Crop related aspects of crop canopy spray interception and spray drift from downward directed spray applications in field crops

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1 Wageningen Environmental Research

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When spraying Plant Protection Products (PPPs), spray drift and crop interception are two important factors which influence the exposure of aquatic organisms in surface water to PPP. This exposure occurs either in a direct way via deposition of spray droplets on the surface water through spray drift or in an indirect way via the exposure of the soil underneath plants followed by transport of PPP to the surface water by drainage and/or runoff.

Edge of field scenarios for the exposure of aquatic organisms in surface water were developed for downward directed spray applications in field crops. A software tool, DRAINBOW, is being developed to facilitate the calculations needed to assess the exposure of aquatic organisms in surface water.

Authorisation is given based on the PPP label, which specifies among others the dose, the application technique (e.g. spraying, seed treatment), timing and frequency of the application and possible mitigation measures (e.g. spray drift reducing technologies, width of a crop-free buffer zone). Because spray drift and crop interception depend on the information specified on the label it is necessary to link all these parameters carefully. This report describes the data and the methods used in the DRAINBOW tool to link spray drift and crop interception to the information on the PPP label for downward directed spray applications.

Spray drift deposition on surface water is shown to be different depending on spray drift reducing technology class (DRT), crop dependent last nozzle position, width of the crop-free buffer zone, crop growth stage and position and width of the surface water.

Key words: spray drift, crop interception, drainage, surface water, field crop, crop growth stage, BBCH, Drift Reducing Technology (DRT), buffer zone, plant protection product (PPP), pesticide

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Photo cover: zande-standard-sprayer-potato_IMG_8018.JPG

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Summary

When spraying Plant Protection Products (PPPs), spray drift and crop interception are two important factors which influence the exposure of aquatic organisms in surface water to PPP. This exposure occurs either in a direct way via deposition of spray droplets on the surface water through spray drift or in an indirect way via the exposure of the soil underneath plants followed by transport of PPP to the surface water by drainage and/or runoff. Authorisation is given on the basis of the PPP label which specifies among others the crop(s) in which the PPP can be used, the dose, the application technique (e.g. spraying, seed treatment), timing and frequency of the application and possible mitigation measures (e.g. spray drift reducing technologies, width of a crop-free buffer zone).

Edge of field scenarios for the exposure of aquatic organisms in surface water were developed for downward directed spray applications in field crops. A software tool, DRAINBOW, is being developed to facilitate the calculations needed to assess the exposure of aquatic organisms in surface water.

The spray drift entry route is incorporated in the DRAINBOW software tool via spray drift curves. The spray drift curve for downward directed spray applications in field crops depends on the width of the minimal agronomic crop-free zone and the position of the last nozzle of the spray boom. Consequently, different spray drift curves for so-called crop classes for downward directed spraying are incorporated in DRAINBOW.

In the Dutch PPP registration procedure, the so-called DTG list ('Definitielijst Toepassingsgebieden Gewasbeschermingsmiddelen' / 'Dutch crop definition list') is used. This DTG list contains the standard terminology for scopes of permitted use for the PPP label (i.e. listing all crops for which the use of a PPP can be requested). This DTG list (v2.2; June 2019) is therefore incorporated in the DRAINBOW tool. The different field crops in the DTG list and the other information on the PPP label need to be linked carefully, because spray drift and crop interception depend on these parameters.

This report describes the data and the methods used in the DRAINBOW tool to link spray drift and crop interception to the information on the PPP label for downward directed spray applications.

Both spray drift and spray interception are related to crop growth development. The BBCH codes (from 00 to 99), a system for uniform coding of phenologically similar growth stages of plant species, was used to characterize crop growth development. An overview is given of the data and methods used to link crop growth development, specified by its BBCH code, to spray drift and spray interception for downward directed spray applications. The relation between crop growth development and time during the growing season is given in fortnight periods. Also the distinction whether a crop is grown only in the summer period or also in the winter period is given. Spray drift from spray applications in a developed crop growth situation is different from that of a bare soil/short crop situation, with more spray drift occurring in a developed crop growth situation. Consequently, two spray drift curves, each representing one of the two situations were distinguished for the different crop classes for downward directed spraying. Information is provided at which BBCH code which spray drift curve is used.

Furthermore, spray drift deposition on surface water is shown to be different depending on spray drift reducing technology class (DRT), crop dependent last nozzle position, width of the crop-free buffer zone, crop growth stage and position and width of the surface water.

Samenvatting

Bij bespuitingen met gewasbeschermingsmiddelen (gbm) zijn spuitdrift en gewasinterceptie twee belangrijke factoren die de blootstelling van waterorganismen door gbm in het oppervlaktewater beïnvloeden. Deze blootstelling treedt op door een directe of een indirecte route. Bij de directe route komen druppels spuitvloeistof door drift tot depositie op het wateroppervlak. Bij de indirecte route komt via depositie van spuitvloeistof op de grond onder het bespoten gewas, gevolgd door transport van gbm door drainage en/of oppervlakkige afspoeling gbm in het oppervlaktewater. De toelating van gbm is geregeld via het etiket op de verpakking en geeft aan in welke gewassen het gbm gebruikt kan worden, de dosering van het middel, de toedieningstechniek (bv. spuiten, zaaizaad ontsmetting), tijdstip en frequentie van toedienen en de benodigde mitigerende maatregelen (bv. drift reducerende technieken (DRT), breedte van de teeltvrije zone).

Scenario's zijn ontwikkeld voor de blootstelling van wateroppervlak door bespuitingen langs de perceelsrand van een veldgewas. Om de benodigde evaluaties voor de blootstelling van oppervlaktewater uit te voeren wordt daarvoor het software-instrumentarium DRAINBOW ontwikkeld.

De spuitdrift blootstellingsroute is in DRAINBOW opgenomen door gebruik te maken van drift curves. Deze driftcurves worden bij neerwaartse bespuitingen medebepaald door de breedte van de minimale agronomische teeltvrije zone en de positie van de laatste spuitdop op de spuitboom. Als gevolg daarvan zijn er verschillende drift curves voor groepen van neerwaarts bespoten gewassen en in DRAINBOW opgenomen.

In de Nederlandse toelatingsprocedure van gbm wordt de zogenaamde DTG-lijst ('Definitielijst Toepassingsgebieden Gewasbeschermingsmiddelen') gebruikt. Deze DTG-lijst bevat de standaard terminologie voor toepassingsgebieden van gbm voor het Wettelijk Gebruiksvoorschrift (WG). De DTG-lijst (v2.2; juni 2019) is daarom opgenomen in het DRAINBOW software instrumentarium. De verschillende veldgewassen benoemd in de DTG-lijst moeten zorgvuldig gekoppeld worden aan de overige informatie op het gbm etiket omdat spuitdrift en gewasinterceptie daaraan gekoppeld zijn. In dit rapport worden de achterliggende data en de methoden beschreven die in DRAINBOW gebruikt worden om spuitdrift en gewasinterceptie te koppelen aan de benodigde informatie voor het gbm etiket van neerwaarts gespoten veldgewassen.

Spuitdrift en gewasinterceptie zijn beiden ook afhankelijk van de gewasontwikkeling gedurende het groeiseizoen. De BBCH-codes, een systematiek voor het uniform coderen van de fenologische ontwikkelstadia (00 to 99) van plantsoorten, worden gebruikt om de gewasontwikkeling te karakteriseren. Een overzicht wordt gegeven van de achterliggende data en methoden om de gewasontwikkeling gedurende het groeiseizoen, zoals beschreven met BBCH-codes, te koppelen aan spuitdrift curves en gewasinterceptie parameters. De relatie tussen gewasontwikkeling en de tijd gedurende het groeiseizoen wordt per veertiendaagse periode gegeven. Ook wordt aangegeven of een gewas alleen in de zomerperiode op het veld staat of ook in de winterperiode. De drift voor bespuitingen in een ontwikkeld gewas verschilt van de drift bij bespuiting van een kort gewas of kale grond voor opkomst. De drift bij de bespuiting van een ontwikkeld gewas is namelijk hoger dan bij bespuiting van een kort gewas. Als gevolg daarvan zijn er voor neerwaarts gerichte bespuitingen per gewas twee driftcurves, voor ieder van de twee situaties; kale grond/kort gewas en ontwikkeld gewas. Bij welke BBCH-code welke drift curve gebruikt moet worden wordt per gewas gegeven.

Verder is de drift depositie op wateroppervlak ook afhankelijk van het gebruik van drift reducerende technieken (DRT) in de verschillende driftreductieklassen (50 tot 99), de gewasafhankelijke positie van de laatste spuitdop, de breedte van de teeltvrije zone, het ontwikkelstadium van het gewas en de wateroppervlak breedte van het oppervlaktewater.

1 Introduction

When spraying plant protection products (PPPs) with downward directed spray techniques, spray drift and crop interception are two important factors which influence the exposure of aquatic organisms in surface water to PPP. Exposure occurs either in a direct way via deposition of spray droplets on the surface water (i.e. spray drift deposition and atmospheric deposition) or in an indirect way via the exposure of the soil underneath plants followed by transport of PPP to the surface water by drainage and/or runoff. In future Dutch surface water scenarios drainage, spray drift deposition and atmospheric deposition are assumed to be the relevant pathways causing PPP to arrive in the surface water.

For the Dutch authorisation process of PPPs edge of field scenarios for the exposure of aquatic organisms in surface water were developed for downward directed spray applications in field crops (Tiktak *et al.*, 2012a). To facilitate the calculations needed to assess the exposure of aquatic organisms in surface water assessment a software tool, DRAINBOW, was developed.

The spray drift entry route is incorporated in the DRAINBOW software tool via spray drift curves. The spray drift curve for downward directed spray applications in field crops depends on the width of the minimal agronomic crop-free zone and the position of the last nozzle of the spray boom. Consequently, different spray drift curves for so-called crop classes for downward directed spraying are incorporated in DRAINBOW. Entries via drainpipes are calculated with the aid of the PEARL model (Tiktak *et al*, 2012b).

Authorisation is given on the basis of the PPP label which specifies among others the crop(s) in which the PPP can be used, the dose, the application technique (e.g. spraying, seed treatment), timing and frequency of the application and possible mitigation measures (e.g. spray drift reducing technologies, width of a crop-free buffer zone).

The Dutch ministries decided that in the Dutch authorisation process for the use of a PPP an authorisation can be requested for crops listed in the so-called DTG list ('Definitielijst Toepassingsgebieden Gewasbeschermingsmiddelen' / 'Dutch crop definition list; Ctgb, 2019a). This DTG list (v2.2) is therefore incorporated in the DRAINBOW tool and DRAINBOW needs to be able to determine spray drift deposition and spray interception for each crop in the DTG list. Spray drift and crop interception depend on the information specified on the PPP label. It is therefore necessary to link all these parameters carefully. This linking is done automatically by the DRAINBOW software tool. This report describes the data and the methods used in the DRAINBOW tool to link spray drift and crop interception to the information on the PPP label for downward directed spray applications.

Both spray drift and spray interception are related to crop growth development. We used the BBCH codes (from 00 to 99) to characterize crop growth development. The BBCH scale is a system for uniform coding of phenologically similar growth stages of all plant species (BBCH, 2001). This report gives an overview of the data and methods used to link crop growth development, specified by its BBCH code to spray drift and spray interception for downward directed spray applications.

In case a bare soil surface is sprayed, spray drift is lower than spraying a developed crop. Therefore, different spray drift curves are determined for these two situations (van de Zande *et al.*, 2012). We indicated for each crop in the DTG list the period, specified by BBCH codes, for which a bare soil surface spray drift curve is to be used (BBCH 00-x) and the period for which a cropped situation spray drift curve is to be used (BBCH x-97). As crops vary in their typical layout of row spacing, minimal crop-free zones are used to grow a crop and accordingly the position of the last nozzle of the spray boom to the last crop row varies for different crop groups. For downward directed spraying nine different situations of minimal agronomic crop-free zone and a corresponding last nozzle position are distinguished. Thus, besides from two different spray drift curves for a bare soil and a cropped

situation, nine different spray drift curves were determined for the nine different situations of minimal agronomic crop-free zone and a corresponding last nozzle position. This resulted in a total of 18 spray drift curves from which the relevant curve needs to be selected for each exposure assessment of aquatic organisms.

Spray interception is also related to crop growth development stage (BBCH, 2001). FOCUS (2000) created the linking of growth stages and interception for several crop types (Anonymous, 2014). We linked this table to the crops in the DTG list, specifying for each crop in the list the BBCH codes per half-month periods during the year.

Furthermore, it was necessary to indicate for each crop in the DTG list, whether it should be labelled as a winter crop or as a summer crop. This was needed because the Dutch scenario for exposure of aquatic organisms was made available for both a winter crop and a summer crop (Tiktak *et al.*, 2012a).

2 DTG list

In the Dutch authorisation process for the use of a Plant Protection Product, an authorisation can be requested for crops that are listed in the 'Definitielijst Toepassingsgebieden Gewasbeschermings-middelen' (Dutch crop definition list; in this report referred to as the DTG-list; Ctgb, 2019a). The full DTG-list (v2.2) is given in Annex 1 of this report including it adaptations done for operating the DRAINBOW software tool. The DTG-list has a hierarchical structure containing four levels for subdivision: Sectors, Crop groups, Crop sub groups and Crops (Figure 1). Table 1 gives the example of the crop category cereals.

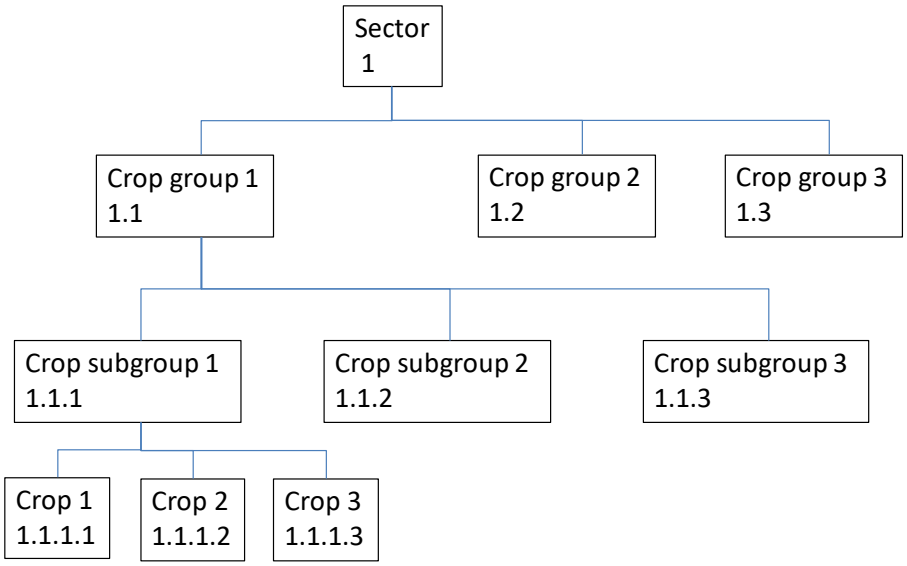

Figure 1 *hierarchical structure of the DTG-list.*

Table 1 *Set up of the DTG-list: example of Crop group cereals.*

Sector	Crop group	Crop subgroup	Crops
1. Arable crops			
	1.3 cereals		
		1.3.1 Winter cereals	
			1.3.1.1 Winter wheat
			1.3.1.2 Winter barley
			1.3.1.3 Winter rye
			1.3.1.4 Triticale
			1.3.1.5 Spelt
			1.3.1.6 Canary grass
		1.3.2 Spring cereals	
			1.3.2.1 Spring wheat
			1.3.2.2 Spring barley
			1.3.2.3 Spring rye
			1.3.2.4 Oats
		1.3.3 Other cereals	

The complete DTG-list is incorporated in the DRAINBOW software tool. The Dutch ministries decided that evaluation always needs to be done on the level of the category 'crop', so the lowest level possible. So, for each crop in the DTG-list PECs can be calculated with DRAINBOW. The user can select one or several crops from the category 'Crop' and DRAINBOW will calculate for each selected crop

Predicted Environmental Concentrations (PECs) in a surface waterbody. However, for several cultivation categories differentiation stops at the level of 'Crop category' or 'Crop subcategory' or even at 'Sector category' (for instance categories: 3.2.1, 7.4, 7.5, and 7.7 in Annex 1). Omitting them is not an option, so the working group decided to perform calculations at the lowest available DTG category level.

The crops of the DTG list can be grouped to groups of crops that are treated with crop protection products using similar application techniques. Distinguished application techniques are: downward spray techniques, sideways and upward spray techniques and special application methods. Special application methods can be: handheld boom spraying, knapsack spraying, spreading of granules (with or without incorporation in the soil), seed treatment, etc.. For the different combinations of application method – crop group, different scenarios are distinguished for the authorisation of PPP. Schematically this is presented in the scheme of Table 2.

Table 2 *Scheme of grouped crops using similar application techniques for the treatment with crop protection products and scenario development steps. In between brackets the main DTG-entry is given. The different type of scenarios are indicated by numbers 1 to 5.*

Entry from DTG list	Downward directed spraying	Sideways and upward directed spraying	Special application methods
Field crops: Arable (1), vegetable (4), herb (5), ornamental (7) crops	1	2	
Fruit- (3) and avenue tree (7.3.1) crops	3	4	
Cultivated grassland	5	Not relevant	
Mushrooms (6)			Insecticides with handheld equipment on the beds or with fog equipment as a room/space application. Indoor application in special designed mushroom growing cells.
Amenity areas (8)	Grass vegetation Lawn, playing fields, sports fields Herbaceous plantings Windbreaks, hedges - herbicides		Handheld equipment, (small) boom sprayers Granulates by hand or small spreader
		Windbreaks, hedges, avenue and border trees, woody plantings-insecticides	Handheld equipment, large air capacity airblast sprayer
Forestry (9)			Not clear, not aerial
Uncultivated land (10)	Temporarily/permanently uncultivated land Deforestation area Buffer areas of fields		Small boom sprayer, handheld equipment
Water courses (11)	Bank or Dry ditches Maintenance paths		Small boom sprayers, hand held equipment
Reed and osier crops (12)			Handheld equipment, small boom sprayer
Refuse heaps (13)			Knapsack, handheld equipment
Stored products (14)			Handheld equipment, Knapsack, (cold) foggers, misters, room application
Disinfectants (15)			Handheld equipment
In and around the house (private garden) (16)	Vegetable garden Ornamental garden Indoor/outdoor		Handheld equipment, small boom sprayer Knapsack, granulates
		Vegetable garden	Handheld equipment

In this report the scenario (1) for downward directed spraying of field crops is described (Zande *et al.*, 2012; Tiktak *et al.*, 2012a). The scenarios for sideways and upward directed spraying of fruit and tree crops (4) and sideways and upward directed spraying of field crops (2) is also developed and separately reported (Zande *et al.*, 2019; Boesten *et al.*, 2018). Necessity of the development of scenarios for all other combinations of application technique and crop is a policy decision which needs to be made by the responsible Dutch ministries (see Annex 6 for more background information).

All crops that are not relevant for scenario 1 (downward spraying of field crops) are listed in Table 3.

Table 3 *Crops in DTG list not relevant for downward spraying of field crops.*

DTG entry number	crop	Reason why not relevant for downward spraying of field crops
1.11.1.4	Hops	In upward/side-ways sprayed scenario of field crops (scenario 2 in Table 2).
2.	Cultivated grassland	Separate scenario (scenario 5 in Table 2)
3.	Fruit crops	Not a field crop: In upward/sideways sprayed scenario for fruit and avenue tree crops (scenario 4 in Table 2); except strawberries (3.2.1) and cranberry (3.2.2.4) which are both sprayed downwards for which drift curves of downward spraying of field crops are applicable.
4.1.5	Vegetable Sprouts	Indoor growth room crop
4.3.1.3	Cucumbers	Greenhouse crop
4.3.2.2	Melon	Greenhouse crop
4.3.2.3	Watermelon	Greenhouse crop
4.3.3	Fruiting vegetables of Solanaceae	Greenhouse crop
4.3.4.1	Okra	Greenhouse crop
6	Mushrooms	Indoor growth room crop
7.3.1.1	Spindle trees	In sideways and upward sprayed of fruit/trees scenario (scenario 4 in Table 2)
7.3.1.2	Transplanted trees	In sideways and upward sprayed of fruit/trees scenario (scenario 4 in Table 2)
7.3.1.3	High Avenue trees	In sideways and upward sprayed of fruit/trees scenario (scenario 4 in Table 2)
7.6	Marsh and Water plants	Not a field crop
7.7	Plant breeding crops and basic seed production for arable, vegetable and fruit crops, herbs and ornamental crops.	The working group decided that the relevant crop from the DTG list must be used. However, in case of unknown crop growth situations (e.g. a biennial crop growth cycle) it is advised to use the DTG crop forage maize (1.4.1.1).
8	Amenity areas	Not a field crop
9	Forestry	Not a field crop
10	Uncultivated land	10.2 Permanently uncultivated land is not a field crop
11	Water courses	Not a field crop
12	Reed and osier crops	Not a field crop
13	Refuse heaps	Not a field crop
14	Stored products	Not a field crop
15	Disinfectants	Not a field crop
16	In and around the house, private garden	Not a field crop

Although crop category 7.7 is relevant for downward spraying of field crops, crop growth periods could not be determined because of the large range of crops possible (Appendix 2). Therefore, the working group decided that instead the notifier/registrant should use the relevant field crop instead in DRAINBOW; e.g. seed production of winter wheat should be treated as winter wheat.

For some crops however, the production of seed is done up till other (higher) growth stages and over a longer field period (two years instead of one growing season) than the cultivation for harvestable products. The seed crop can e.g. grow up to larger plants and be higher (e.g. seed shoots of sugar

beet) than the harvestable tuber or root plants and go from a vegetative stage in the first year to a generative stage in the second year. The spray drift curve of these seed crops could therefore be different from the harvestable crop. It is therefore advised to use a 'worst case' spray drift curve as default, being the 'maize' spray drift curve (DW2, nozzle position -0.125; Table 12). In practice this means that the applicant/evaluator need to select the forage maize crop (1.4.1.1) from the DTG list in DRAINBOW when performing the surface water exposure assessment for a seed crop with an unknown or biennial crop growth cycle.

The difference in length of the crop growth cycle described above is not addressed in the DTG list. Moreover, the biennial growth cycle of the crops is not addressed in the crop category 7.7 of the DTG-list. We therefore advise to modify the DTG list to take into account the specific crops for seed production and identify the seed crops that differ in plant height and multi-year growth periods from the harvestable crops.

The DTG-list was provided by the Board for the Authorisation of Plant Protection Products and Biocides (Ctgb) in the Netherlands (version 2.2; Ctgb, 2019a). For sensible use in DRAINBOW we modified the list for those crops which required a subdivision for summer crops and winter crops (oil seed rape, flower bulbs) and for those crops requiring a subdivision because of different drift curves (spindle trees, transplanted trees, high avenue trees within the crop group tree nursery (note: lane tree cultivation is not part of the field crop scenario). The modifications are listed below:

- Oilseed Rape (1.7.1.5 in the DTG list v2.2) was split into Winter Oilseed Rape (1.7.1.5) and Summer Oilseed Rape (1.7.1.6). Subsequent crops in the same crop subcategory were numbered consecutively.
- Flower bulbs and Flower tubers cultivation for reproduction (7.1.1.1 in DTG list v2.2) was split into Winter Flower bulbs and Flower tubers cultivation for reproduction (7.1.1.1; hyacinth, tulip, narcissus and crocus) and Summer Flower bulbs and Flower tubers cultivation for reproduction (7.1.1.2; amaryllis, dahlia, gladiolus, lily, iris, other flower bulbs and corms). Subsequent crops in the same crop subcategory were numbered consecutively.
- Bulb flower and Tuber flower forced cultivation (7.1.1.2. in DTG list v2.2) was split into Winter Bulb flower and Tuber flower (7.1.1.3; hyacinth, tulip, narcissus and crocus) and Summer Bulb flower and Tuber flower (7.1.1.4; amaryllis, dahlia, gladiolus, lily, iris, other flower bulbs and corms).
- Crop 'Avenue trees' (7.3.1.1 in the DTG list v2.2) was split into Spindle trees (7.3.1.1), Transplanted trees (7.3.1.2) and High avenue trees (7.3.1.3). Subsequent crops in the same crop subcategory were numbered consecutively (note: this crop is not included in the field crop scenario in DRAINBOW since application is upward/sideways).

The resulting table, including the modifications, is shown in Annex I.

3 Summer or winter crops

The edge of field scenarios for the exposure of aquatic organisms in surface water developed (Tiktak *et al.*, 2012a) obtains next to spray drift as entry route to the surface water also drainage as entry route. To cover this route, a drainpipe exposure scenario was developed and parameterised in the PEARL model (Tiktak *et al.*, 2012b). This drainpipe scenario for PEARL is made available for a winter crop and a summer crop. The working group selected the PEARL parameterisation of the FOCUS crop winter cereals for FOCUS groundwater scenario Hamburg as the representative crop for all winter crops and the PEARL parameterisation of the FOCUS crop sugar beets for FOCUS groundwater scenario Hamburg was selected to represent all summer crops. These two crops are chosen because they are both predominantly grown on soils where preferential flow is important and because the crop factors for these two crops are relatively close to the crop factor of winter wheat at the Andelst field site that was used for selection of the drainage scenario (Tiktak *et al.*, 2012a). The working group defined a winter crop as a crop that is present in the field during the winter period (1 November- 31 March). A crop may be present during this period because it is planted or seeded before the winter or because it is a perennial plant. Crops not present in the field between 1 November and 31 March are defined as summer crops.

The software tool DRAINBOW automatically determines whether a crop is a summer crop or a winter crop. Table 4 shows the DTG-crops that are identified as winter crops, all other crops are assumed to be summer crops.

Table 4 *Overview of DTG-crops that are identified as winter crops. All crops in the DTG-list that are not given in this table are assumed to be summer crops.*

Sector[1]	Crop group, Crop subgroup or Crop[2]	
1. Arable crops	1.3.1	All winter cereals
	1.6	All grass seed crops
	1.7.1.2	Caraway
	1.7.1.5	Winter oilseed rape
	1.9.2	Gramineae green manure crops (rye and rye-grass)
	1.10.1.2	Alfalfa
	1.11.1.7	Elephant grass
2. Cultivated grassland	2.	All crops
3. Fruit crops[3]	3.	Not applicable
4. Vegetables	4.4.1.2	Brussels sprouts
	4.4.3.2	Curly Kale
	4.6.1.3	Second year bulb onions
	4.7.1.1	Asparagus
5. Herbs	5.5.1.1	Caraway (seed)
7. Ornamental crops	7.1.1.1	Tulips, hyacinth, crocus and narcissus (Winter Flower bulbs and Flower tuber for reproduction)
	7.1.1.3	Tulips, hyacinth, crocus and narcissus (Winter Flower bulbs and Flower tuber for forced cultivation)
	7.4	Perennial crops
10. Uncultivated land	10.1.1.1	Deforestation area
	10.1.1.2	Temporarily uncultivated land
	10.1.1.3	Buffer areas of fields

1) 'Sector' in the DTG-list. The numbers refer to the number in the DTG-list v2.2.

2) 'Gewasgroep', 'gewassubgroep' or 'gewassen/objecten' in the DTG-list. The numbers refer to numbers in the DTG-list. Only winter crops are listed; all other crops are summer crops.

3) Separate scenarios will be developed for fruit crops. However, strawberries (3.2.1), small cranberries (3.2.2.4) and other small fruit crops (3.2.2.10) are assessed as downward sprayed summer crops.

4 Growth phases of the crop

Spray deposition on soil surface underneath canopy and the interception of the spray by the canopy is influenced by crop development. The seasonal trend of the crop development stage depends to a large extent on climatological conditions. The link between crop development stage and time is given in Annex 2 for all crops of the DTG-list (Ctgb, 2019a) and represents average Dutch conditions. The relation is merely based on labour film distributions of field activities (KWIN-AGV, 1985; KWIN-AV, 2006; IKC-AT, 1994; Peppelman & Groot, 2004) and the Pubas/AgroWerk database (Vink *et al*, 1999) and expert judgement on knowledge of the development stage of the crops at moments of activity. In case of uncertainty or failing detailed knowledge, it was assumed that the crop could be addressed as:

1. General early short crop – distribution as of Broad bean
2. General late short crop – distribution as of Beet
3. General long crop – distribution as of Ware potatoes
4. General winter crop – distribution as of Winter wheat

Table 5 shows examples of the seasonal trend of crop development stage (represented by the BBCH code; BBCH, 2001; see also Figure 2) and time for the three different potato crops in the DTG-list. Time is given in periods of half months, where the first half of the month refers to day 1-15 and the second half to the rest of the month. For example, Jan1 is January 1st up and including January 15th.

How to link information on growth phases, as is given for potatoes as an example in Table 5, to figures on spray interception and spray deposition will be explained in the following chapters.

The working group interpreted BBCH codes as follows: BBCH 9 refers to BBCH 9 – 9.99999; which means that rounding off of the BBCH code (e.g. BBCH 9 equals BBCH 8.50 -9.49) is not done in DRAINBOW. This definition is important, because linking Table 5 to the figures on spray interception and spray deposition requires interpolation over time.

Table 5 *Growth phases (BBCH code) and period during the season (half month periods) for three crops of the DTG-list: starch, seed and ware potatoes. Growth phases for other crops are given in Annex 2.*

Crop/BBCH code	0-9	10-19	20-29	30-39	40-89	90-97
Seed potatoes	Mar2 - Apr2	May1 - May2	Jun1 - Jun2	Jul1-Jul1	Jul2 – Jul2	Aug1- Aug1
Starch potatoes	Mar2 - Apr2	May1 - May2	Jun1 - Jun2	Jul1-Jul1	Jul2 - Aug1	Aug2 - Oct2
Ware potatoes	Apr1 - Apr2	May1 - May2	Jun1 - Jun2	Jul1-Jul1	Jul2 - Aug2	Sep1 - Oct1

BBCH 99 is used for the harvested product which means that BBCH 99 is not used for crop growth stages in the field but refers to e.g. post-harvest or storage treatment of the harvested seeds and root tubers (as applied at stage 99). The last crop growth stage identified for crops in the field is BBCH 97, which stands for 'End of leaf fall, plants or above ground parts dead or dormant'. This means that the final growth stage in the field is by definition BBCH 97 (Table 5, Figure 2, Annex 2).

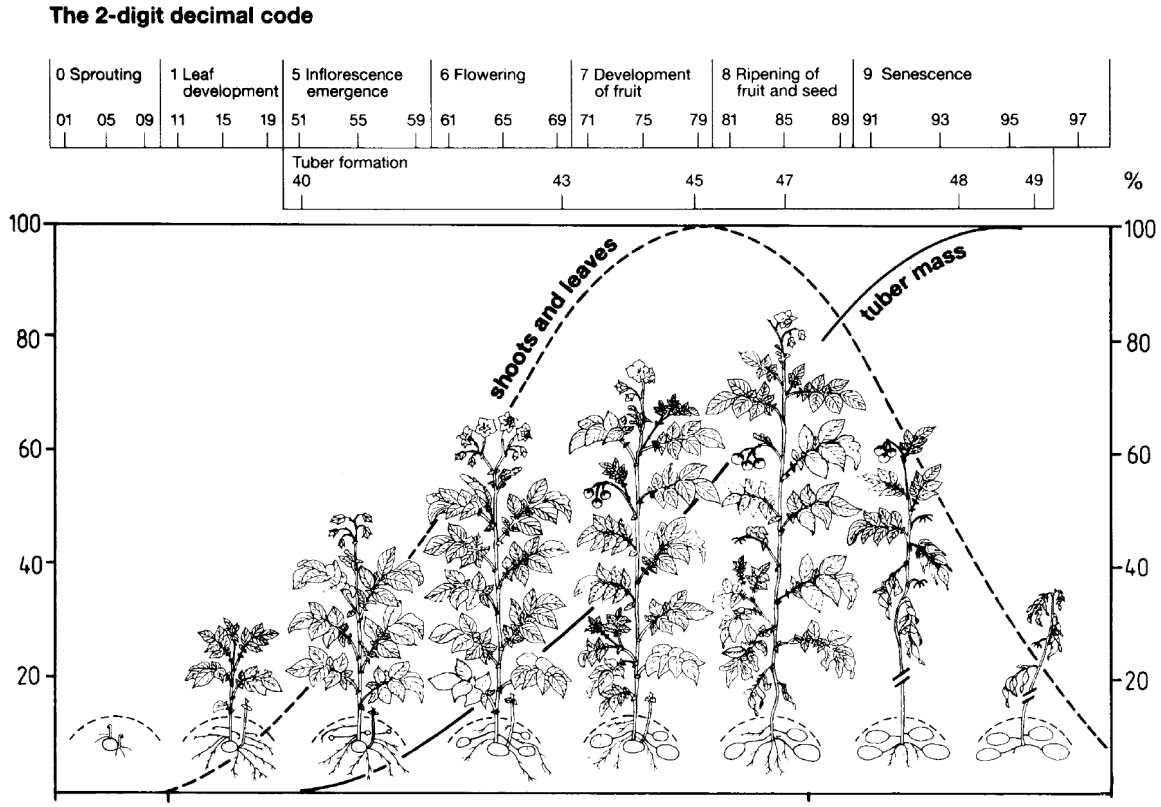

Figure 2 *Example of crop development in time during the growing season for a potato crop, shoots and leaves (dashed line) relative biomass development (% of max.), tuber mass (line) development (% of total) and the BBCH codes of crop stage development (after BBCH, 2001).*

product		weeknr																					
nr	name	type	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
1	Challenge	herbicide	1																				
2	Datura	herbicide	1																				
3	Sencor	herbicide				1	2																
4	Basagran	herbicide				1	2																
5	Revus	fungicide					1	2	3														
6	Teppeki	insecticide						1															
7	Proxanil	fungicide							1	2													
8	InFinito	fungicide								1	2	3		4									
9	Curzate M WG	fungicide									1												
10	Narita	fungicide										1						2					
11	Signum	fungicide												1			2		3				
12	Amistar	fungicide													1								
13	Ranman Top	fungicide													1		2	3	4	5			
14	Imex-Diquat	herbicide																					1
15	Spotlight Plus	herbicide																					1

Figure 3 *Example of an application scheme for different PPPs in ware potato. The columns are week numbers and each coloured cell is an application.*

An example of a typical application scheme of PPPs in ware potatoes (Figure 3) shows that 15 applications are done during the 2016 growing season (J.M.G.P. Michielsen - WUR, personal communication). With these 15 applications 15 products are applied in total, of which one is an insecticide, six are herbicides and eight are fungicides. All products are applied in a tank mixture with 2 or 3 products. The individual products are applied once or up to 5 times.

5 Spray interception by crop canopy

Spray interception data (EFSA, 2014) are specified in Table 6, expressed as percentage of the applied dose (areic mass), for the different crop development stages. This table is taken from Anonymous (2014). Each crop in the DTG-list is coupled to one of the crops specified in Table 6. The complete list of the DTG crops and their corresponding crop from Table 6 is given in Annex 3. The coupling of the DTG crops and the crops given in Table 6 is done automatically in DRAINBOW.

Furthermore, the spray interception data in Table 6 needs to be linked to the information on crop development given as illustrated in Table 5 for potatoes (and as given for all crops in Annex 2). This is also done automatically in DRAINBOW. Linking of the two tables takes place using the BBCH codes (BBCH, 2001). The timing of application needs to be linked to a crop development period as shown in Table 5 for potatoes and in Annex 2 for the relevant DTG crop. Subsequently, the corresponding BBCH code of Table 5 (Annex 2) is linked to the same BBCH code in Table 6 in order to read the spray interception percentage for the relevant crop from Table 6. The method will be explained using the following example. Suppose a plant protection product is applied on May 1st, 8th and 15th in ware potatoes. All applications are in the first half month period 'May 1'. According to Table 5, the crop development period 'May 1' corresponds for ware potatoes to BBCH classes 10-19. Annex 3 shows that the DTG crop ware potatoes corresponds to the crop potatoes in the spray interception table (Table 6). From the spray interception table (Table 6) it can be read that BBCH classes 10-19 for potatoes results in a spray interception of 15% of the applied dosage for all three applications.

Table 6 *Spray interception (% of applied dosage) by crop type and growth stage (BBCH) (after Anonymous, 2014).*

BBCH code*	00–09	10–19	20–29	30-39	40–89	90–97
Beans (field and vegetable)	0	25	40	40	70	80
Cabbage	0	25	40	40	70	90
Carrots	0	25	60	60	80	80
Cotton	0	30	60	60	75	90
Grass	0	40	60	60	90	90
Grass, established turf	90	90	90	90	90	90
Linseed	0	30	60	60	70	90
Maize	0	25	50	50	75	90
Oilseed rape (Summer and Winter)	0	40	80	80	80	90
Onions	0	10	25	25	40	60
Peas	0	35	55	55	85	85
Potatoes	0	15	60	60	85	50
Soybean	0	35	55	55	85	65
Spring Cereals	0	0	20	80	90/80[1)]	80
Strawberries	0	30	50	50	60	60
Sugar beets	0	20	70	70	90	90
Sunflower	0	20	50	50	75	90
Tobacco	0	50	70	70	90	90
Tomatoes	0	50	70	70	80	50
Winter Cereals	0	0	20	80	90/80[1)]	80

*) 00-09 is bare soil until emergence, 10-19 is leaf development, 20-29 is tillering, 30-39 is stem elongation, 40-89 is flowering/ripening and 90-97 is senescence.

1) BBCH 40-69 Development of harvestable vegetative plant parts, Inflorescence emergence, Flowering - 90; BBCH 70-89 development of fruit and ripening – 80.

6 Spray drift deposition on surface water

6.1 Introduction

Concerning spray drift deposition different linkages are needed: i) a link between the spray drift curve to be selected and the crops in the DTG-list on which pesticides are applied by downward directed spray applications (DW in Table 7) and ii) the linkage between the crop development periods (Annex 2) and the choice of either selecting the drift curve representing the bare soil surface/short crop situation or the drift curve representing the developed crop canopy situation (Annex 4). The linking described above is done automatically in DRAINBOW. This chapter will describe the method used by DRAINBOW to perform the coupling of information needed for i) and ii). Furthermore, a description of the spray drift related to the growth situations of the crop is given.

6.2 Link between the spray drift curve to be selected and the crops in the DTG-list

The spray drift curve depends on the application technique and therefore different spray drift curves are available for downward directed spraying techniques (Tiktak *et al.*, 2012a and Zande *et al.*, 2012) and upward and sideways directed spraying techniques (Boesten *et al.*, 2018 and Zande *et al.*, 2019). The relation between the spray drift curve to be selected and the crops in the DTG-list is shown in Table 7. In this table, a distinction is made between herbicide treatments (H), fungicide treatments (F) and insecticide treatments (I) because the spray drift curve to be selected differs between treatments (for example hop, fruits and nursery trees are sprayed downward in the case of herbicide treatments and upward and-sideways in the case of fungicide and insecticide treatments). In this report we defined the numbers in the last three columns of Table 7 as 'crop classes'. Table 7 shows that there are 5 crop classes which means that there are minimal 5 different spray drift curves for the reference situation (standard drift curves, Zande *et al.*, 2012). The crop classes DW1, DW2 and DW3 are sprayed with downward directed spray techniques and the classes US1 and US2 with upward and sideways directed spray techniques. For the downward directed spray techniques, the position of the last nozzle on the spray boom is important to determine the start position of the spray drift curve (Figure 3). Depending on row width of the crop the DTG crops are classified in the classes DW1, DW2, and DW3 representing minimal agronomic crop-free zones of respectively 0.25 m, 0.50 m and 0.75 m. The link between minimal agronomic crop-free zone and nozzle position to the last crop row as indicated in Table 8 is given in Annex 5 for all crops of the DTG-list.

In practice the default crop-free zones are defined in the Activity Decree (I&W, 2017) and read 0.50 m for arable crops, except for intensively sprayed crops for which the crop-free zone is defined at 1.50 m. This mandatory crop-free zone in practice is the addition of the minimal agronomic crop-free zone and an additional width adding up to the total crop-free zone. In the adaptation of the Activity Decree (I&W, 2017) the crop-free zone of cereals was changed from the minimal agronomic buffer zone of 0.25 m to the width of 0.50 m of 'other crops'. Intensively sprayed crops are defined as crops in which generally more than 5 kg/year of PPP are used and crops with more than ten PPP applications per year are performed (VW *et al.*, 2000). In the Activity Decree (I&W, 2017) intensively downward sprayed crops are specified as: potato, onion, carrots, strawberry, asparagus, leek, black salsify, lettuce, flower bulb and flower tuber crops and tree nursery crops (except avenue trees).

Table 7 *Relation between the type of spray drift curve to be selected in the exposure assessment (downward, side- and upward) and the crop (group) in the DTG-list. The numbers in the last three columns are defined as crop classes representing downward (DW) directed classes 1,2,3 and -upward and sideways (US) directed classes 1,2.*

Main crop group[1]	Crop group or crops[2]	H[3]	F[3]	I[3]	remarks
1. Arable crops	Cereals (1.3)	DW1	DW1	DW1	
	Gras seed (1.6)	DW1	DW1	DW1	
	Potatoes (1.1)	DW3	DW3	DW3	
	Hop (1.11.1.4)	DW1[4]	US2	US2	*
	Other arable crops	DW2	DW2	DW2	
2. Culture grassland	All culture grassland	DW1	DW1	DW1	
3. Fruit crops	Strawberries (3.2.1) and cranberries (3.2.2.4)	DW3	DW3	DW3	
	Other small fruit crops (3.2.2, 3.2.3) that are one or two years old	DW3	DW3	DW3	*
	All other fruit crops including small fruit older than two years	DW1[4]	US2	US2	*
4. Vegetables	Spinach (4.1.3)	DW2	DW2	DW2	
	Leaf vegetables (4.1) excluding spinach, onions (4.6), root crops (4.5.2), asparagus (crop in 4.7), Jerusalem artichoke (crop in 4.5.3) and leek (crop in 4.7)	DW3	DW3	DW3	
5. Herbs	Poppy seed and Caraway seed (5.5)	DW1	DW1	DW1	
	Medicinal root crops (5.4)	DW3	DW3	DW3	
	Others herbs	DW2	DW2	DW2	
7. Ornamental crops	Improvement culture and seed production (7.7)	DW1	DW1	DW1	
	Flower bulbs and flower tubers (7.1)	DW3	DW3	DW3	
	Tree nursery (7.3) except 7.3.1.1., 7.3.1.2, 7.3.1.3	DW3	DW3	DW3	
	7.3.1.1., 7.3.1.2, 7.3.1.3	DW1[4]	US1	US1	*
	Other ornamental crops	DW2	DW2	DW2	
10. Uncultivated area	Temporarily uncultivated area including Deforestation area buffer areas of-fields	DW1	DW1	DW1	

1) 'Teeltgroep' in the DTG-list. The numbers refer to the number in the DTG-list.

2) 'Gewasgroep' or 'gewas' in the DTG-list. The numbers refer to numbers in the DTG-list.

3) H is herbicide treatment, F is fungicide treatment and I is insecticide treatment.

4) A separate downward scenario; not in the scenario downward spraying of field crops.

*) The US situations are not relevant for the scenario downward spraying of field crops.

By definition the minimal agronomic crop-free buffer zone cannot be defined for uncultivated land (DTG Sector 10) as no crop is grown at that time. A typical spray drift curve and its minimal crop-free buffer zone is needed to apply the matrix structure methodology of spray drift reduction as presented later on in this report (section 6.4). It was therefore needed to develop a procedure for estimating a realistic value for the minimal crop-free buffer zone for temporarily uncultivated land in between two successive crops. The developed procedure is based on the distance between the directly treated area (Annex 9) and the top of the bank (Figure 3) defining the width of the 'spray free buffer zone'. Applying the procedure resulted in the minimal agronomic buffer zone that is defined at 0.25 m and the smallest nozzle distance as 0.25 m, meaning that the distance between the nozzle and the edge of the ditch is 0.50 m as minimum (DW1, Table 8). As a similar situation occurs in grassland the selected crop-free zone and nozzle position for uncultivated land (Annex 9) could also be applied as an estimate for 'Cultivated grassland' (DTG 2).

Table 8 *Specific crop type groups defined by the minimal agronomic crop-free zone and the last nozzle position for downward directed sprayed crops.*

Crop class	Minimal agronomic crop-free zone[2] (m) [m]	Distance between last nozzle and last crop row[1,2] (m) [d]	Distance between last nozzle and edge of the ditch[2] (m) [c=m+d][3]
DW1	0.25	0.25	0.50
	0.25	0.50	0.75
DW2	0.50	-0.125	0.375
	0.50	0.0	0.50
	0.50	0.25	0.75
	0.50	0.50	1.00
DW3	0.75	-0.125	0.625
	0.75	0.0	0.75
	0.75	0.25	1.00

1) A positive value of [d] means that the last nozzle is positioned inside the last plant row; a negative value means that the last nozzle is positioned outside the last plant row.

2) Definitions of m, d and c are given in Figure 3.

3) Applying situation 2. of Figure 3.

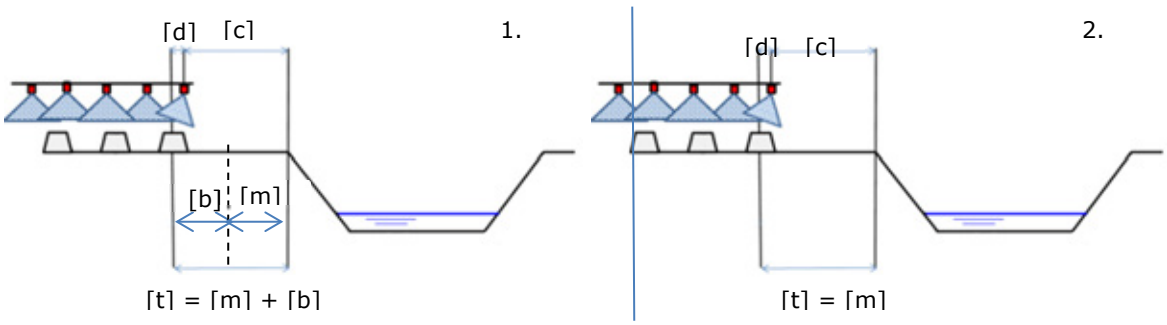

Figure 3 *Schematic representation of the ditch of the Dutch scenario for downward directed spray applications. 1. [t] is the total crop-free zone and the sum of [b] the crop-free buffer zone and [m] the minimal agronomic crop-free zone or the sum of [c] the distance between the last nozzle an the top of the bank and [d] the distance between the last nozzle position and the centre of the last crop row (here negative, i.e. outside the crop). 2. Situation in case [b] is zero.*

6.3 Link between the crop development periods and the choice of either selecting the drift curve representing the bare soil surface/short crop situation or the drift curve representing the developed crop canopy situation

Because crop height is an important factor influencing spray drift from boom sprayers (i.e. spray drift from spraying a developed crop canopy is higher than from spraying a bare soil surface/short crop situation) each of the three crop classes for downward directed spray techniques (DW1, DW2, DW3) in Table 7 in fact comprises two spray drift curves i.e. one curve representing a developed crop canopy and one curve representing the bare soil surface/short crop situation. Figures 4 and 5 in van de Zande *et al.* (2012) show the drift spray drift deposition curves (deposition as function of the distance to the last nozzle) for both situations (see also next section) and are for completeness repeated (Figures 4 and 5).

The choice for a bare soil/short crop or a cropped spray drift situation is based on crop height at application time. When crop height is below 20 cm the bare soil surface drift curves (Fig. 5) are used. For each crop in the DTG-list information is needed on the time of the transition of the bare soil surface/short crop situation to the developed crop canopy situation. The distinction between these two situations is specified by a BBCH code for crop growth stage (see van de Zande *et al.*, 2012 for details). For each crop in the DTG-list Annex 4 lists the BBCH codes for the distinction between the bare soil surface/short crop situation and the developed crop canopy situation. For instance, for ware potatoes BBCH code 21 marks the distinction. This means that BBCH code 21 and above represents the developed crop canopy situation for ware potatoes and that code 0 – 20.999 represents the bare soil surface/short crop situation (note that the rounding off method used here was a decision made by the working group). DRAINBOW automatically selects the appropriate spray drift curve (bare soil/ short crop versus developed crop) on the basis of the BBCH codes.

Next step is to link the application dates to the BBCH code marking the distinction for the two different drift curves (i.e. bare soil surface/small crop situation and the developed crop canopy situation). This is done using the information in Annex 2 (or Table 5 for the example crops). Let's illustrate the entire procedure using the example for application of a plant protection product on May 1st, 8th and 15th in ware potatoes. All applications are in the first half month period 'May 1'. For ware potatoes crop development period 'May 1' corresponds to BBCH classes 10-19 (Table 5). Linking this information to the information in Annex 4 which tells us that the transition from the bare soil surface/short crop situation to the developed crop canopy situation takes place at BBCH code 21 results in the conclusion that for all three applications in this example the drift curve representing the bare soil surface/short crop situation needs to be selected.

The example given above illustrates a straightforward case. Application of the plant protection product in ware potatoes on June 4th is less straightforward because from Table 5 or Annex 2 it cannot been read whether June 4th is before or after BBCH code 21. In this case the working group decided to apply linear interpolation of the time. Table 5 shows that for ware potatoes BBCH code 20 – 29 comprises the period 1 June – 30 June. Via linear interpolation of the time it becomes clear that BBCH code 21 starts at day 4.2 in June (Table 9). Day 4.2 correspond roughly to 4 June 05:00. In the Dutch scenario an application takes always place at 09:00, so at 0.375 d. This means that for our example so for application on June 4th at 09:00 the drift curve representing the developed crop canopy situation needs to be used because 4.375 > 4.2, (so day 4.375 corresponds to BBCH 21).

Table 9 *Example of linear interpolation of time to link BBCH codes to an exact time of the day.*

BBCH	day	month	Day number per BBCH code
20	1.0	June	1,2,3
21	4.2	June	4,5,6,7
22	7.4	June	8,9,10
23	10.7	June	11,12,13
24	13.9	June	14,15,16
25	17.1	June	17,18,19
26	20.3	June	20,21,22,23
27	23.6	June	24,25,26
28	26.8	June	27,28,29
29	30.0	June	30

6.4 Spray drift mitigation

DRAINBOW offers the user the option to mitigate spray drift by selecting a combination of a spray drift reducing technology class (DRT class) and the width of crop-free buffer zone (see Figure 3 for definition of crop-free buffer zone). Therefore, a matrix approach is used (Tiktak *et al*, 2012a and Zande *et al.*, 2012). So for each curve, spray drift deposition (% of areic mass) as a function of DRT class and width of crop-free buffer zone is given in the form of a matrix. Drift is calculated in

DRAINBOW using the spray drift curves as presented in Figure 4 and 5 (Zande *et al.*, 2012, and presented below). The output of the drift calculation of DRAINBOW for downward spraying and all possible combinations given in Table 8 is given in Tables 10 – 15. There are 6 matrices in total because each of the three crop classes and positions of the last nozzle (9 combinations in Table 8) for downward directed spray techniques comprises two spray drift curves i.e. one curve representing the developed crop canopy situation and one curve representing the bare soil surface/short crop situation.

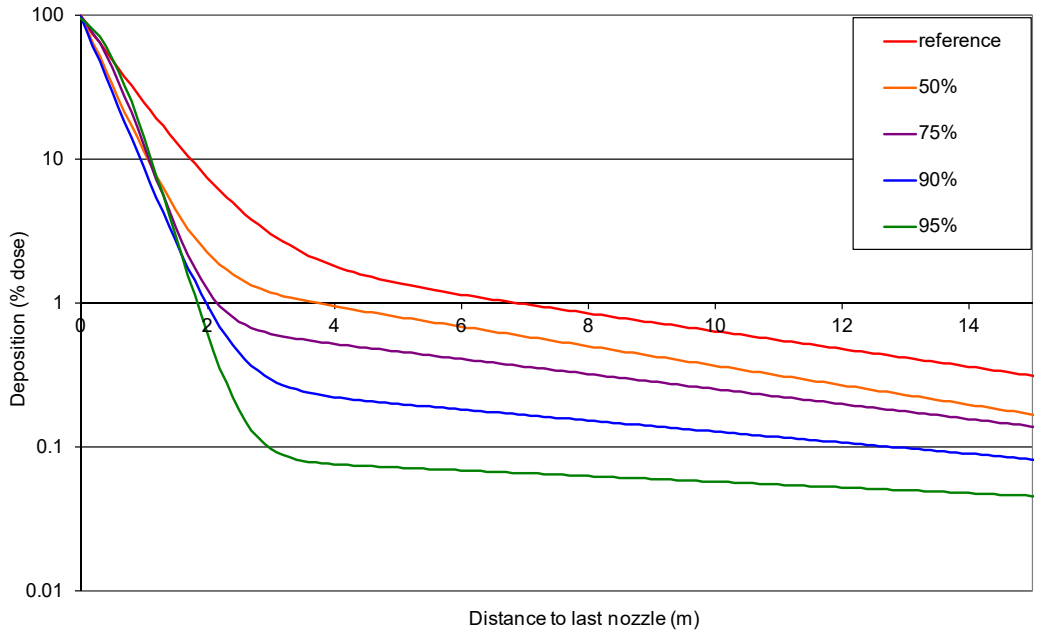

Figure 5 *Spray drift deposition curves of the reference and 50%, 75%, 90% and 95% drift reducing technology spray techniques for downward directed spray applications (boom sprayer) in a developed crop situation.*

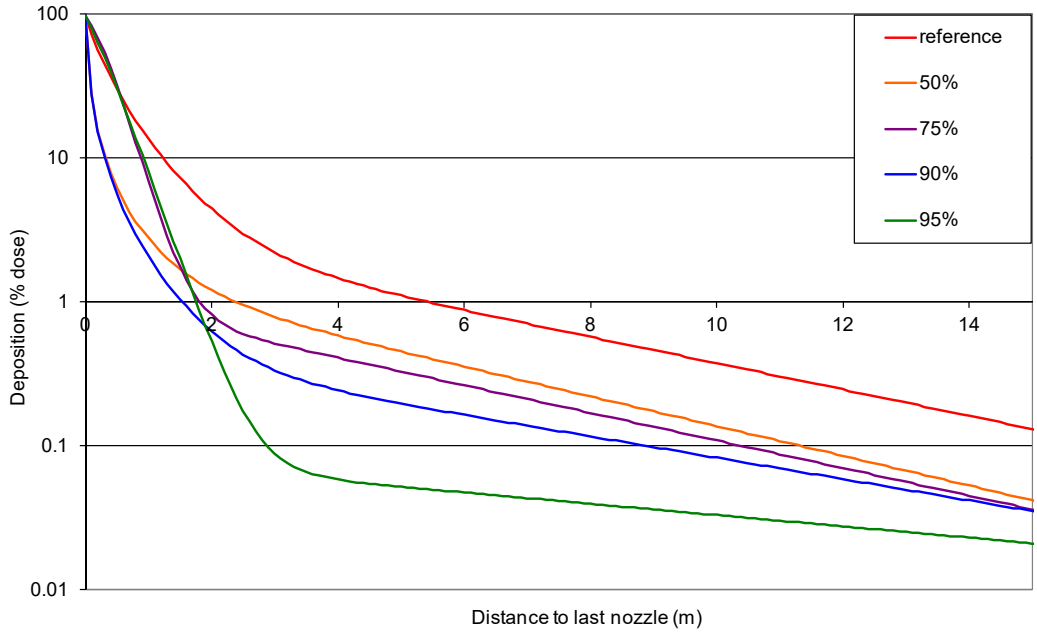

Figure 6 *Spray drift deposition curves of the reference and 50%, 75%, 90% and 95% drift reducing technology spray techniques for downward directed spray applications (boom sprayer) in a bare soil – short crop situation.*

Spray drift deposition is calculated using the dimensions of the ditch for the downward spraying scenario (code 601001) and a fixed water depth of 19.05 cm. This is the water depth at 205 m in the NL scenario ditch (so at 5 m in the 100 m evaluation ditch; see Figure 24 Tiktak *et al.*, 2012a) for a situation where the discharge in the ditch is equal to the base flow (5 L/d). The working group made this decision based on the fact that this would lead to a conservative approach for the evaluation ditch and a less conservative approach for the 200 m long upstream catchment ditch. See Table 10 through 15 below.

To allow comparison, the spray drift deposition data for the standard TOXSWA 1.2 ditch (water surface width 1 meter, at a constant water depth of 30 cm in between 1.50 m length banks) currently used in the surface water exposure assessment as part of the Dutch authorisation procedure (Huijsmans *et al.*, 1997; Beltman and Adriaanse, 1999) are presented in Annex 7. Differences in spray drift deposition between the data presented in Tables 10-15 and nowadays used in the authorisation procedure occur because of different dimensions of the surface water and the data originating from different databases of spray drift data (1998 and 2005). Data presented in Annex 7 come from the different spray drift databases used.

Table 10 *Spray drift deposition (% of applied areic mass) as a function of class of spray drift reducing technology and width of crop-free buffer zone ([b] in Figure 3) and total crop-free zone ([t] in Figure 3) in a bare soil/short crop situation for crop class DW1 (0.25 m crop-free zone). The values were calculated for the ditch for the downward spraying scenario (code 601001) and a fixed water depth of 19.05 cm.*

width of crop-free buffer zone (m)		**0.00**	**0.25**	**0.75**	**1.75**	**2.75**	**3.75**	**4.75**	**5.75**
Width of the total crop-free zone (m)		**0.25**	**0.50**	**1.00**	**2.00**	**3.00**	**4.00**	**5.00**	**6.00**
Nozzle position (m)*	**Technique**								
0.25	reference	3.52	2.90	2.12	1.39	1.05	0.83	0.67	0.54
	DRT50	1.02	0.91	0.74	0.55	0.43	0.33	0.26	0.21
	DRT75	0.78	0.62	0.50	0.39	0.31	0.25	0.20	0.16
	DRT90	0.51	0.43	0.33	0.23	0.19	0.16	0.13	0.11
	DRT95	0.50	0.28	0.11	0.06	0.05	0.05	0.04	0.04
0.50	reference	2.90	2.45	1.87	1.28	0.99	0.79	0.63	0.51
	DRT50	0.91	0.82	0.68	0.51	0.40	0.31	0.25	0.20
	DRT75	0.62	0.54	0.46	0.37	0.29	0.24	0.19	0.15
	DRT90	0.43	0.37	0.29	0.22	0.18	0.15	0.13	0.11
	DRT95	0.28	0.17	0.08	0.06	0.05	0.05	0.04	0.04

* [d] in Figure 3.

Table 11 *Spray drift deposition (% of applied areic mass) as a function of class of spray drift reducing technology and width of crop-free buffer zone ([b] in Figure 3) and total crop-free zone ([t] in Figure 3) in a developed crop canopy situation for crop class DW1 (0.25 m crop-free zone). The values were calculated for the ditch for the downward spraying scenario (code 601001) and a fixed water depth of 19.05 cm.*

width of crop-free buffer zone (m)		0.00	0.25	0.75	1.75	2.75	3.75	4.75	5.75
Width of the total crop-free zone (m)		0.25	0.50	1.00	2.00	3.00	4.00	5.00	6.00
Nozzle position (m)*	Technique								
0.25	reference	5.69	4.47	2.98	1.76	1.33	1.10	0.95	0.82
	DRT50	1.97	1.58	1.19	0.92	0.77	0.66	0.57	0.48
	DRT75	1.21	0.88	0.63	0.51	0.45	0.40	0.35	0.31
	DRT90	0.84	0.56	0.33	0.22	0.20	0.18	0.16	0.15
	DRT95	0.68	0.34	0.13	0.08	0.07	0.07	0.07	0.06
0.50	reference	4.47	3.61	2.53	1.61	1.26	1.06	0.91	0.79
	DRT50	1.58	1.34	1.09	0.88	0.74	0.64	0.54	0.47
	DRT75	0.88	0.71	0.58	0.49	0.43	0.39	0.34	0.30
	DRT90	0.56	0.41	0.28	0.21	0.19	0.18	0.16	0.15
	DRT95	0.34	0.19	0.10	0.08	0.07	0.07	0.06	0.06

* [d] in Figure 3.

Table 12 *Spray drift deposition (% of applied areic mass) as a function of class of spray drift reducing technology and width of crop-free buffer zone ([b] in Figure 3) and total crop-free zone ([t] in Figure 3) in a bare soil/short crop situation for crop class DW2 (0.50 m crop-free zone). The values were calculated for the ditch for the downward spraying scenario (code 601001) and a fixed water depth of 19.05 cm.*

width of crop-free buffer zone (m)		0.00	0.50	1.50	2.50	3.50	4.50	5.50
Width of the total crop-free zone (m)		0.50	1.00	2.00	3.00	4.00	5.00	6.00
Nozzle position (m)*	Technique							
-0.125	reference	3.92	2.66	1.59	1.15	0.90	0.72	0.58
	DRT50	1.10	0.86	0.61	0.47	0.37	0.29	0.23
	DRT75	0.92	0.58	0.42	0.34	0.27	0.22	0.17
	DRT90	0.57	0.40	0.26	0.20	0.17	0.14	0.12
	DRT95	0.68	0.21	0.07	0.05	0.05	0.04	0.04
0.0	reference	3.52	2.45	1.52	1.12	0.88	0.70	0.57
	DRT50	1.02	0.82	0.59	0.45	0.35	0.28	0.22
	DRT75	0.78	0.54	0.41	0.33	0.26	0.21	0.17
	DRT90	0.51	0.37	0.25	0.20	0.16	0.14	0.12
	DRT95	0.50	0.17	0.06	0.05	0.05	0.04	0.04
0.25	reference	2.90	2.12	1.39	1.05	0.83	0.67	0.54
	DRT50	0.91	0.74	0.55	0.43	0.33	0.26	0.21
	DRT75	0.62	0.50	0.39	0.31	0.25	0.20	0.16
	DRT90	0.43	0.33	0.23	0.19	0.16	0.13	0.11
	DRT95	0.28	0.11	0.06	0.05	0.05	0.04	0.04
0.50	reference	2.45	1.87	1.28	0.99	0.79	0.63	0.51
	DRT50	0.82	0.68	0.51	0.40	0.31	0.25	0.20
	DRT75	0.54	0.46	0.37	0.29	0.24	0.19	0.15
	DRT90	0.37	0.29	0.22	0.18	0.15	0.13	0.11
	DRT95	0.17	0.08	0.06	0.05	0.05	0.04	0.04

* [d] in Figure 3.

Table 13 *Spray drift deposition (% of applied areic mass) as a function of class of spray drift reducing technology and width of crop-free buffer zone ([b] in Figure 3) and total crop-free zone ([t] in Figure 3) in a developed crop canopy situation for crop class DW2 (0.50 m crop-free zone). The values were calculated for the ditch for the downward spraying scenario (code 601001) and a fixed water depth of 19.05 cm.*

width of crop-free buffer zone (m)		0.00	0.50	1.50	2.50	3.50	4.50	5.50
Width of the total crop-free zone (m)		0.50	1.00	2.00	3.00	4.00	5.00	6.00
Nozzle position (m)*	Technique							
-0.125	reference	6.47	4.00	2.06	1.45	1.18	1.00	0.86
	DRT50	2.25	1.45	0.99	0.82	0.70	0.60	0.51
	DRT75	1.49	0.78	0.54	0.47	0.42	0.37	0.33
	DRT90	1.06	0.48	0.24	0.20	0.19	0.17	0.16
	DRT95	0.99	0.25	0.08	0.07	0.07	0.07	0.06
0.0	reference	5.69	3.61	1.95	1.41	1.15	0.98	0.85
	DRT50	1.97	1.34	0.96	0.80	0.69	0.59	0.50
	DRT75	1.21	0.71	0.53	0.46	0.41	0.36	0.32
	DRT90	0.84	0.41	0.23	0.20	0.18	0.17	0.15
	DRT95	0.68	0.19	0.08	0.07	0.07	0.07	0.06
0.25	reference	4.47	2.98	1.76	1.33	1.10	0.95	0.82
	DRT50	1.58	1.19	0.92	0.77	0.66	0.57	0.48
	DRT75	0.88	0.63	0.51	0.45	0.40	0.35	0.31
	DRT90	0.56	0.33	0.22	0.20	0.18	0.16	0.15
	DRT95	0.34	0.13	0.08	0.07	0.07	0.07	0.06
0.50	reference	3.61	2.53	1.61	1.26	1.06	0.91	0.79
	DRT50	1.34	1.09	0.88	0.74	0.64	0.54	0.47
	DRT75	0.71	0.58	0.49	0.43	0.39	0.34	0.30
	DRT90	0.41	0.28	0.21	0.19	0.18	0.16	0.15
	DRT95	0.19	0.10	0.08	0.07	0.07	0.06	0.06

* [d] in Figure 3.

Table 14 *Spray drift deposition (% of applied areic mass) as a function of class of spray drift reducing technology and width of crop-free buffer zone ([b] in Figure 3) and total crop-free zone ([t] in Figure 3) in a bare soil/short crop situation for crop class DW3 (0.75 m crop-free zone). The values were calculated for the ditch for the downward spraying scenario (code 601001) and a fixed water depth of 19.05 cm.*

width of crop-free buffer zone (m)		0.00	0.25	1.25	2.25	3.25	4.25	5.25
Width of the total crop-free zone (m)		0.75	1.00	2.00	3.00	4.00	5.00	6.00
Nozzle position (m)*	Technique							
-0.125	reference	3.19	2.66	1.59	1.15	0.90	0.72	0.58
	DRT50	0.96	0.86	0.61	0.47	0.37	0.29	0.23
	DRT75	0.69	0.58	0.42	0.34	0.27	0.22	0.17
	DRT90	0.47	0.40	0.26	0.20	0.17	0.14	0.12
	DRT95	0.37	0.21	0.07	0.05	0.05	0.04	0.04
0.0	reference	2.90	2.45	1.52	1.12	0.88	0.70	0.57
	DRT50	0.91	0.82	0.59	0.45	0.35	0.28	0.22
	DRT75	0.62	0.54	0.41	0.33	0.26	0.21	0.17
	DRT90	0.43	0.37	0.25	0.20	0.16	0.14	0.12
	DRT95	0.28	0.17	0.06	0.05	0.05	0.04	0.04
0.25	reference	2.45	2.12	1.39	1.05	0.83	0.67	0.54
	DRT50	0.82	0.74	0.55	0.43	0.33	0.26	0.21
	DRT75	0.54	0.50	0.39	0.31	0.25	0.20	0.16
	DRT90	0.37	0.33	0.23	0.19	0.16	0.13	0.11
	DRT95	0.17	0.11	0.06	0.05	0.05	0.04	0.04

* [d] in Figure 3.

Table 15 *Spray drift deposition (% of applied areic mass) as a function of class of spray drift reducing technology and width of crop-free buffer zone ([b] in Figure 3) and total crop-free zone ([t] in Figure 3) in a developed crop canopy situation for crop class DW3 (0.75 m crop-free zone). The values were calculated for the ditch for the downward spraying scenario (code 601001) and a fixed water depth of 19.05 cm.*

width of crop-free buffer zone (m)		0.00	0.25	1.25	2.25	3.25	4.25	5.25
Width of the total crop-free zone (m)		0.75	1.00	2.00	3.00	4.00	5.00	6.00
Nozzle position (m)*	Technique							
-0.125	reference	5.03	4.00	2.06	1.45	1.18	1.00	0.86
	DRT50	1.75	1.45	0.99	0.82	0.70	0.60	0.51
	DRT75	1.01	0.78	0.54	0.47	0.42	0.37	0.33
	DRT90	0.68	0.48	0.24	0.20	0.19	0.17	0.16
	DRT95	0.48	0.25	0.08	0.07	0.07	0.07	0.06
0.0	reference	4.47	3.61	1.95	1.41	1.15	0.98	0.85
	DRT50	1.58	1.34	0.96	0.80	0.69	0.59	0.50
	DRT75	0.88	0.71	0.53	0.46	0.41	0.36	0.32
	DRT90	0.56	0.41	0.23	0.20	0.18	0.17	0.15
	DRT95	0.34	0.19	0.08	0.07	0.07	0.07	0.06
0.25	reference	3.61	2.98	1.76	1.33	1.10	0.95	0.82
	DRT50	1.34	1.19	0.92	0.77	0.66	0.57	0.48
	DRT75	0.71	0.63	0.51	0.45	0.40	0.35	0.31
	DRT90	0.41	0.33	0.22	0.20	0.18	0.16	0.15
	DRT95	0.19	0.13	0.08	0.07	0.07	0.07	0.06

* [d] in Figure 3.

Spray drift curves start by definition from the position of the last nozzle. Spray drift deposition is therefore determined by the sum of the distance between the last nozzle position and the centre of the last crop row and the width of the total crop-free zone (which is the sum of the width of the minimal agronomic crop-free zone defined by the crop group (DW1, DW2, DW3) and the width of the crop-free buffer zone (see Figure 3). The spray drift deposition is the same for equal distances of the sum of the following widths: distance between the last nozzle position and the centre of the last crop row ([d] in Figure 3) plus the width of the total crop-free zone ([t] in Figure 3). For, e.g. at a distance of 1 m, the combinations of 50+50 cm or 25+75 cm or 0+100 cm all result in 3.61% spray drift deposition for the reference application technique in the cropped situation and of 2.45% in the bare soil surface situation.

In the current authorisation procedure (Ctgb, 2019b) the Dutch standard ditch (Huijsmans *et al.*, 1997; Beltman and Adriaanse, 1999) is used to calculate the exposure of surface water as result of spray drift deposition on the water surface. Only one value of spray drift deposition (i.e. 0.5%) is used as a first tier, being the spray drift deposition of a DRT75 including a 1.50 m total crop-free zone spraying a developed crop canopy. This single value is used for applications in all crop types irrespective of the minimal required crop-free buffer zone. The systematics developed in the presented crop differentiation procedure lead to an initial discrimination of spray drift values for the reference and DRT techniques implementing the minimal crop-free buffer zones and similar total crop-free buffer zones. The combination of the position of the last nozzle and the minimal required total crop-free buffer zone required by the Activity Decree (I&W, 2017) for the different crop types show that spray drift deposition of a DRT75 in the developed crop situation can vary from 0.6% for intensively sprayed crops (e.g. potatoes, strawberries, flower bulbs, etc.) having a total crop-free buffer zone of 1.50 m, to 0.9% for crops like cereals and both maize and sugar beet (other crops) although both groups have a minimal total crop-free buffer zone of 0.50 m (Annex 7). Introducing the developed matrix approach (DRT x crop-free buffer zone) and the presented methodology means implicitly that similar exposure concentrations in surface water (PEC) can be calculated for different sets of DRT class and crop-free buffer zone (e.g. DRT50 and total crop-free buffer zone of 1.5 m may result in a similar PEC as DRT90 combined with a total crop-free buffer zone of 0.5 m).

When spraying a bare soil surface/short crop the spray drift deposition values for the DRT75 spraying a potato crop (total crop-free buffer zone of 1.50 m), a maize or a sugar beet crop, and a cereal crop (total crop-free buffer zone 0.50 m) are resp. 0.6%, 0.7% and 0.6%. Implementation of the crop growth stage differentiation leads to similar or higher values and more variations in initial spray drift exposure values in the authorisation procedure. These spray deposition values at the water surface are for the new selected 601001 ditch even slightly higher (Tables 10-15 and Tables 11-12 in Zande *et al.*, 2012). Therefore, there is certainly a need to implement the developed crop differentiation methodology for spray drift deposition (matrix approach including described new spray drift deposition values up to 2012) in the Dutch PPP authorisation procedure.

7 Recommendations

The DTG-list was provided by the Board for the Authorisation of Plant Protection Products and Biocides (Ctgb, 2019a) in the Netherlands. For sensible use in DRAINBOW we modified the list for those crops which required a subdivision for summer crops and winter crops (oilseed rape, flower bulbs) or for those crops requiring a subdivision because of different spray drift curves (spindle trees, transplanted trees, high avenue trees). We advise the Ctgb to apply these modifications in the DTG-list used by the Ctgb.

The DTG-list contains an entry for plant breeding crops and basic seed production for arable, vegetable and fruit crops (DTG entry number 7.7). However, this DTG entry is of no practical usage for performing surface water exposure assessments using the DRAINBOW software tool. Growth periods could not be determined for this DTG entry because of the large range of crops possible. For the performance of surface water exposure assessments for applications in seed crops, it is therefore advised that instead of using DTG entry 7.7 the applicant/evaluator uses the relevant field crop in DRAINBOW; e.g. seed production of winter wheat should be treated as winter wheat.

For some crops the production of seed is done up till other (higher) growth stages and over a longer field period (two years instead of one growing season) than the cultivation for harvestable products. The seed crop can e.g. grow up to larger plants and be higher (e.g. seed shoots of sugar beet) than harvestable tuber or root plants and go from a vegetative stage in the first year to a generative stage in the second year. This difference is not addressed in the DTG list. For this particular situation (i.e. unknown crop growth situations) the advice is that the applicant/evaluator uses a 'worst case' spray drift curve as default for '7.7 Plant breeding and basic seed production', being the 'forage maize' spray drift curve (and thus selecting the maize DTG crop (1.4.1.1) when using the DRAINBOW software tool).

In this context, we advise to modify the DTG list to take into account the specific crops for seed production and identify the seed crops that differ in plant height and multi-year growth periods from the harvestable crops.

For the evaluation of 'Temporarily uncultivated land; DTG 10.1.1.2) in between two successive crops the minimal agronomic crop-free buffer zone cannot be defined as no crop is grown at that time. Therefore, a procedure is developed similar as for grassland, based on nozzle position of the directly treated area and the edge of the surface water. It is advised that this procedure is used for registration purposes.

The in this report described implementation of the crop growth stage differentiation for spray drift deposition at water surface for the standard ditch used in the exposure in surface water assessment of the Dutch authorisation procedure leads to similar or higher values and more variations in initial spray drift exposure values for the DRT75 and the minimal required total crop-free buffer zone as currently used in this authorisation procedure. These spray deposition values at water surface are for the new-selected 601001 ditch in the presented scenario even slightly higher than for the standard ditch currently used. Therefore, it is advised to implement in the current authorisation procedure based on TOXSWA 1.2 for downward directed spray applications the developed crop differentiation methodology for:

- Spray drift deposition (i.e. the matrix approach for mitigation of spray drift);
- Drift Reducing Technology (DRT) class;
- Crop-free buffer zone width;
- Outside Nozzle position;
- Crop/bare soil differentiation;
- including the described new spray drift deposition values (1995-2005).

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Annex 1 DTG-list (based on Ctgb, 2019, version 2.2) as modified by the working group

Modifications done by the WG include:

1. Numbering of all crops.
2. Oilseed rape (1.7.1.5 in original DTG list) was split into Winter oilseed rape (1.7.1.5) and Summer oilseed rape (1.7.1.6).
3. Flower bulbs and Flower tubers (7.1.1. in original DTG list) was split into Winter Flower bulbs and Flower tubers cultivation for reproduction (7.1.1.1.; hyacinth, tulip, narcissus and crocus) and Summer Flower bulbs and Flower tubers cultivation for reproduction (7.1.1.2; amaryllis, dahlia, gladiolus, lily, iris, other flower bulbs and tubers).
4. Bulb flower and tuber flower for flower/pot plant cultivation (7.1.2. in original DTG list) was split into Winter Bulb flower and tuber flower for flower/pot plant cultivation (7.1.1.3.; hyacinth, tulip, narcissus and crocus) and Summer Bulb flower and tuber flower for flower/pot plant cultivation (7.1.1.4; amaryllis, dahlia, gladiolus, lily, iris, other flower bulbs and tubers).
5. Avenue trees (7.3.1 in original DTG list) was split into Spindle trees (7.3.1.1), Transplanted trees (7.3.1.2) and High avenue trees (7.3.1.3).

	Sector.		Crop group		Crop subgroup		Crops/Objects	Remarks
1	Arable crops							
		1.1	Potatoes					
				1.1.1	-			
						1.1.1.1	Seed potato	
						1.1.1.2	Ware potato	
						1.1.1.3	Starch potato	
		1.2	Beet					
				1.2.1	-			
						1.2.1.1	Sugar beet	
						1.2.1.2	Fodder beet	
		1.3	Cereals					
				1.3.1	Winter cereals			
						1.3.1.1	Winter wheat	
						1.3.1.2	Winter barley	
						1.3.1.3	Winter rye	
						1.3.1.4	Triticale	
						1.3.1.5	Spelt	
						1.3.1.6	Canary grass	
				1.3.2	Spring cereals			
						1.3.2.1	Spring wheat	
						1.3.2.2	Spring barley	
						1.3.2.3	Spring rye	
						1.3.2.4	Oats	
				1.3.3	Other cereals			
		1.4	Maize					
				1.4.1	-			
						1.4.1.1	Forage maize	
						1.4.1.2	Grain maize	
						1.4.1.3	Corn cob mix	
						1.4.1.4	Corn cob silage	
		1.5	Pulses					
				1.5.1	Peas (dry)			
						1.5.1.1	Marrowfat pea	
						1.5.1.2	Yellow pea	
						1.5.1.3	Grey pea	
						1.5.1.4	Green pea	
						1.5.1.5	Maple pea	

Sector.	Crop group	Crop subgroup	Crops/Objects	Remarks
			1.5.1.6 Brown marrowfat	
			1.5.1.7 Sugar pea	
			1.5.1.8 Lentil	
			1.5.1.9 Chickpea	
		1.5.2 Beans (dry)		
			1.5.2.1 Brown bean	
			1.5.2.2 Yellow bean	
			1.5.2.3 Pinto bean	
			1.5.2.4 White bean (haricot)	
			1.5.2.5 Kidney bean	
			1.5.2.6 Green bean	= Broad bean
			1.5.2.7 Lupin	
			1.5.2.8 Soybean	
	1.6 Grass seed crops			
		1.6.1 Ryegrass		
			1.6.1.1 English ryegrass	
			1.6.1.2 Italian ryegrass	
			1.6.1.3 False oatgrass	
			1.6.1.4 Annual ryegrass	
			1.6.1.5 Hybrid ryegrass	
			1.6.1.6 Other ryegrasses	
		1.6.2 Fescue		
			1.6.2.1 Red Fescue	
			1.6.2.2 Sheep’s Fescue	
			1.6.2.3 Tall Fescue	
			1.6.2.4 Other fescues	
		1.6.3 Bluegrass		
			1.6.3.1 Kentucky bluegrass	
			1.6.3.2 Fowl bluegrass	
			1.6.3.3 Wood bluegrass	
			1.6.3.4 Meadow fescue	
			1.6.3.5 Other bluegrasses	
		1.6.4 Other grasses		
			1.6.4.1 Timothy-grass	
			1.6.4.2 Cock’s-Foot	
			1.6.4.3 Colonial bent	
			1.6.4.4 Crested dog’s-Tail	

Sector.	Crop group	Crop subgroup	Crops/Objects	Remarks
			1.6.4.5 Tufted hair-grass	
			1.6.4.6 June grass	
			1.6.4.7 Other grass seed crops	
	1.7 Oilseeds			
		1.7.1 -		
			1.7.1.1 Poppy seeds	
			1.7.1.2 Caraway	
			1.7.1.3 Flax	(Flax = linseed and flaxseed) Linseed (consumption and seed production) and fibre flax
			1.7.1.4 Mustard	(Yellow or white mustard, black and brown mustard)
			1.7.1.5 Winter oilseed rape	Remark of the working group: oilseed rape (1.7.1.5 in original DTG list) was split into Winter oilseed rape (1.7.1.5) and Summer oilseed rape (1.7.1.6)
			1.7.1.6 Summer oilseed rape	Remark of the working group: oilseed rape (1.7.1.5 in original DTG list) was split into Winter oilseed rape (1.7.1.5) and Summer oilseed rape (1.7.1.6)
			1.7.1.7 Evening primrose	
			1.7.1.8 Common Sunflower	
			1.7.1.9 Gold-of-pleasure	
			1.7.1.10 Crambe	
			1.7.1.11 Soybean	
			1.7.1.12 Other oilseeds	
	1.8 Fibre crops			
		1.8.1 -		
			1.8.1.1 Hemp	
			1.8.1.2 Flax	(Flax = flaxseed and linseed) Linseed (seed production) and fibre flax
			1.8.1.3 Common nettle	
			1.8.1.4 Other fibre crops	
	1.9 Green manure crops			
		1.9.1 Leguminous green manure crops		

Sector.	Crop group	Crop subgroup		Crops/Objects	Remarks
			1.9.1.1	Clover	(Red clover, white clover, alsike clover, carnation clover, Persian clover, berseem clover, hop clover, birds-foot trefoil, honey clover, other clover species)
			1.9.1.2	Lupin	
			1.9.1.3	Common vetch	
			1.9.1.4	Serradella	
			1.9.1.5	Celosia	
			1.9.1.6	Esparcet	
			1.9.1.7	Broad beans	
			1.9.1.8	Other leguminous green manure crops	
		1.9.2	Gramineae green manure crops		
			1.9.2.1	Rye	
			1.9.2.2	Ryegrass	(Italian ryegrass, Annual ryegrass, English ryegrass)
			1.9.2.3	Black oat	
		1.9.3	Cruciferae green manure crops		
			1.9.3.1	Oil radish	
			1.9.3.2	Oilseed rape	
			1.9.3.3	Yellow mustard seed	
			1.9.3.4	Marrow-stem kale	
		1.9.4	Other green manure crops		
			1.9.4.1	Tancy phacelia	Phacelia
			1.9.4.2	Corn spurrey	
			1.9.4.3	African Marigold	Tagetes
			1.9.4.4	Sticky nightshade	
			1.9.4.5	Sudan grass	
			1.9.4.6	Gold-of-pleasure	
			1.9.4.7	Forage turnip	
			1.9.4.8	Arugula	
			1.9.4.9	Niger-seed	

Sector.		Crop group		Crop subgroup		Crops/Objects	Remarks
	1.10	Fodder crops					
			1.10.1	Leguminous fodder crops			
					1.10.1.1	Clover	(Red clover, white clover, alsike clover, carnation clover, Persian clover, berseem clover, clover species spp, hop clover, bird's-foot trefoil, honey clover)
					1.10.1.2	Alfalfa	
					1.10.1.3	Common vetch	
					1.10.1.4	Lupin	
					1.10.1.5	Celosia	
					1.10.1.6	Esparcet	
					1.10.1.7	Broad beans (feed crop)	
			1.10.2	Other fodder crops.			
					1.10.2.1	Forage turnip	
	1.11	Other arable crops					
			1.11.1	-			
					1.11.1.1	Witloof Chicory (roots)	
					1.11.1.2	Large-rooted chicory	
					1.11.1.3	Buckwheat	
					1.11.1.4	Common Hop	
					1.11.1.5	Common madder	
					1.11.1.6	Chinese fairy grass	
					1.11.1.7	Elephant grass	
					1.11.1.8	Quinoa	
					1.11.1.9	Woad	
					1.11.1.10	Wild woad	
					1.11.1.11	Sorghum	
					1.11.1.12	Teff	
					1.11.1.13	Millet	
					1.11.1.14	Russian dandelion	
2	Cultivated grassland						
	2.1	Fodder grassland					
			2.1.1	-			
					2.1.1.1	Permanent pasture	
					2.1.1.2	Mowing grassland	
	2.2	Turf production					

	Sector.		Crop group		Crop subgroup		Crops/Objects	Remarks
3	Fruit crops Only refers to production of fruits							
		3.1	Large fruits					
				3.1.1	Pome fruit			
						3.1.1.1	Apple	
						3.1.1.2	Pear	(Including oriental pear)
						3.1.1.3	Quince	
						3.1.1.4	Common medlar	
						3.1.1.5	Other pome fruit	
				3.1.2	Stone fruit			
						3.1.2.1	Sweet cherry Sour Cherry	
						3.1.2.2	Plum	Including bullace and damson plum
						3.1.2.3	Apricot	
						3.1.2.4	Peach Nectarine	
						3.1.2.5	Other stone fruit	
		3.2	Small fruits					Woody small fruit consist of 3.2.2, 3.2.3 and 3.2.4
				3.2.1	Strawberries			
				3.2.2	Berries			
						3.2.2.1	Currant	Red, white and black currant
						3.2.2.2	Gooseberry	
						3.2.2.3	Blueberry	Including Bilberry, Foxberry (Cowberry)
						3.2.2.4	Small cranberry	American or large cranberry
						3.2.2.5	Mulberry	
						3.2.2.6	Rose hip	
						3.2.2.7	Kiwiberry	
						3.2.2.8	Elderberry	Chokeberry, Sea-buckthorn
						3.2.2.9	Blue honeysuckle	
						3.2.2.10	Other berries	
				3.2.3	Grapes			
						3.2.3.1	Table grape	
						3.2.3.2	Wine grape	
				3.2.4	Blackberry and raspberry family (Rubus spp.)			
						3.2.4.1	Blackberry	
						3.2.4.2	Raspberry	Including Tayberry, Japanese Wine berry

Sector.		Crop group		Crop subgroup		Crops/Objects	Remarks
					3.2.4.3	Common Dewberry	Loganberry, boysenberry
	3.3	Tree Nuts					
			3.3.1	-			
					3.3.1.1	Hazelnut	
					3.3.1.2	Chestnut	
					3.3.1.3	Walnut	
	3.4	Other fruits					
			3.4.1	-			
					3.4.1.1	Fig	
					3.4.1.2	Kiwi	
4	Vegetable crops						
	4.1	Leafy vegetables					
			4.1.1	Lettuce; Lactuca spp			Including Curled leaf lettuce, Oak leaf lettuce, Lollo rosso, head lettuce, Iceberg lettuce, Roman (cos) lettuce, Lollo bionda, Batavia lettuce and Babyleaves
			4.1.2	Endive			Endive (including escarole, Curled-leave endive, cutting endive, sugar loaf, Radicchio rosso
			4.1.3	Spinach family			
					4.1.3.1	Spinach	(Including New Zealand spinach, turnip tops, spleen amaranth)
					4.1.3.2	Chard	
					4.1.3.3	Garden Orache	
					4.1.3.4	Purslane	(Including winter purslane)
			4.1.4	Other leafy vegetables			
					4.1.4.1	Witloof Chicory (forced cultivation)	
					4.1.4.2	Watercress	
					4.1.4.3	Lamb's lettuce	Valerianella locusta
					4.1.4.4	Rocket	Rucola
					4.1.4.5	Sea aster	
			4.1.5	Vegetable sprouts			
					4.1.5.1	Garden cress	
					4.1.5.2	Bean sprouts	(Mung bean sprouts)
					4.1.5.3	Alfalfa	
					4.1.5.4	Rucola cress	

Sector.	Crop group	Crop subgroup	Crops/Objects	Remarks
			4.1.5.5 Other vegetable sprouts	
		4.1.6 Baby leaf crops		All vegetable crops harvested before BBCH 19 (for most crops this concerns the 8 true leaf stage)
	4.2 Legume vegetables (fresh)			
		4.2.1 Beans with pod		
			4.2.1.1 Dwarf French bean	French bean, green bean, snap bean
			4.2.1.2 Slicing bean	
			4.2.1.3 Climbing French beans	French bean, green bean, snap bean
			4.2.1.4 Climbing slicing bean	
			4.2.1.5 Scarlet runner bean	
			4.2.1.6 Yardlong bean	Including cowpea
		4.2.2 Beans without pod		
			4.2.2.1 Broad bean	
			4.2.2.2 Lima bean	
			4.2.2.3 Flageolets	
		4.2.3 Peas with pod		
			4.2.3.1 Mangetout	
			4.2.3.2 Asparagus pea	
			4.2.3.3 Sugar pea	
		4.2.4 Pea without pod		
			4.2.4.1 Green pea	
			4.2.4.2 Field pea	
	4.3 Fruiting vegetables			
		4.3.1 Fruiting vegetables of Cucurbits - edible peel		
			4.3.1.1 Gherkin	
			4.3.1.2 Zucchini	Including bush pumpkin
			4.3.1.3 Cucumber	
		4.3.2 Fruiting vegetables of Cucurbits non-edible peel		
			4.3.2.1 Pumpkins	Including winter squash
			4.3.2.2 Melon	
			4.3.2.3 Watermelon	
		4.3.3 Fruiting vegetables of Solanaceae		
			4.3.3.1 Aubergine	

Sector.	Crop group	Crop subgroup	Crops/Objects	Remarks
			4.3.3.2 Tomato	
			4.3.3.3 Sweet pepper	Including red pepper and Cayenne pepper
			4.3.3.4 Husk tomato	
		4.3.4 Fruiting vegetables of Malvaceae		
			4.3.4.1 Okra	
	4.4 Brassica vegetables			
		4.4.1 Head cabbages		
			4.4.1.1 Head cabbage	Red cabbage, yellow and green Savoy cabbage, head cabbage, White cabbage
			4.4.1.2 Brussels sprouts	Including flower sprouts
		4.4.2 Flowering brassica		
			4.4.2.1 Cauliflower	White, green, purple and Romanesco
			4.4.2.2 Broccoli	Including Chinese broccoli or Kai-lan, Choi sum
		4.4.3 Leafy brassica		
			4.4.3.1 Chinese cabbage	Including Amsoi, Pakchoi, Spinach mustard, Komatsuna, Tatsoi, Mibuna, Mizuna, other Oriental cabbage leaves
			4.4.3.2 Kale	Including cutting curly kale and palm tree kale
		4.4.4 Stern cabbage		
			4.4.4.1 Kohlrabi	Green, white and purple
	4.5 Root and tuber vegetables			
		4.5.1 Radishes		
			4.5.1.1 Small radish	
			4.5.1.2 Black/white radish	Including Rettich, daikon radish
		4.5.2 Root vegetables (Umbelliferae)		
			4.5.2.1 Carrots	Bunched-up carrots, Parisian carrots
			4.5.2.2 Skirret	
			4.5.2.3 Turnip-rooted parsley	
			4.5.2.4 Parsnips	
		4.5.3 Other root and tuber vegetables		
			4.5.3.1 Turnip cabbage	
			4.5.3.2 Swede	

Sector.	Crop group	Crop subgroup	Crops/Objects	Remarks
			4.5.3.3 Jerusalem artichoke	
			4.5.3.4 Japanese artichoke	
			4.5.3.5 Sweet potato	
			4.5.3.6 Red Beet	Beetroot, garden beet
			4.5.3.7 Celeriac	
			4.5.3.8 Black Salsify	Including common salsify
			4.5.3.9 Horseradish	
			4.5.3.10 Yam	
	4.6 Bulb vegetables			
		4.6.1 Onions		
			4.6.1.1 Seed onion	
			4.6.1.2 First year bulb onion	
			4.6.1.3 Second year bulb onion	
			4.6.1.4 Silverskin onions	
			4.6.1.5 Picklers	
		4.6.2 Shallots		
			4.6.2.1 Seed shallot	
			4.6.2.2 Bulb shallot	
		4.6.3 Spring onion		
			4.6.3.1 Spring onion	Including Welsh onion and escallion
		4.6.4 Garlic		
			4.6.4.1 Garlic	
	4.7 Stem vegetables			
		4.7.1 -		
			4.7.1.1 Asparagus	White and green asparagus
			4.7.1.2 Celery	Stalk celery
			4.7.1.3 Cardoon	
			4.7.1.4 Rhubarb	
			4.7.1.5 Fennel	
			4.7.1.6 Leek	
			4.7.1.7 Globe Artichoke	
			4.7.1.8 Sea kale	
			4.7.1.9 Marsh samphire	
	4.8 Other vegetable crops			
		4.8.1 -		
			4.8.1.1 Sweet corn	

	Sector.		Crop group		Crop subgroup		Crops/Objects	Remarks
5	Herbs - fresh or dried							
		5.1	Aromatic herbs					
				5.1.1	-			
						5.1.1.1	Basil	
						5.1.1.2	Chives	Including chinese chives
						5.1.1.3	Summer savory	Including winter savory
						5.1.1.4	Lemon balm	
						5.1.1.5	Dill	
						5.1.1.6	Tarragon	Russian and French Tarragon
						5.1.1.7	Hyssop	
						5.1.1.8	Chervil	
						5.1.1.9	Coriander	
						5.1.1.10	Parsley	Curly-leaf parsley and flat-leaf parsley
						5.1.1.11	Lovage	Lovage leaves (lavas)
						5.1.1.12	Marjoram	
						5.1.1.13	Oregano	Wild marjoram
						5.1.1.14	Mint	
						5.1.1.15	Burnet	
						5.1.1.16	Rosemary	
						5.1.1.17	Sage	
						5.1.1.18	Thyme	
						5.1.1.19	Fennel	
						5.1.1.20	Celery Leaves	
						5.1.1.21	Sorrel	
						5.1.1.22	Tea	
						5.1.1.23	Other aromatic garden herbs	
						5.1.1.24	Edible flowers	E.g. zucchini, African Marigold, common, nasturtium, pot marigold
		5.2	Aromatic root crops					
				5.2.1	-			
						5.2.1.1	Lovage root	
						5.2.1.2	Angelica	
						5.2.1.3	Burnet Saxifrage root	
						5.2.1.4	Turnip-rooted parsley	
						5.2.1.5	Other aromatic root crops	
		5.3	Medicinal herbs					
				5.3.1	-			

Sector.		Crop group		Crop subgroup		Crops/Objects		Remarks
					5.3.1.1	Indian tobacco		Lobelia inflata
					5.3.1.2	Woolly foxglove		Digitalis lanata
					5.3.1.3	Wild pansy		
					5.3.1.4	Wild chamomile		
					5.3.1.5	Purple coneflower		Echinacea
					5.3.1.6	Pot marigold		Calendula officinalis
					5.3.1.7	Other medicinal herbs		
		5.4	Medicinal root crops					
				5.4.1 -				
					5.4.1.1	Valerian		
					5.4.1.2	Asiatic Ginseng		
					5.4.1.3	Purple coneflower (root)		
					5.4.1.4	Other medicinal root crops		
		5.5	herb seed crops					
				5.5.1 -				
					5.5.1.1	Caraway		
					5.5.1.2	Poppy seed		
					5.5.1.3	Other seed herbs		
		5.6	Fruits or berries (herbs)					
				5.6.1				
					5.6.1.1	Common vanilla		
6	Mushrooms							
		6.1	Edible mushrooms					
				6.1.1 -				
					6.1.1.1	Button mushroom		Common mushroom, chestnut mushroom, Portabello mushroom
					6.1.1.2	Oyster mushroom		Golden oyster mushroom, King oyster mushroom, Pink oyster mushroom
					6.1.1.3	Other mushrooms		Shiitake, blue stalk mushroom, Nameko, Horse mushroom, Shaggy ink cap [Lawyer's wig], Winter mushroom, Poplar fieldcap, Shimeji, hen of the woods, Lingzhi mushroom, Judah's ear, Almond portobello
7	Ornamental crops							
		7.1	Flower bulbs and Flower tubers					
				7.1.1 -				

Sector.	Crop group	Crop subgroup		Crops/Objects	Remarks
			7.1.1.1	Winter Flower bulbs and Flower tubers for reproduction	Remark of the working group: Flower bulbs and Flower tubers (7.1.1. in original DTG list) was split into Winter Flower bulbs and Flower tubers cultivation for reproduction (7.1.1.1.; hyacinth, tulip, narcissus and crocus) and Summer Flower bulbs and Flower tubers cultivation for reproduction (7.1.1.2; amaryllis, dahlia, gladiolus, lily, iris, other flower bulbs and tubers).
			7.1.1.2	Summer Flower bulbs and Flower tubers for reproduction	Remark of the working group: Flower bulbs and Flower tubers cultivation for reproduction (7.1.1. in original DTG list) was split into Winter Flower bulbs and Flower tubers cultivation for reproduction (7.1.1.1.; hyacinth, tulip, narcissus and crocus) and Summer Flower bulbs and Flower tubers cultivation for reproduction (7.1.1.2; amaryllis, dahlia, gladiolus, lily, iris, other flower bulbs and tubers).
			7.1.1.3	Winter Bulb flower and tuber flower for flower/pot plant cultivation	Remark of the working group: Bulb flower and tuber flower for flower/pot plant cultivation (7.1.2. in original DTG list) was split into Winter Bulb flower and tuber for flower/pot plant cultivation (7.1.1.3.; hyacinth, tulip, narcissus and crocus) and Summer Bulb flower and tuber flower for flower/pot plant cultivation (7.1.1.4; amaryllis, dahlia, gladiolus, lily, iris, other flower bulbs and tubers).
			7.1.1.4	Summer Bulb flower and tuber flower for flower/pot plant cultivation	Remark of the working group: Bulb flower and tuber flower for flower/pot plant cultivation (7.1.2. in original DTG list) was split into Winter Bulb flower and tuber flower for flower/pot plant cultivation (7.1.1.3.; hyacinth, tulip, narcissus and crocus) and Summer Bulb

Sector.	Crop group	Crop subgroup	Crops/Objects	Remarks
				flower and tuber flower for flower/pot plant cultivation (7.1.1.4; amaryllis, dahlia, gladiolus, lily, iris, other flower bulbs and tubers).
	7.2 Floriculture crops			
		7.2.1 -		
			7.2.1.1 Pot plants	Including annual bedding plants, and potted bulb flowers and tuber flowers
			7.2.2.1 Cut flowers	Including summer flowers, dried flowers, bulb flowers and tuber flowers
			7.2.3.1 Forced shrubs	
			7.2.4.1 Cut green	
	7.3 Tree nursery crops			
		7.3.1 -		
			7.3.1.1 Spindle trees	Remark of the working group: Avenue trees (7.3.1 in original DTG list) was split into Spindle trees (7.3.1.1), Transplanted trees (7.3.1.2) and High avenue trees (7.3.1.3)
			7.3.1.2 Transplanted trees	Remark of the working group: Avenue trees (7.3.1 in original DTG list) was split into Spindle trees (7.3.1.1), Transplanted trees (7.3.1.2) and High avenue trees (7.3.1.3)
			7.3.1.3 High avenue trees	Remark of the working group: Avenue trees (7.3.1. in original DTG list) was split into Spindle trees (7.3.1.1), Transplanted trees (7.3.1.2) and High avenue trees (7.3.1.3)
		7.3.2 -		
			7.3.2.1. Climbing plants	
		7.3.3 -		
			7.3.3.1 Ornamental shrubs (including Roses)	Including rose stocks and outdoor roses
		7.3.4 -		
			7.3.4.1 Conifers (including Christmas trees)	
		7.3.7 -		

Sector.		Crop group		Crop subgroup		Crops/Objects	Remarks
					7.3.7.1	Heather	
			7.3.8	-			
					7.3.8.1	Forest trees and hedging plants	
			7.3.9	-			
					7.3.9.1	Fruit trees and shrubs	Including Fruit tree stocks
		7.4	Perennial crops				Remark of the working group: dominantly (small) tree nursery crops. The working group considers this crop as valid for downward spraying of field crops.
		7.5	Flower seed crops				
		7.6	Marsh and Water plants				
		7.7	Plant breeding crops and seed production.				Remark of the working group: This crop cannot be selected in DRAINBOW. The relevant field crop should be taken instead; e.g. seed production of winter wheat is treated as winter wheat
8	Amenity areas						
		8.1	Managed amenity turf				
				8.1.1	-		
					8.1.1.1	Lawn	Including turf production
					8.1.1.2	Playground	Including turf production
					8.1.1.3	Sports field	Including golf courses and turf production
					8.1.1.4	Grassy verges	
		8.2	Woody plantings				
				8.2.1	-		
					8.2.1.1	Avenue and border trees	
					8.2.1.2	Shelter belts, windbreaks and hedgerows	
					8.2.1.3	Other woody plantings	Forest trees and roadside verges
		8.3	Herbaceous plantings				
9	Forestry						
		9.1	Broad-leaved trees				
		9.2	Coniferous trees				
10	Uncultivated land						
		10.1	Temporarily uncultivated terrain				

Sector.		Crop group		Crop subgroup		Crops/Objects	Remarks
			10.1.1	-			
					10.1.1.1	Deforestation area	
					10.1.1.2	Temporarily uncultivated land	
					10.1.1.3	Buffer areas of fields	
		10.2	Permanently uncultivated land				
			10.2.1	-			
					10.2.1.1	Hard surfaces	Impermeable surface, e.g. asphalt, concrete
					10.2.1.2	Half open surfaces	Surfaces made of paving, blocks or slabs, with joins (e.g. paving stones on pavements and roads, dual-layer porous asphalt)
					10.2.1.3	Permeable surfaces	Poured or water-permeable material (e.g. gravel, shells or grass concrete tiles)
					10.2.1.4	Unpaved surfaces	
		10.3	Objects				
			10.3.1	-			
					10.3.1.1	Green roofs	Vegetation roof, roof garden
					10.3.1.2	Gravel roofs	
					10.3.1.3	Plant wall	Vertical house front, green house front, walls
11	Water courses						
		11.1	(dry) slope				
		11.2	Dry ditches				
		11.3	Water courses which contain water				
		11.4	Maintenance paths of water courses				
		11.5	Ponds				
12	Reed and osier crops						
		12.1	-				
			12.1.1	-			
					12.1.1.1	Osier	Dry and wet crops
					12.1.1.2	Reed	
13	Refuse heaps						
14	Stored products						
		14.1	Edible products				Except plant- and propagation material

	Sector.		Crop group		Crop subgroup		Crops/Objects	Remarks
		14.2	Non-edible products					Except plant- and propagation material
		14.3	Empty storage facilities					Control of plant pathogens
15	Disinfectants							
		15.1	-					
				15.1.1	-			
						15.1.1.1	Agricultural and horticultural equipment, tools and materials	On condition that plant pathogens are claimed, otherwise biocide.
16	In and around the house (private garden)							
		16.1	Vegetable garden (edible crops protected or open field)					
		16.2	Ornamental garden plants (field crops)					Non-edible field grown plants (protected or open field)
		16.3	Houseplants					Plants in house
		16.4	Patio plants					Plants not grown in the open field and/or greenhouse
		16.5	Lawn					
		16.6	Permanent pasture					
		16.7	Permeable surfaces					(Gravel, shells etc)
		16.8	Half open surfaces					(Paving stones, paving bricks etc.)
		16.9	Hard surfaces					(Concrete, etc)
		16.10	Unpaved area					

Annex 2 Growth phases (BBCH code) and period during the season (half month periods) for all crops of the DTG-list

The link between crop development stage and time is merely based on labour film distributions of field activities (KWIN-AGV, 1985; KWIN-AV, 2006; IKC-AT, 1994; Peppelman & Groot, 2004) and the Pubas/AgroWerk database (Vink et al, 1999) and expert judgement on knowledge of the development stage of the crops at moments of activity. In case of uncertainty or failing detailed knowledge, it was assumed that the crop could be addressed as:

1. General early short crop – distribution as of Broad bean
2. General late short crop – distribution as of Beet
3. General long crop – distribution as of Ware potatoes
4. General winter crop – distribution as of Winter wheat

DTG crop code	DTG crop	BBCH code							remarks	source
		0 (sow/planting)	0-9	10-19	20-29	30-39	40-89	90-97		
1	Arable crops									
1.1	Potatoes									
1.1.1	-									
1.1.1.1	Seed potato	mar2-apr1	mar2-apr2	may1-may2	jun1-jun2	jul1-jul1	jul2-jul2	aug1-aug1		1)
1.1.1.2	Ware potato	apr1-apr1	apr1-apr2	may1-may2	jun1-jun2	jul1-jul1	jul2-aug2	sep1-oct1		1)
1.1.1.3	Starch potato	mar2-apr1	mar2-apr2	may1-may2	jun1-jun2	jul1-jul1	jul2-aug1	aug2-oct2		1)
1.2	Beet									
1.2.1	-									
1.2.1.1	Sugar beet	mar2-apr1	mar2-apr1	apr2-may2	may1-may2	jun1-jun2	jul1-nov2		BBCH 90-99 flowering only with seed beets	1)
1.2.1.2	Fodder beet	mar2-apr1	mar2-apr1	apr2-may2	may1-may2	jun1-jun2	jul1-oct2		BBCH 90-99 flowering only with seed beets	1)
1.3	Cereals									
1.3.1	Winter cereals									
1.3.1.1	Winter wheat	oct1-nov1	oct1-nov2	dec1-dec2	jan1-mar2	apr1-may2	jun1-jul2	aug1-aug2		1)
1.3.1.2	Winter barley	sep2-sep2	sep2-nov1	nov2-dec2	jan1-mar2	apr1-may2	jun1-jul1	jul2-jul2		1)
1.3.1.3	Winter rye	oct1-oct1	oct1-nov2	dec1-dec2	jan1-mar2	apr1-may2	jun1-jul2	aug1-aug1		1)
1.3.1.4	Triticale	oct1-nov1	oct1-nov2	dec1-dec2	jan1-mar2	apr1-may2	jun1-jul2	aug1-aug2		5)
1.3.1.5	Spelt	oct1-nov1	oct1-nov2	dec1-dec2	jan1-mar2	apr1-may2	jun1-jul2	aug1-aug2		5)

DTG crop code	DTG crop	BBCH code							remarks	source
		0 (sow/planting)	0-9	10-19	20-29	30-39	40-89	90-97		
1.3.1.6	Canary grass	oct1-nov1	oct1-nov2	dec1-dec2	jan1-mar2	apr1-may2	jun1-jul2	aug1-aug2		5)
1.3.2	Spring cereals									
1.3.2.1	Spring wheat	mar1-mar1	mar1-mar1	mar2-mar2	apr1-apr1	apr2-may1	may2-jul1	jul2-sep1		1)
1.3.2.2	Spring barley	mar1-mar1	mar1-mar1	mar2-mar2	apr1-apr1	apr2-may1	may2-jul2	aug1-aug1		1)
1.3.2.3	Spring rye		mar1-mar1	mar2-mar2	apr1-apr1	apr2-may1	may2-jul2	aug1-aug1		1)
1.3.2.4	Oats	mar1-mar1	mar1-mar1	mar2-mar2	apr1-apr1	apr2-may1	may2-aug1	aug2-aug2		1)
1.3.3	Other cereals	mar1-mar1	mar1-mar1	mar2-mar2	apr1-apr1	apr2-may1	may2-jul1	jul2-sep1	based on Spring wheat	
1.4	Maize									
1.4.1	-									
1.4.1.1	Forage maize	apr2-apr2	apr2-apr2	may1-may2	jun1-jun2	jul1-jul2	aug1-sep1	sep2-oct1		
1.4.1.2	Grain maize	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
1.4.1.3	Corn cob mix	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
1.4.1.4	Corn cob silage	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
1.5	Pulses									
1.5.1	Peas (dry)									
1.5.1.1	Marrowfat pea	mar2-mar2	mar2-mar2	apr1-apr1	apr2-apr2	may1-may1	may2-jun2	jul1-jul1		2)
1.5.1.2	Yellow pea	mar2-mar2	mar2-mar2	apr1-apr1	apr2-apr2	may1-may1	may2-jun2	jul1-jul1		2)
1.5.1.3	Grey pea	mar2-mar2	mar2-mar2	apr1-apr1	apr2-apr2	may1-may1	may2-jun2	jul1-jul1		2)
1.5.1.4	Green pea	mar1-mar1	mar1-mar1	mar2-mar2	apr1-apr1	apr2-may1	may2-jul1	jul2-aug1		1)
1.5.1.5	Maple pea	mar2-mar2	mar2-mar2	apr1-apr1	apr2-apr2	may1-may1	may2-jun2	jul1-jul1		2)
1.5.1.6	Brown marrowfat	mar2-mar2	mar2-mar2	apr1-apr1	apr2-apr2	may1-may1	may2-jun2	jul1-jul1		2)
1.5.1.7	Sugar pea	mar2-mar2	mar2-mar2	apr1-apr1	apr2-apr2	may1-may1	may2-jun2	jul1-jul1		2)
1.5.1.8	Lentils	mar2-mar2	mar2-mar2	apr1-apr1	apr2-apr2	may1-may1	may2-jun2	jul1-jul1		2)
1.5.1.9	Chickpea	mar2-mar2	mar2-mar2	apr1-apr1	apr2-apr2	may1-may1	may2-jun2	jul1-jul1		2)
1.5.2	Beans (dry)									
1.5.2.1	Brown bean	may1-may1	may1-may1	may2-may2	jun1-jun2	jul1-jul2	aug1-aug2	sep1-sep1		1)
1.5.2.2	Yellow bean	mar2-mar2	mar2-mar2	apr1-apr1	apr2-apr2	may1-may1	may2-jun2	jul1-jul1		2)
1.5.2.3	Pinto bean	mar2-mar2	mar2-mar2	apr1-apr1	apr2-apr2	may1-may1	may2-jun2	jul1-jul1		2)
1.5.2.4	White bean (haricot)	mar2-mar2	mar2-mar2	apr1-apr1	apr2-apr2	may1-may1	may2-jun2	jul1-jul1		2)
1.5.2.5	Kidney bean	mar2-mar2	mar2-mar2	apr1-apr1	apr2-apr2	may1-may1	may2-jun2	jul1-jul1		2)
1.5.2.6	Green bean	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		7)
1.5.2.7	Lupin	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		7)
1.5.2.8	Soybean	mar2-mar2	mar2-mar2	apr1-apr1	apr2-apr2	may1-may1	may2-jun2	jul1-jul1		2)
1.6	Grass seed crops									
1.6.1	Ryegrass									
1.6.1.1	English ryegrass	aug2-aug2	aug2-aug2	sep1-sep1	sep2-mar1	mar2-apr1	apr2-jul1	jul2-aug1		1)

DTG crop code	DTG crop	BBCH code							remarks	source
		0 (sow/planting)	0-9	10-19	20-29	30-39	40-89	90-97		
1.6.1.2	Italian ryegrass	aug2-aug2	aug2-aug2	sep1-sep1	sep2-mar1	mar2-apr1	apr2-jul2	aug1-aug1		1)
1.6.1.3	False oatgrass	aug2-aug2	aug2-aug2	sep1-sep1	sep2-mar1	mar2-apr1	apr2-jul2	aug1-aug1		1)it.rye
1.6.1.4	Annual ryegrass	aug2-aug2	aug2-aug2	sep1-sep1	sep2-mar1	mar2-apr1	apr2-jul2	aug1-aug1		1)it.rye
1.6.1.5	Hybrid ryegrass	aug2-aug2	aug2-aug2	sep1-sep1	sep2-mar1	mar2-apr1	apr2-jul2	aug1-aug1		1)it.rye
1.6.1.6	Other ryegrasses	aug2-aug2	aug2-aug2	sep1-sep1	sep2-mar1	mar2-apr1	apr2-jul2	aug1-aug1		1)it.rye
1.6.2	Fescue									
1.6.2.1	Red Fescue	oct1-oct1	oct1-oct1	oct2-oct2	nov1-mar1	mar2-apr1	apr2-jul1	jul2-jul2		1)
1.6.2.2	Sheep's Fescue	oct1-oct1	oct1-oct1	oct2-oct2	nov1-mar1	mar2-apr1	apr2-jul1	jul2-jul2		1)red fescue
1.6.2.3	Tall Fescue	oct1-oct1	oct1-oct1	oct2-oct2	nov1-mar1	mar2-apr1	apr2-jul1	jul2-jul2		1)red fescue
1.6.2.4	Other fescues	oct1-oct1	oct1-oct1	oct2-oct2	nov1-mar1	mar2-apr1	apr2-jul1	jul2-jul2		1)red fescue
1.6.3	Bluegrass									
1.6.3.1	Kentucky bluegrass	oct1-oct1	oct1-oct1	oct2-oct2	nov1-mar1	mar2-apr1	apr2-jul1	jul2-jul2		1)
1.6.3.2	Fowl bluegrass	oct1-oct1	oct1-oct1	oct2-oct2	nov1-mar1	mar2-apr1	apr2-jul1	jul2-jul2		1)red fescue
1.6.3.3	Wood bluegrass	oct1-oct1	oct1-oct1	oct2-oct2	nov1-mar1	mar2-apr1	apr2-jul1	jul2-jul2		1)red fescue
1.6.3.4	Meadow fescue	oct1-oct1	oct1-oct1	oct2-oct2	nov1-mar1	mar2-apr1	apr2-jul1	jul2-jul2		1)red fescue
1.6.3.5	Other bluegrasses	oct1-oct1	oct1-oct1	oct2-oct2	nov1-mar1	mar2-apr1	apr2-jul1	jul2-jul2		1)red fescue
1.6.4	Other grasses									
1.6.4.1	Timothy-grass	oct1-oct1	oct1-oct1	oct2-oct2	nov1-mar1	mar2-apr1	apr2-jul1	jul2-jul2		1)red fescue
1.6.4.2	Cock's-foot	oct1-oct1	oct1-oct1	oct2-oct2	nov1-mar1	mar2-apr1	apr2-jul1	jul2-jul2		1)red fescue
1.6.4.3	Colonial bent	oct1-oct1	oct1-oct1	oct2-oct2	nov1-mar1	mar2-apr1	apr2-jul1	jul2-jul2		1)red fescue
1.6.4.4	Crested dog's-tail	oct1-oct1	oct1-oct1	oct2-oct2	nov1-mar1	mar2-apr1	apr2-jul1	jul2-jul2		1)red fescue
1.6.4.5	Tufted hair-grass	oct1-oct1	oct1-oct1	oct2-oct2	nov1-mar1	mar2-apr1	apr2-jul1	jul2-jul2		1)red fescue
1.6.4.6	June grass	oct1-oct1	oct1-oct1	oct2-oct2	nov1-mar1	mar2-apr1	apr2-jul1	jul2-jul2		1)red fescue
1.6.4.7	Other grass seed crops	oct1-oct1	oct1-oct1	oct2-oct2	nov1-mar1	mar2-apr1	apr2-jul1	jul2-jul2		1)red fescue
1.7	Oil seeds									
1.7.1	-									
1.7.1.1	Poppy seeds	mar2-mar2	mar2-mar2	apr1-apr1	apr2-apr2	may1-may1	may2-jul2	aug1-aug2		1)
1.7.1.2	Caraway	mar1-mar1	mar1-mar1	mar2-mar2	apr1-apr1	apr2-may1	may2-jul1	jul2-jul2		1)
1.7.1.3	Flax	mar2-mar2	mar2-mar2	apr1-apr1	apr2-apr2	may1-may1	may2-jun2	jul1-jul1		2)
1.7.1.4	Mustard	mar2-mar2	mar2-mar2	apr1-apr1	apr2-apr2	may1-may1	may2-jun2	jul1-jul1		2)
1.7.1.5	Winter oilseed rape	aug1-aug1	aug2-aug2	sep1-sep1	sep2-mar1	mar2-apr1	apr2-jul2	aug1-aug1		1)
1.7.1.6	Summer oilseed rape	mar1-mar1	mar1-mar1	mar2-mar2	apr1-apr2	may1-may1	may2-jul2	aug1-aug2		1) caraway
1.7.1.7	Evening primrose	apr1-apr1	apr1-apr1	apr2-apr2	may1-may1	may2-may2	jun1-sep2	oct1-oct1		1)
1.7.1.8	Common sunflower	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
1.7.1.9	Gold-of-pleasure	mar2-mar2	mar2-mar2	apr1-apr1	apr2-apr2	may1-may1	may2-jun2	jul1-jul1		2)
1.7.1.10	Crambe	mar2-mar2	mar2-mar2	apr1-apr1	apr2-apr2	may1-may1	may2-jun2	jul1-jul1		2)

DTG crop code	DTG crop	BBCH code							remarks	source
		0 (sow/planting)	0-9	10-19	20-29	30-39	40-89	90-97		
1.7.1.11	Soybean	mar2-mar2	mar2-mar2	apr1-apr1	apr2-apr2	may1-may1	may2-jun2	jul1-jul1		2)
1.7.1.11	Other oil seeds	mar2-mar2	mar2-mar2	apr1-apr1	apr2-apr2	may1-may1	may2-jun2	jul1-jul1		2)
1.8	Fibre crops									
1.8.1	-									
1.8.1.1	Hemp	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
1.8.1.2	Flax	mar2-mar2	mar2-mar2	apr1-apr1	apr2-apr2	may1-may1	may2-jul1	jul2-jul2		1)
1.8.1.3	Common nettle	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
1.8.1.4	Other fibre crops	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
1.9	Green manure crops									
1.9.1	Leguminous green manure crops									
1.9.1.1	Clover	jul1-aug1	aug2-sep1	sep2-oct1	oct2-dec2				**)	3)
1.9.1.2	Lupin	jul1-aug1	aug2-sep1	sep2-oct1	oct2-dec2				**)	3)
1.9.1.3	Common vetch	jul1-aug1	aug2-sep1	sep2-oct1	oct2-dec2				**) Sowing as green manure crop after harvest of e.g. early potatoes or cereal crop; on the field until ploughing	1)
1.9.1.4	Serradella	jul1-aug1	aug2-sep1	sep2-oct1	oct2-dec2				**)	3)
1.9.1.5	Celosia	jul1-aug1	aug2-sep1	sep2-oct1	oct2-dec2				**)	3)
1.9.1.6	Esparcet	jul1-aug1	aug2-sep1	sep2-oct1	oct2-dec2				**)	3)
1.9.1.7	Broad bean	jul1-aug1	aug2-sep1	sep2-oct1	oct2-dec2				**)	3)
1.9.1.8	Other leguminous green manure crops	jul1-aug1	aug2-sep1	sep2-oct1	oct2-dec2				**)	3)
1.9.2	Graminae green manure crops									
1.9.2.1	Rye	oct1-nov1	oct1-nov2	dec1-dec2	jan1-mar2				**)	5)
1.9.2.2	Ryegrass	oct1-nov1	oct1-nov2	dec1-dec2	jan1-mar2				**)	5)
1.9.2.3	Black oat	oct1-nov1	oct1-nov2	dec1-dec2	jan1-mar2				**)	5)
1.9.3	Cruciferae green manure crops									
1.9.3.1	Oil radish	jul1-aug1	aug2-sep1	sep2-oct1	oct2-dec2				**)	3)
1.9.3.2	Oilseed rape	jul1-aug1	aug2-sep1	sep2-oct1	oct2-dec2				**)	5)
1.9.3.3	Yellow mustard seed	jul1-aug1	aug2-sep1	sep2-oct1	oct2-dec2				**)	5)
1.9.3.4	Marrow-stem kale	jul1-aug1	aug2-sep1	sep2-oct1	oct2-dec2				**)	3)

DTG crop code	DTG crop	BBCH code							remarks	source
		0 (sow/planting)	0-9	10-19	20-29	30-39	40-89	90-97		
1.9.4	Other green manure crops									
1.9.4.1	Tancy phacelia	jul1-aug1	aug2-sep1	sep2-oct1	oct2-dec2				**)	3)
1.9.4.2	Corn spurrey	jul1-aug1	aug2-sep1	sep2-oct1	oct2-dec2				**)	3)
1.9.4.3	African Marigold	jul1-aug1	aug2-sep1	sep2-oct1	oct2-dec2				**)	3)
1.9.4.4	Sticky nightshade	jul1-aug1	aug2-sep1	sep2-oct1	oct2-dec2				**)	3)
1.9.4.5	Sudan grass	jul1-aug1	aug2-sep1	sep2-oct1	oct2-dec2				**)	3)
1.9.4.6	Gold-of-Pleasure	jul1-aug1	aug2-sep1	sep2-oct1	oct2-dec2					
1.9.4.7	Forage turnip	jul1-aug1	aug2-sep1	sep2-oct1	oct2-dec2					
1.9.4.8	Arugula	jul1-aug1	aug2-sep1	sep2-oct1	oct2-dec2					
1.9.4.9	Niger-seed	jul1-aug1	aug2-sep1	sep2-oct1	oct2-dec2					
1.10	Fodder crops									
1.10.1	Leguminous fodder crops									
1.10.1.1	Clover	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
1.10.1.2	Alfalfa	apr1-apr2	apr1-apr1	apr2-apr2		may2-may2	jun1-sep1	sep2-sep2		1)
1.10.1.3	Common vetch	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
1.10.1.4	Lupin	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		
1.10.1.5	Celosia	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
1.10.1.6	Esparcet	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
1.10.1.7	Broad beans (feed crop)	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
1.10.2	Other fodder crops.	Apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
1.10.2.1	Forage turnip	Apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
1.11	Other arable crops									
1.11.1	-									
1.11.1.1	Witloof Chicory (roots)	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
1.11.1.2	Large rooted chicory	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
1.11.1.3	Buckwheat	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
1.11.1.4	Common Hop								x	3)
1.11.1.5	Common madder	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
1.11.1.6	Chinese fairy grass	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
1.11.1.7	Elephant grass	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
1.11.1.8	Quinoa	apr1-may1	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		
1.11.1.9	Woad	apr1-may1	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		
1.11.1.10	Wild woad	apr1-may1	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		
1.11.1.11	Sorhgum	apr1-may1	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		
1.11.1.12	Teff	mar2-mar2	mar2-mar2	apr1-apr1	apr2-apr2	may1-may1	may2-jun2	jul1-jul1		2)
1.11.1.13	Millet	apr1-may1	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		

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1.11.1.13	Russian dandelion	mar2-mar2	mar2-mar2	apr1-apr1	apr2-apr2	may1-may1	may2-jul2	aug1-aug2	Ctgb no experience; to be adapted later	
2	Cultivated grassland									
2.1	Fodder grassland									
2.1.1	-									
2.1.1.1	Permanent pasture								x	
2.1.1.2	Mowing grassland								x	
2.2	Turf production								x	
3	Fruit crops Only refers to production of fruits									
3.1	Large fruits									
3.1.1	Pome fruit								x	
3.1.1.1	Apple								x	
3.1.1.2	Pears								x	
3.1.1.3	Quince								x	
3.1.1.4	Common medlar								x	
3.1.1.5	Other pome fruit								x	
3.1.2	Stone fruit								x	
3.1.2.1	Sweet Cherry Sour cherry								x	
3.1.2.2	Plum								x	
3.1.2.3	Apricot								x	
3.1.2.4	Peach Nectarine								x	
3.1.2.5	Other stone fruit								x	
3.2	Small fruits								x	
3.2.1	Strawberries	mar1-jul2	mar2-mar2	apr1-apr1	apr2-apr2	may1-may1	may2-may2	jun1-oct2		1)
3.2.2	Berries								x	
3.2.2.1	Currant								x(red, white and black)	
3.2.2.2	Gooseberry								x	
3.2.2.3	Blueberry								x	
3.2.2.4	Small cranberry	mar1-mar2	apr1-apr1	may1-may1	jun1-jun2	jul1-jul1	aug1-sep1	sep1-nov22		6)
3.2.2.5	Mulberry								x	
3.2.2.6	Rose hip								x	
3.2.2.7	Kiwiberry								x	
3.2.2.8	Elderberry								x	
3.2.2.9	Blue honeysuckle									

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3.2.2.10	Other berries								x	
3.2.3	Grapes									
3.2.3.1	Table grape								x	
3.2.3.2	Wine grape								x	
3.2.4	'Blackberry and raspberry family (Rubus spp.)'									
3.2.4.1	Blackberry								x	
3.2.4.2	Raspberry								x	
3.2.4.3	Common Dewberry								x	
3.3	Tree Nuts									
3.3.1	-									
3.3.1.1	Hazelnut								x	
3.3.1.2	Chestnut								x	
3.3.1.3	Walnut								x	
3.4	Other fruits								x	
3.4.1	-									
3.4.1.1	Fig									
3.4.1.2	Kiwi								x	
4	Vegetable crops								x	
4.1	Leafy vegetables									
4.1.1	Lettuce; *Lactuca* spp	mar1-aug2	mar1-mar1	mar2-mar2	apr1-apr1	apr2-apr2	may1-may1	may1-oct2	Up to 3 crops per year at same field possible	1)
4.1.2	Endive	mar1-aug1	mar1-mar1	mar2-mar2	apr1-apr1	apr2-apr2	may1-may1	may2-nov1	Up to 3 crops per year at same field possible	1)
4.1.3	Spinach family									
4.1.3.1	Spinach	mar1-sep1	mar1-mar1	mar2-mar2	apr1-apr1	apr2-apr2	may1-may1	may1-oct2	Up to 2 crops per year at same field possible	1)
4.1.3.2	Chard	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
4.1.3.3	Garden Orache	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
4.1.3.4	Purslane	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
4.1.4	Other leafy vegetables									
4.1.4.1	Witloof Chicory (forced cultivation)	apr2-may2	may1-may1	may2-may2	jun1-jun1	jun2-jun2	jul1-jul1	jul2-nov2		1)
4.1.4.2	Watercress	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
4.1.4.3	Lamb's lettuce	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2	Up to 3 crops per year at same field possible	3)

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4.1.4.4	Rocket	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2	Up to 3 crops per year at same field possible	3)
4.1.4.5	Sea aster	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
4.1.5	Vegetable sprouts									
4.1.5.1	Garden cress	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
4.1.5.2	Bean sprouts								x	
4.1.5.3	Alfalfa								x	
4.1.5.4	Rucola cress	mar1-sep1	mar1-mar1	mar2-mar2	apr1-apr1	apr2-apr2	may1-may1	may1-oct2		
4.1.5.5	Other vegetable sprouts								x	
4.1.6	Baby leaf crops									
4.2	Legume vegetables (fresh)									3)
4.2.1	Beans with pod									
4.2.1.1	Dwarf French bean	may2-may2	may2-may2	jun1-jun1	jun2-jun2	jul1-jul1	jul2-jul2	aug1-aug2	Up to 2 crops per year at same field possible	1)
4.2.1.2	Slicing bean	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
4.2.1.3	Climbing French beans	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
4.2.1.4	Climbing slicing bean	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
4.2.1.5	Scarlet runner bean	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
4.2.1.6	Yardlong bean	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
4.2.2	Beans without pod									
4.2.2.1	Broad bean	mar2-mar2	mar2-mar2	apr1-apr1	apr2-apr2	may1-may1	may2-jun2	jul1-jul1		1)
4.2.2.2	Lima bean	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
4.2.2.3	Flageolets	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
4.2.3	Pea with pod									
4.2.3.1	Mangetout	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
4.2.3.2	Asparagus pea	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
4.2.3.3	Sugar pea	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
4.2.4	Pea without pod									
4.2.4.1	Green pea	mar1-apr2	mar1-mar1	mar2-mar2	apr1-apr1	apr2-may1	may2-jul1	jul2-aug1		1)
4.2.4.2	Field pea	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
4.3	Fruiting vegetables									
4.3.1	Fruiting vegetables of Cucurbits -, edible peel									
4.3.1.1	Gherkin	may1-may2	may2-may2	jun1-jun1	jun2-jun2	jul1-jul1	jul2-jul2	jul2-sep2		1)gherkin
4.3.1.2	Zucchini	may1-may2	may2-may2	jun1-jun1	jun2-jun2	jul1-jul1	jul2-jul2	jul2-sep2	Up to 2 crops per year at same field possible	1)gherkin

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4.3.1.3	Cucumber								x	
4.3.2	Fruiting vegetables of Cucurbits - non-edible peel									
4.3.2.1	Pumpkins	may1-may2	may2-may2	jun1-jun1	jun2-jun2	jul1-jul1	jul2-jul2	jul2-sep2		1)gherkin
4.3.2.2	Melon								x	
4.3.2.3	Watermelon								x	
4.3.3	Fruiting vegetables of *Solanaceae*									
4.3.3.1	Aubergine								x	
4.3.3.2	Tomato								x	
4.3.3.3	Sweet pepper								x	
4.3.3.4	Husk tomato									
4.3.4	Fruiting vegetables of *Malvaceae*									
4.3.4.1	Okra								x	
4.4	Brassica vegetables									
4.4.1	Head cabbages									
4.4.1.1	Head cabbage	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
4.4.1.2	Brussels sprouts	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-mar2		1)
4.4.2	Flowering brassica									
4.4.2.1	Cauliflower	mar2-jun1	apr1-apr1	apr2-apr2	may1-may2	may1-may2	jun1-jul2	jul1-sep2		1)
4.4.2.2	Broccoli	may1-aug1	may1-may1	may2-may2	jun1-jun1	jun2-jun2	jul1-jul1	jul1-oct2	Up to 2 crops per year at same field possible	1)
4.4.3	Leafy brassica									
4.4.3.1	Chinese cabbage	mar2-aug2	mar2-mar2	apr1-apr1	apr2-apr2	may1-may1	may2-may2	may2-oct2	Up to 2 crops per year at same field possible	1)
4.4.3.2	Kale	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
4.4.4	Stern cabbage									
4.4.4.1	Kohlrabi	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
4.5	Root and tuber vegetables									
4.5.1	Radishes									
4.5.1.1	Small radish	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
4.5.1.2	Black/white radish	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2	Up to 3 crops per year at same field possible	3)
4.5.2	Root vegetables (Umbelliferae)									

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4.5.2.1	Carrots	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-sep2	oct1-nov1		1)
4.5.2.2	Skirret	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
4.5.2.3	Turnip rootedparsley	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
4.5.2.4	Parsnips	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
4.5.3	Other root and tuber vegetables									
4.5.3.1	Turnip cabbage	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
4.5.3.2	Swede	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
4.5.3.3	Jerusalem artichoke	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
4.5.3.4	Japanese artichoke	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
4.5.3.5	Sweet potato	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
4.5.3.6	Red Beet	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		1)
4.5.3.7	Celeriac	may2-may2	may2-may2	jun1-jun1	jun2-jun2	jul1-jul1	jul2-oct2	nov1-nov1		1)
4.5.3.8	Black Salsify	apr1-apr1	apr1-apr1	apr2-may1	may2-jun1	jun2-jul1	jul2-sep2	oct1-mar1		1)
4.5.3.9	Horseradish	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
4.5.3.10	Yam	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
4.6	Bulb vegetables									
4.6.1.	Onions									
4.6.1.1	Seed onion	apr1-apr1	apr1-apr1	apr2-apr2	may1-may1	may2-may2	jun1-aug2	sep1-sep2		1)
4.6.1.2	First year bulb onion	mar2-apr1	apr1-apr1	apr2-apr2	may1-may1	may2-may2	jun1-jul1	jul2-jul2		1)
4.6.1.3	Second year bulb onion	feb2-mar2	mar2-mar2	apr1-apr1	apr2-apr2	may1-may1	may2-jun2	jul1-jul2		1)
4.6.1.4	Silverskin onions	mar2-mar2	mar2-mar2	apr1-apr1	apr2-apr2	may1-may1	may2-jun2	jul1-jul1		2)
4.6.1.5	Picklers	mar2-mar2	mar2-mar2	apr1-apr1	apr2-apr2	may1-may1	may2-jun2	jul1-jul1		2)
4.6.2	Shallots									
4.6.2.1	Seed shallot	mar2-mar2	mar2-mar2	apr1-apr1	apr2-apr2	may1-may1	may2-jun2	jul1-jul1		2)
4.6.2.2	Bulb shallot	mar2-mar2	mar2-mar2	apr1-apr1	apr2-apr2	may1-may1	may2-jun2	jul1-jul1		2)
4.6.3	Spring onion									
4.6.3.1	Spring onion	mar2-mar2	mar2-mar2	apr1-apr1	apr2-apr2	may1-may1	may2-jun2	jul1-jul1		2)
4.6.4	Garlic									
4.6.4.1	Garlic	mar2-mar2	mar2-mar2	apr1-apr1	apr2-apr2	may1-may1	may2-jun2	jul1-jul1		2)
4.7	Stem vegetables									
4.7.1	-									
4.7.1.1	Asparagus	apr1-apr1	apr1-apr2	may1-may2	jun1-jun2	jul1-jul1	jul2-aug2	sep1-oct1		4)
4.7.1.2	Celery	apr1-apr1	apr1-apr2	may1-may2	jun1-jun2	jul1-jul1	jul2-aug2	sep1-oct1		4)
4.7.1.3	Cardoon	apr1-apr1	apr1-apr2	may1-may2	jun1-jun2	jul1-jul1	jul2-aug2	sep1-oct1		4)
4.7.1.4	Rhubarb	apr1-apr1	apr1-apr2	may1-may2	jun1-jun2	jul1-jul1	jul2-aug2	sep1-oct1		4)

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4.7.1.5	Fennel	may1-aug1	may1-may1	may2-may2	jun1-jun1	jun2-jun2	jul1-jul1	jul1-nov2		1)
4.7.1.6	Leek	apr1-jun2	apr1-apr1	apr2-apr2	may1-may1	may2-may2	jun1-jun2	jul1-dec2		1)
4.7.1.7	Globe Artichoke	apr1-apr1	apr1-apr2	may1-may2	jun1-jun2	jul1-jul1	jul2-aug2	sep1-oct1		4)
4.7.1.8	Sea kale	apr1-apr1	apr1-apr2	may1-may2	jun1-jun2	jul1-jul1	jul2-aug2	sep1-oct1		4)
4.7.1.8	Marsh samphire	apr1-apr1	apr1-apr2	may1-may2	jun1-jun2	jul1-jul1	jul2-aug2	sep1-oct1		4)
4.8	Other vegetable crops									
4.8.1	-									
4.8.1.1	Sweet corn	apr1-apr1	apr1-apr2	may1-may2	jun1-jun2	jul1-jul1	jul2-aug2	sep1-oct1		4)
5	Herbs fresh or dried									
5.1	Aromatic herbs									
5.1.1	-									
5.1.1.1	Basil	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
5.1.1.2	Chives	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
5.1.1.3	Summer savory	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
5.1.1.4	Lemon balm	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
5.1.1.5	Dill	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
5.1.1.6	Tarragon	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
5.1.1.7	Hyssop	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
5.1.1.8	Chervil	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
5.1.1.9	Coriander	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
5.1.1.10	Parsley	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
5.1.1.11	Lovage	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
5.1.1.12	Marjoram	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
5.1.1.13	Oregano	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
5.1.1.14	Mint	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
5.1.1.15	Burnet	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
5.1.1.16	Rosemary	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
5.1.1.17	Sage	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
5.1.1.18	Thyme	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
5.1.1.19	Fennel	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
5.1.1.20	Celery Leaves	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
5.1.1.21	Sorrel	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)

DTG crop code	DTG crop	BBCH code							remarks	source
		0 (sow/planting)	0-9	10-19	20-29	30-39	40-89	90-97		
5.1.1.22	Tea	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2	Ctgb no experience; probably greenhouse crop – to be adapted later	
5.1.1.23	Other aromatic garden herbs	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
5.1.1.24	Edible flowers	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
5.2	Aromatic root crops									
5.2.1	-									
5.2.1.1	Lovage root	apr1-apr1	apr1-apr2	may1-may2	jun1-jun2	jul1-jul1	jul2-aug2	sep1-oct1		4)
5.2.1.2	Angelica	apr1-apr1	apr1-apr2	may1-may2	jun1-jun2	jul1-jul1	jul2-aug2	sep1-oct1		4)
5.2.1.3	Burnet Saxifrage root	apr1-apr1	apr1-apr2	may1-may2	jun1-jun2	jul1-jul1	jul2-aug2	sep1-oct1		4)
5.2.1.4	Turnip-rooted parsley	apr1-apr1	apr1-apr2	may1-may2	jun1-jun2	jul1-jul1	jul2-aug2	sep1-oct1		4)
5.2.1.5	Other aromatic root crops	apr1-apr1	apr1-apr2	may1-may2	jun1-jun2	jul1-jul1	jul2-aug2	sep1-oct1		4)
5.3	Medicinal herbs									
5.3.1	-									
5.3.1.1	Indian tobacco	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
5.3.1.2	Woolly foxglove	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
5.3.1.3	Wild pansy	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
5.3.1.4	Wild chamomile	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
5.3.1.5	Purple coneflower	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
5.3.1.6	Pot marigold	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
5.3.1.7	Other medicinal herbs	apr1-may2	apr2-apr2	may1-may1	may2-may2	jun1-jun1	jun2-jul2	aug1-sep2		3)
5.4	Medicinal root crops									
5.4.1	-									
5.4.1.1	Valerian	apr1-apr1	apr1-apr2	may1-may2	jun1-jun2	jul1-jul1	jul2-aug2	sep1-oct1		4)
5.4.1.2	Asiatic Ginseng	apr1-apr1	apr1-apr2	may1-may2	jun1-jun2	jul1-jul1	jul2-aug2	sep1-oct1		4)
5.4.1.3	Purple coneflower root	apr1-apr1	apr1-apr2	may1-may2	jun1-jun2	jul1-jul1	jul2-aug2	sep1-oct1		4)
5.4.1.4	Other medicinal root crops									
5.5	Herbs seed crops									
5.5.1	-									
5.5.1.1	Caraway	apr1-apr1	apr1-apr2	may1-may2	jun1-jun2	jul1-jul1	jul2-aug2	sep1-oct1		4)
5.5.1.2	Poppy seed	apr1-apr1	apr1-apr2	may1-may2	jun1-jun2	jul1-jul1	jul2-aug2	sep1-oct1		4)
5.5.1.3	Other seed herbs	apr1-apr1	apr1-apr2	may1-may2	jun1-jun2	jul1-jul1	jul2-aug2	sep1-oct1		4)
5.6	Fruits or berries (herbs)									
5.6.1.1	Common vanilla								x greenhouse crop	
6	Mushrooms									

DTG crop code	DTG crop	BBCH code							remarks	source
		0 (sow/planting)	0-9	10-19	20-29	30-39	40-89	90-97		
6.1	Edible mushrooms									
6.1.1	-									
6.1.1.1	Button mushroom								x	
6.1.1.2	Oyster mushroom								x	
6.1.1.3	Other mushrooms								x	
7	Ornamental crops									
7.1	Flower bulb and Flower tubers									
7.1.1	-									
7.1.1.1	Winter Flower bulbs and Flower tubers for reproduction	oct1-oct2	nov1-nov2	dec1-feb2	mar1-apr1	apr2-may1	may2-jun1	jun2-jul1		1) tulip
7.1.1.2	Summer Flower bulbs and Flower tubers for reproduction	mrt1-mrt2	apr1-apr1	apr2-apr2	may1-may2	jun1-jun1	jun2-sep1	sep2-sep2		1) lilly
7.1.1.3	Winter Bulb flower and tuber flower for flower/pot plant cultivation	oct1-oct2	nov1-nov2	dec1-feb2	mar1-apr1	apr2-may1	may2-jun1	jun2-jul1		1) tulip
7.1.1.4	Summer Bulb flower and tuber flower for flower/pot plant cultivation	mar2-apr1	apr1-apr1	apr2-apr2	may1-may2	jun1-jun1	jun2-sep2	oct2-nov1		1) lilly
7.2	Floriculture crops									
7.2.1	-									
7.2.1.1	Pot plants	apr1-apr1	apr1-apr2	may1-may2	jun1-jun2	jul1-jul1	jul2-aug2	sep1-oct1		4)
7.2.2.1	Cut flowers	apr1-apr1	apr1-apr2	may1-may2	jun1-jun2	jul1-jul1	jul2-aug2	sep1-oct1		4)
7.2.3.1	Forced shrubs	apr1-apr1	apr1-apr2	may1-may2	jun1-jun2	jul1-jul1	jul2-aug2	sep1-oct1		4)
7.2.4.1	Cut green	apr1-apr1	apr1-apr2	may1-may2	jun1-jun2	jul1-jul1	jul2-aug2	sep1-oct1		4)
7.3	Tree nursery crops									
7.3.1	-									
7.3.1.1	Spindle trees								x	
7.3.1.2	Transplanted trees								x	
7.3.1.3	High Avenue trees								x	
7.3.2.1	Climbing plants	apr1-apr1	apr1-apr2	may1-may2	jun1-jun2	jul1-jul1	jul2-aug2	sep1-oct1		4)
7.3.3.1	Ornamental shrubs (including Roses)	apr1-apr1	apr1-apr2	may1-may2	jun1-jun2	jul1-jul1	jul2-aug2	sep1-oct1		4)
7.3.4.1	Conifers (including Christmas trees)	apr1-apr1	apr1-apr2	may1-may2	jun1-jun2	jul1-jul1	jul2-aug2	sep1-oct1		4)
7.3.7.1	Heather	apr1-apr1	apr1-apr2	may1-may2	jun1-jun2	jul1-jul1	jul2-aug2	sep1-oct1		4)

DTG crop code	DTG crop	BBCH code							remarks	source
		0 (sow/planting)	0-9	10-19	20-29	30-39	40-89	90-97		
7.3.8.1	Forest trees and hedging plants	apr1-apr1	apr1-apr2	may1-may2	jun1-jun2	jul1-jul1	jul2-aug2	sep1-oct1		4)
7.3.9.1	Fruit trees and shrubs	apr1-apr1	apr1-apr2	may1-may2	jun1-jun2	jul1-jul1	jul2-aug2	sep1-oct1		4)
7.4	Perennial crops	apr1-apr1	apr1-apr2	may1-may2	jun1-jun2	jul1-jul1	jul2-aug2	sep1-oct1		4)
7.5	Flower seed crops	apr1-apr1	apr1-apr2	may1-may2	jun1-jun2	jul1-jul1	jul2-aug2	sep1-oct1		4)
7.6	Marsh and Water plants								x	
7.7	Plant breeding crops and seed production								x Remark of the working group: This crop can not be selected in DRAINBOW. The relevant field crop should be taken instead; e.g seed production of winter wheat is treated as winter wheat	
8	Amenity areas								x	
8.1	Managed amenity turf								x	
8.1.1	-								x	
8.1.1.1	Lawn								x	
8.1.1.2	Playground								x	
8.1.1.3	Sports field								x	
8.1.1.4	Grassy verges								x	
8.2	Woody plantings								x	
8.2.1	-								x	
8.2.1.1	Avenue and border trees								x	
8.2.1.2	Shelter belts, windbreaks and hedgerows								x	
8.2.1.3	Other woody plantings								x	
8.3	Herbaceous plantings								x	
9	Forestry									
9.1	Broad-leaved trees								x	
9.2	Coniferous trees								x	

DTG crop code	DTG crop	BBCH code							remarks	source
		0 (sow/planting)	0-9	10-19	20-29	30-39	40-89	90-97		
10	Uncultivated land									
10.1	Temporarily uncultivated terrain								x	
10.1.1	-									
10.1.1.1	Deforestation area								x	
10.1.1.2	Temporarily uncultivated land								x	
10.1.1.3	Buffer areas of fields								x	
10.2	Permanently uncultivated land								x	
10.2.1	-								x	
10.2.1.1	Hard surfaces								x	
10.2.1.2	Half-open surfaces								x	
10.2.1.3	Permeable surfaces								x	
10.2.1.4	Unpaved surfaces								x	
10.3	Objects									
10.3.1	-									
10.3.1.1	Green roofs								x	
10.3.1.2	Gravel roofs								x	
10.3.1.3	Plant wall								x	
11	Water courses									
11.1	(dry) slope								x	
11.2	Dry ditches								x	
11.3	Water courses which contain water								x	
11.4	Maintenance paths of water courses								x	
11.5	Ponds								x	
12	Reed and osier crops								x	
12.1	-								x	
12.1.1	-								x	
12.1.1.1	Osier								x	
12.1.1.2	Reed								x	
13	Refuse heaps								x	
14	Stored products								x	
14.1	Edible products								x	
14.2	Non-edible products								x	
14.3	Empty storage facilities								x	

DTG crop code	DTG crop	BBCH code							remarks	source
		0 (sow/planting)	0-9	10-19	20-29	30-39	40-89	90-97		
15	Disinfectants								-	
15.1	-								-	
15.1.1	-								-	
15.1.1.1	Agricultural and horticultural equipment, tools and materials								x	
16	In and around the house, (private garden)								x	
16.1	Vegetable garden								x	
16.2	Ornamental garden								x	
16.3	House-plants								x	
16.4	Patio plants								x	
16.5	Lawn								x	
16.6	Permanent pasture								x	
16.7	Permeable surfaces								x	
16.8	Half-open surfaces								x	
16.9	Hard surfaces								x	
16.10	Unpaved area								x	

X not relevant for downward directed spraying

- cannot be determined

1) from: KWIN AGV 1985

2) general early short crop (Broad bean)

3) general late short crop (Beet)

4) general long crop (Consumption potatoes)

5) general winter crop (Winter wheat)

6) Timmer & Balkhoven-Baart, 2006

7) Prins, 2015

Annex 3 Link of DTG crops, EPPO code and crops in the FOCUS interception table after Anonymous, 2014 (Table 6 of this report).

Each crop in the DTG-list is coupled to one of the crops specified in Table 6 of this report. This is done based on expert judgement, having experience with how crops are grown in the field (row distances) and their development in size and height during the growing season.

DTG crop code	DTG crop	EPPO code	FOCUS crop	Remarks
1	Arable crops			
1.1	Potatoes			
1.1.1	-			
1.1.1.1	Seed potato	SOLTU	Potatoes	
1.1.1.2	Ware potato	SOLTU	Potatoes	
1.1.1.3	Starch potato	SOLTU	Potatoes	
1.2	Beet			
1.2.1	-			
1.2.1.1	Sugar beets	BEAVA	Sugar beets	
1.2.1.2	Fodder beets	BEAVC	Sugar beets	
1.3	Cereals			
1.3.1	Winter cereals			
1.3.1.1	Winter wheat	TRZAW	Winter Cereals	
1.3.1.2	Winter barley	HORVW	Winter Cereals	
1.3.1.3	Winter rye	SECCW	Winter Cereals	
1.3.1.4	Triticale	TTLWI	Winter Cereals	
1.3.1.5	Spelt	TRZSP	Winter Cereals	
1.3.1.6	Canary grass	PHACA	Winter Cereals	
1.3.2	Spring cereals			
1.3.2.1	Spring wheat	TRZAS	Spring Cereals	
1.3.2.2	Spring barley	HORVS	Spring Cereals	
1.3.2.3	Spring rye	SECCS	Spring Cereals	
1.3.2.4	Oats	AVESA	Spring Cereals	
1.3.3	Other cereals		Spring Cereals	
1.4	Maize			
1.4.1	-			
1.4.1.1	Forage maize	ZEAMX	Maize	
1.4.1.2	Grain maize	ZEAMX	Maize	
1.4.1.3	Corn cob mix	ZEAMX	Maize	
1.4.1.4	Corn cob silage	ZEAMX	Maize	
1.5	Pulses			
1.5.1	Peas (dry)			
1.5.1.1	Marrowfat pea	PIBSA	Peas	
1.5.1.2	Yellow pea	PIBSA	Peas	
1.5.1.3	Grey pea	PIBSA	Peas	
1.5.1.4	Green pea	PIBSA	Peas	
1.5.1.5	Maple pea	PIBSA	Peas	
1.5.1.6	Brown marrowfat	PIBSA	Peas	
1.5.1.7	Sugar pea	PIBSZ	Peas	
1.5.1.8	Lentil	LENCU	Peas	
1.5.1.9	Chickpea	CIAER	Peas	
1.5.2	Beans (dry)			

DTG crop code	DTG crop	EPPO code	FOCUS crop	Remarks
1.5.2.1	Brown bean	PHSVX	Beans (field+vegetable)	
1.5.2.2	Yellow bean	PHSVX	Beans (field+vegetable)	
1.5.2.3	Pinto bean	PHSVX	Beans (field+vegetable)	
1.5.2.4	White bean (haricot)	PHSVX	Beans (field+vegetable)	
1.5.2.5	Kidney bean	PHSVX	Beans (field+vegetable)	
1.5.2.6	Green bean	VICFX	Beans (field+vegetable)	
1.5.2.7	Lupin	LUPAL		
1.5.2.8	Soybean	GLXMA	Beans (field+vegetable)	
1.6	Grass seed crops			
1.6.1	Ryegrass	LOLSS		
1.6.1.1	English ryegrass	LOLPE	Grass	
1.6.1.2	Italian ryegrass	LOLMU	Grass	
1.6.1.3	False oatgrass	ARREL	Grass	
1.6.1.4	Annual ryegrass	LOLMG	Grass	
1.6.1.5	Hybrid ryegrass	LOLBO	Grass	
1.6.1.6	Other ryegrasses		Grass	
1.6.2	Fescue	FESSS		
1.6.2.1	Red Fescue	FESRU	Grass	
1.6.2.2	Sheep's Fescue	FESOV	Grass	
1.6.2.3	Tall Fescue	FESAR	Grass	
1.6.2.4	Other fescues		Grass	
1.6.3	Bluegrass	POASS		
1.6.3.1	Kentucky bluegrass	POAPR	Grass	
1.6.3.2	Fowl bluegrass	POAPA	Grass	
1.6.3.3	Wood bluegrass	POANE	Grass	
1.6.3.4	Meadow fescue	FESPR	Grass	
1.6.3.5	Other bluegrasses		Grass	
1.6.4	Other grasses			
1.6.4.1	Timothy-grass	PHLPR	Grass	
1.6.4.2	Cock's-foot	DACGL	Grass	
1.6.4.3	Colonial bent	AGSSS	Grass	
1.6.4.4	Crested dog's-tail	CYXCR	Grass	
1.6.4.5	Tufted hair-grass	DECCA	Grass	
1.6.4.6	Junegrass	KOLSS	Grass	
1.6.4.7	Other grass seed crops		Grass	
1.7	Oil seeds			
1.7.1	-			
1.7.1.1	Poppy seeds	PAPSO	Linseed	
1.7.1.2	Caraway	CRYCA	Linseed	
1.7.1.3	Flax	LIUUT	Linseed	
1.7.1.4	Mustard	SINAL BRSNI	Oilseed rape	
1.7.1.5	Winter oilseed rape	BRSNN	Oilseed rape	
1.7.1.6	Summer oilseed rape	BRSNN	Oilseed rape	
1.7.1.7	Evening primrose	OEOSS	Linseed	
1.7.1.8	Common sunflower	HELAN	Sunflower	
1.7.1.9	Gold of pleasure	CMASA	Linseed	
1.7.1.10	Crambe	CRMAB	Linseed	
1.7.1.11	Soybean	GLXMA	Soybean	
1.7.1.12	Other oil seeds		Linseed	
1.8	Fibre crops			
1.8.1	-			
1.8.1.1	Hemp	CNISA	Sunflower	
1.8.1.2	Flax	LIUUT	Linseed	
1.8.1.3	Common nettle	URTSS	Sunflower	
1.8.1.4	Other fibre crops		Sunflower	
1.9	Green manure crops			

DTG crop code	DTG crop	EPPO code	FOCUS crop	Remarks
1.9.1	Leguminous green manure crops			
1.9.1.1	Clover		Linseed	
		TRFPR		Red clover
		TRFRE		White clover
		TRFHY		Alslike clover
		TRFIN		Carnation clover
		TRFRS		Persian clover
		TRFAL		Berseem clover
		MEDLU		Hop clover
		LOTCO		Birds-foot trefoil
		MEUAL		Honey clover
				Other clover species
1.9.1.2	Lupin	LUPSS	Linseed	
1.9.1.3	Common vetch	VICSA	Linseed	
1.9.1.4	Serradella	OROSA	Linseed	
1.9.1.5	Celosia	CEOAR	Linseed	
1.9.1.6	Esparcet	ONBVI	Linseed	
1.9.1.6	Broad beans	VICFX	Beans (field+vegetable)	
1.9.1.7	Other leguminous green manure crops		Beans (field+vegetable)	
1.9.2	Graminaceae green manure crops			
1.9.2.1	Rye	SECCE	Grass	
1.9.2.2	Ryegrass	LOLSS	Grass	
1.9.2.3	Black oat	AVESG	Grass	
1.9.3	Cruciferae green manure crops		Oilseed rape	
1.9.3.1	Oil radish	RAPSA	Oilseed rape	
1.9.3.2	Oilseed rape	BRSNN	Oilseed rape	
1.9.3.3	Yellow mustard seed	SINAL	Oilseed rape	
1.9.3.4	Marrow-stem kale	BRSOM	Oilseed rape	
1.9.4	Other green manure crops			
1.9.4.1	Tancy phacelia	PHCTA	Grass	
1.9.4.2	Corn spurrey	SPRAR	Grass	
1.9.4.3	African Marigold (Tagetes)	TAGER	Grass	
1.9.4.4	Sticky nightshade	SOLSI	Grass	
1.9.4.5	Sudan grass	SORSU	Grass	
1.9.4.6	Gold-of-pleasure	CMASA	Grass	
1.9.4.7	Forage turnip	BRSRR	Grass	
1.9.4.8	Arugula	ERUVE	Grass	
1.9.4.9	Niger seed	GUIAB	Grass	
1.10	Fodder crops			
1.10.1	Leguminous fodder crops			
1.10.1.1	Clover		Linseed	
		TRFPR		Red clover
		TRFRE		White clover
		TRFHY		Alslike clover
		TRFIN		Carnation clover
		TRFRS		Persian clover
		TRFAL		Berseem clover
		MEDLU		Hop clover
		LOTCO		Birds-foot trefoil
		MEUAL		Honey clover
		TRFSS		Other clover species
1.10.1.2	Alfalfa	MEDSA	Linseed	
1.10.1.3	Common vetch	VICSA	Linseed	
1.10.1.4	Lupin	LUPAL	Linseed	
1.10.1.5	Celosia	COEAR	Linseed	
1.10.1.6	Esparcet	ONBVI	Linseed	
1.10.1.7	Broad bean (feed crop)	VICFX	Beans (field+vegetable)	

DTG crop code	DTG crop	EPPO code	FOCUS crop	Remarks
1.10.2	Other fodder crops.		Sugar beets	
1.10.2.1	Forage turnip	BRSRR	Sugar beets	
1.11	Other arable crops		Sugar beets	
1.11.1	-			
1.11.1.1	Witloof Chicory (roots)	CICIF	Sugar beets	
1.11.1.2	Large rooted chicory	CICIS	Sugar beets	
1.11.1.3	Buckwheat	FAGES	Cereals	
1.11.1.4	Comon Hop	HUMLU	x	
1.11.1.5	Common madder	RBITI	Sugar beets	
1.11.1.6	Chinese fairy grass	MISSI	Grass	
1.11.1.7	Elephant grass	PESPU	Grass	
1.11.1.8	Quinoa	CHEQU	Spring Cereals	
1.11.1.9	Woad	ISATI	Spring Cereals	
1.11.1.10	Wild woad	RESLT	Spring Cereals	
1.11.1.11	Sorghum	SORVU	Spring Cereals	
1.11.1.12	Teff	ERATF	Spring Cereals	
1.11.1.13	Millet	PANMI	Spring Cereals	
1.11.1.14	Russian dandelion	TARKS	Carrots	Check – grown as a full field crop or on ridges?
2	Cultivated grassland			
2.1	Fodder grassland			
2.1.1	-			
2.1.1.1	Pemanent pasture		Grass	
2.1.1.2	Mowing grassland		Grass	
2.2	Turf production		Grass	
3	Fruit crops Only refers to production of fruits			
3.1	Large fruits			
3.1.1	Pome fruit		Apples	
3.1.1.1	Apple	MABSD	Apples	
3.1.1.2	Pear	PYUCO PYUPC	Apples	 Including oriental pear
3.1.1.3	Quince	CYDOB	Apples	
3.1.1.4	Common Medlar	MSPGE	Apples	
3.1.1.5	Other pome fruit		Apples	
3.1.2	Stone fruit		Apples	
3.1.2.1	Sweet cherry Sour cherry	PRNAV PRNCE	Apples	
3.1.2.2	Plum	PRNDO PRNDT	Apples	Including bullace and damson plum
3.1.2.3	Apricot	PRNAR	Apples	
3.1.2.4	Peach Nectarine	PRNPS PRNPN	Apples	
3.1.2.5	Other stone fruit		Apples	
3.2	Small fruits			
3.2.1	Strawberries	FRAAN	Strawberries	
3.2.2	Berries		Bushberries	
3.2.2.1	Currant	RIBRU RIBNI	Bushberries	Red and white currant Black currant
3.2.2.2	Gooseberry	RIBUC	Bushberries	
3.2.2.3	Blueberry	VACCO VACMY VACVI	Bushberries	Including Bilberry Foxberry (cowberry)
3.2.2.4	Small Cranberry	VACOX VACMA	Strawberries	American or large cranberry
3.2.2.5	Mulberry	MORSS	Bushberries	
3.2.2.6	Rose hip	ROSSS	Bushberries	
3.2.2.7	Kiwiberry	ATIAR	Bushberries	
3.2.2.8	Elderberry,	SAMSS ABOSS HIORH	Bushberries	Chokeberries Sea-buckthorn

DTG crop code	DTG crop	EPPO code	FOCUS crop	Remarks
3.2.2.9	Blue honeysuckle	LONCO	Bushberries	
3.2.2.10	Other berries		Bushberries	
3.2.3	Grapes		Vines	
3.2.3.1	Table grape	VITVI	Vines	
3.2.3.2	Wine grape	VITVI	Vines	
3.2.4	'Blackberry and raspberry family (Rubus spp.)'		Bushberries	
3.2.4.1	Blackberry	RUBFR	Bushberries	
3.2.4.2	Raspberry	RIUBID RUBPH	Bushberries	Including Tayberry, Japanese wine berry
3.2.4.3	Common Dewberry	RUBCA RUBLO RUBLO	Bushberries	Including Loganbery Boysenberry
3.3	Tree nuts		Apples	
3.3.1	-		-	
3.3.1.1	Hazelnut	CYLAV	Apples	
3.3.1.2	Chestnut	CSNSS	Apples	
3.3.1.3	Walnut	IUGRE	Apples	
3.4	Other fruits		Apples	
3.4.1	-			
3.4.1.1	Fig	FIUCA	Apples	
3.4.1.2	Kiwi	ATIDE	Apples	
4	Vegetable crops			
4.1	Leafy vegetables			
4.1.1	Lettuce; *Lactuca* spp	LACSS	Beans (field+vegetable)	
4.1.2	Endive	CICEN	Beans (field+vegetable)	
4.1.3	Spinach family			
4.1.3.1	Spinach	SPQOL TEATE BRSRE AMADU	Beans (field+vegetable)	Including NewZealand spinach Turnip tops Spleen amaranth
4.1.3.2	Chard	BEAVV	Sugar beets	
4.1.3.3	Garden Orache	ATXHO	Beans (field+vegetable)	
4.1.3.4	Purslane	POROS CLAPE	Beans (field+vegetable)	Including Winter purslane
4.1.4	Other leafy vegetables			
4.1.4.1	Witloof Chicory (forced cultivation	CICIF	Sugar beets	
4.1.4.2	Watercress	NAAOF	Beans (field+vegetable)	
4.1.4.3	Lamb's lettuce	VLLLO	Beans (field+vegetable)	
4.1.4.4	Rocket	ERUVE	Beans (field+vegetable)	
4.1.4.6	Seaaster	ASTTR	Beans (field+vegetable)	
4.1.5	Vegetable sprouts			
4.1.5.1	Garden cress	LEPSA	Beans (field+vegetable)	
4.1.5.2	Bean sprouts	PHSAU	x	
4.1.5.3	Alfalfa	MEDSA	x	
4.1.5.4	Rucola cress	ERUVE	Beans (field+vegetable)	
4.1.5.5	Other vegetable sprouts		x	
4.1.6	Baby leaf crops		Beans (field+vegetable)	
4.2	Legume vegetables (fresh)			
4.2.1	Beans with pod			

DTG crop code	DTG crop	EPPO code	FOCUS crop	Remarks
4.2.1.1	Dwarf French bean	PHSVN	Beans (field+vegetable)	
4.2.1.2	Slicing bean	PHSVN	Beans (field+vegetable)	
4.2.1.3	Climbing French beans	PHSVX	Beans (field+vegetable)	
4.2.1.4	Climbing slicing bean	PHSVX	Beans (field+vegetable)	
4.2.1.5	Scarlet runner bean	PHSCO	Beans (field+vegetable)	
4.2.1.6	Yardlong bean	VIGSC VIGSI	Beans (field+vegetable)	Including cowpea
4.2.2	Beans without pod			
4.2.2.1	Broad bean	VICFX	Beans (field+vegetable)	
4.2.2.2	Lima bean	PHSLU	Beans (field+vegetable)	
4.2.2.3	Flageolet bean	PHSVX	Beans (field+vegetable)	
4.2.3	Peas with pod			
4.2.3.1	Mangetout	PIBSX	Peas	
4.2.3.2	Asparagus pea	TTGPU	Peas	
4.2.3.3	Sugar pea	PIBSZ	Peas	
4.2.4	Pea without pod			
4.2.4.1	Green pea	PIBSX	Peas	
4.2.4.2	Field pea	PIBSA	Peas	
4.3	Fruiting vegetables		-	
4.3.1	Fruiting vegetables of Cucurbits with, edible peel		-	
4.3.1.1	Gherkin	CUMSG	Potatoes	
4.3.1.2	Zucchini	CUUPG CUUPM	Potatoes	Including Bush pumpkin
4.3.1.3	Cucumber	CUMSA	x	
4.3.2	Fruiting vegetables of Cucurbits non-edible peel		-	
4.3.2.1	Pumpkins	CUUPE	Potatoes	
4.3.2.2	Melon	CUMME	x	
4.3.2.3	Watermelon	CITLA	x	
4.3.3	Fruiting vegetables of *Solanaceae*			
4.3.3.1	Aubergine	SOLME	x	
4.3.3.2	Tomato	LYPES	x	
4.3.3.3	Sweet pepper	CPSAN CPSFR	x	Including red pepper and Cayenne pepper
4.3.3.4	Husk tomato	PHYIX	x	
4.3.4	Fruiting vegetables of *Malvaceae*			
4.3.4.1	Okra	ABMES	x	
4.4	Brassica vegetables			
4.4.1	Head cabbages			
4.4.1.1	Head cabbage	BRSOL	Cabbage	
4.4.1.2	Brussels Sprouts	BRSOF	Cabbage	
4.4.2	Flowering brassica			
4.4.2.1	Cauliflower	BRSOB	Cabbage	
4.4.2.2	Broccoli	BRSOK	Cabbage	
4.4.3	Leafy brassica			
4.4.3.1	Chinese cabbage	BRSPK	Cabbage	
4.4.3.2	Kale	BRSOC	Cabbage	
4.4.4	Stern cabbage			
4.4.4.1	Kohlrabi	BRSOG	Cabbage	
4.5	Root and tuber vegetables			

DTG crop code	DTG crop	EPPO code	FOCUS crop	Remarks
4.5.1	Radishes			
4.5.1.1	Small radish	RAPSR	Sugar beets	
4.5.1.2	Black/white radish	RAPSN	Sugar beets	
4.5.2	Root vegetables (Umbelliferae)			
4.5.2.1	Carrots	DAUCS	Carrots	
4.5.2.2	Skirret	SIUSI	Carrots	
4.5.2.3	Turnip rooted parsley	PARCT	Carrots	
4.5.2.4	Parsnips	PAVSA	Carrots	
4.5.3	Other root and tuber vegetables			
4.5.3.1	Turnip cabbage	BRSOG	Sugar beets	
4.5.3.2	Swede	BRSNA	Sugar beets	
4.5.3.3	Jerusalem artichoke	HELTU	Sugar beets	
4.5.3.4	Japanese artichoke	STASB	Sugar beets	
4.5.3.5	Sweet potato	IPOBA	Sugar beets	
4.5.3.6	Red Beet	BEAVD	Sugar beets	
4.5.3.7	Celeriac	APUGR	Sugar beets	
4.5.3.8	Black Salsify	SCVHI TROPS	Sugar beets	Including Common salsify
4.5.3.9	Horseradish	ARWLA	Sugar beets	
4.5.3.10	Yam	SIUSS	Sugar beets	
4.6	Bulb vegetables			
4.6.1.	Onions			
4.6.1.1	Seed onion	ALLCE	Onions	
4.6.1.2	First year bulb onion	ALLCE	Onions	
4.6.1.3	Second year bulb onion	ALLCE	Onions	
4.6.1.4	Silverskin onions	ALLCE	Onions	
4.6.1.5	Picklers	ALLCE	Onions	
4.6.2	Shallots			
4.6.2.1	Seed shallot	ALLAS	Onions	
4.6.2.2	Bulb shallot	ALLAS	Onions	
4.6.3	Spring onion			
4.6.3.1	Spring onion	ALLCE	Onions	
4.6.4	Garlic			
4.6.4.1	Garlic	ALLSA	Onions	
4.7	Stem vegetables			
4.7.1	-			
4.7.1.1	Asparagus	ASPOF	Beans (field+vegetable)	
4.7.1.2	Celery	APUGD	Beans (field+vegetable)	
4.7.1.3	Cardoon	CYUCA	Beans (field+vegetable)	
4.7.1.4	Rhubarb	RHERH	Beans (field+vegetable)	
4.7.1.5	Fennel	FOEVA	Sugar beets	
4.7.1.6	Leek	ALLPO	Beans (field+vegetable)	
4.7.1.7	Globe Artichoke	CYUSC	Beans (field+vegetable)	
4.7.1.8	Sea kale	CRMMA	Beans (field+vegetable)	
4.7.1.9	Marsh samphire	SAAEU		
4.8	Other vegetable crops			
4.8.1	-			
4.8.1.1	Sweet corn	ZEAMS	Maize	
5	Herbs (fresh or dried)		Beans (field+vegetable)	
5.1	Aromatic herbs			
5.1.1	-			
5.1.1.1	Basil	OCIBA	Beans (field+vegetable)	

DTG crop code	DTG crop	EPPO code	FOCUS crop	Remarks
5.1.1.2	Chives	ALLSC ALLTU	Beans (field+vegetable)	Including Chines chives
5.1.1.3	Summer Savory	STIHO STIMO	Beans (field+vegetable)	Including Winter savory
5.1.1.4	Lemon balm	MLSOF	Beans (field+vegetable)	
5.1.1.5	Dill	AFEGR	Beans (field+vegetable)	
5.1.1.6	Tarragon	ARTDR	Beans (field+vegetable)	
5.1.1.7	Hyssop	HYSOF	Beans (field+vegetable)	
5.1.1.8	Chervil	ARNCE	Beans (field+vegetable)	
5.1.1.9	Coriander	CORSA	Beans (field+vegetable)	
5.1.1.10	Parsley	PARCR	Beans (field+vegetable)	
5.1.1.11	Lovage	LEWOF	Beans (field+vegetable)	
5.1.1.12	Marjoram	MAHJO	Beans (field+vegetable)	
5.1.1.13	Oregano	ORIVU	Beans (field+vegetable)	
5.1.1.14	Mint	MENSS	Beans (field+vegetable)	
5.1.1.15	Burnet	SANMI	Beans (field+vegetable)	
5.1.1.16	Rosemary	RMSOF	Beans (field+vegetable)	
5.1.1.17	Sage	SALOF	Beans (field+vegetable)	
5.1.1.18	Thyme	THYVU	Beans (field+vegetable)	
5.1.1.19	Fennel	FOEVD	Beans (field+vegetable)	
5.1.1.20	Celery Leaves	APUGS	Beans (field+vegetable)	
5.1.1.21	Sorrel	RUMAC	Beans (field+vegetable)	
5.1.1.22	Tea	CAHSI	Bushberries	CHECK
5.1.1.23	Other aromatic garden herbs		Beans (field+vegetable)	
5.1.1.24	Edible flowers	 CUUPG TAGER TOPMA CLDOF	Beans (field+vegetable)	e.g. zucchini african marigold common nasturtium pot marigold
5.2	Aromatic root crops			
5.2.1	-			
5.2.1.1	Lovage root	LEWOF	Beans (field+vegetable)	
5.2.1.2	Angelica	ANKAR	Beans (field+vegetable)	
5.2.1.3	Burnet Saxifrage root	PIMSA	Beans (field+vegetable)	
5.2.1.4	Turnip rooted parsley	PARCT	Beans (field+vegetable)	
5.2.1.5	Other aromatic root crops		Beans (field+vegetable)	
5.3	Medicinal herbs			
5.3.1	-			

DTG crop code	DTG crop	EPPO code	FOCUS crop	Remarks
5.3.1.1	Indian tobacco	LOBIN	Beans (field+vegetable)	
5.3.1.2	Woolly foxglove	DIKLA	Beans (field+vegetable)	
5.3.1.3	Wild pansy	VIOTR	Beans (field+vegetable)	
5.3.1.4	Wild chamomile	MATCH	Beans (field+vegetable)	
5.3.1.5	Purple coneflower	RUDPU	Beans (field+vegetable)	
5.3.1.6	Pot marigold	CLDOF	Beans (field+vegetable)	
5.3.1.7	Other medicinal herbs		Beans (field+vegetable)	
5.4	Medicinal root crops			
5.4.1	-			
5.4.1.1	Valerian	VALOF	Beans (field+vegetable)	
5.4.1.2	Asiatic Ginseng	PNXGI	Beans (field+vegetable)	
5.4.1.3	Purple coneflower root	RUDPU	Beans (field+vegetable)	
5.4.1.4	Other medicinal root crops		Beans (field+vegetable)	
5.5	Herb Seed crops			
5.5.1	-			
5.5.1.1	Caraway	CRYCA	Oilseed rape	
5.5.1.2	Poppy seed	PAPSO	Oilseed rape	
5.5.1.3	Other seed herbs		Oilseed rape	
5.6	Fruits or berries (herbs)			
5.6.1.1	Common vanilla	VANPL	Tomato	Greenhouse crop - Like tomato, but not as high
6	Mushrooms			
6.1	Edible mushrooms			
6.1.1	-			
6.1.1.1	Button mushroom	AGARBI	x	
6.1.1.2	Oyster mushroom	PLEUOS	x	
6.1.1.3	Other mushrooms		x	
7	Ornamental crops			
7.1	Flower bulb and Flower tuber			
7.1.1	-			
7.1.1.1	Winter Flower bulb and Flower tuber cultivation for reproduction		Onions	
7.1.1.2	Summer Flower bulb and Flower tuber cultivation for reproduction		Onions	
7.1.1.3	Winter Bulb flower and tuber flower for flower/pot plants cultivation		Onions	
7.1.1.4	Summer Bulb flower and tuber flower for flower/pot plants cultivation		Onions	
7.2	Floriculture crops			
7.2.1	-			
7.2.1.1	Pot plants		Beans (field+vegetable)	
7.2.1.2	Cut flowers		Beans (field+vegetable)	
7.2.1.3	Forced shrubs		Beans (field+vegetable)	
7.2.1.4	Cut green		Beans (field+vegetable)	
7.3	Tree nursery crops			

DTG crop code	DTG crop	EPPO code	FOCUS crop	Remarks
7.3.1	-			
7.3.1.1	Spindle trees		Apples	As FOCUS does not contains leaf-falling 'tree crops', apples is suggested
7.3.1.2	Transplanted trees		Apples	
7.3.1.3	High Avenue trees		Apples	
7.3.2	-			
7.3.2.1	Climbing plants		Cabbage	
7.3.3	-			
7.3.3.1	Ornamental shrubs (including Roses)		Cabbage	
7.3.4	-			
7.3.4.1	Conifers (including Christmas trees)		Cabbage	
7.3.7				In DTG-list V2.2; 7.3.5 and 7.3.6 are missing
7.3.7.1	Heather		Cabbage	
7.3.8				
7.3.8.1.	Forest trees and hedging plants		Cabbage	
7.3.9				
7.3.9.1.	Fruit trees and shrubs		Cabbage	
7.4	Perennial crops		Potatoes	
7.5	Flower seed crops		Potatoes	
7.6	Marsh and Water plants		x	
7.7	Plant breeding crops and seed production		x	Remark of the working group: This crop cannot be selected in DRAINBOW. The relevant field crop should be taken instead; e.g seed production of winter wheat is treated as winter wheat
8	Amenity areas			
8.1	Manged amenity turf			
8.1.1	-			
8.1.1.1	Lawn		x	
8.1.1.2	Play ground		x	
8.1.1.3	Sports field		x	
8.1.1.4	Grassy verges		x	
8.2	Woody plantings			
8.2.1	-			
8.2.1.1	Avenue and border trees		x	
8.2.1.2	Shelter belts, windbreaks and hedgerows		x	
8.2.1.3	Other woody plantings		x	
8.3	Herbaceous plantings		x	
9	Forestry			
9.1	Broad-leaved trees		x	
9.2	Coniferous trees		x	
10	Uncultivated land			
10.1	Temporarily uncultivated terrain			
10.1.1	-			
10.1.1.1	Deforestation area		x	
10.1.1.2	Temporarily uncultivated land		x	
10.1.1.3	Buffer areas of fields		x	
10.2	Permanently uncultivated land			

DTG crop code	DTG crop	EPPO code	FOCUS crop	Remarks
10.2.1	-			
10.2.1.1	Hard surfaces		x	
10.2.1.2	Half-open surfaces		x	
10.2.1.3	Permeable surfaces		x	
10.2.1.4	Unpaved surfaces		x	
10.3	Objects			
10.3.1	-			
10.3.1.1	Green roofs			
10.3.1.2	Fravel roofs			
10.3.1.3	Plant wall			
11	Water courses			
11.1	(dry) Slope		x	
11.2	Dry ditches		x	
11.3	Water courses which contain water		x	
11.4	Maintenance paths of water courses		x	
11.5	Ponds		x	
12	Reed and osier crops			
12.1	-			
12.1.1	-			
12.1.1.1	Osier		x	
12.1.1.2	Reed		x	
13	Refuse heaps		x	
14	Stored products			
14.1	Edible products		x	
14.2	Non-edible products		x	
14.3	Empty storage facilities		x	
15	Disinfectants			
15.1	-			
15.1.1	-			
15.1.1.1	Agricultural and horticultural equipment, tools and materials		x	
16	In and around the house, (private garden)			
16.1	Vegetable garden		x	
16.2	Ornamental garden plants		x	
16.3	Houseplants		x	
16.4	Patio plants		x	
16.5	Lawn		x	
16.6	Permanent pasture		x	
16.7	Permeable surfaces		x	
16.8	Half-open surfaces		x	
16.9	Hard surfaces		x	
16.10	Unpaved area		x	
x	not relevant for downward directed or sideways-upward directed spray scenario			

Annex 4 Link of DTG crops and BBCH crop code marking transition between the bare soil/short crop situation and the developed crop canopy situation

The transition of the bare soil surface/short crop situation to the developed crop canopy situation is based on a distinction in crop height of lower or higher than 20 cm and specified by a BBCH code for crop growth stage. For each crop the BBCH code for the distinction between the bare soil surface/short crop situation and the developed crop canopy situation is given. For instance, for ware potatoes BBCH code 21 marks the distinction. This means that BBCH code 21 and above represents the developed crop canopy situation for ware potatoes and that code 0 – 20.999 represents the bare soil surface/short crop situation.

DTG crop code	DTG crop	BBCH crop code marking transition between the bare soil/short crop situation and the developed crop canopy situation	remarks
1	Arable crops		
1.1	Potatoes		
1.1.1	-		
1.1.1.1	Seed potato	21	
1.1.1.2	Ware potato	21	
1.1.1.3	Starch potato	21	
1.2	Beet		
1.2.1	-		
1.2.1.1	Sugar beet	33	
1.2.1.2	Fodder beet	33	
1.3	Cereals		
1.3.1	Winter cereals		
1.3.1.1	Winter wheat	31	
1.3.1.2	Winter barley	31	
1.3.1.3	Winter rye	31	
1.3.1.4	Triticale	31	
1.3.1.5	Spelt	31	
1.3.1.6	Canary grass	31	
1.3.2	Spring cereals		
1.3.2.1	Spring wheat	31	
1.3.2.2	Spring barley	31	
1.3.2.3	Spring rye	31	
1.3.2.4	Oats	31	
1.3.3	Other cereals	31	As Spring wheat
1.4	Maize		
1.4.1	-		
1.4.1.1	Forage maize	15	
1.4.1.2	Grain maize	15	
1.4.1.3	Corn cob mix	15	
1.4.1.4	Corn cob silage	15	
1.5	Pulses		
1.5.1	Peas (dry)		
1.5.1.1	Marrowfat pea	34	
1.5.1.2	Yellow pea	34	
1.5.1.3	Grey pea	34	
1.5.1.4	Green pea	34	

DTG crop code	DTG crop	BBCH crop code marking transition between the bare soil/short crop situation and the developed crop canopy situation	remarks
1.5.1.5	Maple pea	34	
1.5.1.6	Brown marrowfat	34	
1.5.1.7	Sugar pea	34	
1.5.1.8	Lentil	34	
1.5.1.9	Chickpea	34	
1.5.2	Beans (dry)		
1.5.2.1	Brown bean	15	
1.5.2.2	Yellow bean	15	
1.5.2.3	Pinto bean	15	
1.5.2.4	White bean (haricot)	15	
1.5.2.5	Kidney bean	15	
1.5.2.6	Green bean	15	
1.5.2.7	Lupin	32	As Sunflower
1.5.2.8	Soybean	15	
1.6	Grass seed crops		
1.6.1	Ryegrass		
1.6.1.1	English ryegrass	31	
1.6.1.2	Italian ryegrass	31	
1.6.1.3	False oatgrass	31	
1.6.1.4	Annual ryegrass	31	
1.6.1.5	Hybrid ryegrass	31	
1.6.1.6	Other ryegrasses	31	
1.6.2	Fescue		
1.6.2.1	Red Fescue	31	
1.6.2.2	Sheep's Fescue	31	
1.6.2.3	Tall Fescue	31	
1.6.2.4	Other fescues	31	
1.6.3	Bluegrass		
1.6.3.1	Kentucky bluegrass	31	
1.6.3.2	Fowl bluegrass	31	
1.6.3.3	Wood bluegrass	31	
1.6.3.4	Meadow fescue	31	
1.6.3.5	Other bluegrasses	31	
1.6.4	Other grasses	31	
1.6.4.1	Timothy-grass	31	
1.6.4.2	Cock's-foot	31	
1.6.4.3	Colonial bent	31	
1.6.4.4	Crested dog's-tail	31	
1.6.4.5	Tufted hair-grass	31	
1.6.4.6	June grass	31	
1.6.4.7	Other grass seed crops	31	
1.7	Oil seeds		
1.7.1	-		
1.7.1.1	Poppy seeds	32	
1.7.1.2	Caraway	32	
1.7.1.3	Flax	32	
1.7.1.4	Mustard	32	
1.7.1.5	Winter oilseed rape	32	
1.7.1.6	Summer oilseed rape	32	
1.7.1.7	Evening primrose	32	
1.7.1.8	Common Sunflower	32	
1.7.1.9	Gold of pleasure	32	
1.7.1.10	Crambe	32	
1.7.1.11	Soybean	15	
1.7.1.12	Other oil seeds	32	
1.8	Fibre crops		
1.8.1	-		
1.8.1.1	Hemp	32	
1.8.1.2	Flax	32	
1.8.1.3	Common nettle	32	

DTG crop code	DTG crop	BBCH crop code marking transition between the bare soil/short crop situation and the developed crop canopy situation	remarks
1.8.1.4	Other fibre crops	32	
1.9	Green manure crops		
1.9.1	Leguminous green manure crops		
1.9.1.1	Clover	32	
1.9.1.2	Lupin	32	
1.9.1.3	Common vetch	32	
1.9.1.4	Serradella	32	
1.9.1.5	Celosia	32	
1.9.1.6	Esparcet	32	As Sunflower/Lupin
1.9.1.6	Broad beans	15	
1.9.1.7	Other leguminous green manure crops	15	
1.9.2	Graminae green manure crops		
1.9.2.1	Rye	31	
1.9.2.2	Ryegrass	31	
1.9.2.3	Black oat	31	
1.9.3	Cruciferae green manure crops		
1.9.3.1	Oil radish	32	
1.9.3.2	Oilseed Rape	32	
1.9.3.3	Yellow mustard seed	32	
1.9.3.4	Marrow-stem kale	32	
1.9.4	Other green manure crops		
1.9.4.1	Tancy phacelia	31	
1.9.4.2	Corn spurrey	31	
1.9.4.3	African Marigold	31	
1.9.4.4	Sticky nightshade	31	
1.9.4.5	Sudan grass	31	
1.9.4.6	Gold of pleasure	31	As other crops from this group
1.9.4.7	Forage turnip	31	As other crops from this group
1.9.4.8	Arugula	31	As other crops from this group
1.9.4.9	Niger-seed	31	As other crops from this group
1.10	Fodder crops		
1.10.1	Leguminous fodder crops		
1.10.1.1	Clover	32	
1.10.1.2	Alfalfa	32	
1.10.1.3	Common vetch	32	
1.10.1.4	Lupin	32	
1.10.1.5	Celosia	32	
1.10.1.6	Esparcet	32	
1.10.1.7	Broad bean (feed crop)	15	
1.10.2	Other fodder crops.	33	
1.10.2.1	Forage turnip	33	As 1.10.2
1.11	Other arable crops		
1.11.1	-		
1.11.1.1	Witloof Chicory (roots)	33	
1.11.1.2	Large rooted chicory	33	
1.11.1.3	Buckwheat	31	
1.11.1.4	Common Hop	x	
1.11.1.5	Common madder	33	
1.11.1.6	Chinese fairy grass	31	As Elephant grass
1.11.1.7	Elephant grass	31	
1.11.1.8	Quinoa	31	
1.11.1.9	Woad	31	
1.11.1.10	Wild woad	31	
1.11.1.11	Sorghum	31	

DTG crop code	DTG crop	BBCH crop code marking transition between the bare soil/short crop situation and the developed crop canopy situation	remarks
1.11.1.12	Teff	31	As grass/cereals
1.11.1.13	Millet	31	
1.11.1.14	Russian dandelion	97	Check: always below 20 cm crop height
2	Cultivated grassland		
2.1	Fodder grassland		
2.1.1	-		
2.1.1.1	Permanent pasture	x	
2.1.1.2	Mowing grassland	x	
2.2	Turf production	x	
3	Fruit crops Only refers to production of unharvested fruits		
3.1	Large fruits		
3.1.1	Pome fruit	x	
3.1.1.1	Apple	x	
3.1.1.2	Pear	x	
3.1.1.3	Quince	x	
3.1.1.4	Common Medlar	x	
3.1.1.5	Other pome fruit	x	
3.1.2	Stone fruit		
3.1.2.1	Sweet Cherry Sour Cherry	x	
3.1.2.2	Plum	x	
3.1.2.3	Apricot	x	
3.1.2.4	Peach Nectarine	x	
3.1.2.5	Other stone fruit		
3.2	Small fruits		
3.2.1	Strawberries	17	
3.2.2	Berries		
3.2.2.1	Currant	x	(Red, white and black)
3.2.2.2	Gooseberry	x	
3.2.2.3	Blueberry	x	
3.2.2.4	Small Cranberry	97	
3.2.2.5	Mulberry	x	
3.2.2.6	Rose hip	x	
3.2.2.7	Kiwiberry	x	
3.2.2.8	Elderberry	x	
3.2.2.9	Blue honeysuckle	x	
3.2.2.10	Other berries	x	
3.2.3	Grapes	x	
3.2.3.1	Table grape	x	
3.2.3.2	Wine grape	x	
3.2.4	'Blackberry and raspberry family (Rubus spp.)'	x	
3.2.4.1	Blackberry	x	
3.2.4.2	Raspberry	x	
3.2.4.3	Common Dewberry	x	
3.3	Nuts		
3.3.1	-		
3.3.1.1	Hazelnut	x	
3.3.1.2	Chestnut	x	
3.3.1.3	Walnut	x	
3.4	Other fruits		
3.4.1	-		
3.4.1.1	Fig	x	
3.4.1.2	Kiwi	x	
4	Vegetable crops		
4.1	Leafy vegetables		
4.1.1	Lettuce; *Lactuca* spp	32	
4.1.2	Endive	32	

DTG crop code	DTG crop	BBCH crop code marking transition between the bare soil/short crop situation and the developed crop canopy situation	remarks
4.1.3	Spinach family		
4.1.3.1	Spinach	32	
4.1.3.2	Chard	33	
4.1.3.3	Garden Orache	32	
4.1.3.4	Purslane	32	
4.1.4	Other leafy vegetables		
4.1.4.1	Witloof Chicory (forced cultivation)	33	
4.1.4.2	Watercress	32	
4.1.4.3	Lamb's lettuce	32	
4.1.4.4	Rocket	32	
4.1.4.5	Sea aster	32	
4.1.5	Vegetable sprouts		
4.1.5.1	Garden cress	32	
4.1.5.2	Bean sprouts	x	
4.1.5.3	Alfalfa	x	
4.1.5.4	Rucola cress		
4.1.5.5	Other vegetable sprouts	x	
4.1.6	Baby leaf crops	19	Check All vegetable crops harvested before BBCH 19 (8 true leaves) therefor short crop lower than 20 cm at BBCH19
4.2	Legume vegetables (fresh)		
4.2.1	Beans with pod		
4.2.1.1	Dwarf French bean	15	
4.2.1.2	Slicing bean	15	
4.2.1.3	Climbing French bean	15	
4.2.1.4	Climbing slicing bean	15	
4.2.1.5	Scarlet runner bean	15	
4.2.1.6	Yardlong bean	15	
4.2.2	Beans without pod		
4.2.2.1	Broad bean	15	
4.2.2.2	Lima bean	15	
4.2.2.3	Flageolets	15	
4.2.3	Peas with pod		
4.2.3.1	Mangetout	34	
4.2.3.2	Asparagus pea	34	
4.2.3.3	Sugar pea	34	
4.2.4	Pea without pod		
4.2.4.1	Green pea	34	
4.2.4.2	Field pea	34	
4.3	Fruiting vegetables		
4.3.1	Fruiting vegetables of Cucurbits edible peel		
4.3.1.1	Gherkin	39	
4.3.1.2	Zucchini	39	
4.3.1.3	Cucumber	x	
4.3.2	Fruiting vegetables of Cucurbits non-edible peel		
4.3.2.1	Pumpkins	39	
4.3.2.2	Melon	x	
4.3.2.3	Watermelon	x	
4.3.3	Fruiting vegetables of *Solanaceae*		
4.3.3.1	Aubergine	x	
4.3.3.2	Tomato	x	
4.3.3.3	Sweet pepper	x	
4.3.3.4	Husk tomato	x	Green house crop

DTG crop code	DTG crop	BBCH crop code marking transition between the bare soil/short crop situation and the developed crop canopy situation	remarks
4.3.4	Fruiting vegetables of *Malvaceae*		
4.3.4.1	Okra	x	
4.4	Brassica vegetables		
4.4.1	Head cabbages		
4.4.1.1	Head cabbage	14	
4.4.1.2	Brussels sprouts	14	
4.4.2	Flowering brassica		
4.4.2.1	Cauliflower	14	
4.4.2.2	Broccoli	14	
4.4.3	Leafy brassica		
4.4.3.1	Chinese cabbage	14	
4.4.3.2	Kale	14	
4.4.4	Stern cabbage		
4.4.4.1	Kohlrabi	14	
4.5	Root and tuber vegetables		
4.5.1	Radishes		
4.5.1.1	Small radish	15	
4.5.1.2	Black/white radish	15	
4.5.2	Root vegetables (Umbelliferae)		
4.5.2.1	Carrots	15	
4.5.2.2	Skirret	15	
4.5.2.3	Turnip rooted parsley	15	
4.5.2.4	Parsnips	15	
4.5.3	Other root and tuber vegetables		
4.5.3.1	Turnip cabbage	15	
4.5.3.2	Swede	15	
4.5.3.3	Jerusalem artichoke	15	
4.5.3.4	Japanese artichoke	15	
4.5.3.5	Sweet potato	15	
4.5.3.6	Red Beet	15	
4.5.3.7	Celeriac	15	
4.5.3.8	Black Salsify	15	
4.5.3.9	Horseradish	15	
4.5.3.10	Yam	15	
4.6	Bulb vegetables		
4.6.1.	Onions		
4.6.1.1	Seed onions	14	
4.6.1.2	First year bulb onion	14	
4.6.1.3	Second year bulb onion	14	
4.6.1.4	Silverskin onions	14	
4.6.1.5	Picklers	14	
4.6.2	Shallots		
4.6.2.1	Seed shallot	14	
4.6.2.2	Bulb shallot	14	
4.6.3	Spring onion		
4.6.3.1	Spring onion	14	
4.6.4	Garlic		
4.6.4.1	Garlic	14	
4.7	Stem vegetables		
4.7.1	-		
4.7.1.1	Asparagus	32	
4.7.1.2	Celery	32	
4.7.1.3	Cardoon	32	
4.7.1.4	Rhubarb	32	
4.7.1.5	Fennel	33	
4.7.1.6	Leek	32	
4.7.1.7	Globe Artichoke	32	
4.7.1.8	Sea kale	32	
4.7.1.9	Marsh samphire	60	Only at flowering the crop is higher than 20

DTG crop code	DTG crop	BBCH crop code marking transition between the bare soil/short crop situation and the developed crop canopy situation	remarks
			cm, therefor flowering as division: BBCH60
4.8	Other vegetable crops		
4.8.1	-		
4.8.1.1	Sweet corn	15	
5	Herbs (fresh or dried)		
5.1	Aromatic herbs		
5.1.1	-		
5.1.1.1	Basil	15	
5.1.1.2	Chives	15	
5.1.1.3	Summer savory	15	
5.1.1.4	Lemon balm	15	
5.1.1.5	Dill	15	
5.1.1.6	Tarragon	15	
5.1.1.7	Hyssop	15	
5.1.1.8	Chervil	15	
5.1.1.9	Coriander	15	
5.1.1.10	Parsley	15	
5.1.1.11	Lovage	15	
5.1.1.12	Marjoram	15	
5.1.1.13	Oregano	15	
5.1.1.14	Mint	15	
5.1.1.15	Burnet	15	
5.1.1.16	Rosemary	15	
5.1.1.17	Sage	15	
5.1.1.18	Thyme	15	
5.1.1.19	Fennel	15	
5.1.1.20	Celery Leaves	15	
5.1.1.21	Sorrel	15	
5.1.1.22	Tea	x	Check permanent green crop
5.1.1.23	Other aromatic garden herbs	15	
5.1.1.24	Edible flowers	x	
5.2	Aromatic root crops		
5.2.1	-		
5.2.1.1	Lovage root	15	
5.2.1.2	Angelica	15	
5.2.1.3	Burnet Saxifrage root	15	
5.2.1.4	Turnip rooted parsley	15	
5.2.1.5	Other aromatic root crops	15	
5.3	Medicinal herbs		
5.3.1	-		
5.3.1.1	Indian tobacco	15	
5.3.1.2	Woolly foxglove	15	
5.3.1.3	Wild pansy	15	
5.3.1.4	Wild chamomile	15	
5.3.1.5	Purple coneflower	15	
5.3.1.6	Pot marigold	15	
5.3.1.7	Other medicinal herbs	15	
5.4	Medicinal root crops		
5.4.1	-		
5.4.1.1	Valerian	15	
5.4.1.2	Asiatic Ginseng	15	
5.4.1.3	Purple coneflower root	15	
5.4.1.4	Other medicinal root crops	15	
5.5	Herb Seed crops		
5.5.1	-		
5.5.1.1	Caraway	32	
5.5.1.2	Poppy seed	32	

DTG crop code	DTG crop	BBCH crop code marking transition between the bare soil/short crop situation and the developed crop canopy situation	remarks
5.5.1.3	Other seed herbs	32	
5.6	Fruits or berries (herbs)		
5.6.1			
5.6.1.1	Common vanilla	x	
6	Mushrooms	x	
6.1	Edible mushrooms	x	
6.1.1	-		
6.1.1.1	Button mushroom	x	
6.1.1.2	Oyster mushroom	x	
6.1.1.3	Other mushrooms	x	
7	Ornamental crops	x	
7.1	Flower bulbs and Flower tubers		
7.1.1	-		
7.1.1.1	Winter Flower bulbs and Flower tubers for reproduction	14	
7.1.1.2	Summer Flower bulbs and Flower tubers for reproduction	14	
7.1.1.3	Winter Bulb flower and tuber flower for flower/pot plant cultivation	14	
7.1.1.4	Summer Bulb flower and tuber flower for flower/pot plant cultivation	14	
7.2	Floriculture crops		
7.2.1	-		
7.2.1.1	Pot plants	15	
7.2.2.1	Cut flowers	15	
7.2.3.1	Forced shrubs	15	
7.2.4.1	Cut green	15	
7.3	Tree nursery crops		
7.3.1	-		
7.3.1.1	Spindle trees	x	
7.3.1.2	Transplanted trees	x	
7.3.1.3	High Avenue trees	x	
7.3.2			
7.3.2.1	Climbing plants	14	
7.3.3			
7.3.3.1	Ornamental shrubs (including Roses)	14	
7.3.4			
7.3.4.1	Conifers (including Christmas trees)	14	
7.3.7			
7.3.7.1	Heather	14	
7.3.8			
7.3.8.1.	Forest trees and hedging plants	29	
7.3.9			
7.3.9.1.	Fruit trees and shrubs	29	
7.4	Perennial crops	21	
7.5	Flower seed crops	21	
7.6	Marsh and Water plants	x	
7.7	Plant breeding crops and seed production.	x	Remark of the working group: This crop can not be selected in DRAINBOW. The relevant field crop should be taken instead; e.g seed production of winter wheat is treated as winter wheat
8	Amenity areas	x	
8.1	Managed amenity turf	x	
8.1.1	-		

DTG crop code	DTG crop	BBCH crop code marking transition between the bare soil/short crop situation and the developed crop canopy situation	remarks
8.1.1.1	Lawn	x	
8.1.1.2	Play ground	x	
8.1.1.3	Sports field	x	
8.1.1.4	Grassy verges	x	
8.2	Woody plantings		
8.2.1	-		
8.2.1.1	Avenue and border trees	x	
8.2.1.2	Shelter belts, windbreaks and hedgerows	x	
8.2.1.3	Other woody plantings	x	
8.3	Herbaceous plantings	x	
9	Forestry		
9.1	Broad leaved trees	x	
9.2	Coniferous trees	x	
10	Uncultivated land		
10.1	Temporarily uncultivated terrain		
10.1.1	-		
10.1.1.1	Deforestation area	x	
10.1.1.2	Temporarily uncultivated land	x	
10.1.1.3	Buffer areas of fields	x	
10.2	Permanently uncultivated land		
10.2.1	-		
10.2.1.1	Hard surfaces	x	
10.2.1.2	Half-open surfaces	x	
10.2.1.3	Permeable surfaces	x	
10.2.1.4	Unpaved surfaces	x	
10.3	Objects		
10.3.1	-		
10.3.1.1	Green roofs	x	check – no procedure for available yet
10.3.1.2	Gravel roofs	x	check
10.3.1.3	Plant wall	x	check
11	Water courses		
11.1	(dry) Slope	x	
11.2	Dry ditches	x	
11.3	Water courses which contain water	x	
11.4	Maintenance paths of water courses	x	
11.5	Ponds	x	
12	Reed and osier crops		
12.1	-		
12.1.1	-		
12.1.1.1	Osier	x	
12.1.1.2	Reed	x	
13	Refuse heaps	x	
14	Stored products		
14.1	Edible products	x	
14.2	Non-edible products	x	
143	Empty storage facilities	x	
15	Disinfectants		
15.1	-		
15.1.1	-		
15.1.1.1	Agricultural and horticultural equipment, tools and materials	x	
16	In and around the house, (private garden)		
16.1	Vegetable garden (edible crops protected or open field)	x	
16.2	Ornamental gardens (field crops)	x	
16.3	House plants	x	
16.4	Patio plants	x	
16.5	Lawn	x	
16.6	Permanent pasture	x	

DTG crop code	DTG crop	BBCH crop code marking transition between the bare soil/short crop situation and the developed crop canopy situation	remarks
16.7	Permeable surfaces	x	
16.8	Half open surfaces	x	
16.9	Hard surfaces	x	
16.10	Unpaved area	x	

x not relevant for downward directed spraying

Annex 5 Link of DTG crops and Minimal Agronomic and Total Crop-free Zone and last nozzle position on the spray boom to the last crop row

The minimal agronomic crop-free zone is the minimal distance between the top of the bank and the centre of the last crop row needed for agricultural activities. In general, the minimal agronomic crop-free zone has the width of the distance between the crop rows (row distance).

The total crop-free zone is the required crop-free buffer zone as determined by the Activity Decree (AD; I&W, 2017). The total crop-free zone is the sum of the minimal agronomic crop-free zone and some additional buffer zone width. The total crop-free zone is for intensively sprayed crops 1.50 m and for other crops sprayed downwardly 0.50 m (AD). In the period 2000 – 2017 cereals (1.3) and grass seed crops (1.6) were allowed to have a total crop-free zone of 0.25 m, also coinciding with their minimal agronomic crop-free zone. Following the AD, since 2018 at least a 75% Drift Reducing Technique (DRT75) is to be used on the whole field when applying Plant Protection Products.

The last nozzle position on the spray boom is important for downward spraying as the spray drift curves are determined and presented from this point. The last nozzle position depends on the nozzle spacing on the spray boom and the crop row spacing underneath the spray boom. A positive value means that the last nozzle is positioned inside the last plant row. A negative value means that the last nozzle is positioned outside the last plant row. For sideways and upward sprayed crops (fruit, avenue trees) the spray drift curves start at the position of the last tree row.

DTG crop code	DTG crop	Minimal Agronomic Crop-free zone [m]	Total Crop-free zone (Activity Decree) [m]	Last nozzle position on spray boom [m]	remarks
1	Arable crops				
1.1	Potatoes				
1.1.1	-				
1.1.1.1	Seed potato	0.75	1.50	-0.125	DRT75 = 1.50; DRT90 = 1.00
1.1.1.2	Ware potato	0.75	1.50	-0.125	DRT75 = 1.50; DRT90 = 1.00
1.1.1.3	Starch potato	0.75	1.50	-0.125	DRT75 = 1.50; DRT90 = 1.00
1.2	Beet				
1.2.1	-				
1.2.1.1	Sugar beet	0.50	0.50	0.25	
1.2.1.2	Fodder beet	0.50	0.50	0.25	
1.3	Cereals				
1.3.1	Winter cereals				
1.3.1.1	Winter wheat	0.25	0.50	0.25	
1.3.1.2	Winter barley	0.25	0.50	0.25	
1.3.1.3	Winter rye	0.25	0.50	0.25	
1.3.1.4	Triticale	0.25	0.50	0.25	
1.3.1.5	Spelt	0.25	0.50	0.25	
1.3.1.6	Canary grass	0.25	0.50	0.25	
1.3.2	Spring cereals				
1.3.2.1	Spring wheat	0.25	0.50	0.25	
1.3.2.2	Spring barley	0.25	0.50	0.25	

DTG crop code	DTG crop	Minimal Agronomic Crop-free zone [m]	Total Crop-free zone (Activity Decree) [m]	Last nozzle position on spray boom [m]	remarks
1.3.2.3	Spring rye	0.25	0.50	0.25	
1.3.2.4	Oats	0.25	0.50	0.25	
1.3.3	Other cereals	0.25	0.50	0.25	
1.4	Maize				
1.4.1	-				
1.4.1.1	Forage maize	0.50	0.50	-0.125	
1.4.1.2	Grain maize	0.50	0.50	-0.125	
1.4.1.3	Corn cob mix	0.50	0.50	-0.125	
1.4.1.4	Corn cob silage	0.50	0.50	-0.125	
1.5	Pulses				
1.5.1	Peas (dry)				
1.5.1.1	Marrowfat pea	0.50	0.50	0.25	
1.5.1.2	Yellow pea	0.50	0.50	0.25	
1.5.1.3	Grey pea	0.50	0.50	0.25	
1.5.1.4	Green pea	0.50	0.50	0.25	
1.5.1.5	Maple pea	0.50	0.50	0.25	
1.5.1.6	Brown marrowfat	0.50	0.50	0.25	
1.5.1.7	Sugar pea	0.50	0.50	0.25	
1.5.1.8	Lentil	0.50	0.50	0.25	
1.5.1.9	Chickpea	0.50	0.50	0.25	
1.5.2	Beans (dry)				
1.5.2.1	Brown bean	0.50	0.50	0.25	
1.5.2.2	Yellow bean	0.50	0.50	0.25	
1.5.2.3	Pinto bean	0.50	0.50	0.25	
1.5.2.4	White bean (haricot)	0.50	0.50	0.25	
1.5.2.5	Kidney bean	0.50	0.50	0.25	
1.5.2.6	Green bean	0.50	0.50	0.25	
1.5.2.7	Lupin	0.25	0.50	0.25	
1.5.2.8	Soybean	0.50	0.50	0.25	
1.6	Grass seed crops				
1.6.1	Ryegrass				
1.6.1.1	English ryegrass	0.25	0.50	0.25	
1.6.1.2	Italian ryegrass	0.25	0.50	0.25	
1.6.1.3	False oatgrass	0.25	0.50	0.25	
1.6.1.4	Annual ryegrass	0.25	0.50	0.25	
1.6.1.5	Hybrid ryegrass	0.25	0.50	0.25	
1.6.1.6	Other ryegrasses	0.25	0.50	0.25	
1.6.2	Fescue				
1.6.2.1	Red Fescue	0.25	0.50	0.25	
1.6.2.2	Sheep’s Fescue	0.25	0.50	0.25	
1.6.2.3	Tall Fescue	0.25	0.50	0.25	
1.6.2.4	Other fescues	0.25	0.50	0.25	
1.6.3	Bluegrass				
1.6.3.1	Kentucky bluegrass	0.25	0.50	0.25	
1.6.3.2	Fowl bluegrass	0.25	0.50	0.25	
1.6.3.3	Wood bluegrass	0.25	0.50	0.25	
1.6.3.4	Meadow fescue	0.25	0.50	0.25	
1.6.3.5	Other bluegrasses	0.25	0.50	0.25	
1.6.4	Other grasses				
1.6.4.1	Timothy-grass	0.25	0.50	0.25	
1.6.4.2	Cock’s-foot	0.25	0.50	0.25	
1.6.4.3	Colonial bent	0.25	0.50	0.25	
1.6.4.4	Crested dog’s-tail	0.25	0.50	0.25	
1.6.4.5	Tufted hair-grass	0.25	0.50	0.25	
1.6.4.6	June grass	0.25	0.50	0.25	
1.6.4.7	Other grass seed crops	0.25	0.50	0.25	
1.7	Oil seeds				
1.7.1	-				
1.7.1.1	Poppy seeds	0.50	0.50	0.25	
1.7.1.2	Caraway	0.50	0.50	0.25	

DTG crop code	DTG crop	Minimal Agronomic Crop-free zone [m]	Total Crop-free zone (Activity Decree) [m]	Last nozzle position on spray boom [m]	remarks
1.7.1.3	Flax	0.50	0.50	0.25	
1.7.1.4	Mustard	0.50	0.50	0.25	
1.7.1.5	Winter oilseed rape	0.50	0.50	0.25	
1.7.1.6	Summer oilseed rape	0.50	0.50	0.25	
1.7.1.7	Evening primrose	0.50	0.50	-0.125	
1.7.1.8	Common Sunflower	0.50	0.50	-0.125	
1.7.1.9	Gold-of-pleasure	0.50	0.50	0.25	
1.7.1.10	Crambe	0.50	0.50	0.25	
1.7.1.11	Soybean	0.50	0.50	0.25	
1.7.1.12	Other oil seeds	0.50	0.50	-0.125	
1.8	Fibre crops				
1.8.1	-				
1.8.1.1	Hemp	0.50	0.50	-0.125	
1.8.1.2	Flax	0.50	0.50	0.25	
1.8.1.3	Common nettle	0.50	0.50	0.25	
1.8.1.4	Other fibre crops	0.50	0.50	0.25	
1.9	Green manure crops				
1.9.1	Leguminous green manure crops				
1.9.1.1	Clover	0.50	0.50	0.25	
1.9.1.2	Lupin	0.50	0.50	0.25	
1.9.1.3	Common vetch	0.50	0.50	0.25	
1.9.1.4	Serradella	0.50	0.50	0.25	
1.9.1.5	Celosia	0.50	0.50	0.25	
1.9.1.6	Esparcet	0.50	0.50	0.25	
1.9.1.7	Broad beans	0.50	0.50	0.25	
1.9.1.8	Other leguminous green manure crops	0.50	0.50	0.25	
1.9.2	Gramineae green manure crops				
1.9.2.1	Rye	0.50	0.50	0.25	
1.9.2.2	Ryegrass	0.50	0.50	0.25	
1.9.2.3	Black oat	0.50	0.50	0.25	
1.9.3	Cruciferae green manure crops				
1.9.3.1	Oil radish	0.50	0.50	0.25	
1.9.3.2	Oilseed rape	0.50	0.50	0.25	
1.9.3.3	Yellow mustard seed	0.50	0.50	0.25	
1.9.3.4	Marrow-stem kale	0.50	0.50	0.25	
1.9.4	Other green manure crops				
1.9.4.1	Tancy phacelia	0.50	0.50	0.25	
1.9.4.2	Corn spurrey	0.50	0.50	0.25	
1.9.4.3	African Marigold	0.50	0.50	0.25	
1.9.4.4	Sticky nightshade	0.50	0.50	0.25	
1.9.4.5	Sudan grass	0.50	0.50	0.25	
1.9.4.6	Gold-of-pleasure	0.50	0.50	0.25	
1.9.4.7	Forage turnip	0.50	0.50	0.25	
1.9.4.8	Aragula	0.50	0.50	0.25	
1.9.4.9	Niger-seed	0.50	0.50	0.25	
1.10	Fodder crops				
1.10.1	Leguminous fodder crops				
1.10.1.1	Clover	0.50	0.50	0.25	
1.10.1.2	Alfalfa	0.50	0.50	0.25	
1.10.1.3	Common vetch	0.50	0.50	0.25	
1.10.1.4	Lupin	0.50	0.50	0.25	
1.10.1.5	Celosia	0.50	0.50	0.25	
1.10.1.6	Esparcet	0.50	0.50	0.25	
1.10.1.7	Broad bean (feed crop)	0.50	0.50	0.25	
1.10.2	Other fodder crops.	0.50	0.50	0.25	
1.10.2.1	Forage turnip	0.50	0.50	0.25	
1.11	Other arable crops				
1.11.1	-				
1.11.1.1	Witloof Chicory (roots)	0.50	0.50	0.25	

DTG crop code	DTG crop	Minimal Agronomic Crop-free zone [m]	Total Crop-free zone (Activity Decree) [m]	Last nozzle position on spray boom [m]	remarks
1.11.1.2	Large-rooted chicory	0.50	0.50	0.25	
1.11.1.3	Buckwheat	0.50	0.50	0.25	
1.11.1.4	Common Hop	2.	3.0		x sideways sprayed
1.11.1.5	Common madder	0.50	0.50	0.25	
1.11.1.6	Chinese fairy grass	0.50	0.50	0.25	
1.11.1.7	Elephant grass	0.50	0.50	0.25	
1.11.1.8	Quinoa	0.50	0.50	0.25	
1.11.1.9	Woad	0.50	0.50	0.25	
1.11.1.10	Wild woad	0.50	0.50	0.25	
1.11.1.11	Sorghum	0.50	0.50	0.25	
1.11.1.12	Teff	0.50	0.50	0.25	
1.11.1.13	Millet	0.50	0.50	0.25	
1.11.1.14	Russian dandelion	0.50	0.50	0.25	
2	Cultivated grassland				
2.1	Fodder grassland				
2.1.1	-				
2.1.1.1	Permanent pasture	0.25	0.50	0.25	x
2.1.1.2	Mowing grassland	0.25	0.50	0.25	x
2.2	Turf production	0.25	0.50	0.25	
3	Fruit crops Only refers to production of fruits				
3.1	Large fruits				
3.1.1	Pome fruit				
3.1.1.1	Apple	3.0	3.0		x DRT75 = 4.5; DRT90 = 3.0
3.1.1.2	Pear	3.0	3.0		x DRT75 = 4.5; DRT90 = 3.0
3.1.1.3	Quince	3.0	3.0		x DRT75 = 4.5; DRT90 = 3.0
3.1.1.4	Common medlar	3.0	3.0		x DRT75 = 4.5; DRT90 = 3.0
3.1.1.5	Other pome fruit	3.0	3.0		x DRT75 = 4.5; DRT90 = 3.0
3.1.2	Stone fruit				
3.1.2.1	Sweet Cherry Sour Cherry	3.0	3.0		x DRT75 = 4.5; DRT90 = 3.0
3.1.2.2	Plum	3.0	3.0		x DRT75 = 4.5; DRT90 = 3.0
3.1.2.3	Apricot	3.0	3.0		x DRT75 = 4.5; DRT90 = 3.0
3.1.2.4	Peach Nectarine	3.0	3.0		x DRT75 = 4.5; DRT90 = 3.0
3.1.2.5	Other stone fruit	3.0	3.0		x DRT75 = 4.5; DRT90 = 3.0
3.2	Small fruits				
3.2.1	Strawberries	0.75	1.50	-0.125	DRT75 = 1.50; DRT90 = 1.00
3.2.2	Berries				
3.2.2.1	Currant	2.0	3.0		x (red, white and black); DRT90 = 3.0 DRT75 = 4.5
3.2.2.2	Gooseberry	2.0	3.0		x DRT75 = 4.5; DRT90 = 3.0
3.2.2.3	Blueberry	2.0	3.0		x DRT75 = 4.5; DRT90 = 3.0
3.2.2.4	Small cranberry	0.50	0.50	0.25	
3.2.2.5	Mulberry	2.0	3.0		x DRT75 = 4.5; DRT90 = 3.0

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3.2.2.6	Rose hip	2.0	3.0		x DRT75 = 4.5; DRT90 = 3.0
3.2.2.7	Kiwiberry	3.0	3.0		x DRT75 = 4.5; DRT90 = 3.0
3.2.2.8	Elderberry	3.0	3.0		x DRT75 = 4.5; DRT90 = 3.0
3.2.2.9	Blue honeysuckle	3.0	3.0		x DRT75 = 4.5; DRT90 = 3.0
3.2.2.10	Other berries	2.0	3.0		x DRT75 = 4.5; DRT90 = 3.0
3.2.3	Grapes				
3.2.3.1	Table grape	2.0	3.0		x DRT75 = 4.5; DRT90 = 3.0
3.2.3.2	Wine grape	2.0	3.0		x DRT75 = 4.5; DRT90 = 3.0
3.2.4	'Blackberry and raspberry family (Rubus spp.)'				
3.2.4.1	Blackberry	2.0	3.0		x DRT75 = 4.5; DRT90 = 3.0
3.2.4.2	Raspberry	2.0	3.0		x DRT75 = 4.5; DRT90 = 3.0
3.2.4.3	Common Dewberry	2.0	3.0		x DRT75 = 4.5; DRT90 = 3.0
3.3	Tree nuts				
3.3.1	-				
3.3.1.1	Hazelnut	2.0	3.0		x DRT75 = 4.5; DRT90 = 3.0
3.3.1.2	Chestnut	3.0	3.0		x DRT75 = 4.5; DRT90 = 3.0
3.3.1.3	Walnut	3.0	3.0		x DRT75 = 4.5; DRT90 = 3.0
3.4	Other fruits				
3.4.1	-				
3.4.1.1	Fig	2.0	3.0		x DRT75 = 4.5; DRT90 = 3.0
3.4.1.2	Kiwi	2.0	3.0		x DRT75 = 4.5; DRT90 = 3.0
4	Vegetable crops				
4.1	Leafy vegetables	0.75		0.25	
4.1.1	Lettuce; *Lactuca* spp	0.75	1.50	0.25	DRT75 = 1.50; DRT90 = 1.00
4.1.2	Endive	0.50	0.50	0.25	
4.1.3	Spinach family				
4.1.3.1	Spinach	0.50	0.50	0.25	
4.1.3.2	Chard	0.50	0.50	0.25	
4.1.3.3	Garden Orache	0.50	0.50	0.25	
4.1.3.4	Purslane	0.50	0.50	0.25	
4.1.4	Other leafy vegetables				
4.1.4.1	Witloof Chicory (forced cultivation)	0.50	0.50	0.25	
4.1.4.2	Watercress	0.50	0.50	0.25	
4.1.4.3	Lamb's lettuce	0.50	0.50	0.25	
4.1.4.4	Rocket	0.50	0.50	0.25	
4.1.4.5	Sea aster	0.50	0.50	0.25	
4.1.5	Vegetable sprouts				
4.1.5.1	Garden cress	0.50	0.50	0.25	
4.1.5.2	Bean sprouts	0.50	0.50	0.25	(Mung bean sprouts)
4.1.5.3	Alfalfa	0.50	0.50	0.25	
4.1.5.4	Rucola cress	0.50	0.50	0.25	
4.1.5.5	Other vegetable sprouts	0.50	0.50	0.25	
4.1.6	Baby leaf crops	0.50	0.50	0.25	

DTG crop code	DTG crop	Minimal Agronomic Crop-free zone [m]	Total Crop-free zone (Activity Decree) [m]	Last nozzle position on spray boom [m]	remarks
4.2	Legume vegetables (fresh)_				
4.2.1	Beans with pod				
4.2.1.1	Dwarf French bean	0.50	0.50	0.25	
4.2.1.2	Slicing bean	0.50	0.50	0.25	
4.2.1.3	Climbing French beans	0.50	0.50	0.25	
4.2.1.4	Climbing slicing bean	0.50	0.50	0.25	
4.2.1.5	Scarlet runner bean	0.50	0.50	0.25	
4.2.1.6	Yardlong bean	0.50	0.50	0.25	
4.2.2	Beans without pod				
4.2.2.1	Broad bean	0.50	0.50	0.25	
4.2.2.2	Lima bean	0.50	0.50	0.25	
4.2.2.3	Flageolets	0.50	0.50	0.25	
4.2.3	Peas with pod				
4.2.3.1	Mangetout	0.50	0.50	0.25	
4.2.3.2	Asparagus pea	0.50	0.50	0.25	
4.2.3.3	Sugar pea	0.50	0.50	0.25	
4.2.4	Peas without pod				
4.2.4.1	Green pea	0.50	0.50	0.25	
4.2.4.2	Field pea	0.50	0.50	0.25	
4.3	Fruiting vegetables				
4.3.1	Fruiting vegetables of Cucurbitsedible peel				
4.3.1.1	Gherkin	0.50	0.50	0.25	
4.3.1.2	Zucchini	0.50	0.50	0.25	
4.3.1.3	Cucumber				x
4.3.2	Fruiting vegetables of Cucurbits non-edible peel				
4.3.2.1	Pumpkins	0.50	0.50	0.25	
4.3.2.2	Melon				x
4.3.2.3	Watermelon				x
4.3.3	Fruiting vegetables of *Solanaceae*				
4.3.3.1	Aubergine				x
4.3.3.2	Tomato				x
4.3.3.3	Sweet pepper				x
4.3.3.4	Husk tomato				x
4.3.4	Fruiting vegetables of *Malvaceae*				
4.3.4.1	Okra				x
4.4	Brassica vegetables				
4.4.1	Head cabbages				
4.4.1.1	Head cabbage	0.50	0.50	0.25	
4.4.1.2	Brussels sprouts	0.50	0.50	-0.125	
4.4.2	Flowering brassica				
4.4.2.1	Cauliflower	0.50	0.50	0.25	
4.4.2.2	Broccoli	0.50	0.50	-0.125	
4.4.3	Leafy brassica				
4.4.3.1	Chinese cabbage	0.50	0.50	-0.125	
4.4.3.2	Kale	0.50	0.50	0.25	
4.4.4	Stern cabbage				
4.4.4.1	Kohlrabi	0.50	0.50	0.25	
4.5	Root and tuber vegetables				
4.5.1	Radishes				
4.5.1.1	Small radish	0.50	0.50	0.25	
4.5.1.2	Black/white radish	0.50	0.50	0.25	
4.5.2	Root vegetables (Umbelliferae)				
4.5.2.1	Carrots	0.75	1.50	-0.125	DRT75 = 1.50; DRT90 = 1.00
4.5.2.2	Skirret	0.50	0.50	0.25	
4.5.2.3	Turnip rooted parsley	0.75	0.50	0.25	
4.5.2.4	Parsnips	0.75	0.50	0.25	
4.5.3	Other root and tuber vegetables				

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4.5.3.1	Turnip cabbage	0.50	0.50	0.25	
4.5.3.2	Swede	0.50	0.50	0.25	
4.5.3.3	Jerusalem artichoke	0.75	0.50	0.25	
4.5.3.4	Japanese artichoke	0.50	0.50	0.25	
4.5.3.5	Sweet potato	0.50	0.50	0.25	
4.5.3.6	Red beet	0.50	0.50	0.25	
4.5.3.7	Celeriac	0.50	0.50	0.25	
4.5.3.8	Black salsify	0.50	1.50	0.25	DRT75 = 1.50; DRT90 = 1.00
4.5.3.9	Horseradish	0.50	0.50	0.25	
4.5.3.10	Yam	0.50	0.50	0.25	
4.6	Bulb vegetables				
4.6.1.	Onions				
4.6.1.1	Seed onions	0.75	1.50	0	DRT75 = 1.50; DRT90 = 1.00
4.6.1.2	First year bulb onion	0.75	1.50	0	DRT75 = 1.50; DRT90 = 1.00
4.6.1.3	Second year bulb onion	0.75	1.50	0	DRT75 = 1.50; DRT90 = 1.00
4.6.1.4	Silverskin onions	0.75	1.50	0	DRT75 = 1.50; DRT90 = 1.00
4.6.1.5	Picklers	0.75	1.50	0	DRT75 = 1.50; DRT90 = 1.00
4.6.2	Shallots				
4.6.2.1	Seed shallot	0.75	1.50	0	DRT75 = 1.50; DRT90 = 1.00
4.6.2.2	Bulb shallot	0.75	1.50	0	DRT75 = 1.50; DRT90 = 1.00
4.6.3	Spring onion				
4.6.3.1	Spring onion	0.75	1.50	0	DRT75 = 1.50; DRT90 = 1.00
4.6.4	Garlic				
4.6.4.1	Garlic	0.75	0.50	0	Grown on beds like onion or on ridges at 50 cm row spacing
4.7	Stem vegetables				
4.7.1	-				
4.7.1.1	Asparagus	0.75	1.50	0	DRT75 = 1.50; DRT90 = 1.00
4.7.1.2	Celery	0.50	0.50	0.25	
4.7.1.3	Cardoon	0.50	0.50	0.25	
4.7.1.4	Rhubarb	0.50	0.50	0.25	
4.7.1.5	Fennel	0.50	0.50	0.25	
4.7.1.6	Leek	0.75	1.50	-0.125	DRT75 = 1.50; DRT90 = 1.00
4.7.1.7	Globe Artichoke	0.50	0.50	0.25	
4.7.1.8	Sea kale	0.50	0.50	0.25	
4.7.1.9	Marsh samphire	0.50	0.50	0.25	
4.8	Other vegetable crops				
4.8.1	-				
4.8.1.1	Sweet corn	0.50	0.50	-0.125	
5	Herbs fresh or dried				
5.1	Aromatic herbs				
5.1.1	-				
5.1.1.1	Basil	0.50	0.50	0.25	
5.1.1.2	Chives	0.50	0.50	0.25	
5.1.1.3	Summer savory	0.50	0.50	0.25	
5.1.1.4	Lemon balm	0.50	0.50	0.25	
5.1.1.5	Dill	0.50	0.50	0.25	

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5.1.1.6	Tarragon	0.50	0.50	0.25	
5.1.1.7	Hyssop	0.50	0.50	0.25	
5.1.1.8	Chervil	0.50	0.50	0.25	
5.1.1.9	Coriander	0.50	0.50	0.25	
5.1.1.10	Parsley	0.50	0.50	0.25	
5.1.1.11	Lovage	0.50	0.50	0.25	
5.1.1.12	Marjoram	0.50	0.50	0.25	
5.1.1.13	Oregano	0.50	0.50	0.25	
5.1.1.14	Mint	0.50	0.50	0.25	
5.1.1.15	Burnet	0.50	0.50	0.25	
5.1.1.16	Rosemary	0.50	0.50	0.25	
5.1.1.17	Sage	0.50	0.50	0.25	
5.1.1.18	Thyme	0.50	0.50	0.25	
5.1.1.19	Fennel	0.50	0.50	0.25	
5.1.1.20	Celery Leaves	0.50	0.50	0.25	
5.1.1.21	Sorrel	0.50	0.50	0.25	
5.1.1.22	Tea	2.0	3.0		x sideways sprayed
5.1.1.23	Other aromatic garden herbs	0.50	0.50	0.25	
5.1.1.24	Edible flowers	0.50	0.50	0.25	
5.2	Aromatic root crops				
5.2.1	-				
5.2.1.1	Lovage root	0.50	0.50	0.25	
5.2.1.2	Angelica	0.50	0.50	0.25	
5.2.1.3	Burnet Saxifrage root	0.50	0.50	0.25	
5.2.1.4	Turnip rooted parsley	0.50	0.50	0.25	
5.2.1.5	Other aromatic root crops	0.50	0.50	0.25	
5.3	Medicinal herbs				
5.3.1	-				
5.3.1.1	Indian tobacco	0.50	0.50	0.25	
5.3.1.2	Woolly foxglove	0.50	0.50	0.25	
5.3.1.3	Wild pansy	0.50	0.50	0.25	
5.3.1.4	Wild chamomile	0.50	0.50	0.25	
5.3.1.5	Purple coneflower	0.50	0.50	0.25	
5.3.1.6	Pot marigold	0.50	0.50	0.25	
5.3.1.7	Other medicinal herbs	0.50	0.50	0.25	
5.4	Medicinal root crops				
5.4.1	-				
5.4.1.1	Valerian	0.50	0.50	0.25	
5.4.1.2	Asiatic Ginseng	0.50	0.50	0.25	
5.4.1.3	Purple coneflower root	0.50	0.50	0.25	
5.4.1.4	Other medicinal root crops	0.50	0.50	0.25	
5.5	Herb seed crops				
5.5.1	-				
5.5.1.1	Caraway	0.25	0.50	0.25	
5.5.1.2	Poppy seed	0.25	0.50	0.25	
5.5.1.3	Other seed herbs	0.50	0.50	0.25	
5.6	Fruits or berries				
5.6.1					
5.6.1.1	Common vanilla				x
6	Mushrooms				
6.1	Edible mushrooms				
6.1.1	-				
6.1.1.1	Button mushroom				x
6.1.1.2	Oyster mushroom				x
6.1.1.3	Other mushrooms				x
7	ornamental crops				
7.1	Flower bulb and Flower tubers				
7.1.1	-				

DTG crop code	DTG crop	Minimal Agronomic Crop-free zone [m]	Total Crop-free zone (Activity Decree) [m]	Last nozzle position on spray boom [m]	remarks
7.1.1.1	Winter Flower bulbs and Flower tubers for reproduction	0.75	1.50	0	DRT75 = 1.50; DRT90 = 1.00
7.1.1.2	Summer Flower bulbs and Flower tubers for reproduction	0.75	1.50	0	DRT75 = 1.50; DRT90 = 1.00
7.1.1.3	Winter Bulb flower and tuber flower for flower/pot plant cultivation	0.75	1.50	0	DRT75 = 1.50; DRT90 = 1.00
7.1.1.4	Summer Bulb flower and tuber flower for flower/pot plant cultivation	0.75	1.50	0	DRT75 = 1.50; DRT90 = 1.00
7.2	Floriculture crops				
7.2.1	-				
7.2.1.1	Pot plants	0.75	1.50	-0.125	DRT75 = 1.50; DRT90 = 1.00
7.2.1.2	Cut flowers	0.75	0.50	-0.125	
7.2.1.3	Forced shrubs	0.50	0.50	-0.125	
7.2.1.4	Cut green	0.50	0.50	-0.125	
7.3	Tree nursery crops				
7.3.1	-				
7.3.1.1	Spindle trees	1.50	5.0		x
7.3.1.2	Transplanted trees	2.0	5.0		x
7.3.1.3	High Avenue trees	2.0	5.0		x
7.3.2.1	Climbing plants	0.75	1.50	-0.125	DRT75 = 1.50; DRT90 = 1.00
7.3.3	-				
7.3.3.1	Roses (including Ornamental shrubs)	0.75	1.50	-0.125	DRT75 = 1.50; DRT90 = 1.00
7.3.4	-				
7.3.4.1	Conifers (including Christmas trees)	0.75	1.50	-0.125	DRT75 = 1.50; DRT90 = 1.00
7.3.7	-				
7.3.7.1	Heather	0.75	1.50	-0.125	DRT75 = 1.50; DRT90 = 1.00
7.3.8	-				
7.3.8.1	Forest trees and hedging plants	0.75	1.50	-0.125	DRT75 = 1.50; DRT90 = 1.00
7.3.9	-				
7.3.9.1	Fruit trees and shrubs	0.75	1.50	-0.125	DRT75 = 1.50; DRT90 = 1.00
7.4	Perennial crops	0.75	1.50	-0.125	DRT75 = 1.50; DRT90 = 1.00
7.5	Flower seed crops	0.50	0.50	0.25	
7.6	Marsh and Water plants				x
7.7	Plant breeding crops and seed production	0.50	0.50	-0.125	x
8	Amenity areas				
8.1	Managed amenity turf				
8.1.1	-				
8.1.1.1	Lawn				x
8.1.1.2	Play ground				x
8.1.1.3	Sports field				x
8.1.1.4	Grassy verges				x
8.2	Woody plantings				
8.2.1	-				
8.2.1.1	Avenue and border trees				x
8.2.1.2	Shelter belts, windbreaks and hedgerows				x
8.2.1.3	Other woody plantings				x
8.3	Herbaceous plantings				x
9	Forestry				
9.1	Broad-leaved trees				x
9.2	Coniferous trees				x

DTG crop code	DTG crop	Minimal Agronomic Crop-free zone [m]	Total Crop-free zone (Activity Decree) [m]	Last nozzle position on spray boom [m]	remarks
10	Uncultivated land				
10.1	Temporarily uncultivated terrain				
10.1.1	-				
10.1.1.1	Deforestation area				x
10.1.1.2	Temporarily uncultivated land				x
10.1.1.3	Buffer areas of fields				x
10.2	Permanently uncultivated land				
10.2.1	-				
10.2.1.1	Hard surfaces				x
10.2.1.2	Half-open surfaces				x
10.2.1.3	Permeable surfaces				x
10.2.1.4	Unpaved surfaces				x
10.3	Objects				x
10.3.1	-				
10.3.1.1	Green roofs				x
10.3.1.2	Gravel roofs				x
10.3.1.3	Plant wall				x
11	Water courses				
11.1	Dry slope				x
11.2	Dry ditches				x
11.3	Water courses which contain water				x
11.4	Maintenance paths of water courses				x
11.5	Ponds				x
12	Reed and osier crops				
12.1	-				
12.1.1	-				
12.1.1.1	Osier				x
12.1.1.2	Reed				x
13	Refuse heaps				x
14	Stored products				
14.1	Edible products				x
14.2	Non-edible products				x
14.3	Empty storage facilities				x
15	Disinfectants				
15.1	-				
15.1.1	-				
15.1.1.1	Agricultural and horticultural equipment, tools and materials				x
16	In and around the house (private garden)				
16.1	Vegetable garden				x
16.2	Ornamental garden plants				x
16.3	House plants				x
16.4	Patio plants				x
16.5	Lawn				x
16.6	Permanent pasture				x
16.7	Permeable surfaces				x
16.8	Half open surfaces				x
16.9	Hard surfaces				x
16.10	Unpaved terrain				x
x	not relevant for downward directed or sideways and upward spray scenario				

The schematic presentation of the total crop-free zones and the required DRT classes, as specified by the Activity Decree, are given as a matrix structure presentation below. The cells coloured grey are the combinations of DRT and Total crop-free zone (tcfz) that are no option for choice anymore for the authorisation of PPP in the Netherlands at this moment.

Downward sprayed crops – intensively sprayed crops

DRT % /tcfz (m)	0.5	1.0	1.5	2.0	2.5	3.0	4.5	6.0	→
standard									
DRT50									
DRT75									
DRT90									
DRT95									
DRT97,5									
DRT99									

Downward sprayed crops – other crops (including downward sprayed herbicides in fruit and avenue tree crops)

DRT % /tcfz (m)	0.5	1.0	1.5	2.0	2.5	3.0	4.5	6.0	→
standard									
DRT50									
DRT75									
DRT90									
DRT95									
DRT97,5									
DRT99									

Sideways and upward sprayed crops – fruit crops

DRT % /tcfz (m)	1.5	2.0	3.0	4.0	4.5	5.0	6.0	7.0	8.0	9.0	→
standard											
DRT50											
DRT75											
DRT90											
DRT95											
DRT97,5											
DRT99											

Sideways and upward sprayed crops – tree nursery crops, avenue trees

DRT % /tcfz (m)	1.5	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	→
standard										
DRT50										
DRT75										
DRT90										
DRT95										
DRT97,5										
DRT99										

Annex 6 Application techniques used in crops not covered by the exposure scenarios for downward and sideways-upward spraying and their potential emission to surface water.

The crops of the DTG list can be grouped to groups of crops that are treated with crop protection products using similar application techniques. Distinguished application techniques are: downward spray techniques, sideways and upward spray techniques and special application methods. The scenario for downward directed spraying of field crops (Tiktak *et al*, 2012a) and for sideways and upward directed spraying of fruit and tree crops (Boesten *et al.*, 2018) are developed. Special application methods can be: handheld boom spraying, knapsack spraying, spreading of granules (with or without incorporation in the soil), seed treatment, etc.). The development of scenarios for all other combinations of application technique and crops or situations has not be done yet. An inventory of the standard application techniques used in the different crops and situations not covered by the downward and sideways/upward directed spraying scenarios is given below. The results are based on a discussion with two experts from Ctgb.

6. Mushrooms

Application of mainly insecticides with handheld equipment on the beds or a with fog equipment as a room/space application. Indoor application in special designed mushroom growing cells. Cells look like refrigerator cells and are designed as closed systems for air and water. Leakage from the cells occurs through the water drainage system especially between growth periods of mushrooms when the total inward room is cleaned. Emissions from mushroom cells are evaluated with USES 2.0.

8. Amenity areas

8.1 Managed amenity turf

8.1.1.1 Lawn;

Application with handheld equipment – spray drift is a potential route to surface water

8.1.1.2 Play ground;

Small spray equipment used, boom sprayers or handheld sprayers, downward directed spraying – spray Drift is a potential route to surface water.

8.1.1.3 Sports field;

Small spray equipment used, boom sprayers or handheld sprayers, downward directed spraying on a low canopy – spray drift is a potential route to surface water.

8.1.1.4 Grassy verges (grasbermen);

Area alongside roads and often alongside a ditch. Spray application often in the direction of the surface water (sprayed from the road in the direction of the ditch). Spray booms are used or handheld sprayers, high risk for drift to surface water. Sometimes spot spraying is advised with additional shielding.

8.2 Woody plantings

8.2.1.1 Avenue and border trees;

Herbicides are applied with downward directed (small) boom sprayers, insecticides with sideways and upward directed spray techniques. A special application is the treatment of oak processionary caterpillar where a motorised spray gun is used producing electrostatic charged drops with a high air speed and fan capacity blowing the spray up to 10 m height or higher – spray drift is a potential route to surface water.

8.2.1.2 Shelter belts, windbreaks and hedgerows;
Herbicides are applied with small boom sprayers or handheld equipment, sometimes spot spraying with shielding and insecticides with sideways and upward directed spray equipment – spray drift is a potential route to surface water.
8.2.1.3 Other woody plantings
Herbicides are applied with small boom sprayers or handheld equipment and insecticides with sideways and upward directed spray equipment – spray drift is a potential route to surface water.

8.3 Herbaceous plantings (rozenperken, perkplanten, vaste planten)
Weed control mostly sprayed with handheld equipment sometimes granulates are applied by hand. Spray drift and dust drift are potential routes to surface water.

9. Forestry
Unclear what application technology is used in general. Striking, dipping and 'stobben' treatment with hand spray. Not aerial application. Drift figures in authorisation procedure depend on the request of industry. Further information on used PPP in forestry in NL and used procedures will be evaluated.
9.1 Broad-leaved trees
9.2 Coniferous trees

10. Uncultivated land

10.1 Temporarily uncultivated terrain
10.1.1.1 Deforestation area (bosvak kaal);
Mainly herbicide application with handheld spray equipment or small booms sprayers – spray drift is a potential route to surface water.
10.1.1.2 Temporarily uncultivated land;
Boom sprayers are used for the application of mainly herbicides – spray drift is a potential route to surface water.
10.1.1.3 Buffer areas of fields (akkerranden)
Handheld sprayers are used for mainly herbicide applications. Often shielding devices are used to prevent spray drift to surface water. Sometimes small boom sprayers are used too – spray drift is a potential route to surface water.

10.2 Permanently uncultivated land
Emission to surface water through surface run off is evaluated with USES. Application of herbicides glyphosate on pavement is regulated in NL with DOB system allowing only spot spraying– spray drift is a potential route to surface water.
10.2.1.1 Hard surfaces; DOB for glyphosate
10.2.1.2 Half-open surfaces; DOB for glyphosate
10.2.1.3 Permeable surfaces
10.2.1.4 Unpaved surfaces (onverhard)

11. Water courses

11.1 Dry slope (bank)
Hand held sprayers are used for application of herbicides or dip-sticks or strike applicators having no spray drift – spray drift is a potential route to surface water.

11.2 Dry ditches
Application of herbicides with handheld or small boom sprayers, most often spot wise application.

11.3 Water courses which contain water
An inventory is necessary to explore if there are registrations for this practice in the Netherlands. Small boom spray equipment with 100% application in surface water.

11.4 Maintenance paths of water courses
Small boom sprayers or hand-held sprayers are used for mainly herbicide applications – spray drift is a potential route to surface water.

11.5 Ponds
An inventory is necessary to explore if there are registrations for this practice in NL.

12. Reed and osier crops
12.1.1.1 Osier (griend, snijteen)
Mostly handheld equipment. Sometimes handheld equipment with additional shielding of the spray fan. High risk for surface water deposition.
12.1.1.2 Reed (riet)
General small boom sprayers or hand-held sprayers. High risk for surface water deposition.

13. Refuse heaps
Desiccation spraying of potatoes because of late blight control, compulsory. Application of herbicide with handheld equipment – spray drift is a potential route to surface water.

14. Stored products
14.1 Edible products
14.2 Non-edible products
14.3 Empty storage facilities

15. Disinfectants
15.1.1.1 Agricultural and horticultural equipment, tools and materials
Treatment of harvested product before storage or after storage before packaging. No spray drift to surface water, emission to surface water through release to surface water of dumper water containing rests of PPP or applied fungicides for storage. Evaluated in USES.

Disinfection of large equipment often sprayed with spray guns having a potential spray drift risk to surface water.

16. In and around the house, private home environment
PPP can be applied with irrigation water, sticks, handheld sprayers, or small boom sprayers - most often downward directed. Sometimes granulated products are applied by hand.
16.1 Vegetable garden
16.2 Ornamental garden plants
16.3 House plants
16.4 Patio plants
16.5 Lawn
16.6 Permanent pasture
16.7 Permeable surfaces
16.8 Half-open surfaces
16.9 Hard surfaces
16.10 Unpaved area (onverhard)

Annex 7 Spray drift deposition at water surface in NL standard ditch

Spray drift deposition on water surface is for the NL standard ditch (Huijsmans *et al.*, 1997; Beltman and Adriaanse, 1999) presented for the different downward spray technique scenarios (DW1, DW2, DW3). The spray drift deposition is affected by the different positions of the last nozzle relative to the last crop row based on plant row width (0.25 m, 0,50 m, 0,75 m) and the crop growth stages during application (bare soil/low crop, developed crop canopy).

Table 7.1 *Spray drift deposition (% of applied areic mass) as a function of class of spray drift reducing technology and width of crop-free buffer zone ([b] in Figure 3) and total crop-free zone ([t] in Figure 3) in a bare soil/short crop situation for crop class DW1 (0.25 m crop-free zone) at water surface of the standard TOXSWA 1.2 ditch.*

width of crop-free buffer zone (m)		0.00	0.25	0.75	1.75	2.75	3.75	4.75	5.75
Width of the total crop-free zone (m)		0.25	0.50	1.00	2.00	3.00	4.00	5.00	6.00
Nozzle position (m)*	Technique								
0.25	reference	3.11	2.63	2.00	1.37	1.05	0.84	0.67	0.55
	DRT50	0.97	0.88	0.73	0.55	0.43	0.34	0.27	0.21
	DRT75	0.62	0.56	0.49	0.39	0.31	0.25	0.20	0.16
	DRT90	0.45	0.39	0.31	0.23	0.19	0.16	0.13	0.11
	DRT95	0.22	0.14	0.08	0.06	0.05	0.05	0.04	0.04
0.50	reference	2.63	2.27	1.79	1.27	0.99	0.79	0.64	0.52
	DRT50	0.88	0.80	0.68	0.52	0.40	0.32	0.25	0.20
	DRT75	0.56	0.52	0.46	0.37	0.30	0.24	0.19	0.15
	DRT90	0.39	0.34	0.28	0.22	0.18	0.15	0.13	0.11
	DRT95	0.14	0.10	0.07	0.05	0.05	0.05	0.04	0.04

* [d] in Figure 3

Table 7.2 *Spray drift deposition (% of applied areic mass) as a function of class of spray drift reducing technology and width of crop-free buffer zone ([b] in Figure 3) and total crop-free zone ([t] in Figure 3) in a developed crop canopy situation for crop class DW1 (0.25 m crop-free zone) at water surface of the standard TOXSWA 1.2 ditch.*

Width of crop-free buffer zone (m)		0.00	0.25	0.75	1.75	2.75	3.75	4.75	5.75
Width of the total crop-free zone (m)		0.25	0.50	1.00	2.00	3.00	4.00	5.00	6.00
Nozzle position (m)*	Technique								
0.25	reference	4.79	3.85	2.68	1.70	1.32	1.11	0.95	0.83
	DRT50	1.58	1.36	1.13	0.92	0.78	0.67	0.57	0.49
	DRT75	0.81	0.69	0.59	0.51	0.45	0.40	0.35	0.31
	DRT90	0.51	0.39	0.27	0.22	0.20	0.18	0.16	0.15
	DRT95	0.24	0.15	0.09	0.08	0.07	0.07	0.07	0.06
0.50	reference	3.85	3.17	2.32	1.57	1.26	1.07	0.92	0.80
	DRT50	1.36	1.23	1.06	0.88	0.75	0.64	0.55	0.47
	DRT75	0.69	0.63	0.56	0.49	0.44	0.39	0.34	0.31
	DRT90	0.39	0.32	0.25	0.21	0.19	0.18	0.16	0.15
	DRT95	0.15	0.11	0.08	0.07	0.07	0.07	0.06	0.06

* [d] in Figure 3

Table 7.3 *Spray drift deposition (% of applied areic mass) as a function of class of spray drift reducing technology and width of crop-free buffer zone ([b] in Figure 3) and total crop-free zone ([t] in Figure 3) in a bare soil/short crop situation for crop class DW2 (0.50 m crop-free zone) at water surface of the standard TOXSWA 1.2 ditch.*

Width of crop-free buffer zone (m)		**0.00**	**0.50**	**1.50**	**2.50**	**3.50**	**4.50**	**5.50**
Width of the total crop-free zone (m)		**0.50**	**1.00**	**2.00**	**3.00**	**4.00**	**5.00**	**6.00**
Nozzle position (m)*	**Technique**							
-0.125	reference	3.41	2.44	1.55	1.15	0.91	0.73	0.59
	DRT50	1.03	0.83	0.61	0.47	0.37	0.29	0.23
	DRT75	0.66	0.54	0.42	0.34	0.27	0.22	0.18
	DRT90	0.49	0.36	0.25	0.20	0.17	0.14	0.12
	DRT95	0.29	0.12	0.06	0.05	0.05	0.04	0.04
0.0	reference	3.11	2.27	1.48	1.12	0.88	0.71	0.58
	DRT50	0.97	0.80	0.59	0.46	0.36	0.28	0.22
	DRT75	0.62	0.52	0.41	0.33	0.27	0.21	0.17
	DRT90	0.45	0.34	0.25	0.20	0.17	0.14	0.12
	DRT95	0.22	0.10	0.06	0.05	0.05	0.04	0.04
0.25	reference	2.63	2.00	1.37	1.05	0.84	0.67	0.55
	DRT50	0.88	0.73	0.55	0.43	0.34	0.27	0.21
	DRT75	0.56	0.49	0.39	0.31	0.25	0.20	0.16
	DRT90	0.39	0.31	0.23	0.19	0.16	0.13	0.11
	DRT95	0.14	0.08	0.06	0.05	0.05	0.04	0.04
0.50	reference	2.27	1.79	1.27	0.99	0.79	0.64	0.52
	DRT50	0.80	0.68	0.52	0.40	0.32	0.25	0.20
	DRT75	0.52	0.46	0.37	0.30	0.24	0.19	0.15
	DRT90	0.34	0.28	0.22	0.18	0.15	0.13	0.11
	DRT95	0.10	0.07	0.05	0.05	0.05	0.04	0.04

* [d] in Figure 3

Table 7.4 *Spray drift deposition (% of applied areic mass) as a function of class of spray drift reducing technology and width of crop-free buffer zone ([b] in Figure 3) and total crop-free zone ([t] in Figure 3) in a developed crop canopy situation for crop class DW2 (0.50 m crop-free zone) at water surface of the standard TOXSWA 1.2 ditch.*

Width of crop-free buffer zone (m)		0.00	0.50	1.50	2.50	3.50	4.50	5.50
Width of the total crop-free zone (m)		0.50	1.00	2.00	3.00	4.00	5.00	6.00
Nozzle position (m)*	Technique							
-0.125	reference	5.40	3.49	1.95	1.43	1.18	1.01	0.87
	DRT50	1.73	1.29	0.98	0.83	0.71	0.60	0.52
	DRT75	0.90	0.66	0.53	0.47	0.42	0.37	0.33
	DRT90	0.61	0.35	0.23	0.20	0.19	0.17	0.16
	DRT95	0.32	0.12	0.08	0.07	0.07	0.07	0.06
0.0	reference	4.79	3.17	1.85	1.39	1.16	0.99	0.86
	DRT50	1.58	1.23	0.96	0.81	0.69	0.59	0.51
	DRT75	0.81	0.63	0.53	0.46	0.41	0.37	0.32
	DRT90	0.51	0.32	0.23	0.20	0.18	0.17	0.15
	DRT95	0.24	0.11	0.08	0.07	0.07	0.07	0.06
0.25	reference	3.85	2.68	1.70	1.32	1.11	0.95	0.83
	DRT50	1.36	1.13	0.92	0.78	0.67	0.57	0.49
	DRT75	0.69	0.59	0.51	0.45	0.40	0.35	0.31
	DRT90	0.39	0.27	0.22	0.20	0.18	0.16	0.15
	DRT95	0.15	0.09	0.08	0.07	0.07	0.07	0.06
0.50	reference	3.17	2.32	1.57	1.26	1.07	0.92	0.80
	DRT50	1.23	1.06	0.88	0.75	0.64	0.55	0.47
	DRT75	0.63	0.56	0.49	0.44	0.39	0.34	0.31
	DRT90	0.32	0.25	0.21	0.19	0.18	0.16	0.15
	DRT95	0.11	0.08	0.07	0.07	0.07	0.06	0.06

* [d] in Figure 3

Table 7.5 *Spray drift deposition (% of applied areic mass) as a function of class of spray drift reducing technology and width of crop-free buffer zone ([b] in Figure 3) and total crop-free zone ([t] in Figure 3) in a bare soil/short crop situation for crop class DW3 (0.75 m crop-free zone) at water surface of the standard TOXSWA 1.2 ditch.*

Width of crop-free buffer zone (m)		0.00	0.25	1.25	2.25	3.25	4.25	5.25
Width of the total crop-free zone (m)		0.75	1.00	2.00	3.00	4.00	5.00	6.00
Nozzle position (m)*	Technique							
-0.125	reference	2.85	2.44	1.55	1.15	0.91	0.73	0.59
	DRT50	0.92	0.83	0.61	0.47	0.37	0.29	0.23
	DRT75	0.59	0.54	0.42	0.34	0.27	0.22	0.18
	DRT90	0.42	0.36	0.25	0.20	0.17	0.14	0.12
	DRT95	0.17	0.12	0.06	0.05	0.05	0.04	0.04
0.0	reference	2.63	2.27	1.48	1.12	0.88	0.71	0.58
	DRT50	0.88	0.80	0.59	0.46	0.36	0.28	0.22
	DRT75	0.56	0.52	0.41	0.33	0.27	0.21	0.17
	DRT90	0.39	0.34	0.25	0.20	0.17	0.14	0.12
	DRT95	0.14	0.10	0.06	0.05	0.05	0.04	0.04
0.25	reference	2.27	2.00	1.37	1.05	0.84	0.67	0.55
	DRT50	0.80	0.73	0.55	0.43	0.34	0.27	0.21
	DRT75	0.52	0.49	0.39	0.31	0.25	0.20	0.16
	DRT90	0.34	0.31	0.23	0.19	0.16	0.13	0.11
	DRT95	0.10	0.08	0.06	0.05	0.05	0.04	0.04

* [d] in Figure 3

Table 7.6 *Spray drift deposition (% of applied areic mass) as a function of class of spray drift reducing technology and width of crop-free buffer zone ([b] in Figure 3) and total crop-free zone ([t] in Figure 3) in a developed crop canopy situation for crop class DW3 (0.75 m crop-free zone) at water surface of the standard TOXSWA 1.2 ditch.*

width of crop-free buffer zone (m)		**0.00**	**0.25**	**1.25**	**2.25**	**3.25**	**4.25**	**5.25**
Width of the total crop-free zone (m)		**0.75**	**1.00**	**2.00**	**3.00**	**4.00**	**5.00**	**6.00**
Nozzle position (m)*	**Technique**							
-0.125	reference	4.28	3.49	1.95	1.43	1.18	1.01	0.87
	DRT50	1.46	1.29	0.98	0.83	0.71	0.60	0.52
	DRT75	0.74	0.66	0.53	0.47	0.42	0.37	0.33
	DRT90	0.44	0.35	0.23	0.20	0.19	0.17	0.16
	DRT95	0.18	0.12	0.08	0.07	0.07	0.07	0.06
0.0	reference	3.85	3.17	1.85	1.39	1.16	0.99	0.86
	DRT50	1.36	1.23	0.96	0.81	0.69	0.59	0.51
	DRT75	0.69	0.63	0.53	0.46	0.41	0.37	0.32
	DRT90	0.39	0.32	0.23	0.20	0.18	0.17	0.15
	DRT95	0.15	0.11	0.08	0.07	0.07	0.07	0.06
0.25	reference	3.17	2.68	1.70	1.32	1.11	0.95	0.83
	DRT50	1.23	1.13	0.92	0.78	0.67	0.57	0.49
	DRT75	0.63	0.59	0.51	0.45	0.40	0.35	0.31
	DRT90	0.32	0.27	0.22	0.20	0.18	0.16	0.15
	DRT95	0.11	0.09	0.08	0.07	0.07	0.07	0.06

* [d] in Figure 3

Annex 8 BBCH –stages; notes related to crop coverage period in the field

The basic principles of the BBCH scale (detailing stage 0 and 99) are:

Principal growth stages	Stage Description
0	Germination / sprouting / bud development
1	Leaf development (main shoot)
2	Formation of side shoots / tillering
3	Stem elongation or rosette growth / shoot development (main shoot)
4	Development of harvestable vegetative plant parts or vegetatively propagated organs / booting (main shoot)
5	Inflorescence emergence (main shoot) / heading
6	Flowering (main shoot)
7	Development of fruit
8	Ripening or maturity of fruit and seed
9	Senescence, beginning of dormancy

With additional comment given on the stages:
- Post harvest or storage treatment is coded 99.
- Seed treatment before planting is coded 00.

In general, no crop is in the field between harvest of the product and the seeding/planting of the next crop. At BBCH stage 0 in general the seed is sown, or tuber is planted. Some crops are planted as small 2-3 leaf stage plants BBCH 12-13 (strawberry, leaf vegetables, other brassica vegetables, cucurbits).

In general, most crops are harvested at growth stage 89 (cereals, maize, oilseed rape, faba bean, sunflower). From some crops fresh products or storage organs are harvested and not the ripened seeds. These crops clear the field after harvest of the fresh products or storage organs, in general this is in BBCH stage 49 (potato, beet, bulb vegetables, root and stem vegetables, leaf vegetables, other brassica vegetables). Crops like peas and beans can be either harvested as a fresh marketable product at BBCH 79 or as a ripened dry seed at growth stage BBCH 89.

Only for strawberries and hop no BBCH 99 code was given. For strawberries and hop BBCH97 (Old leaves dead) is the last stage.

In general, BBCH 97 indicates: plant dead or all leaves fallen. So BBCH 97 is basically the last growth stage of the crop in the field.

For the crops listed in BBCH (2001) an overview of the start and end periods of the identified crops is given, including additional information on stages at which planting and harvesting takes place.

Cereals
(Wheat = Triticum sp. L., barley = Hordeum vulgare L., oat = Avena sativa L.,
rye = Secale cereale L.)
Code Description
Principal growth stage 0: Germination
00 Dry seed (caryopsis)
...
97 Plant dead and collapsing
99 Harvested product

Maize
(Zea mays L.)
Code Description
Principal growth stage 0: Germination
00 Dry seed (caryopsis)
...
89 Fully ripe: kernels hard and shiny, about 65% dry matter
97 Plant dead and collapsing
99 Harvested product

Oilseed rape
(Brassica napus L. ssp. napus)
Code Description
Principal growth stage 0: Germination
00 Dry seed
...
89 Fully ripe: nearly all pods ripe, seeds dark and hard
97 Plant dead and dry
99 Harvested product

Faba bean
(Vicia faba L.)
Code Description
Principal growth stage 0: Germination
00 Dry seed
...
89 Fully ripe: nearly all pods dark, seeds dry and hard
93 Stems begin to darken
95 50% of stems brown or black
97 Plant dead and dry
99 Harvested product

Sunflower
(Helianthus annuus L.)
Code Description
Principal growth stage 0: Germination
00 Dry seed (achene)
...
89 Fully ripe: seeds on inner third of anthocarp dark and hard. Back of anthocarp brown. Bracts brown Seeds about 85% dry matter
92 Over ripe, seeds over 90% dry matter
97 Plant dead and dry
99 Harvested product

Beet
(Beta vulgaris L. ssp. vulgaris)
Code Description
Principal growth stage 0: Germination
00 Dry seed
...
49 Beet root has reached harvestable size <--- beet harvested in field, from here onward growth stages are for seed production
51 Beginning of elongation of main stem
52 Main stem 20 cm long
...
97 Leaves dead
99 Harvested product <-- meant is the beet seed

Potato
(Solanum tuberosum L.)
Code Description
Principal growth stage 0: Sprouting/Germination
00 Innate or enforced dormancy, tuber not sprouted
...
48 Maximum of total tuber mass reached, tubers detach easily from stolons, skin set not yet complete (skin easily removable with thumb)
49 Skin set complete: (skin at apical end of tuber not removable with thumb) 95% of tubers in this stage <--- in this growth stage the potato tubers are harvested in the field
The rest of the growth stages refer to the flowering, and seed development, and the natural desiccation of the potato plant after seed development, and occur parallel to the potato tuber development with at the end of the season again the natural leaf desiccation.
91 Beginning of leaf yellowing
93 Most of the leaves yellowish
95 50% of the leaves brownish
97 Leaves and stem dead, stems bleached and dry this leaf <--- in this leaf stage the ware and starch potato tubers are in general harvested
99 Harvested product <--- meant is the seed from the flowers, or the tubers as harvested

Pome fruit
(Apple = Malus domestica Borkh., pear = Pyrus communis L.)
Code Description
Principal growth stage 0: Sprouting/Bud development
00 Dormancy: leaf buds and the thicker inflorescence buds closed and covered by dark brown scales
...
87 Fruit ripe for picking <---
89 Fruit ripe for consumption: fruit have typical taste and firmness <--- harvesting of fruit
...
93 Beginning of leaf fall
95 50% of leaves discoloured or fallen
97 All leaves fallen
99 Harvested product

Stone fruit
(Cherry = Prunus cerasus L., plum = Prunus domestica L. ssp. domestica,
peach = Prunus persica Batsch., apricot = Prunus ameriaca L.)
Code Description
Principal growth stage 0: Sprouting/Bud development
00 Dormancy: leaf buds and the thicker inflorescence buds closed
and covered by dark brown scales
...
87 Fruit ripe for picking <---
89 Fruit ripe for consumption: fruit have typical taste and firmness <--- harvest of fruit
91 Shoot growth completed; foliage still fully green
92 Leaves begin to discolour
93 Beginning of leaf fall
95 50% of leaves discoloured or fallen
97 All leaves fallen
99 Harvested product

Currants
(Black currant = Ribes nigrum L., red currant = Ribes rubrum L.)
Code Description
Principal growth stage 0: Sprouting/Bud development
00 Dormancy: leaf buds and the thicker inflorescence buds closed and covered by dark brown scales
...

87 Fruit ripe for picking: most berries ripe <---- harvest of fruits
89 Berries at base of racemes tending to drop (beginning of fruit abscission)
91 Shoot growth completed; terminal bud developed; foliage still fully green
92 Leaves begin to discolour
93 Beginning of leaf fall
95 50% of leaves discoloured or fallen
97 All leaves fallen
99 Harvested product

Strawberry
(Fragaria ananassa Duch.)
Code Description
Principal growth stage 0: Sprouting/Bud development
00 Dormancy: Leaves prostrate and partly dead
03 Main bud swelling
Principal growth stage 1: Leaf development
10 First leaf emerging
11 First leaf unfolded
12 2nd leaf unfolded
13 3rd leaf unfolded <----- plants of this size are planted in the
... field (start of growing season)
87 Main harvest: more fruits coloured <--- harvest of fruits
89 Second harvest: more fruits coloured <---
91 Beginning of axillary bud formation
92 New leaves with smaller lamina and shortened stalk visible
93 Old leaves dying, young leaves curling; old leaves of cultivarspecific colour
97 Old leaves dead
<--- no 99 growth stage
Omittance of:
Citrus, Olive, Coffea, Musacea.

Grapevine
(Vitis vinifera L. ssp. vinifera)
00 Dormancy: winter buds pointed to rounded, light or dark brown
according to cultivar; bud scales more or less closed according
to cultivar
01 Beginning of bud swelling: buds begin to expand inside the bud
scales
...
89 Berries ripe for harvest <--- harvest of grapes
91 After harvest; end of wood maturation
92 Beginning of leaf discolouration
93 Beginning of leaf-fall
95 50% of leaves fallen
97 End of leaf-fall

Soybean
(Glycine max L. Merr.)
00 000 Dry seed
...
49 409 Harvestable vegetative plant parts have reached final size
(Cutting of soybean plants for feeding purposes)
...
89 809 Full maturity: approx. all pods are ripe; beans final colour, dry
and hard (= Harvest maturity). Majority of pods are ripe; beans
final colour, dry and hard <--- harvest of soybean crop
...

91 901 About 10% of leaves discoloured or fallen
...
96 906 About 60% of leaves discoloured or fallen
97 907 Above ground parts of plants dead

Omittance of:
Cotton, Peanut

Hop
(Humulus lupulus L.)
00 Dormancy: rootstock without shoots (uncut)
01 Dormancy: rootstock without shoots (cut)
07 Rootstock with shoots (uncut)
08 Beginning of shoot-growth (rootstock cut)
09 Emergence: first shoots emerge at the soil surface
...
11 First pair of leaves unfolded
....
33 Bines have reached 30% of top wire height
3. Stages continuous till...
38 Plants have reached the top wire
39 End of bine growth
...
89 Cones ripe for picking: cones closed; lupulin golden;
aroma potential fully developed <--- harvest of hop cones
92 Overripeness: cones yellow-brown discoloured, aroma deterioration
97 Dormancy: leaves and stems dead
<--- no 99 growth stage

Bulb vegetables
(Onion = Allium cepa L., leek = Allium porrum L., garlic = Allium sativum L.,
shallot = Allium ascalonicum auct. non L.)
Code Description
2- and 3digit
Principal growth stage 0: Germination
00 000 Dry seed,1 dormant bulb
...
48 408 Leaves bent over in 50% of plants
49 409 Leaves dead, bulb top dry; dormancy. Growth complete; length and stem diameter typical for variety reached <--- harvest of bulbs, rest of development stages deals with flowering, ripening of seeds
...
89 809 Fully ripe: seeds black and hard
92 902 Leaves and shoots beginning to discolour
95 905 50% of leaves yellow or dead
97 907 Plants or above ground parts dead
99 909 Harvested product (seeds) <--- this harvested product is seed

Root and stem vegetables
(Carrot = Daucus carota L. ssp. sativus, celeriac = Apium graveolens L. var.
rapaceum Gaud., kohlrabi = Brassica oleracea L. var. gongylodes,
chicory = Cichorium intybus var. foliosum, radish = Raphanus sativus L. ssp.,
swede = Brassica napus L. ssp. rapifera Metzg., scorzonera = Scorzonera
hispanica L.)
Code Description
Principal growth stage 0: Germination
00 Dry seed

...
48 80% of the expected root diameter reached
49 Expansion complete; typical form and size of roots reached <--- harvest of stem and tuber product
... other development stages deal
... with flowering and seed production
89 Fully ripe: seeds on the whole plant of typical colour and hard
92 Leaves and shoots beginning to discolour
95 50% of leaves yellow or dead
97 Plants or above ground parts dead
99 Harvested product (seeds)

Leaf vegetables (forming heads)
(Cabbage = Brassica oleracea L. var. capitata f. alba and rubra, chinese cabbage = Brassica chinensis L., lettuce = Lactuca sativa L. var. capitata, endive = Cichorium endivia L.)
Code Description
Principal growth stage 0: Germination
00 Dry seed <--- seeding for plant production
...
12 2nd true leaf unfolded
13 3rd true leaf unfolded <--- plants of this size are planted in the
... field (start of growing season)
48 80% of the expected head size reached
49 Typical size, form and firmness of heads reached <--- harvest of product in the field
... other development stages deal with
... flowering and seed production
89 Fully ripe: seeds on the whole plant of typical colour and hard
92 Leaves and shoots beginning to discolour
95 50% of leaves yellow or dead
97 Plants dead
99 Harvested product (seeds)

Leaf vegetables (not forming heads)
(Spinach = Spinacia oleracea L., loosehead lettuce = Lactuca sativa L. var. crispa, kale = Brassica oleracea L. var. sabellica)
Code Description
Principal growth stage 0: Germination
00 Dry seed <--- spinach is sown
...
12 2nd true leaf unfolded
13 3rd true leaf unfolded <--- lettuce and kale plants of this size are
... planted in the field (start of growing season)
48 80% of the leaf mass typical for the variety reached
49 Typical leaf mass reached <--- harvest of product in the field
... other development stages deal with
... flowering and seed production
89 Fully ripe: seeds on the whole plant of typical colour and hard
92 Leaves and shoots beginning to discolor
95 50% of leaves yellow or dead
97 Plants dead
99 Harvested product (seeds)

Other brassica vegetables
(Brussels sprout = Brassica oleracea L. var. gemmifera DC./Zenk., cauliflower = Brassica oleracea L. var. botrytis, broccoli = Brassica oleracea L. var. italica Plenck)

Code Description
Principal growth stage 0: Germination
00 Dry seed <--- seeding for plant production
...
12 2nd true leaf unfolded
13 3rd true leaf unfolded <--- lettuce and kale plants of this size are
... planted in the field (start of growing season)
48 80% of the sprouts tightly closed 80% of the expected head diameter reached
49 Sprouts below terminal bud tightly closed Typical size and form reached;
head tightly closed <--- harvest of product in the field
... other development stages deal
... with flowering and seed production
89 Fully ripe: seeds on the whole plant of typical color and hard
92 Leaves and shoots beginning to discolour
95 50% of leaves yellow or dead
97 Plants dead
99 Harvested product (seeds)

Cucurbits
(Cucumber = Cucumis sativus L., melon = Cucumis melo L., pumpkin,
marrow, squash = Cucurbita pepo L., calabash = Cucurbita pepo L. var.
giromontiina Alef./Greb, water-melon = Citrullus var. vulgaris Schad.)
Code Description
2 -and 3digit
Principal growth stage 0: Germination
00 000 Dry seed <--- seeding for plant production
...
12 102 2nd true leaf unfolded
13 103 3rd true leaf unfolded <--- lettuce and kale plants of this size are
... planted in the field (start of growing season)
81 801 10% of fruits show typical fully ripe colour <--- between stages 81 and 89 fruits are harvested
82 802 20% of fruits show typical fully ripe colour
83 803 30% of fruits show typical fully ripe colour
84 804 40% of fruits show typical fully ripe colour
85 805 50% of fruits show typical fully ripe colour
86 806 60% of fruits show typical fully ripe colour
87 807 70% of fruits show typical fully ripe colour
88 808 80% of fruits show typical fully ripe colour
89 809 Fully ripe: fruits have typical fully ripe colour
97 907 Plants dead
99 909 Harvested product (seeds)

Omittance of:
Solanaceous fruits

Pea
(Pisum sativum L.)
Code Description
Principal growth stage 0: Germination
00 Dry seed
...
79 Pods have reached typical size (green ripe); peas fully formed <--- fresh peas are harvested
...

89 Fully ripe: all pods dry and brown. Seeds dry and hard (dry ripe) <--- dry peas are harvested (seed)
97 Plants dead and dry
99 Harvested product <--- dry seed

Bean
(Phaseolus vulgaris var. nanus L.),
Code Description
Principal growth stage 0: Germination
00 Dry seed
...
79 Pods: individual beans easily visible <--- fresh bean are harvested
...
89 Fully ripe: pods ripe (beans hard) <--- dry peas are harvested (seed)
97 Plants dead
99 Harvested product <--- dry seed

Annex 9 Temporarily uncultivated area in between two successive crops

When a PPP is applied to a temporarily uncultivated field in between two successive crops, e.g. after harvest or before sowing/planting the width of minimal crop-free buffer zone is not per definition defined. A clear definition of the minimal crop-free buffer zone is however necessary to apply the matrix structure methodology of spray drift reduction, as identified in this report. We therefore devised a procedure to establish a minimal crop-free buffer zone for temporarily uncultivated areas. For this procedure we used the position of the top of the bank of the ditch as a starting point (Fig. 3). The last nozzle position of the treated area can be identified relative to the top of the bank. As the last nozzle position on the spray boom is defining the directly sprayed area (Fig. 9.1; ISO22866) we assume that the distance between the directly treated area (A in Fig. 9.1) and the top of the bank defines the width of the 'spray free buffer zone'. The directly treated area is defined as the working width of the sprayer (L in Fig. 9.1) plus half a nozzle distance (a/2 in Fig. 9.1) on both sides of the spray boom. Similar to spraying a grassland area the distance between the edge of the directly treated area (half a nozzle distance outside the last nozzle position on the spray boom) and the top of the bank define the minimal crop-free buffer zone for 'Temporarily uncultivated area' in between successive crops. Similar to grassland, the minimal agronomic buffer zone is therefore 0.25 m and the smallest nozzle distance is 0.25 m, meaning that the distance between the nozzle and the edge of the ditch is 0.50 m as minimum (DW1 Table 8). We propose to use these definitions for the evaluation of 'Temporarily uncultivated area; DTG 10.1.1.2)'.

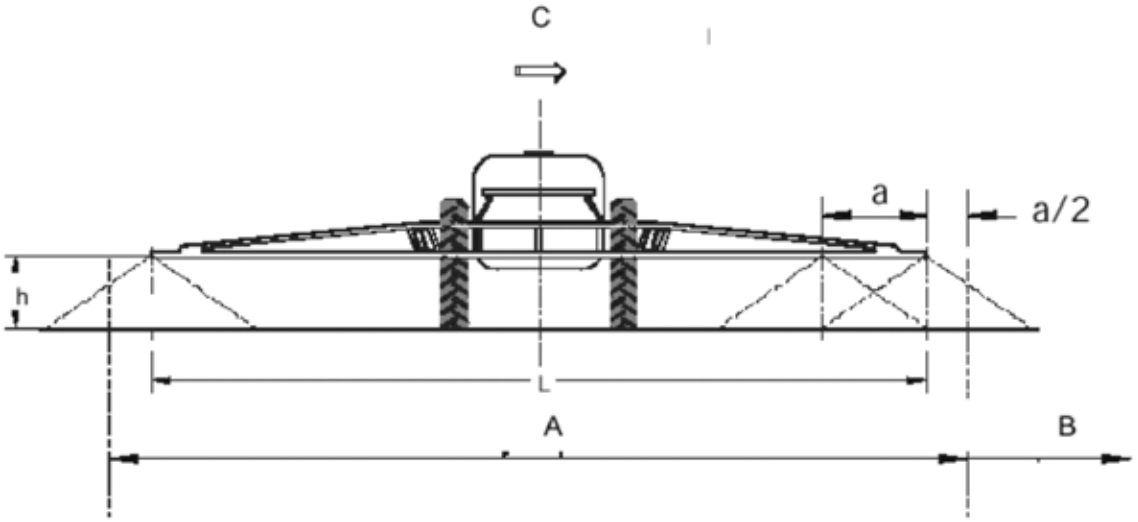

Figure 9.1 *Definition of directly sprayed area (A) and other parameter definitions (from ISO22866).*

Key

A	Directly sprayed area (= L + a)
B	Spray drift zone
C	Wind direction
L	Boom width
a	Nozzle spacing
h	Boom height

Reference:
ISO 22866. 2005. Equipment for crop protection – Methods for the field measurement of spray drift. International Standardisation Organisation, Geneva. 2005.

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The mission of Wageningen University & Research is "To explore the potential of nature to improve the quality of life". Under the banner Wageningen University & Research, Wageningen University and the specialised research institutes of the Wageningen Research Foundation have joined forces in contributing to finding solutions to important questions in the domain of healthy food and living environment. With its roughly 30 branches, 5,000 employees and 12,000 students, Wageningen University & Research is one of the leading organisations in its domain. The unique Wageningen approach lies in its integrated approach to issues and the collaboration between different disciplines.