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

Fodder Radish

September 2024

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Changes

- C.3.1.1 There will be a minimum of three replicates sown. Replicates are dependent on the number of varieties to be tested.

- C.6.3.13 Heading amended to RESISTANCE TO STEM ROTTING

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 Fodder Radish.

A.2.Scope

A.2.1 These procedures apply to all varieties of Fodder Radish.

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 Trials Organisers and Operators

A.3.2.1 Trial Organisers

a. England and Wales
British Society of Plant Breeders Ltd (BSPB)
BSPB House
114 Lancaster Way Business Park
Ely
Cambs. Jeremy M: 07747 567351
CB6 3NX Louise M: 07917 046705
Email mailto:jeremy.widdowson@bspb.co.uk
louise.everest@bspb.co.uk

b. Scotland
SASA
Roddinglaw Road
Edinburgh Tel No: 0131 2448899
EH12 9FJ
Email russell.thomson@sasa.gov.scot

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 National List purposes, including supply of seed and data handling.

A.3.2.3 Data Handling Operator
The 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 proposing 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 in Appendix 1.

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

A.3.3.1 Where these procedures use the word “must” or “will” for any action then failure to carry out this action will result in non-compliance. Where the word “should” is used for any action then this is the method to be followed unless there are clear reasons not to, which can be justified by the operator as technically sound.

A.3.3.2 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 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 Handling of trial seed

A.3.5.1 The Trials Organiser is responsible for organising the handling of seed of candidate varieties submitted by the applicant, and seed of control, or other reference varieties, in accordance with the requirements set out in these Procedures and the current VCU Protocol. The Trials Organiser will ensure that any seed treatments or additives are fit for the purpose. Seed treatment products are listed in Appendix 2.

A.3.6 Dispatch of seed

A.3.6.1 The Trials Organiser 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.
A.3.7 Monitoring of VCU 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 Trials Organiser 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 Special tests

An additional test for characters not specified in the procedures may be requested by the applicant. APHA is responsible for liaison with the Trials Organisers to produce a procedure for the conduct of a special test or trial. This procedure would require the approval of the National Authorities.

A.4.5 Summary of VCU trial assessments required

Bold = Obligatory italics = Additional. Assessed only if requested by the applicant.

Type of character	Reference	Description of assessment
Yield	**Section C**	**Dry matter yield (t/ha)**
Resistance to harmful organisms	**Section D**	**Alternaria %** *Club root* *Beet cyst nematode*
Behaviour with respect to factors in the physical environment.	**Section C**	**Plant population** *Flowering date* *Emergence (1-9)* *Establishment (1-9)* *Height (cm)* *Lodging (1-9)* *Bolting (1-9)* *Stem rotting (1-9)* *Leafiness (1-9)* *Winter hardiness (1-9)* *Re-growth (1-9)* *Vigour (1-9)* *Frost damage (1-9)*
Quality characteristics	**Section E**	**Dry matter content %** *D-value* *Protein content* *Ash content* *Germination %* *Glucosinolate*

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)
Fresh yield

Section B – Seed handling procedures

B.1 Seed handling procedures

B.1.1 See GENERAL INFORMATION, SECTION 5 - Minor Crop VCU Procedures Introduction.

B.2 Authentication of VCU seed

B.2.1 The Seed Handling Operator must forward 200 g of untreated sample of the seed submitted of every variety in the trial, for authentication by the DUS test centre by the date specified by APHA. The Trials Organiser will notify the minimum quantity required to Seed Handling Operators annually.

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 should follow best practice i.e., no brassica species grown in the previous three years.

C.2.3 Soil type should be typical of those on which radish 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 damage from wild fauna.

C.2.5 The trial area should be cultivated in the direction of ploughing and drilled across the direction of ploughing and cultivation such that each plot receives similar treatments. Cultivations should follow best 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.3 Sowing the trial

C.3.1 Plot size

C.3.1.1 Plot should be drilled to a greater length than required and then trimmed back to appropriate length. The outside rows of the plot should be discarded, and the plot size should be sown to allow a minimum target harvest plot after trimming, of 10 m^2. There will be a minimum of three replicates sown. Replicates are dependent on the number of varieties to be tested.

C.3.2 Plant population

C.3.2.1 Drill at a rate of 10 kg/ha in order to achieve a target final uniform plant population of approximately 60-100 plants per m^2.

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 Growing Trial Operators, along with the trial plans produced by the Trial Design and Data Handling Operator.

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. Varieties must not be moved around within the plan e.g., if drilling errors occur. If plots are moved out of their original sub-block they will have to be treated as missing plots. If there are any queries, please contact the Trials Organiser.

C.3.3.3 Buffer plots may be required in some instances. The Trials Organiser will advise if this is the case.

C.3.3.4 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 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.3.4.2 At least two rows of discard should be drilled on either side of the trial with the same drill and at the same time that the trial is drilled

C.3.4.3 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.3.5 Confirmation of trial layout

C.3.5.1 After full establishment and within one month of sowing the Growing Trial Operator must confirm that the trial has been sown to plan or give full details of any changes to plan. This should be done by clearly highlighting the changes in the electronic plan and returning it to the Trial Design and Data Handling Operator.

Return a completed site data 1 sheet including the following information:

- Site location details including how to get to the field.
- Sketch showing the layout of the trial in the field, in relation to other trials and showing access roads, gates, etc.
- Trial sketch showing plot numbers and variety codes and/or names.
- A short post-establishment report of the condition of the trial.

C.4 Husbandry

C.4.1 **Agronomy**

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

C.4.2 **Fertiliser and spray application**

Applications of fertilisers and sprays should be uniform. It is normally best to apply these across the direction of the plots. The precision application of chemicals post-drilling down the rows is permitted where appropriate, but wheeling's within or between plots post drilling are not acceptable unless they consistently occur in the same place in each plot.

C.4.3 **Fertiliser application**

Applications of fertilisers should 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**

The Trials Organiser must be consulted. Application should be across the direction of drilling.

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 and may provide some early-season control of insect-borne-virus vectors. 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).

C.4.6 **Irrigation**

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

C.4.7 **Pathways**

A gap (pathway) at the end of each plot of at least 1m is required.

C.4.8 **Plot assessment**

Plots should be assessed at the time of the population count to determine whether they are suitable for harvest. Weak plots may occur due to mechanical or varietal problems. If the problem

is considered to be varietal the plots must remain as part of the trial. If the problem is considered to be mechanical the plots should either be treated as missing or as half plots.

Plots affected should be notified to the Trials Organiser at the time of detection.

C.4.8.1 Half plots - plots with gaps or poor uniformity may occur

If plots have gaps due to mechanical or agronomic problems, it may be necessary to eliminate the poor area by reducing the plot to a uniform length. Removal must be across all rows - whole rows cannot be discarded. These plots should be measured and pegged at the time of the population counts.

C.4.8.2 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 make the plots missing. These plots should be pegged at the time of the population counts and a symbol should be entered in subsequent data records (see C.6.2.5). The plots should be clearly indicated when the data is sent to the Trial Design and Data Handling Operator.

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 after consultation with the Growing Trial Operators.

C.5.1.2 Plots should be trimmed to their final harvest length as described in C.4.7 above. The plot dimensions must be measured prior to harvesting. If it is necessary to reduce the harvest size as described in C.4.8.1 above, give clear details with the yield file. Individual harvested plot lengths should be recorded.

C.5.2 Harvesting method

C.5.2.1 All trials will be harvested by harvesting equipment approved by the Trials Organiser.

C.5.3 **Samples**

C.5.3.1 A sample of the chopped material (minimum 500 g) should be taken for dry matter analysis from each plot. A composite sample from all rows should be taken. Make every attempt to ensure that the sample is well mixed and representative of the plot.

C.5.3.2 All samples should be labelled with the labels provided by the Trials Organiser.

C.5.3.3 The samples should be delivered to the appropriate Quality Testing Operator as soon as practical after harvest.

C.5.3.4 All plot samples must be labelled with the trial identification number, variety name/breeders' reference, AFP number, plot number and Growing Trial Operator identification number.

C.5.4 **Submission of data and samples**

C.5.4.1 Appendix 6 lists the records, with deadlines, to be sent to the Trials Organiser. Diary sheets and any 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 6. 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 Trials Organiser.

C.5.4.3 All samples should be sent to the Quality Testing Operator following the deadlines set out in Appendix 6.

C.6 Records

C.6.1 There are four components:

1. Diary: Field notes of trial status, recording and inspections
2. Site data part 1:
    a. A map of site location showing nearby settlements and roads
    b. A sketch showing the layout of trials in the field with access points
3. Site data part 2*: Details of agrochemical applications and irrigation
4. Plot records: Plot data

*Template available from Trials Organiser

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, e.g., 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 record this in any data file or hard copy medium as a symbol thereby indicating there is no recorded value associated with this plot.

C.6.2.6 Specific plot records must be made as counts or on the scales shown for each character. Only the character names as listed may be used. All records should be returned to the Data Handling Operator as soon as possible after they are completed.

C.6.2.7 All records must be returned as soon as reasonably possible and when complete for the whole trial. Indicative deadlines are given in Appendix 6. All records must be returned by the final deadlines.

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 NL decision-making.

C.6.3.2 **SOWING DATE (OBLIGATORY) (Day/month/year)**

This is recorded in Part 1 of the Site Information Form

C.6.3.3 **PLOT SIZE (OBLIGATORY) (m^2)**

This is recorded in Part 1 of the Site Information Form

C.6.3.4 *GERMINATION from all plots (ADDITIONAL) (%)*

C.6.3.5 **PLANT POPULATION (OBLIGATORY) (Count)**

Record the number of plants in all plots after emergence. Record the plot length counted and indicate any rows that have a low population.

C.6.3.6 **HARVEST DATE (OBLIGATORY) (Day/month/year)**

This is recorded in Part 2 of the Site Information Form

C.6.3.7 **HARVEST LOSSES (OBLIGATORY) (%)**

C.6.3.8 **FRESH YIELD from all plots (OBLIGATORY) (kg)**

Enter the total harvested weight in kg per plot and provide the harvested plot dimensions with the record If the plot lengths or widths are not constant then these must also be entered as records.

C.6.3.9 **DRY MATTER YIELD from all plots (OBLIGATORY) (kg)**

Assessed by agreed Protocol.

C.6.3.10 **DRY MATTER CONTENT from all plots (OBLIGATORY) (%)**

A detailed protocol for the assessment of dry matter content is given in Section E. Also specify the fresh weight taken for the sample. If the figures are DM% then enter the fresh weight of sample as 100.

C.6.3.11 *D VALUE from all plots (ADDITIONAL)*

A detailed protocol for the assessment of digestibility is given in Section E.

C.6.3.12 *PROTEIN CONTENT from all plots (ADDITIONAL) (%)*

C.6.3.13 *ASH CONTENT from all plots(ADDITIONAL) (%)*

C.6.3.14 *EMERGENCE from all plots (ADDITIONAL) (1-9)*

1 No emergence
9 100% emergence

C.6.3.15 *ESTABLISHMENT from all plots (ADDITIONAL) (1-9)*

1 Very thin
9 Very thick

C.6.3.16 *VIGOUR from all plots (ADDITIONAL) (1-9)*

1 Poor
9 Excellent

C.6.3.17 *LEAFINESS from all plots (ADDITIONAL) (1-9)*

1 Least leafy
9 Most leafy

C.6.3.18 *BOLTING from all plots (ADDITIONAL) (1-9)*

1 100% bolting
9 No bolting

C.6.3.19 *LODGING from all plots (ADDITIONAL) (1-9)*

Record the % plants in the plot that are bent over from the root at more than 30°.

1 Plants lodged
9 No lodging

C.6.3.20 *HEIGHT from all plots (ADDITIONAL) (cm)*

Estimate the average canopy height for each plot, 70 days after sowing.

C.6.3.21 *HARDINESS from all plots (ADDITIONAL) (1-9)*

1 Complete loss
9 No damage

C.6.3.22 *RESISTANCE TO STEM ROTTING from all plots (ADDITIONAL) (1-9)*

1 All stems rotting
9 No stems rotting

C.6.3.23 *RE-GROWTH from all plots (ADDITIONAL) (1-9)*

Record the incidence of axillary side shoots where:

1 None
9 Extensive

C.6.3.24 *FROST DAMAGE from all plots (ADDITIONAL) (1-9)*

1 complete loss

9 no damage

C.6.3.25 **Site factors**

Any factors which may have affected the yield of the trial or individual plots must be noted and accompany the yield data. Where varietal differences are seen in pest or disease attack, records should be made either as an estimated % of plants affected, or as % leaf area attacked in accordance with the procedure in Section D for disease.
Records for other scores should be taken as % plants affected or on a 1 to 9 scale. Include definitions of 1 to 9 on the scale.

C.6.3.26 **Trial inspection**

All trials will be inspected by the Trial Inspection 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:

1. Give inspectors reasonable access to trials and provide full location and site details (if not already given with site data 1)
2. Provide the inspector with information (for example pesticide sprays applied etc) within 7 days of a request.
3. Co-operate with the inspector in making any non-routine assessments required to establish the validity of the trial (for example population counts)
4. Carry out any action agreed in consultation with the inspector. In particular it is important that any requirement to shorten plots is undertaken. *The data on plots* that the trials operator and inspector agree to exclude should not be submitted.

Section D – Disease testing procedures

D.1 Assessment of natural infection

D.1.1 The Growing Trial 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 in the growing trials. Confirmation of the identity of a disease should be obtained from an appropriate plant pathologist if required.

D.1.2.2 Recording methods

D.1.2.3 Diseases are assessed using the timings and appropriate assessment keys given in Appendix 7. All disease records to be sent to the appropriate 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 Operator appointed by the Trials Organiser is responsible for conducting approved quality tests according to these procedures. The Growing Trial Operators are responsible for producing representative samples for quality assessment as indicated in Section C.

E.2 Quality assessment methodology for obligatory and additional tests

E.2.1 Dry Weight Determination

The treatment of samples and the time interval between cutting and weighing should be such that there is no significant moisture loss between the weighing of the plot fresh yield and the weighing of the fresh weight of the sample.

A fully representative sub-sample (500 – 750 g) of well chopped fresh material is accurately weighed, or an accurately recorded catch weight (500 - 750 g recorded to one decimal place) taken. Although in some instances all of the sampling and weighing of fresh material may be carried out in the field, it is acceptable for samples to be brought to the laboratory for weighing. If the latter option is followed the representative sample is immediately sealed in a 500-gauge polythene bag and kept out of direct sunlight and as cool as possible until transported to the laboratory. Each sample is identified with a label.

The sample is placed in the drier which must be at a temperature of 100 °C ± 4 °C with the air re-circulator set in the range 80-100% recirculation in order to restore the temperature to 100 °C ± 4 °C as rapidly as possible. When the temperature is restored to 100°C ±4°C the air regulator is set at 80% recirculation i.e., 20% fresh hot air. The air regulator is critical for even rapid drying. The samples are dried 100 °C ± 4 °C for such time as is necessary for complete drying.

The dried sample is carefully removed from the drier as soon as the sample is cool enough for accurate weighing. The dry weight is recorded to one decimal place.

E.2.2.2 **Digestibility analysis**

The Dry Organic Matter Digestibility (DOMD or D-value) of all the samples taken for quality must be determined according to an agreed protocol.

The samples are milled using a Foss Tecator 1093 Cyclotec sample mill fitted with a 1 mm screen. The screen and grinding ring should be inspected for wear frequently and replaced at appropriate intervals, at least annually. It is important that all samples are milled through a **single** Cyclotec mill to maintain the precision of the analysis.

The milled samples are scanned, and the spectral data stored using a FOSS NIR systems 5000N scanning instrument or equivalent. A 'Digestibility Analysis (de Boever)' calibration, (supplied by Departement Qualite des Productions Agricoles, Belgium) is used to convert the spectral data for each sample to D-value units. The calibration has been shown to relate NIRS spectra to D-values as assessed by wet chemistry techniques e.g. (pepsin cellulase method). The NIRS calibration models are maintained and validated on an annual basis, whereby a set of control samples are analysed using the NIRS technique and the respective laboratory methodology. A comparison of the results from the two techniques are compared to ensure the accuracy of the NIRS calibration model.

Inconsistent or apparently anomalous results must be repeated. The final data values must be sent to the Testing Co-ordinator in an approved form. The laboratory must be prepared to immediately undertake any repeat analyses requested by the Testing Co-ordinator, which may be individual varieties or even whole trials.

<u>Crude protein analysis</u>

This is evaluated by the Quality Testing Operator using "Dumas Gas Analysis".

Determination of Crude Protein or Total Nitrogen Content must be by a chemical method, recognised by competent authorities (IBD, AOAC, ISO, etc) and which makes direct measurement of nitrogen content.

Methods acceptable to the Testing Authority are currently total nitrogen determined by the Kjeldahl method and total nitrogen using the Dumas method. These methods are only acceptable where instrumentation used is capable of analysing sample sizes greater than 0.5 g.

Quality assurance of the analytical procedures should include regular analysis of a suitable test material - for example, a sample of flour maintained for that purpose. Instrument drift in Dumas nitrogen should be controlled by standardisation against a suitable analytical standard (EDTA, Glycine), for which the nitrogen content is known. Systematic errors in Kjeldahl nitrogen analysis should be controlled by the inclusion of blank analyses and by the analysis of a suitable analytical standard (Ammonium Sulphate, Methionine in a suitable bulking agent) for which the nitrogen content is known.

Section F – Trial design and data handling procedures

F.1 Plan validation and storage

F.1.1 After the trial has been drilled, the Growing Trial Operator must:

a) Confirm that the trial has been drilled according to plan and provide the sowing date, by returning site data 1 and associated trial sketch to the Trial Design and Data Handling Operator.
b) If any amendments to the plan have been made, return a hard copy of the plan to the Trial Design and Data Handling Operator with any amendments clearly indicated. Alternatively, amendments may be notified electronically with the agreement of the Trial Design and Data Handling Operator.

F.1.2 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.2.3 Details of any agrochemical applications are also recorded and forwarded to the Trials Organiser.

F.3 Data processing

F.3.1 Processing of individual agronomic and disease variates

F.3.2 A list of the agronomic, yield and disease variates, which may be recorded and processed, are specified in Sections C, D and E. After scrutiny, copies of the results will be returned to the Growing Trial Operator for action as agreed by the Trials Organiser.

F.4 Other tests and trials

F.4.1 Any additional or alternative designs required for the assessment of additional VCU characters not detailed in Annex E of the **MINOR CROPS VCU TRIAL PROTOCOL** will be added to these **Procedures** as and when approved by the NLSC.

Supporting Document for Appendices

Appendices for this main procedure are stored in a separate document, which is updated closer to the start of the growing trial to include the latest information on controls and trial organisers. This will be published on VCU protocols and procedures for testing agricultural crops - GOV.UK (www.gov.uk).

This publication is available at www.gov.uk/government/publications

Any enquiries regarding this publication should be sent to us at

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www.gov.uk/apha

The Animal and Plant Health Agency (APHA) is an executive agency of the Department for Environment, Food & Rural Affairs, and also works on behalf of the Scottish Government and Welsh Government.