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Keywords: spray drift, arable crops, drift reducing techniques, crop-free buffer zone

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Photo cover: Jan van de Zande [WUR-spray-BBCH89-92_IMG_1976.JPG]

Contents

Preface

Studies have been carried out to show the effect (and interaction) of application technique and width of buffer zone on spray drift deposition alongside a sprayed field. These studies make it possible to assess the requirement in meeting ecotoxicological values for off-field evaluation of plant protection products for non-target arthropods, non-target plants and surface water applied with boom sprayers to different field crops and growth stages. The WUR Drift Calculator (WDC) is introduced in 2021 for use in the authorisation procedure of plant protection products (Ctgb) from January 2022 onward. The WDC is based on updated spray drift data from spray drift measurements in the period 1995-2005. This means that ongoing and new procedures until that date of introduction may still use the spray drift values as used in the authorisation procedure and based on spray drift measurements in the period 1995-1999. This report provides tables of spray drift deposition from boom spray applications on the different evaluation zones until the WDC is in place in the authorisation procedures. Results are presented in a matrix of Drift Reducing Technology (DRT) versus crop-free buffer zone for applications in a bare ground situation and a field crop situation.

Wageningen, December 2021

Summary

The Dutch government's policy (Environmental Activities Decree, Sustainable Crop Protection 2) has set goals for the reduction of the emission of plant protection products into the environment. Data are needed on actual spray drift and drift reducing measures when spraying a plant protection product to support decision making on the authorisation of the use of plant protection products in different crop types (Board for the Authorisation of Plant Protection Products and Biocides, Ctgb).

The WUR Drift Calculator (WDC) is introduced in 2021 for use in the authorisation procedure of plant protection products (Ctgb) from January 2022 onwards. The WDC is based on updated spray drift data from spray drift measurements in the period 1995-2005. This means ongoing and new procedures up till that date of introduction may still use the spray drift values as used in the authorisation procedure and based on spray drift measurements in the period 1995-1999. This report provides tables of spray drift deposition from boom spray applications on the different evaluation zones until the WDC is in place in the authorisation procedures. Results are presented in a matrix of Drift Reducing Technology (DRT) versus crop-free buffer zone for applications in a bare ground situation and a crop situation. Data were extrapolated from performed spray drift experiments; in order to assess spray drift deposits for the distance at which the off-field threshold level to protect non-target terrestrial arthropods (NTA), non-target terrestrial plants (NTP) and surface water (SW) is likely to be met when spraying a plant protection product onto a crop, or onto a bare soil/short crop situation.

When using boom sprayers in field crops, in the authorisation procedure the standard spray drift deposition on the off-field evaluation zone was 10% of the applied dose for non-target arthropods (NTA), 4.7% for non-target plants (NTP) and 1.0% for surface water (SW) until the end of 2017. Since the 1st of January 2018 the Environmental Activities Decree prescribes the compulsory use of at least DRT75 (75% drift reducing techniques) to be used on the whole field. This means spray drift deposition on the off-field evaluation zone changed to 5.5% for non-target arthropods (NTA), 0.9% for non-target plants (NTP) and 0.5% for surface water (SW). These values are based on a conventional boom sprayer application with standard non drift-reducing flat fan nozzles (until end of 2017) and a DRT75 from January 2018 and a spray boom height of 50 cm above the crop canopy. For arable crops, spray drift deposition is evaluated at a 1.0 m wide zone at 0.5-1.5 m for NTA and at 1.5-2.5 m distance for NTP relative to the centre of the last crop row and for SW at 1.5-2.5 m from the field edge or top of the bank of the surface water body. For NTA/NTP the last crop row is defined at 1.0 m from the edge of the field, whereas for SW it is at 1.50 m from the top of the bank for intensively sprayed crops and at 0.50 m for other crops. Spray drift was investigated for a standard application technique and various drift-reducing techniques, for both a mature crop (height >20 cm) and a situation with bare soil of short crop (height <20 cm). Drift-reducing techniques (DRT) are classified in different classes, representing drift reduction levels of 50%, 75%, 90%, 95%, 97.5% and 99% compared to the standard application technique. This classification system is based on deposits at the SW evaluation zone. However, the drift-reducing effect depends strongly on the distance of the evaluation zone from the crop; usually for NTA, NTP and SW evaluation zones a certain application technique gives rise to different drift reductions. Still, drift reducing techniques are relevant for NTA/NTP risk assessments as well. Representative techniques for each of the DRT classes are chosen and spray drift deposition is calculated on the NTA, NTP and SW evaluation zones for applications using boom sprayers in the crop and the bare soil/short crop situation. At this moment the DRTs 75 up to 99 are used in the NTA/NTP evaluation procedure whereas for SW this is the DRTs 75 to 95. Also, the effect on spray drift deposition at the evaluation zones is assessed for additional buffer zone widths up to 4 m.

1 Introduction

The Dutch government's policy (Sustainable Crop Protection 2, EZ, 2013; Environmental Activities Decree, I&W, 2017; Future vision Crop protection 2030, LNV, 2019) has set goals for the reduction of the emission of plant protection products into the environment. To support decision making on the authorisation of the use of plant protection products (Board for the Authorisation of Plant Protection Products and Biocides, Ctgb) data are needed on actual spray drift and on drift reducing measures when spraying a plant protection product onto a crop. Therefore, spray drift deposits of plant protection products, authorised to be used in different crops, need to be assessed. Plant protection products are typically applied to the whole field using a field sprayer, during the growing season, when the crop is at full growth, but also on bare soil surfaces or short crops.

In order to meet the Non-Target Plants (NTP), Non-Target Arthropods (NTA) and Surface Water (SW) thresholds for ecotoxicological risk assessments of an agrochemical substance an analysis is made of ways to reduce spray drift, based on relevant spray drift research performed in the Netherlands. The required width of a crop-free buffer zone is calculated to meet the NTA/NTP/SW threshold for ecotoxicity. Data are taken from field experiments spraying different crops (mainly potatoes) and a bare soil surface using boom sprayers of different Drift Reducing Technology (DRT) classes. These field experiments were carried out under standardized conditions (ISO22369; Zande et al., 2012; TCT, 2021). For each DRT class a representative application technique was selected. Next, calculations are carried out to estimate the spray drift deposition at the NTA/NTP/SW evaluation zones for the selected application techniques of the DRT classes.

The WUR Drift Calculator (WDC; Holterman & Van de Zande, 2021) is introduced in 2021 for use in the authorisation procedure of plant protection products (Ctgb, 2021) from January 2022 onwards. The spray drift deposition data in the WDC are based on the current scientific knowledge and largely based on the methodology and data presented in Zande et al., 2012 but extended for the drift reduction technology (DRT) classes of 97.5% and 99% (resp. DRT97.5, DRT99). The WDC is based on updated spray drift data from spray drift measurements in the period 1995-2005.This means ongoing and new procedures for dossiers submitted until that date may still use the spray drift values as currently used in the authorisation procedure and based on spray drift measurements in the period 1995-1999 (Ctgb, 2020a, 2020b). This report provides tables of spray drift deposition from boom sprayer applications on the different evaluation zones for these intermediate procedures. Results are presented in a matrix of Drift Reducing Technology (DRT) versus crop-free buffer zone for applications in situations with bare ground and a crop.

2 Materials and methods

Spray drift deposits on NTP, NTA and SW evaluation zones were quantified using available data from field experiments carried out throughout various years. These experiments involved boom sprayers equipped with standard flat fan nozzles or drift-reducing nozzles, both with and without air assistance.

2.1 Field measurements

Spray drift measurements were done in the period 1995-1999 in which the downwind 18-24 m edge of a cropped field was sprayed (potato; a developed crop with complete field coverage, BBCH39 till 50% desiccation of leaves (BBCH95). Similar experiments with a short crop (e.g. sugar beet, maize, flower bulbs; maximum plant height 20 cm) or bare soil surface were done in the period 2000-2005. Drift deposits were quantified with a fluorescent tracer (Brilliant Sulfo Flavine, BSF) in the sprayed liquid. Collectors were placed on soil surface up to 15 m downwind from the last nozzle of the field sprayer and sampled sedimenting drops from the passing drift cloud.

Measurements were carried out with the 'worst case' wind direction (i.e. perpendicular to the field edge). The deviation of the wind direction was within 30 degrees from perpendicular to the driving direction, which was parallel to the watercourse. Spray drift experiments were done in accordance with the ISO standard for spray drift measurements (ISO22866), adapted for the Dutch situation, and the protocol for the certification of drift reducing spray techniques according to the Water Pollution Act and Environmental Activities Decree in the Netherlands (CIW, 2003; TCT, 2017a, 2017b). At least 10 replicate measurements (with double sampling rows) in time and place were carried out to represent the average situation for spraying a developed crop during the growing season or a short crop/bare soil surface using the same sprayer settings (i.e. spray pressure and boom height above target). Spray drift deposits recovered from the collectors were averaged at the different distances and were curve-fitted for the different spray technologies.

For various drift reducing spray techniques, drift reduction with respect to the reference spray technique was determined at a distance of 2-3 m from the last nozzle in the certification process. However, for many crop situations the actual location of the water surface or field edge differs from this range. Therefore, the computed drift reduction at 2-3 m used for spray drift reduction certification is in fact not representative for all field situations yet a good estimate of the general spray drift reduction potential.

The drift reducing spraying techniques measured in the period 1995-2005 are certified in different DRT classes (TCT, 2021). At least a DRT75 technique must be used in outdoor spray applications for all crops and bare soil, according to the Environmental Activities Decree (I&W, 2021); e.g. to reduce the standard minimum crop-free buffer zone of intensively sprayed crops from 1.50 m for DRT75 to 1.0 m for DRT90.

The typical curves obtained for the different Drift Reducing Technology classes when spraying a field crop are defined for the cropped situation and for the bare soil or small crop situation (Zande et al., 2012). At the field edge (0-2 m) drift reduction is limited as overspray occurs of the last nozzle which depends much on the top angle of the outside nozzle. Even with the use of end nozzles, overspray cannot always be prevented. Consequently, spray drift deposition curves occasionally can cross each other in this area. In this report no adjustments were made regarding this issue. The reference techniques of the drift reduction classes are based on the evaluation in the cropped situation (spraying a potato field). This means that the spray drift deposition curves in the bare soil / short crop situation may have other drift reduction steps. The choice for a bare soil/short crop or a cropped spray drift situation is based on crop height at application time. When the crop height is below 20 cm the drift curves for bare soil surface are used (Zande & Ter Horst, 2019).

2.2 Spray drift deposition

Spray drift deposition decreases with the distance to the sprayed plot (**Figure 1**). From the spray drift measurements in the field the data of the conventional spraying using an XR11004 nozzle was used as a basic curve for the spray drift deposition. In agreement with the methodology described in Zande et al. (2007) the data of the years 1995 – 1999 were combined and a reference spray drift curve was presented for the situation: boom sprayer with boom height at 0.50 m above crop canopy equipped with standard flat fan nozzles (XR11004, drift reduction class 0). Based on the comparative drift measurements in the field in the period 1995-2005, spray drift reduction curves were determined for the different drift reducing spray techniques like nozzle type, air assistance, low boom height, and special types of equipment for both the cropped as the bare soil surface situation. An end nozzle in the last nozzle body of the spray boom to prevent overspray at the edge of the crop was introduced following Zande et al., 2007. The representative spray drift reduction curves for each DRT class (Zande et al., 2012) were used to calculate the spray drift deposition for these drift reducing spray techniques by calculating the fractions at various distances (zones) from the last nozzle. By further differentiation of the DRT95 class into DRT97.5 and DRT99 some representative spray drift reduction curves for use in the bare soil situation were adapted (e.g. DRT90 and DRT95 since 2014, DRT97.5 since 2019). In this way, differences in absolute values of spray drift deposition due to varying field situations or weather conditions could be reduced, and reduction capacities of the drift reducing spray techniques could be compared on an equal basis and presented against the basic drift curve (1995-1999). These calculated spray drift depositions of the drift reducing techniques were again curve fitted representing the normalized spray drift curve for the drift reducing spray technique.

The representative techniques used for the determination of the drift deposition curve for the DRT techniques in this report are:

DRT75 boom sprayer equipped with 75% driftreducing nozzles (ID12002) and end-nozzle;
DRT90 boom sprayer equipped with 50% driftreducing nozzles (DG11004), air assistance and end-nozzle;
DRT95 boom sprayer equipped with 90% driftreducing nozzles (TDXL11004), air assistance and end-nozzle;
DRT97.5 TwinForce air-assisted boom sprayer with 50% driftreducing nozzles (DG11004) and end-nozzle;
DRT99 boom sprayer with Släpduk system equipped with 50% driftreducing nozzles (AI110015) and end-nozzle.

These representative techniques for the DRT classes are similar to those used in the WDC (Holterman & van de Zande, 2021).To present the measured spray drift deposition on different distances from the last nozzle or the last crop row the measured quantities were curve fitted and spray drift deposition was determined as the area under the drift curve (**Figure 1**) for the specific NTA, NTP and SW zones between the starting point and end point of the zone.

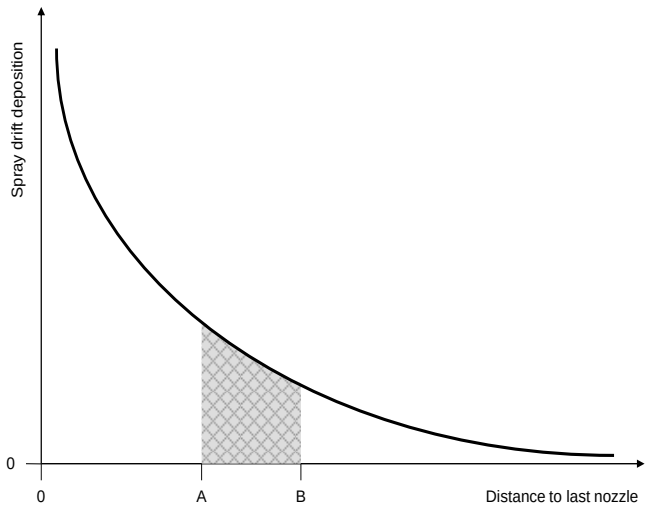

Figure 1 *Determination of the spray drift deposition at a specific evaluation zone on distance (A-B) of the last spray nozzle. With A=distance from last crop row/last nozzle/field edge to evaluation zone starting point (NTA = 0.5 m, NTP =1.5 m and SW =1.5 m) and B= distance from last crop row/last nozzle/field edge to evaluation zone end point (NTA = 1.5 m, NTP =2.5 m and SW = 2.5 m).*

From the spray drift curves of the above-mentioned application techniques the spray drift deposition at the non-target zones for arthropods (0.5-1.5 m from last crop row/last nozzle), plants (1.50-2.50 m from last crop row/last nozzle) and surface water (1.50-2.50 m from the top of the bank of the surface water) was calculated in steps of 0.25 m crop-free buffer zones.

To meet specified threshold values in the risk assessment the required distances to the non-target evaluation zones for arthropods and plants and surface water can be predicted from the fitted curves, as well as the required buffer zone width needed. These distances are expressed as crop-free buffer zone distances, specified as the distance between the last crop row and the edge of the field/top of the bank of the surface water. In the authorisation procedure for non-target plant and arthropods (Ctgb, 2019b) the edge of the field is for field crops defined at 1.0 m distance from the centre of the last crop row (**Figure 2**).

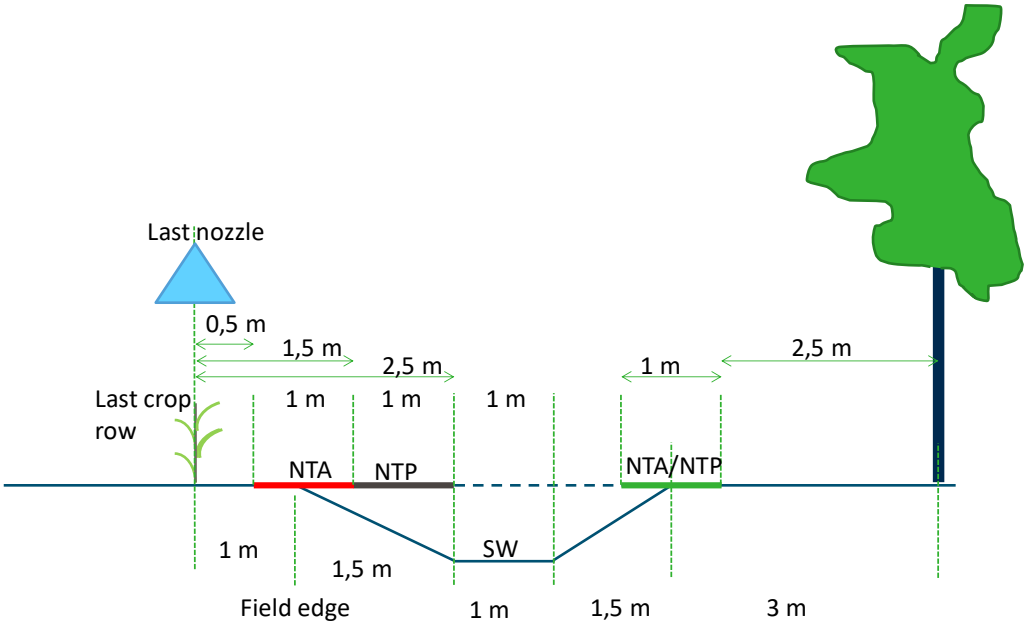

Figure 2 *Position of the evaluation zones for surface water (SW), non-target plants (NTP) and arthropods (NTA) for field crops (left) and fruit crops (right).*

Crop groups and use of spray drift curves

The crop types for downward directed spraying can be distinguished in crops having a minimum crop-free zone (distance between last crop row and top of the bank of the ditch) of 0.50 m and 1.50 m, coinciding with the crop groups cereals and other crops and intensively sprayed crops of the Environmental Activities Decree (I&W, 2017). For each of the crop type groups a differentiation can be made in the position of the last nozzle on the spray boom in relation to the last crop row. This position of the last nozzle defines the starting point of the drift curve for this specific crop. In SW evaluation (Ctgb, 2020a; Appendix 2) the last nozzle position is not specified but a potato-like crop is taken as default with a nozzle position 0.125 m outside the last crop row and a 1.50 m crop-free buffer-zone. However, in the NTA/NTP evaluation the last nozzle position was defined to be on top of the last crop row (Ctgb, 2020b).

Crop height and spray drift

Crop height is important as spray drift from spraying a developed crop canopy is higher than from spraying a bare soil surface/small crop situation. This distinction is made based on plant height. When crop height is lower than 20 cm the bare soil drift curve is to be used, for higher crops the drift curve for a developed crop canopy is to be used. Depending on the phenological development of the crop this distinction between bare soil surface/short crop or developed crop canopy situation is specified by a BBCH code for crop growth stage (BBCH, 2001). This BBCH crop growth stage is used to distinguish between short crop or developed crop canopy and may differ depending on the crop type. E.g. for cereals the distinction is made at BBCH 31 (first node at least 1 cm above tillering node, in the stem elongation stage), and for maize at BBCH 15 (5 leaves unfolded). For potatoes the distinction is made at BBCH 19/21 (9 or more leaves visible /1st basal side shoot visible (>5 cm)). The BBCH codes for distinction between bare soil surface/short crop and developed crop situations for the so-called DTG crops is given in Zande & Ter Horst (2019).

3 Results

Spray drift deposits have been determined by using the available results of the spray drift field experiments. The spray drift deposition at the different evaluation zone distances for the non-target plant (NTP) zone and for the non-target arthropod (NTA) zone are presented in Paragraph 3.1 for the cropped situation and in Paragraph 3.2 for the bare soil surface/ short crop (< 20 cm crop height) situation. For the surface water (SW) evaluation zone these are presented in Paragraphs 3.3 and 3.4, respectively. The effect of drift reducing techniques (DRT) and width of crop-free buffer zone is presented. This document is intended to provide the DRT versus crop-free buffer zone matrix for agricultural crops that are covered by the Environmental Activity Decree. The use of techniques from the reference class and DRT50 class are not allowed for crops covered by the Environmental Activity Decree and therefore spray drift deposits are not presented in the following paragraphs. For the spray drift deposition on the surface water evaluation zone the use of techniques from the DRT97.5 and DRT99 class is still in discussion (see evaluation manual; Ctgb, 2021) and are therefore not presented in the **Table 3** and **Table 4**; however both classes are in place to assess deposition on the NTA/NTP zones.

For crops/uses not covered by the Activity Decree, a drift deposition value is used based on a reference technique. This value is laid down in the evaluation manual (Ctgb, 2020a, 2020b) and the current document is not intended for these uses. Further refinement for these uses is to be made on a case by case basis with underpinning of the commonly used techniques in that use - see Evaluation Manual (Ctgb, 2020a, 2020b) for further information.

The spray drift deposition is in the following paragraphs presented with rounded numbers in 1 decimal for numbers of 1.0 and higher and 2 decimals for numbers smaller than 1.0. For completeness the spray drift deposition numbers are in Annex 1 presented for the reference technique and the spray drift reducing techniques DRT50, DRT75, DRT90, DRT95, DRT97.5 and DRT99 with 3 decimals.

3.1 NTA/NTP Cropped situation

The spray drift deposition at the non-target plant zone and the non-target arthropod zone (each 1 m wide) for the cropped situation are computed for evaluation zone distances ranging from 0.5 m to 5.5 m from the last crop row/last nozzle and are presented in 0.25 m steps. Starting point is the spray drift deposition for NTA at the zone 0.50-1.50 m from the centre of the last crop row and for NTP at 1.50-2.50 m from the centre of the last crop row for the default situation with a 1 m crop-free buffer zone between the centre of the last crop row and the edge of the field. This is done for the representative Drift Reducing Techniques (DRT) of the drift reduction classes 75, 90, 95, 97.5 and 99 with the last nozzle position above the last crop row in **Table 1**.

At the field edge (0-2 m) drift reduction is limited as overspray occurs of the last nozzle which depends much on the top angle of the outside nozzle, variation in boom height during application and variation in crop height and canopy density at the crop edge. Even with the use of end nozzles, overspray cannot always be prevented. Consequently, spray drift deposition curves occasionally can cross each other in this area. These effects were observed in some of the spray drift deposition data of DRTs for specific techniques that represent the drift curve of the DRT classes (Annex 1). Therefore, the spray drift deposition does not always decrease with increasing DRT very close to the crop edge. E.g. the drift deposition of the DRT95 at the zone 0.5-1.5m is higher than that of the DRT50 - DRT90 and at the zones 0.75-1.75 m and 1.0-2.0 m higher than that of the DRT90; whereas of the DRT99 at zones 0.5-1.5 m and 0.75-1.75 m is higher than of the DRT97.5 (Annex 1). In the **Table 1** below adjustments were made regarding this issue. In the authorisation procedure (Ctgb, 2020b) therefore the spray drift deposition at the standard NTA evaluation zone (0.5-1.5 m) for the DRT75, DRT90 and DRT95 was set to 5.5% and for the DRT97.5 at 1.6% equally high as for the DRT99,

guaranteeing the highest spray drift reducing technology was used to meet the specified spray deposition value.

This means for NTA to meet a specified threshold value a spray drift deposition value of 3.7% is to be taken at 0.75-1.75 m and 2.3% at 1.0-2.0 m for the DRT90 and DRT95. For the DRT97.5 and DRT99 the spray drift deposition values at 0.75-1.75 m is 0.47%.

As the standard evaluation zone for NTP is at 1.5-2.5 m from the last crop row these crossing line effects are not relevant for NTP.

Would for example a specific product require a maximum spray drift deposition value of 0.8% at the NTA evaluation zone, then the minimal required crop free zones are 2.25 m for the DRT75 and DRT90, 2.0 m for the DRT95 and 1.25 m for the DRT97.5 and DRT99 to meet this threshold value.

Table 1 *Spray drift deposition (% of applied dose) at non-target evaluation zone (EZ; 1 m wide) and different crop-free buffer zone widths (cm) for non-target arthropods (NTAcfbz) and non-target plants (NTPcfbz) for the drift reducing technologies from the DRT classes 75%, 90%, 95%, 97.5% and 99% spraying a crop with the last nozzle position on top of the last crop row.*

DRT/zone	**Spray drift deposition [%] at non-target zone distances (cm)**																
EZ (cm)	**50-150**	75-175	100-200	125-225	**150-250**	175-275	200-300	225-325	250-350	275-375	300-400	325-425	350-450	375-475	400-500	425-525	450-550
NTPcfbz (cm)					**100** [2]	125	150	175	200	225	250	275	300	325	350	375	400
NTAcfbz (cm)	**100** [1]	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500
DRT75	5.5	4.0	2.6	1.5	0.90	0.70	0.67	0.63	0.56	0.48	0.42	0.38	0.36	0.35	0.34	0.32	0.29
DRT90	5.5	3.7	2.3	1.4	0.89	0.57	0.36	0.23	0.16	0.12	0.10	0.09	0.08	0.07	0.07	0.07	0.07
DRT95	5.5	3.7	2.3	1.3	0.62	0.30	0.15	0.08	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.06
DRT97.5	1.6	0.47	0.19	0.11	0.068	0.06	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03
DRT99	1.6	0.47	0.14	0.04	0.023	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01

[1] Default situation without additional crop-free buffer zone for NTA; this column has a colour grey, because for NTA it is the standard crop-free buffer zone.

[2] Default situation without additional crop-free buffer zone for NTP; this column has a colour grey, because for NTP it is the standard crop-free buffer zone, for NTA the figures can be used as 1 meter additional crop-free buffer zone.

3.2 NTA/NTP Bare soil surface / short crop situation

The spray drift deposition at the non-target plant zone and the non-target arthropod zones (1 m wide) are for evaluation zone distances of 0.5 m till 5.5 m presented in 0.25 m steps for the bare soil surface/short crop situation. This is done for the representative Drift Reducing Techniques (DRT) of the drift reduction classes 75, 90, 95, 97.5 and 99 and a last nozzle position above the last crop row in **Table 2**.

In a bare soil surface/short crop situation spray drift reduction is limited at the field edge (0-2 m) as with spraying a fully developed crop (**Table 1**). Overspray of the last nozzle occurs, which depends much on the top angle of the outside nozzle as with the use of end-nozzles, and especially variation in boom height during application at the crop edge. Therefore, spray drift deposition curves can cross in this area and the spray drift deposition does not always decrease with increasing DRT just next to the crop edge (Annex 1). E.g. the drift deposition of the DRT95 at zones 0.5-1.5m, 0.75-1.75 m, 1.0-2.0 m and 1.25-2.25 m is higher than of the DRT90; similarly for the DRT99 at zones 0.5-1.5 m is higher than of the DRT97.5 (Annex 1).

To guarantee the highest spray drift reducing technology is used to meet the specified spray drift deposition value the higher values are to be taken of the higher DRT classes in these cases. This means for NTA when spraying a bare soil surface or short crop to meet a specified threshold value a spray drift deposition value of 3.2% is to be taken at 0.5-1.5 m for the DRT75, DRT90 and DRT95 and of 0.65% for the DRT97.5 and DRT99 (**Table 2**). In a similar way this means for NTA to meet a specified threshold value a spray drift deposition value of 2.1% is to be taken at 0.75-1.75 m, 1.3% at 1.0-2.0 m and 0.70% at 1.25-2.25 m for the DRT90 and DRT95.

As the standard evaluation zone for NTP is at 1.5-2.5 m from the last crop row these crossing line effects are not relevant for NTP spraying a bare soil surface/short crop situation.

When for example a specific product requires a maximum spray drift deposition value of 0.8% at the NTA evaluation zone spraying a bare soil surface/short crop, the minimal required crop-free zones are 2.0 m for the DRT75, 1.75 m for the DRT90 and DRT95, and 1.0 m (is default crop-free buffer zone) for the DRT97.5 and DRT99 to meet this threshold value.

Table 2 *Spray drift deposition (% of applied dose) at non-target evaluation zone (EZ; 1 m wide) and different crop-free buffer zone widths (cm) for non-target arthropods (NTAcfbz) en non-target plants (NTPcfbz) for the drift reducing technologies from the DRT classes, 75%, 90%, 95%, 97.5% and 99% spraying a bare soil or short crop with the last nozzle position on top of the last crop row.*

DRT/zone	**Spray drift deposition [%] at non-target zone distances (cm)**																
EZ (cm)	**50-150**	75-175	100-200	125-225	**150-250**	175-275	200-300	225-325	250-350	275-375	300-400	325-425	350-450	375-475	400-500	425-525	450-550
NTPcfbz (cm)					**100** [2]	125	150	175	200	225	250	275	300	325	350	375	400
NTAcfbz (cm)	**100** [1]	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500
DRT75	3.2	2.3	1.5	0.89	0.53	0.42	0.40	0.38	0.36	0.33	0.31	0.30	0.30	0.29	0.28	0.26	0.23
DRT90	3.2	2.1	1.3	0.70	0.41	0.34	0.29	0.26	0.23	0.20	0.18	0.16	0.15	0.14	0.13	0.13	0.13
DRT95	3.2	2.1	1.3	0.70	0.35	0.18	0.10	0.06	0.06	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.04
DRT97.5	0.65	0.20	0.10	0.06	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
DRT99	0.65	0.14	0.04	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01

[1] Default situation without additional crop-free buffer zone for NTA; this column has a colour grey, because for NTA it is the standard crop-free buffer zone.

[2] Default situation without additional crop-free buffer zone for NTP; this column has a colour grey, because for NTP it is the standard crop-free buffer zone, for NTA the figures can be used as 1 meter additional crop-free buffer zone.

3.3 SW cropped situation

Spray drift deposits on surface water have been determined by using the available results of the spray drift field experiments. The spray drift deposition at the different evaluation zone distances for surface water are presented for the cropped situation. The effect of drift reducing techniques (DRT) and width of crop-free buffer zone is presented. The spray drift deposition at surface water evaluation zones (1 m wide) for crop-free buffer zone distances of 0.50 m till 4 m are in 0.25 m steps presented for the cropped situation. This is done for the representative Drift Reducing Techniques (DRT) of the drift reduction classes 75, 90 and 95.

Depending on the row distances of the crop the last nozzle position differs (CIW, 2003, Zande et al., 2012, Zande & Ter Horst, 2019 Annex5) and is therefore in **Table 3** presented for a last nozzle position of 0.125 m outside the last crop row, for the last nozzle position above the last crop row and for the nozzle position 0.25 m inside the last crop row.

Table 3 *Spray drift deposition (% of applied dose) at surface water and different crop-free buffer zone widths for the drift reducing technologies from the DRT classes 75%, 90% and 95% spraying a developed crop with the last nozzle position 0.25 m inside the last crop row, on top of the last crop row and 0.125 m outside the last crop row.*

DRT/zone		**Spray drift deposition [%] at surface water zone with different crop-free buffer zones (m)**														
EZ (cm)	Nozzle position to last crop row (m)	**200-300**	225-325	250-350	275-375	**300-400**	325-425	350-450	375-475	400-500	425-525	450-550	475-575	500-600	525-625	550-650
SWcfbz (cm)		**50** [3]	75	**100** [2]	125	**150** [1]	175	200	225	250	275	300	325	350	375	400
DRT75	+0.25	**0.63**	0.56	0.48	0.42	**0.38**	0.36	0.35	0.34	0.32	0.29	0.26	0.24	0.22	0.20	0.19
DRT90	+0.25	**0.23**	0.16	**0.12**	0.10	**0.09**	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.06
DRT95	+0.25	**0.08**	0.08	**0.07**	0.07	**0.07**	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.06	0.05
DRT75	0	**0.67**	0.63	0.56	0.48	**0.42**	0.38	0.36	0.35	0.34	0.32	0.29	0.26	0.24	0.22	0.20
DRT90	0	**0.36**	0.23	**0.16**	0.12	**0.10**	0.09	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.06
DRT95	0	**0.15**	0.08	**0.08**	0.07	**0.07**	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.06
DRT75	-0.125	**0.69**	0.65	0.60	0.51	**0.45**	0.40	0.37	0.36	0.34	0.33	0.30	0.28	0.25	0.23	0.21
DRT90	-0.125	**0.45**	0.29	**0.19**	0.14	**0.11**	0.09	0.08	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.06
DRT95	-0.125	**0.22**	0.11	**0.08**	0.08	**0.07**	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.06

* Grey cells: values not used, since: the starting point is the Evaluation Manual for which a generic value of 0.5% for DRT75 and 0.2% for DRT90 at a crop-free zone of 150 cm is valid; refinements and differentiation are only triggered for DRT90 and up (which may include the use of DRT75 with an additional crop-free zone > 150 cm).

[1] Default situation according to Environmental Activities Decree without additional crop-free buffer zone for intensively sprayed crops.

[2] Default situation according to Environmental Activities Decree without additional crop-free buffer zone for DRT90 and higher in intensively sprayed crops.

[3] Default situation according to Environmental Activities Decree without additional crop-free buffer zone for other crops.

3.4 SW Bare soil surface / short crop situation

Spray drift deposits on surface water have been determined by using the available results of the spray drift field experiments for the bare soil surface/short crop situation. The effect of drift reducing techniques (DRT) and width of crop-free buffer zone is presented. The spray drift deposition at surface water evaluation zones (1 m wide) for crop-free buffer zone distances of 0.50 m till 4 m are in 0.25 m steps presented for the bare soil surface/short crop situation (crop height < 20 cm). This is done for the representative Drift Reducing Techniques (DRT) of the drift reduction classes 75, 90 and 95. Depending on the row distances of the crop the last nozzle position differs (CIW, 2003, Zande et al., 2012, Zande & Ter Horst, 2019 Annex5) and is therefore in **Table 4** presented for a last nozzle position of 0.125 m outside the last crop row, for the last nozzle position above the last crop row and for the nozzle position 0.25 m inside the last crop row.

Table 4 *Spray drift deposition (% of applied dose) at surface water and different crop-free buffer zone widths for the drift reducing technologies from the DRT classes 75%, 90% and 95% spraying a bare soil surface/low crop (< 20 cm) with the last nozzle position 0.25 m inside the last crop row, on top of the last crop row and 0.125 m outside the last crop row.*

DRT/zone		**Spray drift deposition [%] at surface water zone with different crop-free buffer zones (m)**														
EZ (cm)	Nozzle position to last crop row (m)	**200-300**	225-325	250-350	275-375	**300-400**	325-425	350-450	375-475	400-500	425-525	450-550	475-575	500-600	525-625	550-650
SWcfbz (cm)		**50** [3]	75	**100** [2]	125	**150** [1]	175	200	225	250	275	300	325	350	375	400
DRT75	+0.25	**0.38**	0.36	0.33	0.31	**0.30**	0.30	0.29	0.28	0.26	0.23	0.21	0.19	0.17	0.16	0.15
DRT90	+0.25	**0.26**	0.23	**0.20**	0.18	**0.16**	0.15	0.14	0.13	0.13	0.13	0.13	0.12	0.12	0.12	0.11
DRT95	+0.25	**0.06**	0.06	**0.05**	0.05	**0.05**	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
DRT75	0	**0.40**	0.38	0.36	0.33	**0.31**	0.30	0.30	0.29	0.28	0.26	0.23	0.21	0.19	0.17	0.16
DRT90	0	**0.29**	0.26	**0.23**	0.20	**0.18**	0.16	0.15	0.14	0.13	0.13	0.13	0.13	0.12	0.12	0.12
DRT95	0	**0.10**	0.06	**0.06**	0.05	**0.05**	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04
DRT75	-0.125	**0.41**	0.39	0.37	0.34	**0.32**	0.31	0.30	0.29	0.28	0.27	0.25	0.22	0.20	0.18	0.17
DRT90	-0.125	**0.32**	0.27	**0.24**	0.21	**0.19**	0.17	0.15	0.14	0.14	0.13	0.13	0.13	0.13	0.12	0.12
DRT95	-0.125	**0.13**	0.07	**0.06**	0.06	**0.05**	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04

* Grey cells: values not used, since: the starting point is the Evaluation Manual for which a generic value of 0.5% for DRT75 and 0.2% for DRT90 at a crop-free zone of 150 cm is valid; refinements and differentiation are only triggered for DRT90 and up (which may include the use of DRT75 with an additional crop-free zone > 150 cm).

[1] Default situation according to Environmental Activities Decree without additional crop-free buffer zone for intensively sprayed crops.

[2] Default situation according to Environmental Activities Decree without additional crop-free buffer zone for DRT90 and higher in intensively sprayed crops.

[3] Default situation according to Environmental Activities Decree without additional crop-free buffer zone for other crops.

4 Discussion

The Evaluation Manual for Surface Water (Ctgb, 2020a) specifies for downward spray applications a standard scenario for DRT75 resulting in a single spray deposition value for surface water; 0,5%, for all field crops with downward spraying, irrespective of the specific (agronomic) crop-free buffer zone, last nozzle position and growth stage of the crop. A refinement is possible for a 90% spray drift reducing technique corresponding to a spray drift value of 0.2% for all field crops. These data are based on Huijsmans et al., 1997. No distinction is made for a fully developed crop or a small crop (<20 cm crop height) or bare soil surface application or last nozzle position. As stated in the Evaluation Manual (Ctgb, 2020a) additional spray drift-mitigation technique/crop free zone combinations and corresponding spray drift percentages can be considered for a particular application. These spray drift percentages must be supported by reliable scientific data.

From January 2022 onward the authorisation procedure (Ctgb, 2021) will make use of the WUR Drift Calculator (WDC; Holterman & Zande, 2021) in which the spray drift deposition data are based on the current scientific knowledge and merely based on the methodology and data presented in Zande et al., 2012 but extended for the drift reduction technology (DRT) classes of 97.5% and 99% (resp. DRT97.5, DRT99). This means ongoing and new procedures for dossiers submitted up till that date of introduction may make use of the spray drift values as used in the authorisation procedure as referenced in Ctgb, 2020a, 2020b, with the implementation of the different DRTs, last nozzle position and width of crop-free buffer zones as presented in this report.

Differences do therefore occur in height of presented spray drift deposition values from this report based on 1995-1999 drift data, and used in earlier and running authorisation procedures, and those to be used in the near future, as generated with the WDC based on 1995-2005 drift data. Due to new analysis of the 1995-1999 drift dataset the presented values in this report may also show some deviations to earlier delivered/distributed specific reports for specific products.

5 Conclusions

The WUR Drift Calculator (WDC; Holterman & Van de Zande, 2021), based on updated spray drift data from spray drift measurements in the period 1995-2005, is introduced in 2021 for use in the authorisation procedure of plant protection products (Ctgb) from January 2022 onwards. This means ongoing and new procedures for dossiers submitted up till that date may still make use of the spray drift values as presented in this report and based on spray drift measurements in the period 1995-1999, until the WDC is in place in the authorisation procedures. This report presents tables of spray drift deposition, against the basic drift curve (1995-1999), of a matrix of different DRT-classes versus width of crop-free buffer zones for field crops sprayed with boom sprayers in a cropped and a bare soil surface situation.

Data will be subject to change because of new developments in spray technology and ongoing further research.

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Annex 1 Detailed specification of spray drift deposition data; reference and DRT classes against width of crop-free buffer zone

The techniques used for the determination of the spray drift deposition curves for the reference and DRT techniques are:

Reference boom sprayer equipped with standard flat fan nozzles (XR11004) and 50 cm nozzle height

DRT50 boom sprayer equipped with 50% driftreducing nozzles (DG11004) and end-nozzle

DRT75 boom sprayer equipped with 75% driftreducing nozzles (ID12002) and end-nozzle

DRT90 boom sprayer equipped with 50% driftreducing nozzles (DG11004), air assistance and end-nozzle

DRT95 boom sprayer equipped with 90% driftreducing nozzles (TDXL11004), air assistance and end-nozzle

DRT97.5 TwinForce air-assisted boom sprayer with 50% driftreducing nozzles (DG11004) and end-nozzle

DRT99 boom sprayer with Släpduk system equipped with 50% driftreducing nozzles (AI110015) and end-nozzle

Table A1.1 *Spray drift deposition (% of applied dose) at non-target evaluation zone (EZ; 1 m wide) and different crop-free buffer zone widths (cm) for non-target arthropods (NTAcfbz) and non-target plants (NTPcfbz) for the reference boom spray technique (conventional XR11004) and drift reducing technologies from the DRT classes 50%, 75%, 90%, 95%, 97.5% and 99% spraying a crop with the last nozzle position on top of the last crop row.*

DRT/zone	**Spray drift deposition [%] at non-target zone distances (cm)**																
EZ (cm)	**50-150**	75-175	100-200	125-225	**150-250**	175-275	200-300	225-325	250-350	275-375	300-400	325-425	350-450	375-475	400-500	425-525	450-550
NTPcfbz (cm)					**100** [2]	125	150	175	200	225	250	275	300	325	350	375	400
NTAcfbz (cm)	**100** [1]	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500
reference	**9.875**	8.838	7.469	6.008	**4.700**	3.800	3.156	2.621	2.177	1.816	1.534	1.323	1.174	1.071	1.000	0.948	0.907
DRT50	**5.487**	4.212	3.096	2.162	**1.500**	1.055	0.808	0.648	0.553	0.492	0.449	0.418	0.391	0.369	0.352	0.337	0.324
DRT75	**5.47**	3.989	2.64	1.543	**0.900**	0.700	0.671	0.628	0.556	0.477	0.419	0.380	0.362	0.351	0.336	0.316	0.289
DRT90	**3.346**	2.648	1.986	1.383	**0.893**	0.568	0.361	0.231	0.160	0.121	0.097	0.085	0.078	0.074	0.073	0.072	0.071
DRT95	**5.576**	3.663	2.264	1.263	**0.618**	0.302	0.151	0.078	0.075	0.074	0.073	0.072	0.072	0.068	0.065	0.063	0.061
DRT97.5	**0.688**	0.354	0.186	0.105	**0.068**	0.055	0.050	0.046	0.044	0.042	0.040	0.038	0.037	0.035	0.034	0.033	0.032
DRT99	**1.600**	0.470	0.139	0.044	**0.023**	0.023	0.022	0.021	0.019	0.017	0.014	0.012	0.011	0.010	0.009	0.009	0.009

[1] Default situation without additional crop-free buffer zone for NTA.

[2] Default situation without additional crop-free buffer zone for NTP.

Table A1.2 *Spray drift deposition (% of applied dose) at non-target evaluation zone (EZ; 1 m wide) and different crop-free buffer zone widths (cm) for non-target arthropods (NTAcfbz) en non-target plants (NTPcfbz) for the reference boom spray technique (conventional XR11004) and drift reducing technologies from the DRT classes 50%, 75%, 90%, 95%, 97.5% and 99% spraying a bare soil or short crop with the last nozzle position on top of the last crop row.*

DRT/zone	**Spray drift deposition [%] at non-target zone distances (cm)**																
EZ (cm)	**50-150**	75-175	100-200	125-225	**150-250**	175-275	200-300	225-325	250-350	275-375	300-400	325-425	350-450	375-475	400-500	425-525	450-550
NTPcfbz (cm)					**100** [2]	125	150	175	200	225	250	275	300	325	350	375	400
NTAcfbz (cm)	**100** [1]	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500
reference	**5.605**	4.953	4.191	3.406	**2.751**	2.329	2.030	1.770	1.542	1.346	1.185	1.055	0.954	0.876	0.816	0.768	0.727
DRT50	**1.151**	1.059	0.95	0.84	**0.753**	0.701	0.659	0.613	0.561	0.509	0.462	0.421	0.385	0.355	0.330	0.310	0.292
DRT75	**3.123**	2.26	1.499	0.894	**0.529**	0.416	0.397	0.380	0.357	0.332	0.314	0.302	0.296	0.288	0.275	0.256	0.232
DRT90	**0.864**	0.747	0.623	0.503	**0.405**	0.340	0.294	0.256	0.225	0.199	0.178	0.161	0.148	0.139	0.133	0.130	0.128
DRT95	**3.185**	2.058	1.259	0.704	**0.352**	0.178	0.096	0.057	0.055	0.054	0.052	0.051	0.049	0.046	0.042	0.039	0.037
DRT97.5	**0.394**	0.199	0.103	0.058	**0.039**	0.033	0.032	0.031	0.031	0.031	0.031	0.03	0.029	0.028	0.027	0.026	0.026
DRT99	**0.645**	0.144	0.038	0.029	**0.028**	0.027	0.026	0.023	0.020	0.017	0.014	0.011	0.009	0.008	0.007	0.006	0.006

[1] Default situation without additional crop-free buffer zone for NTA.

[2] Default situation without additional crop-free buffer zone for NTP.

Table A1.3 *Spray drift deposition (% of applied dose) at surface water and different crop-free buffer zone widths for the reference boom spray technique and drift reducing technologies from the DRT classes 50%, 75%, 90%, 95%, 97.5% and 99% spraying a developed crop with the last nozzle position 0.25 m inside the last crop row, on top of the last crop row and 0.125 m outside the last crop row.*

DRT/zone		**Spray drift deposition [%] at surface water zone with different crop-free buffer zones (m)**														
EZ (cm)	Nozzle position to last crop row (m)	**200-300**	225-325	250-350	275-375	**300-400**	325-425	350-450	375-475	400-500	425-525	450-550	475-575	500-600	525-625	550-650
SWcfbz (cm)		**50** [3]	75	**100** [2]	125	**150** [1]	175	200	225	250	275	300	325	350	375	400
reference	+0.25	**2.621**	2.177	1.816	1.534	**1.323**	1.174	1.071	1.000	0.948	0.907	0.868	0.833	0.802	0.772	0.745
DRT50	+0.25	**0.648**	0.553	0.492	0.449	**0.418**	0.391	0.369	0.352	0.337	0.324	0.309	0.291	0.272	0.251	0.230
DRT75	+0.25	**0.628**	0.556	0.477	0.419	**0.380**	0.362	0.351	0.336	0.316	0.289	0.261	0.237	0.216	0.199	0.185
DRT90	+0.25	**0.231**	0.160	**0.121**	0.097	**0.085**	0.078	0.074	0.073	0.072	0.071	0.069	0.066	0.063	0.059	0.056
DRT95	+0.25	**0.078**	0.075	**0.074**	0.073	**0.072**	0.072	0.068	0.065	0.063	0.061	0.059	0.058	0.056	0.055	0.054
DRT97.5	+0.25	**0.046**	0.044	**0.042**	0.040	**0.038**	0.037	0.035	0.034	0.033	0.032	0.031	0.030	0.029	0.028	0.027
DRT99	+0.25	**0.021**	0.019	**0.017**	0.014	**0.012**	0.011	0.010	0.009	0.009	0.009	0.009	0.009	0.008	0.008	0.008
reference	0	**3.156**	2.621	2.177	1.816	**1.534**	1.323	1.174	1.071	1.000	0.948	0.907	0.868	0.833	0.802	0.772
DRT50	0	**0.808**	0.648	0.553	0.492	**0.449**	0.418	0.391	0.369	0.352	0.337	0.324	0.309	0.291	0.272	0.251
DRT75	0	**0.671**	0.628	0.556	0.477	**0.419**	0.380	0.362	0.351	0.336	0.316	0.289	0.261	0.237	0.216	0.199
DRT90	0	**0.361**	0.231	**0.160**	0.121	**0.097**	0.085	0.078	0.074	0.073	0.072	0.071	0.069	0.066	0.063	0.059
DRT95	0	**0.151**	0.078	**0.075**	0.074	**0.073**	0.072	0.072	0.068	0.065	0.063	0.061	0.059	0.058	0.056	0.055
DRT97.5	0	**0.050**	0.046	**0.044**	0.042	**0.040**	0.038	0.037	0.035	0.034	0.033	0.032	0.031	0.030	0.029	0.028
DRT99	0	**0.022**	0.021	**0.019**	0.017	**0.014**	0.012	0.011	0.010	0.009	0.009	0.009	0.009	0.009	0.008	0.008
reference	-0.125	**3.463**	2.876	2.389	1.986	**1.666**	1.421	1.242	1.180	1.032	0.972	0.927	0.887	0.850	0.817	0.787
DRT50	-0.125	**0.919**	0.718	0.593	0.520	**0.469**	0.433	0.404	0.379	0.360	0.344	0.331	0.317	0.300	0.282	0.261
DRT75	-0.125	**0.686**	0.652	0.597	0.514	**0.446**	0.397	0.369	0.357	0.344	0.327	0.303	0.275	0.249	0.226	0.207
DRT90	-0.125	**0.454**	0.287	**0.189**	0.138	**0.107**	0.090	0.081	0.075	0.073	0.072	0.072	0.070	0.067	0.065	0.061
DRT95	-0.125	**0.215**	0.106	**0.075**	0.075	**0.074**	0.074	0.073	0.070	0.066	0.064	0.062	0.060	0.059	0.057	0.056
DRT97.5	-0.125	**0.052**	0.048	**0.045**	0.043	**0.041**	0.039	0.037	0.036	0.035	0.034	0.032	0.031	0.030	0.030	0.029
DRT99	-0.125	**0.022**	0.022	**0.020**	0.018	**0.015**	0.013	0.012	0.010	0.010	0.009	0.009	0.009	0.009	0.008	0.008

[1] Default situation according to Environmental Activities Decree without additional crop-free buffer zone for intensively sprayed crops.

[2] Default situation according to Environmental Activities Decree without additional crop-free buffer zone for DRT90 and higher in intensively sprayed crops.

[3] Default situation according to Environmental Activities Decree without additional crop-free buffer zone for other crops.

Table A1.4 *Spray drift deposition (% of applied dose) at surface water and different crop-free buffer zone widths for the reference boom spray technique and drift reducing technologies from the DRT classes 50%, 75%, 90%, 95%, 97.5% and 99% spraying a bare soil surface/low crop (< 20 cm) with the last nozzle position 0.25 m inside the last crop row, on top of the last crop row and 0.125 m outside the last crop row.*

DRT/zone		**Spray drift deposition [%] at surface water zone with different crop-free buffer zones (m)**														
EZ (cm)	Nozzle position to last crop row (m)	**200-300**	225-325	250-350	275-375	**300-400**	325-425	350-450	375-475	400-500	425-525	450-550	475-575	500-600	525-625	550-650
SWcfbz (cm)		**50** [3]	75	**100** [2]	125	**150** [1]	175	200	225	250	275	300	325	350	375	400
reference	+0.25	**1.770**	1.542	1.346	1.185	**1.055**	0.954	0.876	0.816	0.768	0.727	0.690	0.655	0.623	0.592	0.563
DRT50	+0.25	**0.613**	0.561	0.509	0.462	**0.421**	0.385	0.355	0.330	0.310	0.292	0.276	0.261	0.247	0.234	0.222
DRT75	+0.25	**0.380**	0.357	0.332	0.314	**0.302**	0.296	0.288	0.275	0.256	0.232	0.208	0.188	0.172	0.159	0.148
DRT90	+0.25	**0.256**	0.225	**0.199**	0.178	**0.161**	0.148	0.139	0.133	0.130	0.128	0.126	0.124	0.120	0.116	0.112
DRT95	+0.25	**0.057**	0.055	**0.054**	0.052	**0.051**	0.049	0.046	0.042	0.039	0.037	0.037	0.037	0.037	0.037	0.037
DRT97.5	+0.25	**0.031**	0.031	**0.031**	0.031	**0.030**	0.029	0.028	0.027	0.026	0.026	0.025	0.024	0.023	0.022	0.021
DRT99	+0.25	**0.023**	0.020	**0.017**	0.014	**0.011**	0.009	0.008	0.007	0.006	0.006	0.006	0.005	0.005	0.005	0.005
reference	0	**2.030**	1.770	1.542	1.346	**1.185**	1.055	0.954	0.876	0.816	0.768	0.727	0.690	0.655	0.623	0.592
DRT50	0	**0.659**	0.613	0.561	0.509	**0.462**	0.421	0.385	0.355	0.330	0.310	0.292	0.276	0.261	0.247	0.234
DRT75	0	**0.397**	0.380	0.357	0.332	**0.314**	0.302	0.296	0.288	0.275	0.256	0.232	0.208	0.188	0.172	0.159
DRT90	0	**0.294**	0.256	**0.225**	0.199	**0.178**	0.161	0.148	0.139	0.133	0.130	0.128	0.126	0.124	0.120	0.116
DRT95	0	**0.096**	0.057	**0.055**	0.054	**0.052**	0.051	0.049	0.046	0.042	0.039	0.037	0.037	0.037	0.037	0.037
DRT97.5	0	**0.032**	0.031	**0.031**	0.031	**0.031**	0.03	0.029	0.028	0.027	0.026	0.026	0.025	0.024	0.023	0.022
DRT99	0	**0.026**	0.023	**0.020**	0.017	**0.014**	0.011	0.009	0.008	0.007	0.006	0.006	0.006	0.005	0.005	0.005
reference	-0.125	**2.174**	1.895	1.653	1.440	**1.261**	1.116	1.001	0.913	0.844	0.791	0.747	0.708	0.672	0.639	0.607
DRT50	-0.125	**0.681**	0.637	0.588	0.535	**0.485**	0.441	0.402	0.369	0.342	0.320	0.284	0.269	0.254	0.241	0.228
DRT75	-0.125	**0.405**	0.389	0.370	0.344	**0.322**	0.308	0.298	0.293	0.282	0.266	0.245	0.220	0.198	0.180	0.165
DRT90	-0.125	**0.315**	0.274	**0.240**	0.212	**0.188**	0.169	0.154	0.143	0.136	0.131	0.129	0.127	0.125	0.122	0.118
DRT95	-0.125	**0.131**	0.072	**0.056**	0.055	**0.053**	0.052	0.050	0.048	0.043	0.040	0.038	0.037	0.037	0.037	0.037
DRT97.5	-0.125	**0.032**	0.032	**0.031**	0.031	**0.031**	0.030	0.030	0.029	0.028	0.027	0.026	0.025	0.024	0.023	0.022
DRT99	-0.125	**0.025**	0.024	**0.022**	0.019	**0.015**	0.013	0.010	0.008	0.007	0.006	0.006	0.006	0.006	0.005	0.005

[1] Default situation according to Environmental Activities Decree without additional crop-free buffer zone for intensively sprayed crops.

[2] Default situation according to Environmental Activities Decree without additional crop-free buffer zone for DRT90 and higher in intensively sprayed crops.

[3] Default situation according to Environmental Activities Decree without additional crop-free buffer zone for other crops.

Corresponding address for this report:
P.O. Box 16
6700 AA Wageningen
The Netherlands
T +31 (0)317 48 07 00
wur.eu/plant-research

Report WPR-1120

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Corresponding address for this report:
P.O. Box 16
6700 AA Wageningen
The Netherlands
T +31 (0) 317 48 07 00
www.wur.eu/plant-research

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