Horticulture: Knowledge Exchange update

Nathalie Key

Knowledge Exchange Manager, AHDB Horticulture

Horticulture Strategic Centres

- AHDB's Farm Excellence platform - improving industry performance and success by sharing knowledge and ideas through farmer-to-farmer learning.

- An established and developing framework of monitor farms and strategic centres
    - case studies
    - latest developments, innovations and technologies

- For Horticulture:
    - Strategic SmartHort Centres
    - Horticulture Strategic Centres for Field Vegetables

Strategic SmartHort Centres

- SmartHort campaign – getting the best out of the industry's workforce and operational management practice
- Strategic centres focus on increasing labour efficiency in you business – LEAN, labour management and labour efficiency
- Three host businesses were selected following an open call - Haygrove Ltd, Volmary Ltd and Thomas Thomson Ltd

    - 3 workshops per year, per site

    - online resources, including "how-to" guides

LEAN labour management, and labour efficiency

Key activities:

- Process mapping and waste identification
- Practical problem solving using a technique called Plan, Do, Check, Act
- How to encourage continuous improvement across the whole organisation
- Visual management boards and metrics to check improvements have worked

KE contact:
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Horticulture strategic centre for field vegetables

- Showcase the latest research and technology to improve integrated pest management (IPM) strategies.
- 4 new centres, with focus on brassicas, onions, carrots and legumes
- Research in practice
- Shared experience
- Grower to grower learning

KE contact:
Dawn.Teverson@ahdb.org.uk

Brassicas

Location: Lincolnshire and Cornwall

- Variety trials: autumn and winter cauliflower cultivars and spring cabbage
- Fungicide timing trial using spore trapping data and disease models for light leaf spot and ring spot
- Herbicide screening replicating SCEPTREplus plant protection trials on niche crops
- Aphid control insecticide screening
- Peat-free alternatives for propagation

Onions

Locations: Norfolk and Essex

- Variety trials: yield, quality and storage performance in controlled environment and ambient stores of 27 brown and 9 red varieties
- Establishing optimum plant population density to give higher percentage of class one bulbs

Legumes

Location: Lincolnshire

- Variety trials: 18 varieties tested at PGRO
- Evaluation of tolerance to pea downy mildew
- 13 treatments of biostimulant and nutritional products
- App for reporting bean seed fly populations to produce a UK map
- Bean seed fly control trials as part of AHDB's SCEPTREplus programme

Carrots

Location: Yorkshire

- Variety trials: 75 different varieties
- Carrot variety breakage testing
- Seed size and drill depth trials

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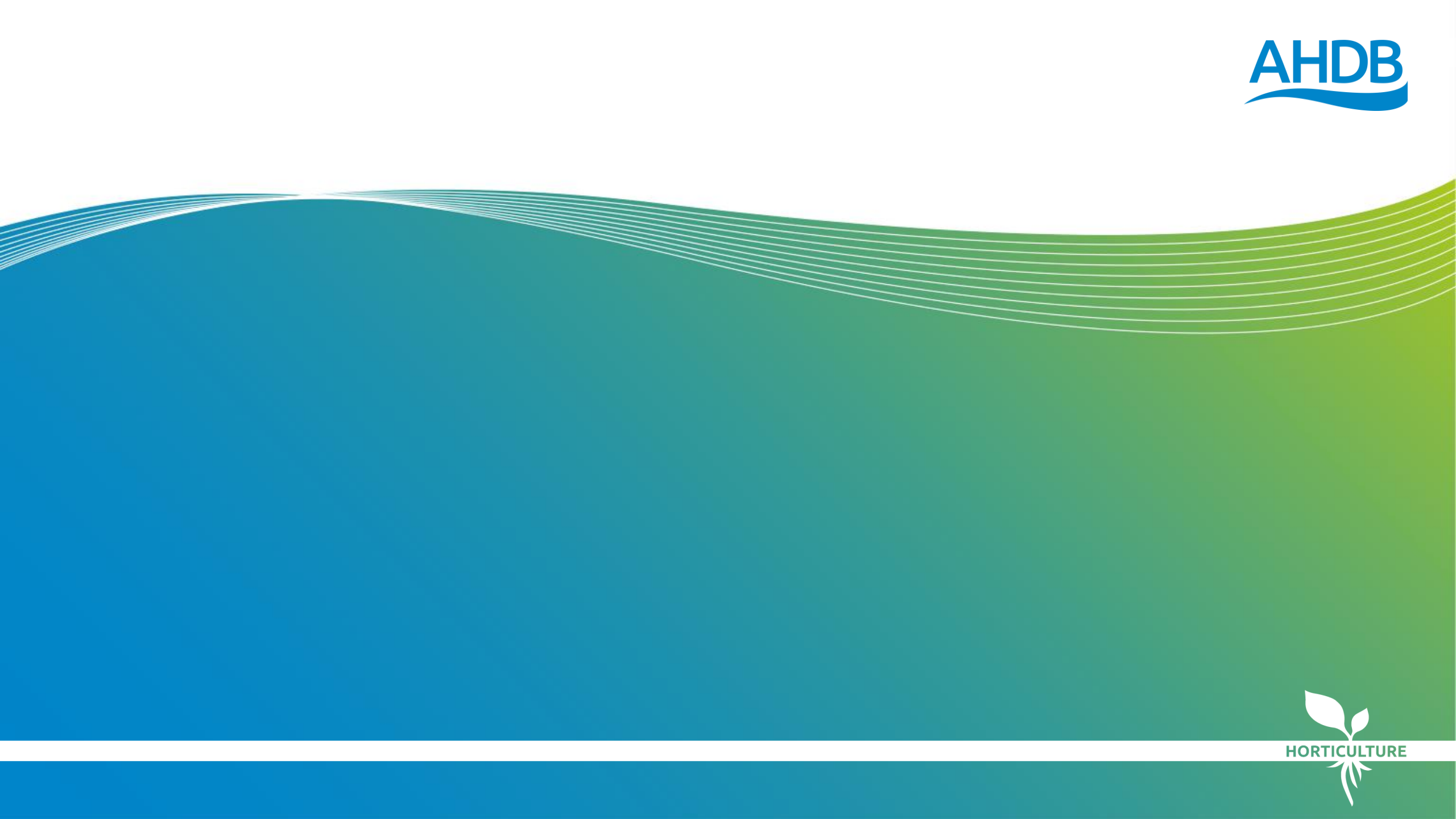
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SP 42: Control of White Mould and Smoulder in Narcissus

Dave Kaye, RSK ADAS Ltd.

September 2019

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Introducing SCEPTREPLUS

+ Develop solutions to emerging crop protection issues
+ Reduce adverse environmental impacts of crop protection products
+ Reduce supply chain vulnerability
+ Accelerate the testing process and bring new products to market

Trial overview

- Targets:
  - White Mould – *Ramularia vallisumbrosae*
  - Smoulder – *Botryotinia narcissicola*
- Number of available actives in decline
- Identify suitable crop safe alternatives

Smoulder (ADAS)

Trial site and design

- Narcissus var. *St. Patrick's Day*
- Second year down crop

Image: J. Parkers

- J H Richards & Sons, Hayle, Cornwall.
- Plot size: 7.5m^2
  - 10 treatments
  - 4 treatment applications (10 day intervals)
  - 4 replicates
- Reliant on naturally occuring sources of infection

Treatments

Treatment	Product / code	a.i / fungicide type	FRAC code
1	Untreated	-	-
2	Tracker	Boscalid & epoxiconazole	7 + 3
3	AHDB9873	Conventional	9
4	AHDB9914	Conventional	7 + 11
5	AHDB9913	Conventional	7
6	AHDB9926	Conventional	7
7	AHDB9927	Conventional	17
8	AHDB9863	Conventional	U8
9	AHDB9871	Biological	44
10	AHDB9862	Conventional	3

- Water volume – 200 L / ha
- Several modes of action included in the trial

Assessments

- White mould and Smoulder incidence and severity
- Crop safety

No.	Timing	Date
1	Treatment application 1 (set-up)	14/02/2019
2	Treatment application 2	28/02/2019
3	Treatment application 3	19/03/2019
4	Treatment application 4	03/04/2019
5	Treatment application 4 + 14 days	16/04/2019

Results

EFFICACY

- White Mould and Smoulder developed from naturally occurring sources of infection
- Average disease severity score at the final assessment (untreated):
  - White mould - 7.15%
  - Smoulder - 27.10%

Incidence – White Mould

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Average foliar white mould incidence per treatment at each assessment date

Date / Treatment	14-Feb	28-Feb	20-Mar	03-Apr	16-Apr
Untreated	20.00	45.00	35.00	65.00	No data
Tracker	5.00	25.00	15.00	30.00	No data
AHDB9873	15.00	25.00	10.00	60.00	No data
AHDB9914	15.00	10.00	10.00	5.00	No data
AHDB9913	25.00	25.00	10.00	5.00	No data
AHDB9926	15.00	25.00	0.00	15.00	No data
AHDB9927	25.00	35.00	20.00	45.00	No data
AHDB9863	20.00	40.00	5.00	25.00	No data
AHDB9871	10.00	25.00	25.00	35.00	No data
AHDB9862	20.00	5.00	10.00	40.00	No data
	Not significantly different from untreated control ($p>0.05$)				
	Significantly different from untreated control ($p<0.05$)				

- Natural senescence of the crop at the final assessment meant white mould incidence could not be assessed at this time

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Incidence – Smoulder

SCEPTREPLUS

Average foliar smoulder incidence per treatment at each assessment date

Date / Treatment	14-Feb	28-Feb	20-Mar	03-Apr	16-Apr
Untreated	50.00	95.00	100.00	100.00	100.00
Tracker	45.00	60.00	45.00	45.00	60.00
AHDB9873	60.00	55.00	60.00	85.00	100.00
AHDB9914	50.00	80.00	40.00	30.00	55.00
AHDB9913	25.00	70.00	65.00	50.00	55.00
AHDB9926	45.00	55.00	50.00	50.00	75.00
AHDB9927	50.00	70.00	65.00	90.00	95.00
AHDB9863	60.00	65.00	75.00	70.00	70.00
AHDB9871	45.00	70.00	85.00	100.00	100.00
AHDB9862	60.00	80.00	65.00	65.00	70.00
	Not significantly different from untreated control ($p>0.05$)				
	Significantly different from untreated control ($p<0.05$)				

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Severity – White Mould

SCEPTREPLUS

Average foliar white mould severity per treatment at each assessment date

Date / Treatment	14-Feb	28-Feb	20-Mar	03-Apr	16-Apr
Untreated	0.20	2.35	2.75	7.15	No data
Tracker	0.05	0.75	0.50	1.20	No data
AHDB9873	0.25	0.85	0.50	5.00	No data
AHDB9914	0.20	0.20	0.20	0.10	No data
AHDB9913	0.68	0.75	0.75	0.40	No data
AHDB9926	0.25	0.30	0.00	0.60	No data
AHDB9927	0.30	1.05	1.40	3.80	No data
AHDB9863	0.20	1.70	0.10	1.65	No data
AHDB9871	0.35	1.00	1.65	3.25	No data
AHDB9862	0.20	0.10	0.35	2.10	No data
	Not significantly different from untreated control (p>0.05)				
	Significantly different from untreated control (p<0.05)				

- Natural senescence of the crop at the final assessment meant white mould incidence could not be assessed at this time

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Severity – White Mould (assessment 4)

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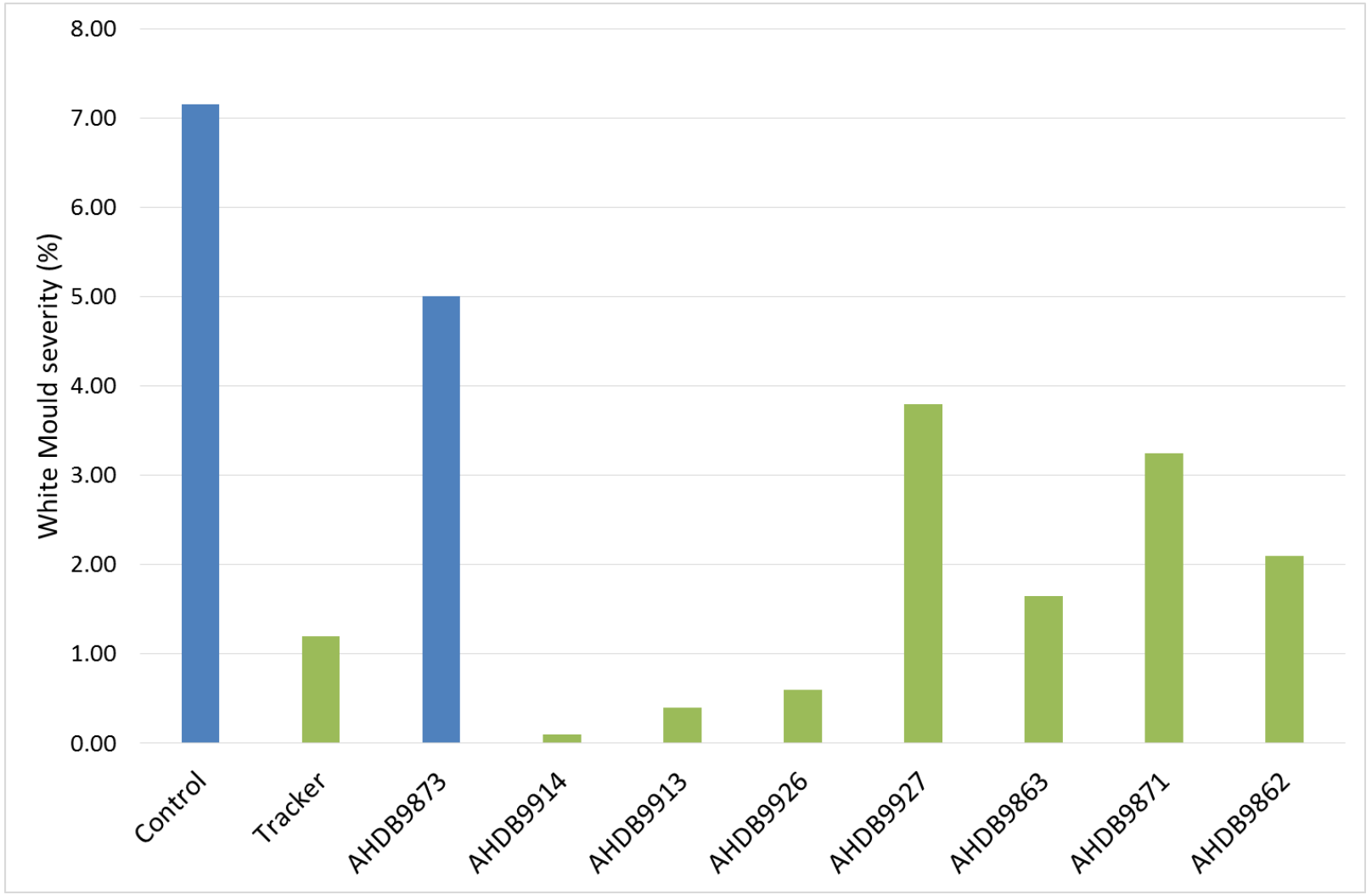

- Green bars represent severity scores significantly lower than the untreated control ($p<0.05$)

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Severity – Smoulder

SCEPTREPLUS

Average foliar smoulder severity per treatment at each assessment date

Date / Treatment	14-Feb	28-Feb	20-Mar	03-Apr	16-Apr
Untreated	1.03	6.95	18.30	24.30	27.10
Tracker	0.68	2.90	2.70	2.80	4.25
AHDB9873	1.35	3.05	3.55	11.15	13.50
AHDB9914	0.65	3.45	1.90	1.65	3.70
AHDB9913	0.45	4.45	5.80	4.25	6.45
AHDB9926	1.10	2.40	3.65	4.55	7.35
AHDB9927	0.58	4.55	7.45	9.90	16.65
AHDB9863	1.33	4.45	6.25	7.80	6.45
AHDB9871	0.71	4.05	12.00	19.90	16.90
AHDB9862	1.03	4.50	4.40	6.05	7.85
	Not significantly different from untreated control ($p>0.05$)				
	Significantly different from untreated control ($p<0.05$)				

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Severity – Smoulder (assessment 5)

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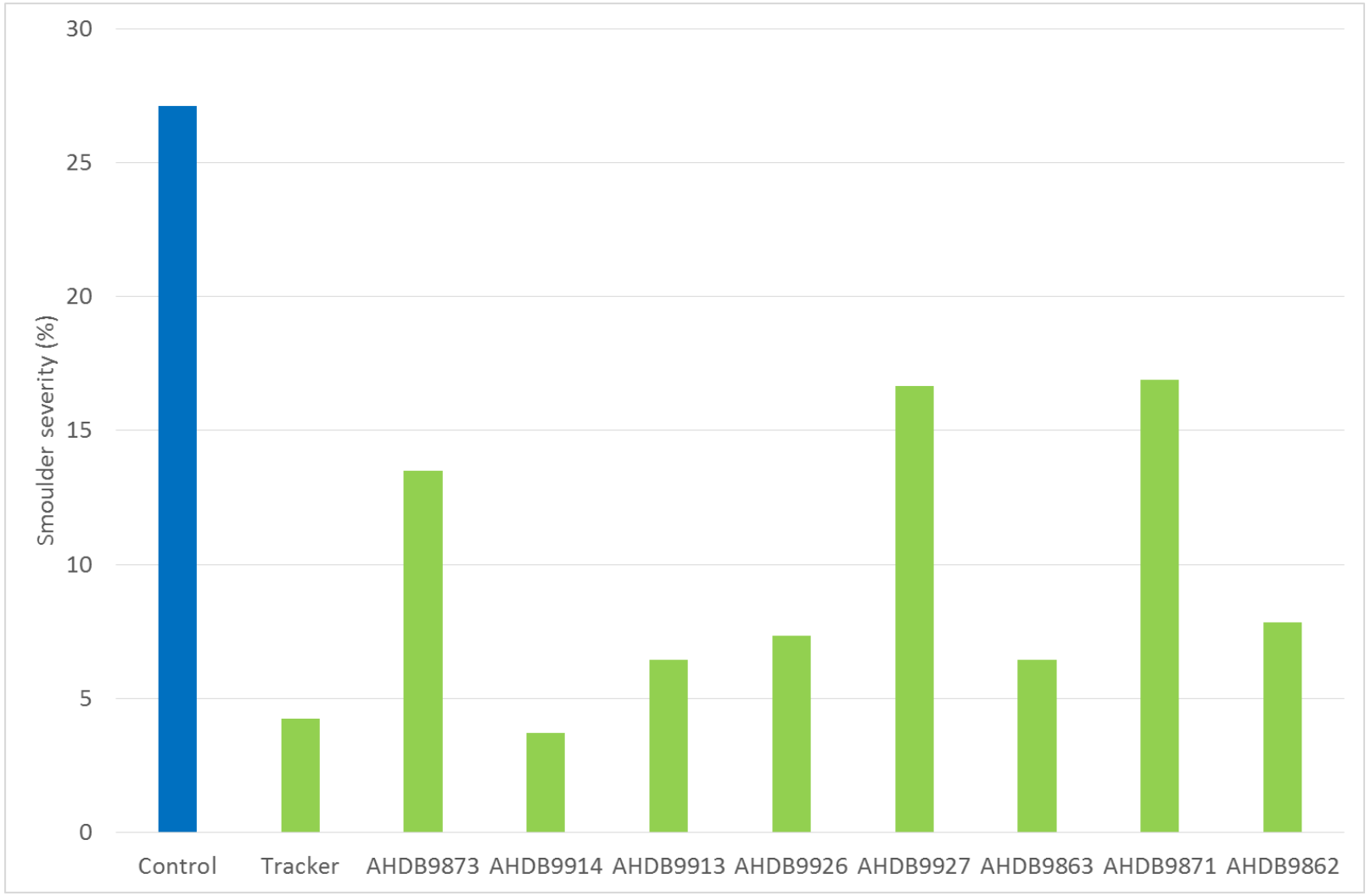

- Green bars represent severity scores significantly lower than the untreated control ($p<0.05$)

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Overview: Severity

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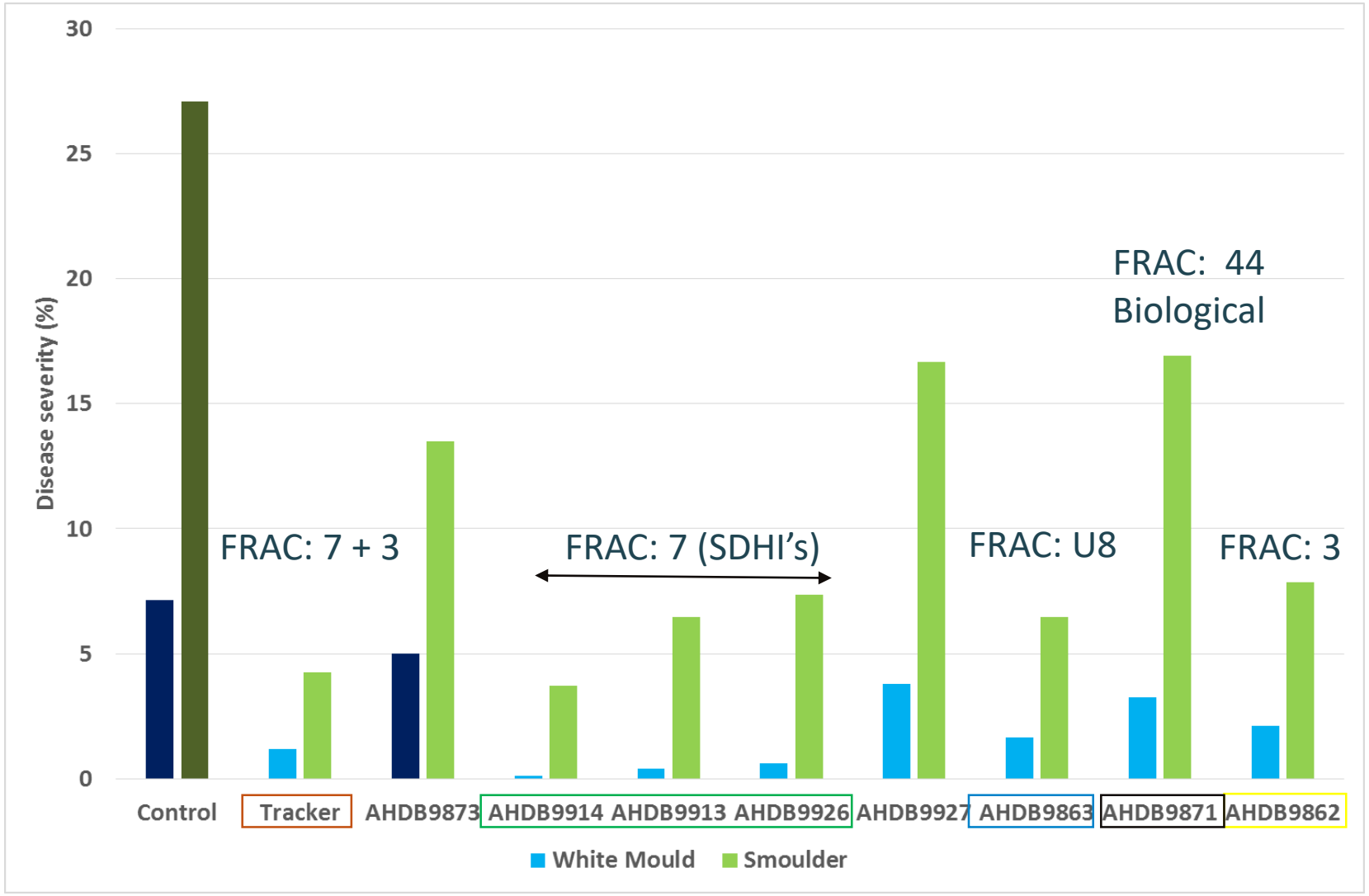

Note: data is for White Mould (assessment 4, 03/04/19) and Smoulder (assessment 5, 16/04/19).

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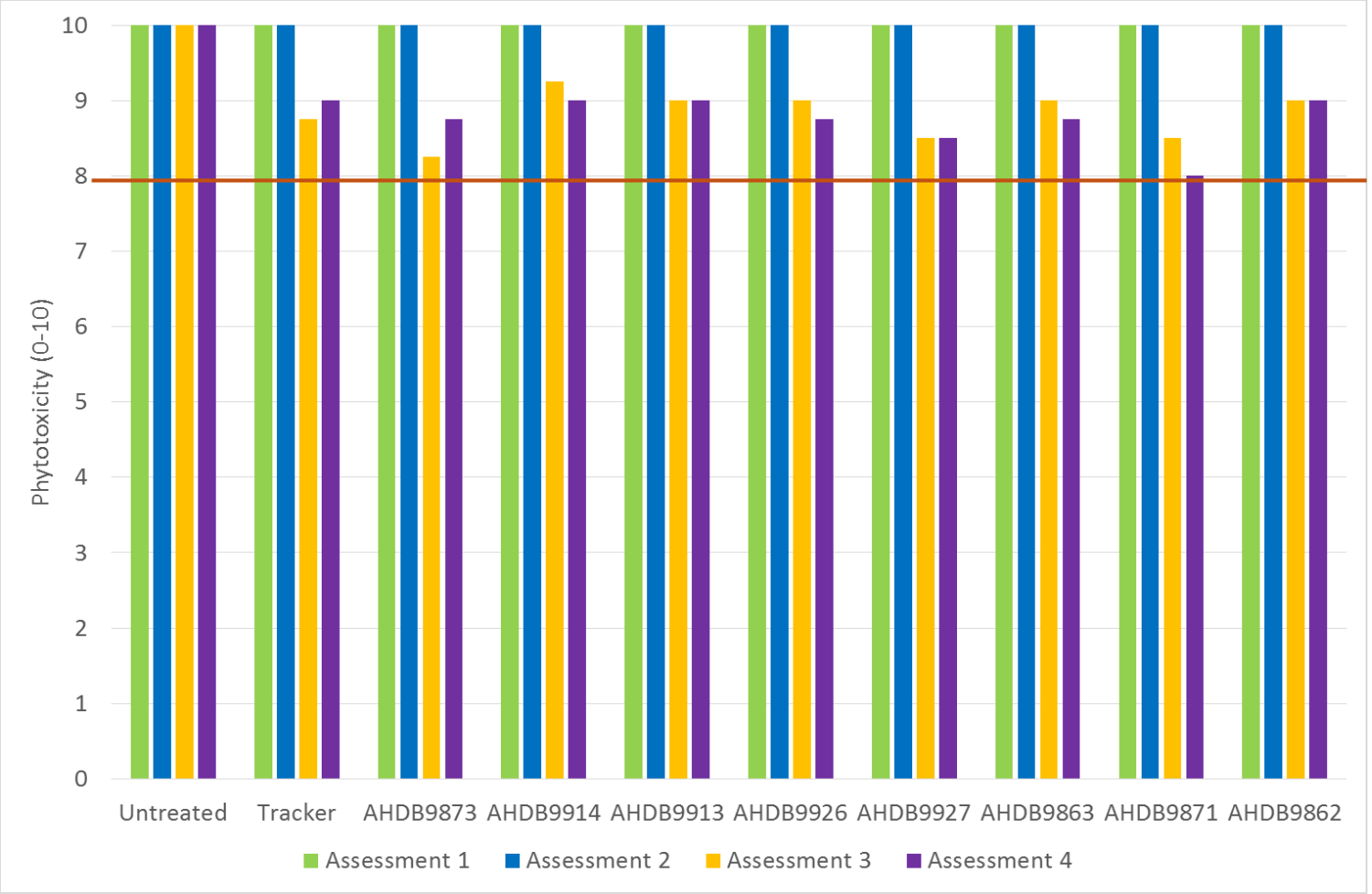
Crop safety



- Minor phytotoxic damage developed in all treatments
- Damage comparable to, or less than, the industry standard Tracker
- No damage of commercial significance, with all plots scoring 8 or above

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Conclusions

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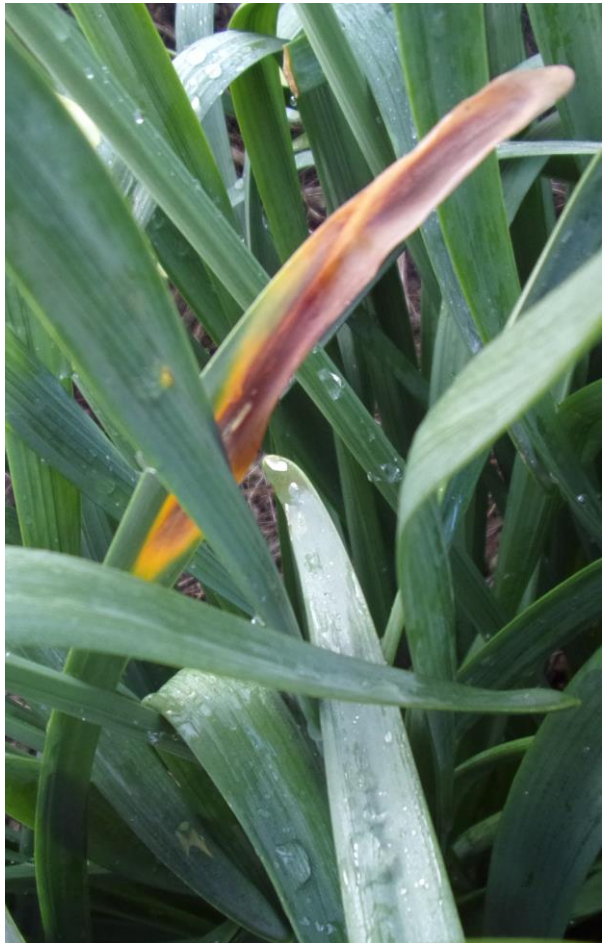

- Products tested in SP 42 reduced the incidence and severity of both white mould and smoulder
- Three products, AHDB9913, AHDB9914 and AHDB9926 (all SDHI's) gave the best control against both diseases
- AHDB9862 and AHDB9863 also gave good control
- The biological product AHDB9871 significantly reduced white mould and smoulder incidence and could be a valuable addition to an IPM programme
- No phytoxicity of commercial concern developed following any treatment at any assessment date

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Acknowledgements

AHDB Horticulture

J H Richards and Sons

Agchem companies

Alice Shrosbree (ADAS)

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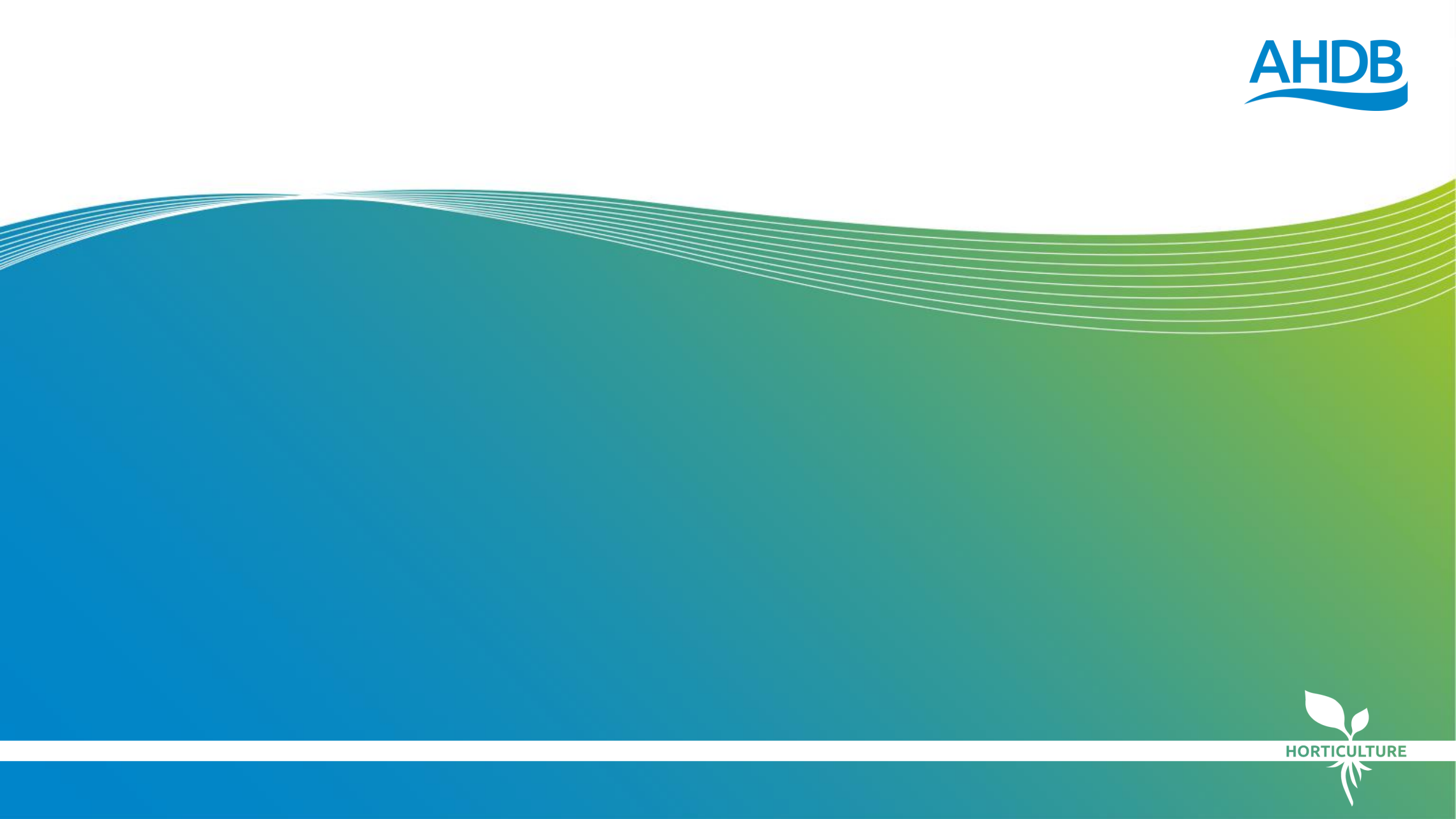
Any questions?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Narcissus days – Cornwall Sept 2019

SceptrePlus: Narcissus herbicide screens – Post-cropping screen – 2019 update

Angela Huckle and Emily Lawrence

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Outline

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- Post-cropping trial – 2018 (Recap and summary)
- Post-cropping trial update – 2019
- 2019/2020 trial plans

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2018 Post-cropping trial location and design

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- Spalding, Lincolnshire

  (Jack Buck Farms)
- Sandy clay loam
- Thirty-two plots, 2m x 6m
  - 8 treatments
  - 4 replicates
- Variety: Tamsyn

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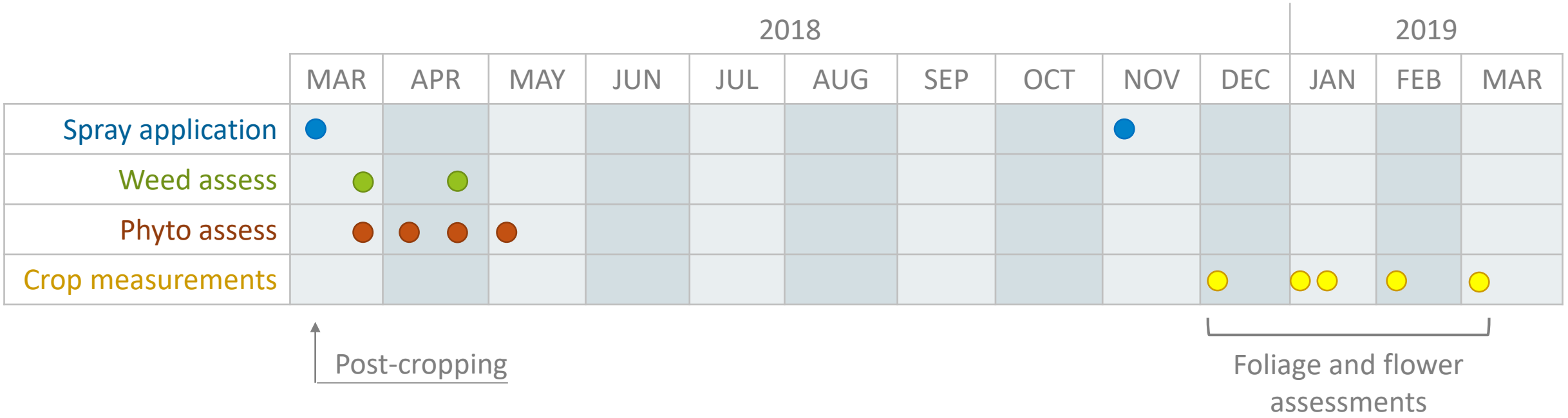
Post-cropping trial - timeline



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Treatments

Trt No.	Products
1	**Untreated**
2	**AHDB 9921**
3	**Kerb Flo** 3.0 L/ha + **Stomp Aqua** 2.9 L/ha
4	**Kerb Flo** 3.0 L/ha + **Stomp Aqua** 2.9 L/ha + **AHDB 9987**
5	**Lector** 0.1 L/ha + **Wing-P** 3.5 L/ha
6	**Lector** 0.1 L/ha + **Wing-P** 3.5 L/ha + **Centium 360 CS** 0.25 L/ha
7	**Butryflow** 1.0 L/ha + **Stomp Aqua** 2.9 L/ha
8	**Butryflow** 1.0 L/ha + **Stomp Aqua** 2.9 L/ha + **AHDB 9987**

8 weeks post spray application

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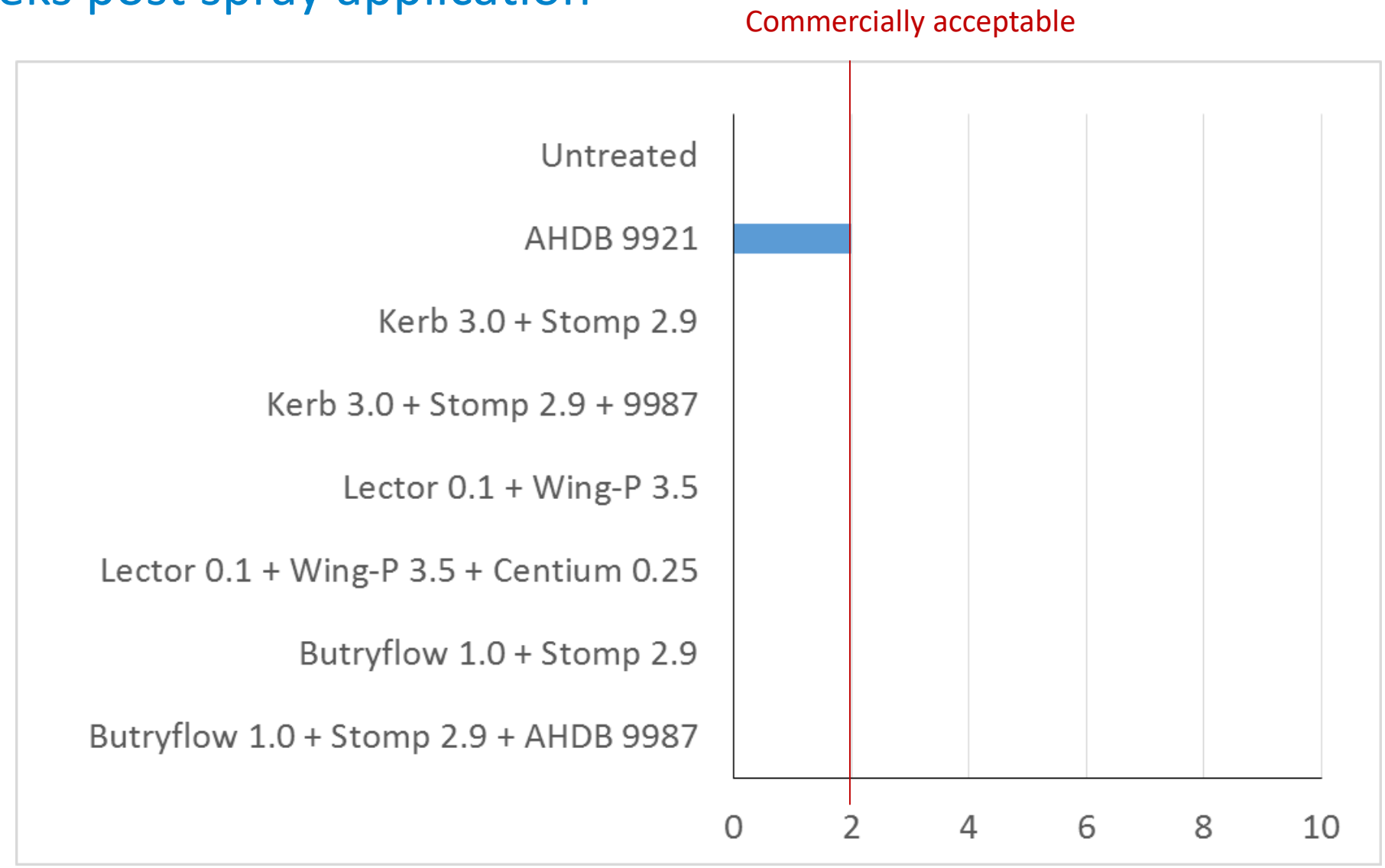

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AHDB 9921


AHDB 9921

Trial summary 2018

EFFICACY

- No data in 2018 as very few weeds, but in 2019 trials were repeated

CROP SAFETY

- By harvest all products appear commercially acceptable
  - No significant differences in emergence date, leaf height, bud count or flower appearance at harvest in 2019
  - AHDB 9921 gave a striking but transient effect for up to 6 weeks after application

Post-cropping screen – 2019 progress update

2019 Post-cropping trial design

SCEPTREPLUS

- Rose an Grouse, Cornwall (Greenyard Flowers)
- Sandy clay loam
- Sixty plots, 2m x 6m
  - 15 treatments
  - 4 replicates
- Variety: Lowan (first year crop)

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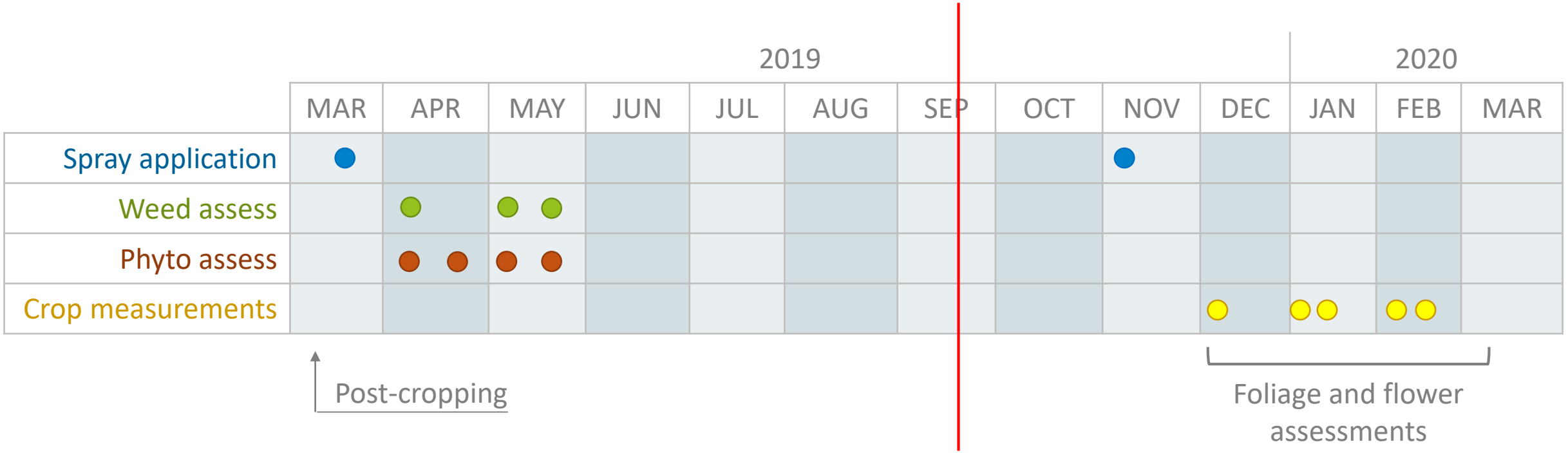
Post-cropping trial - timeline



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Treatments

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Trt No.	Products
1 and 2	**Untreated**
3	**Kerb Flo** 3.0 L/ha + **Stomp Aqua** 2.9 L/ha
4	**Kerb Flo** 3.0 L/ha + **Stomp Aqua** 2.9 L/ha + **AHDB 9987**
5	**Lector** 0.1 L/ha + **Wing-P** 3.5 L/ha
6	**Lector** 0.1 L/ha + **Wing-P** 3.5 L/ha + **Centium 360 CS** 0.25 L/ha
7	**Butryflow** 1.0 L/ha + **Stomp Aqua** 2.9 L/ha
8	**Butryflow** 1.0 L/ha + **Stomp Aqua** 2.9 L/ha + **AHDB 9987**
9	**AHDB 9921**
10	**AHDB 9865**
11	**AHDB 9864**
12	**AHDB 9994**
13	**AHDB 9900 lower rate**
14	**AHDB 9900 label rate**
15	**AHDB 9900 label rate (inter-row)**

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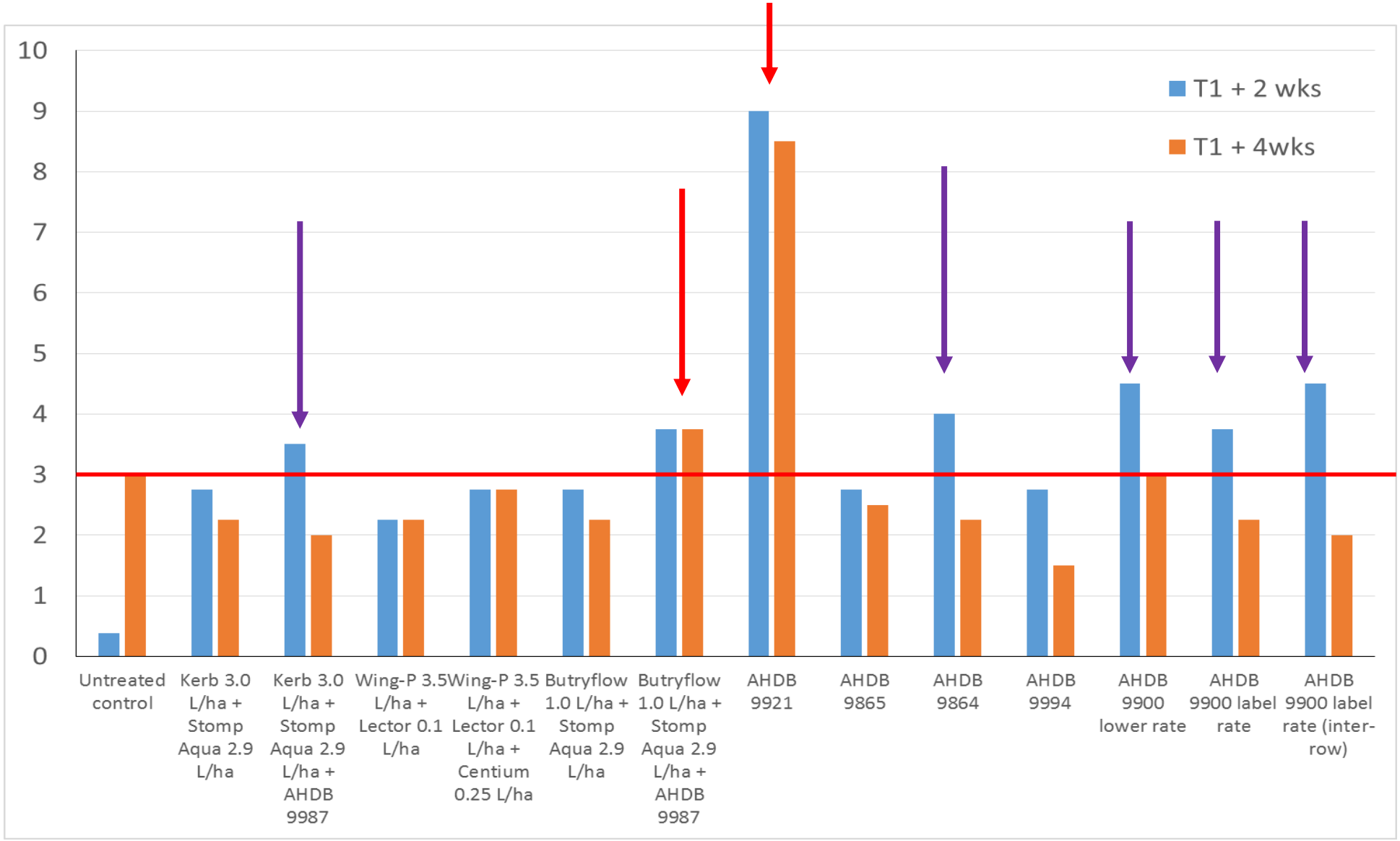
Crop safety scores – 2 and 4 weeks post application



Scores below 3 are deemed acceptable crop safety

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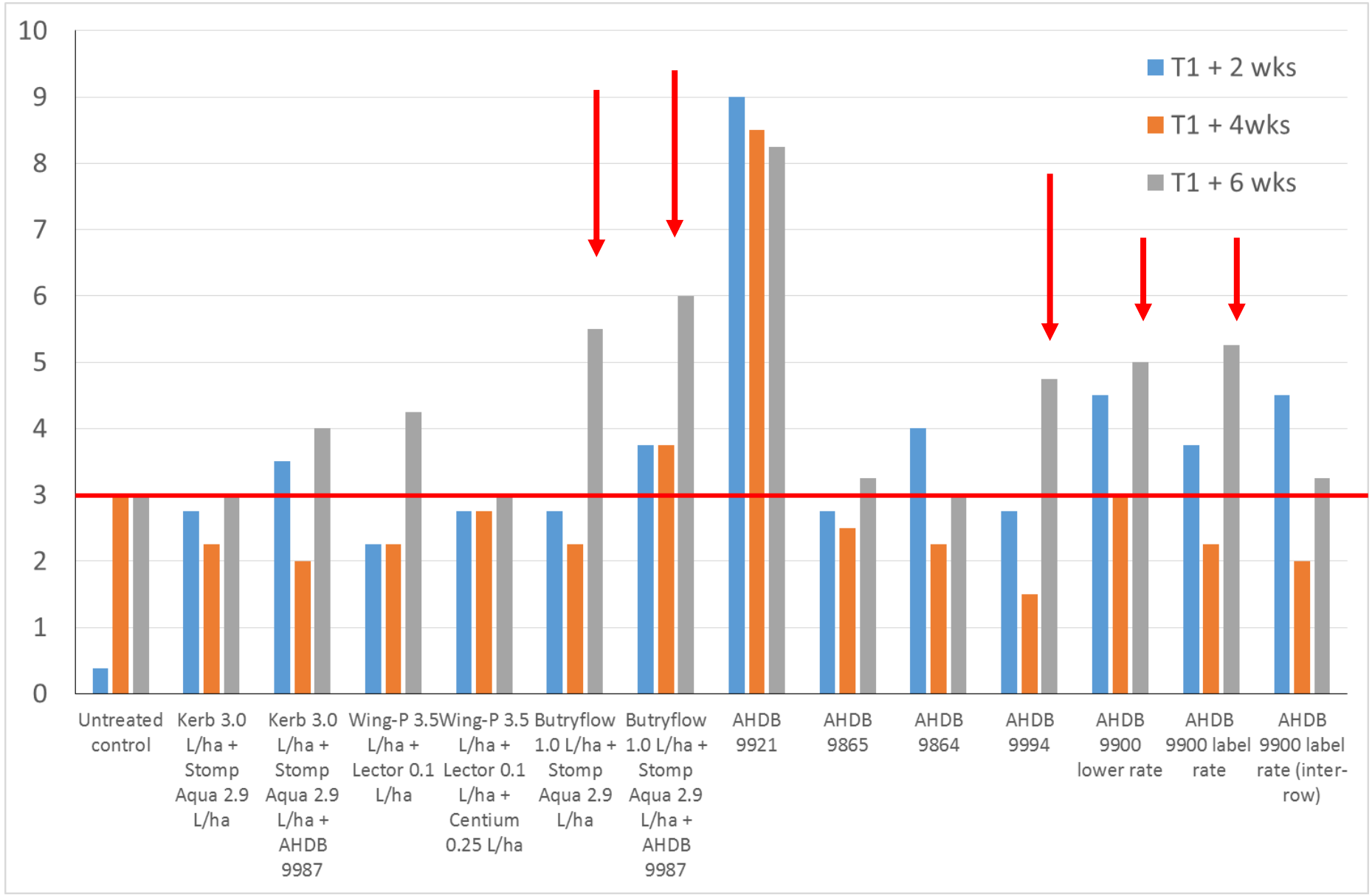
Crop safety scores – including 6 weeks post application



At 6 weeks some yellowing and early senescence was seen, which confounded crop safety scores. But, there does appear to be a treatment effect, e.g. treatments with Butryflow and AHDB 9900

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Phyto effects 9921– loss of turgor

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2 weeks post application

4 weeks post application

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Phyto effects 9900 – drooping

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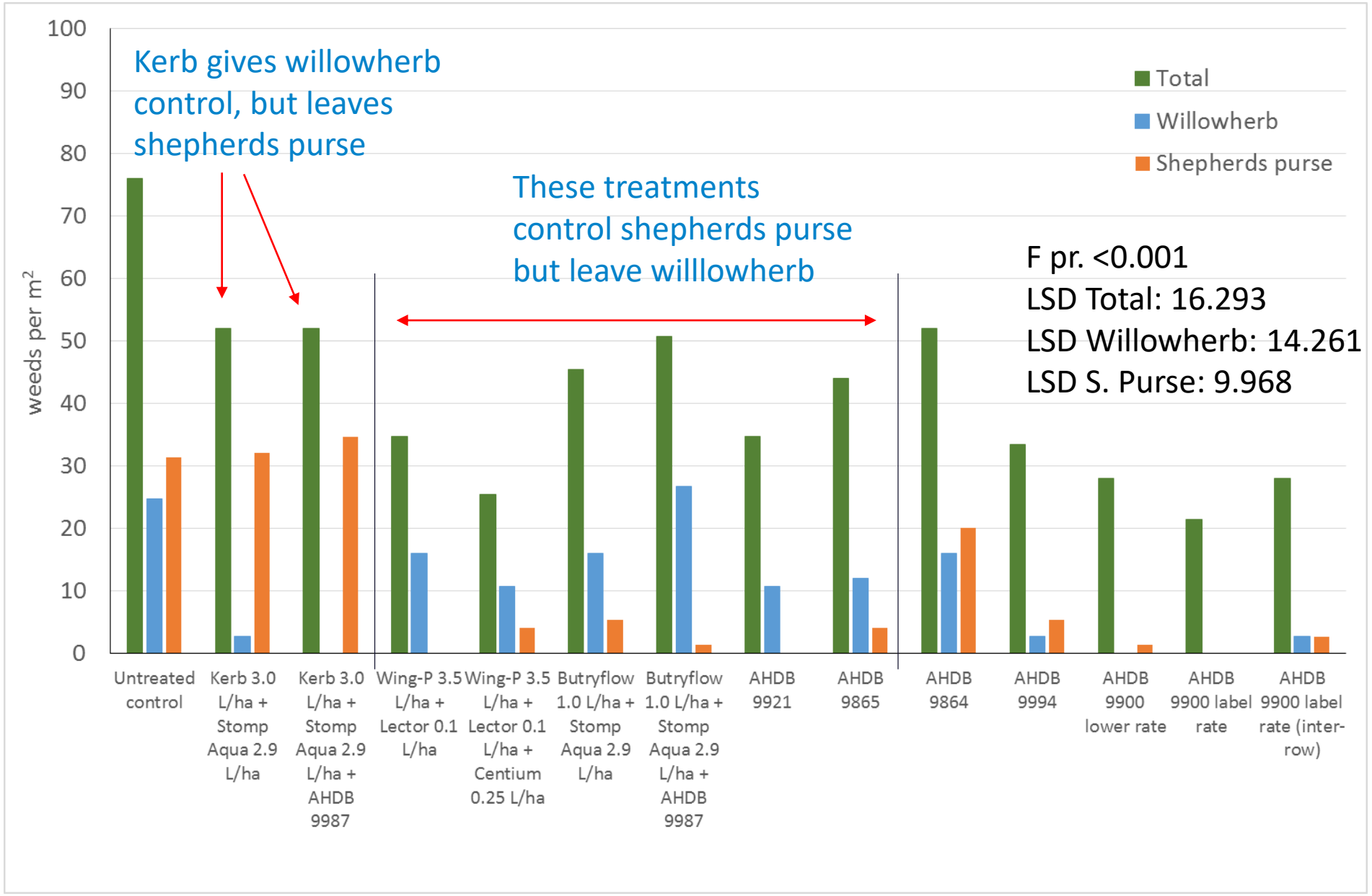
Weed count results at 6 weeks after application



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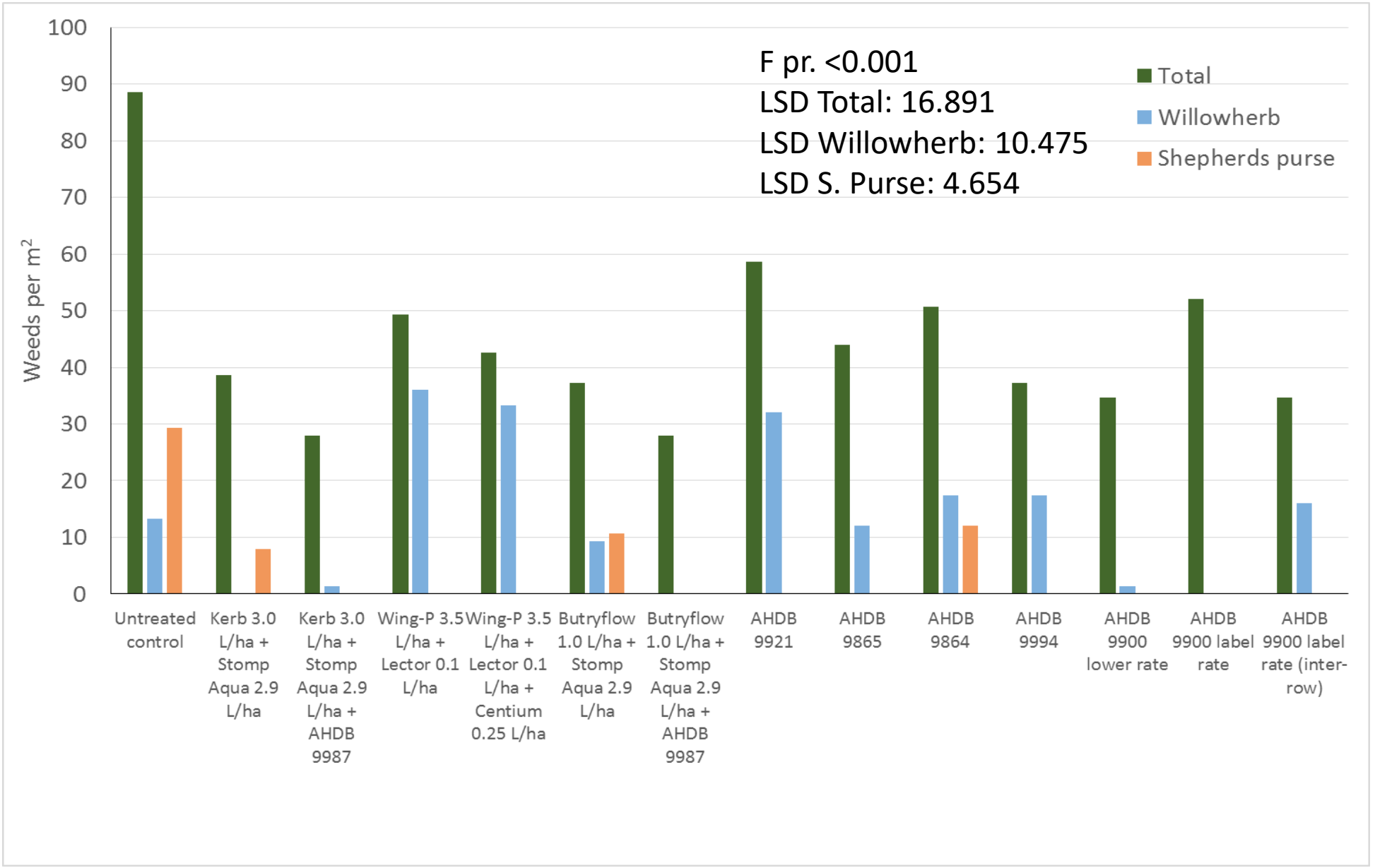
Weed count results at 10 weeks after application



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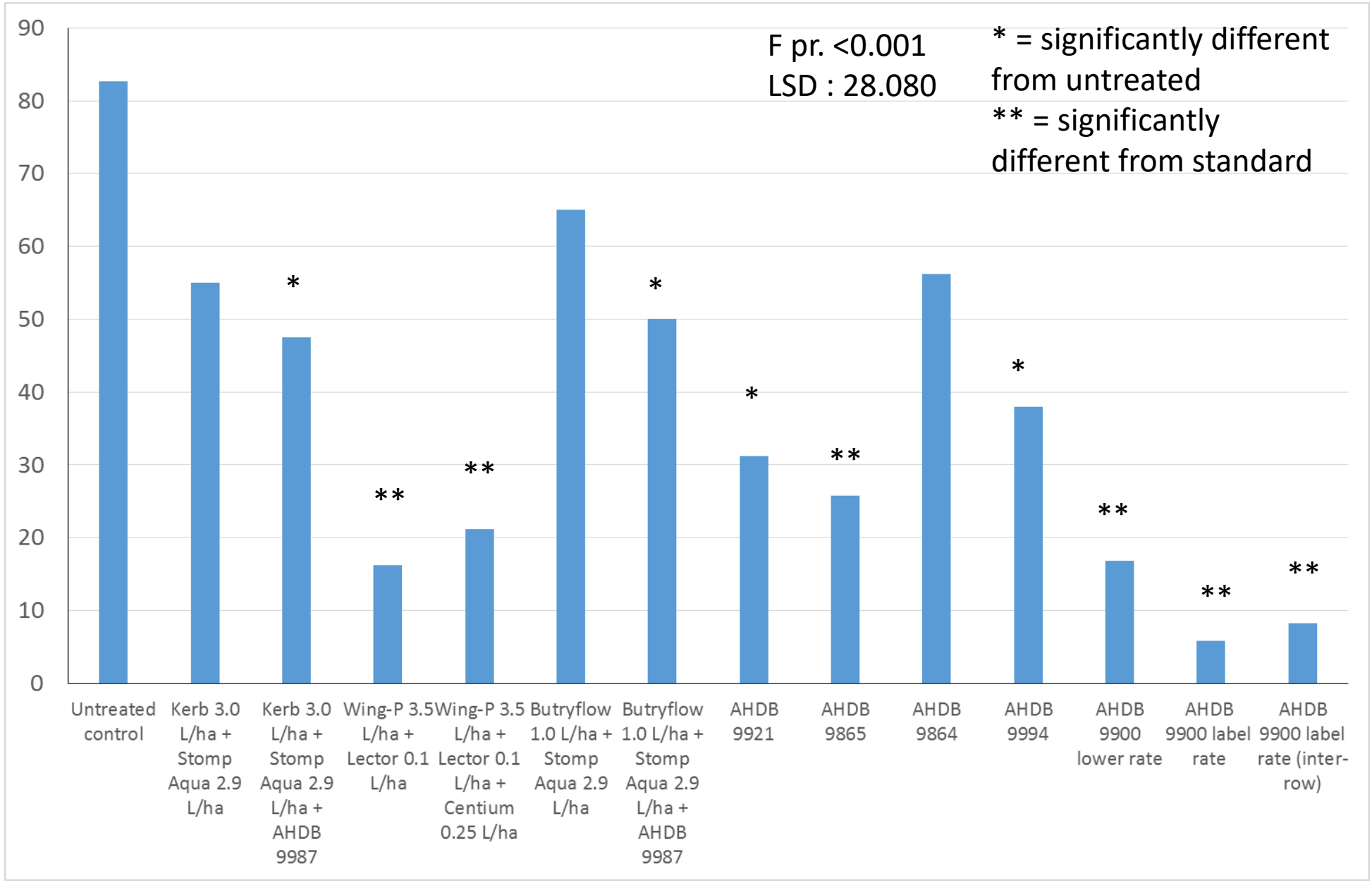
% Weed cover results at 10 weeks after application



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Lector 0.1 L/ha + Wing-P 3.5 L/ha + Centium 0.25 L/ha

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Preliminary conclusions and remaining assessments

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- Crop safety
  - All treatments except AHDB 9921 appeared crop safe at 4 weeks post-application
  - Plots treated with Butryflow, AHDB 9994 or AHDB 9900 seemed to droop at 10 weeks, or senesce early
- Weed control
  - All treatments except Kerb Flo + Stomp Aqua, Butryflow + Stomp Aqua and AHDB 9864 significantly reduce % weed cover when compared to the untreated
  - Wing-P tank mixes, AHDB 9865 and AHDB 9900 significantly reduce % weed cover when compared to the standard (Kerb Flo + Stomp Aqua)
  - Tank mixes containing Kerb and AHDB 9900 significantly reduced numbers of willowherb in this trial, AHDB 9994 gave a reduction for the 1st 6 weeks after application.
- Assessments to be carried out later this year or early 2020
  - Emergence, Bud counts and Flower quality

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2019/20 Dormant crop herbicide screen

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- Site required!
- 1st applications in November
  - Trial to run from November until March/April
- Re-run metobromuron (Praxim) tank-mixes from 2017 trial
  - Revise with Belchim and grower experiences from 2018
  - Include AHDB 9987, AHDB 9994, AHDB 9900
- Re-visit list with Bolette Palle-Neve and Spencer Collins

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Thanks!

- Greenyard Flowers
- J.H. Richards and Sons
  - Andrew Richards
- ADAS Scientific staff
  - Alice Shrosbree
- AHDB Horticulture Crop Protection Team
- Agchem companies

SCEPTREPLUS

#SCEPTREplus

Questions?

- Contact us
- Joe.martin@ahdb.org.uk
- Angela.huckle@adas.co.uk

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Follow progress

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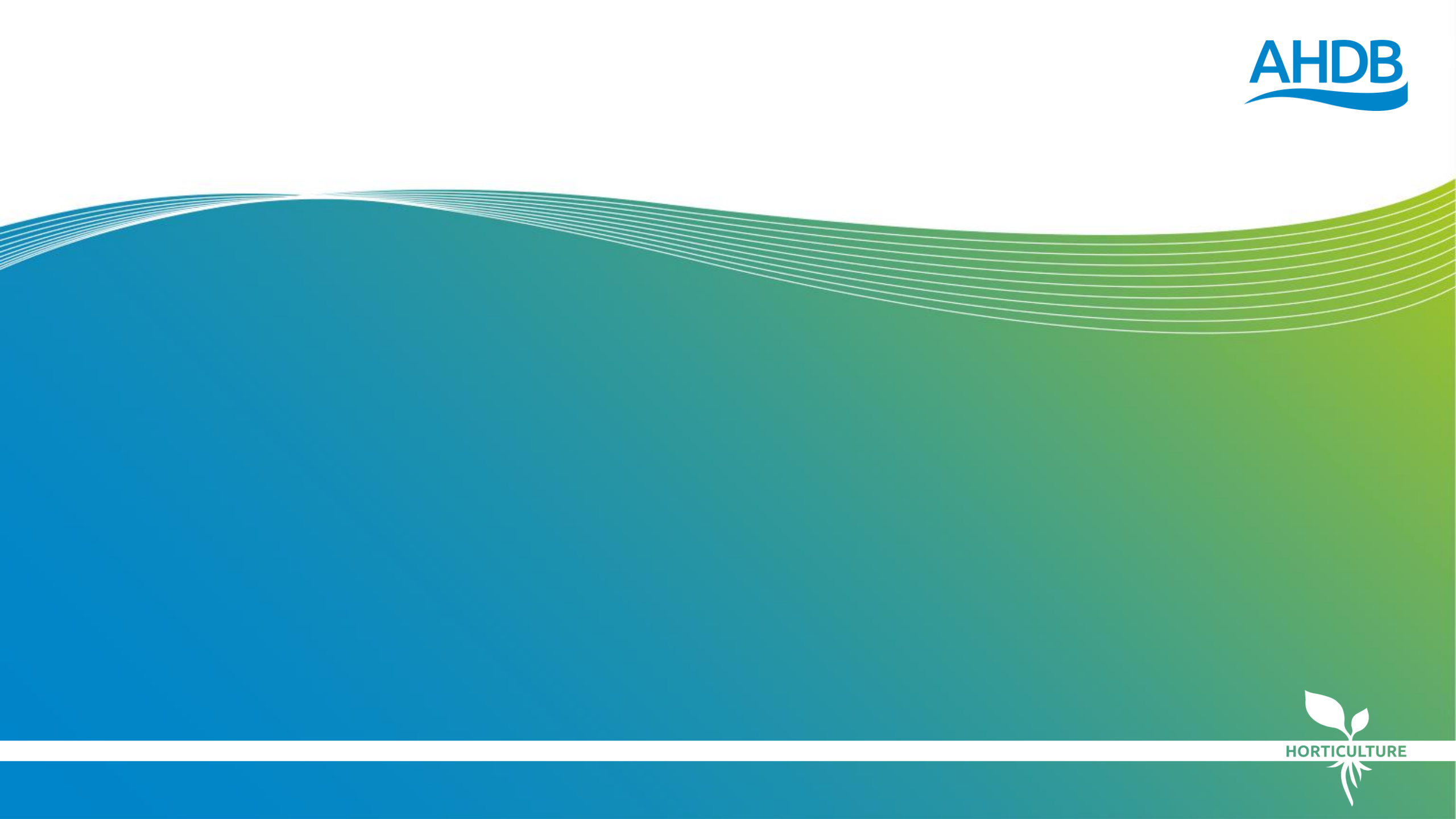
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AHDB Narcissus Event

Optimising biofumigation for suppression of plant parasitic nematodes

Dr Matthew Back – Reader in Plant Nematology

Harper Adams University

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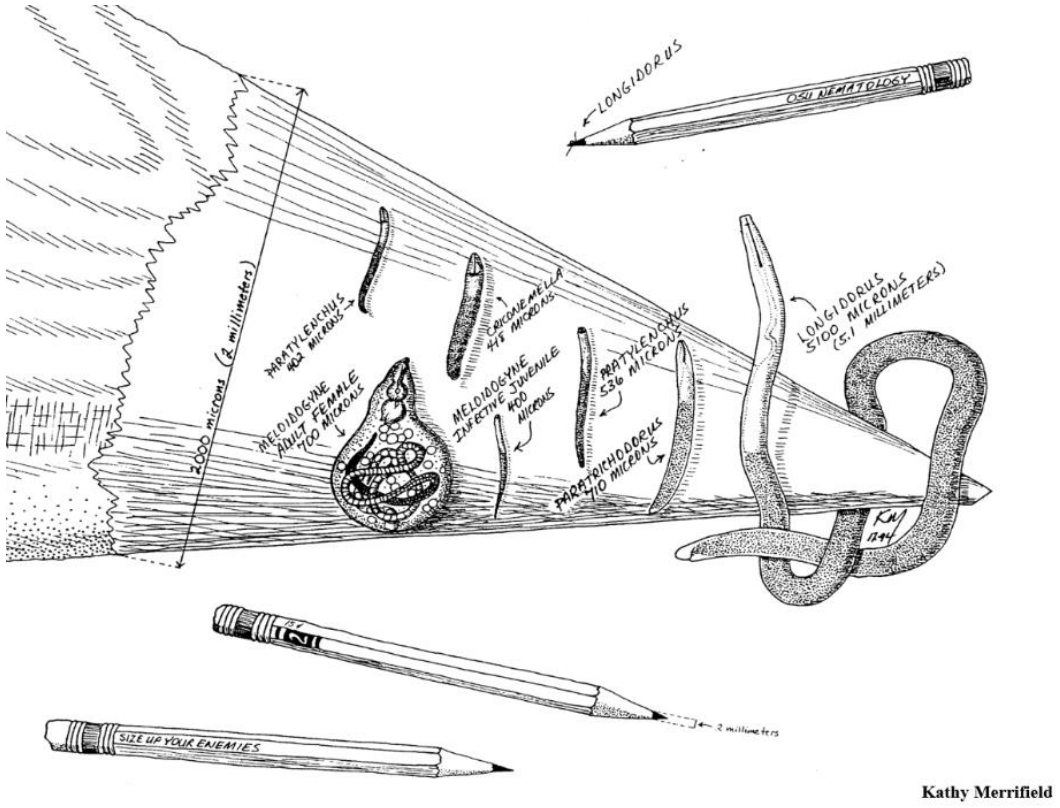
Outline

- Plant parasitic nematodes
- Principles of biofumigation
- Evidence for biofumigation efficacy
- Factors affecting biofumigation success
- Conclusions

The world of nematodes!

Plant parasitic nematodes



Circa 27,000 nematode species described – range of trophic groups

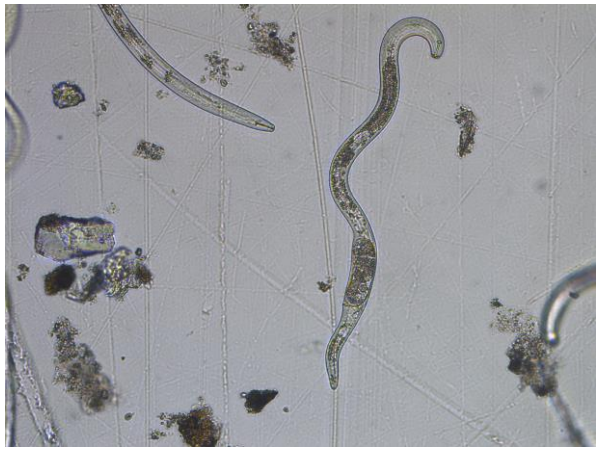
$4.4 \pm 0.64 \times 10^{20}$ nematodes inhabit the surface soils of the world (c. 0.3 gigatonnes)

Global losses attributed to PPNs is ca. £65.45 BN per annum

Sandy soils (60% + sand) have higher numbers of PPN

Plant parasitic nematodes infecting narcissus

Stem and bulb nematode
Ditylenchus dipsaci

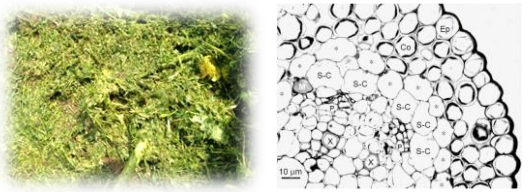


Root lesion nematodes
Pratylenchus spp.

Stubby root nematodes
Trichodorus and *Paratrichodorus* spp.

Biofumigation

Photograph taken by Bill Watts, AHDB



Glucosinolates + myrosinase + water

Volatile Organic Compounds:

Isothiocyantes
Thiocyanates
Nitriles and Epithionitriles
Oxazolidines

Motivation for using biofumigation

I. Loss of pesticides
II. ‘Soil health’ movement – cover crops
III. BPS Greening - EFA

EU member states support near-total neonicotinoids ban

BBC NEWS

By Matt McGrath
Environment correspondent

27 April 2018 | Share

Campaigners in Brussels celebrate the new ban

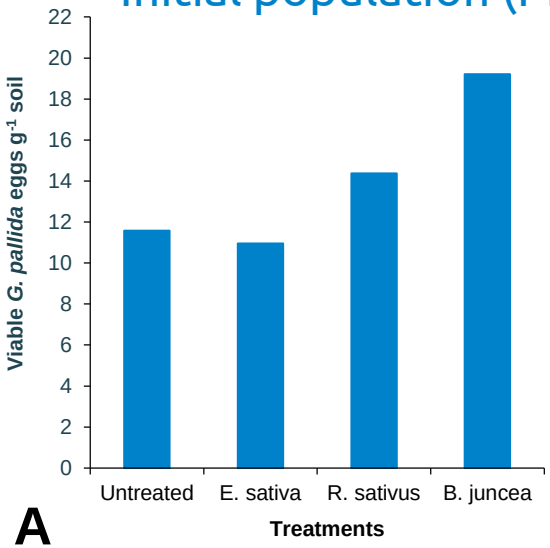
Diquat, thiram and pymetrozine banned by European Commission

EU bans UK's most-used pesticide over health and environment fears

Officials say chlorothalonil poses high risk to wildlife and may potentially harm humans

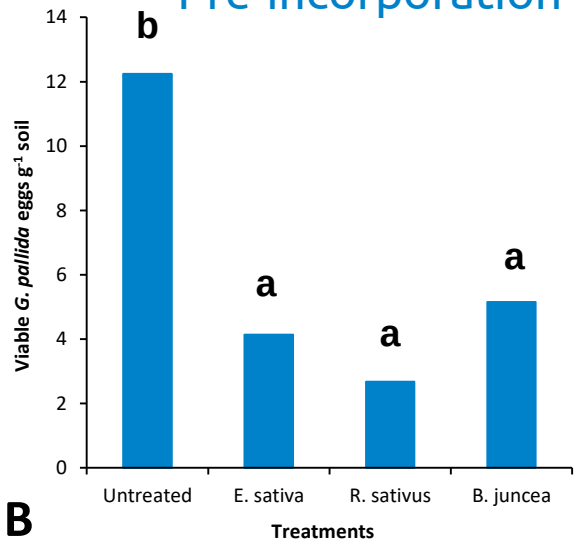
Preliminary observations of *G. pallida* suppression with biofumigation – Ngala et al. (2015)

Initial population (Pi)



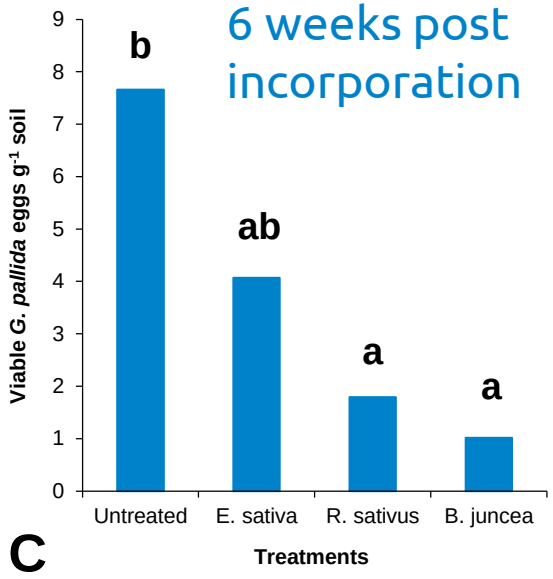
A

Pre-incorporation



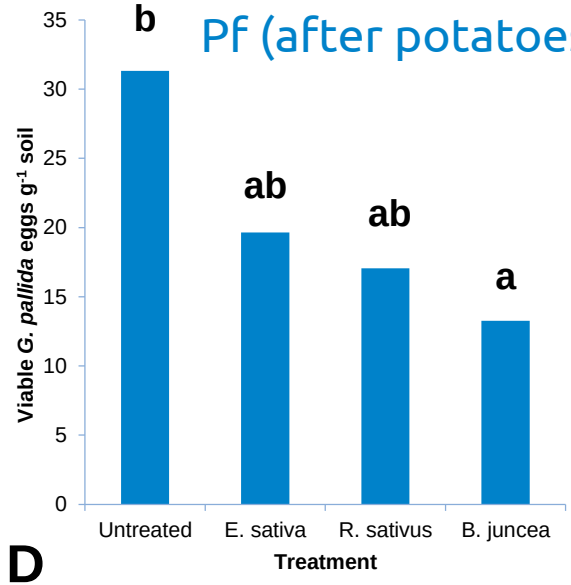
B

6 weeks post incorporation



C

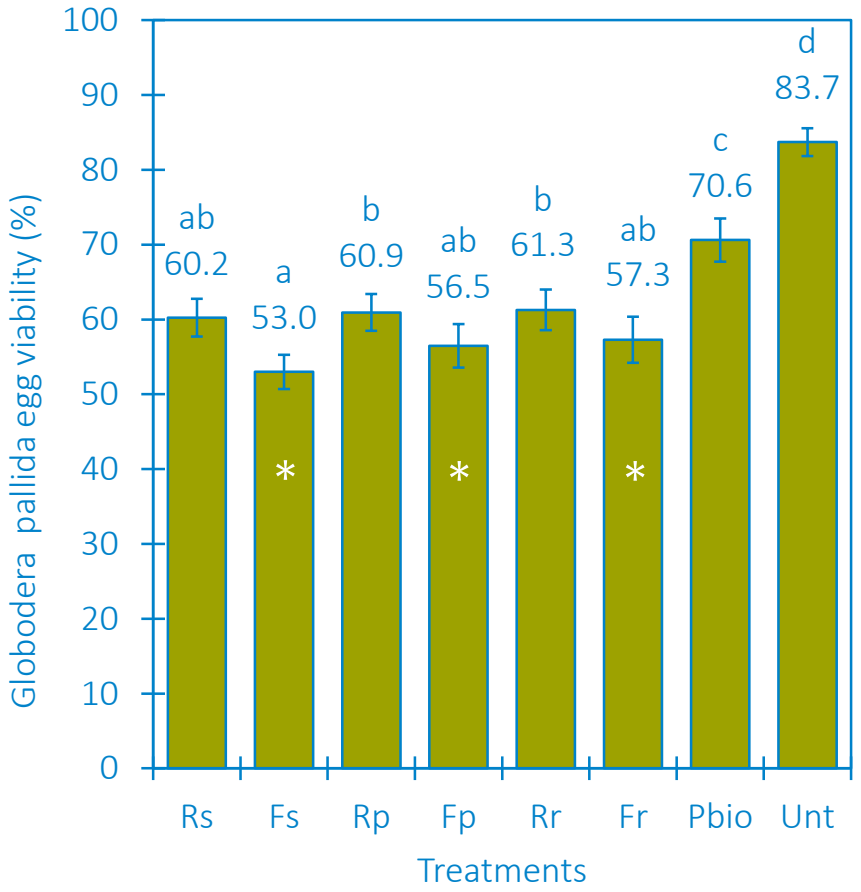
Pf (after potatoes)



D

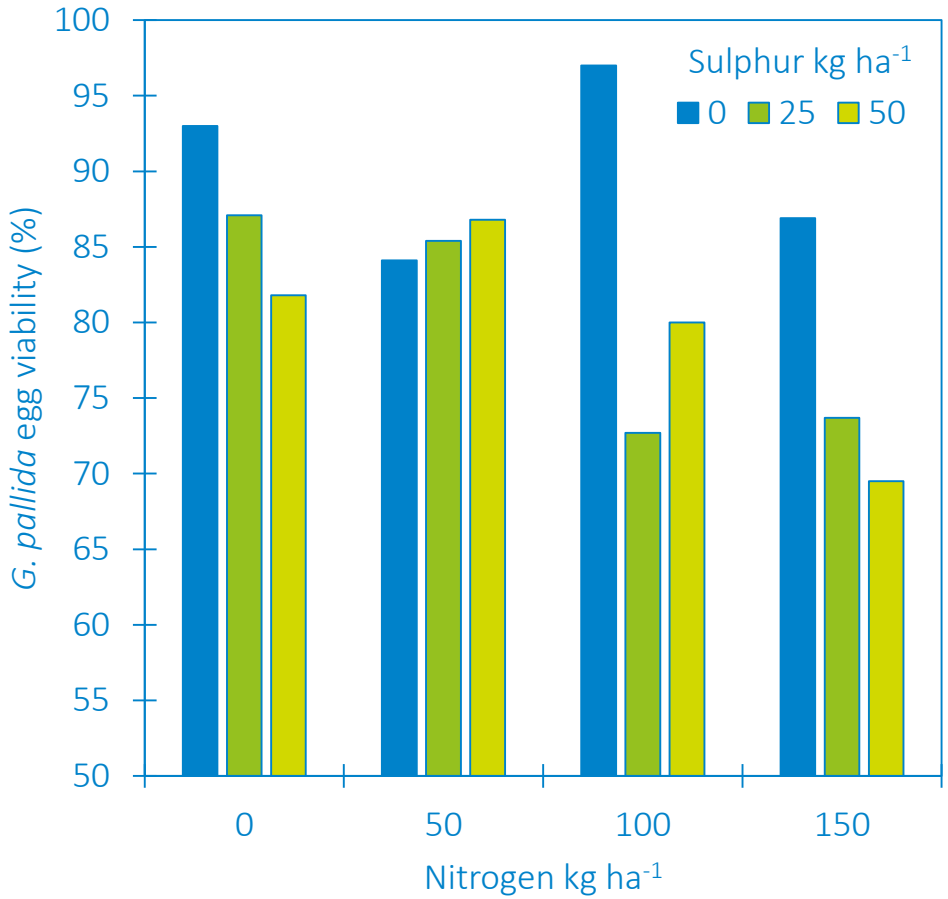
Agronomy matters!

Chopping/incorporation



Watts (2018)

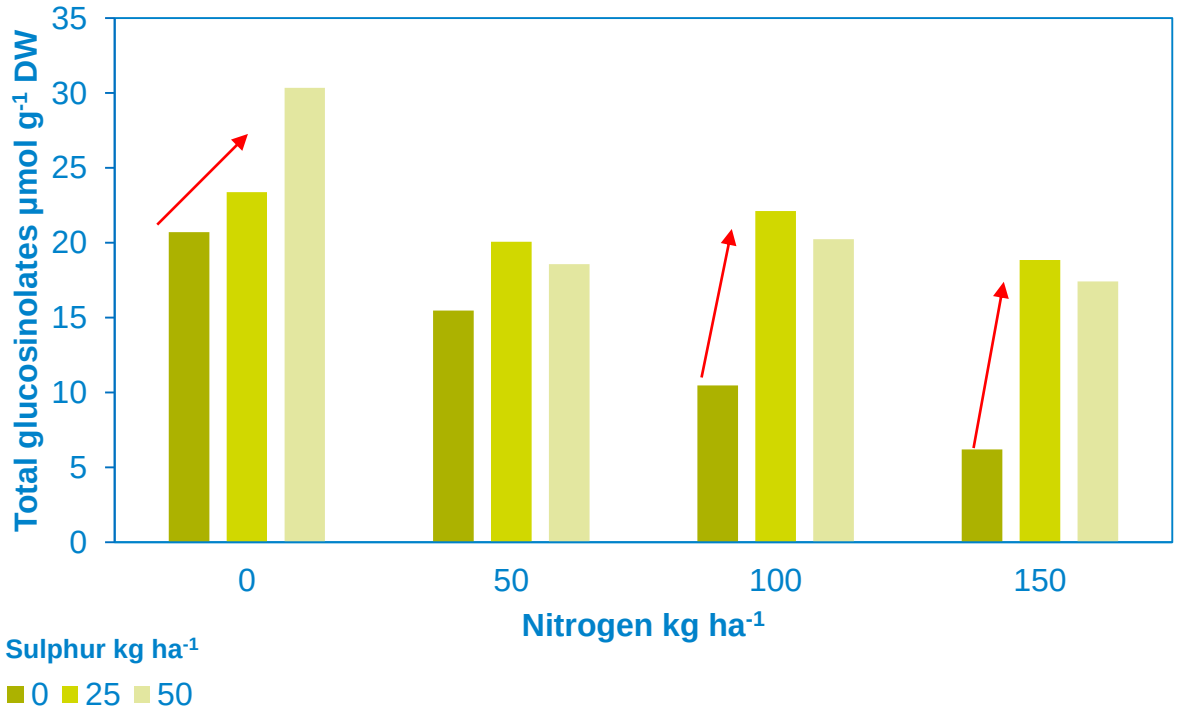
N & S inputs

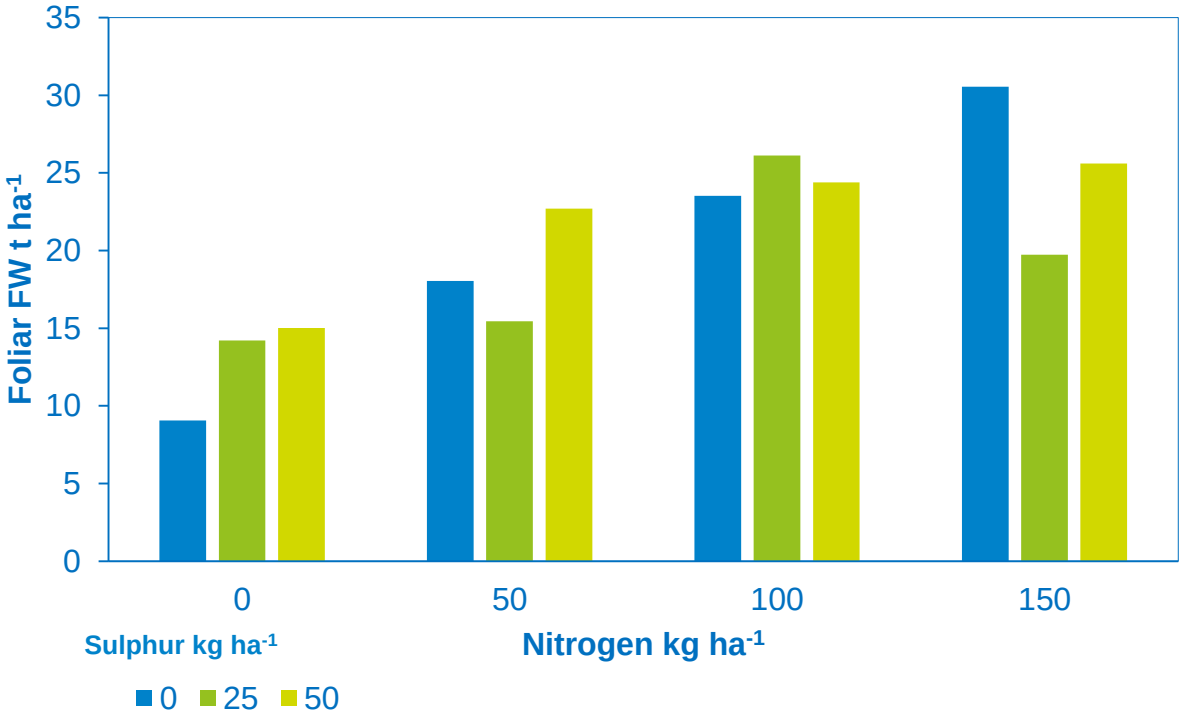


Back *et al*. (2019)

- ✓ Sowing date
- ✓ Species/ cultivar choice
- ✓ Irrigation
- ✓ Pest and pathogen considerations

Influence of nutrients on GSLs and brassica biomass



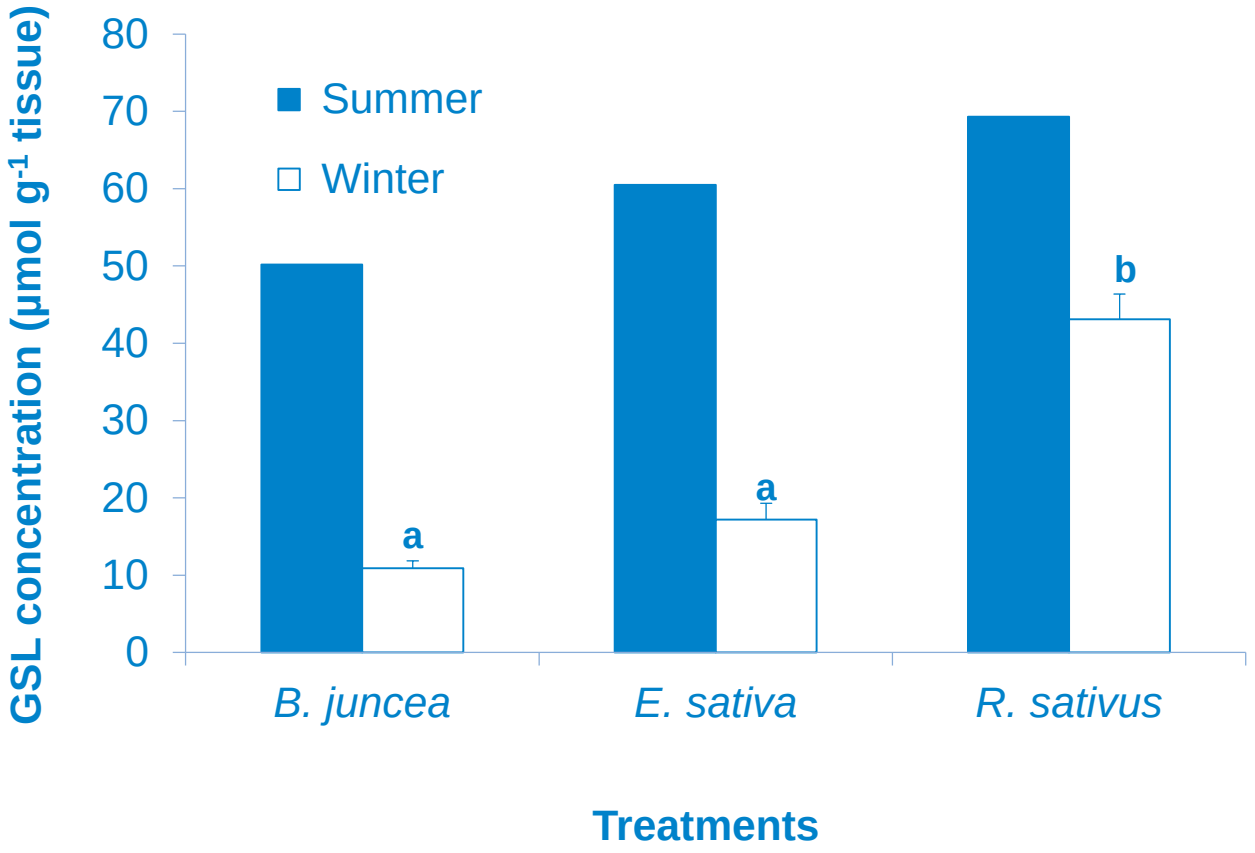


Influence of nutrients on brassica biomass

A) *B. juncea* – no N and no S: B) *B. juncea* – 150 kg ha^{-1} N + 25 kg ha^{-1} S

If restricted on N input in an NVZ apply the maximum possible.

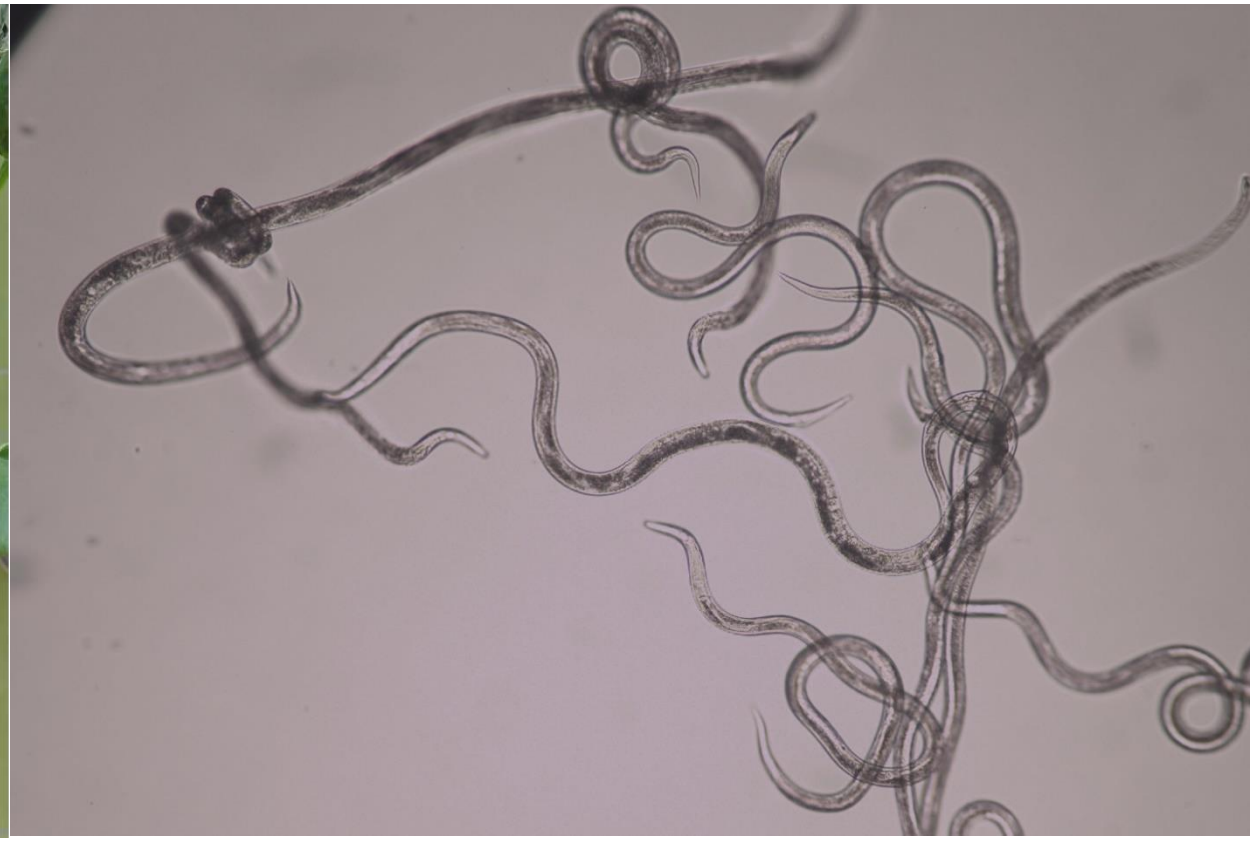
GSL accumulation in summer and winter grown biofumiants

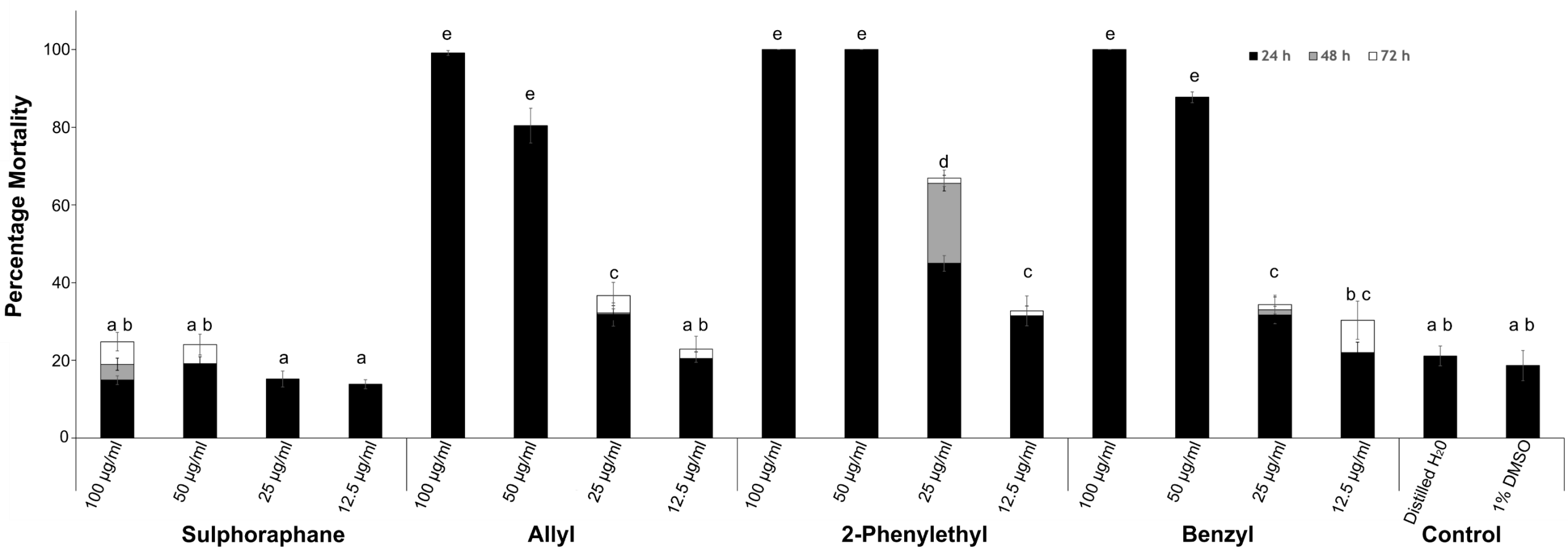


Biofumigation: practical considerations

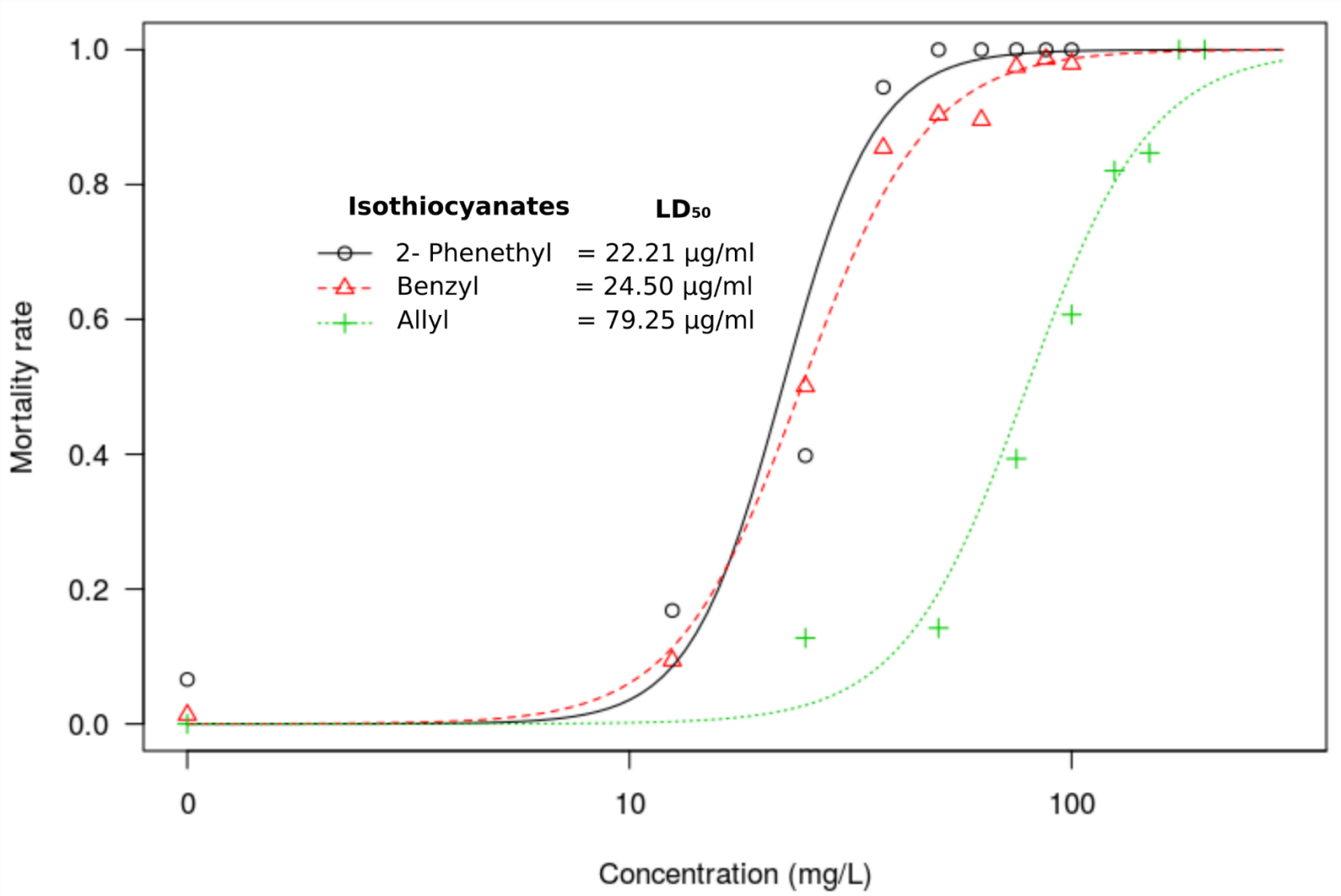
Photographs: Bruno Ngala and Bill Watts

Stem and bulb nematode (*Ditylenchus gigas* and *D. dipsaci*) – PhD Project – Nasamu Musa





- Mortality of *Ditylenchus gigas* after 24, 48 and 72 h exposure to Sulforaphane, Allyl, 2-Phenylethyl and Benzyl isothiocyante
- Error bars show the standard error of the mean
- Treatments labelled with same letters do not differ



LD50 Ratio of ITCs	p values
2-Phenethyl:Allyl	<0.001
Allyl:Benzyl	<0.001
2-Phenethyl:Benzyl	0.02562

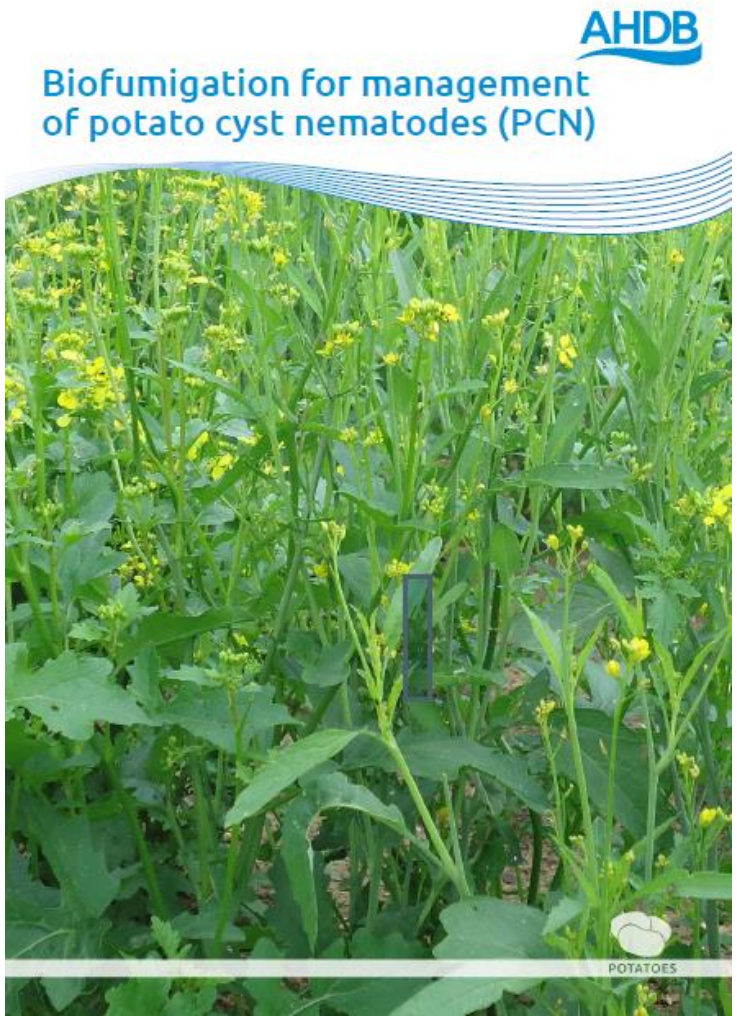
Some nematodes were paralyzed; in particular when exposed to allyl ITC

Lethal dose of *D. gigas* exposed to different Isothiocyanates concentrations

Conclusions

- Biofumigation can be a useful method of crop protection for a range of pests and pathogens
- However, efficacy can be variable…….knowledge is key
- Biofumigants need careful management to ensure optimal performance
- As with all crop protection approaches, biofumigation needs to be part of an integrated programme

Biofumigation guide



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Acknowledgements

- **Our funders (past and present):** Agrovista, Barworth Agriculture, AHDB Potatoes, European Commission, Frontier Agriculture, Joordens-Zaden, PGRO, RAGT Seeds, Tozers Seeds

- **Local growers who have hosted our experiments**

- **Crop & Environment Research Centre (HAU)**

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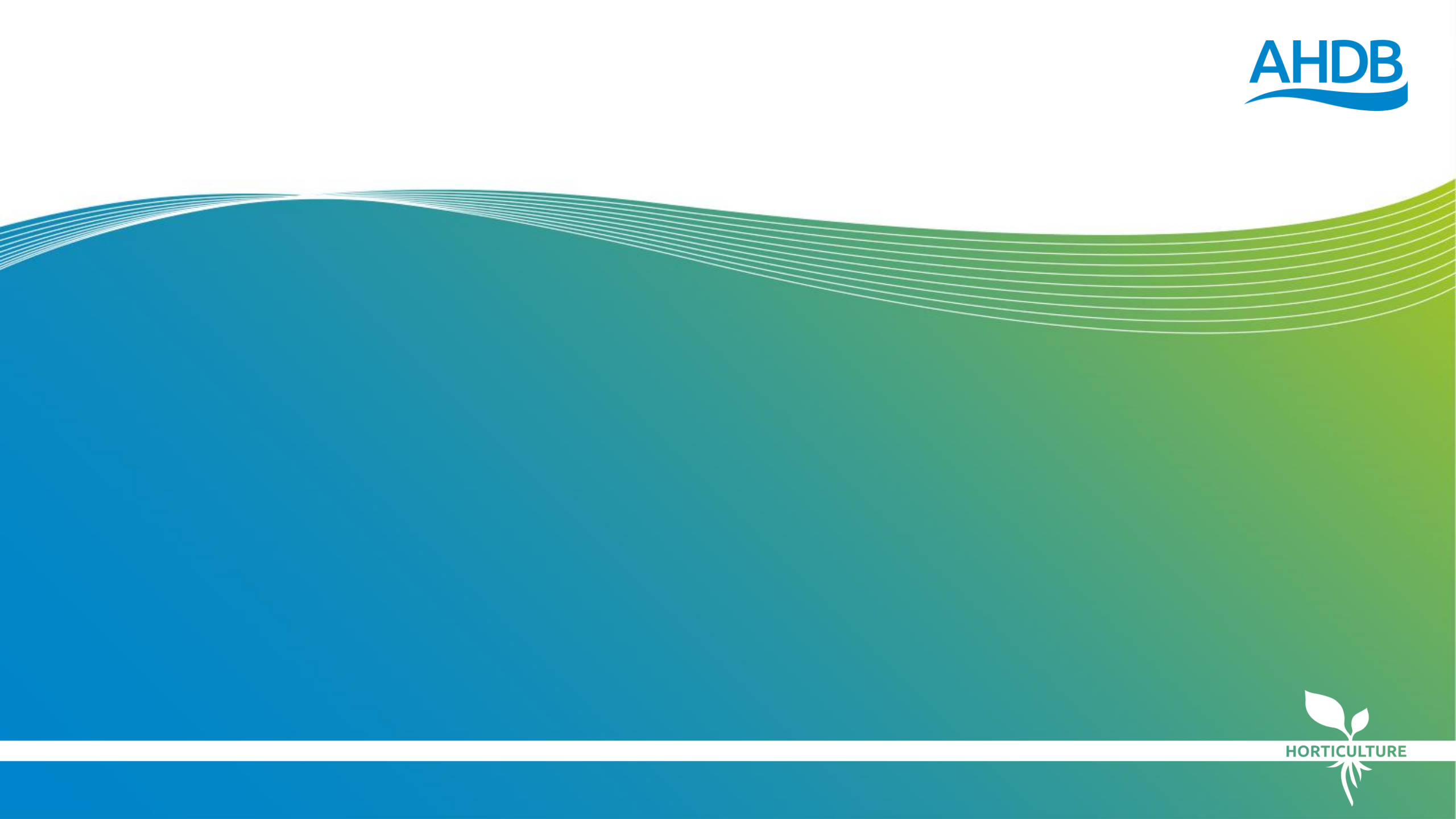
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Crop Protection Update - Narcissus

Spencer Collins– Crop Protection Scientist

Content

- EAMUs
- Herbicides
- Fungicides
- Insecticides
- SCEPTREplus
- Risk of loss

Minor Use Authorisations

- Extension of Authorisation for Minor Use – EAMU
- Product must be authorised on a UK crop
- Edible crops must be supported by residues data – to demonstrate consumer safety
- No Crop Safety or efficacy data
- Letter from manufacturer

- All use is at the risk of the user
- No manufacturer liability

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Minor Use Emergency Derogations

- Emergency extension of Authorisation for Minor Use for 120 days only
- Product should be authorised on a UK crop if possible
- There must be a strong case that there are no alternatives for control of the problem
- Edible crops must still be supported by residues data – to demonstrate consumer safety
- Letter from manufacturer

- ➢ Only authorised for 120 days
- ➢ Review by Expert Committee and signed by Minister

HORTICULTURE

EAMU applications

- Since 2012 AHDB have submitted approximately 500 applications for EAMUs and Emergency derogations
- Around 350 of these have been successful
- This does not take into account all of the EAMUs with multiple crops included

HORTICULTURE

Herbicides

Product (active)	Crop	Approval	Comments
Praxim (metobromuron)	Outdoor ornamental plant production (bulb)	EAMU 3073/19	Pre-emergence and between 1 September and 1 December Including products Inigo, Lianto, Soleto
Spinnaker (prosulfocarb)	Ornamental	EAMU 1746/19	EAMU on new product identical to Defy

Fungicides

Product (active)	Crop	Approval	Comments
Frupica (mepanipyrim)	outdoor and protected and outdoor ornamental plant production	EAMU 1294/19	Control of Botrytis (Sphaerotheca) and Powdery Mildew (Erysiphe)
Prolectus (Fenpyrazamine)	ornamental plant production	EAMU 0784/19	Control of botrytis
Amylo X WG (*Bacillus amyloliquefaciens* D747)	ornamental plant production	EAMU 0428/19	Biological pesticide
Topas (penconazole)		EAMU 0169/19	Control powdery mildew
Karma (Potassium hydrogen carbonate)	Protected and outdoor ornamental plant production	EAMU 3338/19	Control of powdery mildew

Insecticides

Product (active)	Crop	Approval	Comments
Batavia (spirotetramat)	Outdoor ornamental plant production	EAMU 1058/19	Sucking insect pests
Pitcher (Garlic extract)	Protected and outdoor ornamental plant production	EAMU 3744/19	Control of leaf and bud nematodes and vine weevil

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SCEPTREplus

- Herbicide Trials
  - Post-cropping and dormant period trials
  - Metobromuron EAMU
  - Potential products to take forward

- Bulb dip trials
  - Loss of Bravo
  - Conventional and biological products in treatment list
  - Sept/Oct start

Active ingredient renewal 1107/2009

- Actives - Risk of loss.
  - Active supported?
  - Cut off hazard criteria
  - Endocrine disruptor
  - No safe use
  - Political pressure (glyphosate)

Traffic light system

1 – Low risk

2 – Medium risk

3 – High risk

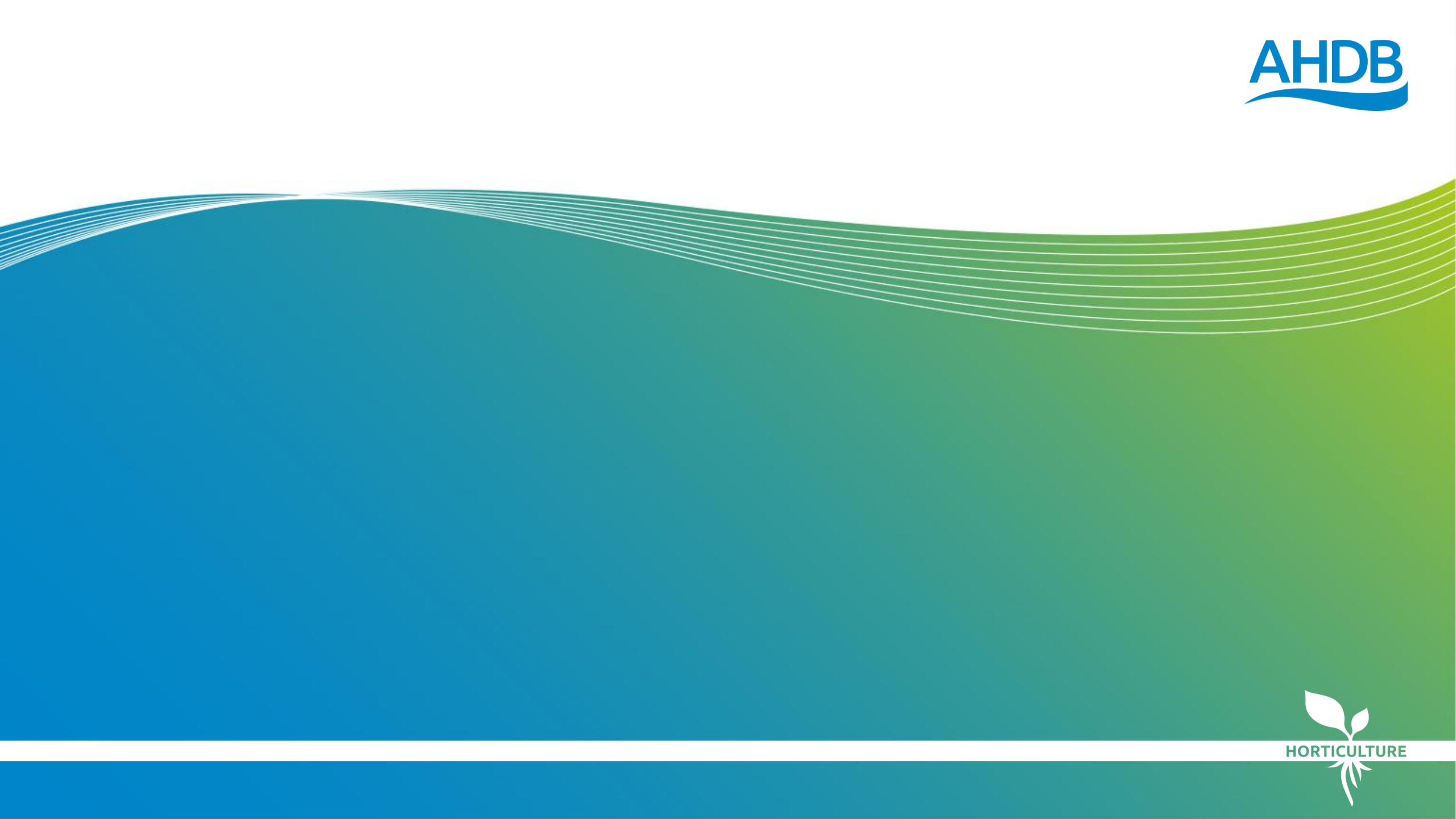
Risk of loss

Active	Risk of loss	Expiry date	Classifications	Comments on renewal	Endocrine Distruptor	Candidate for substitution
cypermethrin	3	31/10/2019	Acute Tox. 4 - H302,Acute Tox. 4 - H332,STOT SE 3 - H335,Aquatic Acute 1 - H400,Aquatic Chronic 1 - H410	0	ED	
lambda-cyhalothrin	2	31/03/2023	Acute Tox. 3 - H301,Acute Tox. 4 - H312,Acute Tox. 2 - H330,Aquatic Acute 1 - H400,Aquatic Chronic 1 - H410	0	0	low ADI / ARfD / AOEL two PBT criteria
deltamethrin	2	31/10/2019	Acute Tox. 3 - H301,Acute Tox. 3 - H331,Aquatic Acute 1 - H400,Aquatic Chronic 1 - H410	Expected consultation 06/04/18	0	
Dazomet	2	31/05/2023	Acute Tox. 4 - H302,Eye Irrit. 2 - H319,Aquatic Acute 1 - H400,Aquatic Chronic 1 - H410	0	0	
spirotetramat	2	30/04/2024	Skin Sens. 1A - H317,Eye Irrit. 2 - H319,STOT SE 3 - H335,Repr. 2 - H361fd,Aquatic Acute 1 - H400,Aquatic Chronic 1 - H410	0	0	
fosthiazate	2	31/10/2019	Acute Tox. 3 - H301,Acute Tox. 4 - H312,Skin Sens. 1 - H317,Acute Tox. 3 - H331,Aquatic Acute 1 - H400,Aquatic Chronic 1 - H410	No information regarding renewal	0	
dimethoate	3		Acute Tox. 4 - H302,Acute Tox. 4 - H312	Non-renewal	0	low ADI / ARfD / AOEL
spirodiclofen	3	31/07/2020		0	ED	
pyrethrins	1	31/08/2022	Acute Tox. 4 - H302,Acute Tox. 4 - H312,Acute Tox. 4 - H332,Aquatic Acute 1 - H400,Aquatic Chronic 1 - H410	0	0	
metaldehyde	3	31/05/2023		All outdoor uses banned in UK.	0	

Thank you for your attention!

Any questions?

Spencer.Collins@AHDB.org.uk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Risk Register 2019

Risk Register - Pests

Pests	*Latin Name*	Crop	Crop(s) Affected	Likelihood	Crop Loss	Risk
Large Narcissus Fly	*Merodon equestris*	Narcissus	hippeastrum, hyacinth, nerine, snowdrop, vallota, iris, scilla	4	2 (10%)	8
Nematodes	*Ditylenchus dipsaci (stem & bulb).*	Narcissus	Broad, including: garlic, onion, carrot, fava bean, alfalfa, oats, and strawberry, hyacinth, tulip, narcissus	3	2	6
Bulb scale mite	*Steneotarson emus laticeps*	Narcissus	narcissus	3	1	3
Slugs	*Various*	Narcissus	Wide	5	4	20

Risk Register - Diseases

Pests	*Latin Name*	Crop	Crop(s) Affected	Likelihood	Crop Loss	Risk
White mould	*Ramularia vallisumbrosae*	Narcissus	narcissus	5	4	20
Narcissus Smoulder	*Botrytis narcissicola*	Narcissus	narcissus	3	3	9
Fusarium neck and basal rot	*Fusarium oxysporum f.sp. narcisi*	Narcissus	narcissus	5	4	20
Leaf scorch	*Stagonospora curtisii*	Narcissus	narcissus	2	1	2
Fire	*Sclerotinia polyblastis*	Narcissus	narcissus	1	1	1

Risk Register - Weeds

Pests	*Latin Name*	Crop	Crop(s) Affected	Likelihood	Crop Loss	Risk
Small nettle	*Urtica urens*	Various	various	4	3	12
Broad leaf weeds	*Various*	Various	various	5	3	15

Chlorine Dioxide Case Studies

2019 Work

- Build on initial trials at Jack Buck Farms in 2018

Grower site	Type of testing	Timing
Jack Buck Farms, Lincs	Cold water dipping	End of June
Jack Buck Farms, Lincs	Hot water dipping	End of July
Greenyard, Cornwall	Hot water dipping	Mid August
Carwin Farm, Cornwall	Hot water dipping	Start September

The Science bit

- Contracted Rob Lillywhite to provide science input; test water samples for Fusarium spores, before and after addition of ClO2.

- Test batches of untreated and treated bulbs for Fusarium infection immediately post-treatment.

- Plant untreated and treated bulbs to monitor for growth or flowering defects over next 2 seasons.

The practical bit

- Scotmas visited each site at the appropriate time, taking dip water samples before adding ClO2 and after.
- Added chlorine dioxide as required until a residual amount was present in monitored samples
- Ran batches of bulbs through.
- Delivered samples of water and bulbs to Rob.
- Participating growers kept samples of treated bulbs to grow on and monitor in their own soils.

Scotmas in action

Fusarium Basal Rot

Outcomes of Phase 1 of the project

- 30 isolates of Fusarium oxysporum spp. were collected from bulbs and soil and molecular tests have been developed to confirm the presence of F. oxysporum f.sp narcisi

- Tests have been developed that will specifically detect Fusarium in soil samples. This test could provide a measure of the risk of infection from field sites.

- Initial steps have been taken to determine the threshold of spores in soil that are needed to result in infection.

Plans for Phase 2 of the project

1. Define a relationship between the amount of Fusarium DNA and how this might relate to the amount of (spore) inoculum in field soil
2. Assess the risk of Fusarium disease development in onion, stocks, Narcissus and lettuce and identify how the amount of Fusarium changes over time and space in relation to the whole microbial community
3. Determine the presence of Fusarium in symptomless onion and narcissus to assess risk of disease development in store or pre-planting
4. Determine whether pathogenic Fusarium can grow on the roots of non-host rotation crops


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Soil sickness / fatigue

What is it?

- The development of negative conditions in soil that reduce or inhibit normal plant growth
- The conditions result from chemicals released by plants
- New research suggests additional effects from fragments of DNA in the soil from decaying plant material from the crop.
- Possible link with nutrient lock up effects also.
- Links to maintaining diversity in natural plant communities

Representation of autotoxicity effect associated with the breakdown of crop residues (ref: Journal of Plant Pathology (2017), 99 (3), 545-570)

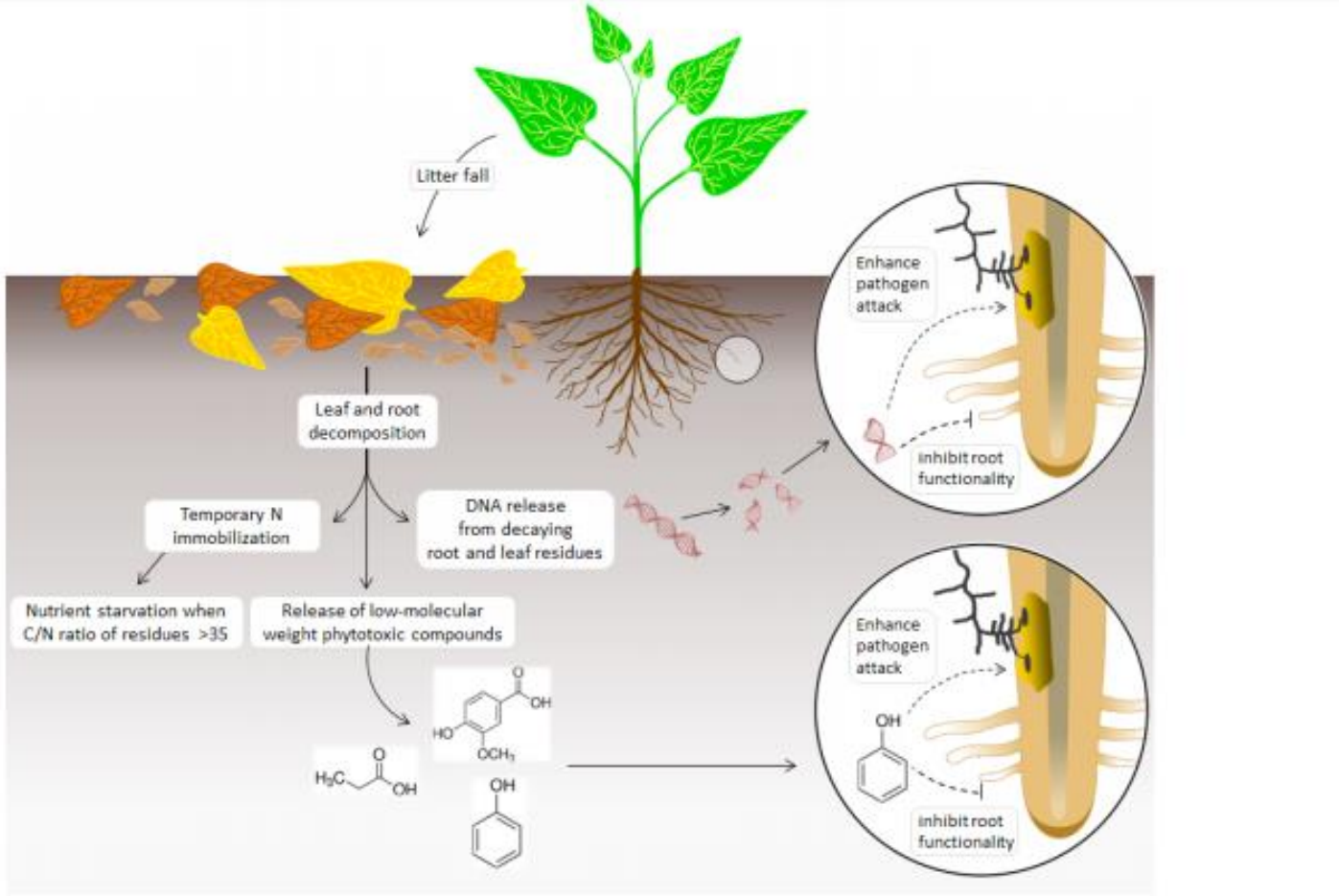

Fig. 5. Schematic representation of autotoxicity effects associated with the decomposition of crop residues, including nutrient immobilization due to microbial competition, release of low-molecular weight phytotoxic compounds and extracellular DNA from conspecific plants tissues.

Methods to overcome soil sickenss

- Crop rotation
- Polyculture in new planting sites
- Soil replacement, dilution?
- Flooding
- Hydroponic production


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