

# CRD EFFICACY WORKING DOCUMENT SUMMARISING UK MAJOR ‘PESTS’<sup>1</sup> (DISEASES, PESTS AND WEEDS) ON A RANGE OF UK CROPS

## Introduction

This working document provides a summary of the ‘major’ UK arthropod pests, diseases and weeds for a number of the major UK crops. This information is designed to assist applicants in trials planning, supporting a relevant National GAP and in drafting product labels that are appropriate to UK conditions. It forms part of a series of guidance under development, or already available to be used in trials planning; providing reasoned cases for the relevance of data in supporting UK uses; and drafting appropriate UK labels. **Where more detailed guidance already exists in a crop guide, information on those crops is not reproduced here, and applicants should refer to the specific efficacy guides at [www.hse.gov.uk/pesticides/efficacy-guides/index.htm](http://www.hse.gov.uk/pesticides/efficacy-guides/index.htm).** For fungal diseases and pests, this document primarily covers foliar targets although in some cases soil pests have also been included. However seed treatments are specifically not covered.

CRD Efficacy team recognise that over time the status of the crop/target under UK conditions may change, and it may be appropriate to make justified amendments to this working document. Applicants may contact CRD proposing amendments (by email, [ppenquiries@hse.gov.uk](mailto:ppenquiries@hse.gov.uk)), providing a full explanation and justification for any changes. This should be accompanied by relevant, current information and evidence on the pest and crop in the UK (for example, area grown, value of crop, prevalence and nature of economic damage/other adverse impacts of the target pests). The CRD efficacy team will then consider this information and determine if amendments to the guidance are appropriate.

The document also provides an indicative number of required fully supportive effectiveness trials results (crop safety is not specifically addressed here and for herbicides/PGR will usually require dedicated trials including 2N doses).

This document should be read in conjunction with the Efficacy guide ‘GB and NI efficacy advice and product labelling’, which provides information on a number of National specific issues, including the scheme for supporting differential label claims based on the supporting effectiveness trials data at [www.hse.gov.uk/pesticides/assets/docs/efficacy-advice-product-labelling.pdf](http://www.hse.gov.uk/pesticides/assets/docs/efficacy-advice-product-labelling.pdf).

## Major/minor status of crop and target in the UK

In defining what is ‘major’ CRD considered a range of factors, including: area of crop grown, the area of crop sprayed, the importance of the pest (frequency, distribution, economic impact, difficulty in control), and a range of agronomic factors as well as expert judgement. For major

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<sup>1</sup> The term ‘pest’ is defined in accordance with EPPO general standards, as a generic term to cover insects, diseases, and weeds.

weed species inclusion was based on their competitiveness compared to the crop, and the extent to which they reduce crop yield, quality, and delay or interfere with crop harvest or cause problems with grazing animals by inhibiting feeding, poisoning or tainting milk.

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For arthropod pests, ‘minor’ targets have also been included in this document because it is important to understand the full pest complex across the range of crops. Many species have more than one host crop, or there may be relevant data on closely related target species. It is therefore possible to consider both generating cross-supporting data sets and/or making appropriate arguments within the dossier particularly where there are a limited number of results on a specific crop/target combination.

The information is also provided to assist applicants in understanding what are considered relevant ‘pests’ in UK crops. There are many arthropod species which may be present but do not have a sufficient adverse impact that justifies control measures using a plant protection product (PPP). This includes examples where the species is a major pest in another country. It is therefore important in meeting the requirement of 1107/2009 in justifying the relevance of the proposed target(s) to National conditions.

### **Number of required fully supportive trials**

CRD Efficacy assessments follow the principles and requirements of the European and Mediterranean Plant Protection Organisation (EPPO) standards. A detailed explanation is provided in EPPO PP1/226 on establishing the number of appropriate effectiveness trials results required. The number of fully supportive, appropriate **effectiveness** results is based around the EPPO range for **field uses** of 6 – 15 (major use) or 3 – 6 (minor use). **The numbers indicated within this document are a ‘worst case’, based on an assumption there are no available relevant existing supporting data/authorisations (or appropriate extrapolations).** As a general guide, historically the UK have followed PP 1/226 which indicates that 10 fully supportive results are required to give the necessary high degree of confidence for a major target in a major crop, and 3 for a minor target. It should be noted that to obtain a sufficiently robust data set it is likely that a greater number of trials will need to be conducted (For example, the ‘pest’ may only occur at low population levels that season, or environmental conditions may impact trials outcomes etc). EPPO standard, PP 1/296(1), addresses the trials number requirements for low-risk plant protection products and they are not specifically covered here.

PP 1/226 also refers to those situations where a reduced number of supportive results may be possible. This is particularly relevant to **arthropod pests**, which as indicated above, may have a wide range of host crops and data may be available from other crops, and/or have a number of closely related species. For example, there are often several Lepidoptera caterpillars and aphids on a particular crop (whether considered ‘major’ or ‘minor’), and there will be scope to reduce the number of supportive results on individual species. The degree of reduction will depend on a number of factors (e.g. crop agronomy, pest biology), and should always be supported by an appropriate reasoned case. For **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. It may also be possible to extrapolate from one weed species to a related species. For **diseases** they are often specific to a particular crop, however it may be possible for certain diseases to extrapolate and the use of EPPO extrapolations (which is relevant to all product types) is discussed below.

Applicants should also refer to the EPPO database on PPP data extrapolation for a range of crops, covering weeds, diseases, insects (and soil pests) to identify key pest/crop combination (both effectiveness and, where available crop safety). This allows applicants to plan trials programmes, and utilise the data fully to support as wide a range of target/crops as possible for efficacy considerations. There are also a number of ‘generic pest’ tables, which are particularly relevant to UK ‘pests’: slugs (within EPPO 1/95(4)), nematodes, other soil pests (e.g. cutworms, wireworms), spider mites, thrips, whitefly. Although these ‘generic’ pests are identified in the individual tables below, data generated on some of the key major hosts allow wide ranging extrapolation onto other host crops. It is not expected that data will be generated on each individual crop. CRD would expect to follow EPPO extrapolations but it may also be possible to make additional extrapolations based on appropriate evidence and reasoned cases.

### **Geographical location of trials**

CRD Efficacy has always accepted data generated from non-UK regions to support a UK authorisation, provided there is an appropriate case for relevance (covering agronomy, pest, climate, edaphic factors, and 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). In some instances it may be necessary to ensure that the ‘pest’ population tested is relevant to the resistance status in the UK. EPPO PP 1/278 ‘Principles of zonal data production and evaluation’ discusses the generation of data across regional areas. This is relevant in describing the various factors that should be part of justifying the use of data generated in one area to support an authorisation in another.

## 1. ARTHROPODS, MOLLUSCS, NEMATODES AND OTHER SOIL PESTS

### SUGAR BEET

| Pest Group   | Major  | Minor  |
|--------------|--|--|
| Nematodes*   | Beet cyst nematodes<br>( <i>Heterodera schachtii</i> )<br>(HETDSC)             | Root knot ( <i>Meloidogyne spp.</i> )  |
|              | Free living nematodes (e.g.<br><i>Trichodorus spp</i> , <i>Longidorus spp.</i> | Stem nematodes ( <i>Ditylenchus dipsaci</i> )<br>(DITYDI)  |
| Aphids       | Black bean aphid ( <i>Aphis fabae</i> ) (APHIFA)                               |  |
|              | Peach potato aphid ( <i>Myzus persicae</i> )<br>(MYZUPE)                       |  |
|              | Potato aphid ( <i>Macrosiphum euphorbiae</i> )<br>(MACSEU)                     |  |
| Thrips       |  | Thrips sp. (Onion thrips,- <i>Thrips tabaci</i><br>(THRITB); field- <i>Thrips angusticeps</i><br>(THRIAN) and Bean<br>thrips ( <i>Caliothrips fasciatus</i> ) (HEROFA) |
| Diptera      | Beet leafminer (mangold fly,<br><i>Pegomya hyoscyami</i> ) (PEGOHY)            |  |
| Coleoptera*  | Wireworm <i>Agriotes sp.</i><br>(AGRILI)                                       | Pygmy beetle ( <i>Atomaria linearis</i> ) (ATOMLI),<br>beet (mangold) flea beetles ( <i>Psylliodes sp</i> )  |
| Lepidoptera* |  | Cutworm ( <i>Noctuid sp</i> ),   |

|              |  |   |
|--------------|--|---|
| Hemiptera    |  | Tarnished plant bug ( <i>Lygus rugulipennis</i> )<br>(LYGURU) |
| Soil complex | Millipedes, spring tails, symphylids   |   |
| Slugs        | <i>Deroceras reticulatum</i><br>(DERORE) and other <i>Deroceras</i> species;<br><i>Arion hortensis</i> (ARIOHO), <i>A. distinctus</i><br>(ARIODI) and other <i>Arion</i> species |   |
|              | Keeled slugs ( <i>Milax</i> , <i>Tandonia</i> , <i>Boettgerilla</i> )  |   |

- **Nematodes, wireworms, cutworms:** proposed claims may be supported across a number of host crops, provided the conditions of use are comparable and an appropriate justification is made

**ONION AND LEEK** (EPPO Minor Use tables available. Onion is usually the key indicator crop. However included in the table are specific instances where Leek is the key indicator and has been added to facilitate considering *Allium* as a group)

| Pest Group      | Crop           | Major  | Minor   |
|-----------------|----------------|--|---|
| Nematodes*      | Onion, leek    | Stem and bulb nematodes<br>( <i>Ditylenchus dipsaci</i> ) (DITYDI) |   |
|                 |                |  | Free-living nematodes(e.g.<br><i>Trichodorus</i> and <i>Longidorus</i> spp) |
| Diptera (Flies) | Onion, leek    | Bean seed fly ( <i>Delia platura</i> )<br>(HYLEPL)                 |   |
|                 | Onion and leek | Onion fly ( <i>Delia antiqua</i> ) (HYLEAN)                        |   |
|                 | Onion and leek |  | Allium leafminer ( <i>Phytomyza gymnostoma</i> ) (NAPOGY)                   |
| Lepidoptera     | Onion          |  | Leek moth ( <i>Acrolepiopsis assectella</i> )                               |
|                 | Leek           | Leek moth ( <i>Acrolepiopsis assectella</i> ) (ACROAS)             |   |
| Thrips          | Onion, leek    | Onion thrips ( <i>Thrips tabaci</i> )<br>(THRITB),                 |   |
| Beetles         | Onion, leek    |  | Wireworms* ( <i>Agriotes</i> spp)   |
|                 | Onion, leek    |  | Cutworms* ( <i>Agrostis</i> spp)  |

- **Nematodes, wireworms, cutworms:** proposed claims may be supported across a number of host crops, provided the conditions of use are comparable and an appropriate justification is made

**CARROT (EPPO Minor Use table available for *Umbelliferous* crops)**

| <b>Pest group</b> | <b>Major</b>   | <b>Minor</b>   |
|-------------------|--|--|
| Diptera (flies)   | Carrot fly ( <i>Psila rosae</i> ) (PSILLRO)                        |  |
| Capsids           |  | Tarnished plant bug ( <i>Lygus rugulipennis</i> ) (LYGURU)   |
| Aphids            | Willow carrot aphid ( <i>Cavariella aegopdii</i> ) (CAVAAE)        |  |
|                   |  | Parsnip aphid ( <i>C. pastinacae</i> ) (CAVAPA)<br>Peach potato aphid ( <i>Myzus persicae</i> ) (MYZUPE) |
| Nematodes*        | Carrot cyst nematodes ( <i>Heterodera carotae</i> ) (HETDCA)       |  |
|                   | Root knot nematode ( <i>Meloidogyne</i> spp e.g <i>hapla</i> )     |  |
|                   | Free living nematodes ( <i>Longidorus</i> , <i>Trichodorus</i> sp) |  |
| Lepidoptera*      |  | Various Caterpillar species  |
| Beetles*          |  | Cutworm ( <i>Agrostis</i> spp)   |
|                   |  | Wireworms ( <i>Agriotes</i> spp.)  |

**Nematodes, wireworms, cutworms:** proposed claims may be supported across a number of host crops, provided the conditions of use are comparable and an appropriate justification is made

**PEA (EPPO Minor use table available for legumes) (for relevant species it may be possible to cross-support with appropriate data on field beans, reducing the number of required results on each legume).**

| <b>Pest group</b>  | <b>Major</b>  | <b>Minor</b>   |
|--|---|--|
| Thrips<br>(possible to crosssupport and reduce number on each species if proposed GAP is comparable) | Field thrips ( <i>Thrips angusticeps</i> )<br>(THRIAN)        |  |
|  | Pea thrips ( <i>Kakothrips robustus</i> )<br>(KAKORO)         |  |
| Aphids   | Pea aphid ( <i>Acyrtosiphon pisum</i> )<br>(ACYRON)           |  |
| Lepidoptera  | Pea moth ( <i>Cydia nigricana</i> ) (LASPNI)                  |  |
|  |   | Silver Y moth<br>( <i>Autographa gamma</i> )<br>(PYTOGA) |
| Beetle   | Pea and bean weevil ( <i>Sitona lineatus</i> )<br>(SITNLI)    | Wireworms ( <i>Agriotes</i> spp)                         |
| Diptera (flies, midges)  |   | Bean seed fly ( <i>Delia platura</i> )<br>(HYLEPL)       |
|  | Pea midge ( <i>Contarinia pisi</i> ) (CONTPI)                 |  |
| Nematodes*   | Pea cyst nematode ( <i>Heterodera goettingiana</i> ) (HETDGO) |  |

\*possible to support by data from other relevant species, provided appropriate justification

**FIELD BEAN (EPP0 Minor use table available for legumes) (for relevant species it may be possible to cross-support with appropriate data on field beans, reducing the number of required results on each legume).**

| <b>Pest Group</b> | <b>Major</b>  | <b>Minor</b>   |
|-------------------|---|--|
| Aphids            | Black bean aphid ( <i>Aphis fabae</i> ) (APHIFA)        |  |
|                   | Pea aphid ( <i>Acyrtosiphon pisum</i> ) (ACYRON)        |  |
| Lepidoptera       |   | Silver y moth ( <i>Autographa gamma</i> ) (PYTOGA)   |
| Coleoptera        | Pea and bean weevil ( <i>Sitona lineatus</i> ) (SITNLI) | Cutworms ( <i>Agrostis</i> sp)                       |
|                   | Bruchid beetle ( <i>Bruchus rufimanus</i> )             |  |
| Thrips            | Field thrips ( <i>Thrips angusticeps</i> ) (THRIAN)     |  |
| Diptera           |   | Bean seed fly ( <i>Delia</i> sp)                     |
| Nematodes*        | Stem nematode ( <i>Ditylenchus</i> spp.)                |  |
|                   |   | Pea cyst nematode ( <i>H. goettingiana</i> ) (HETGO) |

\*possible to support by data from other relevant species, provided appropriate justification

**STRAWBERRY (EPPO Minor Use Table available)**

| <b>Pest Group</b>     | <b>Major</b>  | <b>Minor</b>   |
|-----------------------|---|--|
| Aphids                | Strawberry aphid ( <i>Chaetosiphon fragaefolii</i> ) (CHTFSR), shallot aphid ( <i>Myzus ascalonicus</i> ) (MYZUAS) and Melon cotton aphid ( <i>Aphis gossypii</i> ) (APHIGO), data on these can be extrapolated to other species. |  |
| Thrips                | Western flower thrip ( <i>Frankliniella occidentalis</i> ) (FRANOC)   |  |
| Whiteflies            | Glasshouse whitefly, ( <i>Trialeurodes vaporariorum</i> ) (TRIAVA), Tobacco whitefly ( <i>Bemisia tabaci</i> ) (BEMITA)   |  |
| Mites                 | Two-spotted spider mite ( <i>Tetranychus urticae</i> ) (TETRUR)   | Tarsonemid mites ( <i>Phytonemus pallidus fragariae</i> ) (PHTNFP) |
| Diptera (fruit flies) | Spotted wing drosophila ( <i>Drosophila suzukii</i> ) (DROSSU)  |  |
| Weevil                | Vine weevil ( <i>Otiorhynchus sulcatus</i> ) (OTIOSU)   |  |
|                       | Strawberry blossom weevil ( <i>Anthonomus rubi</i> ) (ANTHRU)   |  |
| Lepidoptera           |   | Caterpillars sp  |
| Capsid bugs           |   | Tarnished plant bug, <i>Lygus rugulipennis</i> (LYGURU)            |

**APPLE AND PEAR** (NB in EPPO extrapolation tables, Apple is usually considered key indicator species permitting extrapolation to pear for effectiveness. However, specific crop safety assessments are required on pear). It may be possible to extrapolate effectiveness data (crop safety must still be addressed) from an appropriate data set onto stone fruit for relevant species, provided uses are comparable and robust justification provided.

| <b>Pest Group</b> | <b>Crops</b>   | <b>Major</b>   | <b>Minor</b>   |
|-------------------|----------------|--|--|
| Mites             | Apple and Pear | Fruit tree red spider mite<br>( <i>Panonychus ulmi</i> )<br>(ANTHRU) |  |
|                   | Apple          |  | Rust mites ( <i>Aculus schlechtentali</i><br>(VASAD), <i>Epirimerus pyri</i> )<br>(EPITPI)                                     |
|                   | Pear           | Pear rust mite ( <i>E.pyri</i> ) (EPITPI)                            |  |
|                   | Apple and Pear |  | Pear leaf blister mite<br>( <i>Phytoptus pyri</i> ) (ERPHPI)<br>Flat scarlet mite<br>( <i>Cenopalpus pulcher</i> )<br>(BRVPOU) |
| Lepidoptera       | Apple and Pear | Codling moth ( <i>Cydia pomonella</i> )<br>(CARPO)                   |  |

|                  |   |  |
|------------------|---|--|
| Apple (and pear) | Fruit tree tortix moth<br>( <i>Archips podana</i> )<br>(CACOPO)<br>Summer fruit tree totrix moth<br>( <i>Adoxophyes orana</i> ) (CAPURE)<br>(reduced numbers may be possible to crosssupport) |  |
|------------------|---|--|

|              |                |   |   |
|--------------|----------------|---|---|
|              | Apple and Pear |   | Light brown apple moth<br>( <i>Epiphyas postvittana</i> )<br>(TORTPO) |
|              | Apple and Pear |   | Winter moth ( <i>Operophtera<br/>brumata</i> ) (CHEIBR)               |
|              | Apple and Pear |   | Blastobasis moth<br>( <i>Blastobasis decolorella</i> )<br>(BLAADE)    |
| Woolly aphid | Apple          | Woolly aphid ( <i>Erisoma<br/>lanigerum</i> ) (ERISLA)          |   |
| Other Aphids | Apple and pear | Rosy apple aphid<br>( <i>Dysaphis plantaginea</i> )<br>(DYSAPL) |   |
|              | Apple and pear |   | Leaf curling aphids<br><i>Dysaphis</i> sp (DYSASP)                    |
|              | Pear           | Pear-bedstraw aphid<br>( <i>Dysaphis pyri</i> )<br>(DYSAPY)     |   |

|             |                |  |   |
|-------------|----------------|--|---|
|             | Apple and Pear |  | Green apple aphid ( <i>Aphis pomi</i> )<br>(APHIPO)   |
|             | Apple and pear |  | Apple grass aphid<br>( <i>Rhopalosiphum insertum</i> )<br>(RHOPIN)                          |
| Psyllids    | Apple and pear |  | Apple sucker ( <i>Psylla mali</i> )<br>(PSYLMA)   |
|             | Pear           | Pear sucker ( <i>Cacopsylla pyri</i> )<br>(PSYLPPI)      |   |
| Scale       | Apple and Pear | Mussel scale<br>( <i>Lepidosaphes ulmi</i> )<br>(LEPSUL) |   |
|             | Pear only      |  | Pear scale ( <i>Quadraspidiotus pyri</i> )<br>(QUADOS), (similar species<br>minor in apple) |
| Capsids     | Apple and pear |  | Common green capsid<br>( <i>Lygocoris pabulinus</i> ) (LYGUPA)<br>, other capsid species    |
| Leafhoppers | Apple and pear |  | <i>Edwardsiana crataegi</i> (TYCYFR)<br>and other species                                   |
| Weevils     | Apple and Pear |  | Rhynchites weevil<br>( <i>Rhynchites aequatus</i> )<br>(COENAQ)                             |
|             | Apple and Pear |  | Blossom weevils<br>( <i>Anthonomus</i> spp)<br>(ANTHSP)                                     |

|          |                |   |
|----------|----------------|---|
| Midges   | Apple and pear | Apple leaf midge ( <i>Dasineura mali</i> ) (DASMYA), pear leaf midge ( <i>Dasineura pyri</i> ) (DASYPY) |
|          | Pear           | pear gall midge ( <i>Contarina pyrivora</i> ) (CONTPY)  |
| Sawflies | Apple and Pear | Hoplocampa spp. (HOPLSP), <i>Ametastegia glabrata</i> (TAXOGL)  |

## 2. DISEASES

| Crop       | Major disease; English name, Latin name and EPPO code        | No. of fully supportive trials |
|------------|--|--------------------------------|
| Sugar beet | Powdery mildew ( <i>Erysiphe polygoni</i> ) (ERYSBE)         | 6                              |
|            | Rust ( <i>Uromyces betae</i> ) (UROMBE)                      | 6                              |
|            | Cercospora Leaf Spot ( <i>Cercospora beticola</i> ) (CERCBE) | 6                              |
| Field bean | Leaf and pod spot ( <i>Ascochyta fabae</i> ) (ASCOFA)        | 6                              |
|            | Downy Mildew ( <i>Peronospora viciae</i> ) (PEROVI)          | 6                              |
|            | Chocolate spot ( <i>Botrytis fabae</i> ) (BOTRFA)            | 6                              |
| Apple      | Scab ( <i>Venturia inaequalis</i> ) (VENTIN)                 | 10                             |

|             |  |                           |
|-------------|--|---------------------------|
|             | Powdery mildew<br>( <i>Podosphaera leucotricha</i> ) (PODOLE)  | 10                        |
|             | Canker ( <i>Nectria galligena</i> ) (NECTGA)   | 10                        |
|             | Botrytis fruit rot (application pre-harvest in field)  | 6                         |
|             | Silver leaf ( <i>Chondrostereum purpureum</i> )<br>(STERPU)  | 6                         |
| Pear        | Pear scab ( <i>Venturia pyrina</i> ) (VENTPI)  | Use EPPO<br>extrapolation |
|             | Fireblight ( <i>Erwinia amylovora</i> ) (ERWIAM)   | 6                         |
| Onion       | White rot ( <i>Stromatinia cepivora</i> (= <i>Sclerotium cepivorum</i> ) (SCLOCE)  | 6                         |
|             | Downy mildew ( <i>Peronospora destructor</i> )<br>(PERODE)   | 6                         |
|             | White tip ( <i>Phytophthora porri</i> ) (PHYTPO)   | 6                         |
| Strawberry  | Grey mould ( <i>Botrytis cinerea</i> ) (BOTRCI)  | 6                         |
|             | Powdery mildew ( <i>Sphaerotheca macularis</i> )<br>(SPHRMA)   | 6                         |
| Pea         | Downy mildew ( <i>Peronospora viciae</i> )(PEROVI)   | 6                         |
|             | Leaf and pod spot<br>( <i>Mycosphaerella pinodes</i> ) (MYCOPI)  | 6                         |
| Ornamentals | Rust ( <i>Puccinia horiana</i> (PUCCHN) and <i>Uromyces dianthi</i> (UROMDI) ) <sup>1</sup>                                  | 6                         |
|             | Powdery mildew( <i>Sphaerotheca pannosa</i><br>(SPHRPA), <i>Microsphaera begonia</i> (OIDIBE)and<br>oidium spp) <sup>1</sup> | 6                         |

Where a disease of the crops above is not listed it is assumed to be a minor. For advice on the number of trials for major diseases on crops not listed please consult CRD.

## 3. WEEDS

| Major weeds for the crop                                 | Onion | Apple/<br>pear | Carrot | Field bean | Vining<br>combining peas | Sugar beet |
|--|-------|----------------|--------|------------|--------------------------|------------|
| Annual meadow- grass <i>Poa annua</i> (POAAN)            | x     |                | x      |            | x                        | x          |
| Black bindweed<br><i>Fallopia convolvulus</i><br>(POLCO) |       |                | x      | x          | x                        | x          |
| Black nightshade<br><i>Solanum nigrum</i> (SOLNI)        |       |                |        |            | x                        |            |
| Black-grass (ALOMY)                                      | x     |                | x      | x          | x                        | x          |
| Charlock (SINAR)   | x     |                |        | x          |                          |            |
| Cleavers (GALAP)   | x     | x              |        | x          | x                        | x          |
| Common chickweed<br>(STEME)                              | x     |                |        | x          |                          |            |
| Common couch (AGRRE)                                     |       | x              |        |            |                          | x          |
| Common fumitory<br>(FUMOF)                               | x     |                |        |            |                          |            |
| Common nettle (URTDI)                                    |       | x              |        |            |                          |            |
| Common orache (ATXPA)                                    |       | x              |        |            |                          |            |

| Major weeds for the crop      | Onion | Apple/<br>pear | Carrot | Field bean | Vining<br>combining peas | Sugar beet |
|-------------------------------|-------|----------------|--------|------------|--------------------------|------------|
| Common poppy (PAPRH)          |       |                |        | x          | x                        |            |
| Creeping buttercup<br>(RANRE) |       | x              |        |            |                          |            |
| Docks (RUMSS)                 |       | x              |        |            |                          |            |
| Fat-hen (CHEAL)               |       |                |        | x          | x                        | x          |
| Field bindweed (CONAR)        |       | x              |        |            |                          |            |
| Groundsel (SENVU)             | x     |                | x      |            |                          |            |
| Knotgrass (POLAV)             | x     | x              | x      |            | x                        | x          |
| Mayweed spp. (MATSS)          | x     |                | x      |            | x                        |            |
| Pale persicaria (POLLA)       |       |                | x      |            | x                        | x          |
| Redshank (POLPE)              | x     |                | x      |            | x                        | x          |
| Small nettle (URTUR)          | x     |                |        |            |                          |            |
| Speedwell spp (VERSS)         |       |                |        | x          |                          |            |

|                                  |              |                   |               |                   |                              |                        |
|----------------------------------|--------------|-------------------|---------------|-------------------|------------------------------|------------------------|
| Thistles (CIRSS)                 |              | x                 |               |                   | x                            |                        |
| <b>Major weeds for the crop</b>  | <b>Onion</b> | <b>Apple/pear</b> | <b>Carrot</b> | <b>Field bean</b> | <b>Vining combining peas</b> | <b>Sugar beet</b>      |
| Volunteer cereals (TRZSS, HORSS) |              |                   |               | x                 | x                            |                        |
| Volunteer oilseed rape (BRSNN)   | x            |                   |               | x                 | x                            | x                      |
| Volunteer potatoes (SOLTU)       | x            |                   | x             |                   | x                            | x                      |
| White campion (MELAL)            | x            |                   |               |                   |                              |                        |
| Wild oats (AVESS)                |              |                   |               | x                 | x                            | x (spring germinating) |

x = major weed in the crop in the UK (see introductory text for details).