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 2026

Red Clover and Lucerne

April 2025

Changes since last version

- Updated year of document and date of last update
- Updated email link to national archives at end of document
- Updated Niab abbreviation
- Updated C.5.4.1
- Updated E.2.2.1

Contents

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 Red Clover and Lucerne.

A.2.Scope

A.2.1 These procedures apply to all varieties of Red Clover and Lucerne.

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

England and Wales:

British Society of Plant Breeders Ltd (BSPB)
BSPB House
114 Lancaster Way Business Park
Ely
Cambridgeshire
CB6 3NX
Telephone number:01353 653200
Email: bspb-trials@bspb.co.uk

Scotland:
SASA
Roddinglaw Road
Edinburgh
EH12 9FJ
Telephone number:0131 2448899
Email: seeds@sasa.gov.scot

A.3.2.1 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 supply of seed and data handling.

A.3.2.2 **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.3.2.3 **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 can 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.3.2.4 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’ be 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 (for example, evenings or 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 and 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 VCU trial assessments required

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

Red Clover and Lucerne

Type of character	Reference	Description of assessment – Obligatory	Description of assessment – Additional (Assessed only if requested by applicant)
Yield	Section C	**Dry matter yield under conservation management in the first, and second harvest years (Lucerne) and in the first, second and third harvest years (Red Clover).**	None
Behaviour with respect to factors in the physical environment.	Section C	**Ground cover in autumn of each harvest year** **Resistance to winter damage**	None
Seasonal dry matter yield	Section C5	None	*First, second, third and fourth cut conservation yields are measured in each of the harvest years*

Type of character	Reference	Description of assessment – Obligatory	Description of assessment – Additional (Assessed only if requested by applicant)
Resistance to harmful organisms	Section D	**Sclerotinia trifoliorum, stem rot (%) (Red Clover only)** **Stem eelworm (%)** **Downy mildew (%)** **Verticillium wilt % (Lucerne only)** **Slugs (1 to 9 scale)** **Sitona (1 to 9 scale)**	None
Quality characteristics	Section E	**Crude protein, second cut, second and third harvest years (Red Clover only)** **Crude protein, first cut first harvest year (Lucerne only)**	None

Further measurements

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

- **Sowing date**
- **Establishment weakness**
- **Harvest date**
- **Pest damage (where present at a level which will affect results)**
- **Plot size**

- **Ground cover in sowing year**

Section B – Seed handling procedures

B.1 Responsibilities

B.1.1 The Seed Handling Operator or Growing Trial Operators are responsible for carrying out the following seed handling procedures.

B.2 Seed handling procedures

B.2.1 The Seed Handling Operator/Growing Trial Operators will receive a sowing list from the Trials Organiser, along with instructions as to which seed treatments or additives may be used. The chemicals approved by the Procedures Development Group are listed in Appendix 2.

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

B.2.3 The Seed Handling Operator/Growing Trial Operator must retain 20g of the seed submitted of every variety in the trial, for authentication by the DUS test centre.

B.2.4 Cross contamination must be avoided by ensuring equipment is clean between weighing and treatments.

B.2.5 Each seed handling operator must retain a 10g sample of seed until one month after the end of the trial.

B.3 Authentication of seed stocks

B.3.1 Year 1 VCU and DUS submissions are taken from the single submitted seed stock. Year 2 and any further VCU seed submissions are authenticated by the DUS Test Centre according to the procedures set out in the appropriate DUS Protocol.

B.3.2 All samples must be kept under suitable conditions for the authentication procedures required and must be clearly labelled and sealed.

B.3.3 APHA will select samples from Growing Trial Operators/Seed Handling Operators for authentication at DUS test centre.

B.3.4 Seed Handling Operators must send requested samples to the DUS test centre by the date specified by APHA.

B.3.5 Where there is more than one Seed Handling Operator, APHA will select samples for authentication from at least two Seed Handling Operators.

B.3.6 If the level of uniformity recorded in DUS tests is not uniform (COYU) or VCU authentication of a candidate the VCU tests will be considered invalid for that candidate in the season.

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 Soil type should be typical of those on which red clover and lucerne 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.2.3 Previous cropping must be appropriate for red clover and lucerne crops to be grown.

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 wheeling compaction. Cultivations should follow best practice.

C.3 Sowing the trial

C.3.1 Plot size

C.3.1.1 Plots must be drilled or broadcast to produce a minimum plot length of 4.5m after cutting back. Minimum sown width is 0.9m with a maximum unsown gap between plots of 0.5m. Minimum harvest plot size is 6.5m^2. The row number per plot should not be less than 10 rows for drilled plots. There will be a minimum of 3 replicates sown. Replicates are dependent on the number of varieties to be tested.

C.3.2 Plant population

C.3.2.1 When sowing, self-cleaning type drills should be used to sow at the following seed rates:

- **Red clover**
    - Candidates 13 kg per ha
- **Lucerne**
    - Should be sown before end of May to ensure establishment, seed should be inoculated by trial operator immediately prior to sowing.
    - Candidates 20 kg per ha

C.3.3 Trial layout

C.3.3.1 The Trials Organisers, following consultation with APHA, produce provisional sowing lists. The Trials Organisers will make final sowing lists available to Growing Trial Operators, along with the trial plans produced by the Data Handling Operator.

C.3.3.2 The trial must be sown according to the plan produced by the 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 are any other anomalies.

C.3.3.3 If there is a need to replace a planned variety, for example, 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 Sowing

C.3.4.1 Care must be taken with drill settings and sowing speed to ensure uniform distribution of seed in each plot. It is also important to ensure that there is no carry over of seed between plots. Trials Operators should inform the appropriate Trials Organiser as soon as it is apparent that the establishment of any plot has been unsuccessful.

C.3.4.2 Any missing rows or parts of rows or plot areas must be noted on the sowing plan and returned to the appropriate Trials Organiser so that a decision on the viability of these and adjacent plots can be made. It may sometimes be possible to patch in missing parts of rows without affecting the viability of the trial, but this should only be done after consultation with the appropriate Trials Organiser if it is done after the sowing year.

C.3.5 Confirmation of trial layout

C.3.5.1 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 appropriate Data Handling Operator.

b) If any amendments to the plan have been made, return a hard copy of the plan to the appropriate Data Handling Operator with any amendments clearly indicated. Alternatively, amendments may be notified electronically with the agreement of the Data Handling Operator.

C.4 Husbandry

C.4.1 Agronomy

Where not specified in these procedures' agronomy should follow best local practice, advisory and regulatory guidelines. Application of fertilisers and sprays should be uniform. It is normally best to apply these across the direction of the plots. Application wheelings should not run through the harvested plot area.

C.4.2 Fertiliser application

Application of fertilisers should be uniform. It is normally best to apply these across the direction of the plots. It must take into account inherent fertility, previous cropping, winter rainfall and 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.

These are examples of fertiliser rates.

Sowing year:

- At the discretion of the Growing Trial Operators, but in line with official advisory publications (including RB209).

First, second and third harvest years:

Fertiliser Treatment	Amount
Spring phosphate	up to 175kg per ha P2O5 depending on the soil requirements
Spring and July potash	up to 175kg per ha K2O in spring depending on the soil requirements and up to 175kg per ha in July depending on the soil requirements.
Sulphur	up to 40kg per ha of SO3 in spring depending on the soil requirements and up to 40kg per ha in July depending on soil requirements.

In addition to the above lime should be applied at the discretion of the appropriate Growing Trial Operators. In the sowing year, Growing Trial Operators should note the necessity of adequate pH, phosphate, and potash for establishment.

C.4.3 Herbicides

Chemicals must not be used if there are any known varietal sensitivities. If in doubt, the Trials Organiser should be consulted. Application should normally be across the direction of drilling.

C.4.4 Growth regulators

These should not be used on Red Clover and Lucerne trials.

C.4.5 Pest and disease control

C.4.5.1 **Pest control**

Sitona (pea and bean weevil) is the most likely insect pest. During the sowing year it should be controlled by appropriate means, if necessary, but treatment should not be done in the 3 harvest years unless the trial is jeopardised, but this must be reported to the Growing Trials Organiser.

Slugs can also damage the establishing trial and treatment with an approved molluscicide may be required in the sowing year. Treatment should not be done in the 3 harvest years unless the trial is jeopardised, but this must be reported to the Growing Trials Organiser.

If necessary, approved means should be used to prevent or minimise damage by field mice, birds, and other vertebrate pests. Control should be carried out throughout the trial period and not just in the establishment year.

C.4.5.2 **Disease control**

Disease control should only be undertaken after agreement by the Trials Organiser.

C.4.6 Irrigation

Irrigation will only be permitted to facilitate establishment. Permission from the Trials Organiser is not required to do this.

C.4.7 Pathways

A gap (pathway) is required at the end of each plot to allow access for harvesting and fertiliser application. It is usual to sow the pathways with a dense slower growing grass for ease of maintenance and to allow machinery to travel in wetter conditions.

C.5 Harvesting

C.5.1 Red Clover

C.5.1.1 **Sowing year**

Plots to be topped at 60mm at the discretion of the Growing Trial Operator without weighing to produce a uniform dense sward by the end of the season.

C.5.1.2 **First, second and third harvest yea**r

Up to four cuts per year. Cutting height as close as possible to 60mm.

The cutting dates to use are as follows.

- First cut: early flowering or earlier if lodged.
- Second cut: 6 weeks after the first cut.
- Third cut: 6 weeks after the second cut.
- Fourth cut: Mid-October.

C.5.1.3 **Excluded harvests**

If a scheduled harvest in any management is omitted due to low yields (not more than 300g of fresh material on any plot), then all the plots are fertilised as specified in these procedures.

C.5.2 Lucerne

C.5.2.1 **Sowing year**

Plots to be topped at 60mm at the discretion of the Growing Trial Operator without weighing to produce a uniform dense sward by the end of the season.

C.5.2.2 **All harvest years**

Cutting heights as close as possible to 60mm

- First cut: early flowering or earlier if lodged.
- Second cut: 6 weeks after the first cut.
- Third cut: 6 weeks after the second cut.
- Fourth cut: Mid-October.

C.5.2.3 **Excluded harvests**

If there is insufficient growth (such as, less than an estimated 300g fresh material on any plot) to comply with the cutting cycles, the decision to apply fertiliser is the responsibility of the trials co-ordinator who has the option to omit a fertiliser application if this is consistent with best practice.

C.5.3. Harvesting method

C.5.3.1 Plots should be harvested using a specialist grass harvester with a reciprocating-knife cutter bar. The harvested herbage must be weighed either on-board or separately, using an electronic balance graduated to 0.1kg. All harvested material must be removed from the plot after weighing.

Yield records should be transmitted electronically to the appropriate Data Handling Operator within seven working days of each cut.

C.5.4 Samples

C.5.4.1 A representative sample should be taken from each plot at each cut and dried to assess total dry matter yield.

A fully representative sub-sample of fresh material is accurately weighed, or an accurately recorded catch weight taken. 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. The fresh sample is recorded to the nearest 1g.

If the plot fresh yield is over 300g then the sample should be a minimum of 300g. If the whole plot fresh yield is less than 100g then the yield should be recorded as zero and no sample should be taken. If the whole plot fresh yield is between 100g and 300g then use the whole plot yield as the dry matter sample.

The samples are placed in the drier which must be at a temperature of 104 ºC with the air recirculator set in the range 80% to100% recirculation to restore the temperature to 104 ºC as rapidly as possible. When the temperature is restored to 104 ºC the air regulator is set at 80% recirculation such as., 20% fresh hot air. The regulator is critical for rapid drying. The samples are dried for such time as is necessary for complete drying.

The dried sample is carefully removed from the drier and as soon as the sample is cool enough for accurate weighing. The dry weight is recorded to the nearest 0.1g.

When the dry weights are reported as a percentage, the fresh weight should be reported as 100.

C.5.4.2 Samples, for protein content testing, should be forwarded immediately to:

Quality Analysis Testing
Niab
Park Farm
Villa Road
Impington
Histon
CB4 9NZ

Telephone number: 01223 233258

It is important that samples are despatched promptly after harvest. Notification of sample dispatch should be faxed to the appropriate Trials Organiser at the same time.

C.5.5 Submission of data

C.5.5.1 All records should be transmitted to the Data Handling Operator following the deadlines set out in Appendix 6. The Growing Trial Operators should ensure that data are free from errors before transmission. After scrutiny, the results will be returned to the Growing Trial Operators for action as agreed by the Trials Organisers.

C.6 Records

C.6.1 There are four components:

1. **Diary**: Field notes of trial status.
2. **Site data part 1, this includes the following site details**:
    a. site sketch
    b. map and location
    c. previous cropping
    d. soil analysis
    e. fertiliser applications
3. **Site data part 2:** Details of agrochemical applications and any irrigation.
4. **Plot records**: Plot data.

C.6.1.1 An entry in the Diary sheet should be made for any observations relevant to variety performance.

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, for example., copy and safe storage. Whichever method is used, individual plot data will only be accepted at the appropriate Data Handling Centre in an approved format using the AFP number, variety name and units as listed in Sections C and D.

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 identified 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 should be made as counts or on the scales shown for each character. Only the character names as listed may be used.

C.6.2.7 All records should be returned as soon as reasonably possible. Indicative deadlines are given in Appendix 6. All records must be returned by the final deadlines.

C.6.3 Procedures for recording characters

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

- **Bold = Obligatory**
- *Italic = Additional if requested by the applicant*

C.6.3.1 **GROUND COVER (OBLIGATORY) (%)**

Record in the autumn of the sowing year and once in autumn in each harvest year.

When scoring Red Clover/Lucerne ground cover, assess the ground cover of sown species in each plot by eye either as a percentage of ground cover or on a 1 to 9 scale where 0 is most Clover/Lucerne. Determine the percentage ground cover of the highest and lowest eye score within each replicate using a point quadrat, 100 points per plot first strike. Ignore any weeds present in the plot. If preferred, it is permissible to quadrat every plot.

C.6.3.2 **FRESH YIELD (OBLIGATORY) (kg)**

Enter the total harvested weight to the nearest 0.1kg 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 using the character names ‘PLOT LENGTH’ and ‘PLOT WIDTH.’ Also, if there is a tare on the balance, this should be entered as ‘TARE WT’ to the nearest 0.1kg.

C.6.3.3 **DRY SAMPLE WEIGHT (OBLIGATORY) (g)**

A detailed protocol for sampling for dry matter is given in Section C.5. Also specify the fresh weight taken for the sample (‘FRESH SAMPLE WT,’ ‘FRESH WT’). If the figures are DM% then enter the fresh weight of sample as 100.

C.6.3.4 **SCLEROTINIA (OBLIGATORY if present) (%)**

Record as described in Section D

C.6.3.5 **DOWNY MILDEW (OBLIGATORY, if present) (%)**

Record as described in Section D

C.6.3.6 **SLUGS (OBLIGATORY, if present) (1 to 9)**

Slug damage can be severe on Red Clover especially in the spring or after wet weather. Record only if significant damage is seen on the most affected variety on the scale:

- 1 = Most damage
- 9 = No damage

Also record the approximate leaf area damaged on the most severely affected plot.

C.6.3.7 **STEM EELWORM (OBLIGATORY, if present) (1 to 9)**

Record if present, estimate percentage of plants affected.

C.6.3.8 **VERTICILLIUM WILT (OBLIGATORY if present) (%)**

Record only if present when levels of damage are greater than 5% of plants in the worst plots. Estimate percentage of plants affected.

C.6.3.9 **SITONA (OBLIGATORY if present) (1 to 9)**

Record only if significant leaf notching is seen on the most affected variety on the scale.

- 1 = Most damage
- 9 = No damage

Also record the approximate leaf area damaged on the most severely affected plot.

C.6.4 Establishment weakness

Growing Trial Operators must monitor all newly sown trials for sward establishment. Poor establishment in any plot or trial, which may affect variety performance should be reported to the Trials Organiser, who may request ground cover scores (0 to 9) to be recorded. Such incidences should be reported in the same way as for non-compliances and all other test sites alerted to ensure that it is not seed lot related.

C.6.5 Site factors

Any factors which may have affected the yield of the trial or individual plots must be noted and accompany the yield data.

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.6.6 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 of Growing Trial Operators in respect of inspections are to:

1. Give inspectors reasonable access to trials.
2. Provide the inspector with information (for example, pesticide sprays applied) at the time of inspection if requested.
3. Cooperate 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. It is important that any requirement to shorten plots is undertaken and that missing values are returned for any plots excluded from the trial.

Section D – Disease testing procedures

D.1 Assessment of natural infection

Recording of disease on the growing trials will be the responsibility of the Growing Trial Operator at the appropriate sites.

D.1.1 Diseases recorded

D.1.1.1 No inoculated disease tests are carried out routinely.

D.1.1.2 No Disease Observation Plots are carried out routinely.

D.1.1.4 All disease assessments should be sent to the Data Handling Operator as soon as they are made.

D.1.2 Naturally occurring disease in VCU growing trials

D.1.2.1 Foliar disease on the Clover component should be recorded when the level of infection on the most affected variety is over 5% of the leaf area. Percentage of leaf area infected on the plot should be recorded using the key below as a guide.

D.1.2.2 Red Clover/Lucerne pathogens should be recorded when more than 5% of the plot area is affected. The percentage of the area infected in each plot should be recorded.

D.1.2.3 If disease infection persists, successive records should be made through the season.

Disease	Time
Stem rot (Sclerotinia trifoliorum)	Winter
Downy mildew (Peronospora trifoliorum)	Spring

D.1.2.4 **Leaf diseases**

Instructions

1. Examine all clover/Lucerne leaves in at least 4 areas of each plot.
2. Include all necrosis and chlorosis attributable to disease to be assessed.
3. Estimate the percentage of infection using the description below, interpolating values if necessary.
4. Record the average percentage of infection from the 4 areas.

Infection Disease Severity Description

Score	Description
0	No infection observed
0.1	Older leaves with a trace of infection, other leaves uninfected
1	Older leaves with up to 10% infection, other leaves largely uninfected
5	Older leaves with up to 25% infection, middle aged leaves with a trace of infection
10	Older and middle-aged leaves with up to 25% infection, young leaves largely uninfected
25	Leaves of all ages appear 50% infected 50% green on average
50	Leaves of all ages appear more infected than green on average
75	Very little green tissues left
100	No green tissue left

Section E – Quality testing procedures

E.1 Responsibilities

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

E.2 Quality assessment methodology for obligatory and additional tests

E.2.1 Samples are collected for dry matter and protein analysis as indicated in Section C. Although in some instances all 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.

E.2.2 Dried material from the following cuts should be retained for protein analysis. Instructions for milling these samples are given below. Samples from each replicate should be bulked for each variety and milled following oven drying. Samples to be despatched to the Testing Coordinator for analysis:

- **Red Clover:** Cut 2 in the second and third harvest years.
- **Lucerne:** Cut 1 in the first harvest year.

E.2.2 Quality tests

E.2.2.1 **Milling of dried samples for further quality analysis (see Section C.5.4)**

1. The dry matter samples from both replicate plots must be combined and a representative sample taken for milling (sufficient to provide 150ml of milled material for analysis).
2. The mill must be a hammer mill fitted with a screen with 1mm apertures. Screens must be checked for wear of the inside surface at regular intervals. Frequent use causes the circular 1mm hole to elongate, and when the elongation reaches 1.2mm the screen must be changed.
3. Samples for milling must be absolutely dry. This can be achieved either by milling immediately after weighing out of the dryer or by re-heating dried samples to 80 °C for 1 hour before milling.
4. The mill must be thoroughly clean before use.
5. The mill must be at maximum speed before the sample is introduced gradually to prevent the mill labouring.
6. All of the sample must be removed from the receptacle and thoroughly mixed. Care must be taken at all stages to prevent the loss of fine powder which is a critical part of the milled sample.
7. After mixing, a representative sub-sample should be taken in the following manner:

a) If less than 150ml of milled sample, all of it should be placed in the sample tubs.
b) If more than 150ml of milled sample, the tub should be filled with a fully representative sub-sample that has been fully mixed before placing in the tub.

8. The sample tub must be sealed with a close-fitting lid and labelled with information in an approved format.
9. The milled samples must be sent to the laboratory for analysis immediately and by 15 September at the latest, with appropriate identification documentation.

E.2.2.2 **Crude protein analysis**

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

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 appropriate Data Handling Operator.
b) If any amendments to the plan have been made, return a hard copy of the plan to the appropriate Data Handling Operator with any amendments clearly indicated. Alternatively, amendments may be notified electronically with the agreement of the Data Handling Operator.

F.1.2 The 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, seed rates, soil details and fertiliser applications.

F.2.3 Details of any agrochemical applications are also recorded and retained by the Growing Trial Operator.

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 Red Clover and Lucerne will be added to these procedures as and when approved by the NLSC.

Data Protection:
For information on how we handle personal data visit www.gov.uk and search Animal and Plant Health Agency Personal Information Charter.

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

Any enquiries regarding this publication should be sent to us at

webmaster@apha.gov.uk

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