

Data requirements for Oilseed Rape and Vegetable Brassica Pests, Diseases and Weeds

Introduction

CRD Efficacy will be developing a series of crop guides, including information on agronomy, relevant UK pests and how to support UK authorisations and label claims. In the short term, this Efficacy Guideline provides key information for Oilseed Rape and Brassica Pests. The original 405 guideline has formed the basis of this revision, but has been updated to take account of the relevant EPPO Extrapolation tables on Vegetable Brassicas: https://www.eppo.int/ACTIVITIES/plant_protection_products/extrapolation_tables

The extrapolation tables provide important information indicating key pest targets, as well as key indicator crops for that particular target. The tables can be used both for trials planning and to support reasoned cases for proposed uses and extrapolation possibilities.

In Appendix 1, details are provided of the UK PPP scheme of differential label claims describing the expected levels of control.

UK Pests Supporting a UK Authorisation

Information is provided below on UK pest complex for oilseed rape and vegetable Brassicas, alongside an indication on the required number of fully supportive effectiveness trials to support a UK authorisation. These numbers are based on the EPPO PP 1/226 'Number of Efficacy trials' and indicated supportive results for major (6-15) and minor (3-6) pests. The indicated number (for example, 10 supportive results for a major pest), is based on assuming there are no other relevant supporting data (e.g. same/related pest on a different crop; or existing authorised uses on a relevant product). There is always scope for cross-supporting with other additional data, which may reduce the required number of results on an individual pest. In particular, because of oilseed rape and vegetable brassicas are within the same Brassicaceae family, there are a number of common pests to both. And therefore, the possibility of cross supporting, or generating data on the major host and reducing numbers on other crops should be considered. As always, the applicant should fully justify and explain how the generated data support the claim (and see comments above on using EPPO extrapolation table for Vegetable brassicas).

It is recognised that over time there may changes to the 'pest' species (insect/disease/weed) on a particular crop. Where a use/label claim is requested for a pest target not mentioned in this guide, it will be necessary to confirm that it is known to occur in the UK at levels which justify treatment. The applicant should provide an appropriate case with evidence of the nature and impact of the problem. For further information, including, on the number of trials required you are advised to contact the CRD Efficacy Team.

Whether a UK-only, or part of a wider sought authorisation, the UK has always accepted data generated from non-UK regions, provided there is an appropriate case for relevance (covering agronomy, pest, climate, edaphic factors, pest biology). The UK is within the EPPO 'Maritime' region (see PP 1/241 'Guidance on comparable climates'), and therefore

climatic comparability for trials generated within this region requires no further justification. However, it should be remembered other relevant agronomic factors should also be covered in any reasoned case for relevance (described in the standard).

If data are being generated to support not only authorisation in the UK, but in a number of other countries, on a regional or zonal basis, PP 1/278 'Zonal data production and evaluation' provides further relevant guidance alongside the range of illustrative examples. In such situations, the required number of supportive results indicated below would be adapted within the zonal context.

UK Definition of Winter and Spring Crops

In January 2015 an important change was made to the qualifiers used to define spring and winter crops. The qualifiers changed from being based on variety to being based on the time of year in which the crop is planted. This change better reflected the environmental risk assessment and allowed growers more flexibility to plant spring varieties in the autumn.

A clarification has been added to these qualifiers to highlight that application to spring varieties sown in the winter (and vice versa) is likely to be at the growers own commercial risk. This is because crop safety and effectiveness may not have been demonstrated on spring varieties sown in the winter (or vice versa). The relevant phrase will be added to the label of professional products which have a specific authorisation for winter crops but not spring (or vice versa) (and which are not seed treatments), where relevant data on all varieties is not provided.

For products authorised on winter crops:

"This product is authorised in winter sown crops. Growers choosing to apply this product to winter sown spring varieties should note that crop safety has not been demonstrated in spring varieties. As a result, application of this product to winter sown spring varieties is done so at the growers own commercial risk (and this also applies to unclassified varieties)."

For products authorised on spring crops:

"This product is authorised in spring sown crops. Growers choosing to apply this product to spring sown winter varieties should note that crop safety has not been demonstrated in winter varieties. As a result, application of this product to spring sown winter varieties is done so at the growers own commercial risk (and this also applies to unclassified varieties)."

1. Insect Pests

a) Oilseed Rape

Table 1: Major and Minor Pests of Winter and Spring Oilseed Rape¹ (and other Brassica seed crops)

MAJOR PESTS – 10 acceptable trials results (unless otherwise stated)		
<u>Foliar Pests</u>		
Cabbage stem flea beetle (W ¹)	<i>Psylliodes chrysocephala</i>	PSYICH
Cabbage stem weevil (S ¹) (6 trials results)	<i>Ceutorhynchus quadridens</i>	CEUTQU
Peach-potato aphid (virus vector) ⁴	<i>Myzus persicae</i>	MYZUPE
Mealy Cabbage aphid ⁴	<i>Brevicoryne brassicae</i>	BRVCBR
<u>Inflorescence/pod pests</u>		
Cabbage seed weevil (6 trials results)	<i>Ceutorhynchus assimilis</i>	CEUTPL
Brassica pod midge (6 trials results)	<i>Dasineura brassicae</i>	DASYBR
Pollen beetle	<i>Brassicogethes aeneus</i> (previously <i>Meligethes aeneus</i>)	MELIAE
<u>Other pests: Slugs⁵</u>		
Grey field slug	<i>Deroceras reticulatum</i> and other	DERORE,
Garden slug	<i>Deroceras</i> species; <i>Arion</i> <i>hortensis</i> , <i>A. distinctus</i> and other <i>Arion</i> species	ARIOHO, ARIODI

MINOR PESTS – 3 acceptable trials results (unless otherwise stated)		
<u>Foliar Pests</u>		
Flea beetles including <i>Phyllotreta</i> (S), Wessex flea beetle	<i>Phyllotreta</i> species	PHYESP
<u>Stem borers</u>		
Rape winter stem weevil (W ¹)	<i>Ceutorhynchus picitarsis</i>	CEUTPI
<u>Other pests⁴</u>		
Mealy Cabbage aphid (direct feeding damage)	<i>Brevicoryne brassicae</i>	BRVCBR
Cabbage root fly (W ¹)	<i>Delia radicum</i>	HYLERA
Beet Cyst Nematode	<i>Heterodera schachtii</i>	HETDSC
Turnip sawfly	<i>Athalia rosae</i>	ATALCO
Mustard beetle (Mustard only) (extrapolation from other relevant beetle species possible)	<i>Phaedon cochleariae</i>	PHAECO

NB – leaf-miners such as Brassica leafminer and Cabbage leafminer (*Phytomyza rufipes*) are occasionally found, however do not cause economic damage in oilseed rape, and claims are not appropriate on a UK label.

The scheme denotes whether the insect target is considered a pest only in winter oilseed rape (w), spring oilseed rape (s), or both (no annotation), please note **cabbage stem flea beetle is only a pest of winter rape, and *Phyllotreta* flea beetles in spring rape.**

Where pests are common to both winter and spring oilseed rape, direct extrapolation from the major to minor crop (in terms of relative pest importance) may be possible. However applicants should consider if pest biology and pest/crop interaction are comparable. In general it may be advisable to conduct a proportion of the 10 trials on each crop (e.g. 6 on winter and 4 on spring oilseed rape). The balance should reflect the relative importance of the pest on each crop.

Claims made for a group of pests, e.g. weevils, can be supportive of each other with a reduced number of trials on individual species.

There is scope for a reduction in number of trials for pests not specific to oilseed rape if data are available from other crops. This may be particularly relevant for pests of vegetable brassicas (see below). The degree of reduction in trials numbers will depend both on the relative pest status on these other crops and comparability of other factors such as pest/crop interaction. Individual cases should be discussed with CRD.

Slugs are a major pest of oilseed rape, which is considered particularly palatable. EPPO PP 1/95 'Slugs' contains advice on how to support slug species across a wide range of arable situations, and oilseed rape is considered a key indicator crop. In addition, the standard also advised vegetable Brassicas are a key indicator crop to support leafy vegetables.

b) Vegetable Brassicas

Table 2: Major and Minor Pests of Vegetable Brassicas¹ (including cruciferous crops)

MAJOR PESTS – 10 acceptable trials results (unless otherwise stated)		
<u>Foliar Pests</u>		
Peach-potato aphid (virus vector)	<i>Myzus persicae</i>	MYZUPE
Mealy Cabbage aphid	<i>Brevicoryne brassicae</i>	BRVCBR
Diamond-back moth	<i>Plutella xylostella</i>	PLUTMA
Cabbage moth	<i>Mamestra brassicae</i>	BARABR
Other caterpillars (see notes below)		
Cabbage Whitefly (5 trials results)	<i>Aleyrodes proletella</i>	ALEUPR
<u>Root pests</u>		
Cabbage Root fly	<i>Delia radicum</i>	HYLERA
<u>Slugs</u>		
Grey field slug	<i>Deroceras reticulatum</i> and other	DERORE,
Garden slug	<i>Deroceras</i> species; <i>Arion hortensis</i> , <i>A. distinctus</i> and other	ARIOHO,
	<i>Arion</i> species	ARIODI

MINOR PESTS – 3 acceptable trials results (unless otherwise stated)		
<u>Foliar Pests</u>²		
Flea beetle	<i>Phyllotreta species</i>	PHYESP
Wessex Striped beetle, Turnip beetle (extrapolation from <i>Phyllotreta</i>)		
Cabbage stem weevil	<i>Ceutorhynchus quadridens</i>	CEUTQU
Cabbage stem flea beetle ¹	<i>Psylliodes chrysocephala</i>	
<u>Other pests</u>		
Other aphids (by extrapolation from the major species)		
Pollen beetle ¹	<i>Brassicogethes aeneus</i>	MELISP
Cutworm	<i>Agrotis species</i>	1AGROG
Beet cyst nematode	<i>Heterodera schachtii</i>	HETDSC
Turnip Root Fly(extrapolate from HYLEARA)	<i>Delia floralis</i>	HYLEFL
Turnip sawfly	<i>Athalia rosae</i>	ATALCO
Bean seed flies	<i>Delia platura, D. florilega</i>	HYLEPL,HYLEFG
Brassica leafminer	<i>Scaptomyza flava</i>	SCATFL
Swede gall midge	<i>Contarina nasturtia</i>	CONTNA
Field thrips, onion thrips	<i>Thrips angusticeps T. tabaci</i>	THRIAN, THRITB

¹ It would be expected that data are generated on oilseed rape, and extrapolation of use is possible.

Where supporting claims for major pests on a range of brassicas, the 10 trials should be conducted on the most important and/or challenging crops. There is no requirement to conduct 10 trials on each crop. Applicants should refer to the EPPO Minor Use Extrapolation table for Vegetable Brassica pests to identify the key species, and full range of extrapolation possibilities, both within Brassicas and other crops.

There is scope for a reduction in number of trials for pests not specific to vegetable brassicas if data are available from other crops. This may be particularly relevant for pests of oilseed rape (see above). The degree of reduction in trials numbers will depend both on the relative pest status on these other crops and comparability of other factors such as pest/crop interaction. Individual cases should be discussed with CRD.

Diamond-back moth and cabbage moth are major species, and more difficult target. Specific data is required for both (and in accordance with EPPO extrapolation table), but reductions from 10 individual results is possible by cross-supporting from each-other (for example, 5 acceptable trials on each). A range of other caterpillars are also pests of vegetable brassicas, and a claim for the wider group of caterpillars can be supported if there are further trials results on additional species. For example, small white butterfly (*Pieris rapa*) (PIERRA); large white butterfly (*Pieris brassica*) (PIERBA); Silver Y (*Autographa gamma*) (PYTOGA); Garden pebble moth (*Evergestis forficalis*) (EVERFO) .

Cutworms have many host crops, and extrapolation may be possible with appropriate reasoned case. Further advice is given in EPPO Extrapolation tables on Minor use for 'soil pests'.

2. Diseases

a) Oilseed Rape

Table 3: Major and Minor Diseases of Winter and Spring Oilseed Rape

MAJOR DISEASES - 10 acceptable trials results¹:	MINOR DISEASES – 3 acceptable trials results:
Phoma Stem Canker and leaf spot (<i>Leptosphaeria maculans</i>)(LEPTMA)	White leaf spot (<i>Mycosphaerella capsellae</i>)(PSDCCA)
<i>Alternaria species</i> (primarily ALTEBA)	Botrytis (BOTRCI)
Light leaf spot (<i>Pyrenopeziza brassicae</i>) (PYRPBR)	Ringspot (<i>Mycosphaerella brassicicola</i>) (MYCOBR)
Sclerotinia (<i>Sclerotinia sclerotiorum</i>) (SCLESC)	Damping off (<i>Rhizoctonia</i>) (RHIZSO)
Clubroot (<i>Plasmodiophora brassicae</i>) (PLADBR)	Damping off (<i>Pythium</i>) (1PYTHG)
	Powdery mildew (<i>Erysiphe cruciferarum</i>) (ERYSCR)
	Downy mildew (<i>Hyaloperonospora brassicae</i>) (HPERBR)

¹A minimum of 10 fully supportive effectiveness trials, carried out over at least 2 years, with results that are fully supportive of the effectiveness of a product are sufficient to provide a recommendation for use against a major target species. For club root, where 10 trials are needed this can include 5 trials on vegetable brassicas.

Spring Oilseed rape

Disease control claims can be extrapolated between winter and spring rape. A typical package would be expected to include at least some data on both winter and spring varieties.

b) Vegetable Brassicas

Table 4: Major Diseases of Vegetable Brassicas

MAJOR DISEASES - 6 acceptable trials results¹:
<i>Alternaria</i> (<i>Alternaria brassicae</i> , <i>A.brassicicola</i>) (ALTEBA, ALTEBI)
Ring spot (<i>Mycosphaerella brassicicola</i>) (MYCOBR)
White blister (<i>Albugo candida</i>)(ALBUCA)
Phoma Stem Canker & leaf spot (<i>Leptosphaeria maculans</i>) (LEPTMA)
Downy mildew (<i>Peronospora parasitica</i>) (PEROPA)
Sclerotinia (<i>Sclerotinia sclerotiorum</i>) (SCLESS)
Clubroot (<i>Plasmodiophora brassicae</i>) (PLADBR)*

¹A minimum of 6 fully supportive effectiveness trials, carried out over at least 2 years, with results that are fully supportive of the effectiveness of a product are sufficient to provide a recommendation for use against a major target species. *The exception to this is club root where 10 trials are needed but this can include 5 trials on oilseed rape.

The main concern for vegetable brassicas is the need to minimise blemishes in and on the marketable parts of the plant (eg cabbages, flowerheads, and buttons). Other diseases considered minor in vegetable brassicas can be supported by 3 trials in each case. Extrapolation from other brassicas including Oilseed rape can be used to support specific claims provided these are based on the EPPO Minor use extrapolation table and sufficient trials are presented. Alternatively if you consider you can make a good, evidence-based case for extrapolation then this will also be considered. Depending on the disease, additional trials may also be required for root crops. Provided the trials show comparable effectiveness and crop safety, claims can then be extrapolated to all vegetable brassicas.

The same principles described above for oilseed rape will also generally apply to vegetable brassicas although the importance of different diseases and therefore the number of trials required, will vary depending on the crop. There is potential to extrapolate between different brassica crops but because of the diversity of forms evidence will be required demonstrating that a product is effective across a range of different crops in order to claim them on the label. For an overall claim of control on brassicas for a major foliar disease, data will be required from at least six trials across a range of different crops. The crops used should cover a range of different forms and take account of the importance of the disease on different crops. As a general guide they should include at least 2 trials each on cabbages, a flower headed brassica such as cauliflower or broccoli and either a leafy crop such as kale or Chinese cabbage or on Brussels sprouts. Depending on the disease, additional trials may also be required for root crops. Provided the trials show comparable effectiveness and crop safety, claims can then be extrapolated to all vegetable brassicas. Where claims are made for the control of several different diseases it may not be necessary to demonstrate the control of each disease on the full range of crops. The overall data package must however be sufficient to show that efficacy is either consistent between the different crops or varies in a consistent and predictable way.

Provided adequate data is available to demonstrate effectiveness across the range of crops for which control is to be claimed, data from trials on oilseed rape may also be used to support claims on vegetable brassicas.

3. Weeds

In many cases it will be possible to make a well-argued case for extrapolation from one crop to another if there is sufficient information on the weed control required, the competitiveness of the crop and the factors affecting acceptable weed control in both crops. There is the potential to extrapolate between different brassica crops, for example from winter to spring oilseed rape, but because of the wide diversity of plant structure within the brassicas evidence will be required demonstrating that a product is effective across a range of different crops in order to claim them on the label.

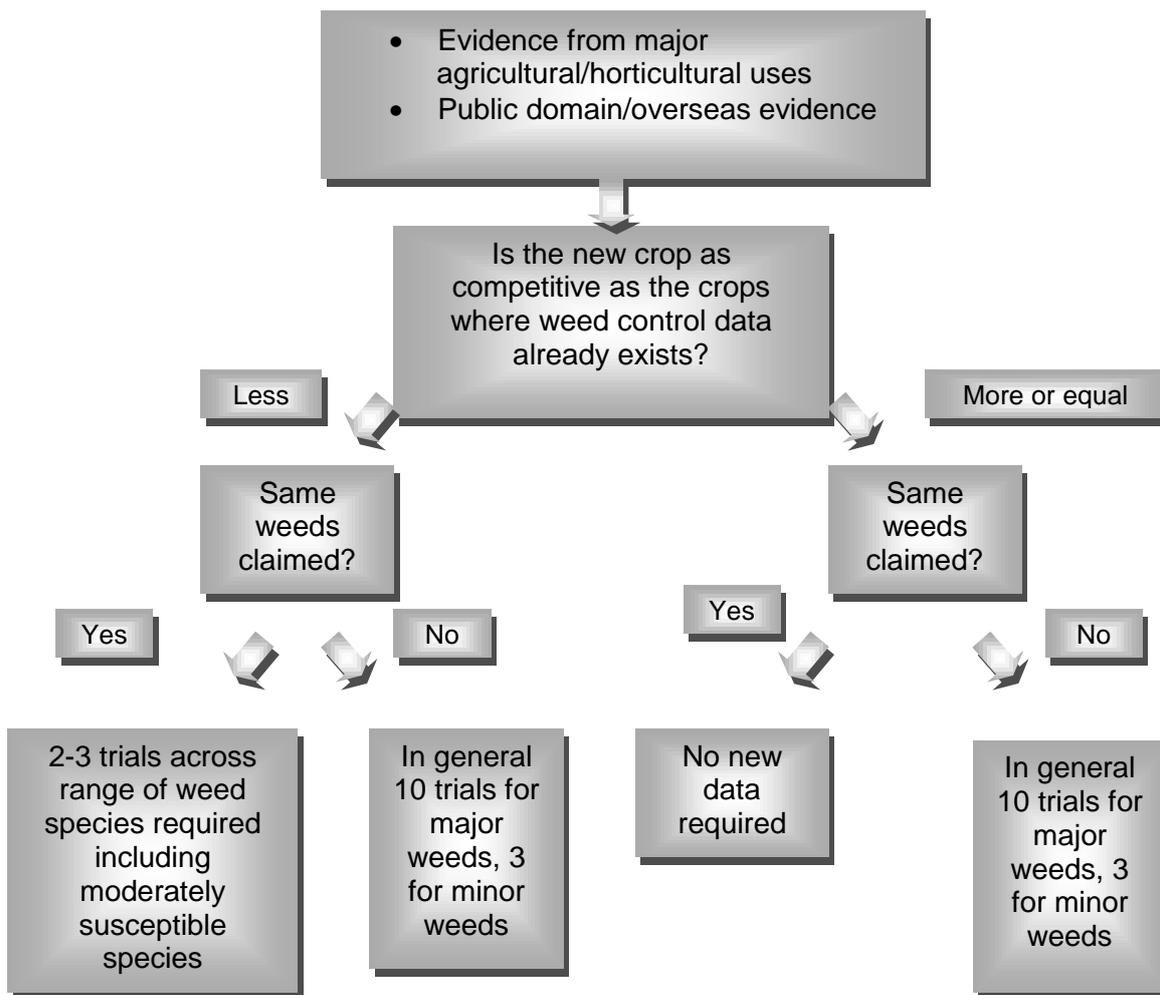
An indication of the relative competitiveness of different crops is provided in **Table 5** below.

Situation	Crops	Notes
A- Arable – competitive crops	Cereals, grassland, oilseed rape	Extrapolation accepted within group and from B or C.
B- Arable/horticultural-poorly competitive crops	Sugar beet, peas, onions, linseed, brassicas	Extrapolation accepted within group and from C, but not A.
C- Other situations – non-competitive crops	Orchards, hardy Ornamentals, amenity vegetation, land not intended to bear vegetation	Extrapolation accepted within group, but not from A, and possibly B.

Note that competitiveness of the crop is only one aspect of any case for extrapolation.

It may also be possible to extrapolate from one weed species to a related species. There is the scope to extrapolate from charlock to shepherd's purse and vice versa if one of the species is treated as a major weed and is supported by sufficient data i.e. at least 10 trials.

Sporadic weeds may be supported by minimal data if a related major or minor weed species has been supported by data.



The following sections categorise the main weeds of oilseed rape and vegetable brassicas into those that are considered to be ‘major’ and those considered to be ‘minor’. For major weeds a minimum of 10 acceptable trial results and 3 as a minimum for minor weeds are required, unless a case for extrapolation from another crop has been made.

a) Oilseed Rape

Table 6: Major and Minor Weeds of Winter and Spring Oilseed Rape (and other Brassica seed crops)

MAJOR WEEDS – 10 acceptable trials

results:

Volunteer cereals (5 barley (HORSS),
5 wheat (TRZSS)
Wild-oats (AVESS)
Black-grass (ALOMY)
Italian Rye-grass (LOLMU)
Common Chickweed (STEME)
Common Poppy (PAPRH)
Charlock (SINAR)
Cleavers (GALAP)

MINOR WEEDS – 3 acceptable trials

results:

Annual Meadow-grass (POAAN)
Shepherd's purse (CAPBP)
Parsley piert (APHAR)
Field pansy (VIOAR)
Forget-me-not (MYOAR)
Volunteer potatoes (SOLTU)
Polygonums (POLAV, POLCO, POLPE)
Mayweeds¹ (MATSS)
Red dead-nettle (LAMPU)
Sow-thistles (SONSS)
Cranesbills (GERSS)
Speedwells (VERSS)
Common fumitory (FUMOF)

- 1) Control across a range of species.

b) Major and Minor Weeds of Vegetable Brassicas

For vegetable brassicas weed control requirements will depend on the method of establishment, the time of sowing/planting and the length of growing season. With any of the vegetable brassicas it is important to achieve good weed control in the early stages of crop growth. Transplanted brassicas establish more rapidly and thus tend to compete more with weed populations than drilled crops. For a typical vegetable brassica crop the major weeds comprise annual meadow grass (POANN), charlock (SINAR), common chickweed (STEME), common field speedwell (VERPE), fat hen (CHEAL), creeping thistle (CIRAR), groundsel (SENVU), mayweeds (MATSS), shepherd's purse (CAPBP), field pennycress (THLAR), redshank (POLPE), volunteer cereals (HORSS, TRZSS) and small nettle (URTUR). For these weeds 10 acceptable trial results and 3 for minor weeds are required, unless a case for extrapolation from another crop has been made.

Crop safety

There are no special requirements for oilseed rape and vegetable brassica crops. As with effectiveness trials there is potential to extrapolate between different brassica crops. However, where use is recommended on brassica species other than *Brassica oleracea* (BRSOX) (cabbage, cauliflower, Brussels sprout etc), such as Chinese cabbage (*B. pekinensis*) (BRSPK), Chinese leaves/Choi sum (*B. chinensis*) (BRSCH) or fodder rape (*B. napus*) (BRSNN); the data package must include crop safety data on species other than *B. oleracea*.

APPENDIX 1: UK LABELLING SCHEME DESCRIBING LEVEL OF CONTROL

The UK operates a system of differential claims for any particular target species, based on the level and consistency of control demonstrated in the effectiveness trials. The schemes differ slightly between the different product groups, but the principle remains the same of providing important information for the user on the expected levels of control on individual species, or relevant groups of targets.

1. Insect Pests

In considering data submitted towards justification of claims of effectiveness against insect pests, a number of factors will need to be considered when interpreting the level of control demonstrated. These include the time of assessment in relation to application, the duration of effectiveness, the potential for re-invasion, and any recommendations for repeat applications.

Table 1a): Levels of insect pest control expected for effectiveness claims

Appropriate Label Claim	Level of Effectiveness
Control	Consistently control commonly above 80%
Partial/Moderate/Useful level of control	Control, between 60 and 80%
Reduction (in population numbers, or damage).	Lower levels of control, for example 40-60%, or lower in <u>exceptional</u> cases. Terms of 'reduction' are particularly relevant when the primary objective is to reduce plant damage (at crop establishment).

For a claim of effectiveness below 80%, it must be demonstrated that the level of control for that specific pest species is still beneficial for the protection of crop (whether quantitative yield or quality factors).

2. Disease

Disease may be measured as both severity and incidence.

The methods of assessing the severity of oilseed rape diseases, particularly for stem diseases, often rely on relatively coarse, non-linear scales with as few as four divisions. With such scales meaningful levels of control can be difficult to determine unless disease pressure is relatively high. In addition, simple statistical analysis of disease severity when measured as a non-linear scale is generally not appropriate. Even the calculation of means should be avoided. When recording and assessing such results it may be better to assign letters rather than numbers to the steps on the scale to avoid the temptation to analyse them numerically.

If disease levels do not reach sufficiently high levels then useful information may still be obtained by measuring the incidence of disease, provided the sampling size is sufficient to give statistically meaningful results. Disease incidence cannot give useful measures of disease control when disease severity is anything other than low.

Where disease severity is measured as a percentage, there is normally no need to report disease incidence levels if the disease is greater than 5% in the untreated at the time of assessment. Table 2 a) shows the levels of control normally required to support various label claims.

Table 2a): Levels of control required in oilseed rape trials depending on assessment method.

Appropriate Label Claim	Level of control required		
	% Severity	Severity scale ¹	Incidence ²
Control	Consistently >80%	Consistently reduces disease to lowest class or below 20-25%.	Consistently >80%
Partial/Moderate/Useful level of control	Consistently >60%	Reduces disease to lowest class in majority of cases	Consistently >60%
Reduction	<60% in some cases	Clear reduction in disease	<60% in some cases

¹Disease severity in the untreated must be sufficient to fall into at least the second category of the scale and be greater than 20%

²Only normally appropriate where disease incidence is low (<25-50% of samples infected)

The same principles of this scheme apply to describing the level of control for vegetable brassicas.

3. Weeds

In arable and horticultural field crops, the label claim supported by a certain level of weed control is described in Table 3a).

Table 3a): Levels of weed control expected for effectiveness claims

Appropriate Label Claim	Level of Effectiveness
Susceptible (S)	Consistent control of 85% and above (see below*)
Moderately susceptible (MS)	More variable control, mean 75-85%, but with results often above 85%
Moderately resistant (MR)	Variable control, mean 60-75%, but some results above this level
Resistant (R)	Poor control below the levels given above

*To ensure worthwhile levels of control of certain important weeds in field crops, all these categories are raised with the susceptible rating being as follows: pernicious grass weeds where seed return must be prevented, e.g. black-grass and wild-oats, 95% and above, cleavers 90% and above.

For perennial weeds, assessments of control levels in the year following treatment will be important in determining the claim allowed.