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EFFICACY EVALUATION OF PLANT PROTECTION PRODUCTS

PP 1/248 (3) Harmonized system for classification and coding of the uses of plant protection products

Specific scope: This Standard describes a harmonized system for classification and coding of the uses of plant protection products to facilitate the understanding and exchange of data for the purposes of registration, and provides Codes for such uses to form part of the EPPO Code system.

Specific approval and amendment: First approved in 2006–09.

Revision to update references approved in 2014–09.

Revision to reflect the agreed harmonized system for classification and coding of the uses of plant protection products 2021–09.

1 | INTRODUCTION

One of the objectives of EPPO Standards PP1 on efficacy evaluation of plant protection products (PPP) is describing standard methods for the conduct of trials to produce harmonized data and facilitate the exchange and comparison of the data included in the biological assessment dossier for registration of a PPP. To date, there has been considerable variation between EPPO member countries in the description of uses of products. This has complicated the exchange and comparison of data, for instance in the 'mutual recognition' in EU Regulation (EC) 1107/2009.[1] Communication and data exchange among countries through international databases need harmonized classification of the uses of PPPs.

The aim of this Standard is to provide a harmonized system for classification and coding to allow consistent characterization of product uses so that these uses in different countries can clearly be understood, compared and assessed. Such a system leads to substantial harmonization between countries in which the product uses are registered. Since it is already current practice in the EPPO Standards PP1 to characterize hosts and target pests by their EPPO Codes, Codes of the same type are proposed for the purpose of a more precise description of the uses.

An additional benefit of using a harmonized classification of the uses of PPPs may be to facilitate the work related to extrapolation of data.

2 | ELEMENTS CHARACTERIZING A USE

The following elements are defined for characterizing a use:

- Crops or crop groups
- Treated objects, i.e. crop parts (e.g. seeds) and non-crop objects (e.g. railways)
- Targets (pests, weeds and plant growth regulation targets)
- Crop destinations (e.g. grown for human consumption, for animal consumption, for amenity or ornamental purposes)
- Locations for the use of PPPs, i.e. in field and semi-open structures, in greenhouses or indoors
- Treatments, i.e. treatment methods (e.g. spraying, fumigating), treatment equipment and treatment specifications (e.g. spot application or treatment between rows).

These elements are further described in this Standard. The harmonized classification with the associated EPPO Codes is made available on the EPPO Global Database website (https://gd.eppo.int/) (see Appendix I).

Other elements (not covered by this Standard) can additionally be used to characterize the use, e.g. the growth stage of the crop (see 'Further specifications').

EPPO Standard PP 1/240 *Harmonized basic information for databases on plant protection products* provides guidance on the information concerning the registered use of a particular PPP.

3 | USE OF THE CLASSIFICATION SYSTEM

In the simplest case, a single crop is treated in a single manner against a single target pest (particular destination or location not being specified). In most cases taxonomic Codes are sufficient to describe a crop or

[1]EC (2009) Regulation (EC) No 1107/2009 of the European Parliament and of the Council of 21 October 2009 concerning the placing of plant protection products on the market and repealing Council Directive 79/ 117/EEC and 91/414/EEC. Official Journal of the European Union L 309, 1–50.

target pest. This corresponds to the scope of many of the specific EPPO Standards PP1 on efficacy evaluation. However, uses may also concern broader categories for crops and targets (such as 'vegetable crops', or 'dicotyledonous weeds' or 'aphids'), as well as terms for treatments, locations, treated objects and destinations. For some of these categories non-taxonomic Codes have been assigned and, when needed, short English descriptions of the terms used in classification have been added.

The principle that should be applied is that a PPP use can be described by a combination of EPPO Codes, e.g. botrytis control on table grapes should be identified as BOTRCI for *Botrytis cinerea* + VITVI for *Vitis vinifera* + 3HCOFD for grown for human consumption fresh.

4 | CROPS AND CROP GROUPS

Single crops can be described by the EPPO Codes corresponding to their scientific name (taxonomic Codes). This is the standard five-letter Code for a plant and six-letter Code for fungi. The EPPO Code system also provides non-taxonomic Codes for various forms of crop plants, such as winter and spring cereals.

Examples of how to use Codes for single crops

Taxonomic Codes: VITVI for *Vitis vinifera* and HORVX for *Hordeum vulgare*. Mushrooms have a six-letter Code: AGARBI for *Agaricus bisporus*.

Non-taxonomic Codes: TRZAW for winter soft wheat, BRSNS for spring oilseed rape.

If several crops are to be considered together, different approaches may be possible:

- A separate EPPO taxonomic Code is given for each crop concerned (especially if it is important to limit the use to strictly specified crops).
- A non-taxonomic Code for crop group is used when all crops within the group are considered. These EPPO Codes are composed of five letters starting with 3 and ending with C.
- An EPPO taxonomic Code for a genus is used if the crops concerned belong within a single genus. However, if only a small number of species are needed to describe the use, the individual taxonomic EPPO Codes should be used.

A set of crop groups has been listed. They have the following characteristics:

- They cannot easily be described by the use of existing taxonomic EPPO Codes.
- The use cannot alternatively be described by suitable location or crop destination terms.

Examples of how to use Codes for crop groups

Taxonomic Codes: 1TULG for Tulipa.
As a general remark, when the crop concerned corresponds to several species within the same genus, it is advised to use the genus Code, e.g. 1ABIG for *Abies*. Codes describing a single (unknown or unspecified) species, e.g. ABISS *Abies* sp., are not appropriate.

Non-taxonomic Codes: Citrus fruit crops 3CITC, or arable crops 3ARAC, which includes cereal crops 3CERC, grass crops 3GRAC, legume crops 3LEGC etc.

- They may appear as such, or under a similar name, in national lists.
- They correspond to a group which is meaningful in the context of treatment with PPPs.

In most cases, lists of species have been identified to clarify and harmonize the content of a group (e.g. cereal crops 3CERC or legume vegetable crops 3LEVC). In the other cases, a description (e.g. for ornamental conifers 3ORCC or broadleaf forest tree 3FOBC) or definitions have been provided (e.g. for amenity grassland 3AMGC and rotational grassland 3RGRC).

It may be noted that other crop groups used elsewhere are not recommended because they do not fit the above characteristics. In particular, many commonly used terms could be excluded because they essentially describe a location or a destination. For example, 'fodder beet', becomes *Beta vulgaris* BEAVX + grown for animal consumption (3ANICD)'.

5 | TREATED OBJECTS

If the use involves an application of a PPP to an object which is not a crop or only a part of a crop, then the appropriate EPPO Code from the category 'Treated object' should be used. These are composed of five letters beginning with 3 ending with O. Two main types of objects appear in this list: crop parts (3CRPAO) and non-crop objects (3NOCRO). 'Crop parts' Codes will be useful to specify which parts (plant organs or harvested products) of the crop is treated. These Codes will normally be used in combination with Codes for crops or crop groups. Non-crop objects (3NOCRO) include Codes to identify structures and equipment, types of land or water without specific reference to any plants growing on the land. These Codes will, of course, not be associated with a crop or crop group but are to be used in combination with Codes for targets.

Examples of how to use treated objects Codes

Crop parts
Treatment of aerial plant parts of pome fruits or grapevine = 3AERPO [aerial parts (treatment of)] + 3PMFC (pome fruit crops) or VITVI *Vitis vinifera*.
Treatment of potatoes tubers or ornamental bulbs = 3BULBO [bulbs, tubers, corms (treatment of)] + SOLTU *Solanum tuberosum* or 3ORHC (ornamentals herbaceous plants).
Seed treatment of wheat = 3SEEDO [seeds (treatment of)] + 3WHEC wheat crops.
The Code 3HARVO (harvested crops) can be used for treatments of stored products. More specifically, the classification allows the specification of whether a product is used for treatment of harvested fresh crops (3HARFO) or harvested plant products (3HARPO):
3HARFO can be used for post-harvest treatments of fresh fruits, fresh vegetables, potatoes, propagation material (e.g. grafts, rootstocks, cuttings), ornamental crops (e.g. cut flowers, bulbs and tubers) and seed for propagation. For post-harvest treatments of apple or potatoes = 3HARFO harvested fresh crops + *Malus domestica* (MABSD) or *Solanum tuberosum* (SOLTU).
3HARPO can be used for post-harvest treatments of dried fruits, hay, coffee, dried seed and other stored products but should NOT be used for seed for propagation, for which the crop destination Code 3SEEDD (grown for seed for propagation) should be used (see below under crop destination). For post-harvest treatments of cereals = cereal crops (3CERC) + 3HARPO harvested plant products.

Non-crop objects
Weed control on railways = weed (3WEEDT) + railways (3RAILO).
The Code for inter-crop (3INTCO) identifies the short-term situation after harvest of the first crop and before planting of the succeeding crop in the same or successive growing season.
Codes for the treatment of bare fallow (3BARFO) and green fallow (3GREFO) are also available.

6 | TARGETS

The main targets of PPPs are pests, mostly individual species or groups of closely related species in the case of animals and microorganisms, or broad categories in the case of pest plants (weeds). Another 'target' of a PPP is the use as 'plant growth regulation' (PGR). This term is used to cover any desired beneficial effect manifested by a plant in reaction to a PPP, without the involvement of any other organism.

Single pests can be described by the EPPO Codes corresponding to their scientific name (taxonomic Codes). This is the standard six-letter Code for an animal or microorganism. Weeds, as plants, will have a five-letter Code, e.g. STEME for *Stellaria media*. Volunteer plants of a crop, in another crop, are weeds, e.g. SOLTU for volunteer potatoes, specified as a target and not as a crop.

If several targets are to be considered together (e.g. to describe a product designed to control multiple species that feed on the same crop or crop group), different approaches are possible:
- A separate EPPO Code is given for each target concerned (especially if it is important to limit the use to strictly specified targets).
- An EPPO Code for a genus (or even higher levels in the taxonomy) is used if the target concerned is a large portion of relevant species within the genus.
- A non-taxonomic target group Code is used. These non-taxonomic EPPO Codes, of six letters starting with 3 and ending with T, have been identified for PGR targets and weeds. For diseases and insects, taxonomic Codes for individual species or higher taxonomic levels, should be used.

Examples of how to use single pest Codes

PHYTIN for *Phytophthora infestans* or CARPPO for *Cydia pomonella* or PAPRH for *Papaver rhoeas*.

Examples of how to use pest group Codes
Taxonomic Codes: 1APHIG for *Aphis*, 1DIPTO for *Diptera*, 1LIRIG for *Liriomyza*, 1AGRIG for *Agriotes*, 1SCLEG for *Sclerotinia*, 1FUSAG for *Fusarium*, 1PHYTG for *Phytophthora*. For the following common names of pest groups the taxonomic Codes could also be used: for cutworms 1NOCTF (Noctuidae), wireworms 1ELATF (Elateridae), thrips 1THYSO (Thysanoptera), fruit flies 1TEPHF (Tephritidae), whiteflies 1ALEYF (Aleyrodidae), nematodes 1NEMAP (Nematoda), mites 1ACARG (Acarus), spider mites 1TETRF (Tetranychidae).

Non-taxonomic Codes: 3DICOT for dicotyledonous weeds (or more specifically 3PEDIT for perennial dicotyledonous weeds), 3MNCOT for monocotyledonous weeds, aquatic weeds (3AQUWT) etc.

Examples of PGR targets
3PPLOT for prevention of lodging, 3PFWST for flowering stimulation or 3PIRUT for inhibition of russeting.

As for crop groups, target groups are specified when they have the following characteristics:

- They cannot easily be described by the use of existing EPPO taxonomic Codes.
- They appear as such, or under a similar name, in national lists.
- They correspond to a group which is meaningful in the context of treatment with PPPs.

This arises most often when the pests concerned have some biological features in common, but cannot be conveniently placed in a single and meaningful taxonomic group.

It may be noted that the organisms to be considered as the relevant members of such groups may vary depending on the crop concerned. In many cases, it is possible and preferable to specify them individually (as this is done in several EPPO Standards PP1 *Efficacy Evaluation of Plant Protection Products*, or PP2 *Good Plant Protection Practice*). In some cases, the set of pests concerned for a given crop may vary in different parts of the EPPO region. If it is important to make this clear for a given use, then the individual pests will have to be specified, rather than using a target group.

It should be noted that in the EPPO Global Database, common names are not assigned to families or genera (e.g. the common name wireworm is not associated to the family Elateridae). As a general policy, common names (if any) have been attributed to species only.

7 | CROP DESTINATIONS

A destination is the ultimate use or purpose of the crop. It corresponds more or less in common language to the 'use' of the crop, but this term would cause confusion since the Standard deals with the 'use' of PPPs. Accordingly, 'destination' is preferred.

Defining crop destination separately from the crop itself avoids the necessity to multiply crop categories such as 'Fodder X' or 'Seed crops of X'. Basically, destinations are based on the formula 'Grown for X', and are assigned six-character Codes starting with 3 and ending with D. If no destination is indicated, it is meant that all destinations are included.

The Code for grown for processing for human consumption (3HCOPD) should be used for crops grown for starch, wine, cider or beer. It is to be noted that the expression 'not for human consumption' is not considered, as it does not specify the destination.

Examples of how to use crop destinations Codes

Maize grown for biomass production = *Zea mays* (ZEAMX) + grown for industrial use or biomass production (3INDUD).
Grain maize = *Zea mays* (ZEAMX) + grown for harvesting dry (3HDRYD).
Silage maize = *Zea mays* (ZEAMX) + grown for processing for animal consumption (3ANIPD).
Grapes for wine production = *Vitis vinifera* (VITVI) + grown for processing for human consumption (3HCOPD).
Table grapes = *Vitis vinifera* (VITVI) + grown for human consumption fresh (3HCOFD).
Potatoes for seed propagation = *Solanum tuberosum* (SOLTU) + grown for seed for propagation (3SEEDD).
Potatoes for human consumption = *Solanum tuberosum* (SOLTU) + grown for human consumption (3HCOND).
Dried seeds or fruits of spice crops used for production of spices = a crop belonging to the group 'herbs, spices and medicinal crops' (3HSMC) + grown to be used as spice (dried seeds) (3SPDSD) or grown to be used as spice (dried fruits) (3SPDFD). Codes for dried arils, dried roots and rhizomes or dried bark etc. to be used as spices have also been assigned.
The situation where a vegetable or fruit is eaten with or without peel (or pod) has been highlighted as an important aspect to describe PPP uses. Therefore, destination Codes to characterize crops (e.g. legume vegetable crops 3LEVC) that are grown for human consumption fresh without peel or pod (3HCFWD) or with peel or pod (3HCFPD) have been created:
Peas eaten with pods = *Pisum sativum* (PIBSX) + grown for human consumption fresh with peel or pod (3HCFPD).
Peas eaten without pods = *Pisum sativum* (PIBSX) + grown for human consumption fresh without peel or pod (3HCFWD).

8 | LOCATIONS FOR PPP USE

Separately defining locations where PPPs are used independently from the crop itself avoids the necessity of multiplying crop categories such as 'Glasshouse tomatoes', 'Field-grown vegetables' and 'Indoor plants'. Locations are assigned new six-character Codes starting with 3 and

ending with L. There are three main categories: field and semi-open structures (3FIEDL), greenhouses (3GREEL) and indoors (3INDRL) to be used in combination with crop or crop group Codes.

From a standpoint of PPP uses, crops grown in semi-open structures are considered in the same category as crops grown in fields because these structures do not prevent release of PPPs into the environment. Detailed Codes (with definitions) for semi-open structures (e.g. high or low, plastic or net shelters or tunnels) have been provided. A definition of greenhouse has been provided within the Code 3GREEL grown in greenhouses. Indoors (3INDRL) is to be used for treatments applied in closed walk-in buildings such as mushroom houses or structures for witloof chicory or rhubarb forcing.

Examples of how to use Codes for location for plant protection product use

Field tomato = *Solanum lycopersicum* (LYPES) + field and semi-open structures (3FIEDL).
Post-harvest treatment of potatoes or apples = *Solanum tuberosum* (SOLTU) or *Malus domestica* (MABSD) + harvested fresh crops (3HARFO) + indoors (3INDRL).

9 | TREATMENTS

For the purposes of defining a use, the treatments category relates primarily to three categories: treatment equipment, treatment methods and treatment qualifiers. Each Code under 'treatments' is assigned a new six-character Code starting with 3 and finishing with M.

Treatment equipment (3TEQUM) includes codes such as air-blast equipment (3AIRBM), aircraft equipment (3AIRCM) and manual equipment (3MANUM), and explanations on when these Codes should be used have been provided.

Treatment methods (3TMETM) includes Codes such as spraying (3SPRYM), fumigating (3FUMIM), injecting (3INJEM) and coating (3COATM). The coating method can be by dressing (3CODRM), by encrusting (3COENM) or by pelleting (3COPEM). Definitions have been provided for all treatments under treatment methods 3TMETM.

Codes within the category 'treatment qualifiers' (3TQUFM) have been assigned to provide additional information about the way a treatment is carried out. This includes Codes for treatment of individual plants (vertically treated individual plants 3INDVM or horizontally treated individual plants 3INDPM), spot application (horizontal 3SPOTM or vertical 3SPOVM), vertical band application (3VBANM) useful for high-growing crops and treatment between rows (3BROWM), in rows (3IROWM) or of rows (3TROWM).

Examples of how to use Codes for treatments

A treatment for botrytis control, targeted to the zone where grapes are present, applied by air-blast equipment on table grapes = *Botrytis cinerea* (BOTRCI) + *Vitis vinifera* (VITVI) + grown for human consumption fresh (3HCOFD) + vertical band application (3VBANM) + air-blast equipment (3AIRBM).
For herbicide applications directly to single weeds, e.g. spot application on dock = *Rumex* sp. (RUMSS) + horizontal spot application (3SPOTM).
For treatment between the rows of the crop, e.g. herbicide treatment in strawberry rows where the area within the crop row is not treated as it is covered by black plastic = *Fragaria* × *ananassa* (FRAAN) + treatment between rows (3BROWM).
For treatment in the row of the crop without treating the crop itself, e.g. a herbicide treatment to control the grass area between two trees in a tree nursery, the Code 3IROWM (treatment in the row) should be used. This Code should be used, for example, for band application of herbicides in high growing crops (where only the ground below the crop is treated).
For treatment of the whole row of the crop, e.g. treatment with nematicidal granules in potato rows, just after planting, the Code 3TROWM (treatment of the row) should be used.

10 | FURTHER SPECIFICATIONS

The harmonized classification does not allow the user to invent new terms or Codes beyond those which appear in the currently approved lists.

Systems using the EPPO classification and Codes can give to users the possibility of providing other information in the form of free text. This information is completely at the discretion of the user. Since these specifications are not coded, they will remain in the language in which they are entered. Examples of additional useful information to describe a use could be the growth stage of the crop, specified cultivars, the life stage of the pest or the formulation type of the product.

Examples of how to use further specification as free text

Baby-leaf field production of vegetable brassica crops and peas = vegetable brassica crops (3VBRC), *Pisum sativum* (PIBSX) + grown for human consumption fresh (3HCOFD) + field and semi-open structures (3FIEDL) + further specifications: *Baby-leaf-production, crops to be harvested at BBCH 18*.

Fungicide field spray in wheat against ear fusariose = wheat crops (3WHEC) + fusarium (1FUSAG) + field and semi-open structures (3FIEDL) + spraying (3SPRYM) + further specifications: *Ear fusariose, treatment from BBCH 59 to BBCH 69*.

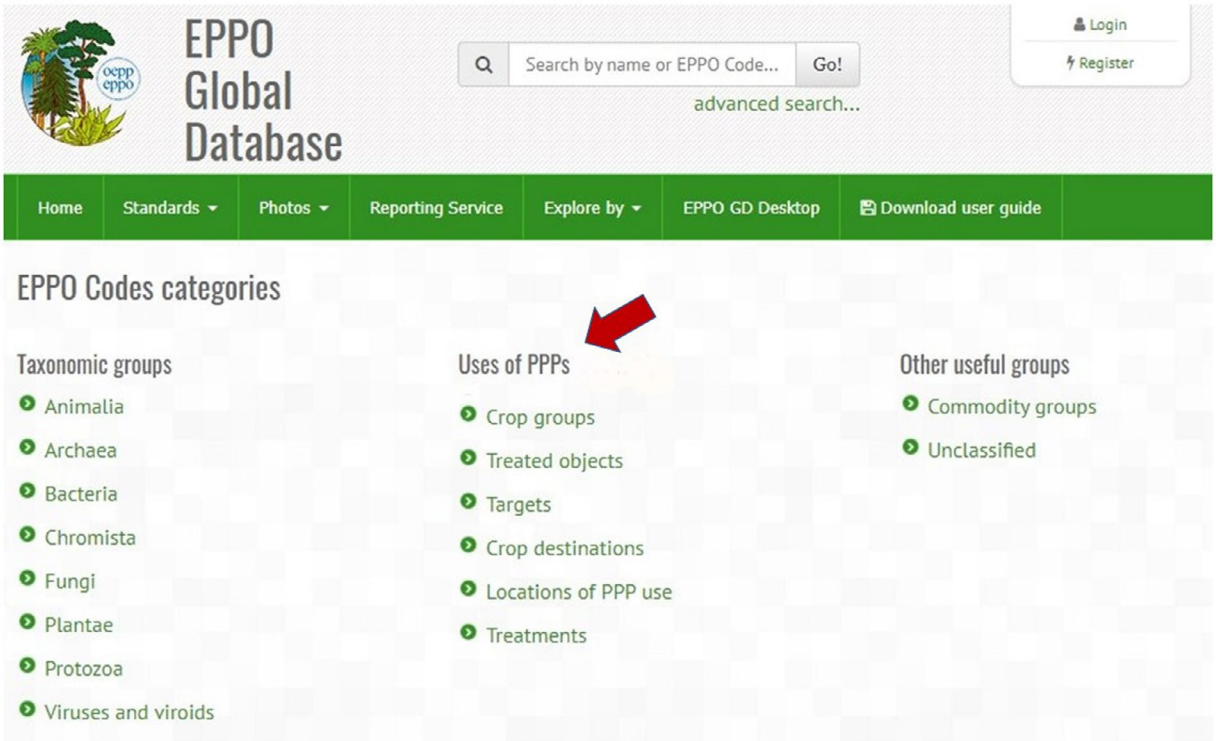
11 | PROCEDURE FOR THE ADOPTION OF EPPO NON-TAXONOMIC CODES

The lists of terms and associated non-taxonomic Codes for crops, crop groups, treated objects, crop destinations, locations, targets and treatments are maintained and updated by the EPPO Expert Working Group on the Harmonization of Data on Plant Protection Products and maintained up to date in the EPPO Global Database.

If a new term to describe the uses of a PPP is considered necessary, it can be proposed to the EPPO Secretariat and the EPPO Expert Working Group will consider such proposals.

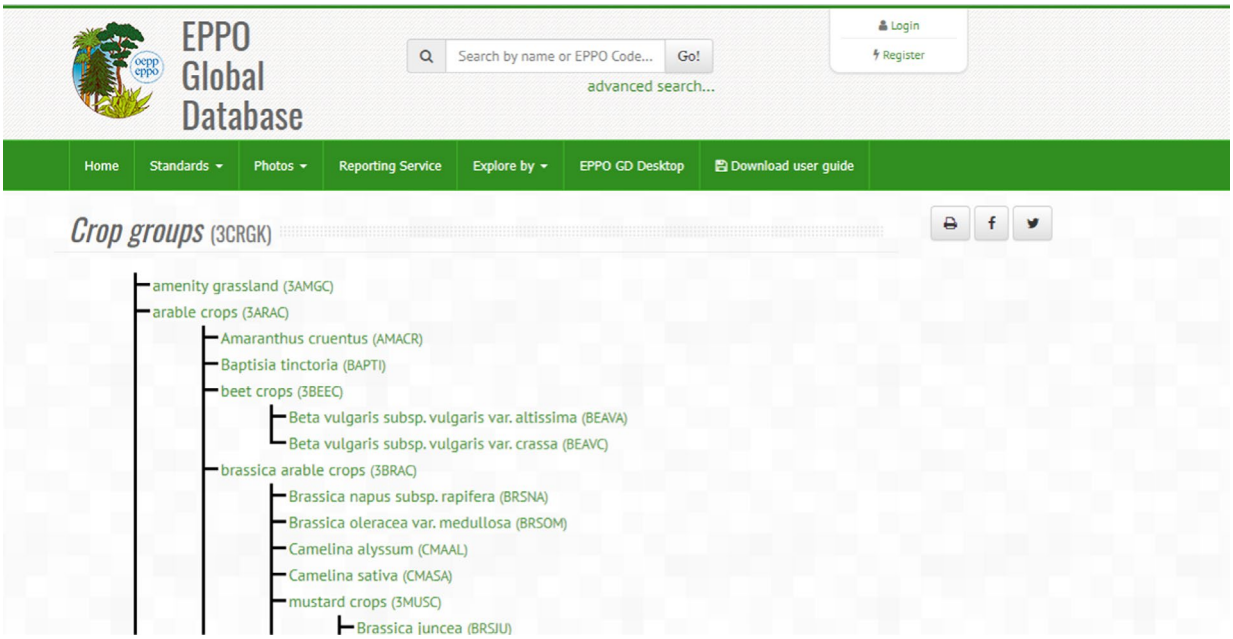
APPENDIX I HOW TO FIND THE EPPO CLASSIFICATION TO DESCRIBE THE USES OF PLANT PROTECTION PRODUCTS IN THE EPPO GLOBAL DATABASE

The harmonized classification with the associated EPPO Codes is made available on the EPPO Global Database website (https://gd.eppo.int/). More specifically, to see all EPPO Code categories (including taxonomic kingdoms) users can visit https://gd.eppo.int/taxon/



For an alternative visualization of the PPP Uses Classification users can visit https://gd.eppo.int/PPPUse/.

By clicking on 'View the expanded list' users can visualize the hierarchy of the classification for the six main categories.



It is to be noted that a number of historical non-taxonomic Codes are still available in the system. The historical Codes are the non-taxonomic Codes (such as NNNGG for cereals, NNNAA for spice plants, NNNZZ for ornamentals). They are also included in the EPPO Global Database but under a distinct section ('Unclassified'). This clear separation from the EPPO classification (as described in the Standard) provides IT specialists with an easy way to exclude this set of historical Codes from their own IT systems, if appropriate, while the historical codes remain available for those users who still need them.