Animal &
Plant Health
Agency

Great Britain and Northern Ireland Variety List Trials: Trial Procedures for Official Examination of Value for Cultivation and Use (VCU) Harvest 2025

Sugar Beet

May 2024

Contents

Changes

- Changed title to Great Britain and Northern Ireland

Section A – General Information

A.1 Purpose

A.1.1 This document sets out the approved procedures to be used for growing trials, tests and assessments as required by the current Protocol for Official Examination of Value for Cultivation and Use for Sugar Beet.

A.2 Scope

A.2.1 These procedures apply to all varieties of Sugar Beet.

A.3 Responsibilities

A.3.1 **Procedures Development Group**

The Procedures Development Group is responsible for reviewing these procedures annually and making amendments for which it has responsibility, in accordance with the provisions of the VCU Protocol.

A.3.2 **Organisers and Operators**

A.3.2.1 Trials Organiser

British Society of Plant Breeders Ltd (BSPB)
BSPB House
114 Lancaster Way Business Park
Ely
Cambs.
CB6 3NX

Tel No: 01353 653846
Mobile: 07747 567351
Email: jeremy.widdowson@bspb.co.uk

A.3.2.2 The Trials Organiser is responsible for ensuring all VCU Protocol and Procedures requirements are followed and liaison with all Operators carrying out trials for Variety List purposes, including any new characters, supply of seed and data handling.

A.3.2.3 Trial Design and Data Handling Operator. The Trial Design and Data Handling Operator identified by the Trials Organiser is responsible for trial design and data validation in accordance with the VCU protocol and associated procedures.

A.3.2.4 Growing Trial Operators, Seed Handling Operators and Quality Testing Operators. The Trials Organiser is responsible for identifying potential Growing Trial Operators and Quality Testing Operators to carry out trials and tests as determined by the Procedures Development Group annual review in accordance with the VCU Protocol, and these Procedures. The Trials Organiser is also responsible for finding Seed Handling Operators who are able to carry out seed handling. Seed Handling Operators prepare trial seed for sowing on behalf of any Growing Trial Operator in accordance with the VCU Protocol and these Procedures.

A.3.2.5 A list of all approved Organisers and Operators is shown Appendix 1.

A.3.3 **VCU Protocol and Procedures non-compliance**

A.3.3.1 The Trials Organiser will forward any reports on VCU Protocol or Procedures non-compliance to APHA within 1 week of receipt. The Trials Organiser will obtain authorisation from APHA for any actions, including those necessary to remedy non-compliances, which are not within the requirements of the VCU Protocol. Such actions must be recorded as a non-compliance. Where emergency action is required and APHA staff are not available (e.g. evenings/weekends) the Trials Organiser should act but report this to APHA at the earliest opportunity. Where GMOs are concerned the arrangements are as detailed in section A.3.4.

A.3.4 **Procedures for GM varieties**

A.3.4.1 The National Authorities and Trials Organiser will develop procedures for GM varieties if an application for a GM candidate variety is received.

A.3.5 **Processing of Seed**

A.3.5.1 The Trial Design and Data Handling Operator will ensure that the Seed Handling Operator receives the relevant seed lists and instructions to carry out their seed handling roles.

A.3.5.2 The Trials Organiser will ensure that any seed treatments or additives are approved for the purpose. Approved products are listed in Appendix 2.

A.3.5.3 Pelleting material shall be a standard commercial pellet of inert material with no additional bio-active additives.

A.3.5.4 The Seed Handling Operator will receive seed from the applicants for distribution to the Growing Trials Operators.

A.3.6 **Dispatch of Seed**

A.3.6.1 The Seed Handling Operator will arrange for seed to be dispatched by the agreed deadlines to the Growing Trial Operators, and, for authentication, to the DUS testing centres including, where appropriate, foreign testing authorities. Dates are given in Appendix 3.

A.3.7 **Monitoring of Growing Trial Operators and Seed Handling Operators – Documentation**

A.3.7.1 The Trials Organiser will take any necessary action to enforce deadline dates and quality standards for required documentation.

A.3.7.2 The Trials Organiser will ensure Growing Trial Operators and Seed Handling Operators have access to all current protocols and procedures relevant to them and that they are notified of any amendments.

A.3.8 **Seed Quantities**

A.3.8.1 The Trials Organiser will determine the quantity of seed required for all VCU tests and trials in each annual series, including authentication, and will notify the applicant of quantities and delivery addresses.

A.3.9 **Labelling of seed**

A.3.9.1 The Seed Handling Operator is responsible for ensuring all seed is clearly labelled with variety name/breeders' reference and AFP number.

A.3.10 **Seed quality**

A.3.10.1 Seed submitted for VCU testing must meet the standards for the final generation of seed given in the appropriate seed regulations, in respect of germination, analytical purity and content of other seeds and any other impurities.

A.4 Summary of Growing Trials, Tests and Assessments Procedures

A.4.1 The number of trials and site locations are as detailed in Appendix 4.

A.4.2 Control varieties are listed in Appendix 5.

A.4.3 The Trials Organiser is responsible for informing the Growing Trial Operators of the additional characters, which must be recorded as and when requested by applicants, and any samples that may be required for analysis.

A.4.4 **VCU trial assessments required**

Bold = Obligatory *Italics = Additional only if requested by the applicant*

A.4.4.1

Observation	Reference	Description of assessment
Yield	Section C	**Plot root yield**
Impact of physical environment	Section C	*Emergence*
Impact of physical environment	Section C	*Plant uniformity*
Impact of physical environment	Section C	*Early vigour*
Impact of physical environment	Section C	**Population count (required for Bolters %)**
Impact of physical environment	Section C	**Bolters**
Impact of physical environment	Section C	*Drought stress*
Impact of physical environment	Section C	*Top size*
Impact of physical environment	Section C	*Crown height*

Observation	Reference	Description of assessment
* Resistance to harmful organisms	Section D	**Virus yellows**
* Resistance to harmful organisms	Section D	**Downy mildew**
* Resistance to harmful organisms	Section D	**Powdery mildew**
* Resistance to harmful organisms	Section D	**Rust**
* Resistance to harmful organisms	Section D	**Ramularia**
* Resistance to harmful organisms	Section D	**Cercospora**
* Resistance to harmful organisms	Section D	**Stemphyllium**
Quality characteristics	Section E	**Sugar content**
Quality characteristics	Section E	**Total estimated impurities**

* There is a requirement to record disease in accordance with these VCU Procedures.

Further Measurements

The following must be measured or recorded in all trials, following procedures in Section C.

Sowing Date
Harvest date
Plot size
Harvest losses (where present at levels which will affect results)

Section B – Seed Handling Procedures

B.1 Responsibilities

B.1.1 The Seed Handling Operator is responsible for carrying out the following procedures.

B.1.2 Treated and pelleted seed is supplied by the applicants to the Seed Handling Operator for distribution to the Growing Trials Operators.

B.2 Seed Handling Procedures

B.2.1 The Seed Handling Operator will receive a sowing list from the Trials Organiser, the applicants will receive from the Trial Organiser a list of chemicals approved by the Procedures Development Group - see Appendix 2.

B.2.2 The Seed Handling Operator must record receipt of seed from applicants by checking it off against the sowing list as it arrives. APHA should be notified of any damage to the packaging, loss of seed or identification problems that would affect the validation of the trials.

B.2.3 Once seed has been received, it must be kept safely until required for drilling, authentication and quality control.

B.2.4 The applicant must record use of treatment chemicals in accordance with best practice and in full observance of all manufacturers' recommendations and relevant statutory obligations.

B.2.5 Any seed treatment equipment used must be fit for the purpose, properly calibrated, set up and operated in accordance with the manufacturer's recommendation.

B.2.6 Cross contamination must be avoided by ensuring equipment is clean between weighing and treatments.

B.2.7 A record must be kept of chemicals used and date of treatment.

B.2.8 Seed treatment should take place as near to the drilling date as possible.

B.3 Authentication of VCU Seed

B.3.1 Results from the second year’s submission will be compared, by the DUS centre, with the first year for authentication purposes.

Section C – Growing Trial Procedures

C.1 Responsibilities

C.1.1 The Growing Trial Operators are responsible for conducting the trials according to these procedures.

C.2 Site Suitability

C.2.1 The Growing Trial Operator will be responsible for providing a suitable site, which meets the following criteria:

C.2.2 Previous cropping - no Sugar beet or other *Beta* species to be grown in the previous two years.

C.2.3 Soil type should be typical of those on which sugar beet are grown locally. Soil fertility and texture should be uniform across the site. The soil should be sufficiently uniform to avoid variation in the growth of the trial.

C.2.4 The trial should be sited away from trees, hedges, headlands and other features, which are likely to cause uneven growth or encourage grazing damage from fauna.

C.2.5 The trial area should be cultivated in the direction of the primary cultivation and drilled across the direction of the primary cultivation such that each plot receives similar treatments. Cultivations should follow best local practice.

C.2.6 The frequency, direction and approximate date of all cultivations carried out since the last crop should be recorded in the site details record sheet.

C.2.7 Organic manures should not be applied to the trial area after the preceding crop unless they can be applied accurately and evenly across the trials area. The use of Fresh Farm Yard Manure is not permitted.

It remains the responsibility of the Growing Trials Operator to maintain the integrity of the trial.

C.2.8 Be aware that some varieties may have stewardship requirements. These will be provided in Appendix 10.

C.3 Sowing the Trial

C.3.1 **Plot Size**

C.3.1.1 Three rows are to be drilled at 0.5m row width, with the same row width between plots. Variation in row spacing of more than 10% between adjoining plots should be notified to the Trials Organiser. All rows of the plot will be harvested for yield and the plot size should be sown to allow a minimum target harvest plot, after trimming, of $10m^2$. A minimum of 3m pathway between plot ends is required to facilitate machine harvesting. There will be four replicates sown.

To allow access for harvesting equipment a headland of a minimum of 24m is required around the trial

C.3.2 **Plant population**

C.3.2.1 Precision drills should be used. Plots should be sown at a target seed spacing of approx. 15-19cm to give an established plant population of approximately 100,000 plants per hectare. Permission must be obtained from the Trials Organiser if a smaller seed spacing is to be used.

If establishment is uneven the Growing Trials Operators should contact the Trials Organiser for guidance.

If not sown to a stand the trials should be gapped as near as possible at the 2-4 true leaf stage to give a uniform plant population of approximately 100,000 evenly distributed plants per hectare.

C.3.3 **Trial layout**

C.3.3.1 The Trials Organiser, following consultation with APHA, produces provisional sowing lists. The Trials Organiser will make final sowing lists available to the Trial Design and Data Handling Operator. The Trial Design and Data Handling Operator will make the final sowing lists and trial plans available to the Growing Trial Operators.

C.3.3.2 The trial should be sown according to the plan produced by the Trial Design and Data Handling Operator and may be an incomplete block design. In an incomplete block design, each replicate is split into a number of sub-blocks. Any splitting of replicates must be between sub-blocks and not through sub-blocks. Varieties can be moved within a sub-block but must not be moved from their sub-block. If plots are moved out of their original sub-block they will have to be treated as missing plots. The Trials Organiser must be informed immediately if there are any departures from the original plan or if there any other anomalies.

C.3.3.3 If there is a need to replace a planned variety e.g. if varieties are withdrawn, affected plots must be sown with any of the standard control varieties. Any such replacements must be agreed with the Trials Organiser. The control varieties are listed in Appendix 5.

C.3.4 **Drilling**

C.3.4.1 Drills must be set up and calibrated in the field before commencing drilling.

C.3.4.2 Care must be taken with drill settings and drilling speed to ensure satisfactory and uniform establishment and plant population from plot to plot. It is also important to ensure that there is no-carry over of seed between plots.

C.3.4.3 Six rows of discard of the same variety, or 2 x 3 rows of 2 different varieties, should be drilled on either side of the trial with the same drill and at the same time that the trial is drilled

C.3.4.4 Precautions must be taken to avoid any missing rows. Any missing rows or parts of rows must be noted on the drilling plan and reported to the Trials Organiser within one month of emergence.

C.3.4.5 Seed is supplied for trial purposes only. Unused seed must not be supplied to third parties without the permission of the breeder. It must not be used for any guard plot or pathway.

C.3.4.6 Seed disposal
All surplus packets and discard trial seed must be returned to the Seed Handling Operator for disposal and the date and quantity returned noted in the Trial Diary.

C.3.4.7 **Pathways**

A gap (pathway) between plot ends of at least 3m is required to avoid carry-over of roots by the harvesting equipment. The gap (pathway) should be cross-drilled as it minimises edge effects on the beet at the end of each plot and improves their harvestability. Beet in the pathways must either be harvested or destroyed by any appropriate method that aims to create a level pathway which is free from beet and any weeds which will affect harvesting. Rotavating or cultivating pathways late in the season should not be carried out as it may create soft ground conditions that adversely affects harvesting. Only under exceptional circumstances may this be considered and only after seeking agreement from the Trials Organiser. Pathways must be gleaned pre-harvest for beet or beet fragments that are of a harvestable size.

C.3.5 **Confirmation of trial layout**

C.3.5.1 After the trial has been drilled, the Growing Trial Operator must:

a) Confirm the drilled plan by transmission of the sowing date and plan to the Trial Design and Data Handling Operator with any amendments to the plan clearly indicated.

b) Despatch a map of the site location, showing major roads and entry point to the site, as well as a detailed ground plan of the trial to the Trial Design and Data Handling Operator.

C.4 Husbandry

C.4.1 **Agronomy**

Where not specified in these procedures agronomy should follow best trials practice.

C.4.2 **Pesticide application**

All activities must take account of the relevant plant protection products regulations and the Code of Practice for Using Plant Protection Products. Applications of pesticides should be uniform. These must be applied across the direction of the plots.

C.4.3 **Fertiliser application**

Applications of fertilisers should be uniform and take into account inherent fertility, previous cropping, winter rainfall, the best local practice. All fertiliser applications should take account of the AHDB Nutrient Management Guide (RB209), the corresponding advisory publications in England, Wales, Scotland and Northern Ireland and past trialling experience.

C.4.4 **Herbicides**

Chemicals should not be used if there are any known varietal sensitivities. If in doubt, the Trials Organiser should be consulted.

C.4.5 **Pest and Disease Control**

C.4.5.1 **Pest Control**

Appropriate seed dressings must be applied as approved by the Trials Organiser. The chemical seed treatment applied to the trial seed should control some soil-borne pests. However, appropriate pesticide treatments should be undertaken to control virus vectors through the season. Precautions should be taken against attacks by, for example, birds, deer, rabbits, hares, mice and insects.

C.4.5.2 **Disease control**

Seedling diseases should be controlled by the routine seed-dressings used and viruses should be controlled by targeting their insect-vectors (see C.4.5.1 above). Trials should be treated with a fungicide according to the instructions in Appendix 6.

C.4.6 **Irrigation**

Irrigation will not be permitted without the specific agreement of the Trials Organiser.

C.4.7 **Plot assessment**

Plots should be assessed between the 6-8 and 8-10 true leaf stage and scored on a scale

1= excluded
3= of concern
5= slight/some concern
9= acceptable on the day

Please provide comments to explain the 1, 3 and 5 scores.

C.4.7.1 Missing plots - Plots with gaps or poor uniformity may occur

If plots are weak due to mechanical or agronomic problems throughout their entire length, it may be necessary to exclude the plots. The adjacent plots may have to be missing due to unfair advantage to their growth. These plots should be entered in subsequent data records as "*" (see C.6.2.5) and should be clearly indicated when the data is sent to the Trial Design and Data Handling Operator.

Where possible 'gapping-up' outside rows of excluded plots should be considered to try to avoid an edge effect on the unaffected neighbouring plot. The plots should be clearly marked when the data is sent to the Trial Design and Data Handling Operator.

C.4.8 **Weed beet**

Weed beet should be removed from plots before they become competitive.

C.4.9 **Trials not taken to plot harvest**

It is the responsibility of the Growing Trials Operator to discuss with the host grower the forward management of trials not taken to plot harvest. If broad-spectrum herbicide tolerant varieties are included in the trial, there must be a procedure in place to ensure that

bolters are removed and destroyed to prevent pollen release and regrowth. The method and visits should be noted in the Trial Diary.

C.4.10 **Post trial husbandry** (See Appendix 10).

C.5 Harvesting

C.5.1 **Timing of harvesting**

C.5.1.1 Date of harvesting will be according to a schedule which will be drawn up by the Trials Organiser in consultation with the Trials Harvesting Contractors and the Growing Trial Operators. Trials harvest should be planned to make sure the final results arrive with the Trials Design and Data Handling Operator by October 25 in the year of harvesting.

C.5.1.2 Pathways (see C.3.4.7 above).

C.5.2 **Harvesting method**

Trials will be harvested by harvesting equipment approved by the Trials Organiser. Harvesters must be able to lift 3 rows. Tops should be removed according to the current British Sugar standard and beet lifted and washed prior to weighing and extraction of brei samples.

Currently 2 systems are approved:

1 Mobile tare house (MTH)

Plots harvested, cleaned, weighed and brei samples obtained and frozen on the MTH.

2 Fixed Tarehouse

Roots from plots harvested into bags, transported to a fixed tare house to be washed, weighed and brei samples obtained.

Within 24 hours of being harvested the bagged roots from the plots should be delivered to the Trials Tarehouse

Within 48 hours of being received at the Trials Tarehouse the roots from the plots should be washed, assessed for yield and a sub-sample taken. The sub-sample is used to produce the brei sample for quality analysis.

A representative brei sample should be obtained from the sub sample within 24 hours of the plot roots being washed, weighed and sub sampled.

C.5.3 **Sampling**

C.5.3.1 Representative brei samples should be obtained within 96 hours of harvest from the roots of each plot for quality analyses using a brei sampling machine. Unless analysed immediately, samples must be stored frozen.

C.5.3.2 Brei samples to be labelled to identify the trial and plot number.

C.5.3.3 Frozen brei samples to be stored at or below -18C and should be delivered to the appropriate Quality Testing Operator as soon as practical after harvest.

C.5.3.4 Brei samples not frozen must be analysed immediately after the brei sample has been obtained and should occur within 24 hours of beet being washed and weighed.

Details of the quality analysis process are described in Section E.

C.5.4 **Submission of data**

C.5.4.1 Appendix 7 lists the records, with deadlines, to be sent to the Trials Organiser. Diary sheets and other field records should be returned to the Trials Organiser within 5 working days of harvest.

C.5.4.2 All plot records should be transmitted to the Trial Design and Data Handling Operator following the deadlines set out in Appendix 7. The Growing Trial Operator should ensure that data are free from errors before transmission. After scrutiny, copies of results will be returned to the Growing Trial Operator for action as agreed by the Trial design and Data Handling Operator.

C.6 Records

Records should be clear and self-explanatory so that the trial can be carried on at a moment's notice by another person without difficulty.

C.6.1 **There are four components:**

1. Diary: Field notes of trial status, recording and inspections

2. Site data 1: Site details including site sketch map and location, previous cropping, soil analysis, cultivations and drilling.

3. Site data 2: Site details including fertiliser and sprays, herbicides, fungicides, insecticides and harvest.

4. Plot records: Plot data.

C.6.1.1 An entry in the Diary sheet should be made on every trial visit and any observations relevant to variety performance should be recorded. If the trial is in good condition, with no problems, this should be recorded.

C.6.2 **Plot records**

C.6.2.1 Plot data may be recorded direct onto a data logger using a system approved by the Trials Organiser or recorded on paper then entered and validated onto a computer using an approved system. A system of ensuring that data are recoverable, in the event of loss of original data, must be implemented, eg copy and safe storage. Whichever method is used, individual plot data will only be accepted by the Trial Design and Data Handling Operator in an approved format using the measure names and units as listed in Section C.6.3.

C.6.2.2 All observations should be checked at the time of recording to ensure that they lie within acceptable limits for the character recorded. Observations that have been designated as exceptional by the recorder should be identified with a note on the approved data file or hard copy medium describing the possible causes together with a recommendation for their exclusion or inclusion in the trial analysis.

C.6.2.3 Plot numbers on record sheets must correspond with the numbering on the field plan.

C.6.2.4 If a character is not recorded or is missing the Growing Trial Operator should indicate in the diary or on the recording sheet the reason why it has been excluded.

C.6.2.5 Where a plot record is missing the Growing Trial Operator should enter “*” in the approved data file or hard copy medium and, unless the non-recording of the plot has already been agreed with the Trials Organiser, append a note to the file explaining why a missing value has been entered for that plot. The Growing Trial Operator must not enter “0” for missing plots.

C.6.2.6 Specific plot records should be made as counts or on the scales shown for each character.

C.6.2.7 All records should be returned to the Trial Design and Data Handling Operator immediately after recording. Indicative deadlines are given in Appendix 7.

C.6.3 **Procedures for recording Characters**

C.6.3.1 The following procedures must be followed for measuring all characters to be used in VL decision-making.

C.6.3.2 **Characters to be Recorded for DUS Purposes.**

These records will be undertaken by the DUS Operator. The Trials Design and Data Handling Operator will notify the Growing Trials Operators which trials are to be recorded and that their sites should be made available to the DUS Operator. NB One of the sites will also be used to obtain leaf measurements for DUS purposes which will involve access to the site by a team from the DUS Operator over several days.

C.6.3.2.1 **TOP SIZE** **from all plots**

(OBLIG ATORY) **(1-9)**

Estimate the relative top size.

Ensure that records are made before severe frost.

1 = very small
9 = very large

C.6.3.2.2 **HEIGHT OF CROWN** **from all plots**

(OBLIG ATORY) **(1-9)**

Record height above soil level:

1= Lowest leaf scar at soil level
9 = Lowest leaf scar very high above soil level

Measure the actual height for extreme values used.

C.6.3.2.3 **FOLIAGE HABIT from all plots (OBLIGATORY) (1-9)**

Record habit in July:

1 = prostrate
9 = erect

C.6.3.2.4 **FOLIAGE COLOUR from all plots (OBLIGATORY) (1-9)**

Record the colour of the lamina in July

1 = pale
9 = dark green

C.6.3.2.5 **LEAF WAVING from all plots (OBLIGATORY) (1-9)**

Record the waviness of the leaf margin in July

1 = smooth
9 = very wavy.

C.6.3.2.6 **LEAF BLISTERING from all plots (OBLIGATORY) (1-9)**

Record the blistering of the leaf surface in July

1 = smooth
9 = very blistered.

C.6.3.3 **VCU Characters to be Recorded for VCU Purposes.**

C.6.3.3.1 The following procedures must be followed for measuring all characters to be used in VL decision-making.

C.6.3.3.2 *EMERGENCE from all plots* *(ADDITIONAL) (COUNT)*

When the most advanced variety has 2 true leaves, count the number of plants in the centre row of each plot and record the length of row counted and seed spacing so that percentage emergence can be calculated.

C.6.3.3.3 *PRE-GAPPING POPULATION COUNT from all plots (ADDITIONAL) (COUNT)*

Record the number of plants from the centre row in the harvested plot area at the 2 to 4 true leaf stage pre gapping. Doubles should be counted as one. Record the plot length and indicate any rows that have a low population.

C.6.3.3.4 **POPULATION COUNT** **from all plots (OBLIGATORY) (COUNT)**

Record the number of plants of the 3 rows in the harvested plot area, from the 6-8 true leaf stage onwards. Record the plot length and indicate any rows that have a low population.

C.6.3.3.5 *PLANT UNIFORMITY* *from all plots* *(ADDITIONAL)* *(1-9)*

Record plant uniformity within the plot in late May/June on the scale:

1 = large variation
9 = small variation

C.6.3.3.6 *EARLY VIGOUR* *from all plots* *(ADDITIONAL)* *(1-9)*

Record on the basis of relative plant size in late May/early June on the scale:

1 = very small
9 = very large.

Record the size of the plants at each end of the scale.

C.6.3.3.7 **BOLTER NUMBER from all plots**

(OBLIGATORY) (COUNT)

Bolters are a potential source of weed beet if flowering occurs early enough for viable seed to be produced. The following procedures ensure that the number of bolters occurring are recorded and pollen release, seed set and shed is prevented.

If broad-spectrum herbicide tolerant varieties are entered into the trial these plots should be inspected for bolters every 2 weeks until harvest to prevent pollen release. Bolters to be stripped and flowering parts destroyed to prevent any further regrowth or pollen release. Bolter inspection visits and any actions should be noted in the Trial Diary.

The number of bolters in the harvested area should be counted a minimum of 3 times at the times suggested below:

a) The end of June – count all bolters. Flowering branches to be stripped to leave the main stem. Ensure that flowering parts are destroyed to prevent any further regrowth or pollen release. The root should remain as part of the harvest plot.

b) The end of July – count all bolters including those previously counted. Flowering branches to be stripped to leave the main stem. Ensure that flowering parts are destroyed to prevent any further regrowth or pollen release. The root should remain as part of the harvest plot.

c) By the middle of September – count all bolters including those previously counted.

If extra bolting counts are necessary follow procedures b) above and send the additional records, clearly indicating the date on which the counts were taken, to the Trial Design and Data Handling Operator.

C.6.3.3.8 *DROUGHT STRESS from all plots*

(ADDITIONAL) (1-9)

This should be assessed on a plot basis when varietal differences become apparent and where drought stress is uniform across the trial.

1 = severe symptoms
9 = no symptoms

If areas of the trial become severely affected by drought, these should be recorded on a trial layout and returned to the Trial Design and Data Handling Operator as soon as possible. The Trials Organiser should also be informed.

C.6.3.3.9 *TOP SIZE* *from all plots* *(ADDITIONAL)* *(1-9)*

Estimate the relative top size on a plot basis prior to harvest.

1 = very small
9 = very large

Ensure that records are made before severe frost.

C.6.3.3.10 *HEIGHT OF CROWN* *from all plots* *(ADDITIONAL)* *(1-9)*

Record height above soil level on a plot basis prior to harvest.

1 = Lowest leaf scar at soil level
9 = Lowest leaf scar very high above soil level

Measure the actual height for extreme values used.

C.6.3.3.11 **VIRUS YELLOWS** **from all plots (OBLIGATORY if present) (COUNT)**

Virus yellows should be assessed on a plot basis by recording the number of plants showing any symptoms in August. Should the level of infection become severe inform the Trials Organiser.

C.6.3.3.12 **DOWNY MILDEW** **from all plots (OBLIGATORY if present) (COUNT)**

Downy mildew should be assessed on a plot basis by recording the number of plants showing any symptoms. Should the level of infection become severe inform the Trials Organiser.

C.6.3.3.13 **POWDERY MILDEW from all plots (OBLIGATORY if present) (%)**

Inspect in July/August/September and record on a plot basis if the disease is > 5% in the most susceptible variety or if infection loci present. Use the NIAB Sugar beet foliar disease key in Appendix 8.

C.6.3.3.14 **RUST from all plots (OBLIGATORY if present) (%)**

Inspect in July/August/September and record on a plot basis if the disease is > 5% in the most susceptible variety or if infection loci present. Use the NIAB Sugar beet foliar disease key in Appendix 8.

C.6.3.3.15 **RAMULARIA from all plots (OBLIGATORY if present) (%)**

Inspect in July/August/September and record on a plot basis if the disease is > 5% in the most susceptible variety or if infection loci present. Use the NIAB Sugar beet foliar disease key in Appendix 8.

C.6.3.3.16 **CERCOSPORA from all plots (OBLIGATORY if present) (%)**

Inspect in July/August/September and record on a plot basis if the disease is > 5% in the most susceptible variety or if infection loci present. Use the NIAB Sugar beet foliar disease key in Appendix 8.

C.6.3.3.17 **STEMPHYLLIUM LEAF SPOT from all plots (OBLIGATORY if present) (%)**

Inspect in July/August/September and record on a plot basis if the disease is > 5% in the most susceptible variety or if infection loci present. Use the NIAB Sugar beet foliar disease key in Appendix 8.

C.6.3.3.18 **ROOT YIELD from all plots (OBLIGATORY) (kg)**

Root yield of each plot should be recorded after washing. Record the weight in kilograms of the clean beet.

Yield data should be sent to the Trial Design and Data Handling Operator within 5 days of harvesting the trial.

The following information should accompany the yield data. This should either be submitted with the yield data to the Trials Design and Data Handling Operator or where appropriate before harvest by the Growing Trials Operator:

1. Lifting date of each replicate of the trial and processing date.
2. Plot length: the plot length harvested in metres.
3. Plot width: the width of the harvested plot in metres from outer row to outer row plus half of the inter-plot gap on either side.
4. Missing plot information.
5. All records and material changes made during lifting and processing.
6. Any other information that may have affected the yield.

C.6.4 **Site Factors**

Any factors which may have affected the yield of the trial or individual plots must be noted and taken into account when validating the trial.

If any other pest or disease attacks are observed, then plot records should be made in accordance with the procedure in Section D for disease.

Plot records for other scores should be taken as plants affected on a 1 to 9 scale. Include definitions for each rating on the 1 to 9 scales.

C.6.5 **Trial Inspection**

All trials will be inspected by the Trial Inspection Operator and Technical Validation Operator and, in some cases, it may be necessary to visit on more than one occasion.

The requirements for Growing Trial Operators in respect of inspections are to:

- Give inspectors reasonable access to trials
- Provide the inspector with information (for example pesticide sprays applied etc) at the time of inspection if requested.
- Co-operate with the inspector in making any non-routine assessments required to establish the validity of the trial (for example population counts)
- Carry out any action agreed in consultation with the inspector.

Section D – Disease Testing Procedures

D.1. Assessment of Natural Infection

D.1.1 The Growing Trials Operator is responsible for carrying out these procedures.

D.1.2 **Naturally occurring disease in VCU growing trials**

D.1.2.1 Naturally occurring disease is normally recorded on a plot basis in the growing trials. Confirmation of the identity of a disease should be obtained from an appropriate plant pathologist if required.

D.1.3 **Recording methods**

D.1.3.1 Diseases are assessed using the timings and appropriate assessment keys given in Appendix 8. All disease records to be sent to the Trial Design and Data Handling Operator as soon as they are made.

Section E – Quality Testing Procedures

E.1 Responsibilities

E.1.1 The Quality Testing Operators appointed by the Trials Organiser are responsible for conducting approved quality tests according to these procedures.

E.2 Quality Assessment Methodology for Obligatory and Additional Tests

E.2.1 Samples of Brei are received from the Harvester Operator. Depending on harvesting method Brei samples are either frozen or fresh.

E.2.2 The Quality Laboratory operated by the Quality Testing Operator shall enable the automated analysis of the brei samples for sugar and impurity measurement (Sodium, Potassium and Amino-nitrogen).

E.2.3 The methods used should be in accordance with the International Commission for Uniform Methods of Sugar Analysis (ICUMSA Method GS6-1 or GS6-3).

E.2.4 In this process the brei shall be analysed by the 'cold water digestion method'. This process to analysis is to make an aqueous extract from a given weight of brei using the proportional addition of a dilute solution of a lead or aluminium extractant which serves primarily to precipitate protein from solution. Once the extract has been filtered the filtrate is analysed for sugar (by polarimetry), sodium and potassium (by flame photometry) and amino nitrogen (by florescence).

E.2.4.5 The above shall be accomplished using an Automated Laboratory System, comprising of

- Manipulator / Brei Transporter
- Dispenser / Clarifier
- An Impurity Meter
- A Polarimeter

Brei Sampler unit
Sample track / Filtration unit

E.2.6 Once data for a trial has been analysed it should be sent by the approved methods to the Trial Design and Data Handling Operator.

E.2.7 These characters are also required for DUS: sugar and impurity measurement.

Section F – Trial Design and Data Handling Procedures

F.1 Plan Validation and Storage

F.1.2 After the trial has been drilled, the Growing Trial Operator must confirm the drilled plan by transmission of the sowing date and plan to the Trial Design and Data Handling Operator with any amendments to the plan clearly indicated.

F.1.3 The Trial Design and Data Handling Operator will check these for statistical validity and, once this has been done, will load the plan on the database.

F.2 Data Recording

F.2.1 Data are recorded using the methods and characters given in Sections C, D and E.

F.2.2 Site information is recorded for each trial including, for example, data on previous cropping, cultivations, soil details, fertiliser and agrochemical applications.

F.3 Other Tests and Trials

F.3.1 Any additional or alternative designs required for the assessment of additional VCU characters not detailed in Appendix 3 of the **VCU TRIAL PROTOCOL** for sugar beet will be added to these **Procedures** as and when approved by the NLSC.

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