



Nematodes of sugar beet:

Beet Cyst Nematode



**Edition one
Summer 2025**

Beet cyst nematode, *Heterodera schachtii* (BCN), is a harmful pest of sugar beet and can result in serious yield loss. Infections in the UK are believed to cover around 10% of the national crop, however, incidence may be much greater as BBRO's Plant Clinic receives more positive cases every year.

BCN favours lighter sandy, loamy and organic soils, although it has also been reported on heavier soils.

The nematodes feed from within the sugar beet's lateral roots, leading to bearded/fanged root systems which prevent the crop from accessing adequate water and nutrients in the soil. This leads to wilting symptoms to appear (when the remainder of the crop is healthy and upright). As they continue to feed, they draw sugars and nitrates from the plant, further reducing yield. Losses can be up to 70% and dirt tares are significantly increased by the bearded/fanged roots.

The nematode protects its next generation within a protective cyst within which up to 600 eggs are laid. The cyst keeps the eggs safe and can remain viable for up to 20 years.

Identifying BCN

If you suspect BCN in a growing crop, pull up a few plants and inspect for signs of BCN: small, white, lemon-shaped blisters on roots which burst when squeezed – Tip: use a magnifier to help ID cysts.

White cysts are evident during late spring and summer, before they mature, turn brown and detach from the root. If you want to know ahead of planting a sugar beet crop if you have a BCN problem, you will need to arrange a soil test.



Figure 2 (right): Roots showing small, bearded BCN infested beet (left) versus healthy beet (right)



Figure 1: Early symptoms of nematode infection; wilted patches amongst a healthy crop



Unsure if it's BCN?

Send samples of suspected sugar beet with BCN to BBRO's Plant Clinic for FREE confirmation



bbro.co.uk/bbro-research/plant-clinic/

Where is BCN found?

Historic soil sampling indicates that around 10% of fields used to grow sugar beet are infested with BCN, however, it is likely that this figure is an under-estimate and it might be much more widespread.

The map shows that all four factory areas are infested with BCN and it is particularly widespread in East Anglia.

If you are growing sugar beet near to or within one of the infected areas it is worth considering what impact BCN may be having on your crop, even if you don't think you have a problem.

Sub-clinical infections (where the crop shows no visible signs of infection) are worth being aware of. These may lead to c.10% yield loss without showing any symptoms and will lead to greater problems next time sugar beet is planted in those areas.

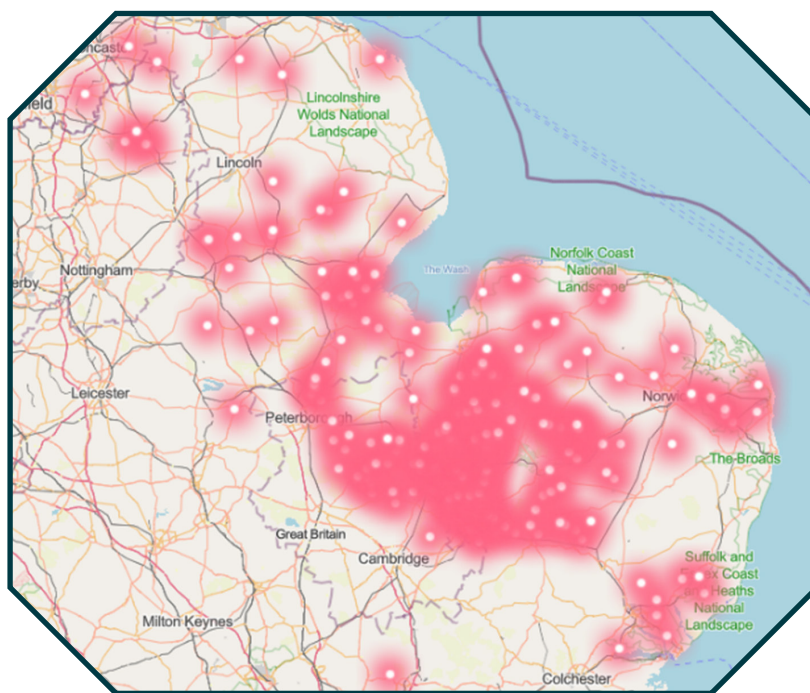


Figure 3: BCN Positive samples recorded between 2008-2014. Use this map as a guide to the location of infected areas. Data courtesy of BBRO & British Sugar

Soil testing & results:

Soil sampling for BCN can take place at any time of the year. BBRO can provide advice on labs and sampling via plantclinic@bbro.co.uk or call 01603 672169. Once your tests are conducted a report will be sent and state if cyst nematodes were found and the species present:

Your Ref:	Fera Ref:	Genus/Species	No. cysts found
GH 24-015	2025004923	No. adult female cyst nematodes found	None found
GH 24-016	2025004924	No. adult female cyst nematodes found	None found
GH 24-017	2025004925	<i>Globodera</i> spp. (viable cysts)	3
		<i>Heterodera schachtii</i> (viable cysts)	4
		<i>Heterodera schachtii</i> - group (non-viable cysts)	1
GH 24-018	2025004926	No. adult female cyst nematodes found	None found

The table on the previous page shows an extract of some soil tests from Fera where BBRO recently sent samples for testing. Samples GH24-015, 016 & 018 all tested negative for any cysts. This means no cysts were in these samples. GH 24-017 is positive for cysts and a mixture of species were found. *Heterodera schachtii* is the beet cyst nematode and should be the only cyst nematode species which will affect sugar beet in the UK. Request complete speciation with your soil test to be sure of which species of nematodes are present as other species of cyst nematode may be present such as:

- *Globodera rostochiensis* & *Globodera pallida* - potato cyst nematodes – also in GH24-017
- *Heterodera avenae* – cereal cyst nematode
- *Heterodera goettingiana* – pea cyst nematode
- *Heterodera cruciferae* – brassica cyst nematode

There are a wide range of species of cyst nematode. If you receive a test result and require help interpreting it contact BBRO via plantclinic@bbro.co.uk

Your report may state a population level in the sample.

This is an important figure to understand how many nematodes are in the sample as this relates to the potential harm your crop may face. For BCN in sugar beet, historically, it was advised, that populations greater than 4 eggs and juveniles per gram of soil should not be used to grow sugar beet as it would cause serious economic harm. Today, using tolerant varieties, you can plant sugar beet into heavier infestations but populations above 20-30 eggs per gram still represent a significant threat.

Managing BCN:

If you find out you have BCN there are several options you have to manage the problem. The most effective methods are to maintain good on-farm hygiene and making sure you use the correct variety in the right place.

On-Farm Hygiene:

BCN has a wide and varied range of hosts, making eradication difficult. Avoid planting other host crops and maintain good weed control to limit population increases.

To maximise population decline, BCN hosts must not be grown more than 1 year in 5 as ~50% of the remaining population hatch each year.



Figure 4: Soil Sampling can be done at any time of the year as required. Aim to sample in late spring/early summer if you are planning on sowing a cover crop.



Figure 5: Immature cysts (White dots) on lateral roots. Signs of BCN infection (high dirt tare and fanged roots) also showing.

Check the BCN map to see if you are at-risk and if you suspect BCN in your fields, make a note of it for when sugar beet is next planted there.

BCN is an important problem to monitor. Preventing an infection in the first place is always optimal, although not always achievable. Once an infestation becomes established it is practically impossible to eradicate, and likely to spread.

Whilst cysts themselves cannot move, cultivators, drills, tractors, livestock and even heavy winds help cysts spread around your fields and farm.

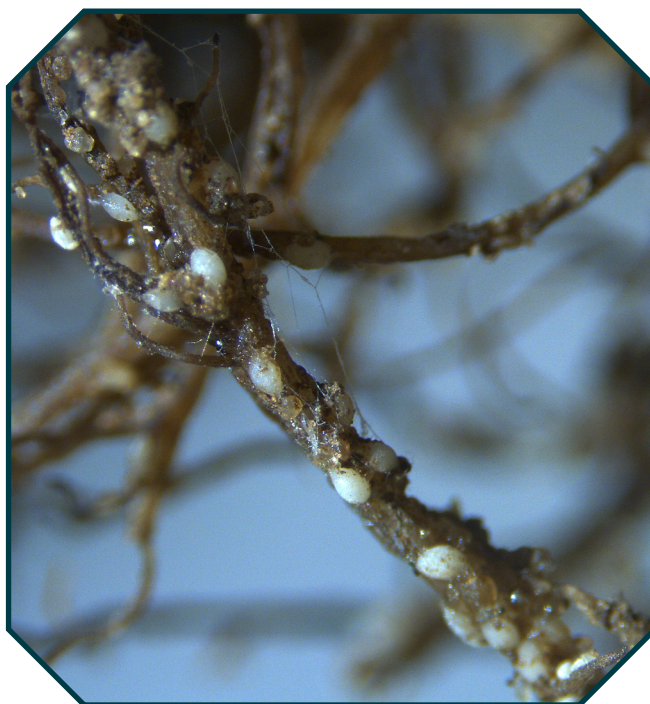


Figure 6: Immature cysts on a lateral root up-close under a microscope.

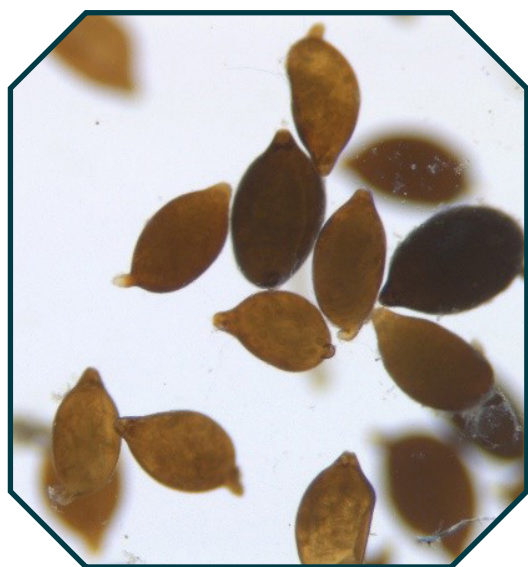


Figure 7 (left): Mature cysts which have become tanned to protect the eggs inside.

If practicable, clean machinery between farms and/or when working between infected and clean fields. Weed beet must also be eradicated to help reduce BCN population build up.



Figure 8: Soil carried on harvesters is a major method of BCN transfer between farms and fields.

Cover Crops:

If growing in a high-risk or infected field you must choose a cover crop mix wisely. Many cover crop mixtures will use at least one BCN host (e.g. brassicas like turnips, mustards and radishes). These can produce a new generation of cysts over the autumn which will severely impact the next sugar beet crop.

Brassica Trap Crops:

Resistant varieties of brassica cover crops are available, often called a trap crop. These cause some of the nematodes to hatch but they cannot complete their lifecycle. BBRO research has shown the most effective cover crops are the Class 1 types which can limit multiplication of BCN. Class 2 types also exist which are less resistant and best suited in situations where sugar beet will not be grown immediately after. Do not be tempted to grow a standard brassica as it may increase population levels significantly. See the BBRO Cover crop guide for more information.

Biofumigation techniques may be able to reduce BCN levels. However, many of the species used are BCN hosts and may instead increase BCN populations. Additionally, biofumigation is not expected to be cost effective for sugar beet.

Figure 9: Avoid growing cover crops for fodder on BCN fields unless they have Class 1 BCN resistance and be aware that stock may move infestations to the next field.



Common BCN Hosts in arable rotations:

Amaranths, Beets & Goosefoots:

Love lies bleeding, Common Amaranth, Green Pigweed, Fat Hen, Common Orache, Garden Beetroot, Sowbane/ Maple-Leaved Goosefoot, Quinoa, Spinach, Garden Orache, Sugar Beet, Fodder Beet, Chard, Good King Henry

Carnations/Pinks:

Corncockle, Wild Carnation/Clove Pink, Soapwort/Wild Sweet William, Common Chickweed

Brassicas:

Wild Radish, Fodder Radish, Chinese Cabbage, Oilseed Rape, Cabbage - All species, Turnips, Gold of Pleasure, Shepherd's Purse, Garden Cress, White Mustard, Field Pennycress (N.B. resistant types of mustard and radish are available for use as trap crops)

Legumes:

Reversed Clover, Indian Pea, Fodder Vetch

Buckwheats:

Buckwheat, Green Buckwheat, Pale Persicaria, Sheep's Sorrel

(Data from BBRO BCN Technical Guide, 2009)

Sugar Beet Variety choice:

Changing variety is the most simple and effective way to manage BCN. When planting in infected fields, it's vital BCN tolerant varieties of sugar beet are grown. These reduce the proportion of juvenile nematodes which become female, placing less burden on the plant and, therefore, allow it to yield better.

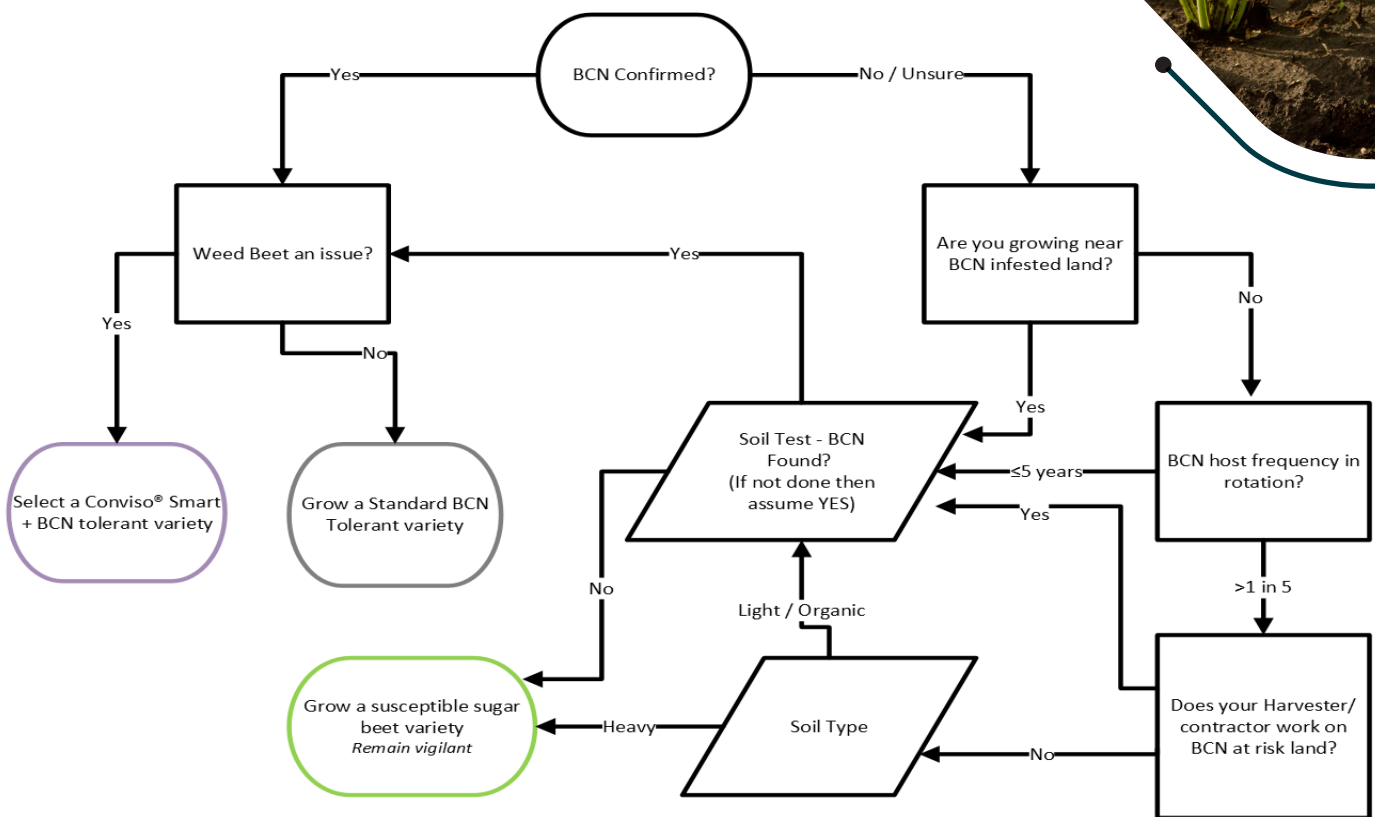
RECOMMENDED LIST OF SUGAR BEET VARIETIES 2026 (Based on trials from 2022-2024)

Rz1 rhizomania varieties		BTS1816		Andar		Kajana KWS		Hanyata KWS		Daphna		Chyna KWS		Gadral		Annabina KWS		Josephina KWS		Hoopoe		Asian		Morgan		Magpie		BTS310		ST Tweed		Baton		Cosprey		Smart Una KWS		Gineproa KWS		BTS Smart 1485		Smart Verica KWS		Smart Nelda KWS		Meruclia KWS									
Status: (C) = control variety ¹				Y6(C)		Y1		Y6(C)		Y4(C)		Y9(C)		Y2		Y1		Y4(C)		Y2		Y1		Y1		Y4		Y2		Y4		SY2		Y4		Y3		SY2		SY1		SY4		SY3		SY1		SY5							
AYPR/BCN/ALS/VY as claimed by the Breeder				-		-		BCN		BCN		BCN		CERC		-		-		-		BCN		-		-		-		-		V		BCN		AYPR		ALS		V		ALS		ALS		ALS/BCN		V							
CROP YIELDS ²		MEAN		SE		95% Icd																																																	
Adjusted tonnes % of C=100% ³		99.1 t/ha		100.0		1.23		3.4		101.4		100.6		99.9		99.8		99.6		99.4		99.4		99.3		98.4		97.7		97.3		96.8		96.7		96.6		96.6		95.4		94.9		94.1		92.6		91.6		91.1		89.5		87.3	
Sugar yield % of C=100% ³		15.9 t/ha						3.4		101.4		100.6		99.9		99.8		99.6		99.4		99.4		99.3		98.4		97.7		97.3		96.8		96.7		96.6		96.6		95.4		94.9		94.1		92.6		91.6		91.1		89.5		87.3	
Root yield % of C=100% ³		95.0 t/ha				3.3		102.2		99.4		98.9		100.6		100.3		99.5		99.1		98.1		96.2		96.3		97.1		96.1		96.2		96.1		96.5		95.7		94.4		93.1		90.2		93.0		90.0		86.4		86.7			
Sugar content %		16.7%				0.27		16.5		16.8		16.9		16.6		16.6		16.6		16.7		16.9		17.1		16.6		16.7		16.8		16.7		16.8		16.7		16.6		16.7		16.8		17.1		16.4		16.9		17.2		16.8			
BOLTERS per 100,000 plants/ha		MEAN		95% Icd		99.9% Icd																																																	
*X Unsuitable for sowing BEFORE Mid March						X								X												X		X		X						X		X		X		X		X		X									
*X Unsuitable for sowing BEFORE Mid March (Breeder claim)																										X		X		X		X		X		X		X		X		X		X											
Early sowing, before 5 March ⁴		2,206 t/ha		3,966		5,884		8,016		[1619]		1,871		1,805		2,573		7,260		[1904]		2,681		1,432		[3365]		1,541		5,683		2,899		4,395		1,851		3,093		2,890		3,074		8,099		2,767		2,097		1,218		6,586			
Normal sowing		14 t/ha				117		30		0		19		14		0		14		0		9		0		0		0		33		33		19		57		9		21		38		14		0		0		14		26			
PRE-GAPPING ESTABLISHMENT ⁵				95% Icd																																																			
Control		100%		3.5%				101.8		100.3		99.8		100.8		100.6		100.4		101.6		97.1		98.7		99.0		100.8		100.7		100.4		98.9		96.3		96.8		100.0		97.8		95.4		94.6		100.9		97.4		98.2			
TOTAL MEASURED IMPURITIES (MPH/100G SUGAR)				15% above mean of C		95% Icd																																																	
Control		3.60		4.14		0.188		3.86		3.51		3.33		3.56		3.68		3.72		3.80		3.56		3.39		3.47		3.45		3.29		3.47		3.44		3.36		3.44		3.42		4.01		3.45		3.40		3.88		3.41		3.86			
DISEASE (1 = high leaf infection 9 = very low leaf infection) ⁶				Average																																																			
Rust				5.0				6.6		[3.4]		3.8		3.9		4.9		7.0		[4.1]		6.0		6.2		[1.3]		[4.3]		4.1		4.2		6.0		5.1		5.1		5		7.4		[7.4]		5.6		6.3		[6.5]		6.4			
Powdery mildew				5.5				6.3		[3.5]		5.6		5.9		5.7		5.9		[5.7]		5.6		1.3		[3.6]		[5.8]		4.1		4.7		5.5		6.1		5.3		5		6.1		[5.5]		6.5		5.3		[5.8]		3.2			
Cercospora				7.4				[8.0]		-		[7.4]		[7.3]		[7.9]		[6.5]		-		[6.6]		[7.9]		-		-		[7.4]		[6.2]		[7.7]		[8.0]		[6.8]		[7.9]		[7.6]		-		[5.2]		[7.5]		-		[6.6]			
OTHER CLAIMS																																																							
AYPR (Aggressive rhizomania)				-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		Y		-		-		-		-		-									
ALS (Herbicide Tolerant)				-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		Y		-		-		-		-		-							
BCN (as claimed by the Breeder)				-		-		Y		Y		Y		Y		Y		Y		Y		Y		Y		Y		Y		Y		Y		Y		-		-		-		-		Y		-									
V (as claimed by the Breeder) ⁷				-		-		-		-		-		-		-		-		-		-		-		-		-		-		V		-		-		-		-		-		-		-		V							
CERC (as claimed by the Breeder)				-		-		-		-		-		Y		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-		-							
RL SYSTEM																																																							
Year first listed				2020		2025		2021		2022		2017		2024		2025		2022		2024		2025		2025		2025		2022		2024		2022		2022		2023		2024		2025		2022		2023		2025		2021							
BREEDER/UK CONTACT ⁸																																																							
Breeder				BTS		SV		KWS		KWS		KWS		KWS		SV		KWS		KWS		KWS		SV		HH		STR		SV		BTS		STR		STR		SV		KWS		KWS		KWS		KWS									
UK Agent				LG		SV		KWS		KWS		KWS		KWS		KWS		SV		KWS		KWS		SV		SV		STR		SV		LG		STR		STR		SV		KWS		KWS		KWS		KWS									

Sugar Beet Variety Selection:

Drilling the right variety is the best way to limit losses to BCN. To make the correct choice you need to think about:

- Do you have a confirmed BCN infestation?
- Are you growing near BCN infested land?
- How often do you grow BCN host species on your fields?
- Do you have machinery on your farm that also works BCN risk land?
- What is your soil type?
- Do you need to get a soil test? What is the result?



Need more advice?
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