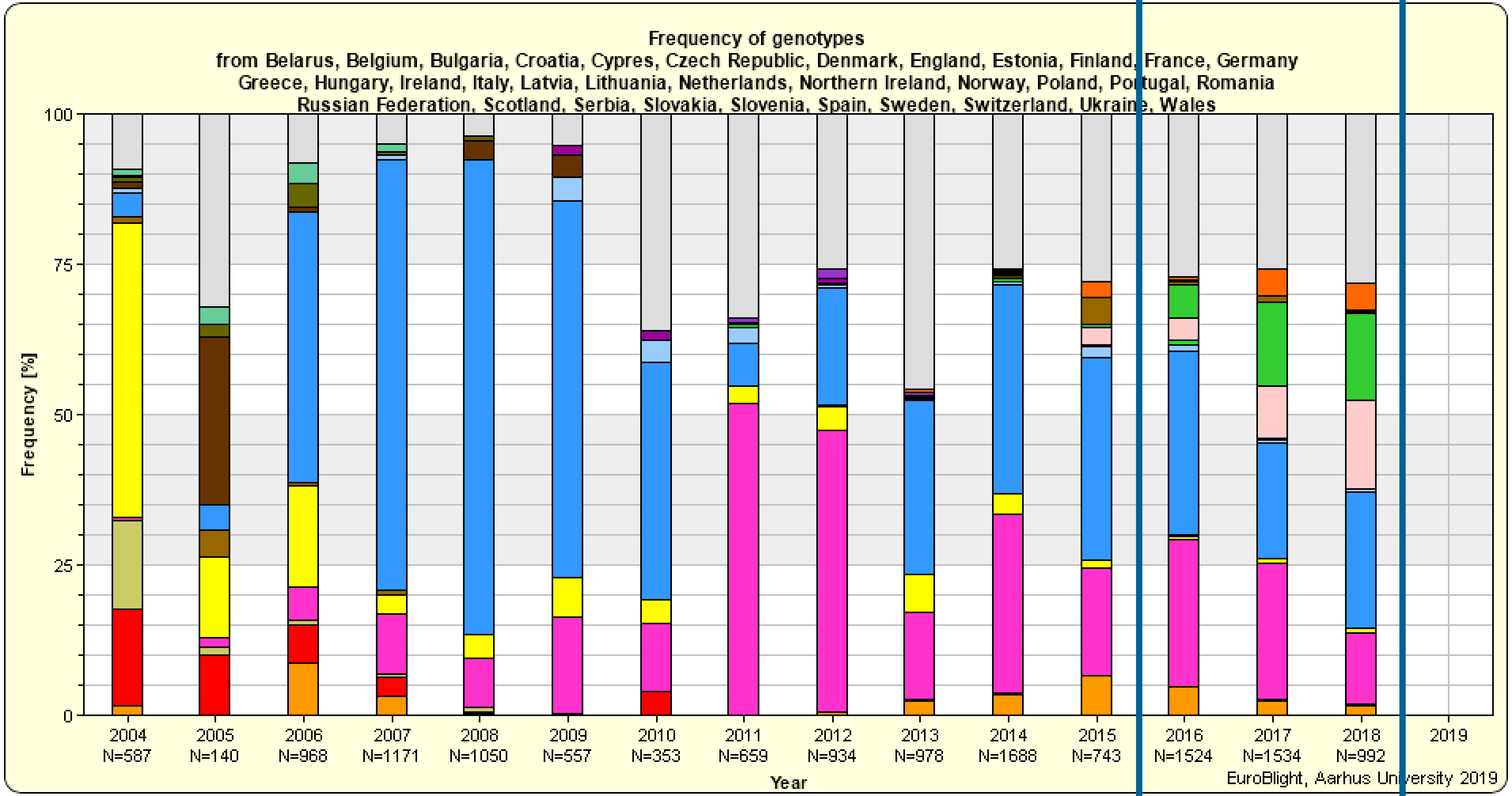


- 6_A1 most widespread
- Wider range of 36_A2 and 37_A2 but not in SW England
- Some spread of ‘Other’ types – Fife and North Wales



EuroBlight
A potato late blight network for Europe

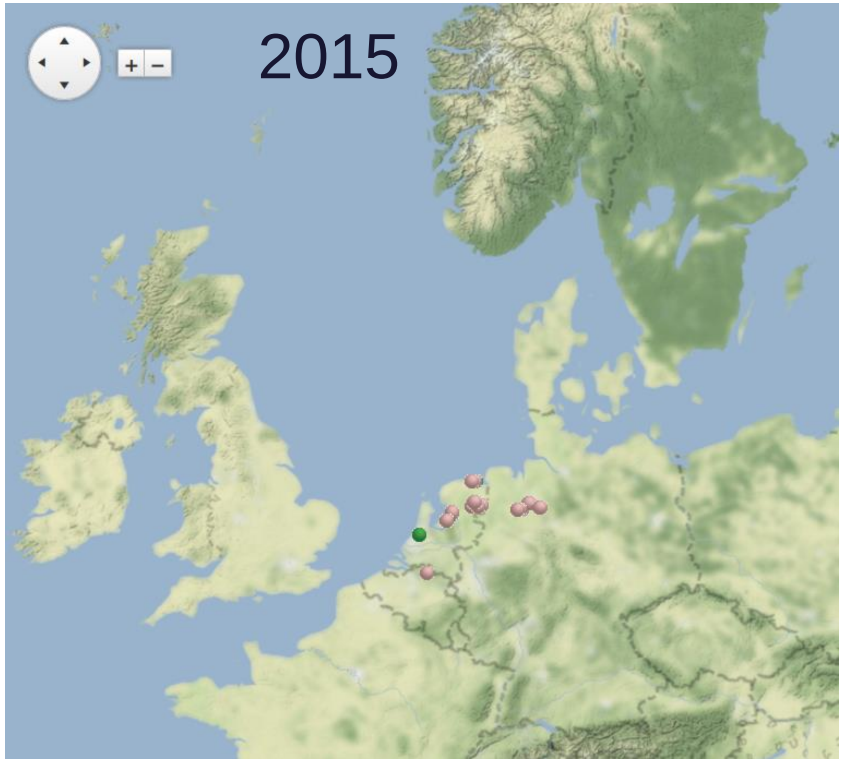
Europe-wide *P. infestans* genotype change

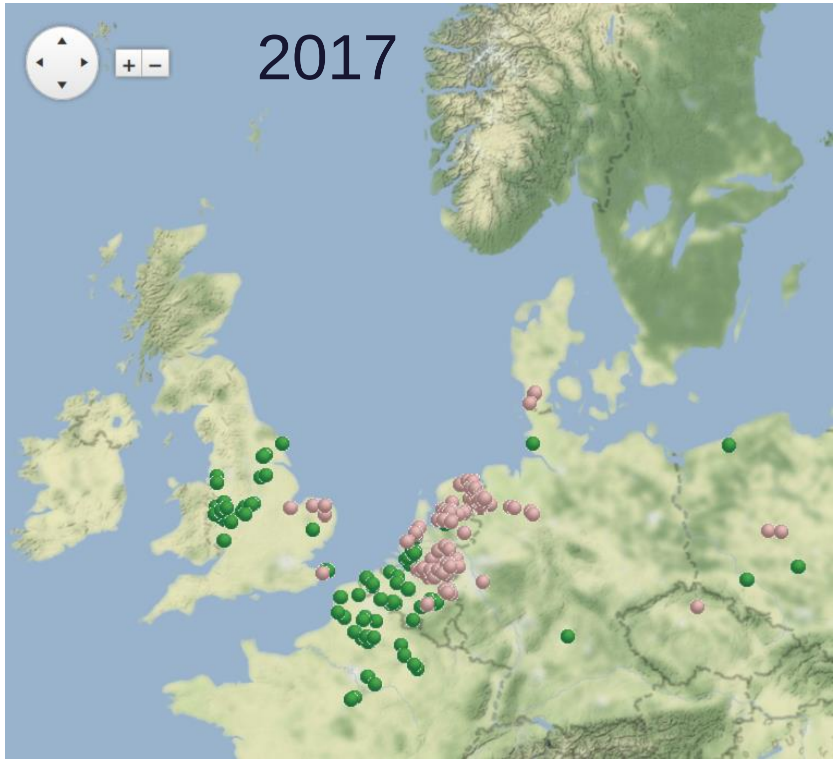


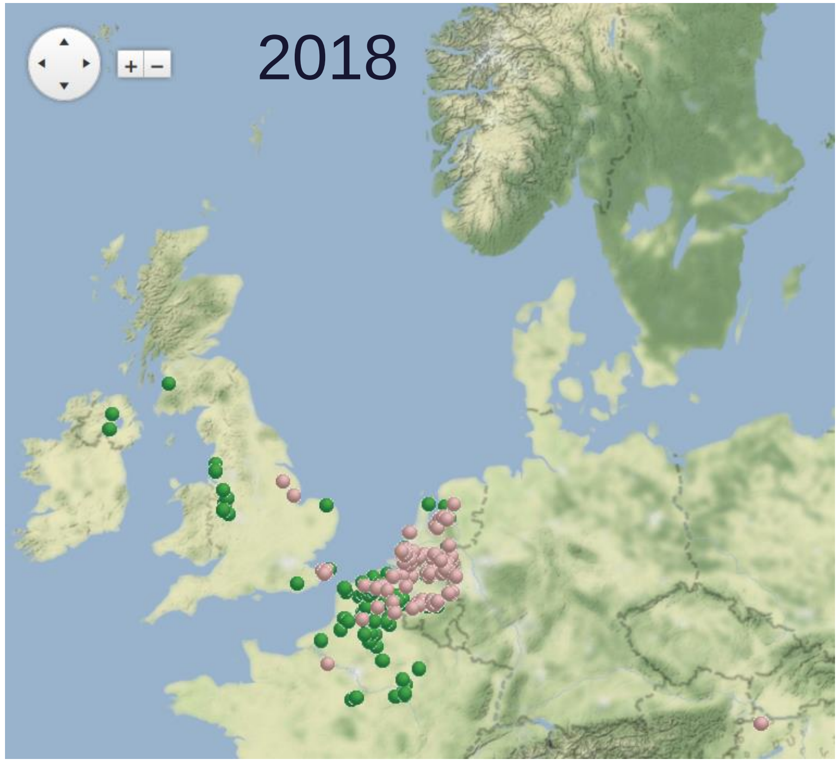
- Higher proportion of ‘Others’
- New types 36_A2, **37_A2** & **41_A2** rose 10 to 36%
- Old types **6_A1**, **13_A2** & **1_A1** fell 60 to 40%
- Data sharing

EuroBlight
A potato late blight network for Europe

European spread of new clones



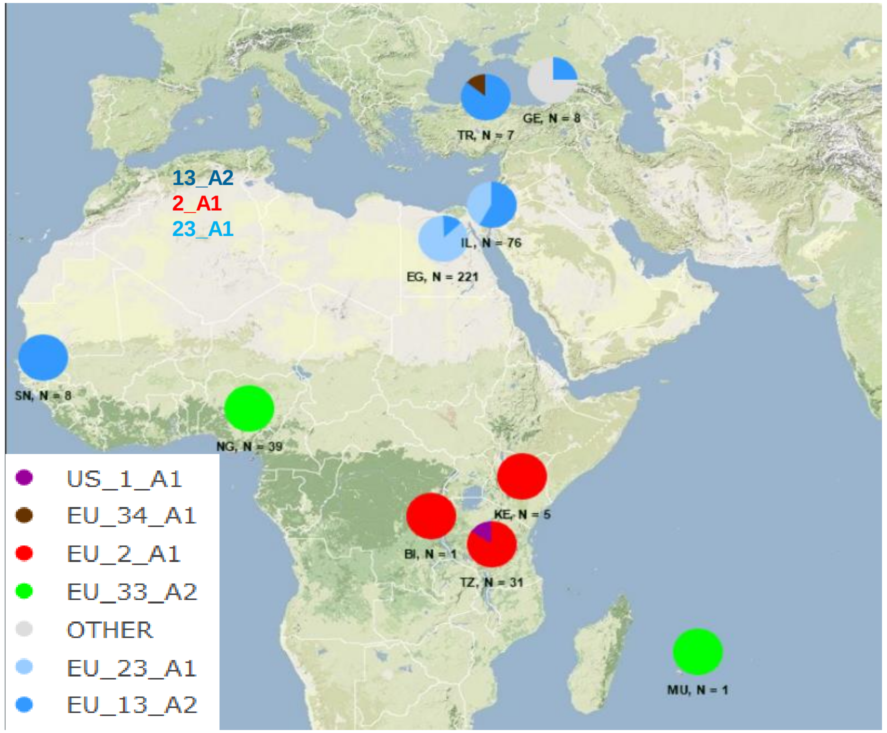


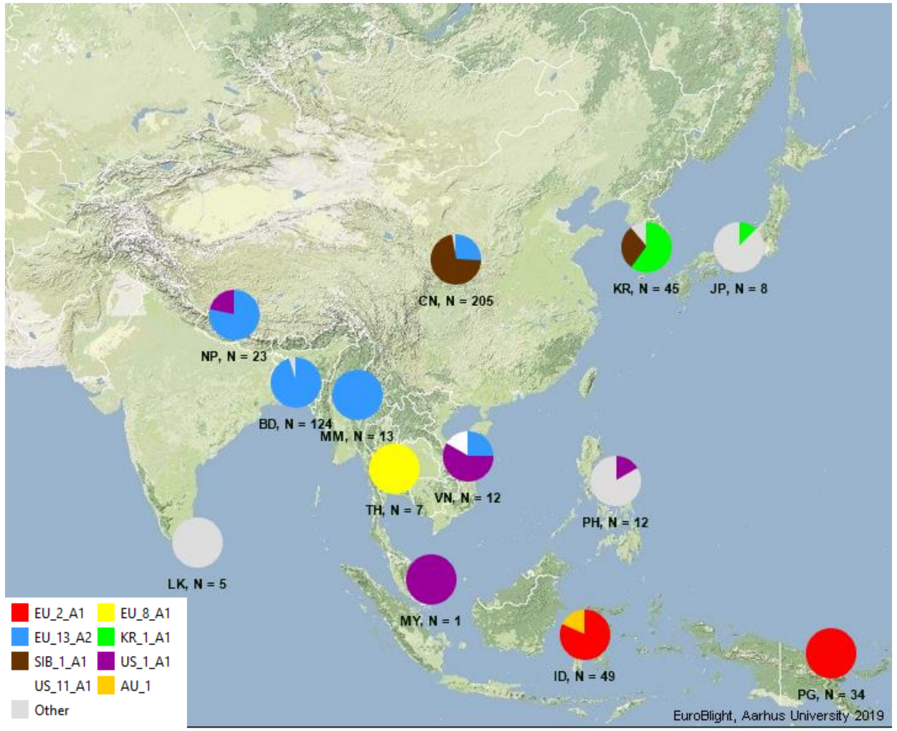


EuroBlight
A potato late blight network for Europe

AHDB

Global reach of EuroBlight



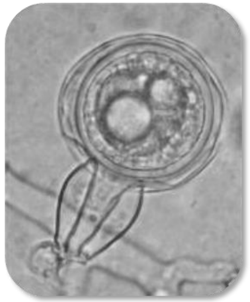


- EU lineages disseminated via seed trade
- Nigeria & Senegal recent incursions
- AsiaBlight making good progress
- International co-operation & shared best-practice

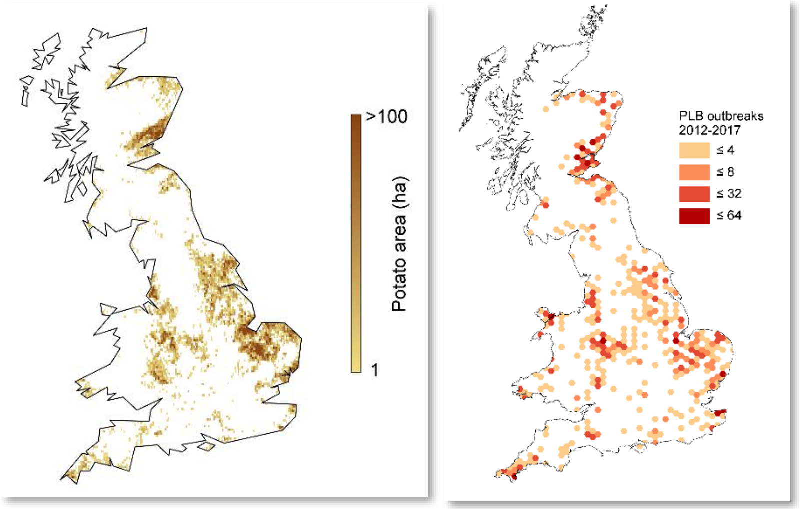
EuroBlight
A potato late blight network for Europe

Take home messages for 2020

- New clones increasing pressure on blight management – mistakes can be costly
- Dominance of clones shows most inoculum overwinters in tubers (seed, volunteers, dumps)
- Soil-borne oospores still a threat (keep rotations long)



Jens Hansen & Isaac Abuley
University of Aarhus, DK



Pete Skelsey (based on AHDB data)

Agronomists' Conference 2019

Fungicide sensitivity and late blight management strategies

Faye Ritchie, ADAS

Alison Lees, JHI

POTATOES

The *Phytophthora infestans* population in the UK and Europe has proved adept at evolving to:

- overcome host resistance genes in potato cultivars (virulence)
- reproduce faster or under a wider range of environmental conditions (aggressiveness)
- overcome fungicides (resistance)

- Monitoring and appropriate management methods

(Workshop session: late blight fungicide sensitivity)

Fungicide testing in GB lineages of *P. infestans*

Project lead: Dr Alison Lees

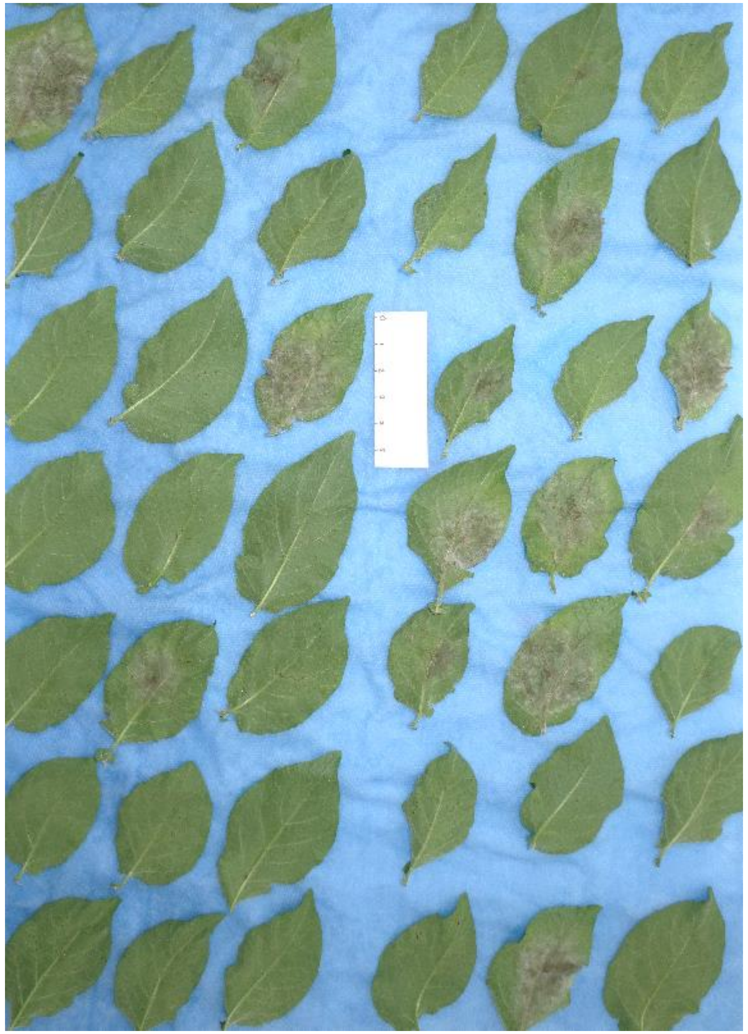
- Test range of FRAC fungicide groups
- Inhibit late blight growth in the laboratory
- Five isolates each of 6_A1, 36_A2 and 37_A2 tested

Mode of action	Active ingredient	Full dose (ppm)*
QiI	cyazofamid	400
QiI	amisulbrom	200
CAA	mandipropamid	750
Carbamates	propamocarb	5000
Benzamides	fluopicolide	500
OSBPI	oxathiapiprolin	75
Dithiocarbamates	mancozeb	6375

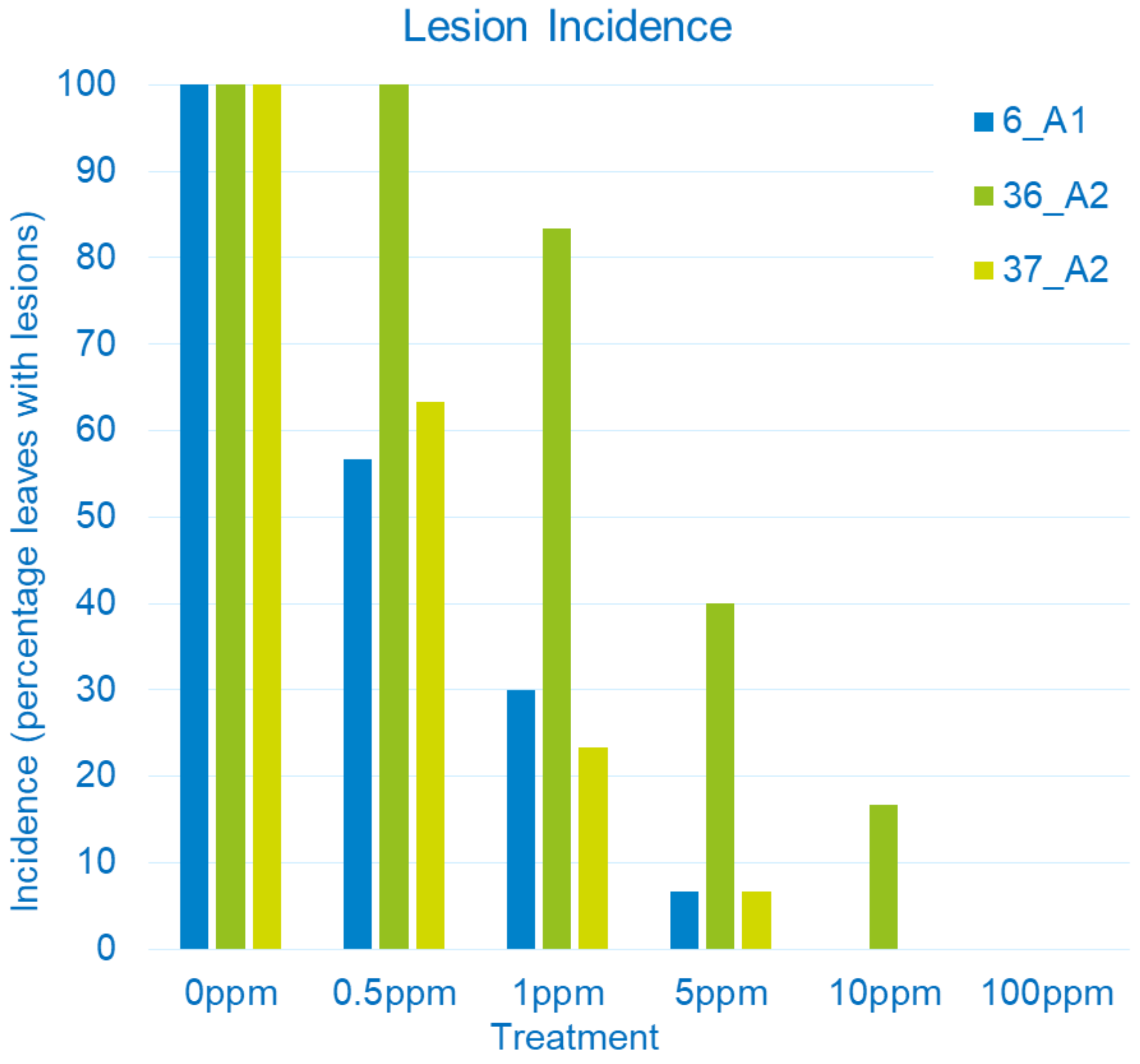
*field rate for illustration only

Assay and explanation of EC_{50}

- Detached leaf assay
- Inoculated using zoospore suspensions
- **EC50** value is the concentration of the **fungicide** that reduces growth by 50% relative to a non-fungicide treated control
- Six leaves inoculated per concentration
- Tests conducted according to standardised protocols and concentrations
- Zoospore motility assay



Fluopicolide (field rate equivalent: 500ppm)

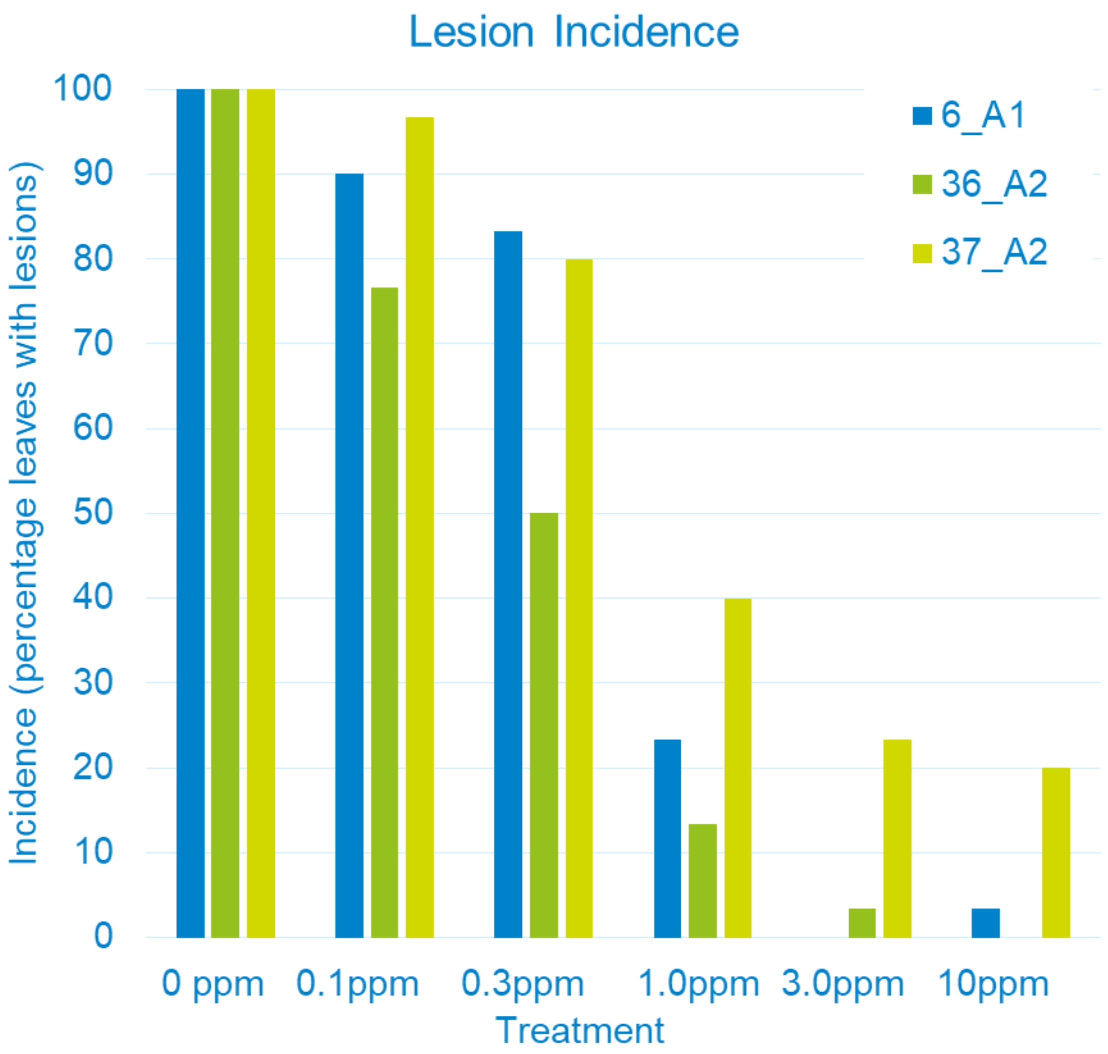


- Maximum EC_{50} value of 19 observed previously (other leaf assay)
- Higher incidence of lesions for 36_A2
- Results consistent with 2018

Genotype	Mean EC_{50}	Min EC_{50}	Max EC_{50}	MIC value* (ppm)
6_A1	**0.62[a]**	0.25	2.99	0.07[a]
36_A2	**1.56[b]**	0.25	16.40	0.13[b]
37_A2	**0.59[a]**	0.25	2.45	0.07[a]

*zoospore motility

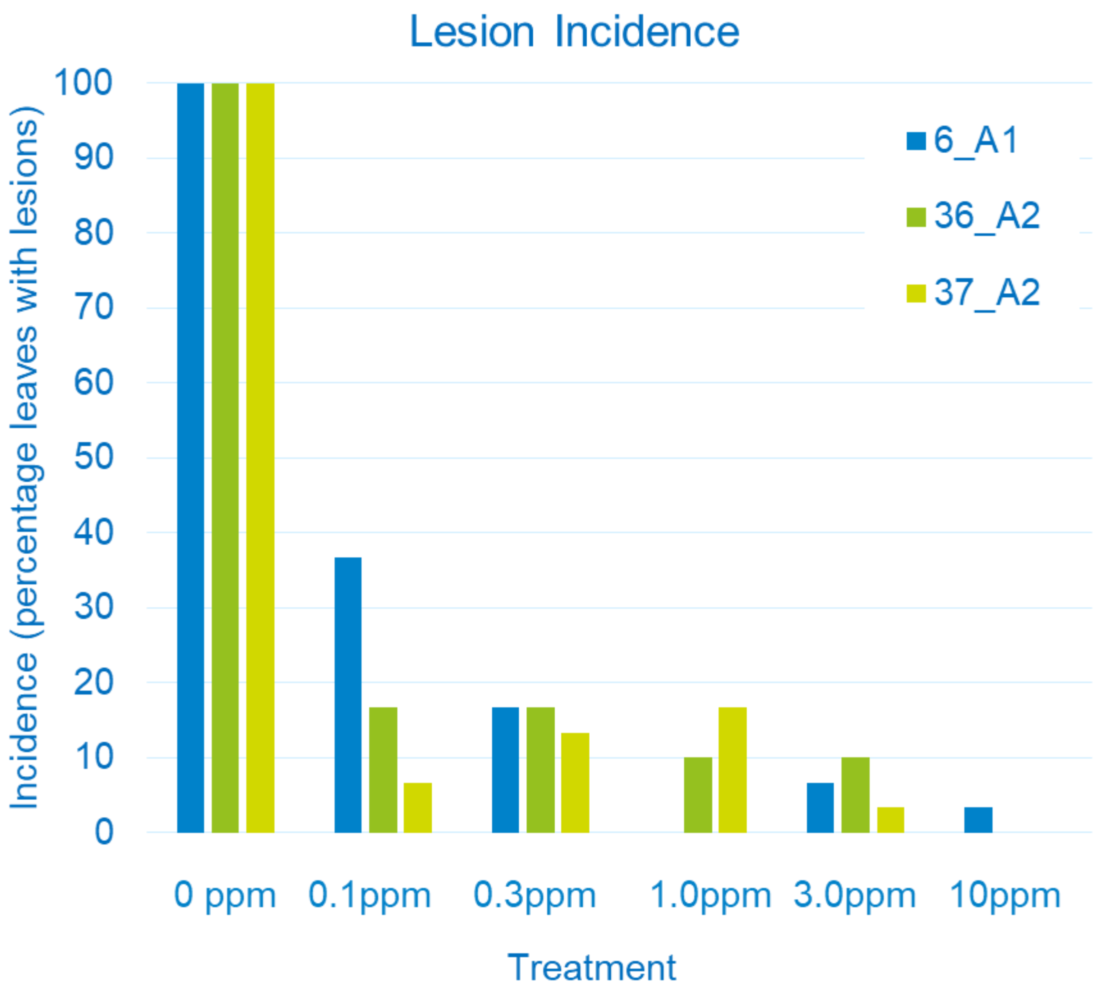
Mandipropamid (field rate equivalent: 750ppm)



- Maximum baseline EC_{50} value of 2.98 observed previously (detached leaf assay, Israel)
- Generally higher incidence of lesions for 37_A2
- Results consistent with 2018

Genotype	Mean EC_{50}	Min EC_{50}	Max EC_{50}
6_A1	**0.44[ab]**	0.16	1.6
36_A2	**0.29[b]**	0.15	4.5
37_A2	**0.56[a]**	0.16	1.8

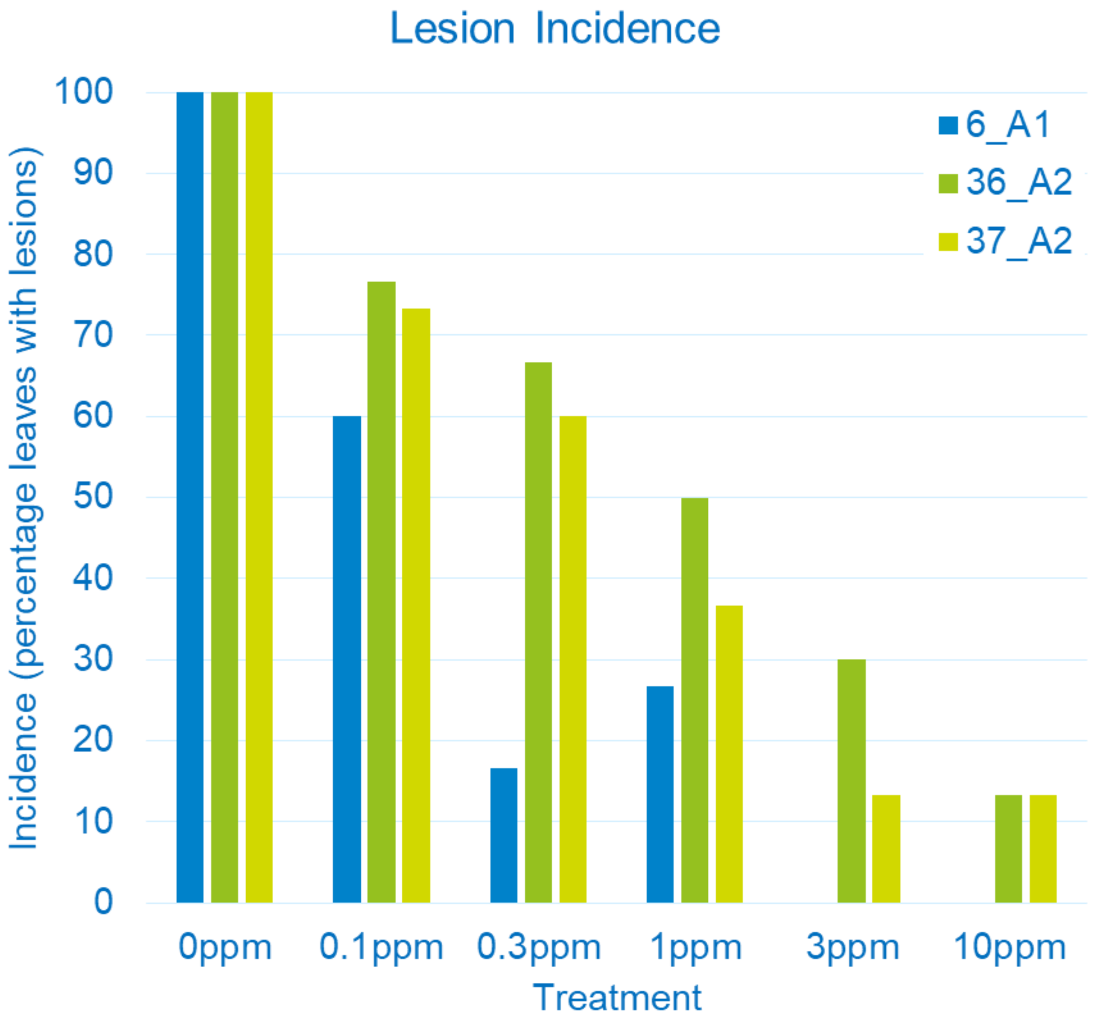
Cyazofamid (field rate equivalent: 400ppm)



- Lesion incidence consistent across genotypes
- Small differences in mean EC_{50} values observed in 2018 – none in 2019
- Results within expected range

Genotype	Mean EC_{50}	Min EC_{50}	Max EC_{50}
6_A1	**0.27[a]**	0.15	2.21
36_A2	**0.22[a]**	0.15	1.48
37_A2	**0.25[a]**	0.15	1.49

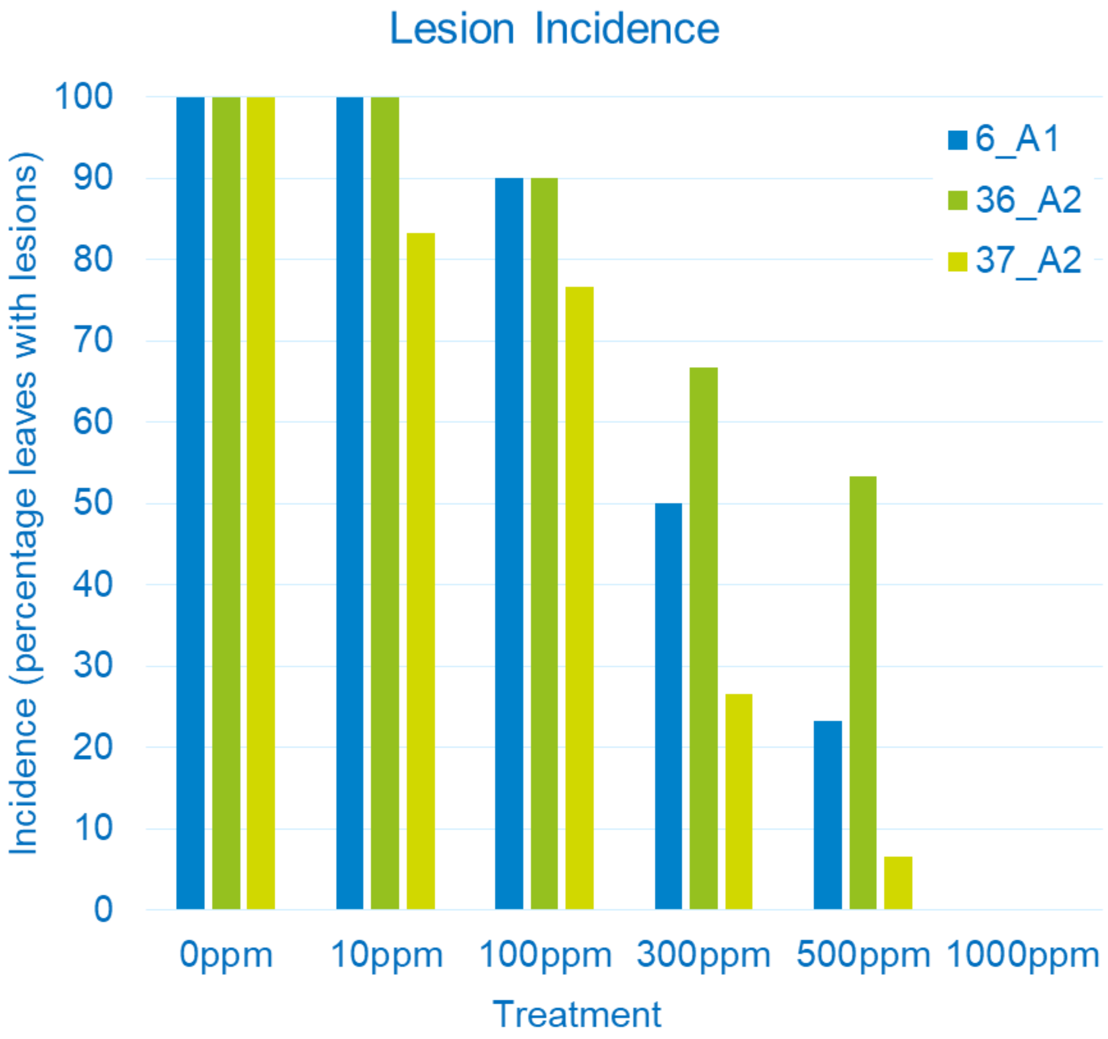
Amisulbrom (field rate equivalent: 200ppm)



- Lesion incidence higher for 36_A2 and 37_A2
- Significantly higher EC_{50} values for 36_A2 than 6_A1 and 37_A2
- First year of testing in this project

Genotype	Mean EC_{50}	Min EC_{50}	Max EC_{50}
6_A1	**0.36[a]**	0.15	2.22
36_A2	**0.98[b]**	0.15	8.14
37_A2	**0.36[a]**	0.15	1.64

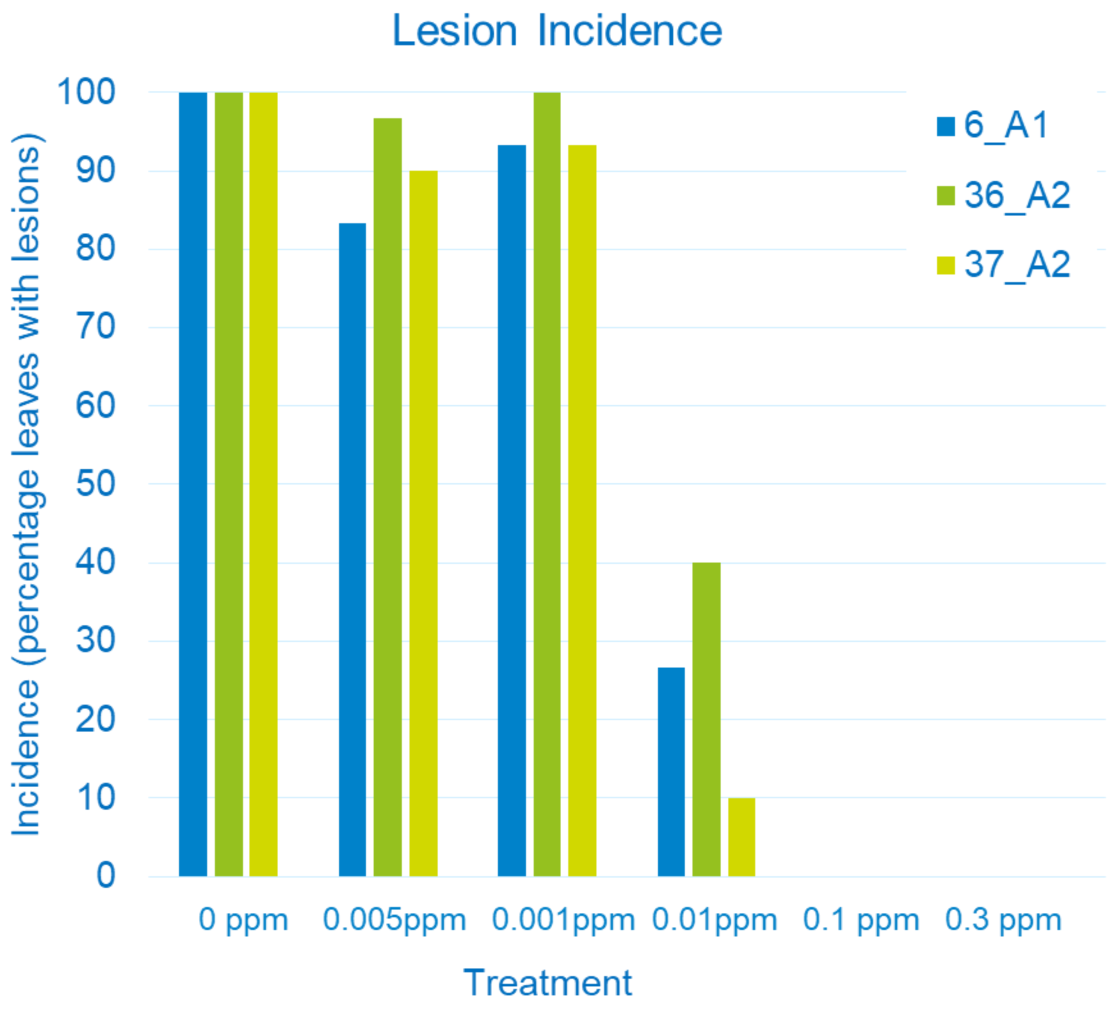
Propamocarb (field rate equivalent: 5000ppm)



- Significantly higher EC_{50} value for 36_A2 compared to other genotypes tested
- Same result as 2018

Genotype	Mean EC_{50}	Min EC_{50}	Max EC_{50}
6_A1	**39.9[a]**	2.5	133.9
36_A2	**64.7[b]**	1.5	180.8
37_A2	**38.1[a]**	1.0	244.0

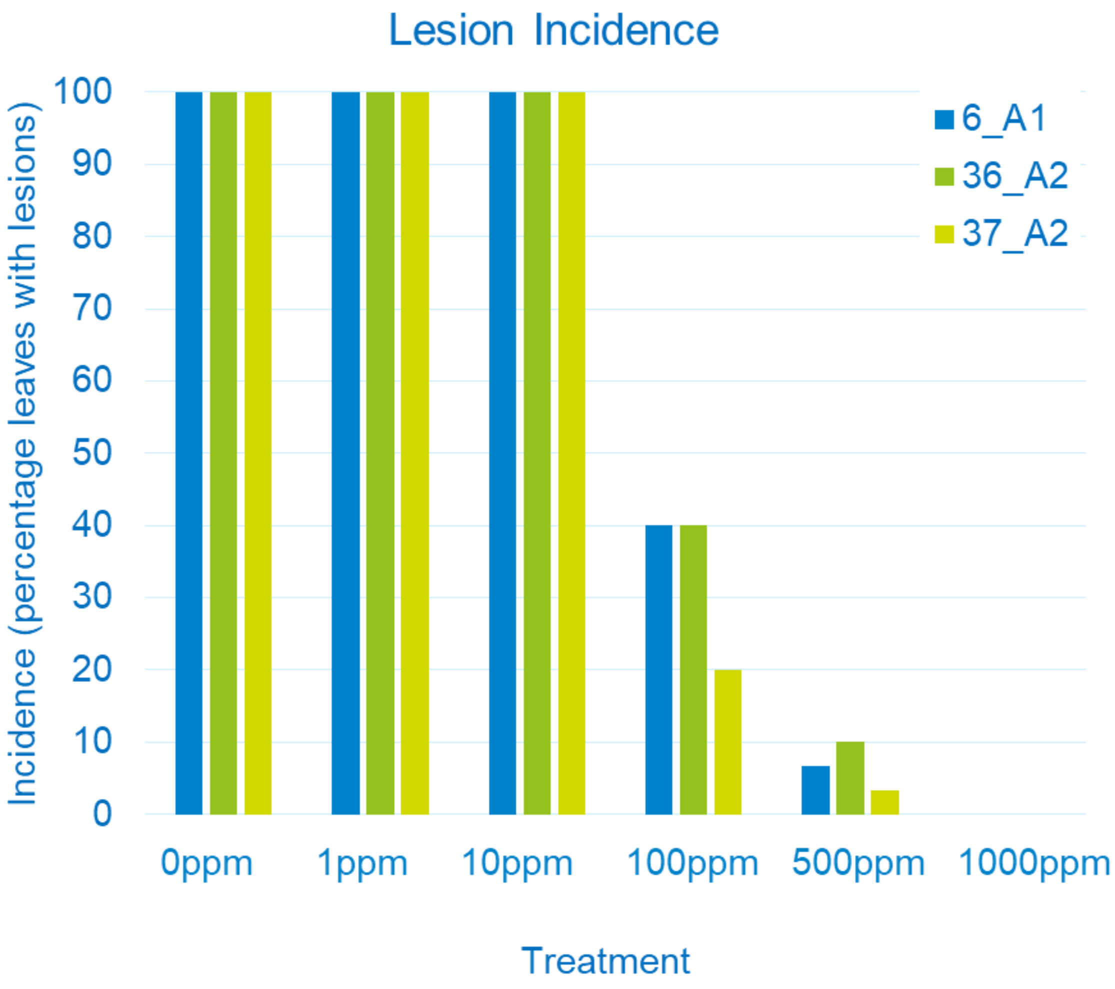
Oxathiapiprolin (field rate equivalent: 75ppm)



- Baseline mean EC_{50} 0.0012 (leaf disc assay)
- Included in this project for the first time in 2019
- No statistically significant differences for EC_{50} between genotypes

Genotype	Mean EC_{50}	Min EC_{50}	Max EC_{50}
6_A1	**0.0053**[a]	0.0003	0.054
36_A2	**0.0048**[a]	0.0004	0.049
37_A2	**0.0015**[a]	0.0004	0.0033

Mancozeb (field rate equivalent: 6375ppm)



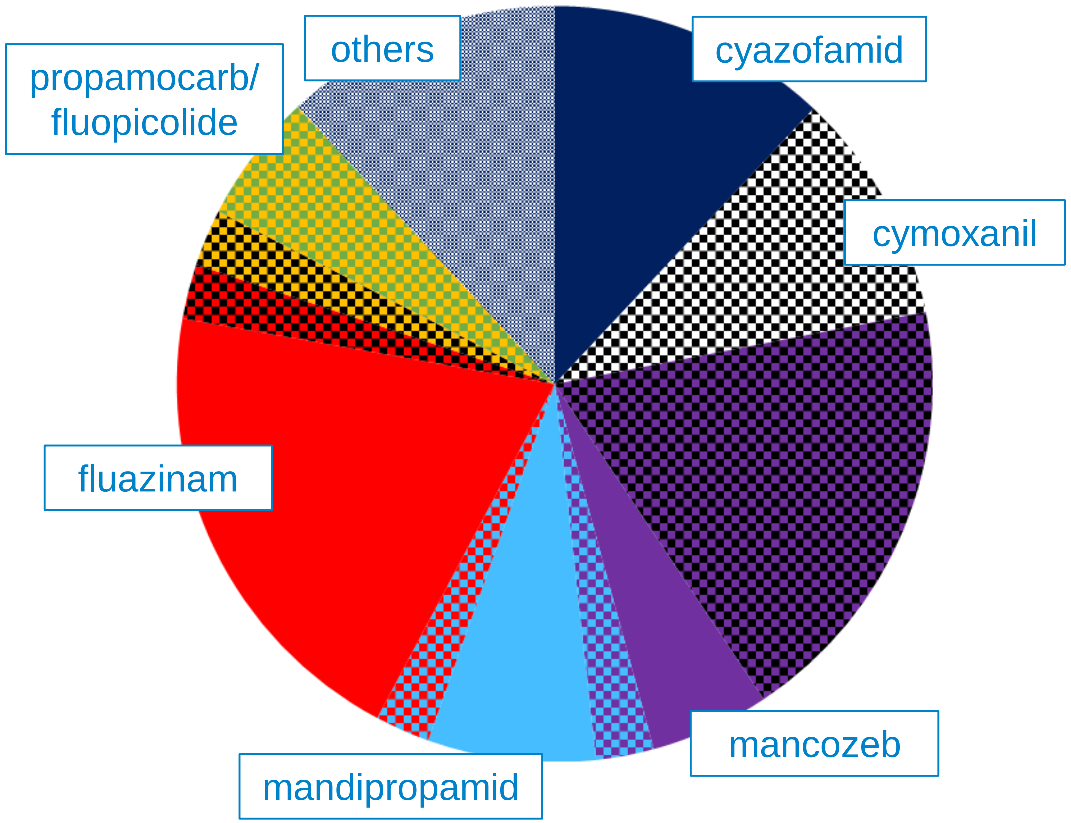
- Included as a control
- Lesion incidence was similar for all genotypes tested
- No statistically significant differences for EC_{50} values between genotypes

Genotype	Mean EC_{50}	Min EC_{50}	Max EC_{50}
6_A1	**53.1**[a]	0.8	244.1
36_A2	**66.6**[a]	0.9	329.5
37_A2	**43.2**[a]	7.4	298.1

Fungicide sensitivity testing - messages

- There were statistically significant but small differences between the EC_{50} values for different modes of action – 36_A2 and 37_A2
- Differences in the incidence of different genotypes producing lesions across range of modes of action – natural variation
- No change in recommendations for control
- Need to consider resistance management strategies - use FRAG guidelines

Change in fungicide usage from 2016 to 2018

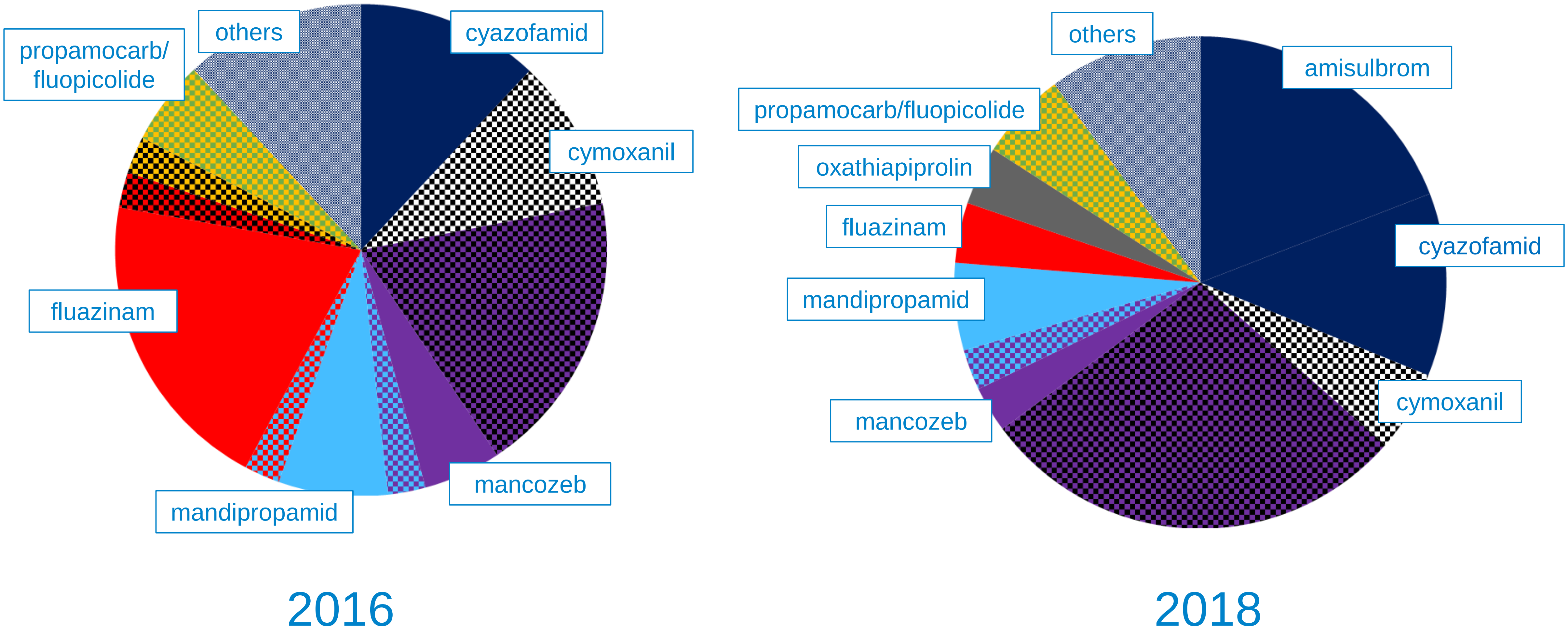


2016

2018

Garthwaite et al., Pesticide usage surveys 271 and 284

Change in fungicide usage from 2016 to 2018



Garthwaite et al., Pesticide usage surveys 271 and 284

Pathogen evolution is not random

The speed at which new strains occur are related to:

1. How many generations the epidemic runs for;
2. How fast the epidemic progresses

- IPM practices which delay and/or slow blight epidemics will slow selection for fungicide resistance, aggressiveness and virulence

Considerations for today and the future

Range of modes of action that are effective against current strains of *P. infestans* in GB

Need to implement fungicide resistance management strategies now

A variety of strategies will be required to maintain control


‘Inspiring our farmers, growers and industry to succeed in a rapidly changing world’

Agronomists' Conference 2019

PCN Lessons – Market Viewpoint

Graeme Byers

CEREALS & OILSEEDS

How can we achieve wide uptake of G pallida resistant varieties?

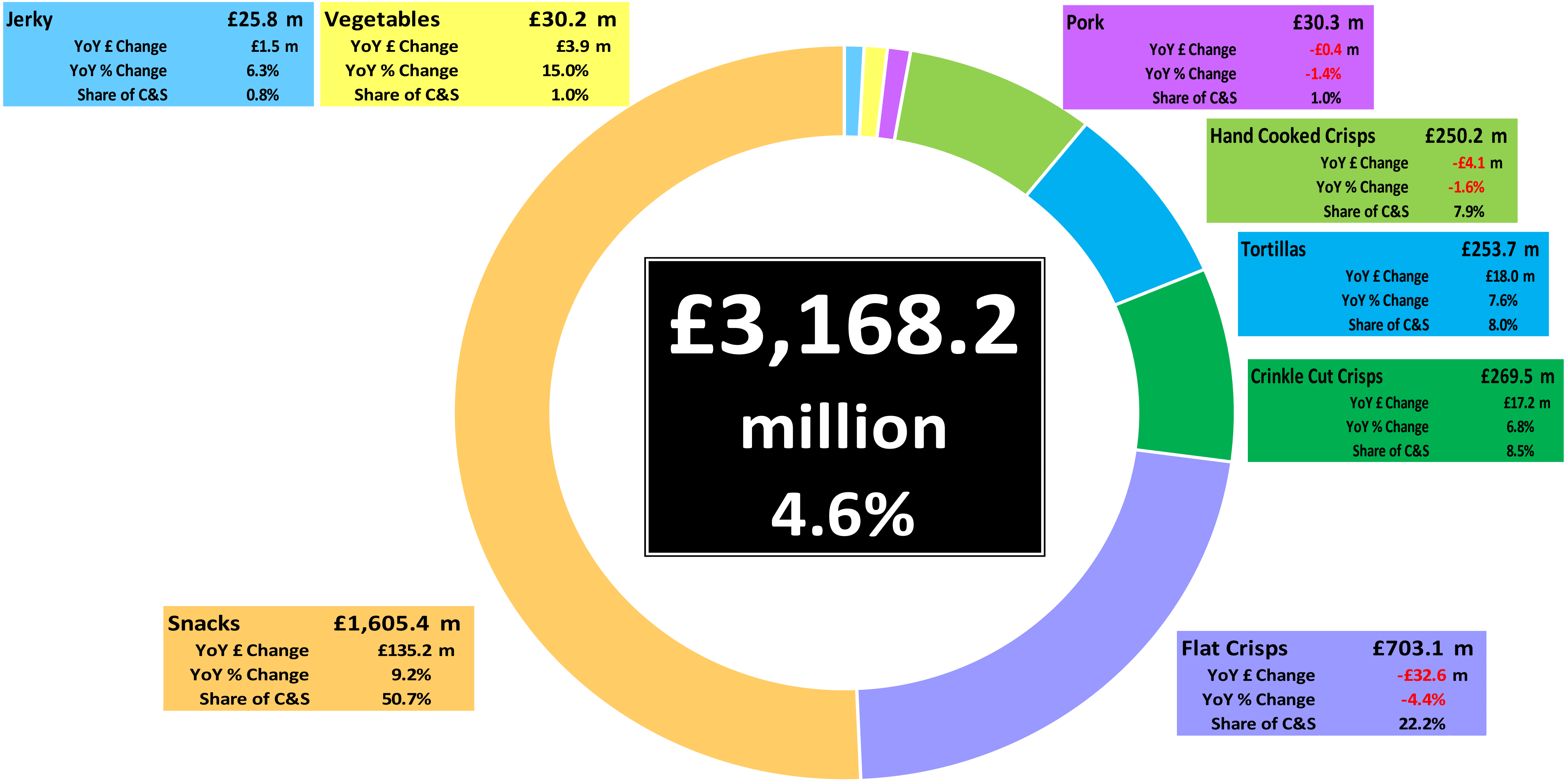
What constitutes mutually useful improvement?

How well do supply chain members understand each other?

Are targeted breeding programmes really targeted?

The end user can move ► how do we work together?

Total GB Crisps & Snacks (C&S) £RSV millions



GB Potato Processing Crop

30% of the GB crop grown for processing

36,000ha

1.5 million tonnes processed in GB each year

71% of the retail sales value of potato products made up of processed products

£89 million of crisp products exported

25,000t of crisps ► 80,000t of potatoes

But

1.4mt of finished processed product imported

Equivalent to 3mt of potatoes that could be grown

Can pallida resistant varieties open up production opportunities?

Understanding Market Needs ► What Does the End User Require?

We are a supply chain and not a market.

Grower

Yield, pest and disease resistance, store stability, damage resistance

Processor

Round uniform shape, high dry matter, pale fry colours, low AFP, firm texture

Retailer

Product offer, legislative compliance, sustainability, CSR

Consumer

Great tasting snacks!

Is a breeding programme targeted if it doesn't hit targets relevant to all parts of the supply chain?

Purchase Decision Hierarchy for Crisps & Snacks

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Flavour e.g. salted, cheese & onion, salt & vinegar, sweet chilli, cheese, assorted etc.

Price

Value for money

Product type e.g. snack, flat crisps, popcorn, nuts, healthier etc.

Bag size e.g. small single, large single, small multi-pack etc.

Brand name

Promotion or offer

Texture e.g. softer/lighter or firmer/crunchier or harder bite

Occasion e.g. snack, pack-up, weekend treat, at lunch etc.

Brand or Own Label

Mission e.g. stock-up, social time, just for me, routine/what I usually buy etc.

Bag weight

Understanding Market Needs

Primary Cross

- Who is driving parental selection?
- How long is it going to take?
- Do we permit genetic modification?

Target market or targeted improvement?

- G pallida resistance ► so what?
- Fresh consumption declining
- Processed products under import pressure
- Without market driven characteristics agronomy improvements cannot be taken up

Who should be involved?

- Genetic specialist and wide bank of genetic material
- Breeder/seed producer/growers/processor
- Consumer and consumer insight

The End User Can Move?

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Variety Persistence

- Russet Burbank
- Jersey Royal
- King Edward
- Maris Piper
- Lady Rosetta

Variety Change

- Markies
- VR808
- Taurus
- Arsenal

How Can We Move Faster?

Start with Targeted Change

- Consult more widely within the supply chain
- Agree all participants objectives

Involve the end user sooner and continuously

Use processor generated data early

Don’t present a pallida resistant variety that doesn’t crisp, bake, boil, chip or roast

Tayto Group ► Variety Approval Process

We have a straightforward process and an open door policy

Our specifications and process requirements well understood by suppliers

Prefer to have all varieties plot tested by single key supplier

Conduct factory testing

small scale fry work

process 1 tonne consignments

texture and organoleptic assessments

scale up into Tayto brands

Brand and then retailer approval

What Does Improvement Look Like?

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Define Strategic priorities

- Support with levy input and core funding

Commence programmes with wide consultation

- Traits that work for the whole supply chain
- Decide on parental material to meet all objectives
- Agree who will evaluate what

Agree commercial priorities

- Exclusivities
- Stakeholder reward
- Lead time

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Session Four – Resource use in potatoes

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Nitrogen, desiccation and determinacy

Mark Stalham

NIAB CUF

AHDB

POTATOES

Why do we need to desiccate?

- Prevent further growth of tubers to maximize return
- Remove foliage to assist harvesting
- Initiate or advance the process of skinset to reduce damage at harvest
- Reduce disease risk

Ware treatments 2019 (rates in l/ha, vol. 400 l /ha)

Treat	T1	T2	T3
1	Reglone 1.5 + Ranman Top 0.5	Reglone 2.5 + Ranman Top 0.5	
2	Flail + Spotlight 1.0 + Ranman Top 0.5	Ranman Top 0.5	
3	Flail + Spotlight 1.0 + Gozai 0.8 + Ranman Top 0.25	Ranman Top 0.5	
4	Gozai 0.8 + Toil 1.5 + Ranman Top 0.25	Spotlight 1.0 + Ranman Top 0.5	
5	Spotlight 1.0 + Ranman Top 0.5	Gozai 0.8 + Toil + Ranman Top 0.25	
6	Spotlight 1.0 + Shinkon 0.25	Gozai 0.8 + Toil + Shinkon 0.25	
7	Spotlight 1.0 + Gozai 0.8 + Toil 1.5 + Ranman Top 0.25	Spotlight 0.6 + Gozai 0.8 + Toil 1.5 + Ranman Top 0.25	
8	No desiccant. Ranman Top 0.5	No desiccant. Ranman Top 0.5	
9	Finalsan 67 + Ranman Top 0.5	Spotlight 1.0 + Ranman Top 0.5	
10	Spotlight 1.0 + Ranman Top 0.5	Gozai 0.8 + Toil 1.5 + Ranman Top 0.25	Spotlight 0.6 + Ranman Top 0.5
11	Saltex 1123 + Ranman Top 0.5	Spotlight 1.0 + Ranman Top 0.5	

A hard target?
Jelly seed crop

- Still actively growing
- Leaf area index 5
- Tall
- Long stems

Reglone
2 wks
post-T1

Spotlight
&/or
Gozai
2 wks
post-T1

AHDB

Pelargonic acid
2 wks
post-T1

Flail
2 wks
post-T1

Flail
Royal

Skinning (% surface area removed in barrel) in Jelly

AHDB

Treatment	T1 (1 August)	T2	T3	14-Aug	21-Aug	28-Aug
1	Reglone	Reglone		53	32	19
2	Flail + Spotlight			51	29	21
3	Flail + Gozai			46	33	18
4	Gozai	Spotlight		53	35	13
5	Spotlight	Gozai		55	40	16
6	Spotlight + Gozai	Spotlight +Gozai		54	36	12
7	Pelargonic acid	Spotlight		54	35	17
8	None	None		65	52	52
9	Spotlight	Gozai	Spotlight	52	38	12
10	Haulm pulling			44	21	13
	S.E. (27 D.F.)			3.6	3.0	3.4
	Control (None)			**65**	**52**	**52**
	Reglone			53	32	19
	Pelargonic acid			54	36	12
	Spotlight/Gozai			54	37	13
	Flail			49	31	20
	Haulm pulling			44	21	13

< 15 % is harvester-suitable

None


Reglone
E 1-11

Spotlight &/or Gozai


Pelargonic acid
E 1-1.

Skinset summary (3 weeks post-T1): 5 experiments + 2 demonstrations

Treatment	Skinning (% SA)
Control (None)	**33.0**
Reglone	19.9
Pelargonic acid	23.8
Spotlight/Gozai	22.9
Flail/haulm pulling	19.7
(Saltex)†	(16.4)†

†5 trials only

Vascular browning & stem-end necrosis (%): Royal

AHDB

Treatment	T1	T2	T3	Vascular browning	Stem-end necrosis
1	Reglone	Reglone		26	3.0
2	Flail + Spotlight			27	3.0
3	Flail + Gozai			34	1.0
4	Gozai	Spotlight		28	1.0
5	Spotlight	Gozai		27	2.0
6	Spotlight (+ Shinkon)	Gozai (+ Shinkon)		27	3.0
7	Spotlight + Gozai	Spotlight + Gozai		25	2.0
8	None	None		28	0.0
9	Pelargonic acid	Spotlight		31	1.0
10	Spotlight	Gozai	Spotlight	32	4.0
11	Saltex	Spotlight		27	2.0
	S.E. (30 D.F.)			3.5	1.17
	Control (None)			**28**	**0.0**
	Reglone			26	3.0
	Pelargonic acid			31	1.0
	Spotlight/Gozai			28	2.4
	Flail			30	2.0
	Saltex			27	2.0

Stolon adhesion in Royal (incidence, %)

Treatment	T1	T2	T3	Detached	Easily detached	Removes plug
1	Reglone	Reglone		41.0	56.0	3.0
2	Flail + Spotlight			49.0	50.0	1.0
3	Flail + Gozai			45.0	55.0	0.0
4	Gozai	Spotlight		49.0	51.0	0.0
5	Spotlight	Gozai		52.0	46.0	2.0
6	Spotlight (+ Shinkon)	Gozai (+ Shinkon)		50.0	50.0	0.0
7	Spotlight + Gozai	Spotlight + Gozai		55.0	44.0	1.0
8	None	None		71.0	29.0	0.0
9	Pelargonic acid	Spotlight		52.0	48.0	0.0
10	Spotlight	Gozai	Spotlight	43.0	55.0	2.0
11	Saltex	Spotlight		55.0	45.0	0.0
	S.E. (30 D.F.)			4.80	4.66	0.71
	Control (None)			**71.0**	**29.0**	**0.0**
	Reglone			41.0	56.0	3.0
	Pelargonic acid			52.0	48.0	0.0
	Spotlight/Gozai			49.8	49.2	1.0
	Flail			47.0	52.5	0.5
	Saltex			55.0	45.0	0.0

Skinset summary

- Not defoliating slows skinset, but not always immediately
- Some crops (Jelly seed, Maris Piper and Georgina ware) were fully skinset after 3-4 weeks. Royal not set sufficiently even after 4 weeks
- Yield: no significant difference across methods: typically 10 t/ha yield gain by undefoliated crops in 3 weeks from T1
- No effect of defoliation method, chemical or timing on vascular browning or stem-end necrosis
- Stolon detachment. Some prolonged adhesion in Royal. Undefoliated fewer attached stolons. Virtually no stolon plug removal in any crop

Maris Piper
SPot North
5 September

Ground cover Maris Piper SPot North (%)

AHDB

Treatment	T1 (5 September)	T2	T3	05-Sep	12-Sep	19-Sep	26-Sep
1	Reglone	Reglone		99	7	0	0
2	Flail + Spotlight			98	0	0	0
3	Flail + Gozai			98	0	0	0
4	Gozai	Spotlight		99	21	1	0
5	Spotlight	Gozai		99	10	2	0
6	Spotlight (+ Shinkon)	Gozai (+ Shinkon)		98	14	0	0
7	Spotlight + Gozai	Spotlight + Gozai		99	12	0	0
8	None	None		99	87	46	32
9	Pelargonic acid	Spotlight		99	38	2	0
10	Spotlight	Gozai	Spotlight	99	13	2	0
11	Saltex	Spotlight		99	2	0	0
	S.E. (30 D.F.)			0.5	3.0	2.0	1.1
	Control (None)			**99**	**87**	**46**	**32**
	Reglone			99	7	0	0
	Pelagonic acid			99	38	2	0
	Spotlight/Gozai			99	15	1	0
	Flail			98	0	0	0
	Saltex			99	2	0	0

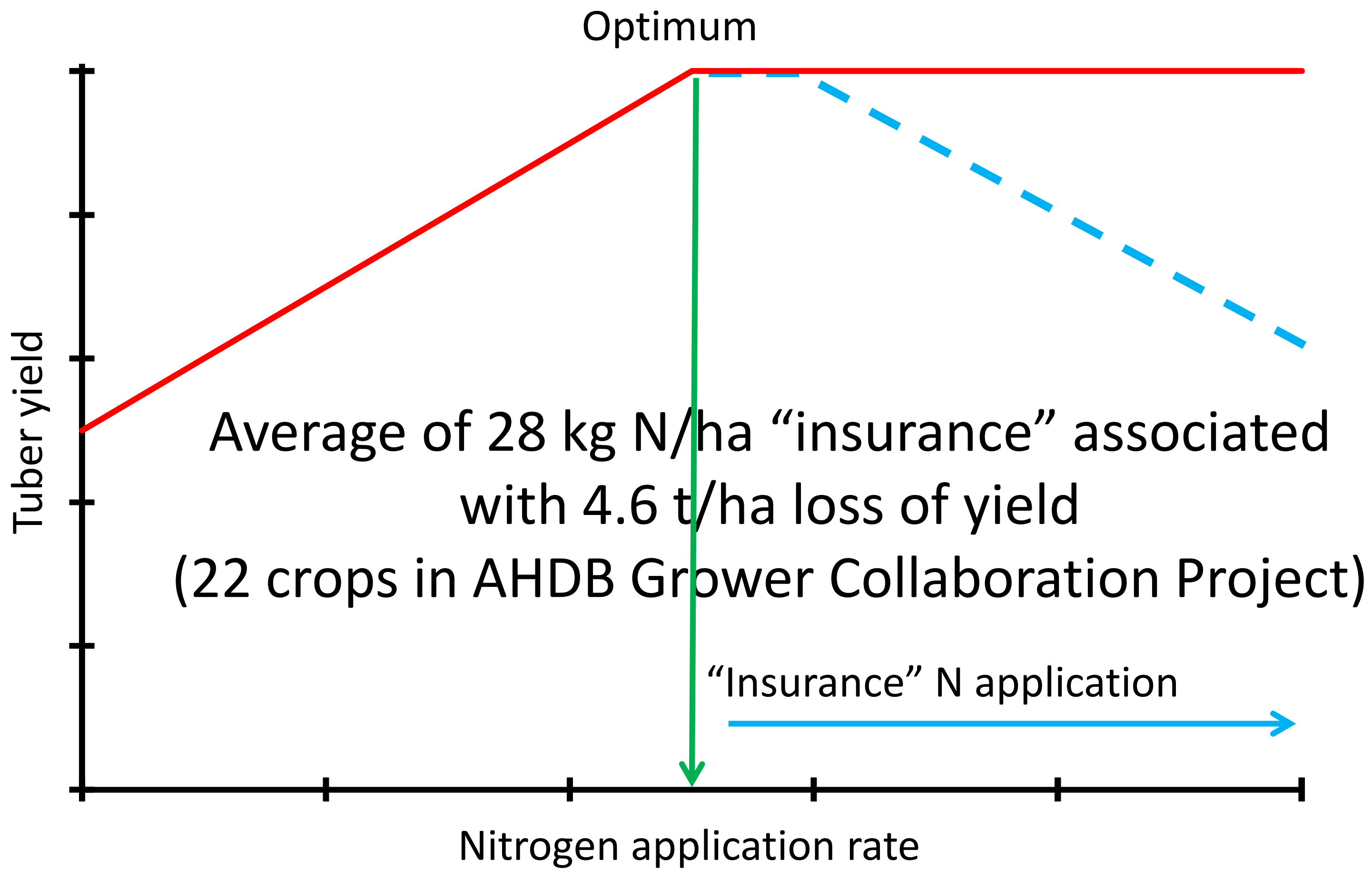
Virtually no leaf after 14 days

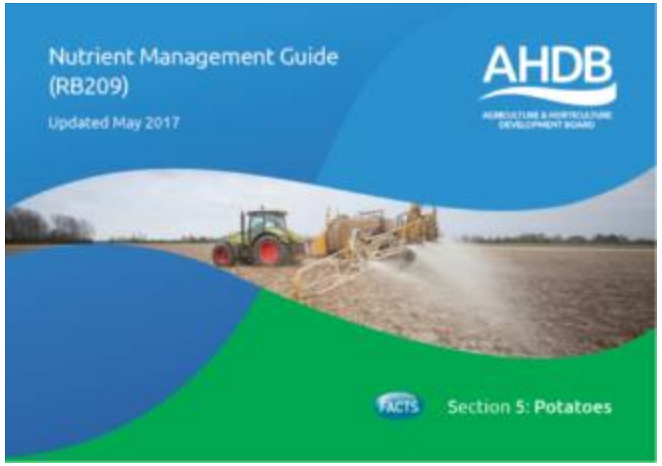
Skinning (% surface area removed in barrel)

Treatment	T1 (5 September)	T2	T3	19-Sep	26-Sep
1	Reglone	Reglone		5.0	0.9
2	Flail + Spotlight			5.4	0.8
3	Flail + Gozai			5.4	0.9
4	Gozai	Spotlight		6.2	1.2
5	Spotlight	Gozai		5.6	1.2
6	Spotlight (+ Shinkon)	Gozai (+ Shinkon)		5.2	1.2
7	Spotlight + Gozai	Spotlight + Gozai		6.1	0.9
8	None	None		8.3	3.0
9	Pelargonic acid	Spotlight		6.5	1.8
10	Spotlight	Gozai	Spotlight	5.9	1.2
11	Saltex	Spotlight		5.7	0.9
	S.E. (30 D.F.)			0.56	0.37
	Control (None)			**8.3**	**3.0**
	Reglone			5.0	0.9
	Pelargonic acid			6.5	1.8
	Spotlight/Gozai			5.8	1.1
	Flail			5.4	0.9
	Saltex			5.7	0.9

Skinset after 14 days

Estimating the optimal N application rate





N fertilizer recommendation: SPot Scotland

Step	Process	Factors	Outcome
1	Calculate soil nitrogen supply (SNS)	Cereal stubble, medium soil in a usually high rainfall area	SNS Index = 1 (soil will supply 60-80 kg N/ha)
2	Identify determinacy group	Maris Piper	Variety group = 3 (indeterminate)
3	Calculate season length	End of May (emergence) to mid September (defoliation)	Season length = 110 days
4	Calculate initial N requirement of crop		147 kg N/ha
5	Calculate supply from organic manures		0 kg N/ha
6	Fertilizer required		147 kg N/ha

Effect of intended season length and variety on N requirement

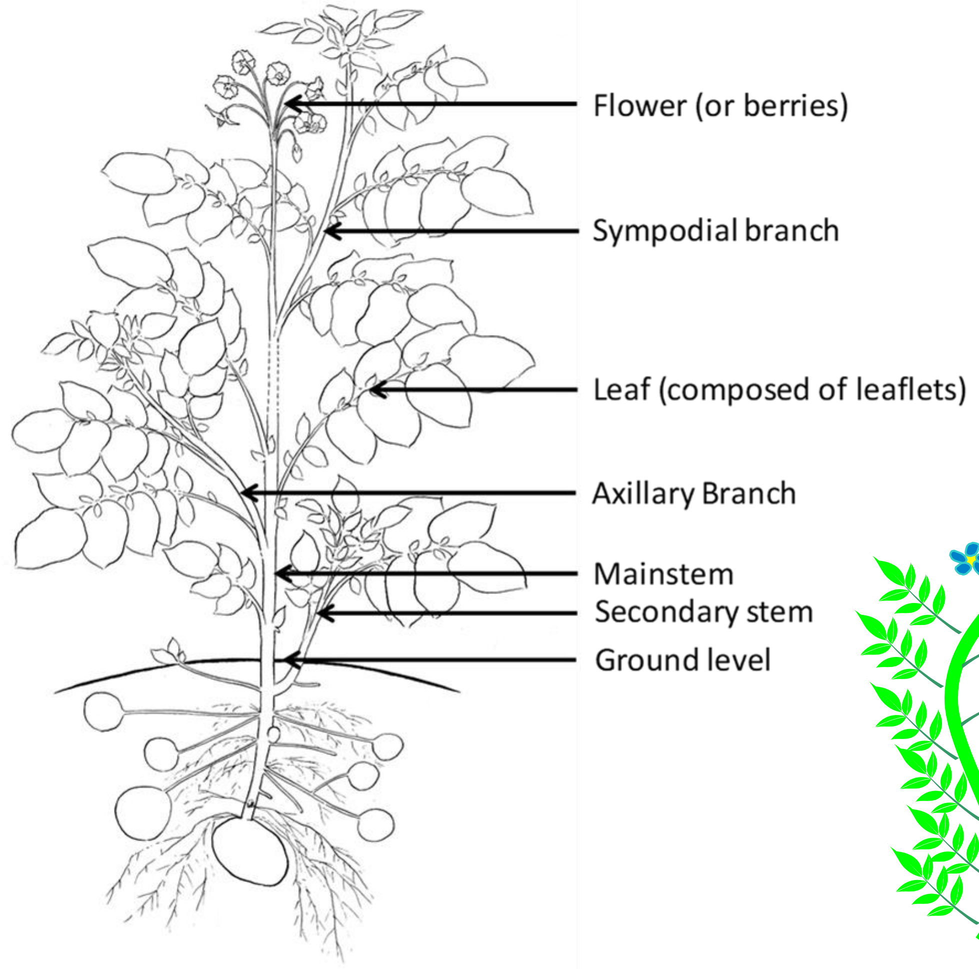
Season length	4 Cara Markies Vales Sovereign	3 Desiree Maris Piper Russet Burbank	2 Charlotte Lady Rosetta Nadine	1 Courlan Estima Innovator Premiere
Short (<60 days)				
Medium (60-90 days)				
Long (90-120 days)				
Very long (>120 days)				

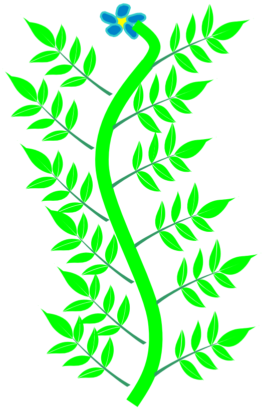
More N

More N

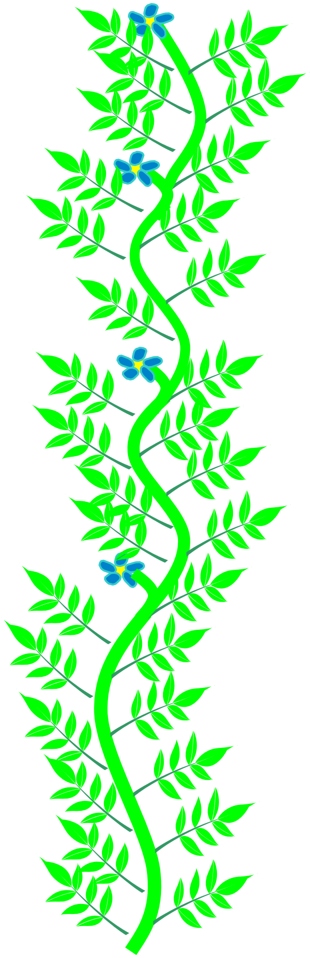
More N

What is determinacy in potato varieties?



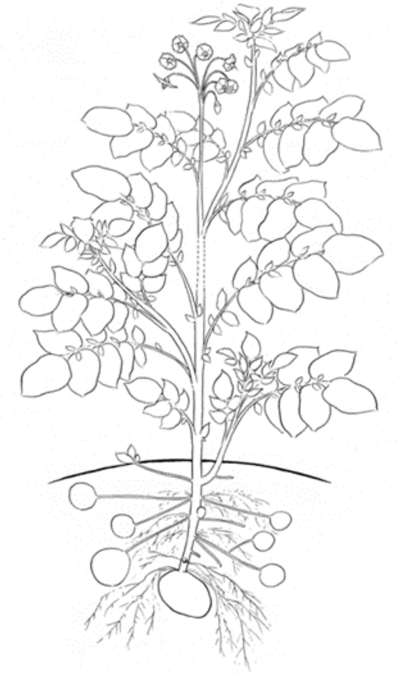


Determinate variety

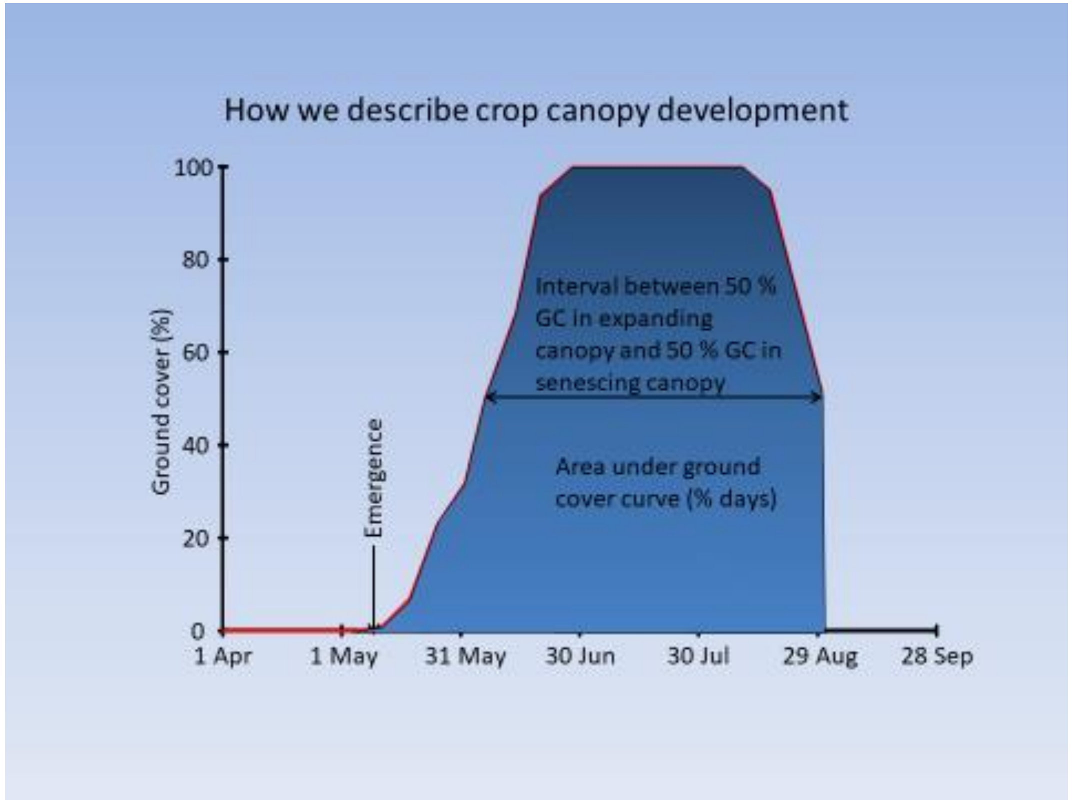


Indeterminate variety

AHDB Determinacy Project 2018
3 metrics of Determinacy



Above ground nodes
More = Indeterminate



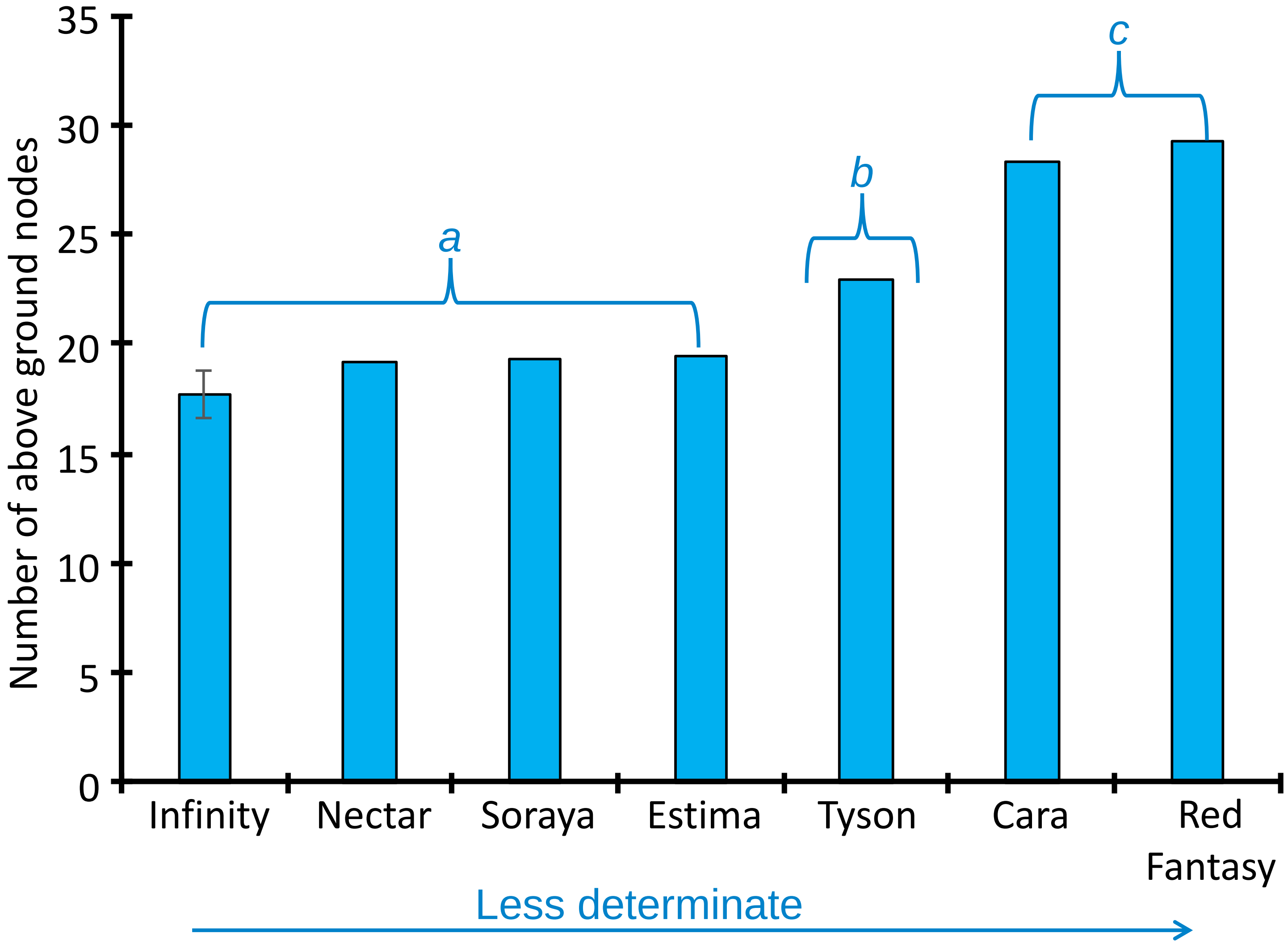
Harvest Index =

$$\frac{Weight\ of\ tubers}{\{Weight\ of\ tubers + Weight\ of\ haulm\}} \times 100\ \%$$

Smaller = Indeterminate

Integrated ground cover
Larger = Indeterminate

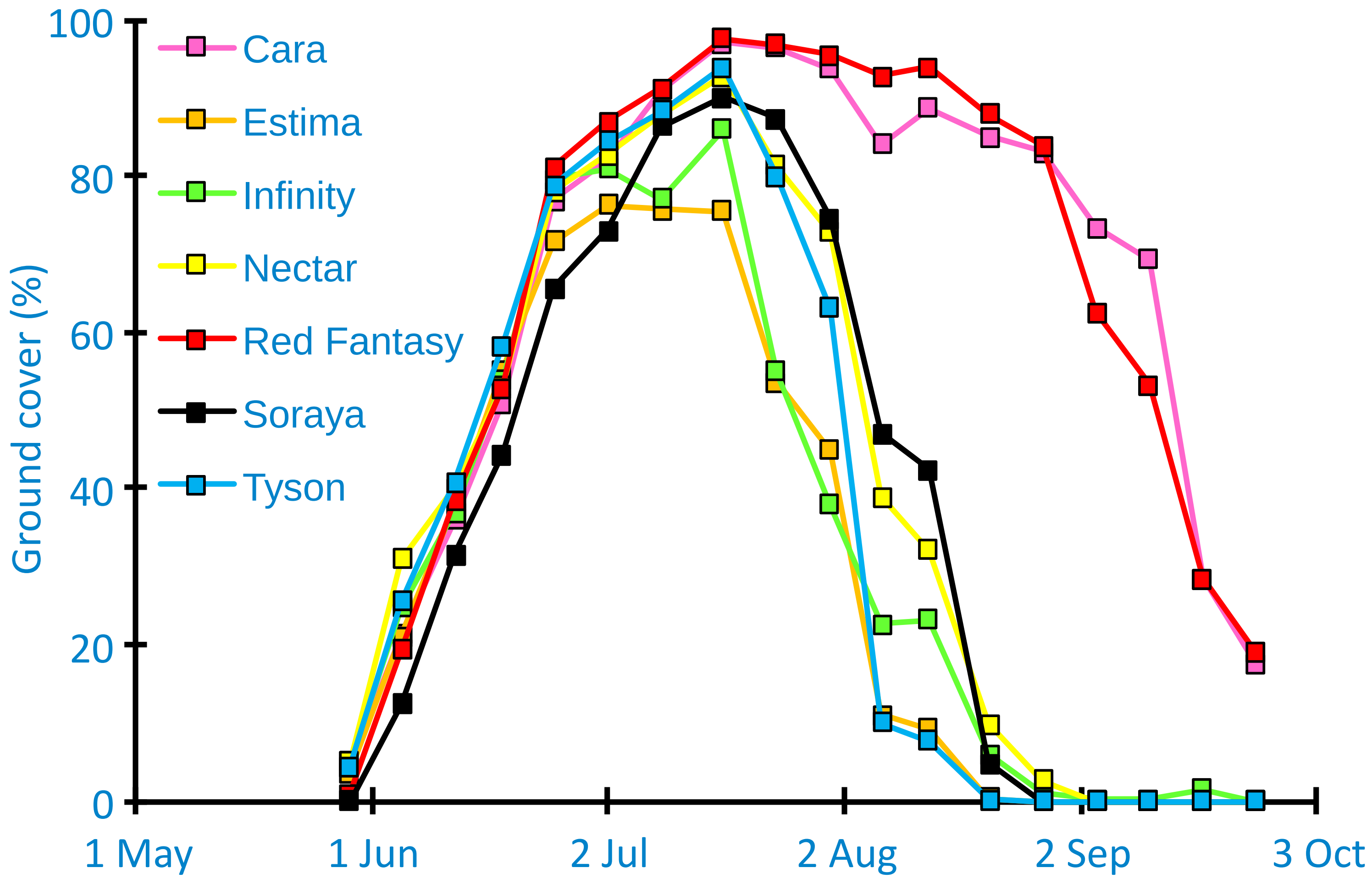
Above ground nodes NIAB



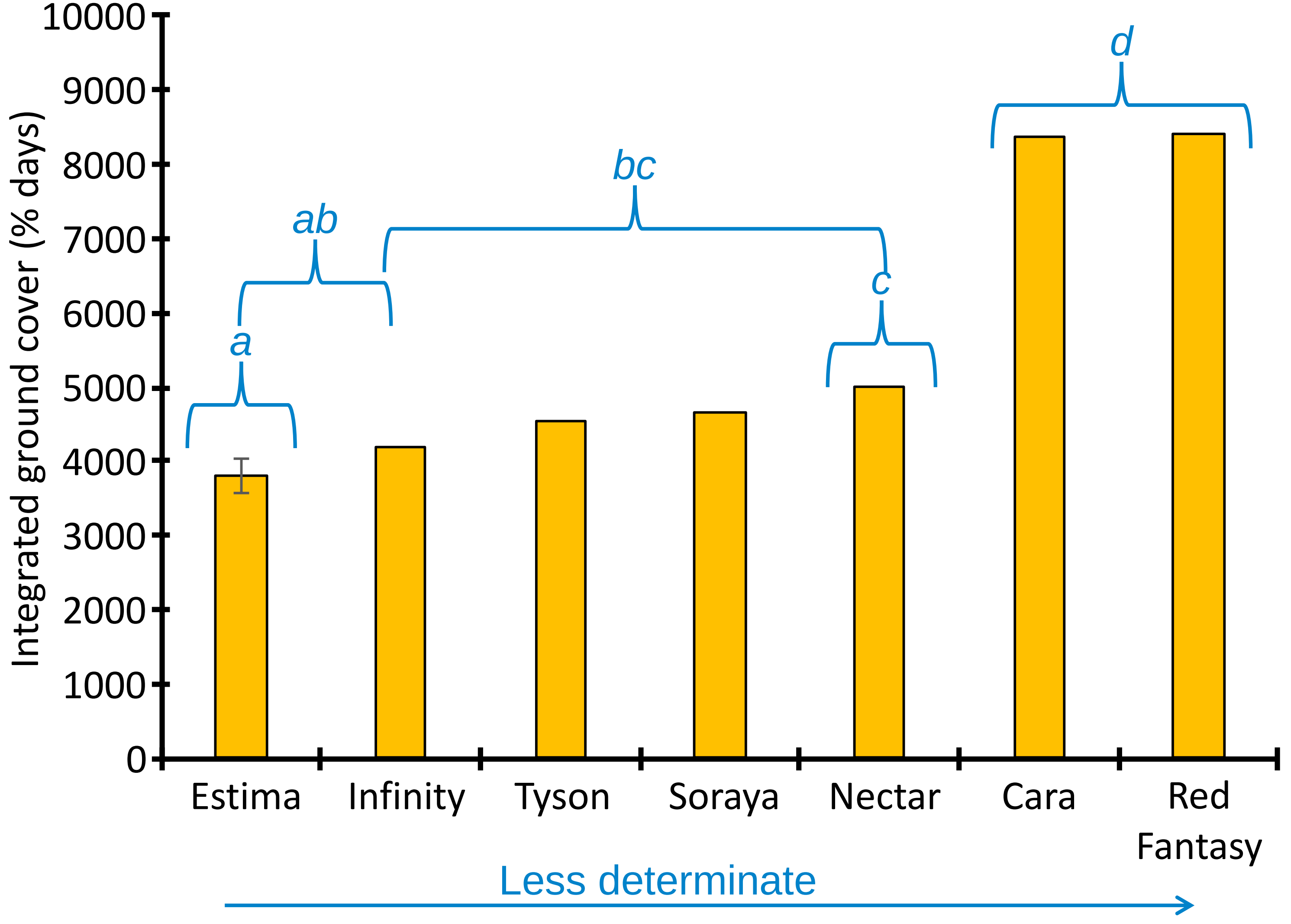
Calculation used to estimate Nitrogen Grouping of a new variety

Varieties grown in similar conditions	Nitrogen Group	Number of main-axis leaves > 5 mm (mean of five stems)	Change in number of leaves per Nitrogen Group	Difference in the number of leaves between the New Variety and Estima	Difference in number of leaves converted to change in Nitrogen Group	Estimate of Nitrogen Group of New Variety	Rounding value to nearest whole Nitrogen Group
Markies	4	38	= (38 – 19) ÷ (4 – 1) = 6.3				
Estima	1	19					
New variety	Unknown	24		= (24 – 19) = 5	= (5 ÷ 6.3) = 0.8	= (1 + 0.8) =1.8	2

Ground cover development NIAB



Integrated ground cover NIAB

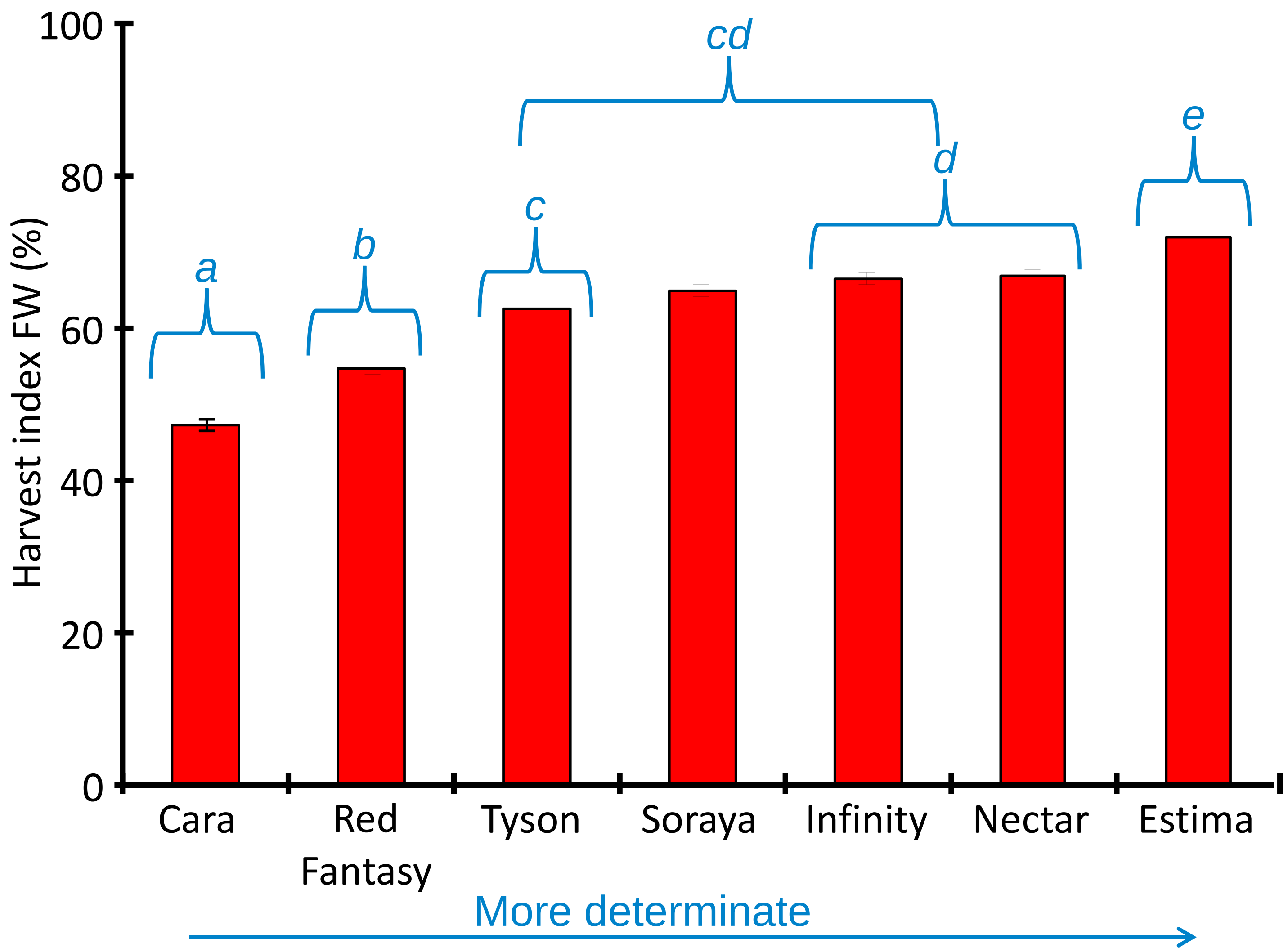


Analysis of historic data

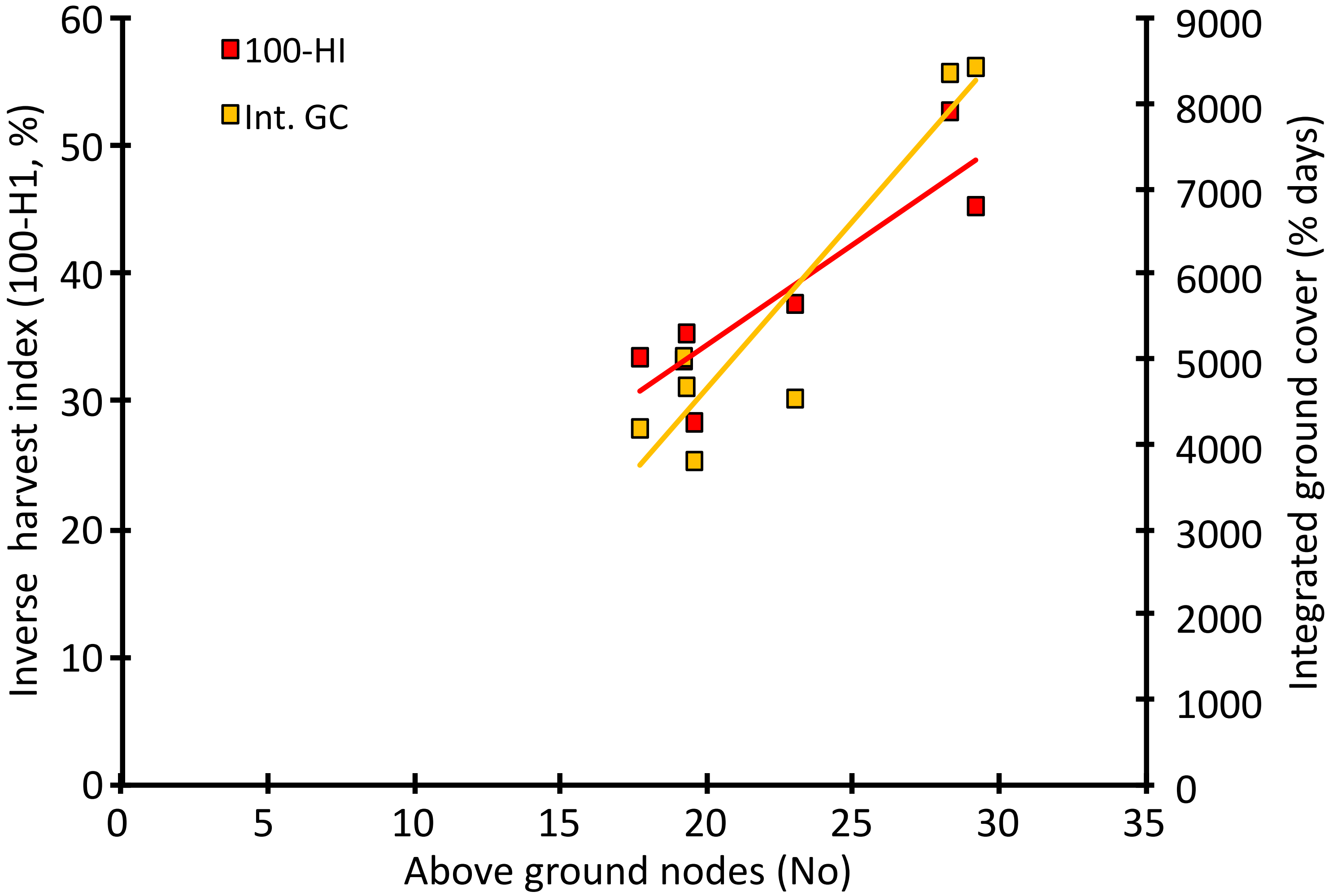
	Number of crops	Integrated GC (% days)
Lady Claire (2)	23	6459 ± 227.5
Lady Rosetta (2)	105	6566 ± 140.3
Linton	12	6676 ± 359.9
Saturna (3)	52	7125 ± 165.6
Shelford	26	7135 ± 159.2
Markies (4)	6	7147 ± 455.6
VR808	65	7436 ± 96.6
Infinity	5	7460 ± 232.1
Arsenal	37	7488 ± 181.4
Hermes (3)	55	7711 ± 145.8
Brooke	5	8028 ± 221.1

Values in brackets are determinacy groups in Nutrient Management Guide

Fresh weight harvest index NIAB (55 DAE)



Relationship between metrics NIAB



AHDB

AHDB Nutrient Management Guide (RB209). May 2017

Nitrogen recommendations

Identifying the variety determinacy group

Nitrogen recommendations split potato varieties into one of four groups according to their degree of determinacy (a measure of the crop's capacity to maintain leaf production after the first appearance of flowers). AHDB research at NIAB-CUF has consistently shown that for a given length of growing season, indeterminate varieties (variety groups 3 and 4) require less nitrogen than determinate varieties (variety groups 1 and 2).

The variety groups shown in Table 5.9 include the ratings for those varieties included in previous editions of this guide and for other varieties based on NIAB trials and breeder/agent experience of foliage habit (determinacy is not the same as the NIAB foliage-maturity score).

In addition, factors such as total nutrient balance, water availability and seed management, will also influence foliage longevity. The list is provided as an indication of determinacy groups but you are advised to seek the latest information from your agronomist or seed supplier for any particular variety.

Table 5.9 Variety determinacy groups

Information provided by NIAB-CUF and AHDB

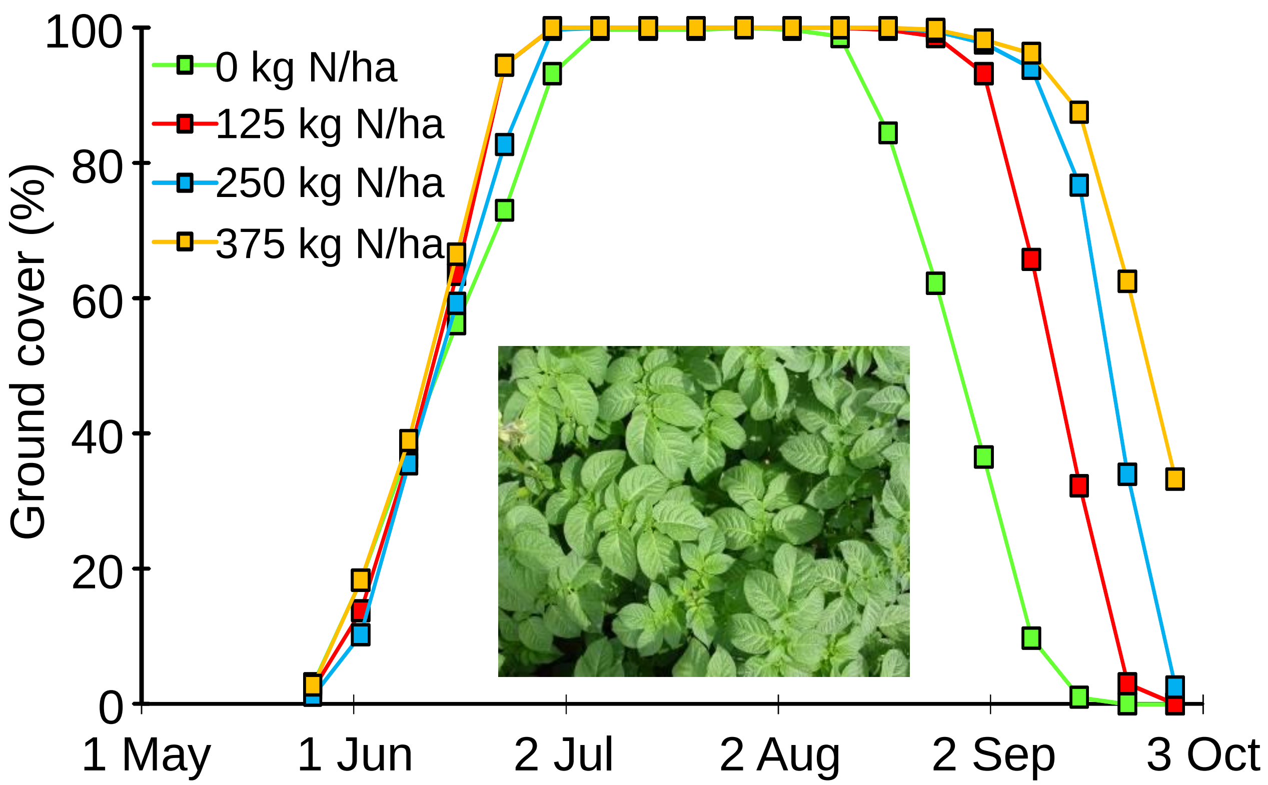
	Group			
	1	2	3	4
	Determinate varieties	Partially determinate varieties	Indeterminate varieties	
	Short haulm longevity	Medium haulm longevity	Long haulm longevity	Very long haulm longevity
Variety	Accord	Atlantic	Agria	Asterix
	Annabelle	Amanda	Ambo	Cara
	Anya	Arcade	Amora	Lady Balfour
	Colmo	Carlingford	Cabaret	Markies
	Estima	Charlotte	Caesar	Royal
	Innovator	Courage	Cosmos	Vales Everest
	Maris Bard	Dundrod	Cultra	Vales Sovereign
	Minerva	Endeavour	Daisy	
	Premiere	Harmony	Desiree	
	Rocket	Juliette	Eos	
	Vales Emerald	Kestrel	Fambo	
	Winston	Lady Claire	Fianna	
		Lady Rosetta	Hermes	
		Marfona	Kerr's Pink	
		Maris Peer	King Edward	
		Maritiema	Lady Christl	
		Melody	Lady Valora	
		Miranda	Maris Piper	
		Mozart	Morene	
		Nadine	Navan	
		Nicola	Pentland Dell	
		Orchestra	Pentland Squire	
		Orla	Picasso	
		Osprey	Record	
		Pentland Javelin	Rooster	
		Rembrandt	Russet Burbank	
		Romano	Sante	
		Saxon	Sassy	
		Shannon	Saturna	
		Shepody	Slaney	
		Vivaldi	Stemster	
		Wilja	Valor	
			Victoria	

Greenvale AP
Natural choice for fresh potatoes

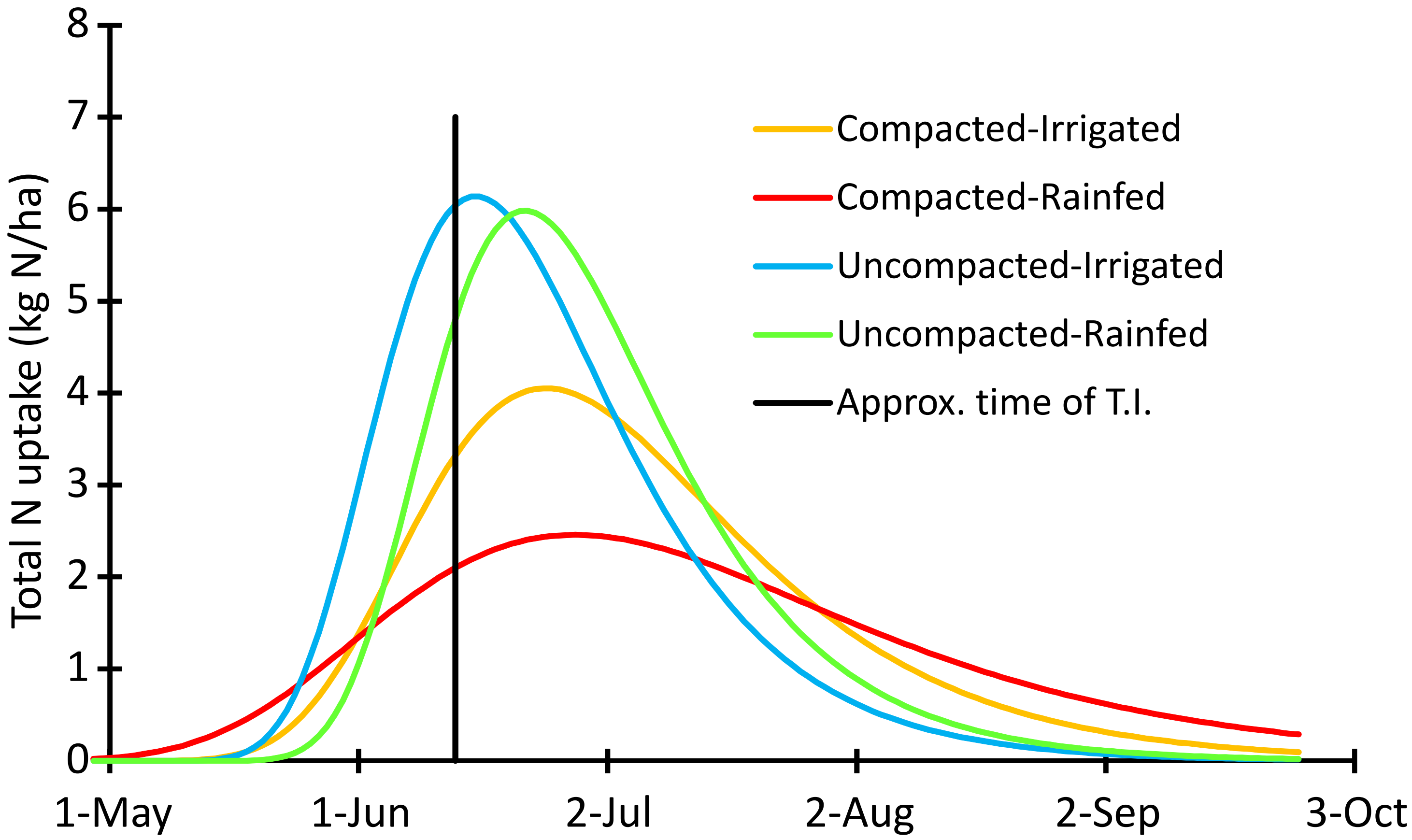
cygnet PB

NIAB CUF

Effect of N application rate on canopy persistence in Brooke (CUF 2007-9)



Effect of compaction and irrigation on nitrogen uptake. Maris Piper CUF 2006

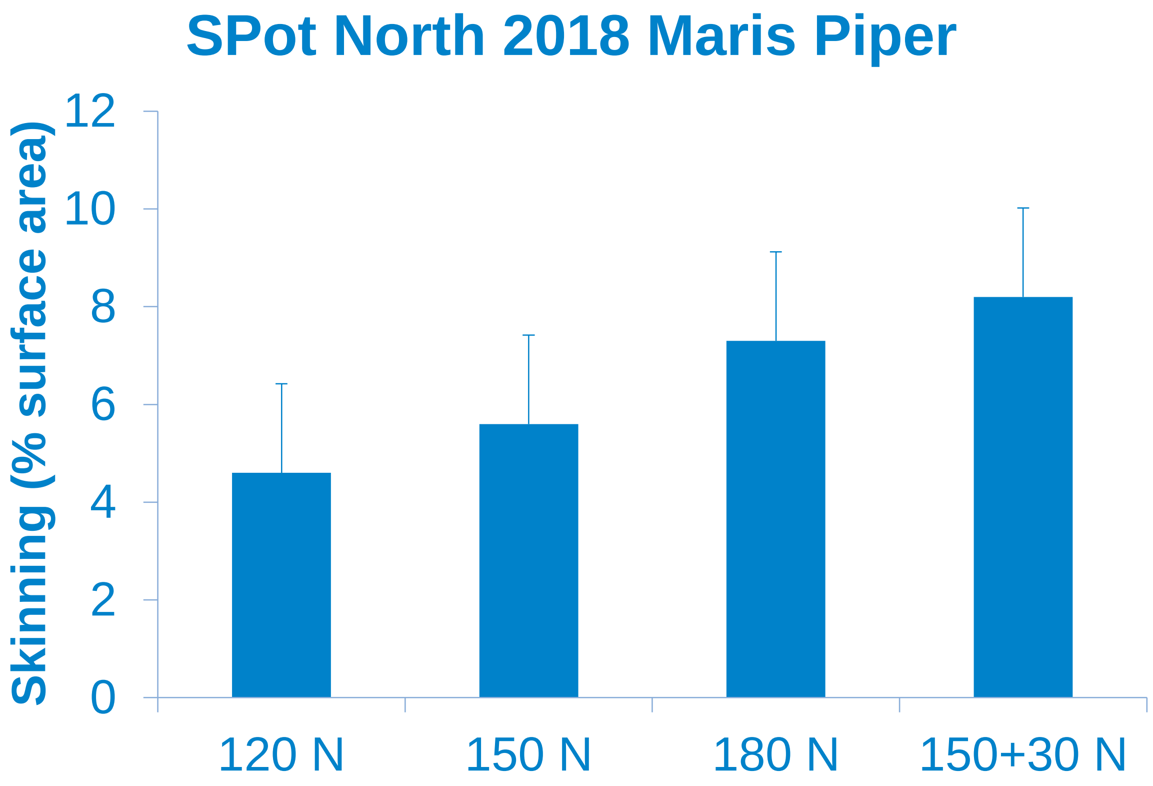


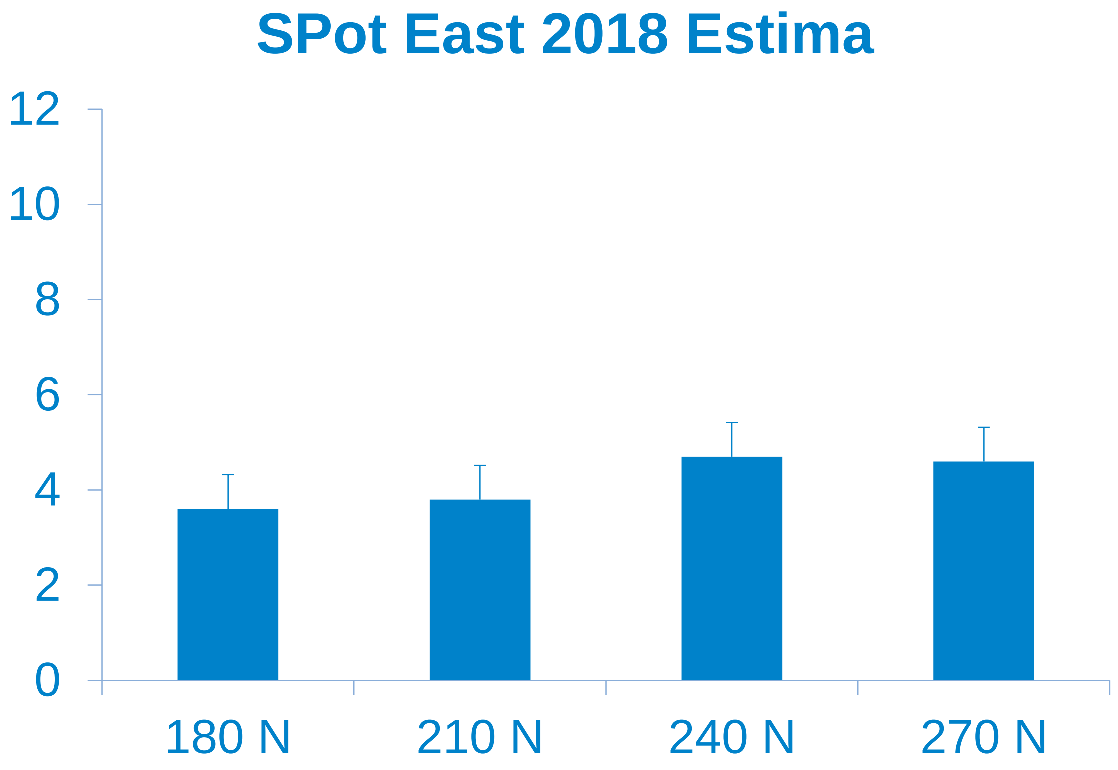
No effect of N rate on black dot

Nitrogen	Incidence (%)	Proportion <5 % SA (%)	Severity (% SA)
180	56.4	74.8	4.97
210	55.4	74.8	6.12
240	50.2	77.0	5.65
270	57.5	73.9	5.60
S.E. (30 D.F.)	3.60	2.83	0.783

Source: SPot East 2018

Increased N delays skinset





Summary

- Spotlight and/or Gozai straights or combinations all similar, but only 2-4 days slower in killing leaves than Reglone or Saltex. Pelargonic acid slowest to act
- Spotlight/Gozai combinations no different to Reglone, flail, haulm-pulling or Saltex in terms of skinset at 3 weeks post-T1
- No effect of defoliation method, chemical or timing on vascular browning or stem-end necrosis or stolon adhesion
- Timing, water volume and conditions of application need more work or publication of data held elsewhere
- Crops demonstrating signs of “active senescence” easier to kill
- Aiming for visible loss of ground cover before chemical desiccation if possible
- Need to know season length and determinacy group for optimal N management
- Reduce insurance N: 28 kg is a 14 % reduction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Agronomists' Conference 2019

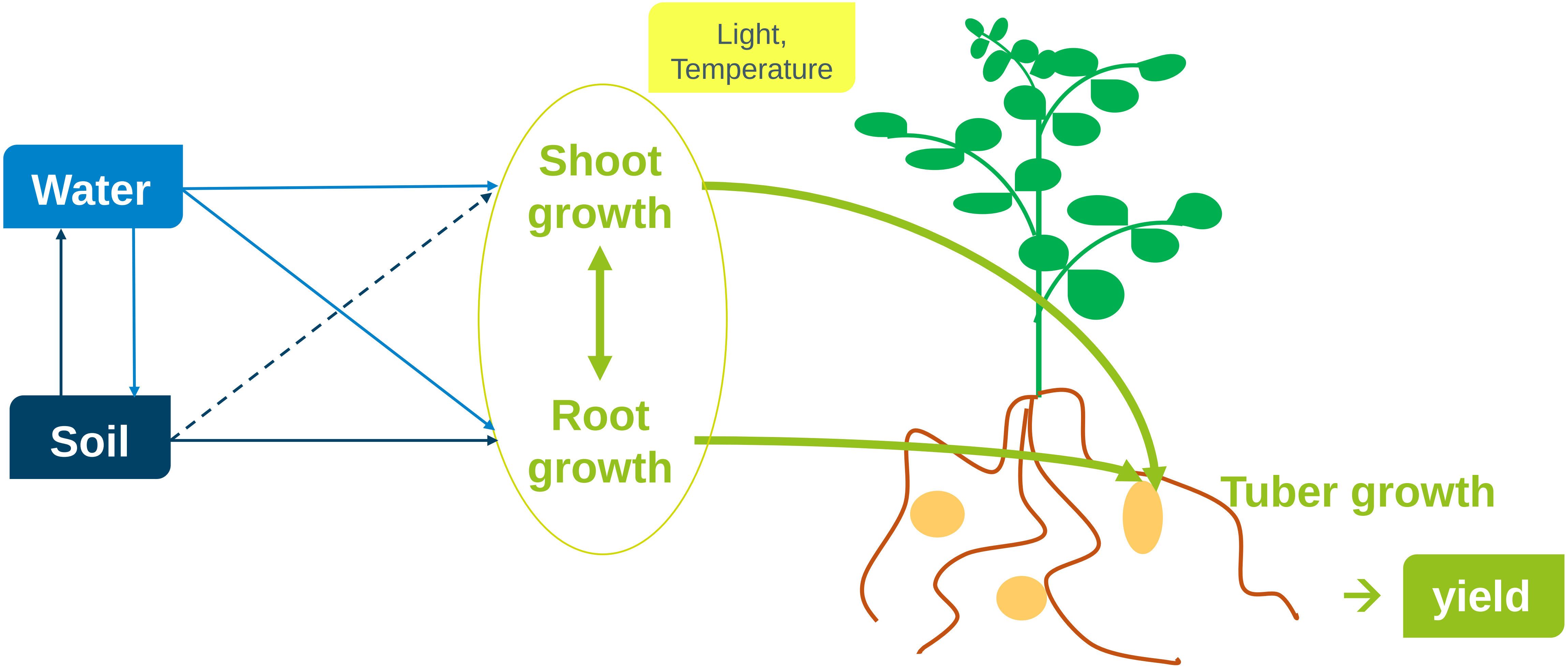
Rooting and Water Uptake

Katharina Huntenburg

AHDB

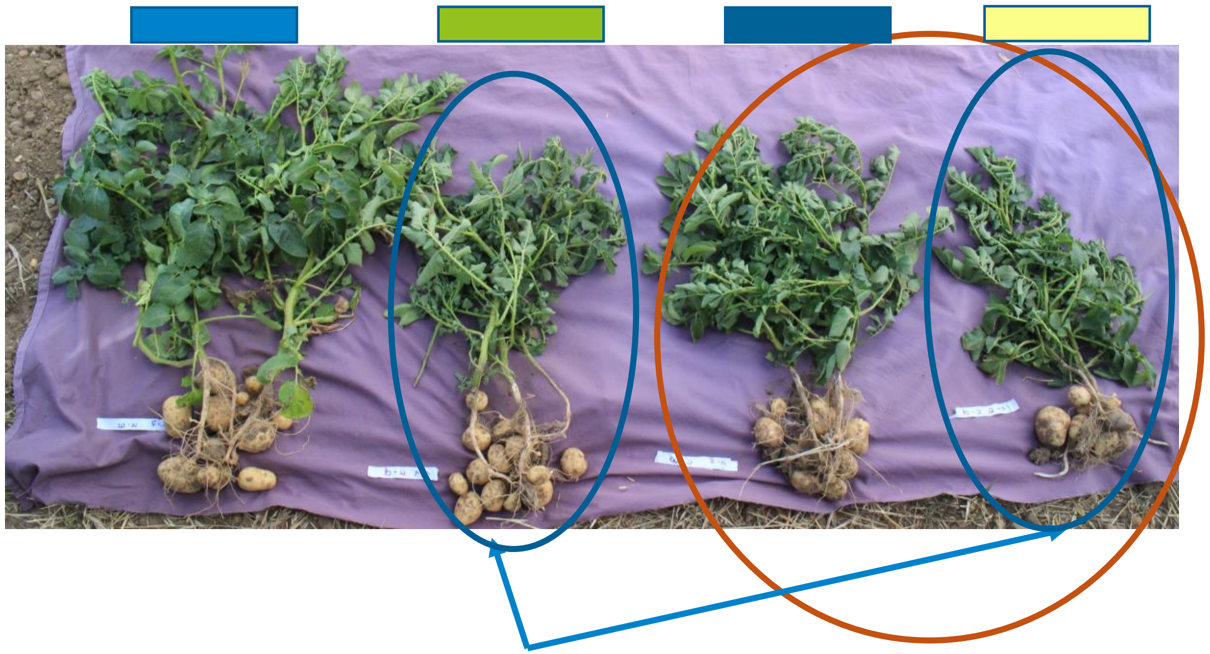
POTATOES

Soil conditions impact the whole plant

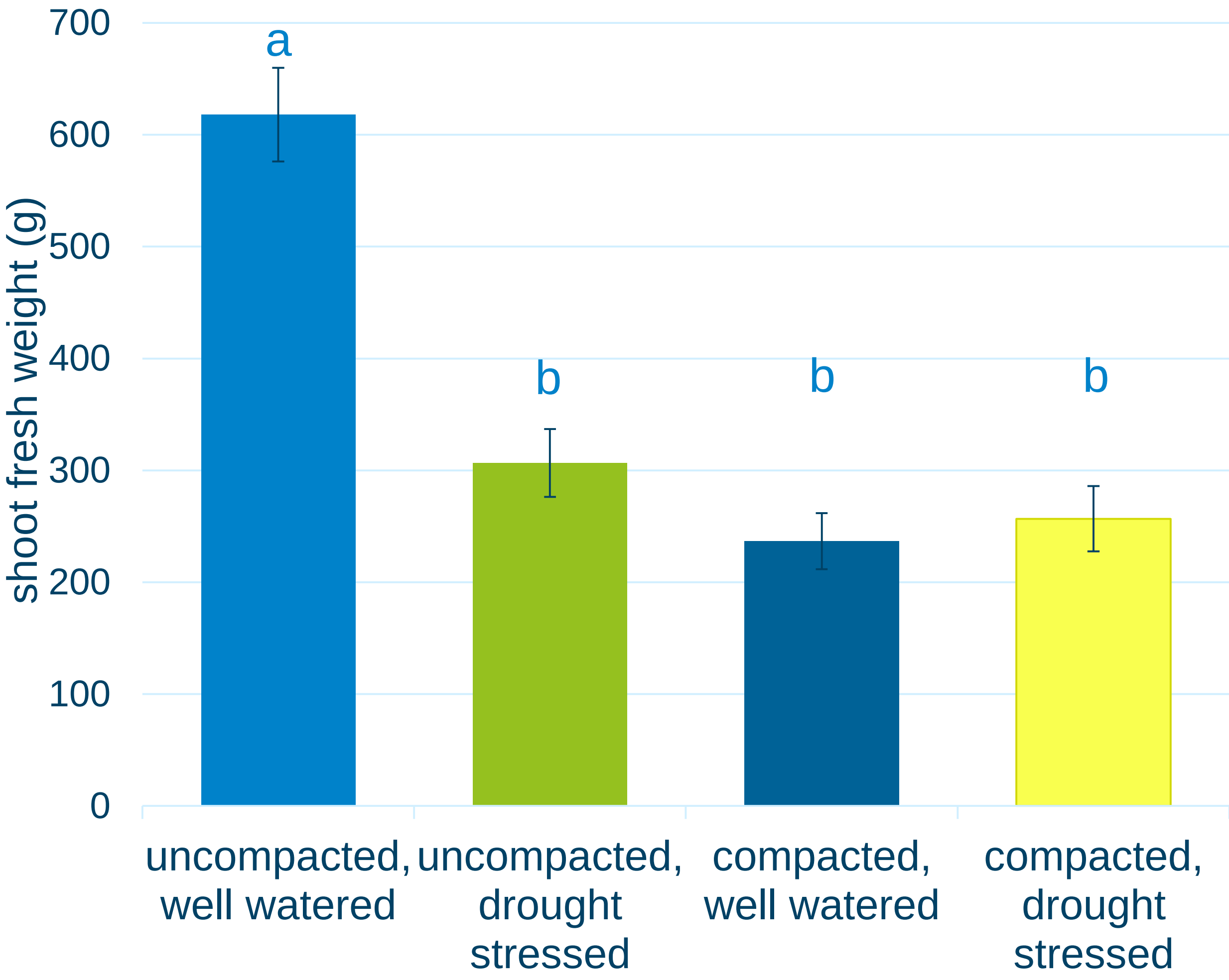


Drought and Compaction limit shoot growth

2018

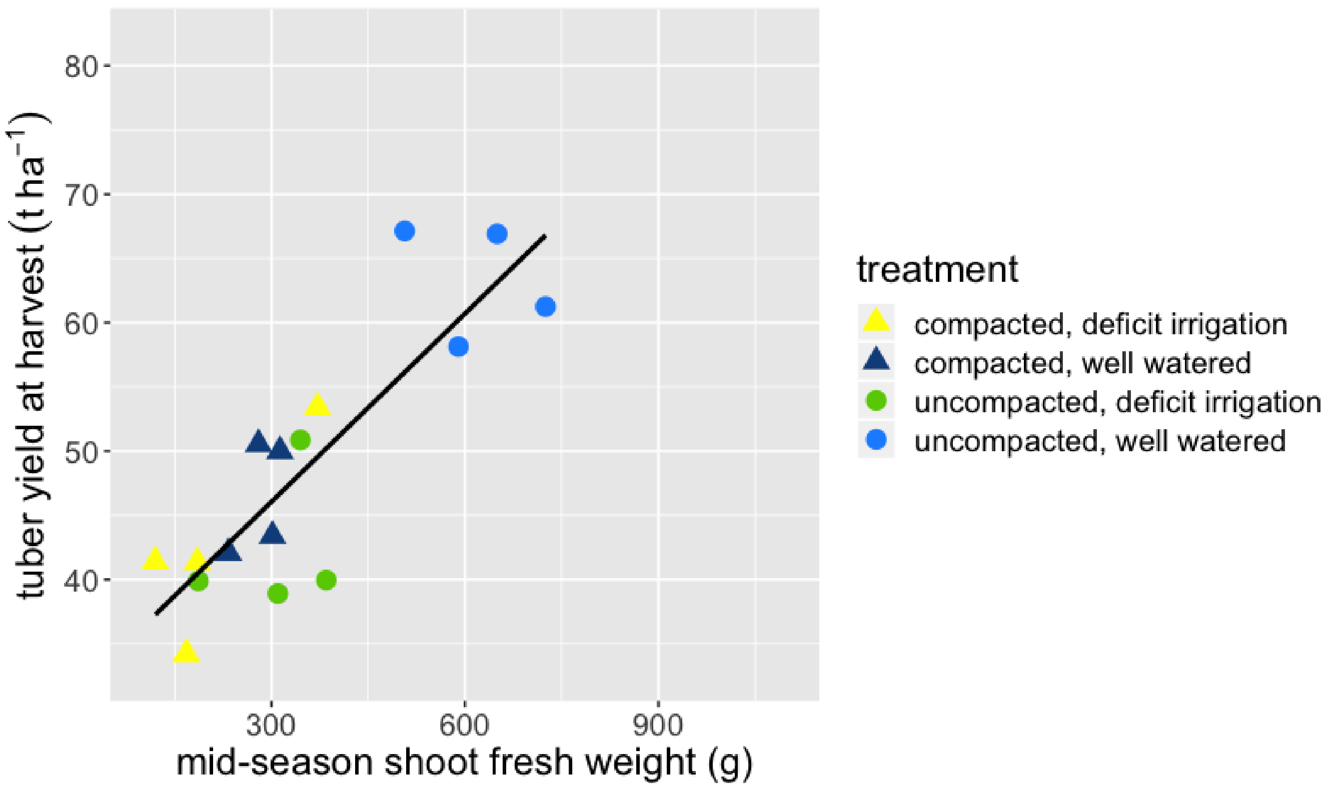


2018

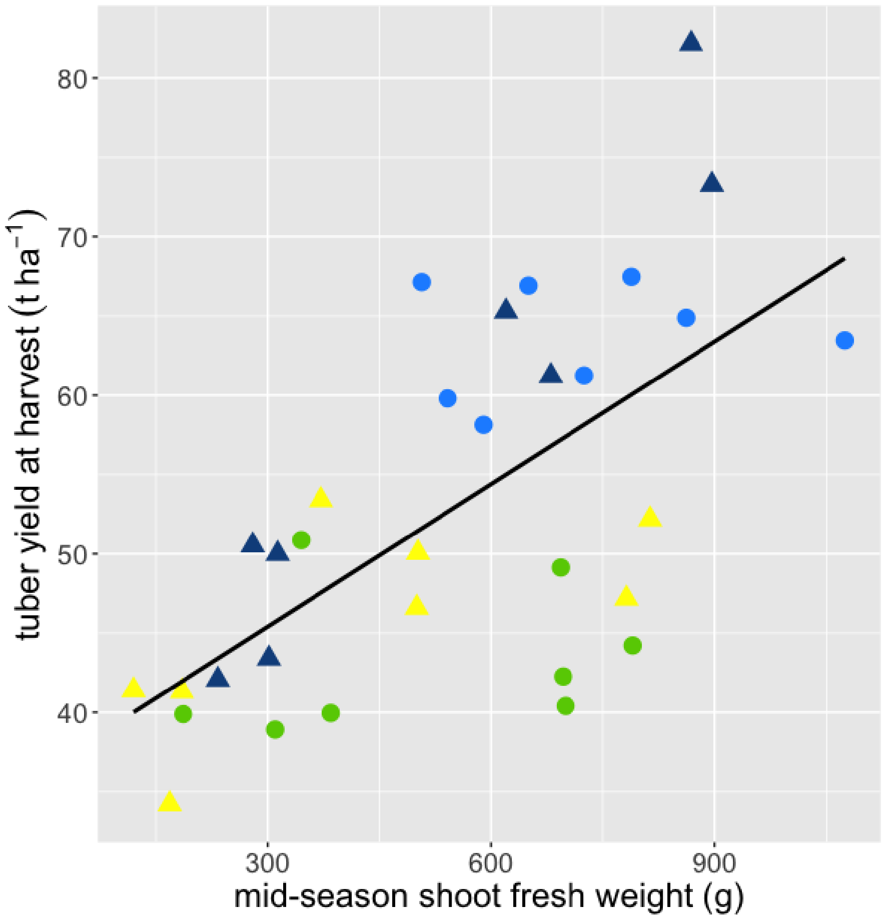


Biomass mid-season predicts yield

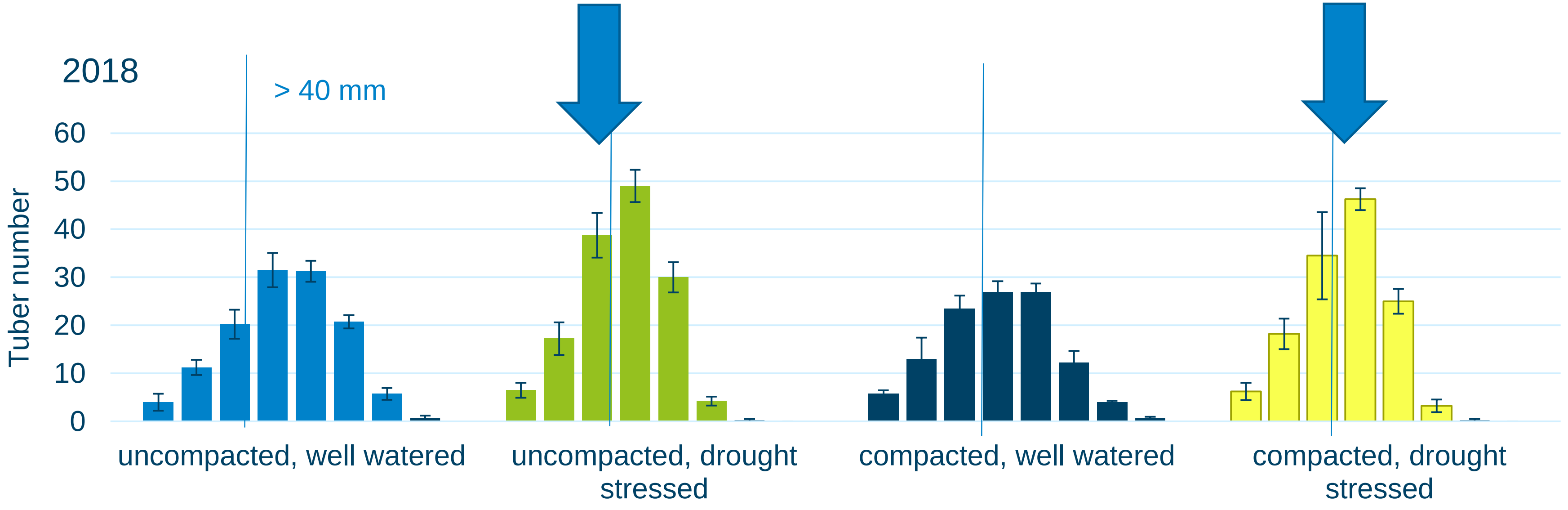
2018

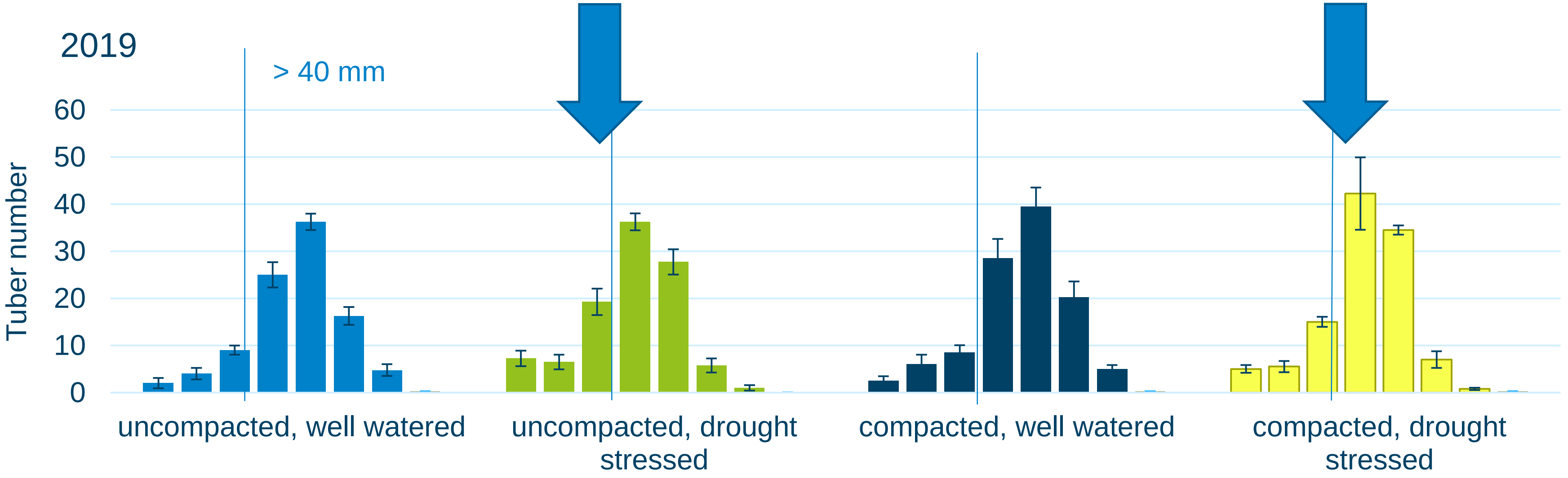


2018 and 2019 combined

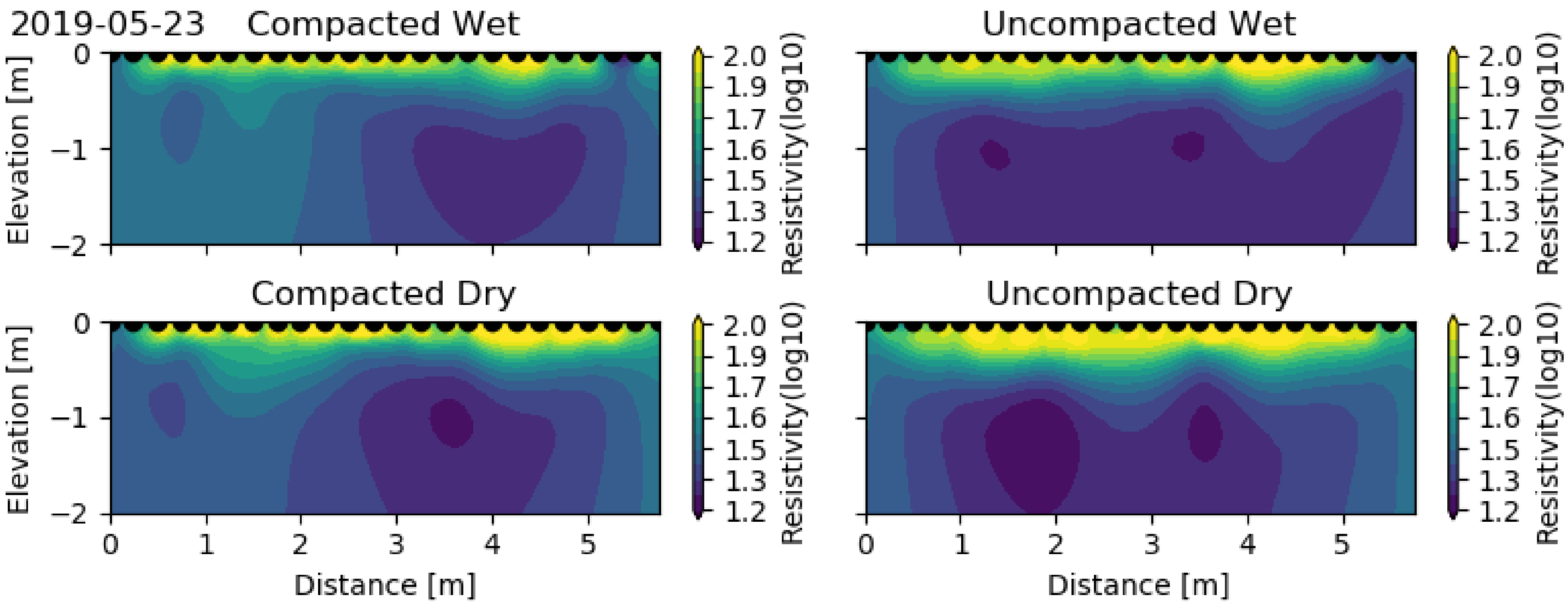


More small tubers under drought stress





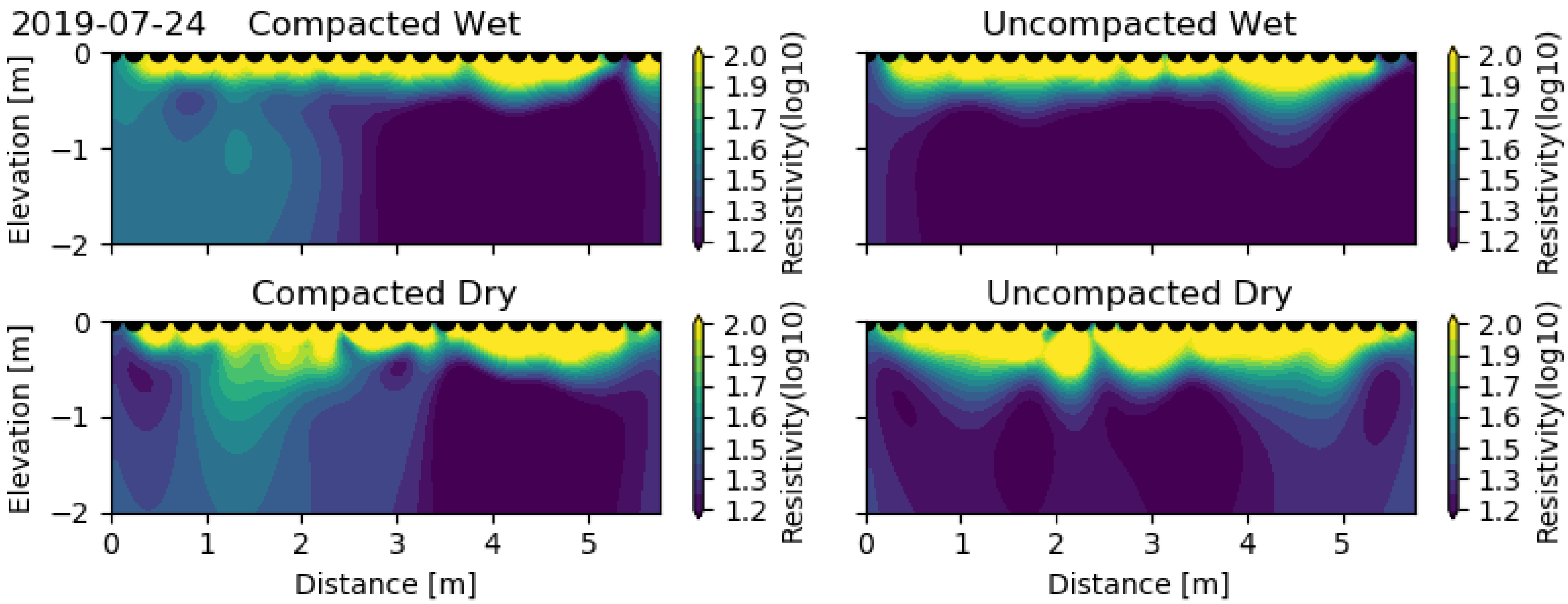
Water extraction depth in May 2019



- Drought stressed plants extract water in deeper layers
- Plants in compacted soil show shallower water extraction

Measurements and Data analysis: G.Blanchy

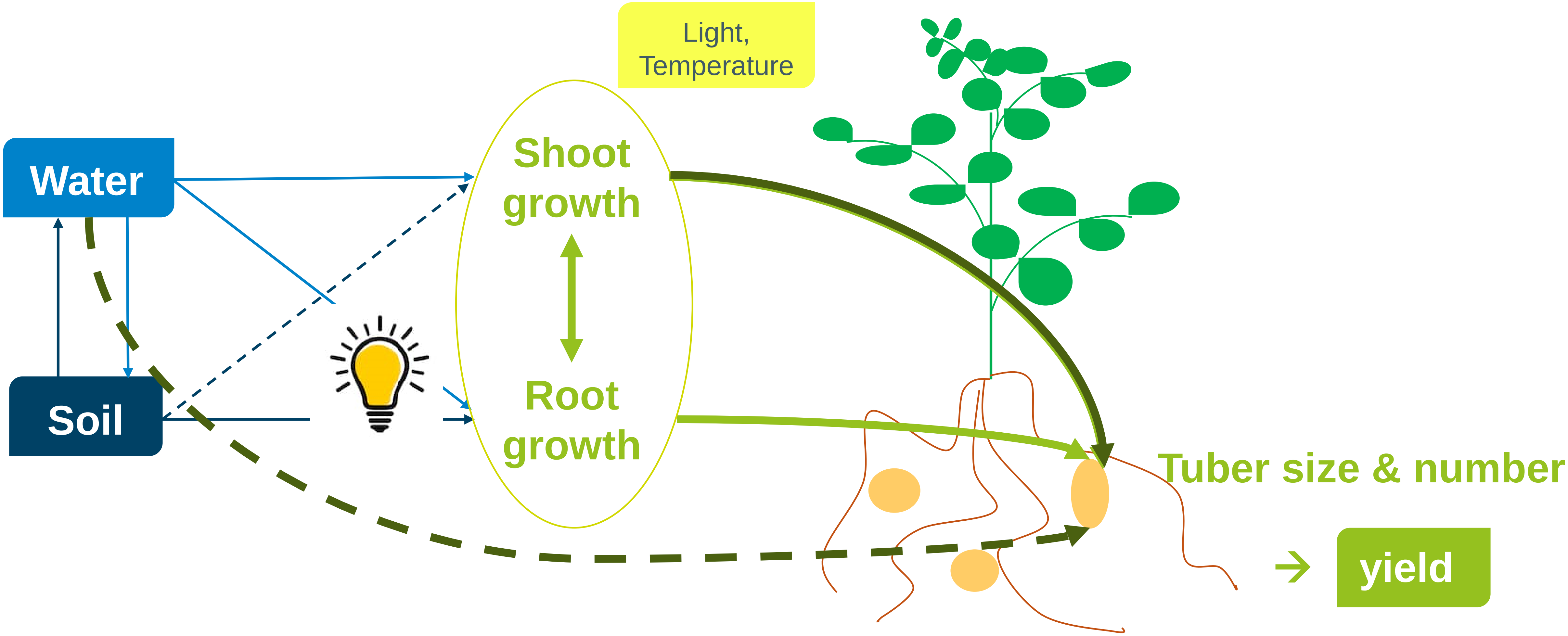
Water extraction depth in July 2019



- Drought stressed plants extract water in deeper layers
- Plants in compacted soil show shallower water extraction

Measurements and Data analysis: G.Blanchy

Soil conditions and irrigation impact yield




Thank you!