UNITED KINGDOM NATIONAL LIST TRIALS: PROCEDURES FOR INSPECTION AND TECHNICAL VALIDATION OF TRIALS FOR VALUE FOR CULTIVATION AND USE

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SECTION A - GENERAL INFORMATION

A.1 INTRODUCTION

A.1.1 An agricultural plant variety is accepted by the National Authorities on to a National List in accordance with the provisions of the Seeds (National List of Varieties) Regulations 2001 (S.I. 2001 No. 3510). These Regulations implement Council Directive 2002/53/EC on the Common Catalogue of varieties of Agricultural Plant Species (Common Catalogue Directive).

A.1.2 It is a condition of acceptance, (under Article 4.1 of the Directive and Regulation 5(3) (c) of the Regulations), that a variety must be of satisfactory value for cultivation and use.

A.1.3 Value for cultivation and use is assessed by tests and growing trials in accordance with the appropriate protocol and procedures.

A.2 PURPOSE

A.2.1 The requirements for conducting inspection and technical validation of growing trials, tests and assessments in relation to official examinations of VCU of varieties of agricultural crops entered for National List Trials are set out in these procedures.

A.3 SCOPE

A.3.1 These procedures apply to all species of agricultural crops entered for UK National List trials.

A.4 RESPONSIBILITIES

A.4.1 The inspection and validation of growing trials, tests and assessments in these procedures are carried out under the responsibility of the Secretary of State for Environment, Food and Rural Affairs, the Scottish Government, the Welsh Government and the Secretary of State for Northern Ireland (the National Authorities).

A.4.2 They are supervised by officials of the National Authorities, i.e. the Food and Environment Research Agency (Fera), the Scottish Government Agriculture, Food and Rural Communities Directorate (SGAFRCD), the Department of Agriculture and Rural Development for Northern Ireland (DARD) and the Welsh Government (WG).

A.4.3 These procedures are authorised by the National List and Seeds Committee (NLSC). They cannot be amended without their approval. Requests and suggestions for amendment to the procedures should be put in writing to the Plant Variety and Seeds Division, Defra.

A.4.4 These procedures are administered by:

Plant Varieties and Seeds (PVS)
The Food and Environment Research Agency (Fera)
Eastbrook, Shaftesbury Road,
Cambridge
CB2 8DR

Tel. No. 03000 600497
Fax. No. 03000 602115
Email: pvs.helpdesk@fera.gsi.gov.uk

A.4.5 Trials Organisers, Trial Design and Data Handling Operators, Trial Inspection and Technical Validation Operators.

All Trials Organisers, Trial Design and Data Handling Operators, Trial Inspection and Technical Validation Operators involved in the procedures referred to in paragraph A.2.1 must be approved by the National Authorities and have access to suitable facilities and expertise. The list of approved operators is given at Appendix 1.

A.5. COMPLIANCE WITH THE PROCEDURES

A.5.1 If non-compliance occurs or there are concerns regarding the validity of any data, tests or trials, this must be reported to Fera.

SECTION B – INSPECTION PROCEDURES

B.1 GROWING TRIAL OPERATORS

B.1.1 The Trials Organiser will provide the Trial Inspection and Technical Validation Operators with a list and contact details of the Growing Trial Operators.

B.2 TIMING OF INSPECTIONS

B.2.1 Crops will be officially inspected at least once by the appropriate Trial Inspection and Technical Validation Operator. Additional inspections may be required in the case of problem trials or in the event of appeals.

B.2.2 Trial Inspection and Technical Validation Operators will give Growing Trial Operators sufficient warning of visits so that arrangements can be made with host growers.

B.2.3 Inspections shall be carried out at the best time to observe any defects in the trials. This is likely to be in February – March for winter oilseed rape crops to allow the assessment of plant population after the winter. Cereals should be inspected between May and July to assess the effectiveness of fungicide, plant growth regulator and fertiliser applications and the uniformity of growth and development. For all crops, trials may be inspected earlier if there are serious concerns relating to establishment or growth and development prior to trial inspection visits. Perennial crops should be inspected in the spring of the year after their establishment and thereafter annually in late spring/early summer.

B.3 ACCESS AND OTHER REQUIREMENTS

B.3.1 The requirements for Growing Trial Operators in respect of inspections are:

B.3.2 To give the Trial Inspection and Technical Validation Operator reasonable access to the trials and in normal circumstances to be present at the trials inspection. Details must be supplied of site location, layout of trials within the field and of plots/varieties within the trial.

B.3.3 To supply the Trial Inspection and Technical Validation Operator with information e.g. pesticide sprays applied etc within seven days of a request if before harvest or as soon as possible and within 72 hours if at or after harvest.

B.3.4 To carry out actions agreed in consultation with the Trial Inspection and Technical Validation Operator and the Trials Organiser; including any extra field records required for Technical Validation. In particular it is important that any requirement to shorten plots is undertaken and that missing values are returned on any plots which have been excluded from the trial.

B.3.5 To discuss the state of the trial with the Trial Inspection and Technical Validation Operator and to carry out any action required as a result of the inspection and agreed in a plan of action. Details of the action will be given in the report.

B.4 REPORTS

B.4.1 The Trial Inspection and Technical Validation Operator shall record the findings on a standard form (see Appendix 2 and Appendix 3 for guidance notes).

B.4.2 The Trial Inspection and Technical Validation Operator is responsible for ensuring that the Trial Inspection Form is sent to the Trials Organiser, the Growing Trial Operator, the Trial Design and Data Handling Operator, and Fera and its Data Reviewer. Reports on trials with no observed problems will be filed before harvest. Reports on trials with problems, in particular where noted as being 'of concern' or recommended for 'proposed abandonment', will be given to Fera by telephone within 2 days of the visit with a written report sent within 2 weeks of the visit.

B.5 INSPECTION CRITERIA

B.5.1 The Trial Inspection and Technical Validation Operator shall assess each trial using the criteria and guidelines given in Appendix 3. These are given as guidance and should be used as appropriate for the species and trial under inspection.

SECTION C - TECHNICAL VALIDATION OF TRIALS PLOT DATA

C.1 TRIALS FOR VALIDATION

C.1.1 The Trials Organiser shall supply the Trial Inspection and Technical Validation Operator with a list of trials for technical validation.

C.2 PRELIMINARY VALIDATION

C.2.1 The preliminary validation of trials plot data will be undertaken by the Trial Design and Data Handling Operator and reported to the Trial Inspection and Technical Validation Operator. All recorded site and plot data must be forwarded to the Trial Inspection and Technical Validation Operator.

C.2.2 Preliminary validation by the Trial Design and Data Handling Operator shall include checks that:

- Any changes to the plan have been documented and allow a valid statistical analysis.
- Character names and units are correct.
- Trial ID is shown on the recording sheet.
- Minimum and maximum values are within expected limits.
- There are records for every plot and replicate.
- Date and growth stage have been recorded.
- Non-yield characters are as consistent across replicates as expected for the character.

C.3 VALIDATION OF YIELD DATA

C.3.1 The Trial Design and Data Handling Operator shall conduct the first stage of validation of yield data and before carrying out statistical analysis. The results will be passed to the Trial Inspection and Technical Validation Operator for use during final validation.

C.3.2 In the first stage of validation of yield data, the Trial Design and Data Handling Operator shall include checks that:

- The data required to determine fresh yield or sugar yield, (e.g. dry matter and sugar content and gross output etc) are available.
- A moisture analyser has been used on all plot dry matter values in the range 83-88%, noting plots that fall outside this range. Moisture analysers must not be used to determine the dry matter of oilseeds.
- All plots or replicates identified during the trials inspection as being of concern have been adjusted for size or omitted.
- Any additional field records required have been made.
- There is sufficient data: if observations on a variety are lost for all but one replicate, then the results for that variety are normally treated as missing for the trial, with the following exceptions.

- If a component of dry matter yield assessment is lost, and the component can be reliably estimated from the remaining observation(s), its value is replaced by an estimated value, e.g. the mean of the other assessments.
- For herbage cut yields where a single plot value for a cut is missing, the missing value is estimated using statistical procedures.
- Where all or part of a plot area is lost, the standardised residuals should be checked carefully before deciding to include it. If 50% or more of the plot area is lost, it should be excluded.
- If more than one third of the plots in a replicate are missing, the residuals should be scrutinised before accepting data from the remaining plots.
- If more than half of the plots in a sub-block of an incomplete block design are missing, the residuals should be scrutinised before accepting data from the rest of the sub-block.
- Where plots are partially damaged, e.g. rabbit damage, and an assessment of the damage to each plot is available, an analysis of data may be done which adjusts yield data for the effects of damage.

C.3.3 After carrying out the statistical analysis, the Trial Design and Data Handling Operator shall examine the following information and inform the Trial Inspection and Technical Validation Operator of any problems likely to require investigation:

- The analysis of variance statistics, including variance accounted for by the varieties, by replication and by blocking for incomplete block designs.
- The Coefficient of Variation (CV), checking that the CV% is of the standard expected (trial standard deviation*100/trial mean). The CV% may be low because of high yield and high because of trial variability or low yield, so the standard error (variety mean) should also be checked. Any trial should be further investigated if it has a CV% higher than given below. These CVs are for guidance only and are not strict thresholds for accepting or rejecting trials. Trials with higher CVs may be acceptable and trials with CVs lower than the guidelines may be unacceptable.

Winter wheat	7%	Spring beans	10%
Winter barley	7%	Spring peas	12%
Winter oats	9%	Sugar beet	8%
Spring wheat	7%	Ryegrass	20%
Spring barley	7%	Maize	8%
Winter oilseed rape	10%	Linseed	10%
Spring oilseed rape	10%	Minor crops (cereals)	10%
Winter beans	10%	Minor crops	15%

- Residuals, checking for any values which may indicate problems with individual plots or sets of plots.
- Variety F ratio. The ratio of the variety mean square to the residual mean square in the analysis of variance is expected to be statistically significant at the 5% level or lower. However, trials with low numbers of varieties may not show statistically significant differences between variety means, particularly for herbage.
- Standardised residuals.

C.3.4 The checked yield analyses and any comments should be passed to the Trial Inspection and Technical Validation Operator for final validation.

C.4 VALIDATION OF NON-YIELD DATA

C.4.1 The Trial Inspection and Technical Validation Operator will review data on agronomic characters and disease levels to ensure that they fall within expected limits.

C.4.2 Disease data. Checks by the Trial Design and Data Handling Operator shall include verification that:

- Records were taken at the correct time, as defined in the procedures.
- There is consistency between replicates.
- For disease data from a fungicide treated trial, records >5% or >10% in any plot are reported to the Trial Inspection and Technical Validation Operator.
- The Trial Inspection and Technical Validation Operator has reviewed the pattern and level of disease recorded if it was unexpected, e.g. more than 5% in a fungicide treated trial.

C.4.3 Agronomic data Checks by the Trial Design and Data Handling Operator shall include verification that:

- Multiple records have been recorded correctly, e.g. totals for leaning and lodging do not exceed 100%.
- Obligatory records have been submitted.
- There is consistency between replicates.
- The Trial Inspection and Technical Validation Operator has reviewed the pattern and level of the recorded characteristic if it was unexpected.

C.5 CONFIRMATION OF DATA FOR OVER-TRIALS ANALYSIS

C.5.1 Using the analyses, plot data and advice from the Trial Design and Data Handling Operator, the Trial Inspection and Technical Validation Operator shall decide, in consultation with the Growing Trial Operator, whether any results are unrepresentative and/or unreliable and should be excluded. Additional information such as the trials inspection reports, knowledge and experience of crops and trials, and accepted best practice may also be used to decide whether any data should be excluded.

C.5.2 On completion of validation, the Trial Inspection and Technical Validation Operator will confirm with the Trial Design and Data Handling Operator which data are acceptable to be included in the final data analysis.

APPENDIX 1 APPROVED ORGANISATIONS

Crop	Trials Organiser	Trial Design and Data Handling Operator	Trial Inspection and Technical Validation Operator	Data Reviewer
Cereals (wheat, barley, oats)	BSPB	BioSS	HGCA-AHDE	NIAB
Winter oilseed rape	BSPB	NIAB	HGCA-AHDE	NIAB
Spring oilseed rape and linseed	BSPB	HGCA-AHDE	HGCA-AHDE	NIAB
Field peas and field beans	BSPB	BioSS	PGRO (inspection) NIAB (validation)	NIAB
Sugar beet	BSPB	NIAB	NIAB	NIAB
Herbage	BSPB	NIAB, BioSS and AFBI*	NIAB, SASA and AFBI*	NIAB
Maize	BSPB	NIAB	NIAB	NIAB
Potatoes	SASA	BioSS	SASA	SASA
Minor crops not included above	BSPB	NIAB	NIAB	NIAB

* The approved organisations are NIAB for England & Wales, BioSS and SASA for Scotland, and AFBI for Northern Ireland.

HGCA, Agriculture & Horticulture Development Board
Stoneleigh Park
Kenilworth
Warwickshire
CV8 2TL

NIAB Huntingdon Road
Cambridge
CB3 0LE

BioSS Biomathematics and Statistics for Scotland
JCMB
Kings Buildings
Edinburgh
EH93JZ

AFBI Agri-Food and Biosciences Institute
Plant Testing Station
50 Houston Road
Crossnacreevy
Belfast
BT6 9SH

PGRO Processors Growers Research Organisation
The Research Station
Great North Road
Thornhaugh
Peterborough
PE8 6HJ

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

APPENDIX 2 NATIONAL LIST VCU TRIAL INSPECTION REPORT

Crop		
Year		
Operator code		
Trial Code		
Site (Operator/County/Nearest settlement)		
Date of Inspection		
Trial Inspector		
Trial contractor present		
Does contractor agree with the report?		

Management & husbandry

Does the trial meet protocol specifications (e.g. soil type)?		If the answer to any question is no, add comments here
Is the field suitable?		
Is the trial in a suitable position within the field?		
Is seedbed preparation & drilling of a good standard?		
Has the trial been sown to plan?		
Are the harvest plot dimensions OK?		
Is the plant population OK?		
Have buffers been sown as required?		
Is weed control acceptable?		
Is the trial free of pest damage?		
Are numbers of volunteers acceptable?		
If a fungicide required, has it been effective?		
If PGR is required, has it been effective?		

Current state of trial

Is trial uniformity acceptable?		If the answer to any question is no, add comments here
Is rep uniformity acceptable?		
Are individual plots free of problems?		
Are all varieties free of problems?		
Is the trial acceptable on the day of the visit?		

Summary report	

Post harvest validation

Is the plot length/width constant?		
Have actions suggested in the trial report been implemented?		
Are moistures 12-17%?		
Is the yield within a sensible range?		
Is the trial free from grain loss, sprouting etc?		
Manual check: is the yield (corrected for moisture) correct?		
If a +F trial, is it free of significant disease?		
If a +PGR trial, is it free of significant lodging?		
Is the CV OK?		

Final trial validation

Is the trial valid?		
Reason if rejected		
Is the non-yield data valid?		
Validator's initials		
Date of validation		

APPENDIX 3

CRITERIA FOR TRIALS INSPECTION

Sowing date **Previous crop** **Soil type**	Do these meet the procedures, if defined, and/or are they appropriate to the trial crop?
Suitability of field **Position in field**	Is the soil apparently uniform in terms of texture, depth, structure and drainage? Is there water nearby that might lead to water logging? Is the field steeply sloping? Are there features such as trees and hedgerows that might give rise to pest problems or effects such as shading or wind effects that might cause abnormal lodging? Are there inoculated disease plots nearby that might give abnormal disease pressure? Is the site free of problems from previous cropping e.g. volunteers, club root in oilseed rape, or herbicide effects? Are there genetically modified (GM) plants in the field or nearby?
Standard of drilling and field operations	Are there any interruptions in the plot drilling? Are there consistent distances between neighbouring rows and inter-plot gaps? Are tractor wheelings/tramlines at right angles to the direction of plot drilling? If the field is sloping, has the trial been laid out such that the plots are at right angles to the contours? Are there any staggered plot ends?
Drilled to plan	Were there any changes to the plan supplied? If so, have these changes been relayed to the Data Handling Operator?
Plant population	Does the plant population appear to be correct? If not the Growing Trial Operator should be asked to conduct a plant count for the control varieties.
Are there buffers	Have buffers, i.e. between hybrids and open pollinating oilseed varieties, been drilled as required?
Weed control	What is the size and population of weeds? Are there any pernicious weeds such as blackgrass, couch, wild oats, brome? Have they been sprayed and, if so, has the herbicide been effective? Are weeds competing or likely to compete with the crop?
Pest control	Is there any damage by pests such as insects, birds, rodents, molluscs etc? Is the crop significantly damaged and will it recover? What measures are being/have been taken to minimise the problem?
Disease control	If the trial should have been sprayed, does it appear to have been effective (is the level of any disease >10% in any plot?) If there is an untreated trial in the field, compare the levels of disease between the treated and untreated plots.
Volunteers	Indicate approximately how many volunteers are present by assessing in the interplot gaps. How big are the volunteer plants? Are they likely to be suppressed by the crop or compete with it? Is the volunteer population constant across the trial or do they appear in bands? If they appear in bands are they across the direction of plot drilling? Conduct a count if there are greater than 10 volunteers per m^2 and estimate the percentage ground cover.
Uniformity	Indicate whether the trial is growing uniformly within the reps. Indicate if there is any difference in growth between reps. Indicate if there is a serious problem with specific plots and note which plots are affected. Indicate if there is a problem with individual varieties and note which varieties are affected and inform the plant breeder/agent. If there is any lodging indicate if it appears to be caused by differences in soil fertility or environmental effects rather than variety.

Any conflict with protocol or procedures	Does the trial meet the protocol and procedures specification for soil type, rotation, sowing date or any other definition? Are the harvestable plot dimensions acceptable?
Please rate the acceptability of the trial as follows:	
Good:	Evenly established well-grown trial that meets protocol requirements.
Satisfactory:	Some problems, such as small areas of poor growth, missing plots or missing rows within plots. Some plots or parts of plot may need to be excluded but overall trials should provide satisfactory data.
Of concern:	Larger areas of poor establishment or growth, affecting replicates. Disease levels >10% in fungicide treated trials. A second trial Inspection may be carried out to assess subsequent development. Requires careful validation at harvest.
Proposed abandonment of trial:	Problems with the trial which cannot be resolved.