PCN Action Scotland: Demonstration trials results

Philip Burgess (scottishpotatoes.org) and
Eric Anderson (Scottish Agronomy ltd)

Fosthiazate and Nemathorin 10G: Where are we?

- EU: Expiry is 31 October 2023 (Note Northern Ireland under EU rules).
- UK: Authorisation ends on 31st October 2024.
- ISK (approval holder) with Syngenta are committed to supporting registration of the a.i. in both GB and EU.
- Nematicide stewardship (https://nspstewardship.co.uk/) vitally important role.
- If Nemathorin is not available, the only remaining product with a PCN approval will be Velum Prime (fluopyram)

Nemathorin availability	
2023	Yes
2024	Yes
2025	Maybe

NSP nematicide stewardship programme

BioSS · The James Hutton Institute · Plant Health Centre Scotland's Centre of Expertise · Scottish Agronomy Ltd · SASA · Scottish Government Riaghaltas na h-Alba gov.scot · soilessentials precision farming solutions · SRUC

Growers taking proactive action to tackle PCN – Neill Smith, Barnyards, Tannadice, Angus

Plant Health Centre
Scotland's Centre of Expertise

Scottish Government
Riaghaltas na h-Alba
gov.scot

PCN
ACTION SCOTLAND

400 acres of ware potatoes.
Suspected PCN when yields began decreasing.

- Adopted an **integrated pest management (IPM)** approach for PCN
- **Soil** is sampled after lifting potatoes to allow time to plan the rotation for PCN management if needed.
- **Rotation** – Extended to a 1 in 6-year rotation for potatoes
- **Resistant Varieties** - Grows *G. rostochiensis* and *G. pallida* resistant varieties where possible.
- **Cover Crop** – Uses oilseed radish as a cover crop to control FLN and PCN, sometimes sacrificing a crop of spring barley to help the cover crop reach its full potential.
- **Nematicides** - Applies nematicides to protect yields in infested fields.
- Open to new approaches – Possible use of chitinous soil amendment.


Neill Smith – How I manage PCN

PCN
ACTION SCOTLAND

WP8: Open Day on Tuesday 16th August 2022, Tannadice (courtesy of Mr Neill Smith, Barnyards).

Plant Health Centre
Scotland's Centre of Expertise

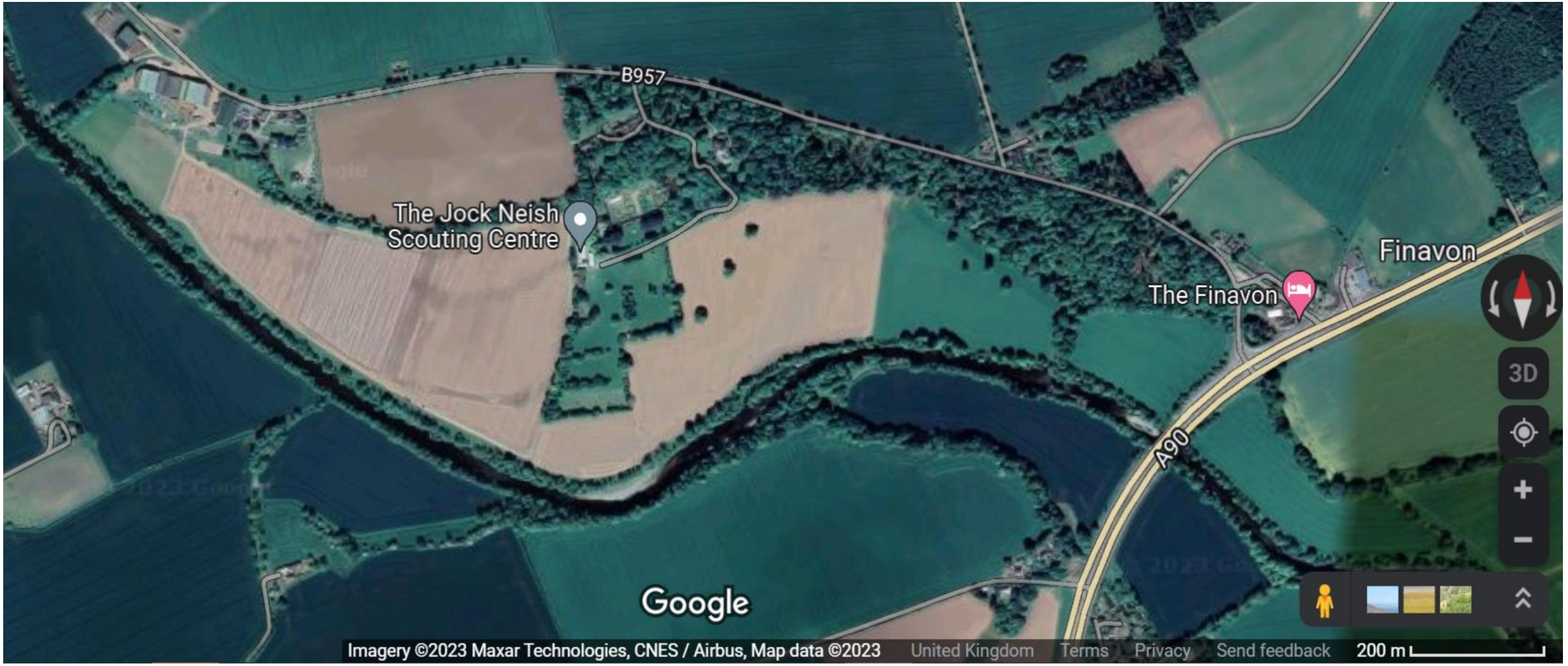
Scottish Government
Riaghaltas na h-Alba
gov.scot

1. Why should I be worried about PCN?
2. Are there any varieties available to reduce the problem?
3. How do I know I have PCN?

- Resistant varieties for Scotland
- IPM in practice
- Tolerance in the field
- Local engagement
- Groundkeeper control
- Soil amendments
- Retailer and landowner engagement

PCN
ACTION SCOTLAND

Trial site: Barnyards



Trial details

Soil Type	Sandy Loam
Planting Date	02/05/2022
Field last in Potatoes	2016
Soil Temperature at Planting	12˚C
Fertiliser	As per field crop
Herbicides - 10/05/2021	Praxim 3.0 l/ha Defy 4.0 l/ha Gozai 0.4 l/ha Toil 1.0 l/ha
Fungicides & Insecticides	As per field crop
Desiccation Product and Rate	T1 - Flail T2 - Spotlight Plus 1.0 l/ha
Date Harvested	24/09/2022
Trial Type	4 Replicate Factorial Trial

Soil Analysis

pH	5.2
Sand	71.2
Silt	15.8
Clay	13.1
OM	2.45

Fertiliser applied		
Nitrogen	Phosphate	Potash
210 kg/ha	180 kg/ha	350 kg/ha

Name	Breeder	Parentage	Maturity	Seed spacing	G. rostoch resistance	G. pallida resistance	Powdery scab	Blackleg	Common scab
Cara	IPM	Ulster Glade x A25/19	Late maincrop	30 cm	R	2	3	6	7
Maris Peer	PBI Cambridge	120/13 x Ulster Knight	Second early	31 cm	2	2	6	4	5
Elland	Cygnet	Golden Millenium x Innovator	Early maincrop	38 cm	3	9	4	6	6
Innovator						8	7	5	6
Eurostar						9	4	4	5
Buster						9	4	6	7
Amanda						8	7	6	7
Karelia	Europlant Greenvale AP)	III 61659230 x Wentow 58 7 49	Medium early	35 cm	8	8		High	High - Very High
Cinderella	Cygnet	Crisps4all x 12601 AB1	Early	50 cm	R	(6)	7		(6)?
Lanorma	Branston	Bydand x Caesar	Early maincrop	32 cm	9	5	4	4	7
Tyson	Stet	Sylvana x Cyrano	Maincrop	25 cm	1	4			6

All planted with and without Nemathorin @ 30kg/ha


PCN
ACTION SCOTLAND
PCN
ACTION SCOTLAND
PCN
ACTION SCOTLAND
SCOTTISH
AGRONOMY LTD
INDEPENDENT TRIALS

SCOTTISH AGRONOMY LTD

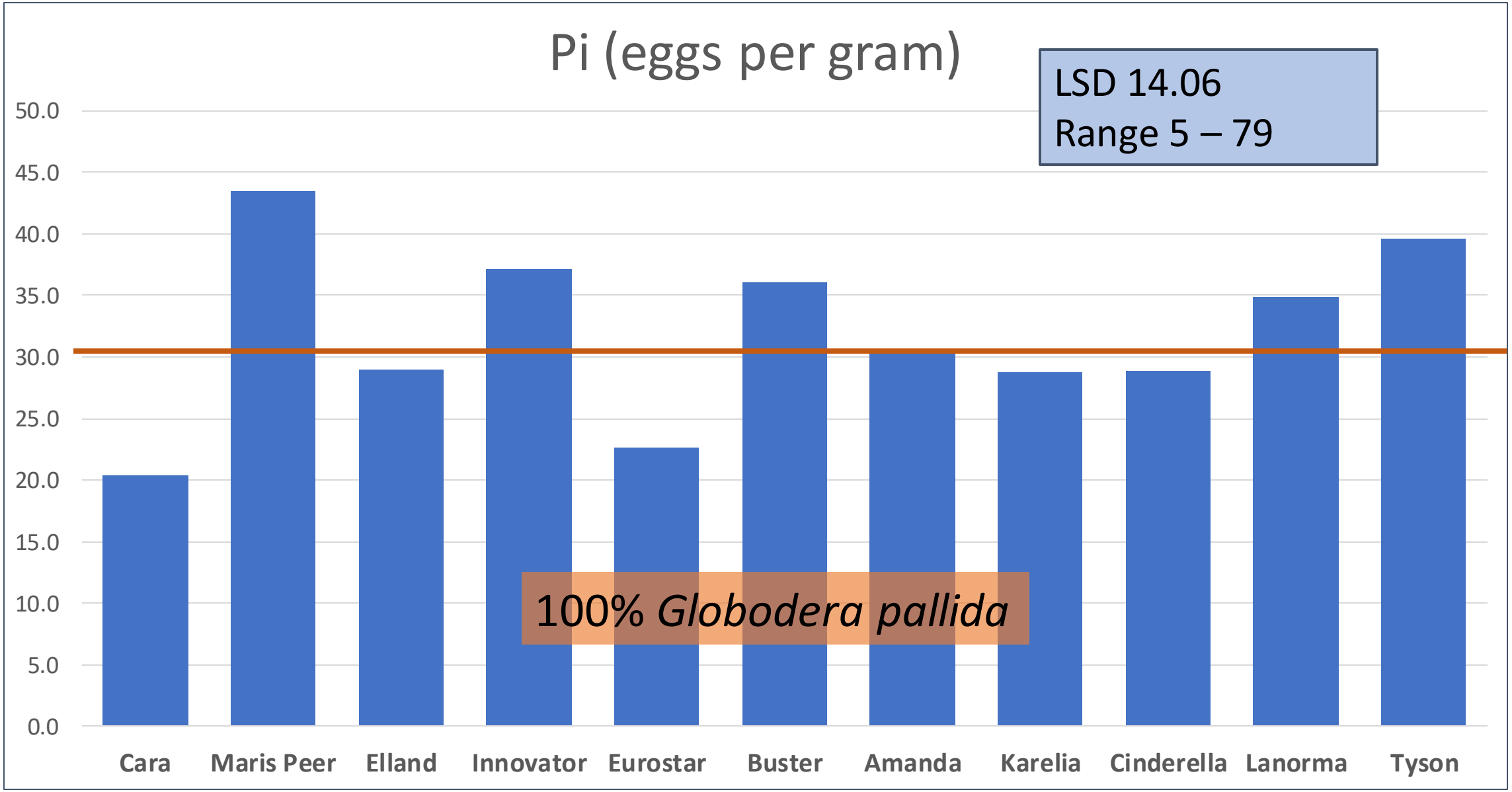
With Nematicide

Untreated

Tyson	Lanorma	Cinderella	Karelia	Amanda	Buster	Eurostar	Innovator	Elland	Maris Peer	Cara

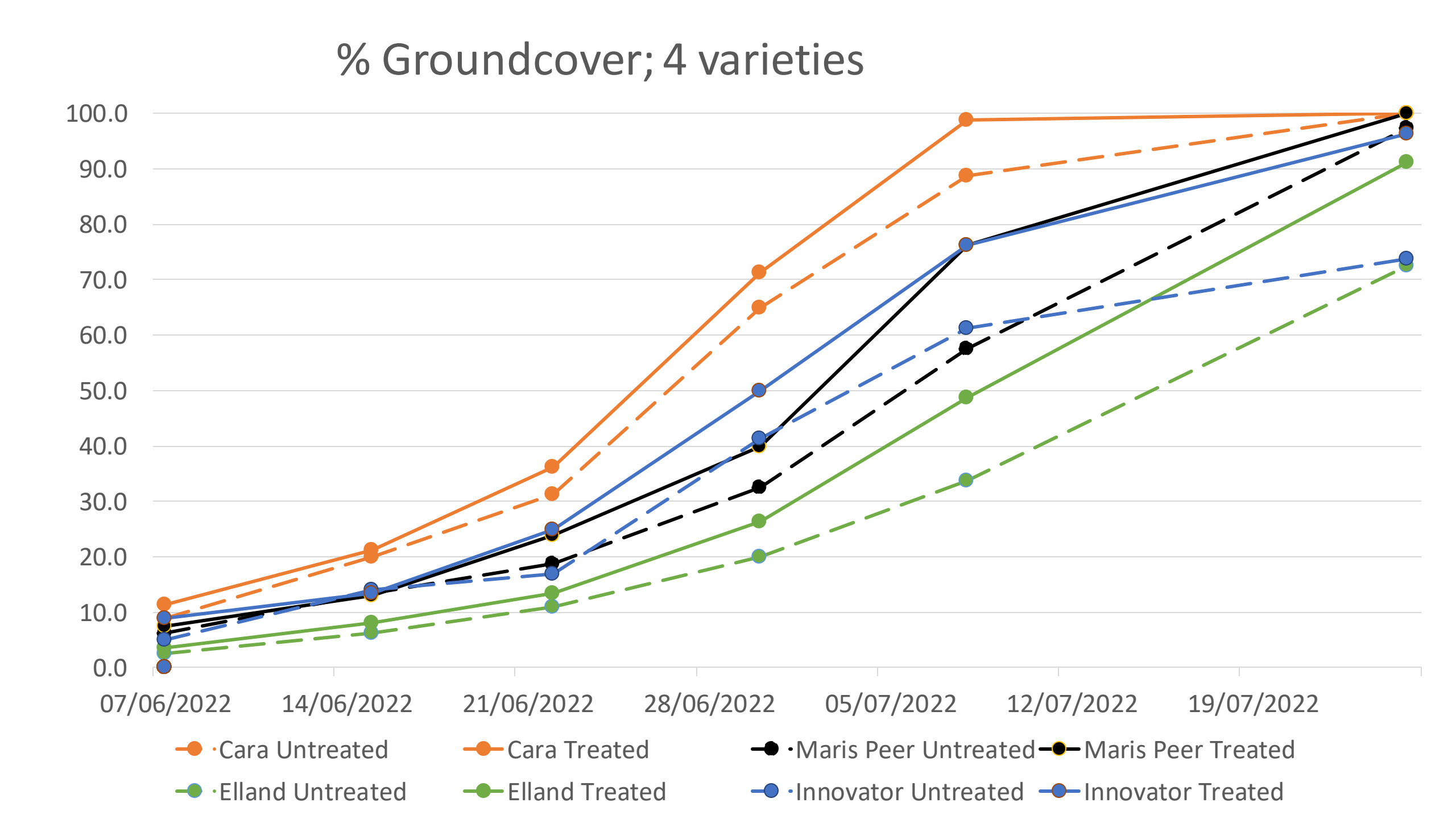
Demonstration replicate: 4 replicates in total (factorial trial)

How much PCN was present on the site?



What is the overall effect of on Nemathorin on the crop?

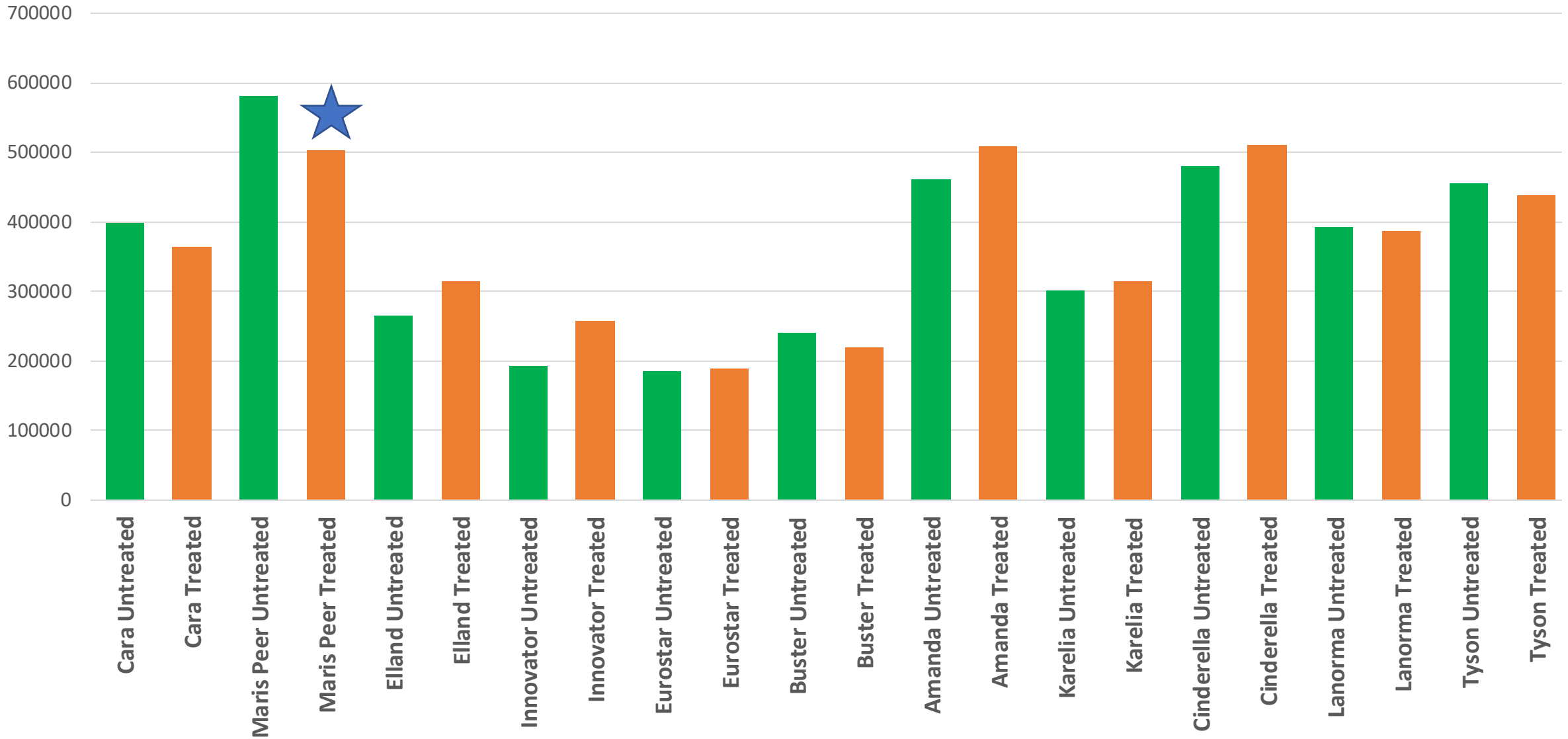
	Percentage ground cover								Stems		DM	
Treatment	**22 June**		**30 June**		**8 July**		**25 July**		**/3m**		**%**	
Untreated	18.3	b	39.9	b	63.2	b	90.5	b	35.4	a	18.2	a
30kg/ha Nemathorin	22.6	a	47.1	a	78.2	a	98.0	a	34.4	a	18.0	b
LSD (P>0.05)	1.43		2.30		3.22		2.64		2.29		0.14	

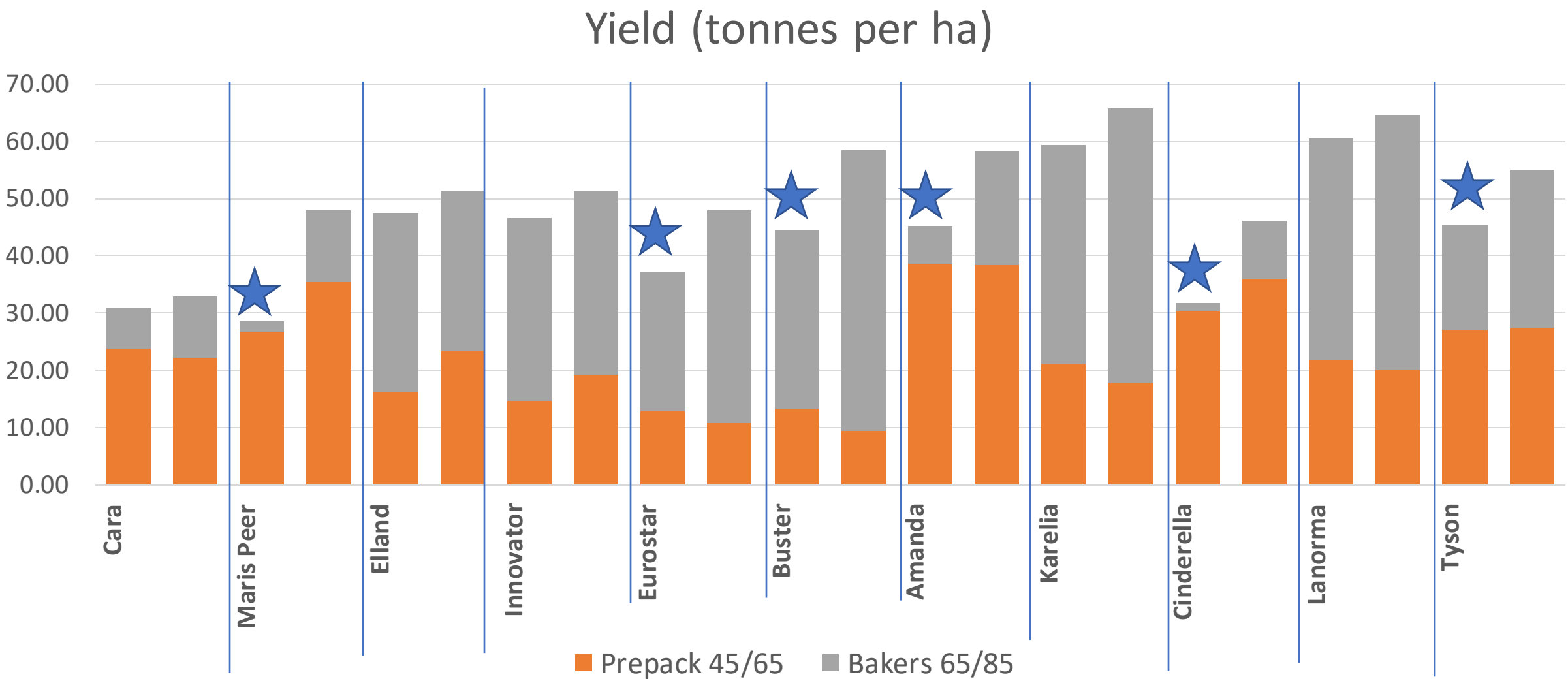

% Groundcover; 4 varieties
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
07/06/2022
14/06/2022
21/06/2022
28/06/2022
05/07/2022
12/07/2022
19/07/2022
Cara Untreated
Cara Treated
Maris Peer Untreated
Maris Peer Treated
Elland Untreated
Elland Treated
Innovator Untreated
Innovator Treated

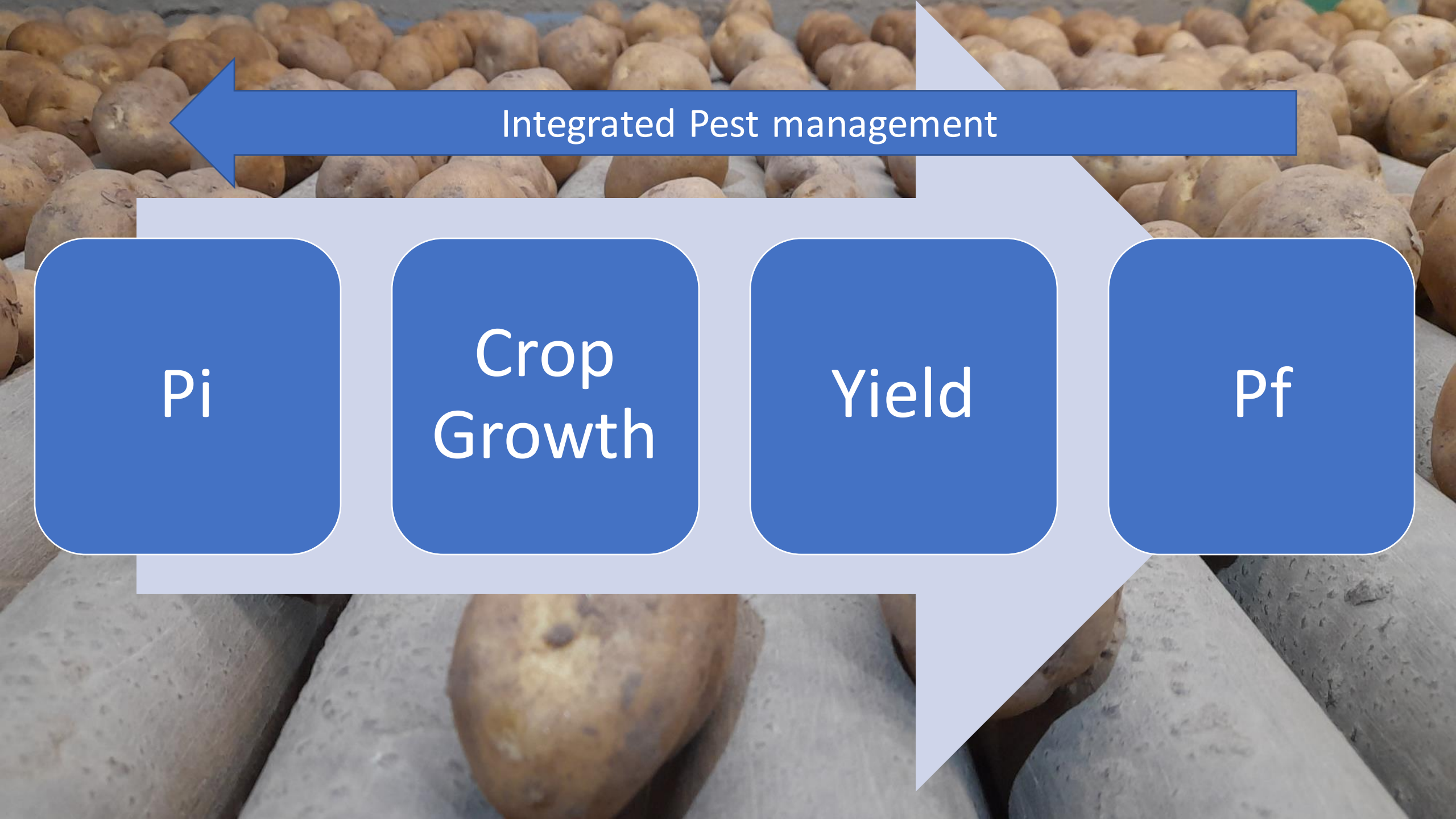
Effect Nemathorin on yield

Treatment	Total yield	45-65mm	>65mm
Untreated	47.87	22.54	21.63
30kg/ha Nemathorin	55.55	23.77	28.99
LSD P=.05	2.15	1.73	2.62

Tuber numbers (all grades), per ha




Yield (tonnes per ha)
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
Cara
Maris Peer
Elland
Innovator
Eurostar
Buster
Amanda
Karelia
Cinderella
Lanorma
Tyson
Prepack 45/65
Bakers 65/85


Integrated Pest management
Pi
Crop Growth
Yield
Pf

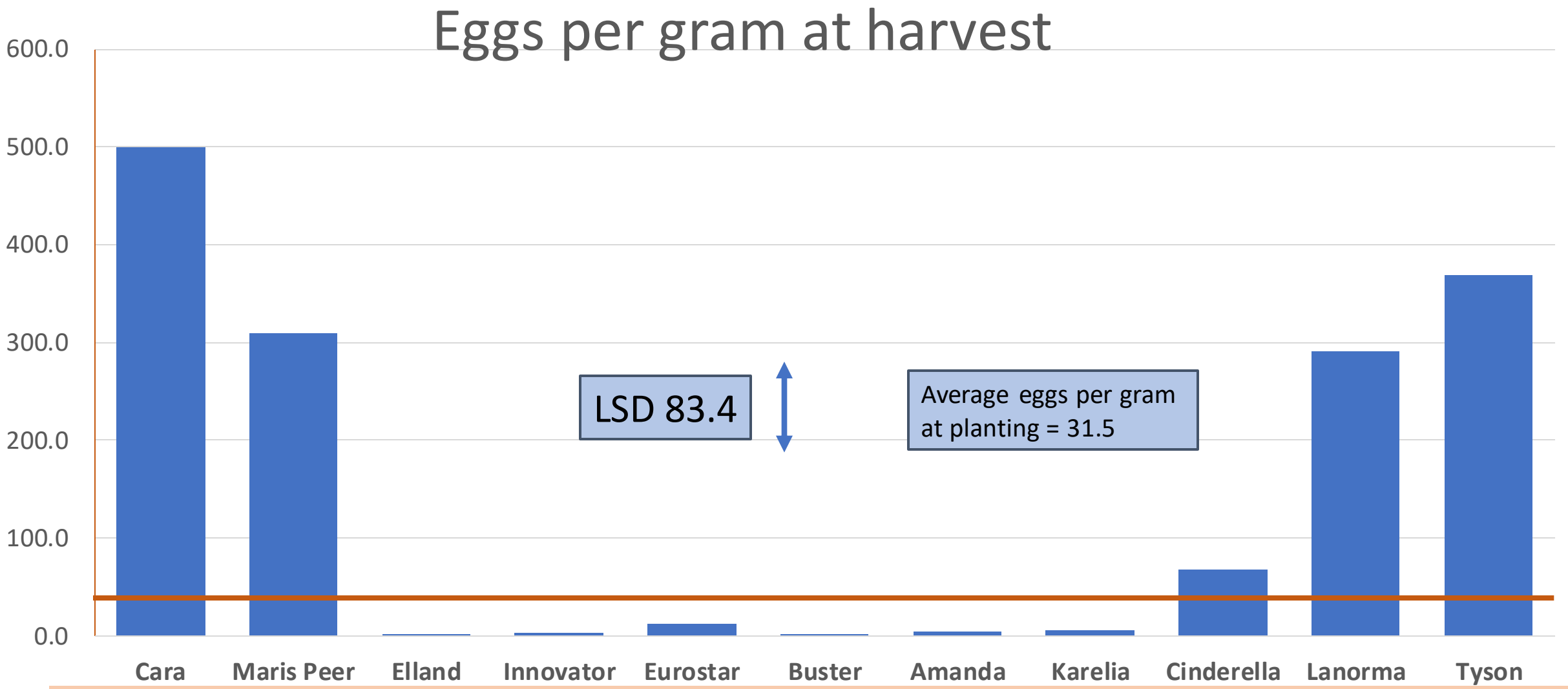
What is the overall effect of Nemathorin on Pf?

	Eggs/Larvae per g soil						Viable Cysts per 200 g soil					
	Pi		Pf		Pf/Pi		Pi		Pf		Pf/Pi	
Untreated	32.1	a	141.4	a	4.40		189.0	a	400.5	a	2.12	
30kg Nemathorin	30.9	a	121.7	a	3.94		158.4	b	342.1	a	2.16	
LSD P=.05	5.74		34.04				27.18		77.89			

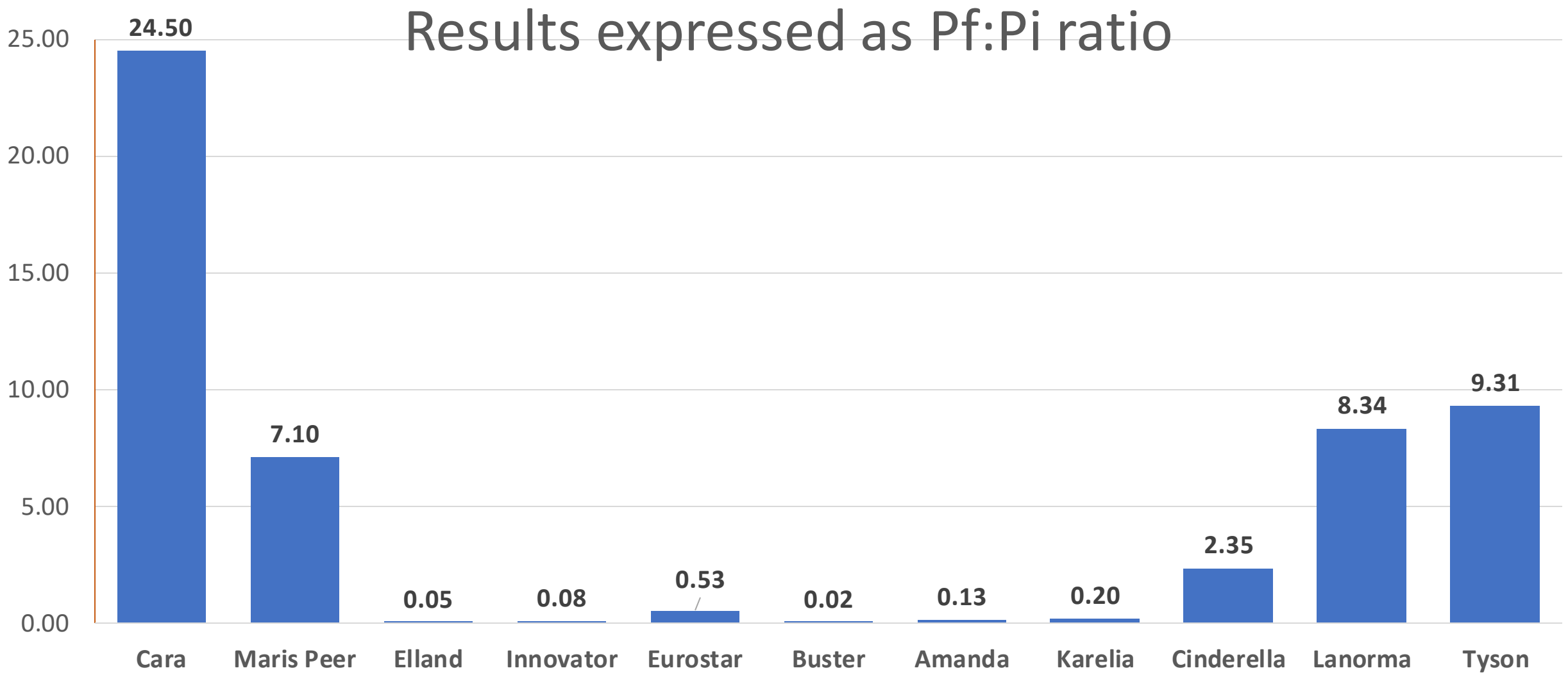
What is the effect of Nemathorin on Pf (eggs/gram) for different varieties?

Variety	Untreated	Treated	
Cara	527.8	471.8	NS
Maris Peer	361.8	256.3	NS
Elland	1.8	1.0	NS
Innovator	5.3	0.5	NS
Eurostar	16.8	7.0	NS
Buster	1.8	0.0	NS
Amanda	5.5	2.8	NS
Karelia	7.3	4.3	NS
Cinderella	86.8	49.3	NS
Lanorma	321.8	260.0	NS
Tyson	344.0	393.0	NS
LSD P=.05		117.92	

But what about the effect of varieties (Pf)?



But what about the effect of varieties (Pf:Pi)?



2	2	9	8	9	9	8	8	6	5	4

Percentage incidence of tuber diseases after harvest

Variety	Common scab	Powdery scab	Silver scurf	Black dot	Black Scurf
Cara	7.0	1.0	61.0	1.0	0.0
Maris Peer	4.5	0.5	65.0	4.0	0.0
Elland	2.5	0.5	55.0	1.0	0.0
Innovator	1.5	0.0	84.0	0.0	2.5
Eurostar	10.0	1.5	75.5	0.0	0.0
Buster	3.5	23.0	63.5	1.0	0.0
Amanda	6.0	1.0	92.5	0.0	0.0
Karelia	6.0	0.0	89.0	0.0	0.0
Cinderella	41.5	0.5	66.5	0.0	0.0
Lanorma	5.0	2.0	84.5	1.0	0.0
LSD P=0.05	9.1	4.9	20.6	2.6	1.7

Spraing only detected in Cara

Very few soft rots

Replace, over time... with

- Saxon
- Cultra
- Maris Piper
- Osprey
- Maris Peer

- With Resistant and tolerant varieties.
- Suitable for production in Scotland
- Resistant to Powdery scab, Blackleg, Black dot.
- No internal defects
- Early maincrop
- High yield, High baker content

- Elland*
- Eurostar
- Buster
- Amanda
- Karelia*

* Varieties in this trial which were tolerant

Conclusions

- Resistance (8/9) and tolerance works.
- PCN will rob yield without effective nematicides (intolerant).
- We may have less effective nematicides in 2025, with risk of internal defects increasing.
- Demands action now to understand populations and manage them for the future. Soil testing is the basis of all decisions.
- Allowing populations to increase, expecting resistant varieties to deliver, will result in (at least) short term higher risk to growers.
- Effective and suitable varieties are available. Variety specific Agronomy understanding needs to improve.
- Requires a whole supply chain effort to transition faster. Breeders, land owners, growers, retailers, research base.

Q and A's

Acknowledgments:

- Scottish Government funding
- Neill Smith (Host grower)
- Jane Brisbane (SRUC)
- Scottish Agronomy Ltd
- SoilEssentials
- SRUC crop clinic (PCN analysis)
- Syngenta UK
- Breeders supplying seed
- Growers and other attending the open day and this event.

Please visit: www.pcnhub.ac.uk for more information