Application Form CRD 9
Submission under Article 53 Regulation (EC) No 1107/2009
Emergency Authorisation

When to use this form

This form is for applications from authorisation holders, growers or their representative organisations for an **Emergency Authorisation** under **Article 53 of Regulation (EC) No 1107/2009.***

An emergency authorisation can only be granted in special circumstances (for a period not exceeding 120 days) where such a measure appears necessary because of a danger which cannot be contained by any other reasonable means. The use must be limited and controlled. There is no obligation to grant an Article 53 authorisation.

* Regulation (EC) 1107/2009 means:
- In relation to Great Britain, Regulation (EC) 1107/2009 as it has effect in Great Britain by virtue of the European Union (Withdrawal) Act 2018.
- In relation to Northern Ireland, Regulation (EC) 1107/2009 as it has effect in Northern Ireland by virtue of the Protocol on Ireland/Northern Ireland.

How to complete this form

- Complete all parts of the form A to E.
- All correspondence and enquiries will be sent to the contact named in the applicant section (Part A) of this form unless HSE is informed otherwise.
- No sections of the form are protected. Take care not to delete or amend existing text.
- To check 'tick boxes', double click on the box, select 'checked' and press 'ok'.
- 'Copy and paste' to add additional rows/tables where appropriate.
- For questions about this form, see CRD contact details below.
- All forms with supporting information must be submitted to the Applications Sift (see Application submission information below).
- You must ensure all information necessary to support your case has been provided, as the information in Parts C to E may be submitted to the Expert Committee on Pesticides (ECP) for independent scientific advice.
- Guidance on the process of how an emergency authorisation is granted can be found in the Applicant Guide to Emergency Authorisations.

Application submission	**By Email**: applications@hse.gov.uk **By ShareFile (cloud-based file sharing system):** Please request details of CRD's ShareFile by emailing applications@hse.gov.uk **By Post:** Applications Sift, Chemicals Regulation Division**,** Mallard House, Kings Pool, 3 Peasholme Green, York, YO1 7PX, UK

CRD contact details
Telephone: 020 3028 1101 (**International:** (+44) 20 3028 1101)
Enquiries Email: CRDInformationManagement@hse.gov.uk
Website: http://www.hse.gov.uk/CRD/

Part A: Co-Applicant details					
1	Applicant	Contact name	Daniel Green	Title*	Mr
		Organisation name	British Sugar plc		
		Address	1 Samson Place, London Road, Peterborough, PE7 8QJ		
		Telephone	07894 296 051		
		Email	Daniel.green@britishsugar.com		
		Date	30th June 2023		
			I confirm that the information given in this application form is true to the best of my knowledge, information and belief. x (please tick to confirm)		
2	Address for invoicing	Contact name	Olivia Seccombe	Title*	Miss
		Organisation name	British Sugar plc		
		Address	1 Samson Place, London Road, Peterborough, PE7 8QJ		
		Telephone	07864 800406		
		Email	Olivia. Seccombe@britishsugar.com		
3	Additional contact for technical information	Contact name	Professor Mark Stevens, BBRO		
		Telephone	07712 822194		
		Email	Mark.stevens@bbro.co.uk		
4	Purchase order number (if needed)		TBC		

Part A: Co-Applicant details					
1	Applicant	Contact name	James Northen	Title*	Dr
		Organisation name	NFU Sugar (be behalf of)		
		Address	Agriculture House Stoneleigh Park Warwickshire CV8 2TZ		
		Telephone	02476 858614		
		Email	James.northen@nfu.org.uk		
		Date	30th June 2023		

			I confirm that the information given in this application form is true to the best of my knowledge, information and belief. x		
2	**Address for invoicing**	**Contact name**	Olivia Seccombe	**Title***	Miss
		Organisation name	British Sugar plc		
		Address	1 Samson Place, London Road, Peterborough, PE7 8QJ		
		Telephone	07864 800406		
		Email	Olivia. Seccombe@britishsugar.com		
3	**Additional contact for technical information**	**Contact name**	Professor Mark Stevens, BBRO		
		Telephone	07712 822194		
		Email	Mark.stevens@bbro.co.uk		
4	**Purchase order number (if needed)**		TBC		

* for example: Mrs, Mr, Ms, Dr

Using personal data
HSE is under a legal duty to protect any personal information we collect and we will only use that information in accordance with the law, including the General Data Protection Regulation (GDPR) (Regulation (EU) 2016/679), the Data Protection Act 2018, the Freedom of Information Act 2000 and the Environmental Information Regulations 2004. We meet our obligations as part of UK Government to safeguard data and prevent any unauthorised access to it through use of technical, personnel and procedural controls.

More details on Government security can be found on the Gov.UK Web site [https://www.gov.uk/government/collections/government-security]. In order to carry out our functions and respond to enquiries effectively, we will sometimes need to share information with other government departments, the emergency services, law enforcement agencies, public authorities (such as local authorities and the Environment Agency) and organisations acting on our behalf. However, we will only do this where it is required or permitted by law.

Part B: Product details			
5	**Product name**	Cruiser SB	
6	**MAPP number**	15012	
7	**Active substance(s) and content (list all)**	600g/l	
		75ml/l product equivalent to 45g thiamethoxam /100,000 seeds	
8	**Authorisation holder**	Syngenta UK Limited	
	Address	SYNGENTA UK LTD, CPC4 CAPITAL PARK, FULBOURN, CAMBRIDGE, CB21 5XE	
9	**Registration or Authorisation number of the product (imported/ currently authorised in the UK for other uses)**	Authorisation Number 2593 of 2013	
10	**Please tick which nation(s)* your application applies to**	x	**England**
		☐	**Scotland**
		☐	**Northern Ireland**
		☐	**Wales**

* An application can be for one or more of the four nations and may cover the whole of the UK.

11	Plant Health Orders
If the emergency authorisation is for use with a Plant Health Order please provide details of the order below.	
Not applicable	

Part C: Comparison table of the proposed emergency use and any current or previously authorised uses
Please complete the proposed emergency use / situation section of the table below. Please use the comparable product / use section of the table when providing details of a product or use (including previous emergency authorisation) which your application is based on.

12 Product	Proposed emergency use / situation	Comparable product / use
On-label / Extension of Authorisation for Minor Use/ Previous Emergency authorisation		EA granted in 2023
Product	Cruiser SB	Cruiser SB
15012	15012	15012
Active substance(s) (a.s.) and content	600g / l thiamethoxam	600g / l thiamethoxam
Formulation type	A flowable concentrate for seed treatment formulation	A flowable concentrate for seed treatment formulation
Field of use (for example, fungicide)	Professional – seed treatment	Professional – seed treatment

13	Uses	Proposed emergency use / situation		Comparable product / use	
Crop details	**Identity of crop or situation of use[1]**	Sugar beet		Sugar beet	
	Situation of crop[2]	indoor (non-crop production)	☐	indoor (non-crop production)	☐
		outdoor	x	outdoor	x
		protected (permanent or temporary cover)[2]	☐	protected (permanent or temporary cover)[2]	☐
		permanent protection with full enclosure (PPFE)	☐	permanent protection with full enclosure (PPFE)	☐
	Growing media used for protected uses	organic media (for example soil or compost, either in containers or on impervious surfaces)	☐	organic media (for example soil or compost, either in containers or on impervious surfaces)	☐
		soil (crops planted directly into the ground)	☐	soil (crops planted directly into the ground)	☐
		synthetic rooting media (for example rockwool or perlite)	☐	synthetic rooting media (for example rockwool or perlite)	☐
	Height of crop	n/a applied as seed treatment		n/a applied as seed treatment	
	Number of crops per year[3]	1		1	
Individual target pest/disease/weed[4]		virus yellows-carrying aphids, principally the peach-potato aphid (*Myzus persicae*). MYZUPE		virus yellows-carrying aphids, principally the peach-potato aphid (*Myzus persicae*). MYZUPE leaf miner fly complex (e.g. *Pegomya hyoscyami* and related sub-species) e.g. PEGOHY	
Maximum individual dose (grams or litres a.s./hectare)[5]		75 ml product / 100 000 seeds		75 ml product / 100 000 seeds	
Maximum total dose (grams or litres a.s./hectare)[5]		75 ml product / 100 000 seeds		75 ml product / 100 000 seeds	

Maximum individual dose (grams or litres product/hectare)[5]	75 ml product / 100 000 seeds			75 ml product / 100 000 seeds		
Maximum total dose (grams or litres product/hectare)[5]	75 ml product / 100 000 seeds			75 ml product / 100 000 seeds		
Maximum number of treatments	1			1		
Water volumes (range)						
Earliest time of application (estimated date and growth stage BBCH code[5])	BBCH 00 – seed treatment before drilling			BBCH 00 – seed treatment before drilling		
Latest time of application (estimated date and growth stage BBCH code[5])	BBCH 00 – seed treatment before drilling			BBCH 00 – seed treatment before drilling		
Interval between applications	Not applicable			Not applicable		
Proposed period of use (dates)	From March 2024			From March 2023		
Application method(s) to be used[6]		Protected/ Permanent protection with full enclosure)	Outdoor		Protected/ Permanent protection with full enclosure	Outdoor
	Horizontal boom sprayer	☐	☐	Horizontal boom sprayer	☐	☐
	Broadcast sprayer with air assistance / variable geometry boom sprayer	☐	☐	Broadcast sprayer with air assistance / variable geometry boom sprayer	☐	☐

	Hand-held application – rotary atomiser	☐	☐	Hand-held application – rotary atomiser	☐	☐
	Hand-held application – hydraulic nozzle	☐	☐	Hand-held application – hydraulic nozzle	☐	☐
	Granule applicator – vehicle mounted or trailed	☐	☐	Granule applicator – vehicle mounted or trailed	☐	☐
	Granule applicator – hand-held	☐	☐	Granule applicator – hand-held	☐	☐
	Fogging – remotely operated	☐	☐	Fogging – remotely operated	☐	☐
	Fogging – hand-held	☐	☐	Fogging – hand-held	☐	☐
	Misting / low volume misting (LVM) – remotely operated	☐	☐	Misting / low volume misting (LVM) – remotely operated	☐	☐
	Misting / low volume misting (LVM) – hand-held	☐	☐	Misting / low volume misting (LVM) – hand-held	☐	☐
	Dipping	☐	☐	Dipping	☐	☐

	Application via conveyor, roller table or other similar equipment	☐	☐	Application via conveyor, roller table or other similar equipment	☐	☐
	Drip irrigation	☐	☐	Drip irrigation	☐	☐
	Soil drench	☐	☐	Soil drench	☐	☐
	Other – please provide details and provide photographs if possible	X Seed treatment	☐	Other – please provide details and provide photographs if possible	X Seed treatment	☐
Operator protection						
Environmental protection						
Other specific restrictions						

14	Seed Treatments							
	Proposed Use as a Seed Treatment				**Comparable product / use**			
Crop[1]	Sugar beet				Sugar beet			
Product and MAPP number	15012				15012			
Active substance(s) (a.s.) and content	600g / l thiamethoxam				600g / l thiamethoxam			
Formulation type	A flowable concentrate for seed treatment formulation				A flowable concentrate for seed treatment formulation			
Field of use (for example: fungicide)	Professional – seed treatment				Professional – seed treatment			
On-label or minor use (Notice of Authorisation Number if known)					On label	☐	NANUM	
					Minor /EAMU use	☐	NANUM	
Seed weight (milligrams)								
Is the seed pelleted?	Yes	x	No	☐	Yes	x☐	No	☐
Application method for treating seeds	Film-coating				Film-coating			
Amount of product per hectare (grams)	OBJ							
Amount of product per 100,000 seeds (grams)	75 ml product / 100 000 seeds				75 ml product / 100 000 seeds			
Application rate to seeds (milligrams a.s. per seed)	0.45mg							

Concentration on seeds (milligrams a.s. per kg seeds)		
Concentration on seeds (grams a.s. per 100000 seeds)	OBJ	
Seed sowing density (seeds per hectare) [7]	115,000 seeds per hectare	
Thousand seed weight (grams)		
Depth of seed sowing	Average target depth of 2.5 cm	
Soil loading (grams a.s. per hectare)	51.75g/ha	51.75g/ha
Is this treated seed precision drilled?	Yes	
Number of crops on the same land within a given year [8]		
Are the treated seeds sown under protection? If so, give details of what kind of protection? [2]	Not applicable	
At what growth stage is the protection removed or the seedlings transplanted outside? [2]	Not applicable	

Notes	
1	Use the basic crop or situation terms as set out in the Crop Definitions List. List individual crops. Do not use the parent or primary group terms. If referring to existing (or previous) authorisations, please update the crop terms to reflect those currently in the Crop Definitions List. For ornamental plant production, clearly state whether the application covers either all or specific areas of ornamental plant production, for example, pot grown, soil grown, cut flowers, shrubs. Where describing the situation of use be specific about exactly where the product will be used, for example, upland moorland.
2	For protected crops: Describe whether permanent or temporary protection. If temporary protection, explain what type of temporary structure is being used (for example, polytunnels, crop covers or mulches), what growth stages the temporary protection is used for and whether application of the product will be while the crop is under protection. Please also detail if grown in soil or substrate, pots on hard surfaces, bench systems, etc. Further information on crop situations can be found in the Crop Definitions List.
3	This may be a specific number, for example, 1 or a range such as 1-3 per year. Be as specific as possible, including explanations where necessary.
4	Individual crops and pests are given an EPPO code for harmonised identification. Please use the following link to obtain the required EPPO code https://gd.eppo.int/
5	The growth stages of crops are categorised using a growth scale, usually expressed as GS or BBCH.
6	Describe in detail any novel methods of application and include pictures of how they are operated (these can be provided in a separate document).
7	If sowing density is provided as a weight of seed per hectare, you must also provide the thousand seed weight.
8	Provide additional information where combinations of crops or repeat sowing after failure may occur.

15	Crop Area / Amount	Proposed emergency use / situation	Comparable product / use
Total amount of crop grown in the UK	**Hectares**	Up to 99,000	99000
	Tonnage	7.5mn tonnes (estimate)	7.5mn tonnes (estimate)
	Value (£)	£300mn (estimate)	£300mn (estimate)
Total amount of crop treated	**Hectares**	0-99,000 depending on 2024 virus yellows forecast	c.60,000ha tbc
	Tonnage	0-7.5mn	c. 4.5mn
	Value (£)	TBC	tbc
% Area of UK crop to be treated		0-99% depending on 2024 virus yellows forecast	60% from the 2023 BS crop declarations
Geographical location(s) of use (min. county level)		Yorkshire, Lincolnshire, Nottinghamshire, Norfolk, Suffolk, Cambridgeshire, Hertfordshire, Rutland, Bedfordshire, Herefordshire, Essex, Leicestershire, Northamptonshire	Yorkshire, Lincolnshire, Nottinghamshire, Norfolk, Suffolk, Cambridgeshire, Hertfordshire, Rutland, Bedfordshire, Herefordshire, Essex, Leicestershire, Northamptonshire
% yield or quality retained due to emergency use			

Part D - Emergency Situation	
For help completing these sections, read the Applicant Guide to Emergency Authorisations.	
16	**Special Circumstances**
Please state the special circumstances which apply to your application.	

British Sugar and NFU Sugar (on behalf of sugar beet growers in the UK) are submitting this application for emergency authorisation of Cruiser SB to be used to protect the English sugar beet crop in 2024. If an emergency authorisation for Cruiser SB is granted, the industry would only use this treatment if the established virus yellows forecast, produced by Rothamsted Research, exceeds the economic threshold, and subject to further strict conditions on use. Recent years show the incidence of Virus Yellows has been high, with the Rothamsted Model predicting an incidence of 67% in 2023. In the absence of further mitigating controls and measures, British Sugar and NFU Sugar believe an emergency authorisation is necessary because of the serious threat that virus yellows complex poses to the industry and viability of the entire UK sugar beet sector. Confidence in the domestic sector is key given the economic importance of the domestic crop and growers.

We continue to focus our attention and investment on finding solutions to virus yellows through our industry 'Virus Yellows Taskforce'. This is a multi-million pound collaborative project with BBRO, British Sugar and NFU Sugar pushing forward with long-term, sustainable solutions. We are pleased to be able to report progress in several areas (see below), including gene editing, grower practices and conventional breeding. However, the industry urgently requires this derogation as an interim solution as it remains the situation, notwithstanding the industry's investments, that currently there is no effective alternative non-chemical control methods commercially available. Interactions and collaborations with European sugar beet researchers towards alternative IPM approaches are ongoing, but these continue to be limited in their effectiveness for virus yellows control at present. This emergency authorisation will allow us time to continue our research activities to look for a longer-term solution.

We are committed to investing in the long-term viability of the industry. British Sugar has invested in a collaboration project to explore how gene editing (GE) can be used to specifically target the three yellowing viruses through new breeding technology. It is expected that Virus Yellows resistance can be achieved by employing minimal gene editing to precisely redirect the silencing activity of existing non-coding RNA, towards a new target of choice. It is expected that a virus yellows resistant sugar beet seed will not be commercially available for use before 2030.

Whilst we work to deliver a fully resistant GE solution, we expect traditionally bred, partially tolerant varieties to continue to be developed, alongside new chemical seed treatments that will help to bridge the gap from 2026 onwards. Currently, there is one partially tolerant sugar beet variety (Maruscha KWS) commercially available for 2024 which has mild resistance to just one of the three yellowing viruses that form the virus yellows complex. However, the yield potential in the absence of virus remains low compared to existing, elite susceptible varieties. BBRO has calculated (from inoculated trials in 2019 and 2020) that growers would have to sustain 62% infection within fields before such varieties become economically viable. This means that Maruscha KWS would only become economically viable at the point at which the actual incidence of VY reached is 62% (rather than the predicted incidence using the Rothamsted model). Currently the actual incidence of YV is 3%and therefore Maruscha KWS would only become economically viable if actual incidence of YV is over 20 times greater than this. In addition, Maruscha KWS does not yet provide an economically viable alternative as it is only commercially available in limited quantities from seed breeders, which would be insufficient to treat the anticipated infection in 2024 and as highlighted above, only protects against one of the three viruses. Hence the industry seeking a Cruiser SB derogation in 2024 as an

interim, emergency solution, especially as the latest El Nino climate predictions already suggest that the 23/24 winter will be warm.

Our application for 2024 includes an economic threshold again and is a limited, controlled, interim solution to ensure the sector can continue to develop the appropriate longer-term pathways of aphid and virus yellows control to protect the future of our homegrown UK sugar industry.

Information on virus yellows incidence in the 2023 crop will be provided as supplementary information as soon as available. BBRO weekly bulletins are available to reference in the interim.

A copy of the cross-industry Virus Yellows Pathway can be found here.

17	Danger

Please provide evidence on the nature of the 'danger'.

As set out above, the anticipated incidence of VY in 2024, could have a significantly adverse impact on growers of sugar beet and the industry as a whole. Without means to control such incidence of virus it poses a serious threat to the viability of the industry.

In 2020, the UK sugar beet sector experienced its worst virus yellows epidemic since the mid-1970s, causing a 25% loss in yield nationally. The cost to growers in the 2020 season was approximately £43m and subsequent impact to the processor of a further £24m. 38.1% of the national crop was infected with virus yellows. Many growers in Cambridgeshire, Norfolk, Suffolk and South Lincolnshire experienced up to 100% infection despite the use of up to 4 aphicide sprays applied at the BBRO recommended aphid spray threshold. Virus yellows also compromised the BBRO R&D trials programme and eight of the 13 Recommended List trials, used to assess up to 120 entries each year to select future elite varieties for UK growers, failed independent inspections primarily due to virus infection with the loss of critical performance data.

This crisis was brought about by the extremely mild winter of 2019/20 and unprecedented aphid numbers surviving, migrating and reproducing on young beet plants throughout April to June, despite the judicious and timely use of aphicide sprays to prevent re-colonisation and limit virus spread. Affected growers saw significant yield losses of up to 50% from decreased root weights and sugar content (and in some cases as much as 80%); sugar extraction was also impacted by increased impurities caused by the virus infection.

In September 2020, a Virus Yellows Taskforce was established between British Sugar, NFU Sugar and the BBRO to accelerate and develop ongoing, innovative and novel pathways of research to limit the future impact of this disease across the UK industry. However, grower confidence is still being impacted; in 2021 the contracted area reduced by around 12%, largely due to the impact of virus yellows. We anticipate further consolidation if growers believe that yields are likely to be further decimated by virus yellows disease. 2020 is referenced here as it was a particularly difficult year for growers who saw wide scale yield losses from virus yellows disease as a result of the mild weather and high aphid populations. Thankfully, a colder winter in 2021 resulted in a much lower virus burden and Cruiser SB was not required.

However, milder winters in 21/22 and again in 22/23 have led to the need for and use of Cruiser SB, via emergency authorisations, to limit the impact of virus yellows whilst alternative methods are identified and evaluated for commercial use.

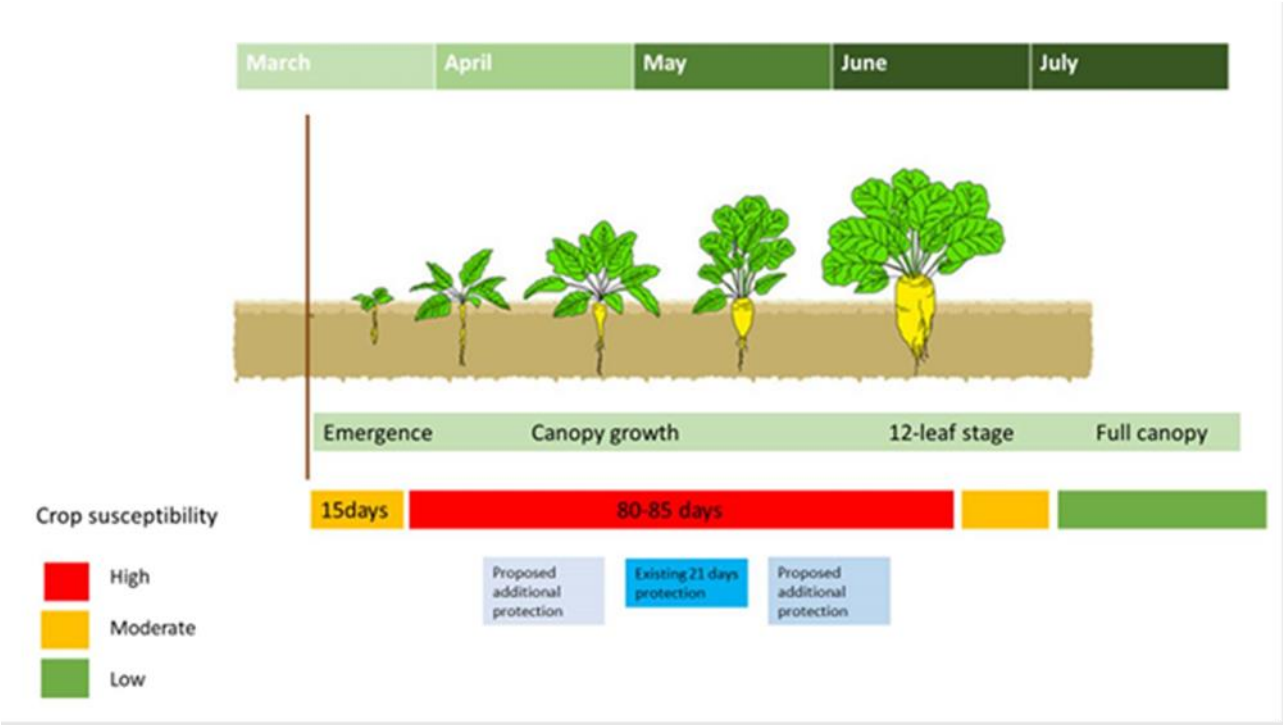
Despite 10 days of below average temperatures in December 2022, January and February 2023 temperatures were above average and the Rothamsted model on 1 March 2023 exceeded the 63% threshold. This shows reliance on cooler weather in January and February to lower Aphid numbers during the Spring.

The 2022 crop yields were hampered by a number of factors including drought through the summer, beet moth pest in some southern areas and then frost in December. It is therefore, very difficult to draw any conclusions from this crop as to the impact of Virus Yellows on untreated crops.

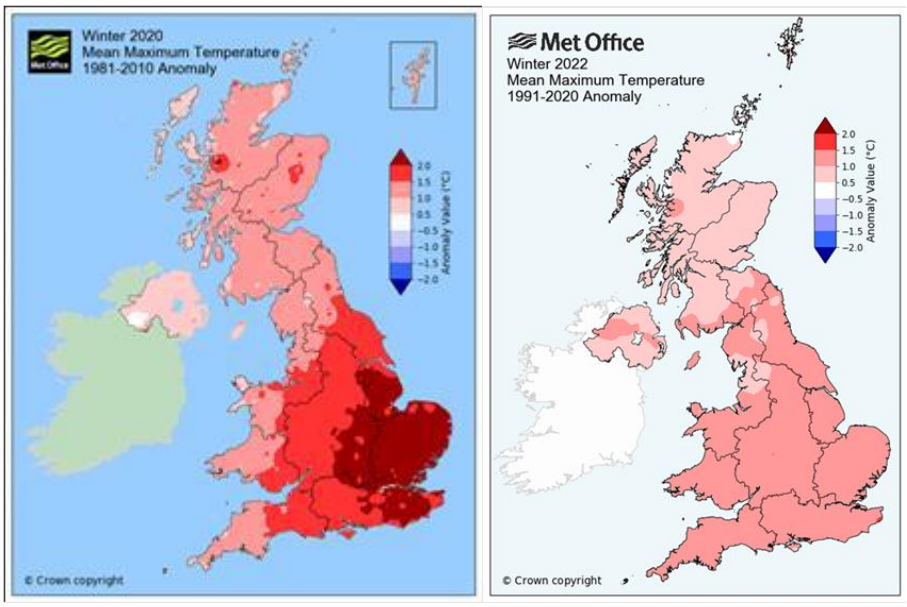
Please provide evidence on the benefit and necessity of the proposed use in terms of addressing the identified danger.

Why a seed treatment emergency authorisation is requested for 2024 to prevent another potential virus yellows epidemic.

Without additional protection from sowing until the 12-leaf stage (the period when beet is most susceptible to colonisation by aphids and virus infection) there currently remain limited alternative control options for 2024 to prevent an increased threat from virus-carrying aphids in sugar beet.



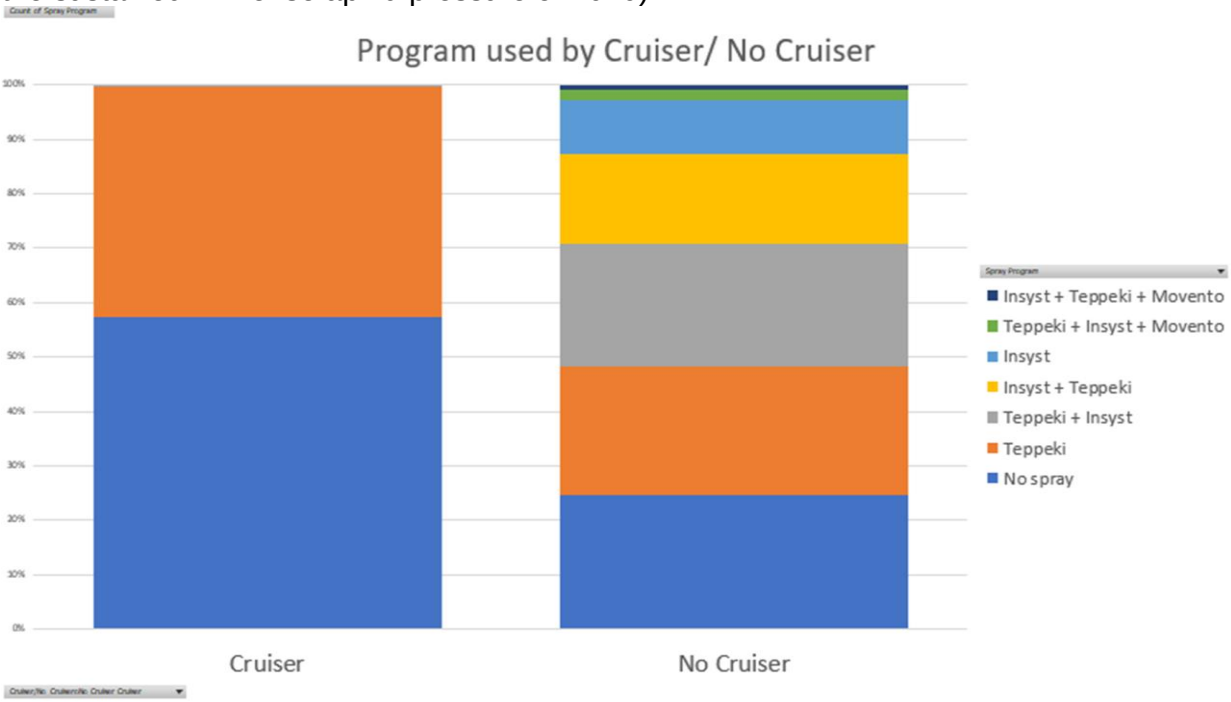
Recent mild winters, with few significant frost events, are leading to the development of continuing high pest pressure situations for spring-sown crops such as sugar beet.



Without a cold winter or the additional insecticidal seed treatment protection for 2024 the UK sugar beet sector will again be at high risk of widespread virus yellows infection. Previously, seed treatments provided effective and targeted aphid control, for up to 12 weeks from sowing, until the onset of mature plant resistance.

In 2020, 2021, and 2022, growers and agronomists have had some success (albeit limited in 2020) in controlling aphids using aphicide sprays. BBRO 2020 aphicide trials in Suffolk and Lincolnshire showed that aphicide sprays provided control, but treatments lacked persistence commercially, **particularly at early growth stages** when large numbers of aphids were invading crops, leading to high levels of virus infection and significant yield loss. It is difficult to know how treated seed would have fared in 2020 given the unprecedented aphid levels experienced. The experiences from 2022 and 2023 will provide a valuable insight in building a picture as to the value of these treatments and foliar sprays in future years. Data will be available by October 2023 and will be submitted to CRD as supplementary information.

However, we do know that seed treatments will protect this critical early period of growth and will decrease the overall need for foliar sprays (which clearly had to be applied frequently under the sustained immense aphid pressure of 2020).



Spray programme by Cruiser/non-Cruiser treated crop (2022 National Crop Survey Data)

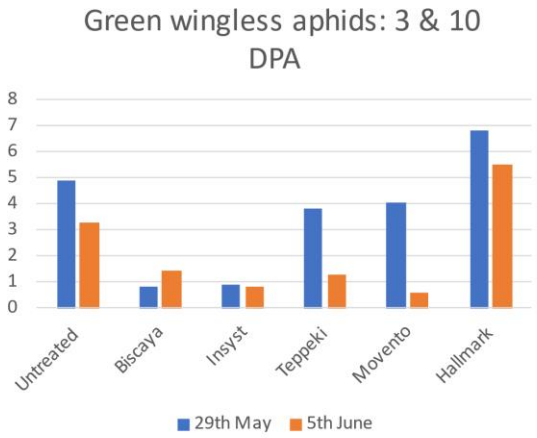
Following the 2019 season (first season without neonicotinoid seed treatments being fully approved), virus yellows was observed in 55% of crops inspected and the national incidence was 1.8%. In 2020, virus yellows was observed in 99% of crops surveyed and the national incidence was 38.1%. In 2021, virus yellows was predicted to be observed in 8.3% of the crop (without any pest management); in reality it was 2% because some aphicide sprays were still used where the threshold was met. However, there are now numerous sources of infection available from which aphids could acquire virus and infect the 2023 crop.

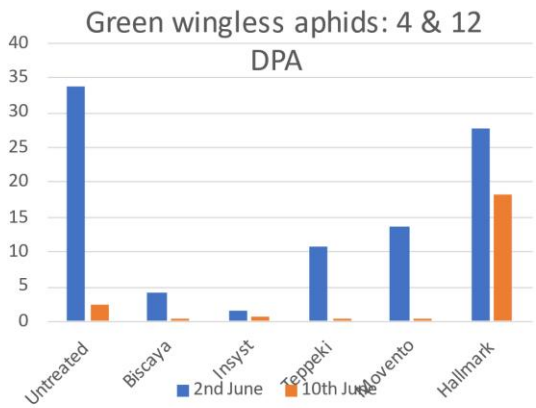
As highlighted, in 2021 the trigger for the use of thiamethoxam was not reached due to the impact of the previous cold winter, demonstrating the limited and controlled use of the product. Cruiser SB will only be used if the Rothamsted forecast triggers its use, as was the case in 2022.

Given the limited efficacy of authorised aphicide sprays such as Teppeki/Afinto and Insyst, the only way to effectively protect sugar beet plants through the early stages of development is the use of Cruiser SB. As noted by the HSE in the 2022 application. the permitted use of aphicide sprays (limited to one spray of Teppeki/Afinto, followed by one spray of InSyst) would be insufficient under sustained pest pressure to provide protection from April – early July, i.e. the period when sugar beet seedlings remain most susceptible to virus yellows (and subsequent yield losses). Seed treatment not only guarantees protection for the whole plant (early stage of development plants are very difficult to target with sprays), but also reduces the chemical burden with the entirety of product application targeted to the seed and ergo the plant itself.

Pyrethroid treatments (e.g. Hallmark) are available for pest control in sugar beet but these sprays are known to have a negative impact on beneficial insects that will naturally limit aphid build up as seen in BBRO trials in 2020 (see below). As a result, the BBRO does not recommend the use of these treatments for sugar beet.

BBRO Aphicide trials:Rougham & Bracebridge





DPA = days post applicatior

Trials from 2020
Over 80% of peach-potato aphids are also resistant to these pyrethroid treatments which would antagonise aphid control if used for this purpose, as seen in BBRO trials and commercial crops in 2020.

Some progress is being made with the development of virus tolerant sugar beet varieties and there has been one partially tolerant BMYV sugar beet variety (Maruscha KWS) commercially available since 2023. BMYV is one of the three yellowing viruses that form the virus yellows complex (BMYV, BChV and BYV). However, the yield potential of Maruscha KWS (in the absence of BMYV) is relatively low compared to existing, elite (susceptible) varieties. BBRO has calculated (from inoculated trials in 2019 and 2020) that growers would have to sustain

62% infection within fields before Maruscha KWS is economically viable. It is not a solution for the immediate future but a positive development.

There has been further progress in developing conventionally bred seed varieties with increased resistance to YV. Delepanque (Strube) have announced their first conventionally bred VY tolerant (BMYV and BYV) variety in Europe – Yellowstone. However, in trials this shows a 25% yield drag , and it is not currently available commercially. We understand there is also a pipeline variety (2024/25) showing some progress against all 3 viruses with reduced yield drag (in absence of disease). This remains a core part of our Virus Yellows Pathway.

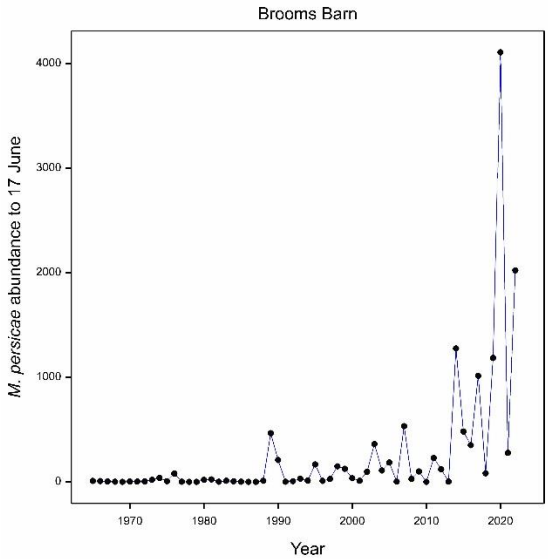
Sources of infection and the number of virus yellows carrying aphids will continue to increase each year and is expected to do so unless there is significant cold weather and the adoption of wider integrated pest management strategies to limit their build-up. Growers strive to follow BBRO best practice to ensure sources of infection are kept to a minimum.

The 2020 season clearly highlighted the limitations of current control strategies without an effective replacement for the neonicotinoid seed treatments. The 2020 virus situation was unprecedented, following the exceptionally mild January and February. Initially, this was reflected in the virus yellows forecast issued by BBRO showing that 72-95% of the crop could become infected with virus without any control strategies applied. The warm, dry spring further compounded the situation and encouraged an early and sustained migration of large numbers of aphids, particularly *Myzus persicae*, to build up in spring crops such as sugar beet.

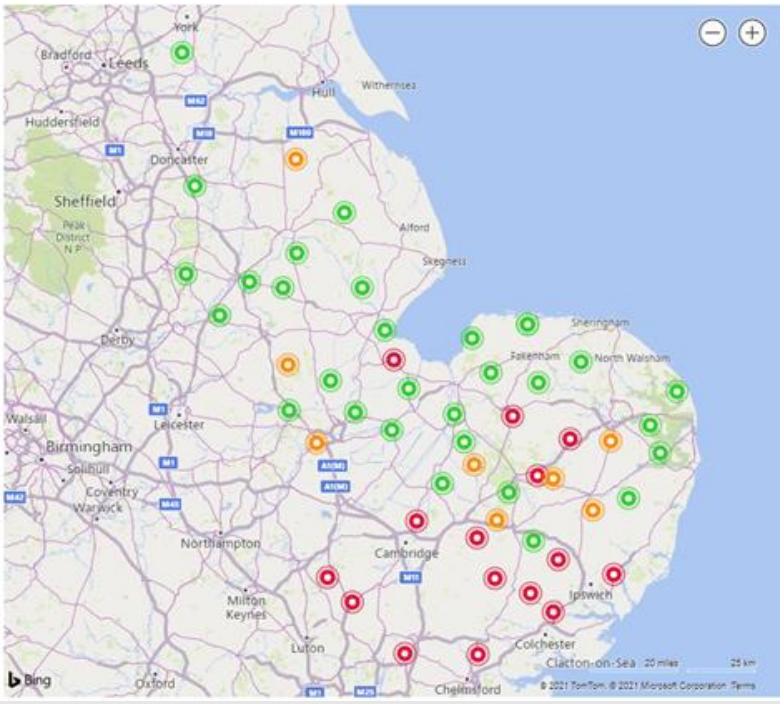
Agronomists and growers were finding the first crops above aphid threshold (one green wingless aphid per four plants up until 12 leaves) from early April and in many cases when plants were only at the cotyledon growth stage or the first pair of true leaves. In BBRO aphicide trials green wingless aphid numbers reached up to 40 per plant, and, in May, reports of over 100 per plant were received from agronomists in commercial crops. Consequently, growers were forced to use a range of sprays (including those products gained through emergency approval), and depending on if and when thresholds were reached, used between 0 and 4 sprays. The mean number of sprays applied, as determined from the British Sugar specific field survey, was 2.5. The wide variation in the number of sprays applied reflects the fact that growers were highly active in monitoring aphid numbers field by field and only applying foliar insecticides where appropriate, in line with thresholds. Aphid populations are typically

heterogenous in their distribution and strongly influenced by many factors such as wind strength and direction, topography, surrounding crops and field boundaries.

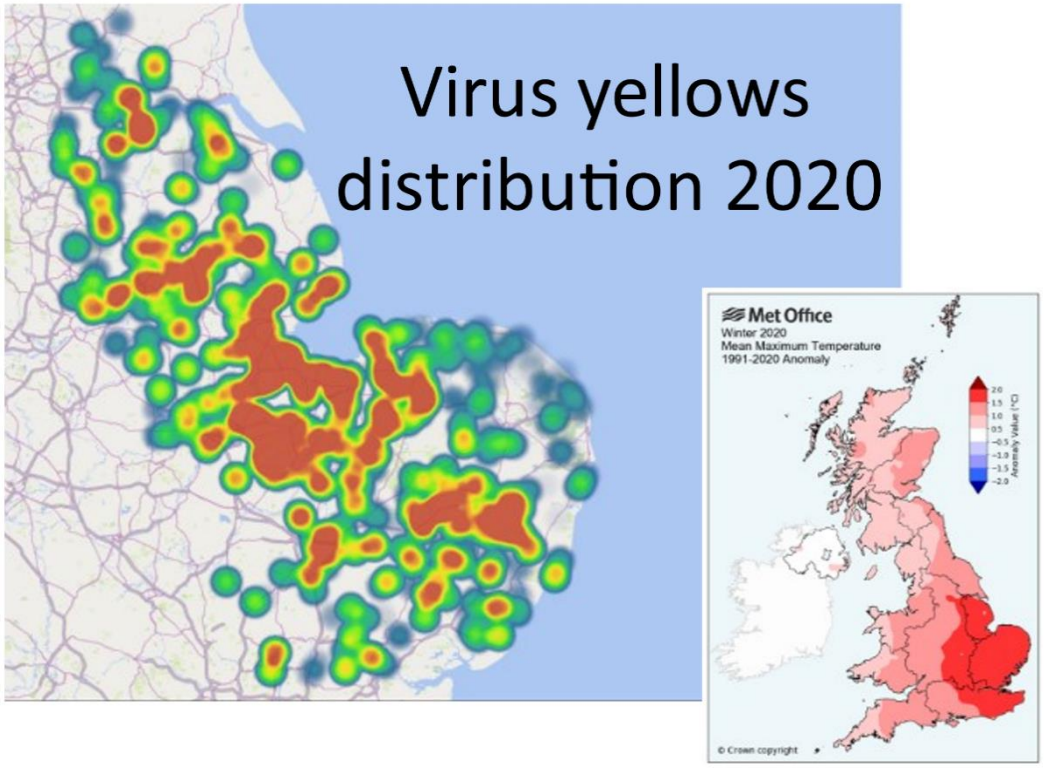
The 2020 Rothamsted Insect Survey data from the suction trap at Broom's Barn, Suffolk also highlighted the unprecedented numbers of winged aphids compared to the previous 58 years. Almost 4,000 *M. persicae* were trapped by the reference date of 17 June 2020.

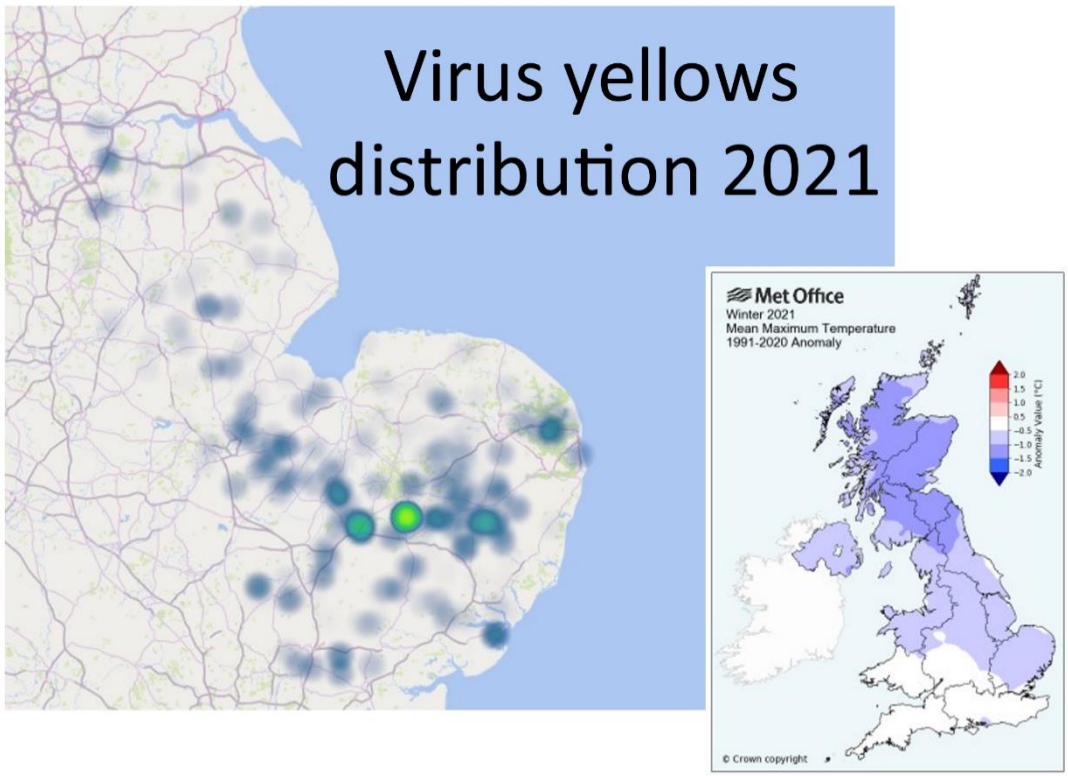


BBRO selected 51 sites across the sugar beet growing region for the 2020 yellow water pan and aphid monitoring survey. Although COVID-19 affected the ability to collect some of these data, sites were visited by British Sugar Contract Managers or agronomists twice a week (April to July), to photograph and empty the yellow water pans. Selected samples were then sent to the BBRO laboratories to confirm aphid species and to determine the infectivity of any *M. persicae* caught. Additional aphid counts were also made of the number of winged and wingless aphids on 2 sets of 10 plants within each field and this information was used to trigger spray programmes at these sites (e.g. Lawshall, Suffolk example below). This information was uploaded onto the daily aphid risk maps published on the BBROplus website (see example below) and included in the regular BBRO information bulletins that were sent to all growers and agronomists.



Due to the early and sustained aphid pressure in 2020, the first virus symptoms were observed by mid-June 2020. Widespread symptom development continued throughout the summer. British Sugar undertook the annual virus yellows survey at the end of August/early September 2020 across 484 sites (the annual Specific Field Survey). Nationally 38.1% of the crop was infected with virus although infection levels ranged from 7% (Cantley) to 61% (Wissington) between the four factory areas. A comparison of the incidence and distribution of virus yellows in the UK from 2020 to 2021 is highlighted below. Beet yellows virus (BYV), the most damaging of the yellowing viruses capable of decreasing yields by up to 50%, also appears to be the most prevalent of the three yellowing viruses.





We have not included the equivalent 2022 data because of the impact of the drought experienced that year.

Currently, for 2024, the UK industry only has one foliar spray of Teppeki/Afinto and one spray of Insyst available for aphid control. Sprays are valuable, but not sufficiently successful, in controlling unprecedented numbers of aphids as seen in 2020 as set out below under "Other Reasonable Means of Control".

Grower vigilance, good on-farm hygiene, monitoring and targeted treatments will all be key to protecting the 2024 crop from virus infection and yield loss. The industry is committed to disseminating these messages to growers to minimise infection spread.

The UK industry submits this Cruiser SB emergency authorisation application as a limited, short-term solution, to ensure the sector can continue to develop the appropriate longer-term pathways of aphid and virus yellows control to protect the future of the UK sugar sector.
This application is made to protect the English sugar beet crop from virus yellows in 2024.

18	Other Reasonable Means of Control
Please detail whether there are any other potential means of addressing the danger.	

We refer above to some of the reasons why no other reasonable means are available, and detail these further below.

In 2020 growers and agronomists had access to Teppeki, and after the approval of emergency authorisations in April and May, Biscaya (now withdrawn), Insyst and/or Gazelle. However, many growers had limited success in controlling the unprecedented numbers of aphids when these products were applied, especially at early growth stages. BBRO trials showed that these products provided control but lacked persistence commercially when under sustained and prolonged aphid migration as experienced in 2020. The only foliar sprays available to growers in 2022 and 2023 were Teppeki/Afinto, Insyst and Movento (via an EA for non-Cruiser SB treated crops).

There are currently no effective alternative non-chemical control options for virus-carrying aphids in sugar beet. However, growers are increasingly interested in trying additional novel solutions to limit virus spread such as the use of weed buffer strips within or around crops to encourage beneficial insects or to 'push' aphids away from beet plants or by introducing beneficial insects directly (such as lacewings) into fields. In 2020, the use of under sown barley in beet to prevent wind-blow damage appeared to have decreased virus infection in some fields too by affecting the attractiveness of beet as a host for aphids at an early growth stage. See: undersown-opinions.pdf (bbro.co.uk). BBRO is currently investigating this concept further, but crop growth stage is critical for success as has been highlighted by EU researchers too.

Following interesting work in New Zealand, BBRO are looking into the use of endophyte grasses to boost natural resistance in the sugar beet crop. There has been good data to support this theory for soil borne pests and the industry is interested to see if this can be replicated on aphids. Field trials were conducted in 2022 and are being repeated in 2023.

Winged *M. persicae* cannot be prevented from entering sugar beet crops and feeding on individual plants and covering plants with plastic as a barrier is uneconomic. Therefore, crops are potentially at risk from virus infection every year until a long-term solution is found through the sustainable pathway being delivered by the 'VY Taskforce' referred to earlier.

The BBRO provides advice to the industry on minimising the development of initial foci of infection and subsequent secondary virus spread. The BBRO provides such advice to the industry via bulletins, real-time information from the plant clinic and current trials, conferences, workshops and open days to adopt relevant, commercially available and appropriate integrated control options. These options include removing sources of infection and the use of cultural practices to help reduce, but not eliminate, the risk of infection.

Growers are advised to sow early, where possible after the 1st March and when soil/weather conditions allow while balancing the risk of plants bolting and then flowering and not developing a storage root if they experience too many cold days during the spring), to achieve maximum yields. Older plants are known to be less physiologically attractive to aphids (Williams, 1995). Therefore, by sowing early there is a greater chance that plants will have gained increasing mature plant resistance before peak aphid migrations. Later sown crops are more susceptible to infection as winged *M. persicae* are attracted to the yellowish-green leaves of younger sugar beet plants and these will not have reached the appropriate growth stage for inherent mature plant resistance. The reason for the resistance of mature plants is still unclear but is the subject of ongoing investigation and PhD research.

References

Dewar, A. (2000). Understanding the soil pest complex. British Sugar Beet Review 68 (4), 11-14.

Hauer, M., Hansen, A.L., Manderyck, B., Olsson, A., Raaijmakers, E., Hanse, B., Stockfish, N. Marlander, B. (2016). Neonicotinoids in sugar beet cultivation in Central and Northern Europe: Efficacy and environmental impact of neonicotinoid seed treatments and alternative measures. Crop Protection 93, 132-142.
LMC International (2017). The economic impact of a ban on neonicotinoids on the EU sugar beet sector. 1-10.
Williams, C. T. (1995). Effects of plant age, leaf age and virus yellows infection on the population dynamics of *Myzus persicae* (Homoptera: Aphididae) on sugar beet in field plots. Bulletin of Entomological Research 85, 557-567.

19 Limited Use

Please provide details of how the use of the product will be limited.

As in previous years, to address a potential emergency facing the UK industry in 2024, the UK sugar beet sector is committed to the following proposed limitations and controls on use, should the authorisation for Cruiser SB be granted, and the threshold for use met. The industry is committed to the responsible use of plant protection products.

Sugar beet is precision sown which avoids soil surface contamination. We also acknowledge the previous HSE analysis in 2018 regarding Hanslope soils flow exceedances if late winter/spring is wet. If sugar beet was sown after the drain flow period of approximately 30th April on these soil types it would be economically unviable for those growers with this soil type. **Consequently, the industry is proposing to maintain the reduced rate of thiamethoxam applied from (the normal) 60g to 45g per 100,000 plants to lower potential risks. This would be to ensure that any use would be limited and controlled to the amount necessary.**

Our approach highlighted below is based on forecasting and threshold trigger points for seed treatment application. The successful trigger mechanism in 2021 showed IPM in practice – the industry did not treat sugar beet seed with Cruiser SB as the Rothamsted virus yellows forecast predicted low levels of infection for the 2021 season.

In addition to the robust trigger mechanism, if Cruiser SB is used, the industry is committed to multiple measures, outlined below, with the specific intention of reducing the level of risk to pollinators.

Outline of the proposed limited use

Under the proposed limited use, the neonicotinoid treatments would be applied at any of the following treatment sites:

- SESVANDERHVE NV/SA Tienen, Belgium
- FLORIMOND DESPREZ Cappelle-en-Pévèle, France
- SESVANDERHAVE LLC Kyiv Oblast, Ukraine
- KWS Buzet, France
- KWS Eskisehir, Turkey
- BETA Seed Buzet, France
- Germains Kings Lynn, UK

This is a significant undertaking by the sugar sector, as the neonicotinoid seed treatment would only be used if deemed necessary (as described below). Once again, it is hoped that this commitment will be seen as a step-change to developing a greater integrated approach, using the virus yellows model to rationalise seed treatment usage and moving away from prophylactic application, while alternative approaches are developed, verified and registered for the crop.

If seed had to be treated, the exact amount required would be known from the seed ordering process between growers and British Sugar by the end of 2023/ early 2024. This is anticipated to be over 60% of the crop (based on 2023 uptake) because of the serious threat that virus yellows complex poses to the impact and viability of the entire UK sugar beet sector. However, no further additional seed would be treated for any fields that may have to be resown in 2024 due to poor weather conditions affecting germination and/or crop establishment.

Once treated and packaged, seed would be delivered to growers from March 2024 onwards. A direct consequence of this approach is that the seed could be delivered and sown later than recommended (usually the crop is sown from 1st March onwards once temperatures are at or above 5C). Delaying sowing due to later on-farm seed delivery, especially into April, will decrease the biological yield potential of the crop, affecting both grower returns and British Sugar income. A yield loss of 6, 8, 13, and 21% is experienced for every week of delay throughout April (BBRO communications). However, the industry is prepared to accept any delay to using Cruiser SB notwithstanding this yield penalty, given the absence of any other reasonable means to ensure the crop is protected against the more damaging virus yellows infection.

As in previous years, to determine whether neonicotinoid seed treatments would need to be used on the 2024 crop, the Virus Yellows forecast will be produced by Rothamsted Research and a decision will be taken as to whether a seed treatment should be applied to the crop based on the outputs of the model available on 1st March 2024. Due to the maritime climate of the UK, and the small footprint of the UK sugar beet crop within the eastern counties of the UK, the virus yellows model usually predicts, when conditions are favourable, that the whole cropping area would be at economic risk from virus infection. BBRO funding continues to support collaborative projects with Rothamsted Research to further refine and develop the model.

This decision has been taken on the strength and robustness of the model outcomes since its first introduction in 1965 and its value to provide an integrated pest management approach, although, a consequence of this approach, as already highlighted, is seed delivery could be delayed. However, if the UK experiences a cold winter in the months of January and February 2024 and the virus yellows forecast **is below the economic threshold of the cost of the seed treatment** then these treatments will **not** be applied. **Therefore, under these conditions, neonicotinoids would not be used under the emergency authorisation in 2024 by the sugar beet Industry, even if approved by DEFRA.**

Calculations of the economic threshold should be based on the current crop price, cost of neonicotinoid seed treatments and the economic impact assessment of virus yellows (**Qi et al., 2001**) where the **cost of crop damage for the grower is greater than the cost of seed treatment**. The 2024 economic threshold for use of neonicotinoid seed treatments for virus yellows will be agreed in due course.

20	Controlled Use
Please provide details of how the use of the product will be controlled.	

As highlighted, all UK sugar beet is grown under contract to a single customer – British Sugar. Grower contracts are negotiated annually between British Sugar and NFU Sugar. This contractual situation affords a unique level of control over production.

The proposed steps to enable the UK sugar beet sector to control neonicotinoid use under an Emergency Authorisation are as follows:

The 2024 seed contract offer letter, jointly agreed by British Sugar and the NFU Sugar, will be re-issued to all sugar beet growers post-decision taken by HSE/CRD/ECP/DEFRA regarding any future emergency use of neonicotinoid seed treatments in sugar beet.

• If the emergency authorisation is granted growers will be given the option to treat some or all of their original seed variety order, but it will be stipulated that neonicotinoid treatments will only be available if the economic threshold for treatment is triggered in March 2024.
• Growers will always have the option to buy untreated seed.
• The seed and neonicotinoid seed dressing will be delivered to the ESTA accredited and the UK processing facility at Germains, Kings Lynn and other European seed processors as highlighted.
• Seed will be processed, primed and pelleted but not neonicotinoid treated, or film coated.
• The pelleting process ensures 100% traceability of product. This procedure is an exact process leading to minimal dust levels (the industry led (ESTA) reference value for dust emission from seed treatment, at point of despatch, is 0.25 g dust/100,000 pelleted seeds) limiting any impact to both operator and environment. (In 2023, the average dust level at the Germains factory was well below this minimum dust level at 0.03g/100,000 seeds).
• Similarly, the seed purchased by growers from KWS will be treated and imported into the UK following guidelines and restrictions as above.
• Await the Virus Yellows forecast to be issued at the beginning of March 2024.
• The 2024 economic threshold for use of neonicotinoid seed treatments will be agreed in due course.
• BBRO to monitor winter aphid and virus levels on weeds, cover crops and unharvested beet (e.g. for anaerobic digestion) in January to April 2024.
• March 2024 onwards treated seed delivered and sown on farm following BBRO recommended guidelines in the BBRO Reference book provided to all growers and agronomists.
• All treated crops and associated field-areas to be recorded via the growers submitted crop declaration
• Beet is precision sown and covered, usually at 2.5cm depth, which avoids the ecotoxicological risks to birds from eating pelleted seed. However, the industry will provide spill kits to contractors and growers in case any seed accidentally remains on the soil surface.
• The same following crop restriction will be used as in 2022/3 and there will be a clause added into the Inter Professional Agreement (IPA) between British Sugar and NFU (the IPA is an extensive document that governs the relationship between NFU Sugar and British Sugar, the terms of the IPA are incorporated into each grower's contract) that stipulates that **growers must follow the following crop rules summarised in the table below.**
The following-crop restrictions apply for subsequent crops planted on the same area of land as Cruiser SB sugar beet drilled in 2023.

- **Any crop excluded from the below table should be considered 'restricted' i.e. a minimum of 32 months from drilling of Sugar Beet.**
- **The 32-month restriction applies to those agri-environment options that allow flowers to grow or appear on the same ground on which Cruiser SB treated seed was sown in 2023.**
- **Cover crops (including mixes) must also follow the 32-month restrictions.**

	Non-restricted	*Restricted*

Rules	*No restrictions following Sugar Beet*	*A minimum of 32 months from drilling of Sugar Beet*
Crops	1. *Wheat (including Durum Wheat)* 2. *Barley* 3. *Millet* 4. *Sorghum* 5. *Oat* 6. *Maize / Corn* 7. *Rye* 8. *Triticale* 9. *Canary seed* 10. *Spelt* 11. *Potato* 12. *Cabbage* 13. *Kale* 14. *Swede* 15. *Lettuce / Babyleaf / Spinach* 16. *Onions* 17. *Leeks* 18. *Carrots* 19. *Parsnips* 20. *Cauliflower* 21. *Broccoli* 22. *Turnip*	23. *Oilseed Rape* 24. *Linseed* 25. *Mustard* 26. *Soya Bean* 27. *Pea* 28. *Bean* 29. *Buckwheat* 30. *Clover* 31. *Phacelia* 32. *Chicory* 33. *Radish* 34. *Vetch* 35. *False Flax* 36. *Lucerne* 37. *Sunflower* 38. *Borage* 39. *Sainfoin* 40. *Nyger* 41. *Lupins*

- Fodder, energy, and red beet are not included as part of the derogation to ensure the 'controlled and limited' element of the Emergency Authorisation.
- It has also been made very clear that no further use of thiamethoxam seed treatments (including any re-drilling of treated sugar beet if crop lost due to wind blow or capping) is permitted on the same field area for 46 months from the date of sowing treated sugar beet seed in 2024 – a requirement of the Cruiser SB EA. This is to minimise the risk of any residues being acquired by succeeding bee-attractive crops or weeds and hence exposing bees and/or other pollinators to the neonicotinoid seed treatment.

- Alongside the use of Cruiser SB treated seed, it is a condition of use that robust BASIS recommended herbicide programmes must be adopted by growers and their agronomists to minimise the number of flowering weeds in treated sugar beet crops to reduce the risk of indirect exposure of pollinators to neonicotinoids. This applies in treated fields only (NOT next to or around sugar beet field drilled with Cruiser SB seed).
- Monitor aphids, their resistance and infectivity at up to 15 sites in each of the four factory areas from first flights until the end of migration each year to provide advice on future control strategies for virus yellows and analyse existing data sets to 'fine-tune' the advice currently given to the industry so new thresholds for treatment can be evaluated and developed if required.
- Post-monitoring of a statistically robust sample of neonicotinoid-treated sugar beet fields in 2024 onwards to determine any neonicotinoid seed treatment residue levels in soil and plants.

It must be re-iterated that this application is **only being made for the sugar beet crop of England** (and not for fodder or bioenergy beet grown more extensively across the whole of the UK).

Consequently, the extent and use of the neonicotinoid products would be limited to those counties that grow the sugar crop, and treatments then only applied if needed, on the trigger of the virus yellows forecast in March 2024.

References

Qi, A., Dewar, A., Werker, R. and Harrington, R. (2001). Virus yellows forecasting in sugar beet and the impact of Gaucho. British Sugar Beet Review, 69, 36-39.

21	Development of Long-Term Solutions
Please provide details of work being undertaken (with timeframes) to develop long-term alternative solutions, which avoid the need to use an emergency authorisation.	

There remains significant research and trial work being undertaken on an accelerated basis to develop alternative, sustainable solutions to the use of neonicotinoids. The industry-wide Virus Yellows taskforce was established to identify pathways to provide new and integrated aphid and virus mitigation strategies for the future.

In 2022, growers had access to the first generation of virus tolerant sugar beet. Maruscha KWS is partially tolerant to BMYV. As set out above, as with all new traits, this variety is lower yielding than conventional varieties, and should not be sown until after mid-March due to its higher levels of bolting. This is clearly a positive step to finding alternative integrated solution to virus yellows. However, it is important to remember that there are at least three yellowing viruses that affect sugar beet and this trait is only against one of these, highlighting the ongoing challenges of breeding for virus (and vector) resistance.

The industry continues to use advanced seed technology for enhance germination/establishment to ensure plants reach the 12-leaf stage as quickly as possible and currently Enrich 200 (Germains), EPD 2 (KWS), SV1 (Sesvanderhave) and UltiPro (Limagrain) treatments are available to growers when they purchase their seed. In addition, BBRO are working with all breeders and seed technology providers alongside the British Sugar/NFU seed working group, to evaluate additional approaches for improved pelleting and further enhanced germination/establishment.

BBRO continues to support ongoing glasshouse and larger-scale field trials to determine the efficacy of existing and novel aphicides as well as other novel products and botanicals (e.g. garlic-based products, silicone and jasmonic acid) and potential viricides. The products being analysed are currently not approved for use on sugar beet, but do not have resistance issues within current *M. persicae* populations in the UK, so could be potentially exploited for their control in the future. These trials are in addition to specific company confidential trials that the agrochemical sector commission with the BBRO utilising our inhouse trials and science teams. Ultimately, this information will be used to support and/or accelerate registration or the extension of use of these products for sugar beet in the future.

The field trials either use natural populations of *M. persicae*, representing the local insecticide resistance status or, if necessary, aphids are introduced into the field (if the natural population remain below the spray threshold) from the BBRO insectary. Aphid populations are then assessed at specific time points post application to determine the efficacy and ultimately virus control of the different aphicides. Data from 2017-2020, showed that several key aphicide products continue to be effective at controlling *M. persicae* when applied as a foliar spray to sugar beet. However, as anticipated, the use of Hallmark 'increased' the number of aphids significantly and is likely the result of the aphicide decreasing the numbers of beneficial insects within these pyrethroid-treated plots. To accelerate the outcomes of this work and to maximise data capture, the BBRO have undertaken additional trials in the autumn by sowing beet in early September and taking aphid assessments during October/November. These autumn data reinforced the summer findings regarding aphid control, and this pro-active approach enables the industry to gain additional information within the same year.

More detailed laboratory and growth room assays and assessments are also ongoing in the BBRO facilities in Norwich. We are investigating further aphicides that are currently in their earlier stages of development and determining whether specific products, currently registered as foliar aphicides, could be deployed as alternative seed treatments.

The BBRO has been working with breeding companies since the early 1990s to identify alternative genetic solutions for controlling virus yellows. Although progress has been made and is accelerating, this is a complex problem compounded by the need to identify resistance genes to three different

viruses. To date no single major sources of virus resistance or tolerance has been identified to the three viruses BMYV, BChV or BYV (in contrast to rhizomania and beet cyst nematode sugar beet varieties that are now used widely in the UK).

BBRO led a five year, £1.13M collaboration with two sugar beet breeders (SES Vanderhave and MariboHilleshog) via an InnovateUK project (project number 102098; a novel pre-breeding strategy to reduce dependence on insecticides for virus yellows control in sugar beet; 2015-2020) which exploited and is developing the genetic diversity found in beet relatives and identifying candidates exhibiting resistance and tolerance to virus yellows. The outputs from this pre-breeding project are currently being consolidated by the breeders and will enable future production of new virus resistant or tolerant commercial varieties, bringing significant economic and environmental benefits.

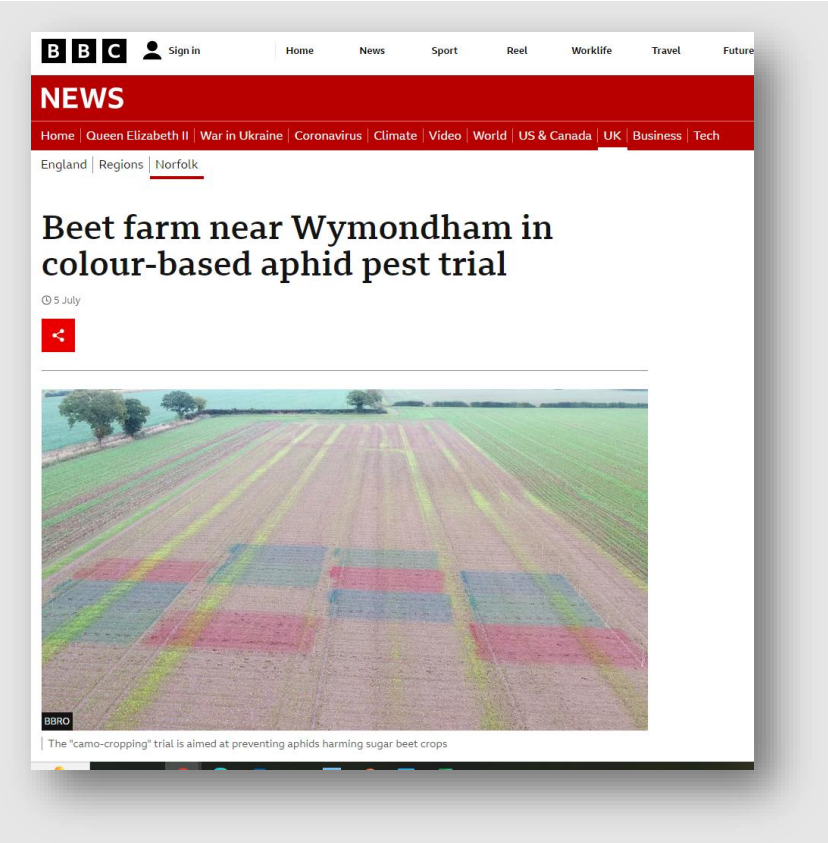
In addition, BBRO continue to work under specific confidentiality agreements with three of the main European sugar beet breeding companies directly to develop and assist with their own in-house breeding efforts with the identification of additional virus yellows resistance (see picture below). In 2020, 2021 2022 and again in 2023, the BBRO produced sufficient viruliferous aphids to inoculate over 100,000 plants in a number of separate field trials across East Anglia to accelerate breeding efforts to continue to identify solutions for this problem.

Due to the complex nature of this disease and the lack of major sources of virus disease resistance developing commercial varieties is very difficult. Even then these varieties will potentially only provide resistance to the individual viruses; stacking of any resistance traits alongside yield and bolting resistance would then need to be developed further.

Alongside our variety screening work, we have an extensive series of projects and trials looking at other aspects of virus reduction. BBRO has placed aphid and virus research at the very centre of its research programme to accelerate new pathways to provide integrated approached for the future. Examples of new/ongoing projects include:

• Evaluating the effects of undersown cover crops to help protect the sugar beet from aphids, especially the impact of undersowing with barley which has shown some positive effects in 2020 (Stevens & Bowen, 2021, Bowen, 2021, undersown-opinions.pdf (bbro.co.uk).

- Other approaches to the camouflaging approach be investigated is looking at establishing replicated trials to assess the impact of using food dyes on the soil to reduce plant-soil contrast at a range of field sites. The theory is the same as for the barley camouflage as it is hoped the dyes will reduce the plant-soil contrast.

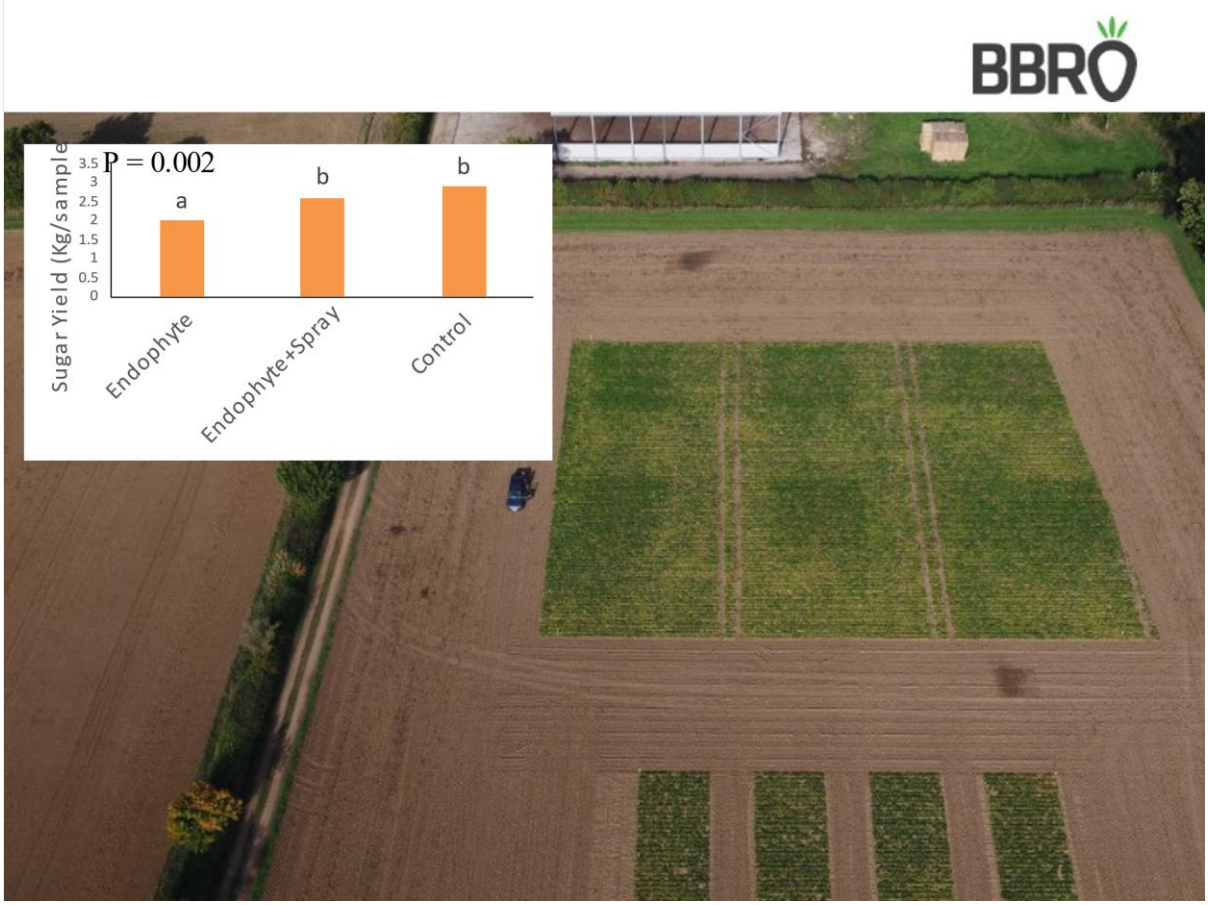


• Studying a range of flowering mixes to attract beneficial insects in the autumn to help boost beneficial numbers in the spring, ensuring they are present in sufficient numbers at the right time.

• Alongside flowering mixes, we are looking at the use of brassica species between rows to act as an attractant to aphids to pull them away from the sugar beet at the vulnerable time for infection.

• Following interesting work in New Zealand, BBRO are looking into the use of endophyte grasses to boost natural resistance in the sugar beet crop. There has been good data to support this theory for

soil borne pests and the industry is interested to see if this can be replicated on aphids. Field trials were conducted in 2022 (see below) and are being repeated in 2023.



• We are also trying to understand more about the infection cycle within the plant and how this can change with different drilling and harvest dates to see if there are any local mitigation strategies that can be deployed.

In tandem with these practical approaches BBRO are involved in two PhD projects, which are at the University of East Anglia and Wageningen University targeting some of the underlying science around aphids and virus (Beet Review May 2021 pages 34, 35). These are looking at:

1) Understanding the molecular strain variability of the virus yellows complex present in the UK and how this relates to breeding programmes
2) The mechanism of how mature plant resistance is triggered in plants and whether this can be used to identify novel control strategies.

This highlights the various and wide-ranging approaches BBRO is taking to help combat virus yellows in sugar beet. There is no quick solution, but complimentary activities, as highlighted above, could hold the key.

The recent Precision Breeding (Genetic Technology) Bill is welcomed and will allow us to take advantage of this when the regulatory environment allows.

British Sugar has invested in a collaboration project to explore how gene editing can be used to specifically target the 3 yellowing viruses through new breeding technology. It is expected that Virus

Yellows (VY) resistance can be achieved by employing minimal gene editing to precisely redirect the silencing activity of existing non-coding RNA, towards a new target of choice.

The project aims to produce a number of gene editing (GE) targets that can be used in a collaboration with sugar beet breeders to develop VY resistance in sugar beet. Armed with these targets, the breeders will have the expertise and facilities to carry out the genetic editing, grow the edited material and apply this to their current superior germplasm for commercial use. This would result in elite commercial beet varieties with genetic resistance to yellowing viruses.

The initial stage of the project is to map the sugar beet genome sequence and gather short interfering RNA (siRNA) expression data. This requires growing beet plants under controlled conditions and sampling leaf and root tissues at multiple developmental timepoints. We will then extract and sequence small RNAs from these samples to validate their sequences and quantify their expression at the biologically relevant developmental stages for virus resistance. We have acquired germplasm and generated material for RNA expression analysis. Once GE designs are completed, the shortlisted GE targets can be identified and validated. It is expected that the generation of high confidence GE targets will be completed by early 2024. In anticipation of these targets, we are working with additional technical partners to develop a beet transformation platform and technical protocols to enable proof of concept experiments. This work will be conducted through 2023-25 and aims to validate the silencing capability of the gene editing designs in beet.

Following this, the targets can be passed to commercial seed breeders who can undertake the editing process and integrate the VY resistance into their commercial seed varieties. It is expected that this process will take at least another 5 years before VY resistant sugar beet seed is commercially available for use.

Whilst we work to deliver a fully resistant GE solution, we expect traditionally bred, partially tolerant varieties to continue to be developed, alongside new chemical seed treatments that will help to bridge the gap from 2026 onwards.

22	Repeat Applications: Monitoring and Stewardship
Please provide details of how you have addressed any monitoring or stewardship requirements set under previous emergency authorisations.	

2022 Cruiser Stewardship report

The 2022 Cruiser Stewardship Agreement provided a successful framework for responsible use of Cruiser SB in 2022, partnering an effective and timely package of grower communications with rigorous data collection and reporting procedures to ensure comprehensive due diligence across the sugar sector. As part of the 2022 stewardship process and with a view to enhancing the efficacy of the stewardship agreement in 2023, British Sugar, NFU Sugar and the BBRO have undertaken a review of the 2022 agreement, drawing together evidence from across the sector to evaluate performance and showcase compliance. All evidence can be found in the Stewardship Agreement Progress Report attached.

1. The 2022 Virus Yellows Forecast

Annually Rothamsted Research conducts a Virus Yellows forecast for sugar beet under contract to BBRO. This provides an indication of the incidence and abundance of aphids and Virus Yellows. The Virus Yellows forecast has been in operation for the UK sugar beet crop since 1965 and is one of the longest running predictive models available anywhere in the world, used to indicate the level and potential impact of an economically important plant disease.

The Cruiser SB EA required the submission of the 2022 Virus Yellows forecast to HSE at the beginning of March 2022. This was shared with HSE and Defra on **01/03/22**, forecasting Virus Yellows incidence of 68.9% and thus triggering use of Cruiser SB.

Alongside the forecasted VY levels for the forthcoming crop the model also predicts the timing of aphid first flights, which is key in monitoring aphids in the field and helping growers to be prepared for when they may reach their spray thresholds. As further testament to the robust validity of the Rothamsted model, it was just a day out in its projection for the first aphid flight.

2. Reducing potential sources of VY infection

The sugar beet industry is committed to communicating grower best practice for infection control. Whilst aphid vector activity will be reduced following spells of very cold/freezing weather, it remains critical to ensure potential sources of virus on the farm are removed, especially before temperatures start to rise as we go into late spring and early summer.

The 2022 BBRO Sugar Beet Reference Book, posted to all growers in **January,** urged that any cover crops were destroyed thoroughly so that no green material was left on which aphids could survive. A comprehensive schedule of BBRO Advisory Bulletin's and tweets throughout **April** and **May** reminded growers of the requirement to remove or manage sources of potential virus-infected material carefully to prevent virus-spread.

3. Drill Operator guidance and seed rates

Drilling restrictions were promoted concertedly from the outset, incorporated within the British Sugar/NFU Sugar final seed pack which was delivered from **19/01/22**.

The sugar beet industry is committed to targeting Cruiser SB stewardship information to all growers and drill operators therefore the stewardship group developed a specific and targeted guidance document for drill operators which was distributed to growers from **07/03/22**. This explained the importance of efficient drilling, equipment maintenance, understanding seed rates and optimising plant populations to ensure the established plant population doesn't exceed the optimum of 100,000 plants per hectare, in line with the Emergency Authorisation for Cruiser SB treated seed.

Further reminders of drilling rate restrictions incorporated within the Emergency Authorisation were communicated to growers and operators through BBRO Advisory Bulletins, tweets and British Sugar operator guide reminders through **March** and **April**.

4. Pesticide spill kits

The use of Cruiser SB treated seed requires growers to have access to a spill kit. As part of industry due diligence spill kits were sent to all growers on **07/03/22** in case of any accidental spillage of Cruiser SB treated seed. The

requirements around spillage clean up were laid out within the Drill Operators Guide, with reminders issued in **March** and **April**.

5. Late drilling/re-drilling of sugar beet

In accordance with the 120-day approval period of the Emergency Authorisation, no Cruiser SB treated seed was authorised for use following the 18th of June. Growers and operators were informed of the terms of the EA in the British Sugar Drill Operators Guide on **07/03/22** as well as via reminders in **March** and **April**. Texts, tweets and BBRO Advisory Bulletins through until **August** continued to cover crop and redrilling restrictions incorporating a list of eligible and restricted follow-on crops and reiterating that Cruiser SB may not be used on the same field area for 46 months from the date of sowing treated sugar beet seed in 2022.

6. Weed control in sugar beet fields

In conjunction with the vast resources available to growers across the BBRO website, the Sugar Beet Review, and other affiliated literature, growers were regularly reminded of their weed control obligations throughout the growing season and signposted to BASIS recommended herbicide programmes as part of the stewardship package. The BBRO Special Advisory Bulletin, published pre-drilling on **01/03/22** outlined grower herbicide responsibilities and referred growers back to the BBRO Sugar Beet Reference Book posted to all contract holders in **January**. Advisory Bulletins throughout the season issued timely reminders to growers of the requirement for a BASIS recommended herbicide programme.

7. Aphid monitoring, thresholds and subsequent aphicide applications

Data collection remained ongoing throughout the growing season. Within the British Sugar database, industry recorded all treated crops and associated field-areas for monitoring by agricultural contract managers. This information also provides a valuable log with which to monitor responsible drilling next year.

Growers retained access to rolling results from the BBRO annual yellow pan network which served to highlight aphid pressure across the growing area via BBRO Plus (a members-only area on the BBRO website accessible by all growers). Timely reminders of aphid pressure were issued to growers via twitter and the BBRO Beetcast (a podcast for growers produced and distributed by BBRO). The BBRO Advisory Bulletin of **18/05/22** reiterated the foliar spray restrictions attached to Cruiser SB treated crops. The BBRO also issued reminders via broader communication channels with an interview with Professor Mark Stevens on aphid pressure and spray programmes appearing in Farmers Weekly on **26/04/22**.

8. Integrated pest management (IPM) to boost beneficial insects

Growers retained access to a wealth of IPM information and practical advice via the BBRO website. A Beetcast released at the start of the growing season on **06/04/22** ran through the latest BBRO research on aphid IPM and linked to the suitable web pages. Known as the ABCD of aphid IPM the project is considering the efficacy of attractants and alternative hosts, beneficials, camouflage, and deterrents and repellents in providing IPM mitigation for Virus Yellows. This cutting-edge research gained further exposure when it was run by the Financial Times on **20/10/22**.

9. Following crop restrictions

	Non-restricted	**Restricted**
Rules	**No restrictions** following Sugar Beet	A **minimum of 32 months** from drilling of Sugar Beet

Crops	*1. Wheat (including Durum Wheat)* *2. Barley* *3. Millet* *4. Sorghum* *5. Oat* *6. Maize / Corn* *7. Rye* *8. Triticale* *9. Canary seed* *10. Spelt* *11. Potato* *12. Cabbage* *13. Kale* *14. Swede* *15. Lettuce/ Babyleaf/ Spinach* *16. Onions* *17. Leeks* *18. Carrots* *19. Parsnips* *20. Cauliflower* *21. Broccoli* *22. Turnip*	*23. Oilseed Rape* *24. Linseed* *25. Mustard* *26. Soya Bean* *27. Pea* *28. Bean* *29. Buckwheat* *30. Clover* *31. Phacelia* 32. Chicory 33. Radish 34. Vetch 35. False flax 36. Lucerne 37. Sunflower

The above table was shared with growers, operators, and agronomists throughout the growing season reminding them of the crop restrictions following Cruiser SB treated sugar beet. First published as part of the Drill Operators Guide on **07/03/22**, reminders were issued via email, text message, Advisory Bulletin, and tweet from **March** through until **August**.

10. BBRO soil and plant residue monitoring

A programme of sampling of neonicotinoid-treated sugar beet fields in 2022 to determine any neonicotinoid seed treatment residue levels in soil and plants was established and commissioned jointly by the sugar industry and Defra to ADAS/Smithers between **February** and **March**. The project covered in-field soil samples, in-field vegetation samples, field-margin soil samples, field-margin vegetation samples, and pollen samples. Interim datasets have flagged no cause for concern relating to the seed coating residue levels of this years drilled crop. The complete set of results and accompanying contextual analysis will be delivered by ADAS post-harvest of all monitored sites. The latest dataset was circulated on **11/11/22**.

11. BBRO liaison with relevant water companies/organisations

The BBRO has actively sought liaison with relevant water companies and organisations such as Anglian Water, The CamEO Water Stewardship Group and The Norfolk River Trust, to understand what monitoring they are doing and review any data they hold regarding neonicotinoids in water. Neonicotinoid residue levels don't appear to be something regularly monitored or reported on by such groups at present, but the Stewardship group has fostered valuable communication channels that will remain open moving forward.

12. Knowledge Exchange (KE) activities

British Sugar, NFU Sugar, and the BBRO have managed and administered an effective Knowledge Exchange package with the BBRO successfully leading distribution to the grower and agronomy base. A comprehensive log, meticulously kept over the course of the year, evidences the posted, emailed, tweeted, and texted

information that was shared with the industry throughout the growing season and into the beginning of the campaign.

As part of the 2023 stewardship programme, we will be asking growers who have used Cruiser SB, to confirm that they have both understood and complied with all elements of the stewardship agreement.

23	Repeat Applications: Data Requirements

Please provide details of how you have addressed any data requirements set under previous emergency authorisations.

We acknowledge the requirements expected of us in the HSE letter from 1st March 2023. Action is captured elsewhere in the application.

Part E: Risk Assessment Areas and Mitigation Measures

For help completing this section, read the Applicant Guide to Emergency Authorisations and the Applicant Guide.

Please provide details to address each risk assessment area using supporting data and/or a robust case.

Where data is used to support any risk assessment area and has previously been submitted to HSE, please provide the product name and COP number, including appropriate documentation to show that you have access to the data.

Include details of proposed mitigation measures and how they will reduce any potential adverse effects or risks.

26	**Non-dietary Human Exposure**

Fully supported by the previous authorisation for Cruiser SB, COP 2013_02236

27	**Residues and Consumer Exposure**

Fully supported by the previous authorisation for Cruiser SB, COP 2013_02236

28	**Environmental Fate and Behaviour**

Fully supported by the previous authorisation for Cruiser SB, COP 2013_02236

29	**Ecotoxicology**

Fully supported by the previous authorisation for Cruiser SB, COP 2013_02236

Note: Under Article 53, emergency authorisation is a derogation from the standard authorisation requirements under Article 29 of Regulation (EC) 1107/2009, but the overall objectives of that Regulation must nevertheless be borne in mind, including securing a high level of protection for human health, animal health and the environment.

Part F: Supporting Information Checklist		
30	**Tick the boxes to confirm the items being submitted**	
Requirements	**Completed**	**Not required**
Cover Letter	x☐	
Part A completed*	x☐	
Part B completed*	x☐	
Part C completed*	x☐	
Part D completed*	x☐	
Part E completed*	x☐	
Supporting data / information submitted with this form	☐	☐
Supporting data / information being sent to HSE separately	☐	☐
Letter of access, including a declaration that the authorisation holder will take back unused stocks at the end of the 120-day use period	☐	☐

* required for all applications

Note: Hyperlinks to information held on websites can break. Therefore, HSE requests that applicants copy the relevant text from the website into a separate document referencing the website at the end (Author. Website Date. Title of Page. [Date Accessed]. Copy of URL in full). This ensures the information can still be accessed even if the hyperlink breaks.