

Presentation Information

SPot East 2020 – Reduction in PVY Virus Transmission Seed Crops

Graham Tomalin

VCS (UK) Ltd VCS Potatoes Ltd



POTATOES

SPot East – Reduction of PVY Seed Crops 2020

Potato Virus UK

- Non persistent poty virus – **PVY**, PVA, PVV aphid transmission- (**severe mosaic virus**/mild mosaic virus)
- PVS – aphid/contact transmission
- PVX – contact transmission
- Persistent potato virus – **PLRV** aphid transmission
- TRV –Spraing – nematode transmission
- Mop Top Virus – powdery scab transmission



PVY^N
Maris
Peer

SPot East – Reduction PVY Seed Crops 2020

Seed Borne Potato Virus PVY – Why is this an issue?

Yield Loss -

Approx. 1% per 1% virus however depends on **MANY** factors

- Virus Strain – PVY^{O/C}, PVY^N
- Variety
- Growing Conditions
- Virus combinations



Leaf Drop Streak - PVY

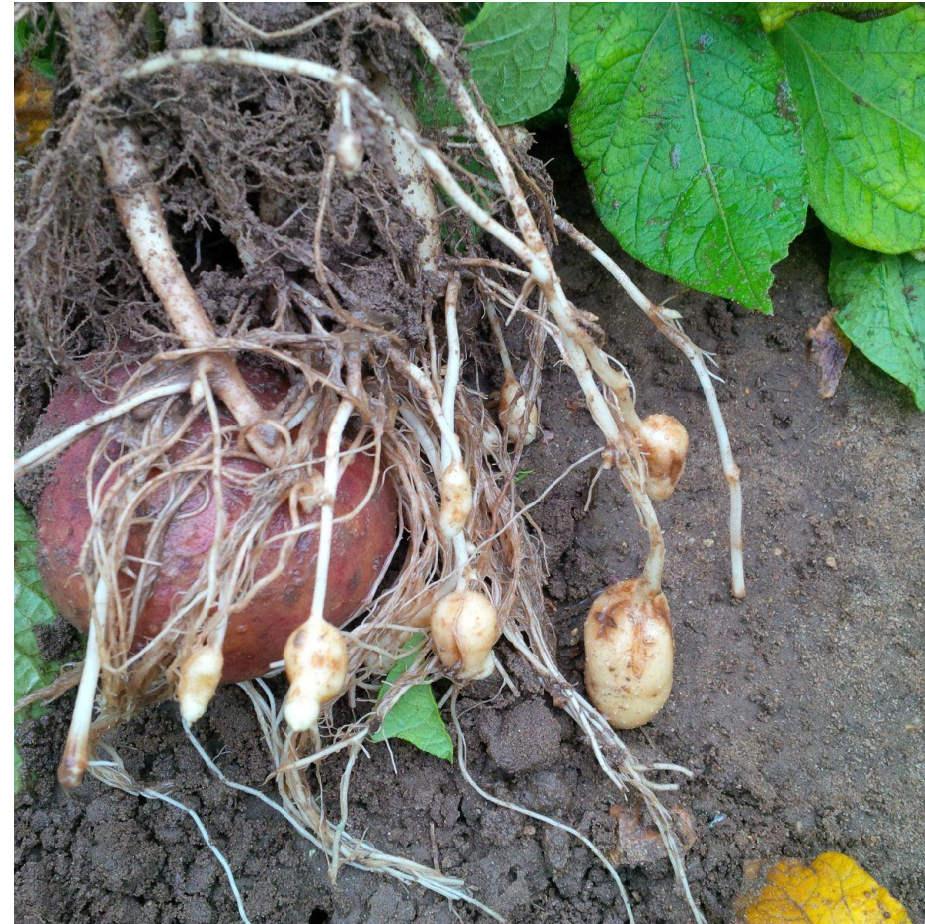
SPot East – Reduction PVY Seed Crops 2020

Seed Borne Potato Virus PVY – Why is this an issue?

Tuber Quality

depends on variety, timing of virus infection

- Tuber cracking (linked to mosaic leaf marking, varietal, virus combinations thought to exacerbate)
- PVY^{NTN} – necrotic ring disorder



Mosaic symptoms – tested as PVY^N Tuber deformities and cracking

SPot East – Reduction PVY Seed Crops 2020



Mosaic symptoms –plants tested positive with PVY^N
Tuber deformities and cracking – varietal

SPot East – Reduction PVY Seed Crops 2020

Seed Borne Potato Virus PVY – Why is this an issue?

Tuber Quality

depends on variety, timing of virus infection

- Tuber cracking
- PVY^{NTN} – necrotic ringspot disorder



PVY^{NTN} Maris peer

SPot East – Reduction PVY Seed Crops 2020



SPot East Host – James Foskett Farms

Certified seed grower for more than 25 years

- Advantage with Salad varieties due to ability to produce chronologically old seed to increase stem/tuber numbers – Maris Peer/Charlotte
- Reduced blackleg risk with susceptible varieties

Biggest issues with seed production in East Suffolk

- PVY Virus
- Drier summers – yield variability



2019 Assessed Risk Parameters of growing seed

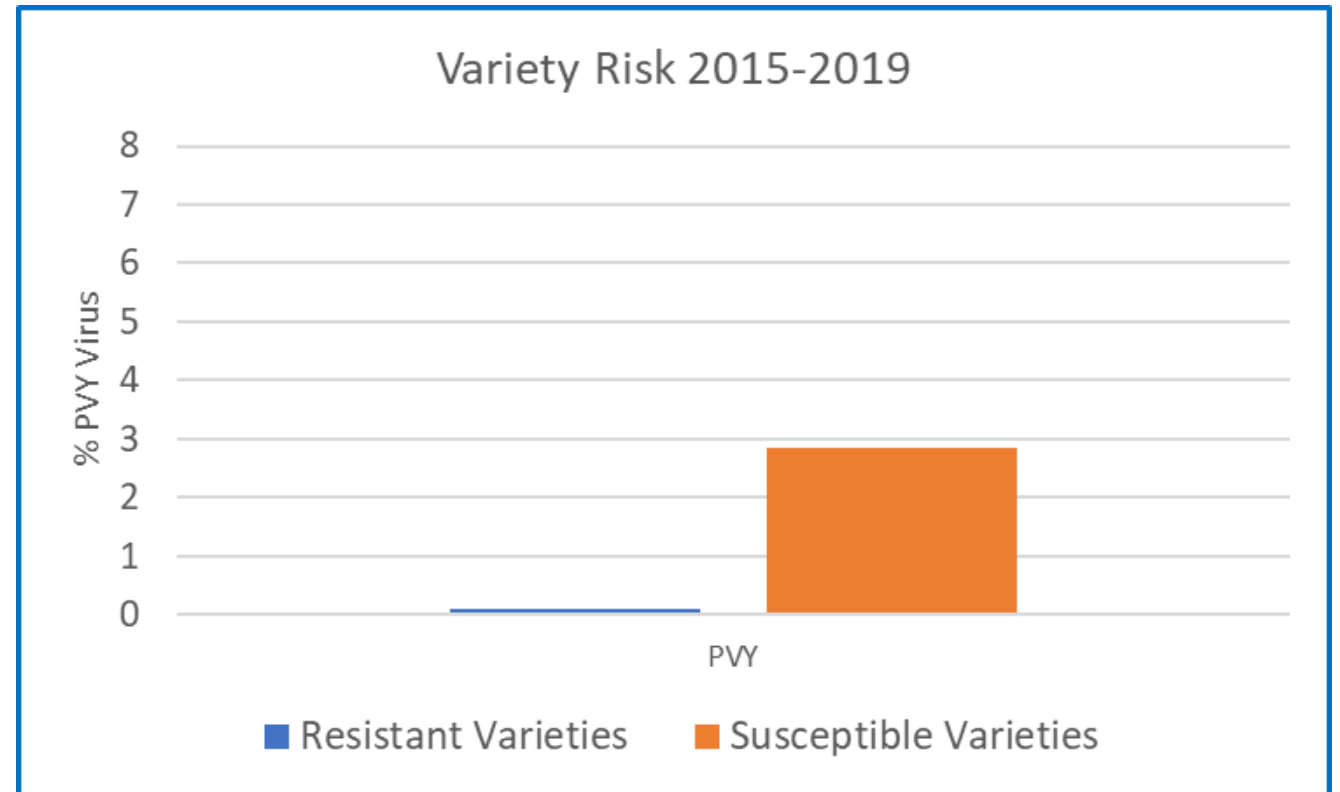
SPot East – Reduction PVY Seed Crops 2020

SPot East Host -

James Foskett Farms

How can we reduce PVY Transmission
in East Anglia

- Grow varieties with higher resistance –
Melody/Sagitta/Carlingford – **MARKET !**



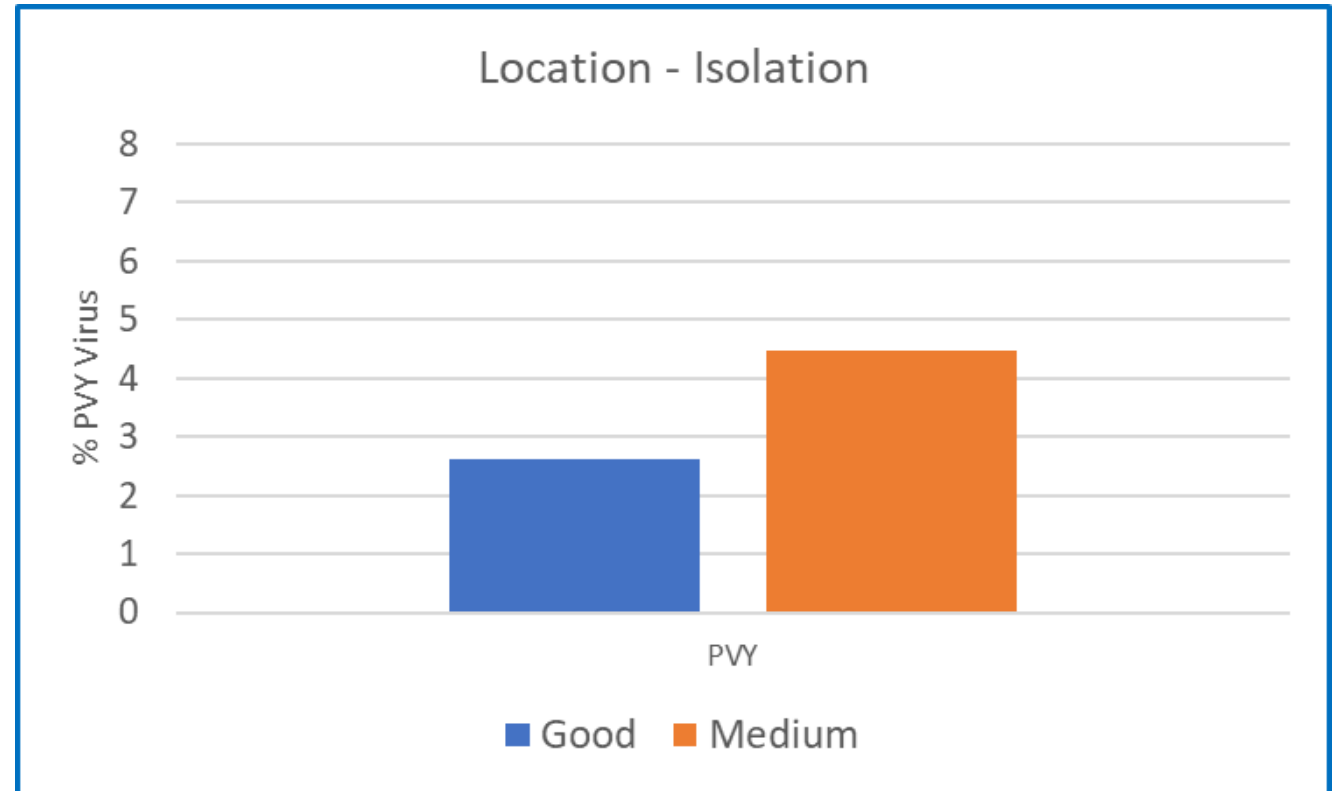
SPot East – Reduction PVY Seed Crops 2020

SPot East Host -

James Foskett Farms

How can we reduce PVY Transmission in East Anglia

- Reduce sources of PVY
 1. Isolation – Ware crops/volunteers



Volunteer control and Ware crops issue across UK

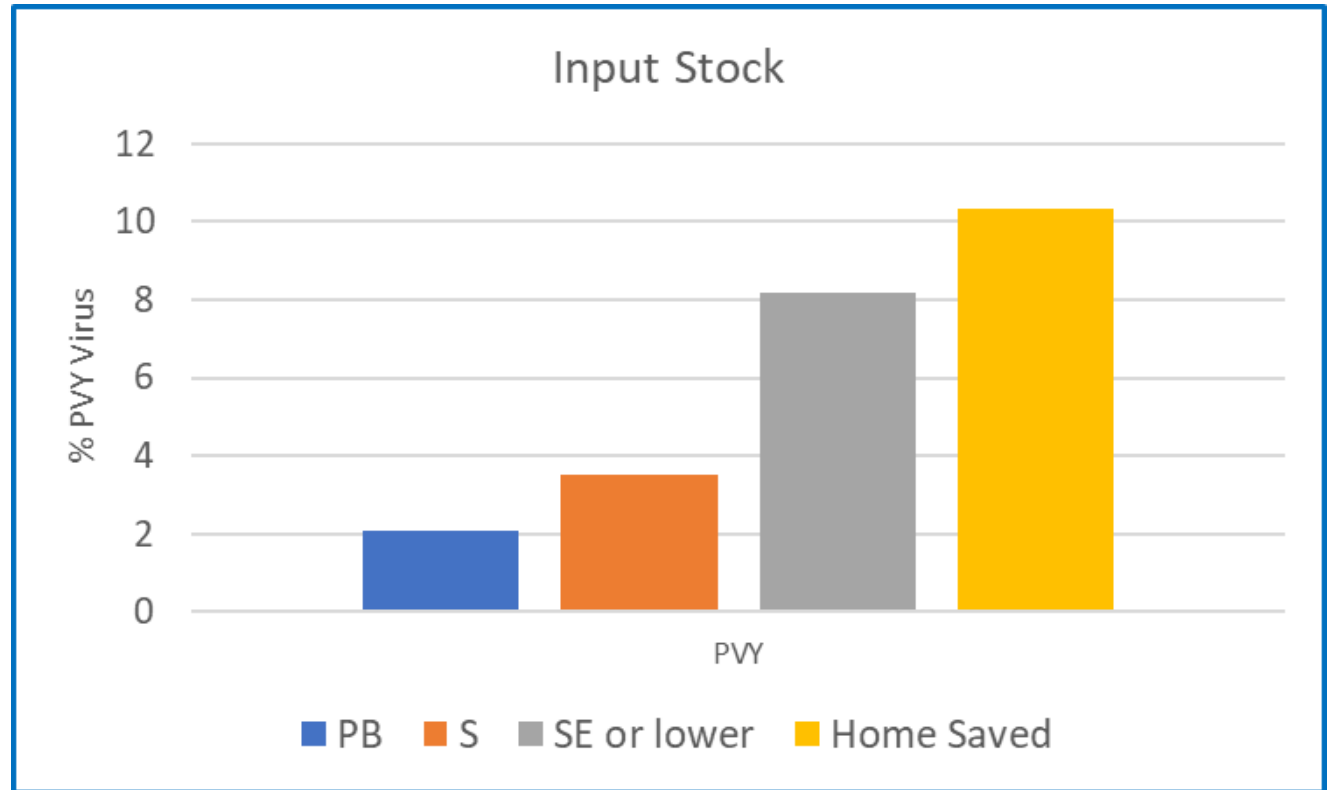
SPot East – Reduction PVY Seed Crops 2020

SPot East Host -

James Foskett Farms

How can we reduce PVY Transmission
in East Anglia

- Reduce sources of PVY
 1. Isolation – Ware crops/volunteers
 2. Reduce in field sources – PVY within input stock Select Higher grade, shorter generation seed.



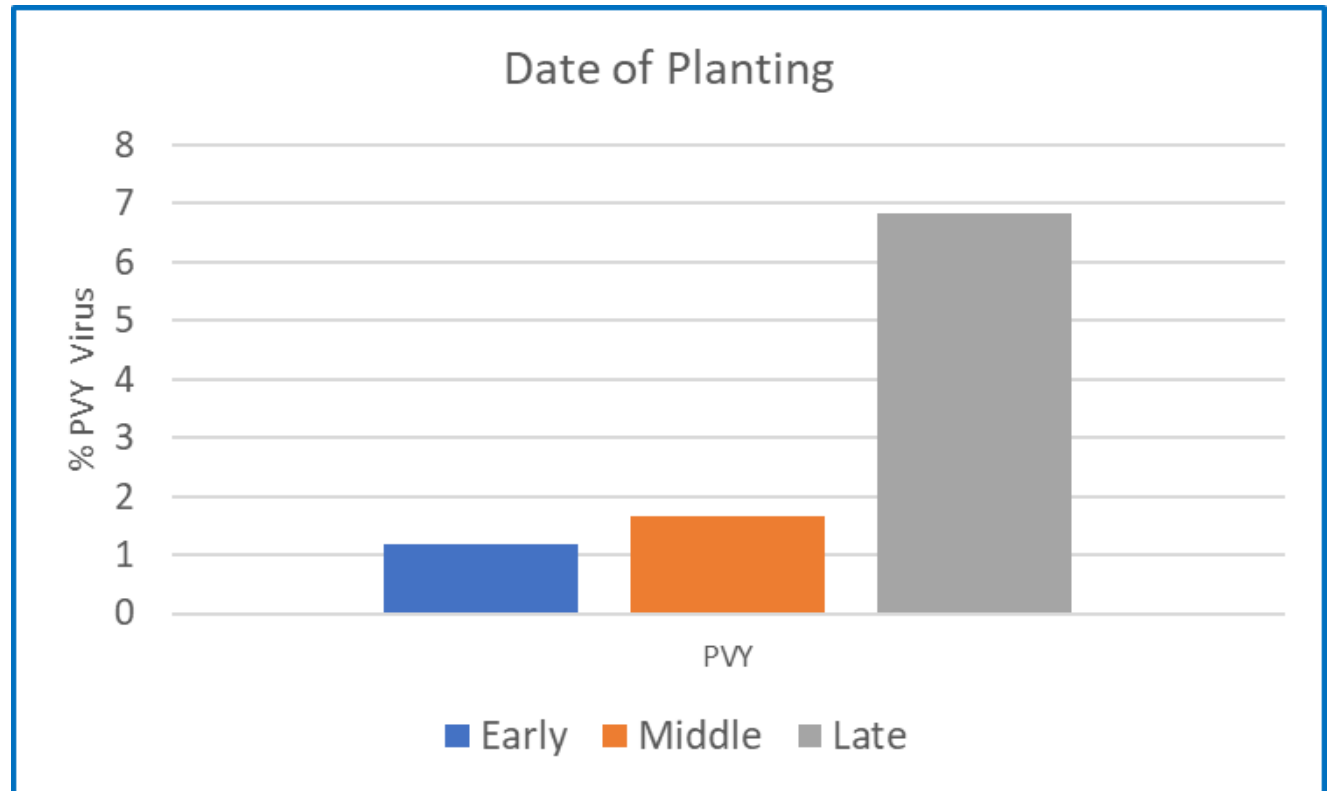
SPot East – Reduction PVY Seed Crops 2020

SPot East Host -

James Foskett Farms

How can we reduce PVY Transmission
in East Anglia

- Earlier Planting – Mature plant resistance



SPot East – Reduction PVY Seed Crops 2020

SPot East Host -

James Foskett Farms

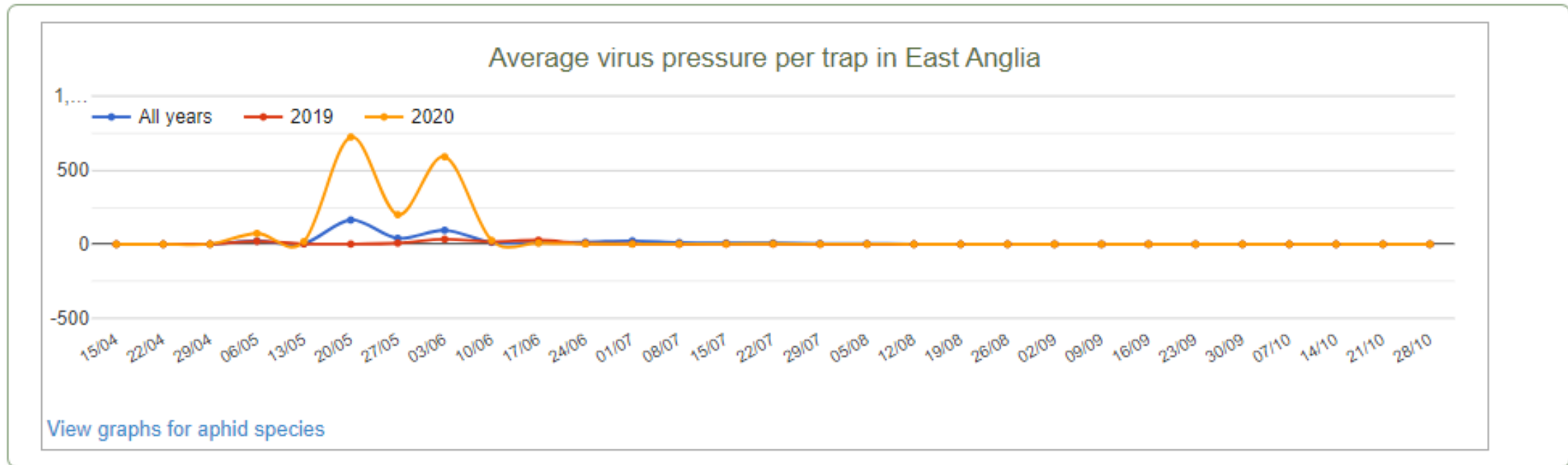
How can we reduce PVY Transmission
in East Anglia

Reduce aphid levels within crop
or Feeding within crops!



SPot East – Reduction PVY Seed Crops 2020

Aphid Pressure East Anglia 2020



Significantly higher than long term average

Data Courtesy of FERA/AHDB yellow water traps

SPot East – Reduction PVY Seed Crops 2020

Spot East Virus Reduction Trial 2020

- Site **Sutton 928A**
- Variety **Maris Peer**
- 4 Replicates
- Planting date **14th April**
- Desiccation date **2nd July**
- Sampling date **14 & 18th August**



SPot East – Reduction PVY Seed Crops 2020



Spot East Virus Reduction Trial 2020

Seed Planted

Area	Seed Stock	PVY ELISA PHVT	PVY ^N	PVLR
Trial area	Scotch PB3	0	0	0
Infector rows	ENG SE 190763	18	11	0
Ware crop	ENG S FG 4 190299	0	0	0



SPot East – Reduction PVY Seed Crops 2020



Spot East Virus Reduction Trial 2020

Treatments

Treatment Number	Treatment – 7 day interval except trt. 5
1	Untreated
2	Std insecticide Program
3	Std Insecticide + Oil 6.25l/ha
4	Std Insecticide + Oil 3.125 l/ha
5	Std Insecticide + Oil 3.125 l/ha fb Oil 3.125l/ha 3/4 day
6	Std Insecticide + Banka 0.1%
7	Std Insecticide + Exp Adv 1
8	Std Insecticide + Exp Adv 2
9	Std Insecticide + new aphicide
10	Std Insecticide + Flipper 0.1%
11	Novel Repellant

Blight spray program
co applied

1. Curzate MWG
2. Revus
3. Curzate MWG
4. Revus
5. Zorvec
6. Zorvec
7. Revus



SPot East – Reduction PVY Seed Crops 2020



Spot East Virus Reduction Trial 2020

Standard Insecticide program within trial

(commencing at
50% emergence
Application interval 7
Days except
Treatment 5)

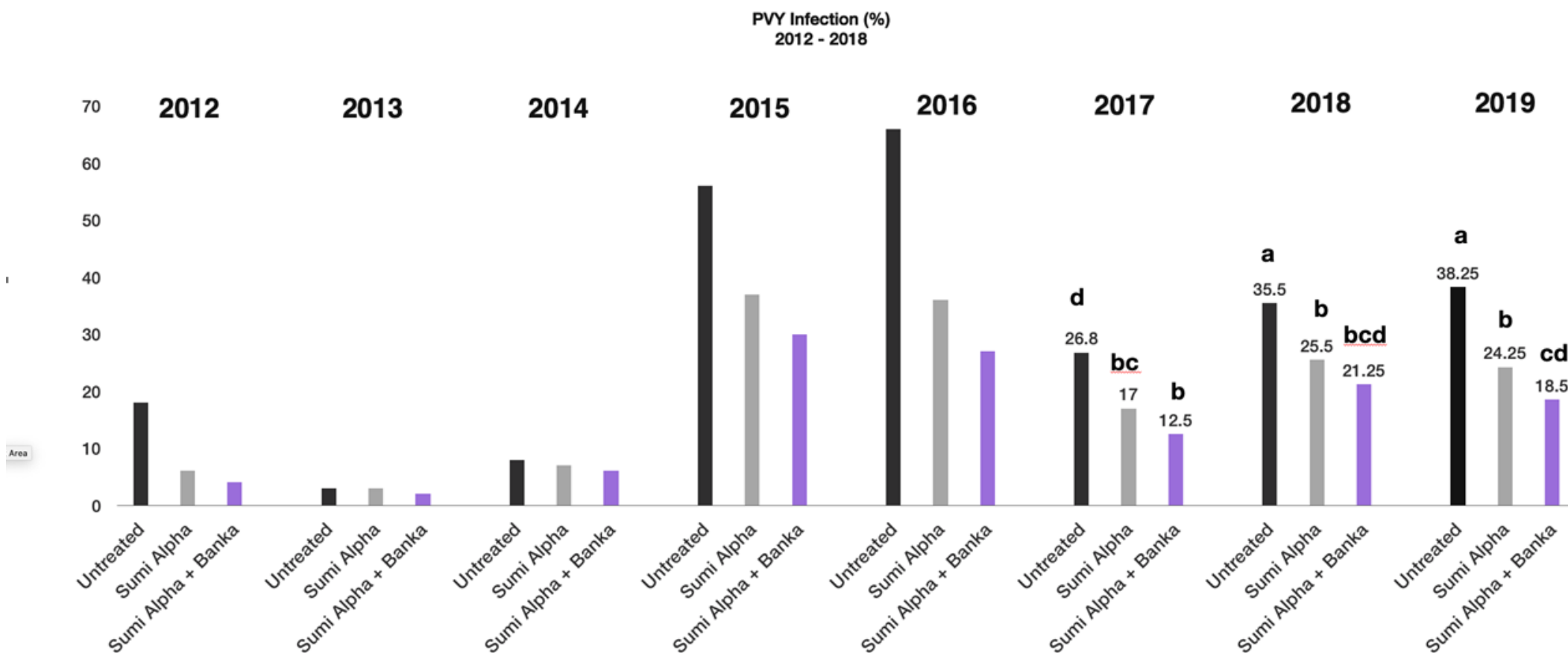
Application	Insecticide 1	Insecticide 2
1	Hallmark Zeon 75ml/ha	-
2	Sven 200 ml/ha	Insyst 250 g/ha
3	Hallmark Zeon 75 ml/ha	-
4	Sven 200 ml/ha	Insyst 250 g/ha
5	Hallmark Zeon 75 ml/ha	-
6	Sven 200 ml/ha	Teppeki 160 g/ha
7	Hallmark Zeon 75 ml/ha	-
8	Sven 200 ml/ha	Teppeki 160 g/ha



SPot East – Reduction PVY Seed Crops 2020



Spot East Virus Reduction Trial 2020 - Banka - Interagro



SPot East – Reduction PVY Seed Crops 2020



Spot East Virus Reduction Trial 2020

Flipper

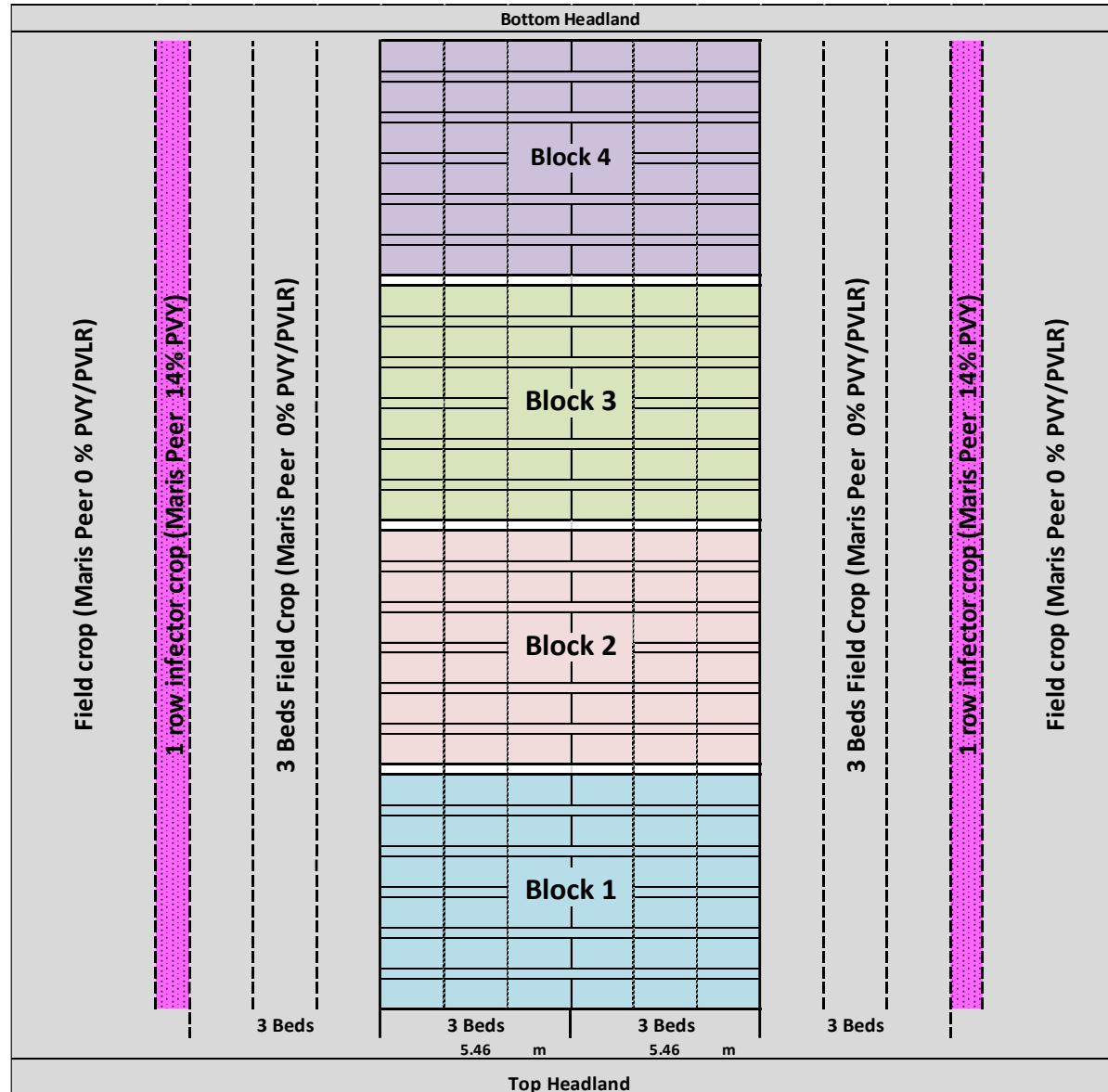
- bio-insecticide/acaricide
- Wide range of EAMU approvals (not potatoes)
- Minimal impact on bees and beneficials
- Contact acting – coverage ideally on underside of leaves



SPot East – Reduction PVY SeedAHDB 2020

Spot East Virus Reduction Trial 2020

Trial plan



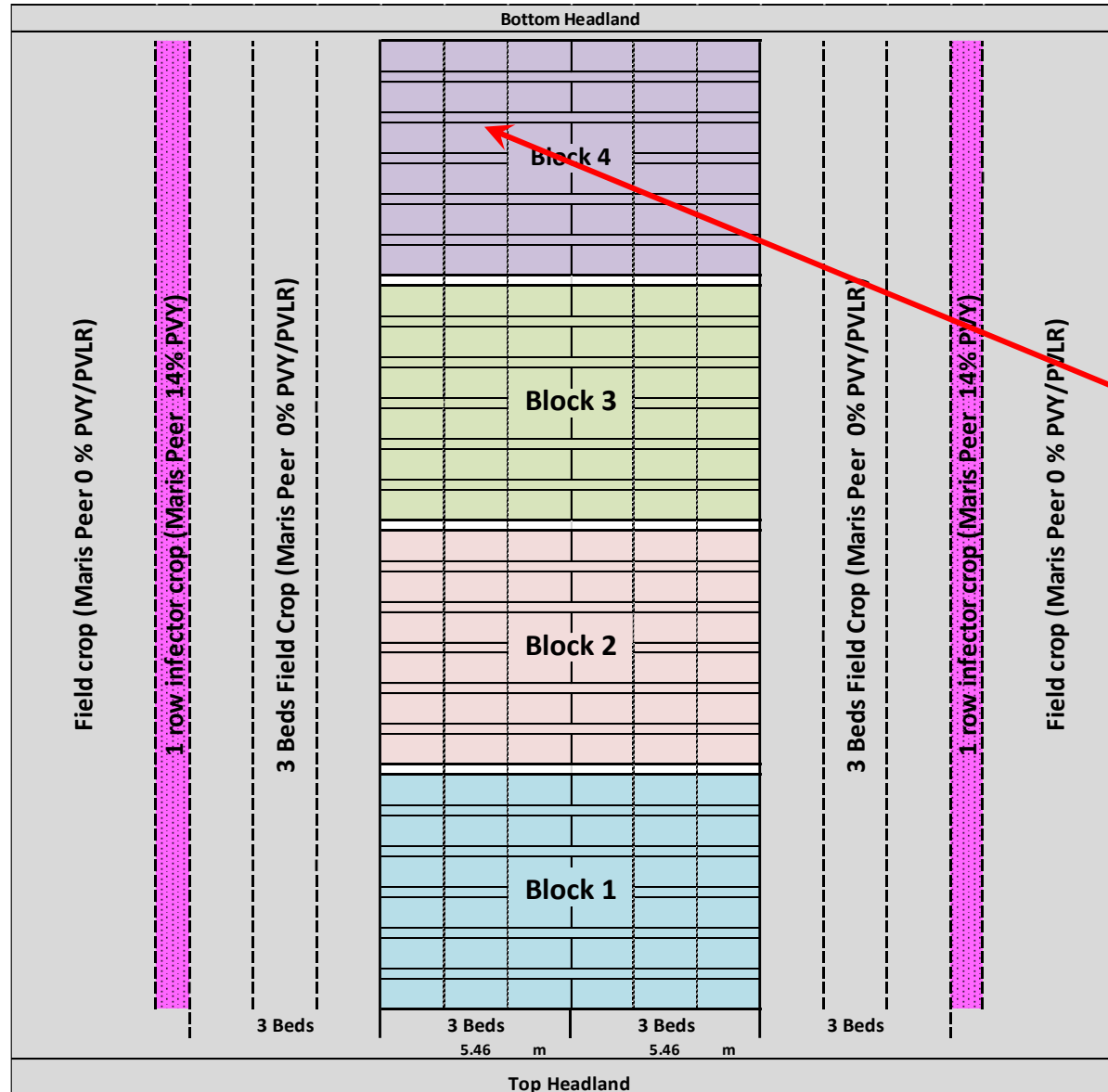
PVY^N
Maris
Peer



SPot East – Reduction PVY SeedAHDB 2020

Spot East Virus Reduction Trial 2020

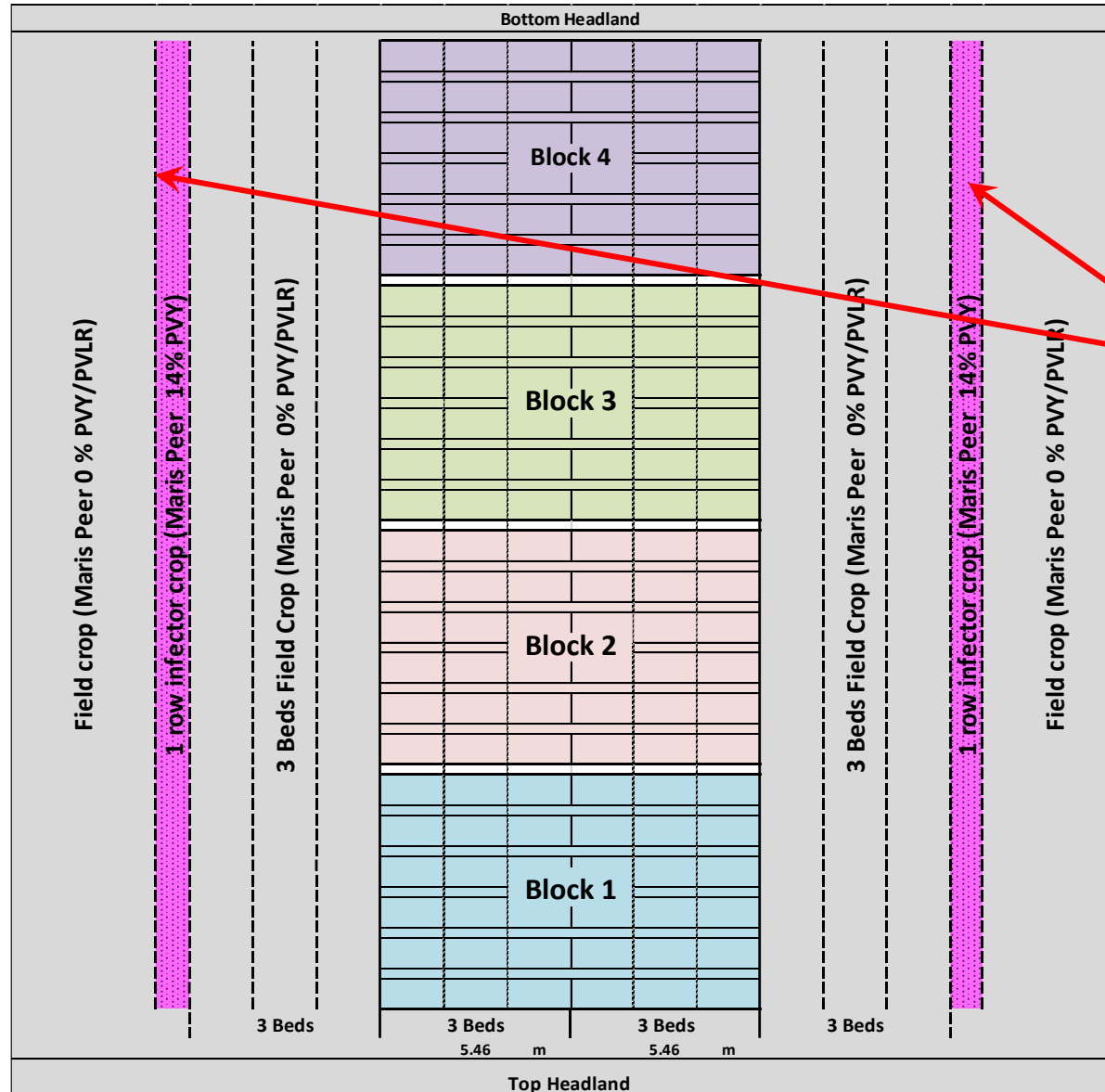
Trial plan



SPot East – Reduction PVY SeedAHDB 2020

Spot East Virus Reduction Trial 2020

Trial plan

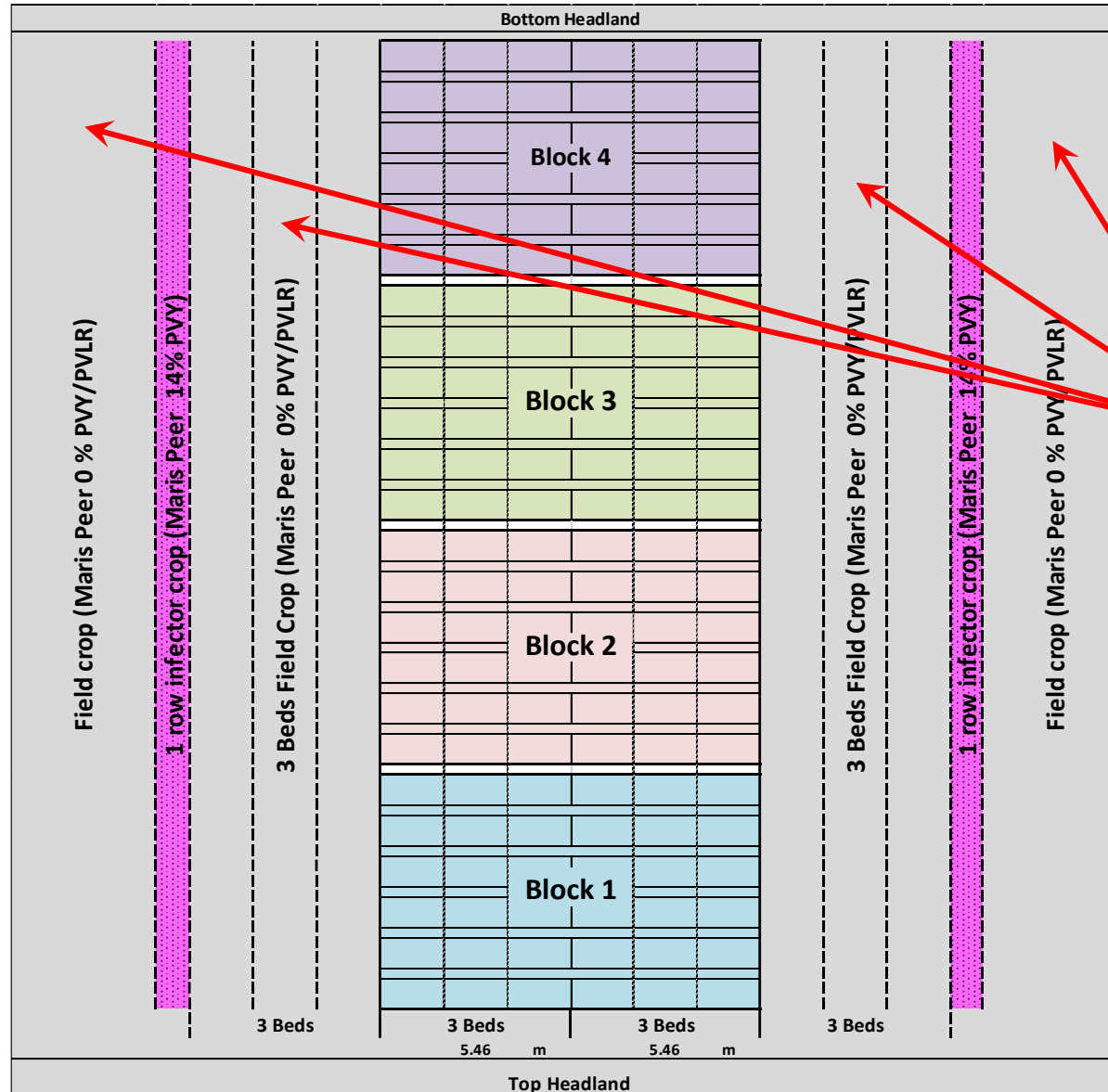


Infector Rows in 4th
Bed away from Trial
equal distance from
each plot

SPot East – Reduction PVY SeedAHDB 2020

Spot East Virus Reduction Trial 2020

Trial plan



Field Crop Seed
tested at 0% PVY

SPot East – Reduction PVY SeedAHDB 2020

Spot East Virus Reduction Trial 2020

Trial plan Block 1 - sampling

111	Trt 4	spare	spare
109	Trt 9	110	Trt 6
107	Trt 11	108	Trt 2
105	Trt 3	106	Trt 8
103	Trt 1	104	Trt 10
101	Trt 5	102	Trt 7

100 tubers sampled
from individual
plants within center
bed of a plot

SPot East – Reduction PVY SeedAHDB 2020

Spot East Virus Reduction Trial 2020

Observations

5th June

Trt 1

Untreated



Fertiliser scorch

Limited water
beading

SPot East – Reduction PVY SeedAHDB 2020

Spot East Virus Reduction Trial 2020

Observations
5th June

Trt 3

std insecticide +
Oil 6.25l/ha



Water beads across
all leaf surfaces

SPot East – Reduction PVY SeedAHDB 2020

Spot East Virus Reduction Trial 2020

Observations

5th June

Trt 4

std insecticide +
Oil 3.125 l/ha



Fertiliser scorch

Water beads across
all leaf surfaces

SPot East – Reduction PVY SeedAHDB 2020

Spot East Virus Reduction Trial 2020

Observations
5th June

Trt 5

std insecticide +
Oil 3.125 l/ha
every 3-4 day



Fertiliser scorch

Water beads across
all leaf surfaces

Oil phytotoxicity

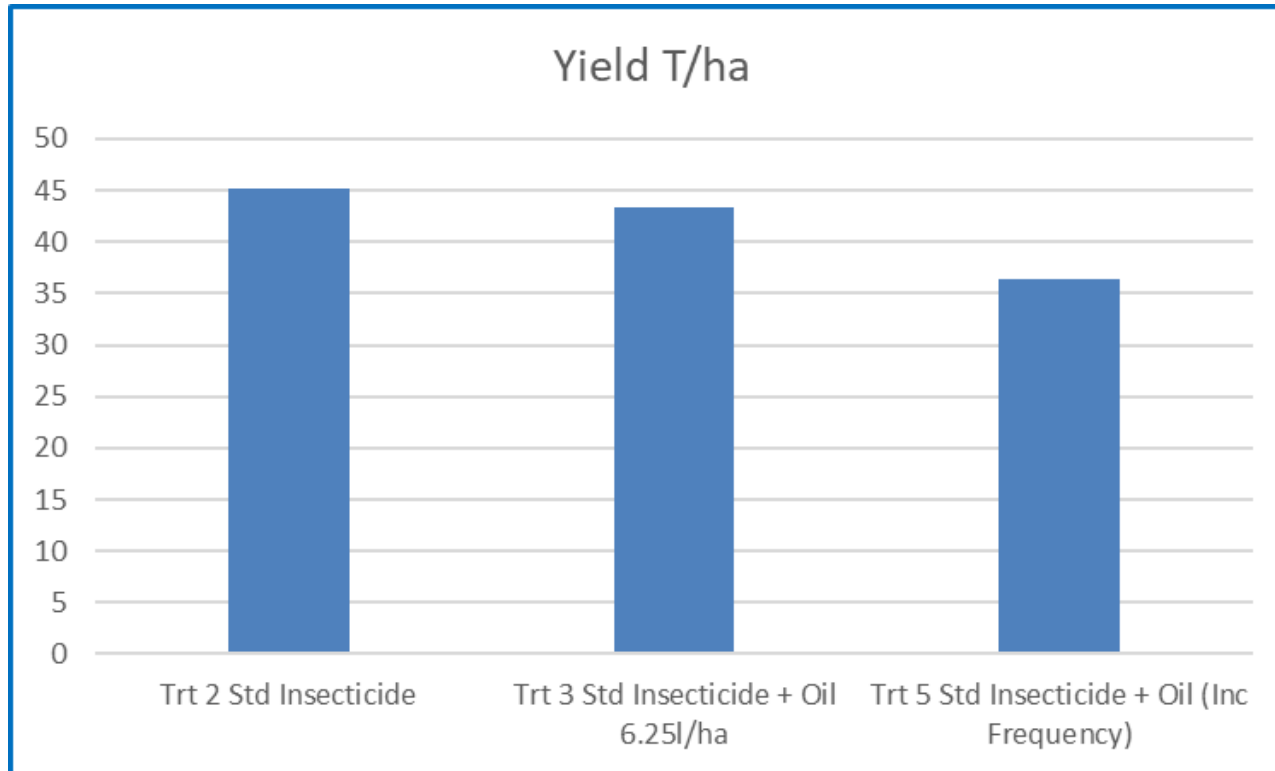
SPot East – Reduction PVY SeedAHDB Crops 2020

Spot East Virus Reduction Trial 2020



SPot East – Reduction PVY SeedAHDB Crops 2020

Spot East Virus Reduction Trial 2020



Reduced yield with
trt 5 – std insecticide
+ oil + increased
frequency oil
applications

Note - Conditions
following application

SPot East – Reduction PVY SeedAHDB Crops 2020

Spot East Virus Reduction Trial 2020

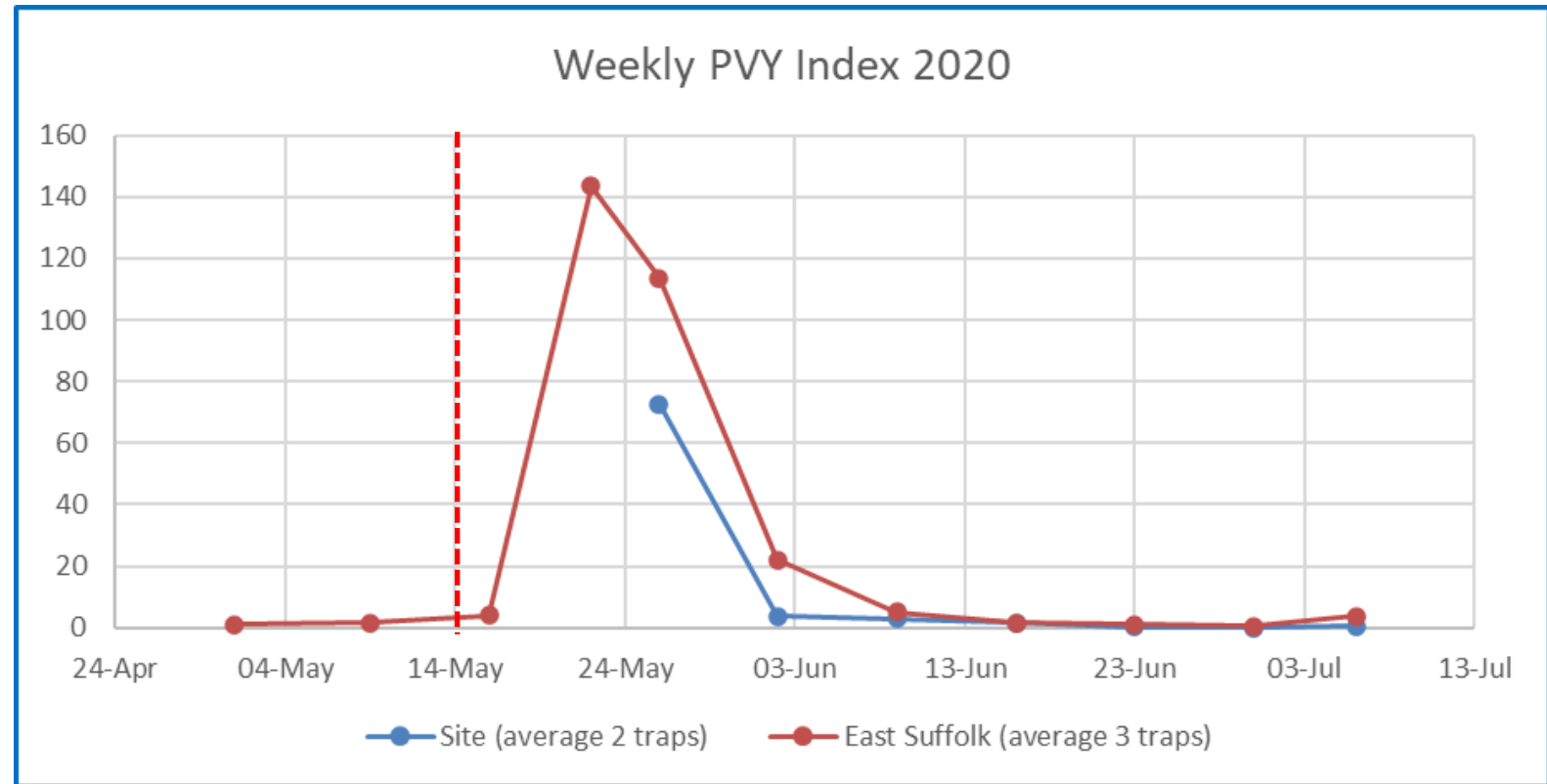
Aphid Pressure on site

Aphid Species	Common Name	PVY Index	26/05	02/06	09/06	16/06	23/06	30/06	06/07	Total PVY Index
<i>Myzus Persicae</i>	Peach-Potato Aphid	1.00	72	2						74
<i>Acyrtosiphon Pisum</i>	Pea Aphid	0.70	1							0.7
<i>Sitobion Avenae</i>	Grain Aphid	0.60	2							1.2
<i>Cavariella Aegopodii</i>	Willow-Carrot Aphid	0.50	15	2		1			1	9.5
<i>Brachycaudus Helichrysi</i>	Leaf-Curling Plum Aphid	0.21	5			1				1.26
<i>Macrosiphum Euphorbiae</i>	Potato Aphid	0.20	1							0.2
<i>Myzus Ascalonicus</i>	Shallot Aphid	0.20				1				0.2
<i>Hyperomyzus Lactucae</i>	Currant-Sowthistle Aphid	0.16	1							0.16
<i>Aphis Fabae</i>	Black-Bean Aphid	0.10	1			2	1			0.4
<i>Brevicoryne Brassicae</i>	Cabbage Aphid	0.01	1			3	3			0.07
<i>Amphorophora Rubi</i>	Bramble Aphid	0.00					1			0
<i>Anoecia Spp.</i>		0.00						1		0
<i>Cavariella Theobaldi</i>		0.00	1							0
<i>Drepanosiphum Platanoidis</i>	Sycamore Aphid	0.00			1					0
<i>Hayhirstia Atriplicis</i>	Chenopod Aphid	0.00				1				0
<i>Megourella Purpurea</i>		0.00				1				0
<i>Microlophium Carnosum</i>	Nettle Aphid	0.00	7		2					0
<i>Protrama Spp.</i>		0.00	1						1	0
<i>Tuberculoides Borealis</i>	feeds on oak	0.00			1					0
Unidentifiable		0.00	3	1	5	4			1	0
Weekly Index			82.92	3	0	1.14	0.13	0	0.5	
Cumulative Index			82.92	85.92	85.92	87.06	87.19	87.19	87.69	87.69

SPot East – Reduction PVY SeedAHDB Crops 2020

Spot East Virus Reduction Trial 2020

Aphid Pressure
on site



East Suffolk Traps (% of PVY Index)–

89% *Myzus P*, 7% WC Aphid

Site Traps -

85% *Myzus P*, 9% WC Aphid

SPot East – Reduction PVY Seed Crops 2020



Spot East Virus Reduction Trial 2020

Results

Treatment Number	Treatment – 7 day interval except trt. 5	Average PVY * note results still outstanding	Average PVLr *note results still outstanding
1	Untreated	31.53%	0.48%
2	Std insecticide Program	20.3%	0%
3	Std Insecticide + Oil 6.25l/ha	32.0%	0%
4	Std Insecticide + Oil 3.125 l/ha	21.5%	0%
5	Std Insecticide + Cropspray 11e 0.1% fb Oil 6.25l/ha 3/4 day int.	18.4%	0.6%
6	Std Insecticide + Banka 0.1%	23.4%	0%
7	Std Insecticide + Exp Adjuvant 1	24.9%	0%
8	Std Insecticide + Exp Adjuvant 2	32.2%	0%
9	Std Insecticide + new aphicide	24.8%	1.4%
10	Std Insecticide + Flipper 0.1%	22.0%	0%
11	Novel Repellant	28.3%	0%

Average PVY^N trt 1
4.18% PVY present



SPot East – Reduction PVY Seed Crops 2020

Spot East Virus Reduction Trial 2020

Results

- No statistical differences – wide range of virus results on all treatments
- Trend toward improvement from treatment 5 - std insecticide + oil with additional oil applied in between standard applications at 3 - 4 day interval
- Is a small plot trial the right approach with rapid build up of aphid numbers ???

SPot East – Reduction PVY Seed Crops 2020

Where Do we Go from Here? - Questions?

1. Mineral oils – Benefit? How best do we use them?
2. Is there any benefit of pyrethroids?
3. Benefits and practicalities of straw mulch?
4. Alternative companion crop?
5. Resistant variety on field Margins?
6. Netting? Expensive but option High Grade seed?
7. Wild flower strips through field?

SPot East – Reduction PVY Seed Crops 2020

Mineral Oils

Currently no approved mineral oils beyond TI within UK
(use limited to improving efficacy of co applied product)

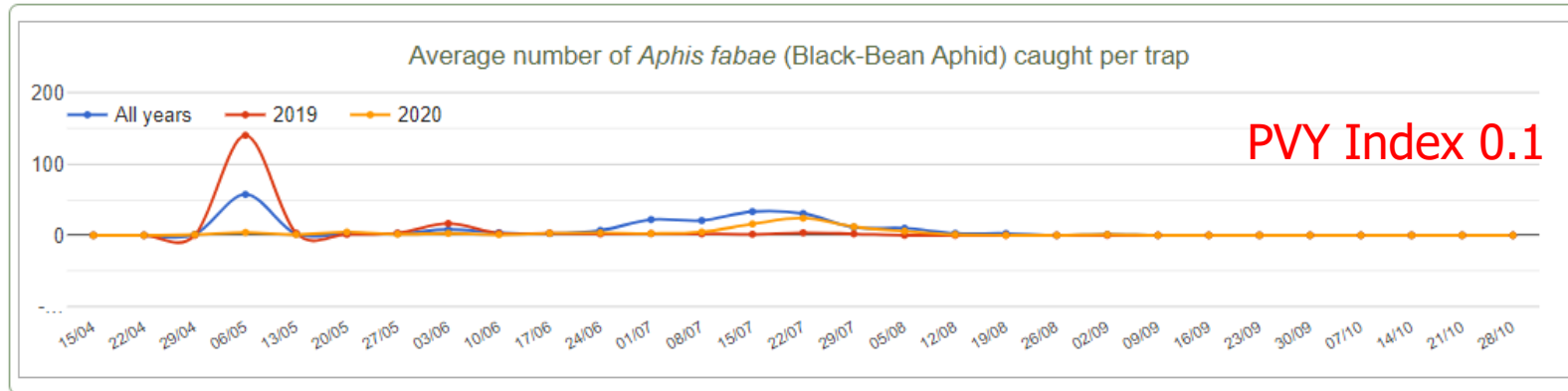
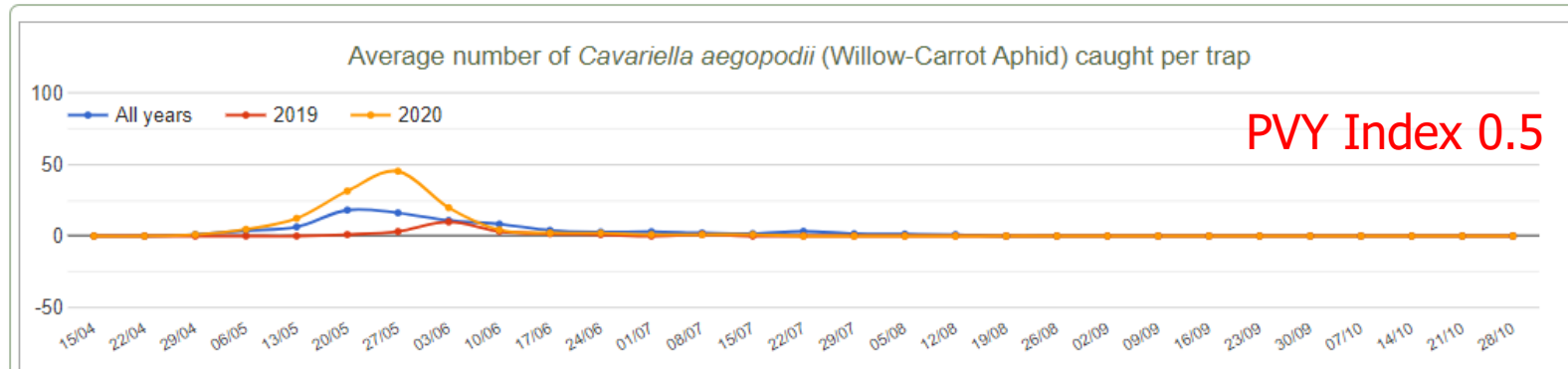
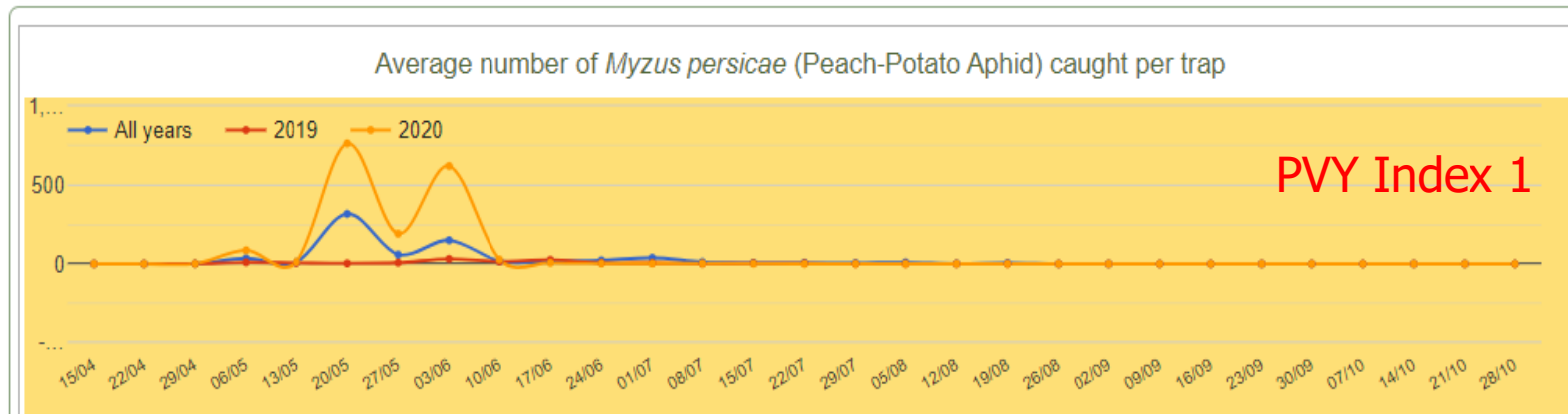
- Good evidence of mineral oil reducing PVY transmission (Bradley et al. 1966, Kirchner et al. Finland 2014, Mackenzie et al. 2016 Canada, Dupuis et al. 2017 Switzerland)
- Most applications within trials at 7 day intervals, are more frequent applications beneficial during peak aphid flights?



SPot East – Reduction PVY Seed 2020

Questions

- Is there any benefit of pyrethroids?
- Repellant?
- Non-resistant aphid *spp.*?



SPot East – Reduction PVY Seed Crops 2020

Straw Mulch & Companion crops

- Contrast reduced between crop and soil (aphids)
- Good evidence of straw mulch reducing transmission (Kirchner et al. Finland 2014, Dupuis et al. 2017 Switzerland)
- Companion crops – significant reductions of PVY (approx. 20%) with oat or hairy vetch companion crops 2011 and 2012 (Dupuis et al. 2017 Switzerland)

Note: AHDB Agronomy week presentations December



SPot East – Reduction PVY Seed Crops 2020

Other options

- Resistant variety on field margin?
- Aphid netting – option for high grade seed - expensive
- Wild flower margins/strips – When to establish?



Aphid Net 0.25-0.8mm

SPot East – Reduction of PVY Seed Crops 2020



VCS (UK) Ltd and VCS Potatoes
Ltd would like to thank the team at
James Foskett Farms and AHDB for
their help with this trial

