Schone bronnen, nu en in de toekomst: tweede reeks knelpunten

Implementation programme 2,4-D

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COLOFON

Written by Laura Mout, Léon Jansen, Suzanne van der Pijll and Sylvia van Nierop
In assignment of steering committee 'Schone bronnen, nu en in de toekomst'

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Project secretariat 'Schone bronnen, nu en in de toekomst'
Schuttelaar & Partners
Zeestraat 84
2518 AD Den Haag
E-mail: info@schonebronnen.nl
Telephone: 070-3184444
Fax: 070-3184422
Website: www.schonebronnen.nl

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1. INTRODUCTION

In the project 'Schone bronnen, nu en in de toekomst', the Association of Dutch Water Companies (Vewin), Dutch crop protection organisation (Nefyto), Association of Dutch Water Boards (Unie van Waterschappen) and Dutch Federation of Agriculture and Horticulture (LTO) work together on a second sequence of pesticides: dimethenamid-p, MCPA, 2,4-D, dichlobenil and pirimifos-methyl. All parties jointly searched for the causes of standard exceedances in ground- and surface water and practical solutions to reduce the emissions of these five substances.

'Schone bronnen, nu en in de toekomst' has the goal to find and implement practical solutions for bottlenecks of pesticides in agriculture in ground- and surface water. The working method is together, pragmatic and constructive by joining knowledge and strengths. It is one of the concrete implementation projects of the agreement of crop protection (Convenant Duurzame Gewasbescherming).

In 2004 en 2005 the project partners discussed the first sequence of substances: bentazon, carbendazim, isoproturon, methomyl en terbutylazin. In 2006 the project partners made an inventory which pesticides lead to standard exceedances in ground- and surface water. The selection process took into account the number and height of exceeding water quality standards, data on the use of the pesticide such as the crop it is used on, the pest it is used against and the contribution of neighbouring countries. The five selected substances are representative for the type of problem that will be tackled. They represent different types of standard exceedances, groups of substances, crops and sectors.

Expert meetings were held for each substance, bringing together all the available knowledge about the substance of the chemical industry, pesticide traders, crop protection advisors, farmers, water boards, contractors, drinking water companies, agricultural and water quality research. Emission routes are identified and possible solutions are drafted and prioritised.

This document describes for 2,4-D the problem, routes of emission, possible solutions and the planned actions. Two expert meetings were held for the substance 2,4-D on May 8th and June 25th, 2007. The last expert meeting of 2,4-D was combined with the expert meeting of MCPA.

2. PROBLEM DEFINITION

Selected on account of groundwater and surface water bottleneck according to Vewin.

Authorization
The substance is a systemic hormone-type foliar herbicide. The substance is authorised for professional and private use. The label of 2,4-D is on May 21st, 2007 restricted to grass green manure crops, underneath apple and pear trees, underneath windshields, on temporarily uncultivated land, on banks of pastures and farming fields, and fallow bulb fields. The applications in cereals, maize, grass seed, pastures, lawns, sport fields, permanently uncultivated land, banks of watercourses, and dry ditch bottoms (spot treatment only) are forbidden since May 21st, 2007 for the single product of 2,4-D. 2,4-D has an Annex I authorization in Europe (see chapter 5).

Use
According to the authorization holder 75% of the volume sold is used on temporary uncultivated land (for example after harvesting of winter wheat) and 20% in grass grown for seed and grassland (see table 16). According to the MNP (Netherlands Environmental Assessment Agency) the use of 2,4-D in public parks and gardens has increased by 50% between 1998 and 2005 (see table 17). 2,4-D is used everywhere in the Netherlands. It is not specified to one region. Under apple and pear trees 2,4-D is used spot wise against weeds. However, MCPA is more common (see table 14). Non-agricultural use of 2,4-D happens for example on sport fields. According to the experts 2,4-D is hardly used on pavements (see table 15).

The substance 2,4-D
2,4-D is a systemic hormone-type foliar herbicide. It works against annual and perennial broadleaved weeds. Grasses are not killed. All proposed uses of 2,4-D in spring, except the use on fallow flower bulb land, meet the standards for leaching to the shallow groundwater as laid down in the Regulation of Uniform Principles for Plant protection products (BUBG). For fallow flower bulb land in spring, and temporarily uncultivated land in autumn, the predicted concentrations for 2,4-D are lower than 0.1 µg/l but higher than 0.01 µg/l. Therefore, a restriction on the use in groundwater protection areas should be placed on the label. The uses on green manuring crops and fallow flower bulb land in autumn do not meet the standards for leaching to the shallow groundwater as laid down in the BUBG and are therefore not permittable. 2,4-D is hazardous for non-target arthropods. 2,4-D has no relevant metabolites.

Monitoring data in surface water
2,4-D was found 2 to 6 times out of a total of 136-178 measurements at drinking water intake points in Meuse and Drentsche Aa (2003-2005) in concentrations exceeding the drinking water standard. Exceedances were found from April to October. The highest concentration of 0.21 µg/l was found in 2005 (see table 1). In the Meuse at Keizersveer 2,4-D is found more often from two

times in 2000 to 16 times in 2005. In 2004 and 2005 2,4-D is found 4 times in total above the drinking water standard. The highest concentration was found in 2005 (0,21 µg/l) (see table 2). The drinking water standard was frequently exceeded at water board authorities. The number of standard exceedances increased from 33 of the 1265 measurements in 1997/1998 to 111 of the 1907 measurements in 2004/2005. Most standard exceedances occurred in May-July and September-October (see table 3, 4 and 5). Water board Hollandse Delta finds 2,4-D mainly in areas of intensive agriculture and fruit growing area. The concentrations found in intensive agriculture areas are comparable to the months that 2,4-D is used. The concentrations found in the fruit growing areas are a bit typical. As the use of 2,4-D is very limited by fruit growers.

Monitoring data in groundwater
In the monitoring network of the provinces, 2,4-D was found once above the drinking water standard in groundwater at 10 meter depth at a concentration of 6.69 µg/l (see table 7).

Monitoring data in air and rainwater
In 2000 and 2001 2,4-D was not found in air samples. In precipitation samples 2,4-D was found in 2000 and 2001 respectively in 21 and 73 out of 234 samples with a maximum average concentration of 8.9 ng/l (see table 11 and 12).

3. ROUTES OF EMISSION AND SOLUTIONS

During the expert meetings the possible routes of emission and solutions for reducing standard exceedances by 2,4-D are discussed and shown below in random order.

3.1. Routes of emission

Drift
It is allowed to use 2,4-D on temporary uncultivated land with the possibility that through drift 2,4-D comes into the surface water. Drift depends on concentration of the sprayed material, weather conditions and the mode of use: type of spray nozzle, height above the ground of the spray booms. This can lead to high concentrations of 2,4-D in surface water.

Run-off from sprayed land
The run-off from sprayed land is influenced by dose rate, binding of the pesticide to soil particles (K_{oc}) and its persistence in soil and on foliage surface (DT_{50}). The half life from 2,4-D is short. A value of 14 days has been selected from laboratory experimentation. With a mean K_{oc} value of 32.5 l/kg 2,4-D does not bind well to soil particles. In soil, the sorption of 2,4-D is dependent on the pH value of the soil; sorption decreases with the pH value. Since 2,4-D is used in temporary uncultivated land without stubbles, for example of winter wheat, it can be sensitive to run-off. Clearly, a heavy rainfall event shortly after spraying will be a poor scenario for both the farmer, water boards and for the drinking water companies.

Pioneering weeds of new building sites
Other terrain managers, for example governmental institutions or Rail Infrabeheer, are less accurate in managing weeds on slopes. Especially in new building sites, as the High Speed Line, pioneering weeds are a problem. These weeds spread themselves to neighboring land of farmers. As a consequence, farmers can not get rid of weeds by only using mechanical weed removal. Farmers have to use more 2,4-D to remove weeds.

3.2. Solutions

During the expert meeting of 25th, 2007 the following solutions were formulated. The solutions are mentioned in random order.

Cooperation between drinking water companies, water boards and farmers
If monitoring data are linked with information from farmers about usage, more can be concluded from monitoring data. Next to that, farmers will become familiar with the drinking water companies, water boards and their activities. As a result farmers will get more insight in the

consequences of their actions. A first step to enlarge cooperation between farmers, drinking water companies and water boards is to organize a joint meeting. This meeting can be integrated with other subjects such as new techniques or machinery. The advice is to support the message of water boards and drinking water companies with local data.

Adjust monitoring networks
The monitoring network of drinking water companies can integrate, for example the transit time from pesticides to the point of application to the drinking water sampling points. Water boards can specify their monitoring network to clarify the problems caused by 2,4-D. Specification can be done by enlarging urban monitoring networks and find out from what specific location the emission really comes. The results of monitoring can then be joined with users of 2,4-D.

Develop a brochure about emissions
It is important to raise awareness amongst users of 2,4-D about emissions to the environment. Therefore, more information has to be given to users of 2,4-D about preventing emission to the environment. Nufarm UK Ltd. plans to make a brochure with special attention to reduce drift by using special nozzles, equipment such as släpduck and air support sprayers, a spraying cap for spot applications, spray boom height, consider action of wind direction, driving speed and legal non spraying zones. Nufarm UK Ltd. invites other key parties to deliver information for the brochure. The brochure will be ready before the next spraying season.

Enlarge people's awareness on preventing emissions
Enlarge people's awareness on the consequences when 2,4-D is used. A brochure can be a first step. To enlarge people's awareness about emissions more is needed. For example, winter readings, meetings, and excursions. All the communication should be done without pressure and with examples of right application methods and good farming practices. Make information for specific regions, because people are more triggered by situations from their own region.

Organise information meetings for advisors
Advisors and traders visit farmers almost every week. When advisors and traders are regularly informed about routes of emission, they can communicate this to farmers. In this case, a farmer hears the message then from a known person who is familiar with his company situation.

Use decision support systems
Many farmers already use decision support systems for applying pesticides. An example of a decision support system is GEWIS. In this system the weather forecast is included in the advice. In agriculture many farmers already use decision support systems; in fruit culture this can be extended. A decision support system which includes the weather forecast is probably helpful to prevent emission from drainage. It is good to look at weather circumstances and soil conditions prior to, during and following the application. Weather is important for the leaching process. For 2,4-D at least the first couple of weeks after application are important. Weather forecasts for such

a period are not reliable. It is however important to communicate to farmers not to apply 2,4-D when the expected amount of rain is more then 20 millimetres in the first three days after application.

Use 2,4-D spot-wise in arable farming
In arable farming 2,4-D is not used spot-wise, because it is not profitable and practical at the moment. If 2,4-D is used spot-wise this could minimize the emission routes of drift and leaching. 'Praktijkonderzoek Plant & Omgeving' (Applied Plant Research) is examining if it is possible to use pesticides spot-wise with help from a robot. This technique is not developed far enough to be used profitable in practice. Therefore, more research is needed.

Develop critical dose tables
For some crops it is possible to apply a lower dose 2,4-D than prescribed. At the moment, the most figures are outdated. More research is needed to develop critical dose tables for different crops. This research can be combined with existing data of Nufarm UK Ltd. and traders (AGRODIS). A remark for critical dose tables; the dose should not be too low since it can lead to resistance of the weeds to 2,4-D. The latter however has not been scientifically proven.

Call attention to terrain managers
Involved organizations as governmental institutions call to attention of the importance of managing slopes and building sites in a proper way, for example mowing. So spreading of pioneering weeds is limited. Farmers suffice with mechanical removing of weeds and use less pesticides containing 2,4-D.

Join the certification line of pesticide application in public areas
At the moment an obliged certification for products which are used on (permanent) uncultivated areas is put together. For glyphosate, the certification system will be available for executors for use on pavements by the end of 2007. The application of pesticides in public areas could be attached to this certification not only for glyphosate, but also for 2,4-D.

Spraying in temporary uncultivated land with stubbles
When products with 2,4-D are sprayed in temporary uncultivated land, it is better to spray when the stubbles are there. The stubbles limit emissions caused run-off.

Join the SWEEP-guidelines
There are already SWEEP-shortlists for use of glyphosate on pavements. The criteria guidelines could be extended for 2,4-D that is used in public green. Use the lessons-learned from agricultural sector and imply those to SWEEP also for 2,4-D. SWEEP-guidelines for glyphosate are made on three levels:

- Policy makers and long-term planners of management of pavements in public areas and on industrial sites. These guidelines are about weed prevention, weed control methods and

organization (communication, registration and evaluation).

- Planners and managers of open spaces with hard-surface in public areas and on industrial areas. For example, a point that is addressed: hard-surfaces alongside surface water and the spraying of herbicides.
- Weed control contractors. These guidelines also include filling spray tanks and cleaning (www.dob-verhardingen.nl).

More information to people that use 2,4-D on lawns and sport fields

Many products that are based on the active ingredient 2,4-D and other ingredients are used by private individuals on lawns or sport fields. The way of preventing emissions from 2,4-D should also be communicated towards private individuals that use mixes with 2,4-D. According to the experts, private individuals generally do not pay attention to application of 2,4-D in water extraction areas. This means that usage of 2,4-D happens in these areas. The experts find it difficult to indicate the amount of application by private individuals in these areas.

4. IMPLEMENTATION PROGRAMME

The routes of emission and solutions are translated in an implementation programme. In the implementation programme the background of the problem, the principal executor from the steering committee 'Schone bronnen, nu en in de toekomst', executors, time line, the intended actions and state of affairs are shown per solution in a table. The experts were asked to rank the solutions in order of importance. 1 is most important, 13 is least important.

<table>
<tr><th>Solution 1 (2,4-D) is similar to MCPA, solution 6</th><th>Parties</th><th>Actions</th><th>State of affairs</th></tr>
<tr><td rowspan="2">Enlarge people's awareness on preventing emissions of 2,4-D.</td><td>Principal executor: LTO-Nederland</td><td rowspan="4">LTO-Nederland checks in what way preventing emissions of 2,4-D can be a subject of for example winter readings.</td><td rowspan="4"></td></tr>
<tr><td>Ranking experts: 1</td></tr>
<tr><td rowspan="2">Background: enlarge people's awareness about the consequences when 2,4-D is used. A brochure can be a first step, but more is needed. For example, winter readings, meetings, and excursions. All the communication should be done without pressure and with examples of right application methods and good farming practices. Make information for specific regions, because people are more triggered by situations from their own region.</td><td>Executor: AGRODIS</td></tr>
<tr><td>Together with: water boards, 'Telen met toekomst', Nefyto, government, DLV Plant, PPO and drinking water companies
Time line: 4th quarter of 2007</td></tr>
</table>

Solution 2 (2,4-D) is similar to MCPA, solution 2	Parties	Actions	State of affairs
Develop a brochure about preventing emissions	**Principal executor:** Nefyto **Ranking experts:** 2	Nefyto stimulates Nufarm UK Ltd. to develop the brochure before the next spraying season.	
Background: it is important to raise awareness amongst users of 2,4-D about emissions to the environment. Therefore, more information has to be given to users of 2,4-D about preventing emissions to the environment. Nufarm UK Ltd. plans to make a brochure with special attention to reduce drift by using special nozzles, equipment such as släpduck and air support sprayers, a spraying cap for spot applications, spray boom height, consider action of wind direction, driving speed and legal non spraying zones.	**Executor:** Nufarm UK Ltd. **Together with:** LTO, AGRODIS, research and water boards, WUR, 'Unie van Waterschappen', Vewin and RIZA **Time line:** 4th quarter of 2007		

Solution 3 (2,4-D) is similar to MCPA, solution 5	Parties	Actions	State of affairs
Organize information meetings for advisors about preventing emissions from 2,4-D.	**Principal executor:** LTO-Nederland **Ranking experts:** 3	LTO-Nederland implements this solution together with CUMELA and AGRODIS for arable farming. For fruit culture LTO-Nederland will cooperate with NFO.	
Background: advisors and traders visit farmers almost every week. When advisors and traders are regularly informed about routes of emissions, they can communicate this to farmers. In this case, a farmer hears the message from a known person who is familiar with his company situation.	**Executor:** AGRODIS, CUMELA and NFO **Together with:** 'Telen met toekomst', water boards and drinking water companies **Time line:** 4th quarter of 2007		

Solution 4 (2,4-D)	Parties	Actions	State of affairs
More **information** to people that use 2,4-D on lawns and sport fields	**Principal executor:** Vewin **Ranking experts:** 4	Vewin writes, on behalf of Schone bronnen, a letter with all non-agricultural solutions to the 'Stuurgroep Implementatie Duurzaam Terreinbeheer' (SIDT) and monitors carefully the progress.	The SIDT wants to implement integrated weed control, like the 'Barometer Duurzaam Terreinbeheer'.
Background: many products that are based on the active ingredient 2,4-D and other ingredients are used by private individuals on lawns or sport fields. The way of preventing emission from 2,4-D should also be communicated towards private individuals that use mixes with 2,4-D. According to the experts, private individuals generally do not pay attention to application of 2,4-D in water extraction areas. The experts find it difficult to indicate the amount of application by private individuals in these areas.	**Executor:** SIDT **Together with:** AGRODIS and authorization holders **Time line:** 4th quarter of 2007		

Solution 5 (2,4-D) is similar to MCPA, solution 1	Parties	Actions	State of affairs
Cooperation between drinking water companies, water boards and farmers	**Principal executor:** 'Unie van Waterschappen' **Ranking experts:** 5	The 'Unie van Waterschappen' stimulates regional water boards to cooperate with drinking water companies and farmers.	
Background: when monitoring data are linked with information from farmers about usage, more can be concluded from monitoring data. Next to that, farmers will become familiar with the drinking water companies, water boards and their activities. As a result farmers will get more insight in the consequences of their actions. A first step to enlarge cooperation between farmers, drinking water companies and water boards is to organise a joint meeting. This meeting can be integrated with other subjects such as new techniques or machinery. Support the message of water boards and drinking water companies with local data.	**Executor:** water boards **Together with:** LTO, drinking water companies and CML (Pesticides Atlas) **Time line:** 4th quarter of 2007		

Solution 6 (2,4-D) is similar to MCPA, solution 8	Parties	Actions	State of affairs
Call attention to terrain managers of the importance of managing slopes and building sites in a proper way for example mowing.	**Principal executor:** Vewin **Ranking experts:** 6	Vewin writes, on behalf of Schone bronnen, a letter with all non-agricultural solutions to the 'Stuurgroep Implementatie Duurzaam Terreinbeheer' (SIDT) and monitors carefully the progress.	The SIDT wants to implement integrated weed control, like the Barometer Duurzaam Terreinbeheer.
Background: in that way spreading of pioneering weeds is limited. Farmers suffice with mechanical removing of weeds and use less pesticides containing 2,4-D.	**Executor:** SIDT **Together with:** terrain managers **Time line:** 4th quarter of 2007		

Solution 7 (2,4-D) is similar to MCPA, solution 3	Parties	Actions	State of affairs
Develop critical dose tables for application of 2,4-D	**Principal executor:** Nefyto **Ranking experts:** 7	Nefyto asks PPO to include the development of critical dose tables for application of MCPA into the research programme 'Emission reduction of pesticides' of PPO (Applied Plant Research).	First reaction of PPO: development of critical dose tables for application of MCPA can be done within the research programme 'Emission reduction of pesticides'.
Background: for some crops it is possible to apply a lower dose 2,4-D than prescribed. At the moment, most figures are outdated. More research is needed to develop critical dose tables for different crops. This research can be combined with existing data of Nufarm UK Ltd. and traders (AGRODIS). A remark for critical dose tables; the dose should not be too low since it can lead to resistance of the weeds to 2,4-D. However, this has not been scientifically proven.	**Executor:** PPO (Applied Plant Research) **Together with:** AGRODIS and authorization holders **Time line:** 4th quarter of 2007		

Solution 8 (2,4-D)	Parties	Actions	State of affairs
Join the Sustainable Weed control on Pavements (SWEEP) guidelines.	**Principal executor:** Vewin	Vewin writes, on behalf of Schone bronnen, a letter with all non-agricultural solutions to the 'Stuurgroep Implementatie Duurzaam Terreinbeheer' (SIDT) and monitors carefully the progress.	The SIDT wants to implement integrated weed control, like the 'Barometer Duurzaam Terreinbeheer'.
	Ranking experts: 8		
Background: there are already SWEEP-shortlists for use of glyphosate on pavements. The criteria guidelines could be extended for 2,4-D that is used in public green. Use the lessons-learned from agricultural sector and imply those to SWEEP also for 2,4-D. SWEEP-guidelines for glyphosate are made on three levels: policy makers and long-term planners, planners and managers of open spaces and weed control contractors.	**Executor:** SIDT		
	Together with: authorization holders		
	Time line: : 4th quarter of 2007		

Solution 9 (2,4-D) similar to MCPA, solution 7 and dichlobenil, solution 5	Parties	Actions	State of affairs
Join law certification on using pesticides in public areas.	**Principal executor:** Vewin	Vewin writes, on behalf of Schone bronnen, a letter with all non-agricultural solutions to the 'Stuurgroep Implementatie Duurzaam Terreinbeheer' (SIDT) and monitors carefully the progress.	The SIDT wants to implement integrated weed control, like the 'Barometer Duurzaam Terreinbeheer'.
	Ranking experts: 9		
Background: pesticide use on pavements will be linked by law to certification. For glyphosate the certification system will be available end of 2007. The application of pesticides in public areas could be attached to this certification not only for glyphosate, but also for 2,4-D.	**Executor:** SIDT		
	Together with: authorization holders		
	Time line: : 4th quarter of 2007		

Solution 10 (2,4-D) similar to MCPA, solution 10	Parties	Actions	State of affairs
Promote usage of decision support systems.	**Principal executor:** LTO-Nederland **Ranking experts:** 10	LTO-Nederland implements this solution together with CUMELA and AGRODIS for arable farming. For fruit culture LTO-Nederland will cooperate with NFO.	
Background: many farmers already use decision support systems for applying pesticides. An example of a decision support system is GEWIS. In this system the weather forecast is included in the advice. In agriculture, many farmers already use decision support systems; in fruit culture this can be extended. A decision support system that includes the weather forecast is probably helpful to prevent emission from drainage. It is good to look at weather circumstances and soil conditions prior to, during and following the application.	**Executor:** CUMELA, NFO, **Together with:** growers, 'Telen met toekomst', AGRODIS, Nufarm UK Ltd. and GEWIS. **Time line:** 4th quarter of 2007		

Solution 11 (2,4-D) similar to MCPA, solution 9	Parties	Actions	State of affairs
Adjust monitoring networks regularly in such a way that routes of emissions can be identified.	**Principal executor:** Unie van Waterschappen **Ranking experts:** 11	The 'Unie van Waterschappen' will ask individual water boards in which way monitoring networks can be adjusted and fit into the European Water Framework Directive.	
Background: the monitoring network of drinking water companies can integrate, for example, the transit time from pesticides to the point of application to drinking water sampling points. Water boards can specify their monitoring network to clarify the problems caused by 2,4-D. Specification can be done by enlarging urban monitoring networks and find out from what specific location the emission really comes. The results of monitoring can then be joined with users of 2,4-D.	**Executor:** water boards **Together with:** Wageningen UR, RIZA and drinking water companies **Tijdspad:** 4de kwartaal van 2007		

Solution 12 (2,4-D)	Parties	Actions	State of affairs
Spraying 2,4-D in temporary uncultivated land with stubbles	**Principal executor:** -	None, because it is not clear enough if this solution contributes to reducing emissions of 2,4-D.	
	Ranking experts: 12		
Background: when products with 2,4-D are sprayed in temporary uncultivated land, it is better to spray when the stubbles are there. The stubbles limit emissions caused run-off.	**Executor:** 'Telen met toekomst'		
	Together with: growers, AGRODIS, DLV Plant		
	Time line: -		

Solution 13 (2,4-D) similar to MCPA, solution 13	Parties	Actions	State of affairs
Use 2,4-D **spot-wise** in arable farming	**Principal executor:** -	None, this solution does not fit in the time frame of the project Schone bronnen.	
	Ranking experts: 13		
Background: in arable farming 2,4-D is not used spot-wise, because it is not profitable and practical at the moment. If 2,4-D is used spot-wise this could minimize the emission routes of drift and leaching. 'Praktijkonderzoek Plant & Omgeving' (Applied Plant Research) is examining if it is possible to use pesticides spot-wise with help from a robot. This technique is not developed far enough to be used profitable in practice. Therefore, more research is needed.	**Executor:** PPO (Applied Plant Research)		
	Together with: authorization holders		
	Time line: -		

5. BASIC INFORMATION

5.1. Measurements surface water in comparison with drinking water standard

Table 1: Monitoring data 2,4-D at drinking water intake points in surface water ('large' rivers) in comparison with drinking water standard (0.1 µg/l).

Year	Measurements (number)	Found (number)	Standard exceedances (number)	Max. concentration standard exceedance (µg/l)	Months with exceedance	Location exceedance
2005	136	33	2	0.21	Apr	Meuse
2004	177	30	6	0.14	Apr, May, June, Aug, Oct	Meuse, Drentsche Aa
2003	178	21	6	0.13	Mar, Apr, July, Sept	Meuse, Drentsche Aa
2002	114	31	15	0.1	Jan, Apr, May, June, July, Aug	Rhine, Drentsche Aa
2001	127	15	0	0		
2000	141	14	3	0.17	June, Aug, Oct	Meuse

Source: REWAB and Vewin, 2000-2005.

Table 2: Monitoring data 2,4-D at drinking water intake points in surface water in comparison with drinking water standard (0.1 µg/l).

Andijk	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Number of measurements	6	10	7	4	7	13
Number of times found	0	0	0	0	0	0
Number of times with drinking water standard exceedance	0	0	0	0	0	0
Maximum concentration in µg/l	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Drentsche Aa - De Punt	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Number of measurements	20	27	31	54	43	15
Number of times found	2	10	21	9	10	0
Number of times with drinking water standard exceedance	0	0	14	5	3	0
Maximum concentration in µg/l	<0.09	0.08	<0.3	<0.17	0.14	0
Months of exceedance			Jan, May-Aug	Apr, Jul, Sept	Apr, May, Jun	
Enschede	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Number of measurements	11	13	4	11	1	
Number of times found	0	0	0	0	0	
Number of times with drinking water standard exceedance	0	0	0	0	0	
Maximum concentration in µg/l	<0.1	<0.1	<0.1	<0.1	<0.1	

Table 2 (continued): Monitoring data 2,4-D at drinking water intake points in surface water in comparison with drinking water standard (0.1 µg/l). Source: REWAB and Vewin, 2000-2005.

Maas - Brakel	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Number of measurements	28	25	24	34	35	31
Number of times found	2	0	0	3	9	14
Number of times with drinking water standard exceedance	0	2	0	0	1	0
Maximum concentration in µg/l	0.17	<0.05	<0.05	0.02	0.14	0.03
Months of exceedance	Aug, Oct				Aug	
Maas - Eijsden	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Number of measurements	13	10	12	13	13	13
Number of times found	2	2	2	1	0	3
Number of times with drinking water standard exceedance	0	0	0	1	0	0
Maximum concentration in µg/l	0.02	0.03	0.06	0.13	<0.05	0.08
Months of exceedance				Mar		
Maas - Heel	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Number of measurements			3	4	4	4
Number of times found			0	0	1	0
Number of times with drinking water standard exceedance			0	0	0	0
Maximum concentration in µg/l			<0.05	<0.05	0.06	<0.05
Maas - Keizersveer	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Number of measurements	13	8	8	13	19	26
Number of times found	2	1	5	2	7	16
Number of times with drinking water standard exceedance	1	0	0	0	2	2
Maximum concentration in µg/l	0.1	0.06	0.08	0.09	0.14	0.21
Months of exceedance	Jun, Oct				Jun, Oct	Apr
Rijn - Lobith	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Number of measurements	13	8		13	13	10
Number of times found	0	0		2	0	0
Number of times with drinking water standard exceedance	0	0		0	0	0
Maximum concentration in µg/l	<0.05	<0.05		0.07	<0.05	<0.05
Rijn - Nieuwegein	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Number of measurements	13	3	4	4	11	12
Number of times found	0	0	1	1	0	0
Number of times with drinking water standard exceedance	0	0	1	0	0	0
Maximum concentration in µg/l	<0.02	<0.02	0.1	0.05	<0.02	<0.02
Months of exceedance			Apr			
Rijn - Nieuwersluis	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Number of measurements	11	15	13	15	12	12
Number of times found	5	2	1	2	1	0
Number of times with drinking water standard exceedance	0	0	0	0	0	0
Maximum concentration in µg/l	0.03	0.02	0.02	0.05	0.05	<0.02

Table 3: Monitoring data 2,4-D water board authorities in comparison with drinking water standard (0.1 µg/l).

Year	Number of measure-ments	Number of times standard exceedance	Extent standard exceedance per 5x5 grid*	Months with exceedances	Location exceedance
2003-2004	1907	74 of 111 5x5 grids	63<1 µg/l; 11>1 µg/l	Feb-Dec: mainly in May-July and Sept-Oct	Zeeland, Noord-Holland, Zuid-Holland, Flevoland, Gelderland, Brabant
2001-2002	1502	33 of 59 5x5 grids	28<1 µg/l; 5>1 µg/l	Feb-Dec: mainly in May, July and Sept	Zeeland, Noord-Holland, Zuid-Holland, Flevoland, Gelderland
1999-2000	1088	30 of 38 5x5 grids	30<1 µg/l	May-Oct: mainly in May and June	Brabant, Utrecht, Gelderland, Drenthe, Groningen
1997-1998	1265	27 of 33 5x5 grids	23<1 µg/l; 4>1 µg/l	Mar-Oct	Noord-Holland, Zuid-Holland, Utrecht, Flevoland, Gelderland

* A grid is a 5x5 kilometre square into which the Netherlands is divided. Source: Bestrijdingsmiddelenatlas, 1999-2004 (Pesticides Atlas).

Monitoring data 2,4-D of Water Maatschappij Limburg by Peter van Diepenbeek presented during the expert meeting of 8 May 2007

Water Maatschappij Limburg measures 4-12 times per year. In groundwater, 2,4-D stays below drinking water standard. Ninety percent of the samples are below detection limit. Water Maatschappij Limburg measures structural in the Meuse. Two times there has been found a value above 0.01 µg/l: once in May (0.06 µg/l) and in August (0.16 µg/l). 2,4-D is not a problem for WML.

Monitoring data 2,4-D of Waterbedrijf Groningen by Theo Vlaar presented during the expert meeting of 8 May 2007

Next to groundwater extractions, Waterbedrijf Groningen extracts drinking water from surface water in the Drentsche Aa. Since 1994 protection measures are taken in the area of the Drentsche Aa together with Province of Drenthe, Water board Hunze en Aa's and Waterbedrijf Groningen. For example filling and cleaning places are made, filling and cleaning of spraying equipment with water from the Drentsche Aa is forbidden. In addition, an area of five metre on both sides of important watercourses became a groundwater protection area. This area functions as a spray free zone. The landscape around Drentsche Aa varies from agriculture (grass, corn and cereals) till nature. The measurements of Waterbedrijf Groningen are similar to the values in table 2.

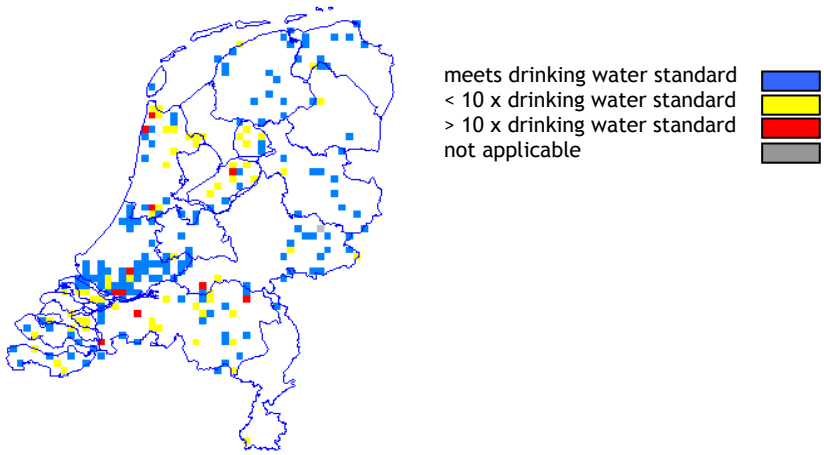

Figure 1: Locations with drinking water standard exceedance by 2,4-D in 2003-2004. Source: Bestrijdingsmiddelenatlas, 2003-2004 (Pesticides Atlas).

Table 4: Monitoring data 2,4-D in surface water measured by 14 water boards from 2003-2006 in comparison with the drinking water standard (0.1 µg/l).

Water board Hollandse Delta	**2003**	**2004**	**2005**	**2006**
Number of monitoring points	42	50	52	53
Number of measurements	167	199	211	214
Number of times found	36	2	17	18
Number of times with drinking water standard exceedance	8	2	12	10
Maximum concentration in µg/l	4.2	0.49	4	4.3
Average concentration in µg/l	0.05	0	0.04	0.04
Water board Zeeuws Vlaanderen	**2003**	**2004**	**2005**	**2006**
Number of monitoring points	9	9	9	9
Number of measurements	36	36	36	36
Number of times found	20	28	21	18
Number of times with drinking water standard exceedance	3	3	4	4
Maximum concentration in µg/l	0.29	0.4	0.3	1.43
Average concentration in µg/l	0.07	0.06	0.06	0.15
Probably originating from	winter wheat and grass grown for seed			
Water board Hunze en Aa's	**2003**	**2004**	**2005**	**2006**
Number of monitoring points	15	15	20	24
Number of measurements	45	60	62	62
Number of times found	1	0	1	1
Number of times with drinking water standard exceedance	1	0	0	0
Maximum concentration in µg/l	0.13	<0.05	0.05	0.06
Average concentration in µg/l	0.13	<0.05	0.05	0.06
Months of exceedance	May			

Table 4 (continued): Monitoring data 2,4-D in surface water by 14 water board authorities from 2003-2006 in comparison with the drinking water standard (0.1 µg/l).

Water board Hollands Noorderkwartier	**2003**	**2004**	**2005**	**2006**
Number of monitoring points	31	23	23	
Number of measurements	172	130	145	
Number of times found	28	27	28	
Number of times with drinking water standard exceedance	?	?	?	
Maximum concentration in µg/l	5.8	1.6	4.3	
Months of exceedance	Apr, May, Jul, Sep	Apr, May, Jul, Sept, Oct	May, Jul, Sep, Oct	
Probably originating from	Bulbs, arable farming and grassland			
Water board Zeeuwse Eilanden	**2003**	**2004**	**2005**	**2006**
Number of monitoring points	14	14	14	14
Number of measurements	56	56	56	56
Number of times found	32	47	39	19
Number of times with drinking water standard exceedance	10	11	9	3
Maximum concentration in µg/l	4.95	0.77	1.7	1.6
Average concentration in µg/l	0.24	0.09	0.13	0.14
Months of exceedance	Apr, June, Oct	Apr, June, Aug, Oct	Apr, June, Aug, Oct	Aug, Oct
Probably originating from	Grass grown for seed			
Water board Veluwe	**2003**	**2004**	**2005**	**2006**
Number of monitoring points			9	12
Number of measurements			12	20
Number of times found			3	2
Number of times with drinking water standard exceedance			0	1
Maximum concentration in µg/l			0.06	0.13
Average concentration in µg/l			0.04	0.12
Months of exceedance				June
Water board Rijnland	**2003**	**2004**	**2005**	**2006**
Number of monitoring points	13	8	0	0
Number of measurements	111	20		
Number of times found	11	14		
Number of times with drinking water standard exceedance	5	7		
Maximum concentration in µg/l	1,6	0,5		
Average concentration in µg/l	0.07	0.09		
Months of exceedance	Apr, May, July	Jan, July-Oct		

Table 4 (continued): Monitoring data 2,4-D in surface water by 14 water board authorities from 2003-2006 in comparison with the drinking water standard (0.1 µg/l).

Water board Aa en Meuse	**2003**	**2004**	**2005**	**2006**
Number of monitoring points	14			
Number of measurements	60			
Number of times found	9			
Number of times with drinking water standard exceedance	4			
Maximum concentration in µg/l	0.26			
Average concentration in µg/l	0.11			
Months of exceedance	May, June, Sep			
Water board Brabantse Delta	**2003**	**2004**	**2005**	**2006**
Number of monitoring points	13			
Number of measurements	48			
Number of times found	15			
Number of times with drinking water standard exceedance	10			
Maximum concentration in µg/l	2			
Average concentration in µg/l	0.34			
Months of exceedance	Jan, May, Sep			
Water board De Dommel	**2003**	**2004**	**2005**	**2006**
Number of monitoring points	13			
Number of measurements	56			
Number of times found	13			
Number of times with drinking water standard exceedance	6			
Maximum concentration in µg/l	0.5			
Average concentration in µg/l	0.15			
Months of exceedance	May, June, Sep			
Water board Velt en Vecht	**2003**	**2004**	**2005**	**2006**
Number of monitoring points	19	14	4	
Number of measurements	3	3	3	
Number of times found	2	2	1	
Number of times with drinking water standard exceedance	0	0	0	
Maximum concentration in µg/l	0.03	0.03	0.04	
Average concentration in µg/l	0.03	0.03	0.04	
Water board Rivierenland	**2003**	**2004**	**2005**	**2006**
Number of monitoring points	5			
Number of measurements	20			
Number of times found	1			
Number of times with drinking water standard exceedance	0			
Maximum concentration in µg/l	0.07			
Average concentration in µg/l	0.07			

Table 4 (continued): Monitoring data 2,4-D in surface water by 14 water board authorities from 2003-2006 in comparison with the drinking water standard (0.1 µg/l).

Water board Vallei en Eem	**2003**	**2004**	**2005**	**2006**
Number of monitoring points	26	1		
Number of measurements	86	12		
Number of times found	0	0		
Number of times with drinking water standard exceedance	0	0		
Maximum concentration in µg/l	<0.05	<0.05		
Water board Schieland en Krimpenerwaard	**2003**	**2004**	**2005**	**2006**
Number of monitoring points	13	13	13	13
Number of measurements	72	72	72	72
Number of times found	0	0	0	0

Source: monitoring data water boards, 2003-2006. The water boards Delfland, Roer en Overmaas, De Stichtse Rijnlanden did not analysed for 2,4-D. The water boards Peel en Maasvallei, Rijn en Ijssel, Regge en Dinkel, Groot Salland, Zuiderzeeland, Amstel, Gooi en Vecht, Wetterskip Fryslân, Noorderzijlvest, Reest en Wieden submitted no data.

Table 5: Monitoring data 2,4-D in surface water of water board Zuiderzeeland from 2001-2003 in comparison with the drinking water standard (0.1 µg/l).

Water board Zuiderzeeland	**2001**	**2002**	**2003**
Number of monitoring points	10	10	9
Number of measurements	50	50	45
Number of times found	5	31	16
Number of times with drinking water standard exceedance	?	?	?
Maximum concentration in µg/l	0.17	3.3	0.46

Table 6: Monitoring data 2,4-D in surface water of water board Hollandse Delta from the urban monitoring net 2004-2006 in comparison with the drinking water standard (0.1 µg/l).

Year	**2004**	**2005**	**2006**
Number of monitoring points	30*	30*	30*
Number of measurements	90	90	90
Number of times found	3	2	2
Number of times with drinking water standard exceedance	3	1**	0
Maximum concentration in µg/l	1.9	0.19**	0.08
Average concentration in µg/l	0.89	0.14	0.07
Months with standard exceedance	July	Feb	

* 26 points in surface water, 4 effluent samples of sewage treatment plants ** of which 1 time in effluent sewage treatment plant.

Monitoring data 2,4-D of Water board Zeeuwse Eilanden by Rien Klippel presented during the expert meeting of 8 May 2007

In the area of Water board Zeeuwse Eilanden no drinking water is extracted from surface or groundwater. Water board Zeeuwse Eilanden monitors 2,4-D since 2000. At fourteen points the surface water is monitored and there is one reference point in isolated water. Zeeuwse Eilanden does not take samples in individual ditches. In general, they find a mix of pesticides. The samples are taken in different areas. Table 4 shows an overview for concentrations 2,4-D during 2003-2006. Zeeuwse Eilanden sees 2,4-D not as a problem for the ecological situation (MPC). The average concentration and the maximum concentration of 2,4-D were the highest in October. According to Zeeuwse Eilanden higher values are not related to a specific area or practice. It is still unknown whether drift, drainage or atmospheric deposition causes high values of 2,4-D. In 2005 a high value is also found in isolated water. The experts doubt whether the isolated water is isolated enough as farming fields are within 200 metres. 2,4-D can enter into the isolated water via all three routes.

Monitoring data 2,4-D of Water board Hollandse Delta by Janneke van Gorsel presented during the expert meeting of 8 May 2007

The area of Water board Hollandse Delta is diverse with agriculture, industry and cities. Water board Hollandse Delta has been monitoring pesticides in rural areas since the early 1990's. In 2002 a structural monitoring network for pesticides in rural areas was set up. Since 2004, Water board Hollandse Delta also monitors pesticides in urban areas. In the agricultural areas are 53 sampling locations divided among intensive agriculture (41), fruit growing (7) and pastureland & livestock (5). Four times a year Hollandse Delta takes a sample at all points: once in February and three times during spraying period. Hollandse Delta samples in urban areas at 34 locations varying from residential districts, near sport facilities, golf courses and sewage. Three times a year samples are taken: in June and August and once every two years in July or February. Figure 2 shows monitoring data per year of Water board Hollandse Delta in different areas.

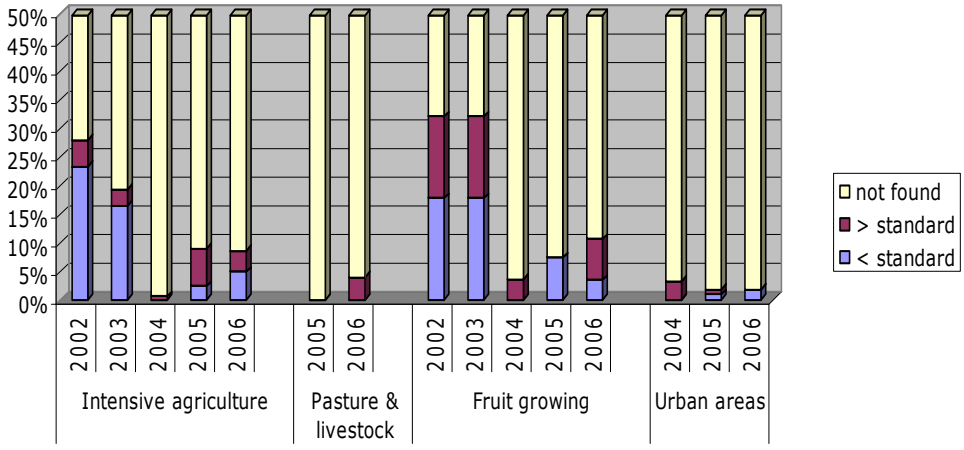

Figure 2: Annual monitoring data of 2,4-D of Water board Hollandse Delta in different areas in comparison with the drinking water standard (0.1 µg/l).

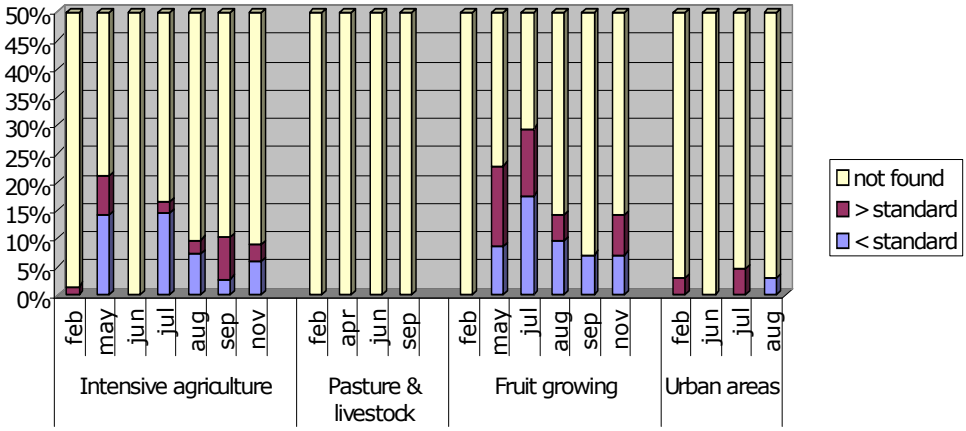

Figure 3: Monitoring data of 2,4-D per month during 2002-2006 of Water board Hollandse Delta in different areas in comparison with the drinking water standard (0.1 µg/l).

For Water board Hollandse Delta can be concluded that drinking water standard is most exceeded in May, July and September. 2,4-D is mainly found in areas of intensive agriculture and fruit growing area. Sometimes 2,4-D is found in urban areas (including sewage). The months in which the concentrations in intensive agriculture areas are found, are comparable in which the months that 2,4-D is used. The concentrations found in the fruit growing area are a bit typical. As the use of 2,4-D is very limited by fruit growers. It is interesting to check who in the fruit growing area of Waterschap Hollandse Delta uses 2,4-D and to determine why.

5.2. Measurements groundwater in comparison with drinking water standard

Table 7: Monitoring data 2,4-D in groundwater at 10 metres depth of 10 provinces in the Netherlands in 2006 compared with the drinking water standard 0.1 µg/l.

Number of measurements	Number of drinking water standard exceedances	Maximum concentration in µg/l	Average concentration in µg/l
675	1	6.69	0.01

Source: RIVM, 2007.

Monitoring data groundwater from CTB evaluation 15 October 1999

The presence of the active substance 2,4-D in groundwater has been investigated in a study described by RIZA (Watersysteemverkenningen Chloorfenoxycarbonzuren, 1995). The monitoring results indicate that 2,4-D is only sporadically found in groundwater (drainage water) (maximum concentration in drainage water 0.13 µg/l, Flevoland '88). No conclusions can be based on the monitoring data in view of the low number of measurements and the fact that a clear relationship with the cultures concerned is absent.

5.3. Measurements regional surface water in comparison with MPC

Table 8: Monitoring data 2,4-D water boards in comparison with the MPC of 26 µg/l.

Year	MPC in µg/l	Number of measurements	Number of standard exceedances	Extent standard exceedance per 5x5 grid*	Months with exceedance	Location exceedance
2003-2004	26	1907	1	1 > 1*MPC	September	Noord-Brabant
2001-2002	26	1502	0			
1999-2000	26	1088	0			
1997-1998	26	1265	0			

* A grid is a 5x5 kilometre square in which the Netherlands is divided. Source: Bestrijdingsmiddelenatlas, 1999-2004 (Pesticides Atlas).

Table 9: Monitoring data 2,4-D, collected by Omegam in 2004 for water quality managers and Riza, in surface water.

Number of measurements	Number found	Average concentration > 0 in µg/l	Maximum concentration in µg/l
775	62	0.86	42.12

Source: Omegam, 2004.

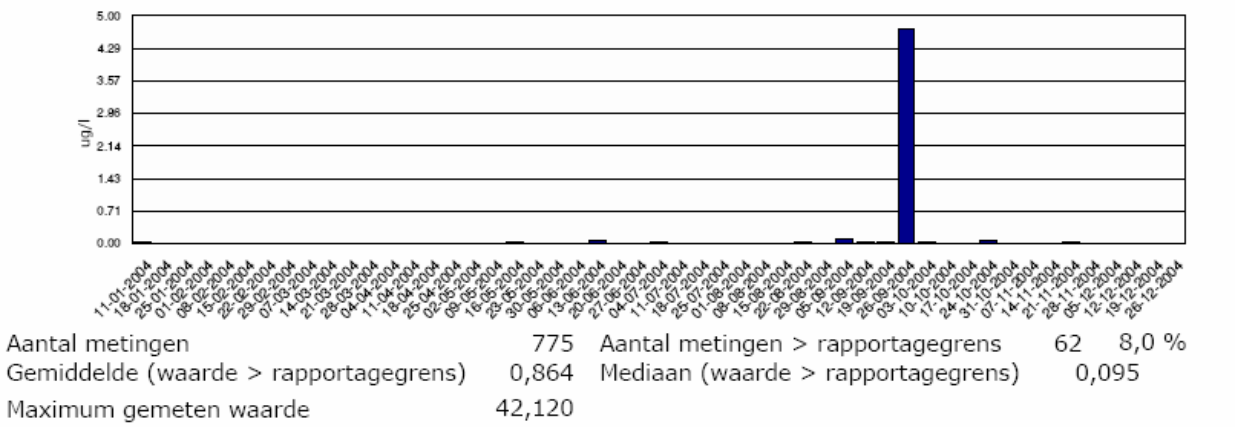

Figure 4: Monitoring data 2,4-D, collected by Omegam in 2004 for water quality managers and RIZA, in surface water (week means).

Legend: Week average value. Number of measurements: 775; Average (value > reporting limit): 0.864; Maximum measured value: 42.120; Number of measurements > reporting limit: 62 (8,0%); Median (value > reporting limit); 0.095. Source: Omegam, 2004.

5.4. Measurements in rainwater and air

According to the report 'Atmospheric deposition of pesticides, PAK and PCB's in The Netherlands' of TNO (2002), 2,4-D was detected in rainwater as were fifty other pesticides, mainly herbicides and fungicides. Figure 5 shows average concentrations per year of pesticides in precipitation, which were found in more than ten percent of precipitation samples.

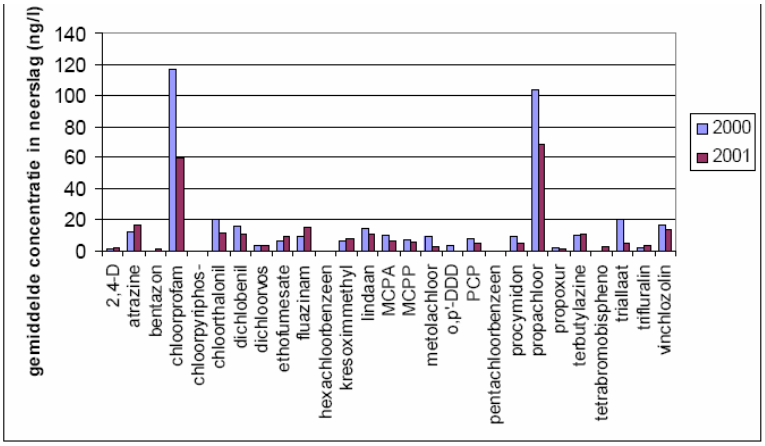

Figure 5: Average concentrations per year of pesticides in precipitation.

Table 10: 2,4-D in air samples in The Netherlands in 2000 and 2001.

2,4-D	2000	2001
Number of monitoring points in air	18	18
Number of measurements air	351	351
Number of times found in air	0	0
Average concentration (ng/m^3)	0.00	0.00
Average concentration > 0 (ng/m^3)	0.00	0.00

Table 11: 2,4-D in precipitation samples in The Netherlands in 2000 and 2001.

2,4-D	2000	2001
Number of monitoring points in precipitation	18	18
Number of measurements in precipitation	234	234
Number of times found in precipitation	21	73
Average concentration (ng/l)	0.8	1.9
Average concentration > 0 (ng/l)	8.9	6.2

Source: Duyzer en Vonk, 2002.

5.5. Use, authorization and substance properties

Table 12: Number of ha and kg active substance (2,4-D) used in agriculture (except grassland).

Year	Total ha	Total kg
1995	9228	5509
1998	5754	2930
2000	8614	3724
2004	17182	7448

Source: CBS StatLine, 2007

Table 13: Number of ha and kg 2,4-D used in agriculture per crop in 2004 (except grassland).

Usage sector	Crop	Total ha	Total kg
Arable farming	Winter wheat	3630	3128
	Summer barley	2260	495
	Grass seed	2977	808
Vegetables outdoors	Strawberries	390	9
Pome- and stone fruits	Apples	2193	949
	Pears	894	574
Nursery stock	Flower nursery outdoors	335	76
	Forest- and hedge plantation	171	3
	Avenue- and public garden trees	1037	154
	Fruit trees	84	13
	Rose bushes	37	2
	Conifer	255	348
	Perennial plants	503	93
Bulbs and flower turnips	Hyacinths	26	12
	Narcissus	71	80
Vegetables under glass	Tomatoes	24	1
Flowers under glass	Roses	15	2
	Chrysanthemums	66	12
	Freesia's	12	1
	Alstroemeria	11	0
	Lilies (cut flowers)	16	2
	Potted plants (flowering)	87	4
	Remaining	2088	683

Source: CBS StatLine, 2007

Table 14: Number of kg 2,4-D used by governmental institutions.

Year	Total kg
1995	1431
2001	1883
2005	1849

Source: CBS StatLine, 2007

According to CBS governmental institutions mainly use 2,4-D around sport fields. This only includes sport fields that are managed by governmental institutions, for example, municipalities.

Table 15: Sales, according to Nufarm UK Ltd., of the active substance 2,4-D in percentages per culture in 2002-2006.

Culture	Percentage of sales
Temporary uncultivated land	75%
Grass grown for seed and grassland	20%
Other	5%

Source: statement Nufarm UK Ltd., 2007.

Table 16: Emission of 2,4-D outside agriculture in 1998 and 2004-2005 in public parks and gardens in comparison with other substances used outside agriculture.

Substance	Emission in 2004/2005 in kg	Emission in 1998 in kg
Mecoprop-p	185	66
2,4-D	154	108
Dicamba	34	14
Dichlobenil	6	1
Imidacloprid	0	3
MCPA	2	1
Glyphosate	2	3
Tolylfluanid	<1	1

Source: RIVM, 2006.

Table 17: Analysis of the contribution of the cultures in the Netherlands (total country) to the drinking water standard exceedance of 2,4-D in surface water in classes.

Culture	Significance Standard exceedance 2003-2004 (0.1µg/l)	Significance Standard exceedance 2002-2001 (0.1µg/l)	Significance Standard exceedance 1999 -2000 (0.1µg/l)	Significance Standard exceedance 1997-1998 (0.1µg/l)
Flower bulbs	very strong	very strong		
Floriculture	very strong	very strong	present	very strong
Fruit growing	just absent	strong		very strong
Greenhouse cultures	present	present	strong	very strong
Grass grown for seed	very strong	present		very strong
Nursery stock	very strong	just absent	present	very strong
Asparagus		just absent		strong
Strawberries	very strong	just absent		
Sugar beet	very strong			
Maize			present	
Grassland				
Cereals	very strong			strong
Potatoes				very strong

Source: Bestrijdingsmiddelenatlas, 1997-2004 (Pesticides Atlas). Remark: table presents a statistical relation, not a causal one.

Table 18: CTB overview 2,4-D non-agricultural use.

Product name	Active substance A	Active substance B	Active substance C	Below crash barriers, traffic signs, fencing, roadside	Public parks and gardens	Temporary uncultivated	Uncultivated	Permanently uncultivated	Pavements	Private use
Aamix	2,4-D	MCPA	Dicamba	-	-	-	-	-	-	+
Brabant Mixture	2,4-D	MCPA	Dicamba	-	-	-	-	-	-	+
Dicamix-G vloeibaar	2,4-D	MCPA	Dicamba	-	+	-	-	-	-	
Gazon-Net N	2,4-D	MCPA	Dicamba	-	-	-	-	-	-	+
Onkruid stop	2,4-D	MCPA	Dicamba	-	-	-	-	-	-	+
Antikiek	MCPA	2,4-D		-	-	+	-	-	-	
Luxan Dicamix-D vloeibaar	2,4-D	Mecoprop-P	Dicamba	-	-	-	-	-	-	
Damine 500	2,4-D			-	-	+	-	-	-	
U46 D-fluid	2,4-D			-	-	+	-	-	-	
Brabant 2,4-D/Dicamba	2,4-D	Dicamba		-	+	-	-	-	-	
Evergreen Anti-onkruid + Gazonmest	2,4-D	Dicamba		-	-	-	-	-	-	+
Gazonfloranid met onkruidverdelger	2,4-D	Dicamba		-	-	-	-	-	-	
Greenmaster fine turf extra	2,4-D	Dicamba		-	-	-	-	-	-	+
Hema gazonmest met onkruidbestrijder	2,4-D	Dicamba		-	-	-	-	-	-	+
Intratuin onkruidbestrijder met gazonmeststof	2,4-D	Dicamba		-	-	-	-	-	-	+
Jepolinex	2,4-D	Dicamba		-	-	-	-	-	-	
Langwerkende gazonmest met onkruidbestrijder	2,4-D	Dicamba		-	-	-	-	-	-	+
Park gazonmest met onkruidbestrijder	2,4-D	Dicamba		-	-	-	-	-	-	+
Pokon onkruid weg!	2,4-D	Dicamba		-	-	-	-	-	-	+
Scotts onkruidbestrijder met gazonmest	2,4-D	Dicamba		-	-	-	-	-	-	+

Source: CTB, 2006.

5.5.1. Statutory Use Instructions and Directions for Use

DAMINE 500 (2,4-D) Professional use

A. Statutory Use Instructions

Permitted is only the use as herbicide:

- grass green manure crops;
- on fallow bulb fields;
- in orchards underneath apple and pear trees, underneath wind shield.

To protect groundwater the use on fallow flower bulb land is not permitted in groundwater protection areas.

To protect groundwater you may not use this product or other products containing 2,4-D during 1st September till 29th February.

This product is harmful for non-target arthropods. Avoid unnecessary exposure.

This product is only intended for professional use.

B. Directions for use

General

DAMINE 500 is a hormone-type foliar herbicide with a systemic mode of action.
The product is effective against annual and perennial broadleaved weeds.
Grasses are not killed. The weeds can be controlled in a young stage as well as in an old stage. The weeds must have formed sufficient foliage. The product works best during growing weather; it should not be applied during bright sunshine. It should be dry during application and some hours afterwards. Crop and weeds must be dry during application of the product.
The product may cause damage to many crops; application should therefore be carried out with great care. Very sensitive crops are, e.g., beet in a young stage and chicory, also in a late stage in summer and autumn.
Amount of spray solution: at least 600 litres/ha.
The product should be sprayed with coarse droplets and at low pressure.

Fields of use

Grass green manure crops against creeping thistle and other weeds.
Dose rate: 2–3 litres per ha.

Fallow bulb fields

Dose rate: 2-4 litres per ha, depending on weed range and weed development. Do not apply later than 6-8 weeks before planting.

Underneath apple and pear trees and underneath wind fences

Dose rate: 2-4 litres per ha. To avoid damage it is recommended to use a shield when spraying the product. Do not spray during flowering of the trees. Do not apply underneath apples and pears that have been in place for less than 2 years.
N.B. One should take into account that pears are usually more sensitive than apples, as was found on loess soils.

U 46 D-Fluid (2,4-D) Professional use

A. Statutory Use Instructions

Permitted is only the use as a herbicide:

- in green manuring crops
- on fallow bulb fields
- in orchards underneath apple and pear trees, underneath wind shield
- on temporary uncultivated land
- banks of pastures and farming fields.

To protect groundwater the use on temporary uncultivated land in autumn and on fallow flower bulb land in spring is not permitted in groundwater protection areas.

To protect groundwater you may not use this product or other products containing 2,4-D during 1st September till 29th February on green manuring crops or fallow flower bulb land.

This product is harmful for non-target arthropods. Avoid unnecessary exposure.

This product is only intended for professional use.

B. Directions for use

General

The product is a hormone-type foliar herbicide with a systemic mode of action.
The product is effective against annual and perennial broadleaved weeds.
Grasses are not killed. The weeds can be controlled in a young stage as well as in an old stage. The weeds must have formed sufficient foliage. The product works best during growing weather; it should not be applied during bright sunshine. It should be dry during application and some hours afterwards. Crop and weeds must be dry during application of the product.
The product may cause damage to many crops; application should therefore be carried out with great care. Very sensitive crops are, e.g., beet in a young stage and chicory, also in a late stage in summer and autumn.
Amount of spray solution: at least 600 litres/ha.
The product should be sprayed with coarse droplets and at low pressure.

Field of use

Grass green manure crops

Dose rate: 2 litres per ha, against creeping thistle and other weeds.

Underneath apple and pear trees and underneath wind fences

Dose rate: 2 litres per ha. To avoid damage it is recommended to use a shield when spraying the product. Do not spray during flowering of the trees. Do not apply underneath apples and pears that have been in place for less than 2 years.
N.B. One should take into account that pears are usually more sensitive than apples, as was found on loess soils.

Temporary uncultivated land

In the stubble a number of perennial weed scan be controlled.
Dose rate: 2 litres per ha, as soon as possible after the stubble has become free. After that, the stubble must be left alone or about three weeks; do not sow cruciferous crops.

Banks of pasture and farming fields
For the control of coltsfoot, thistles and other broadleaved weeds.
Dose rate: 1,5 litres per ha. Avoid drift of the spray solution to adjacent sensitive crops.

Fallow bulb fields
Dose rate: 2 litres per ha, depending on weed range and weed development. Do not apply later than 6-8 weeks before planting.

Antikiek (2,4-D en MCPA) Professional use

A. Statutory Use Instructions
Permitted is only the use as herbicide

- on temporary uncultivated land;
- for spot application in ornamental crops outdoors;
- in outdoor strawberry crops after harvest, on the understanding that treatment may only take place after the last harvest before clearing the crop.

Spot treatment in ornamental crops is not permitted during the period 1 September to 1 March.

B. Directions for Use
General
Antikiek is a herbicide specifically for the control of creeping yellowcress, creeping thistle and perennial sow-thistle. The product should be applied during dry, growing weather on well-developed weeds that still show good growth. No rain must be expected within 6 hours after application. Neither spray during sharp, sunny weather. No soil tillage should be carried out within three weeks after application in order to enable the product to properly affect the plants.
Dose rate: 14 litres Antikiek in about 500 litres water per ha. This large amount of water is important because thorough moistening of the weeds is required. Use a nozzle type that produces coarse droplets to prevent drift. Shake the bottle well before starting preparation of the spray solution.
For spot application outdoors: 3% spray concentration (30 ml in 1 litre water).
Waiting interval: a treated field can be planted/sown again five weeks after spraying.

Temporary uncultivated land
The first use to think of is fallow flower bulb land after the bulbs have been harvested. In principle, however, all fields with creeping yellowcress qualify for treatment. The prescribed waiting interval must of course in all cases be observed.
A mixture of Antikiek and amitrol gives very good results. The dose levels then are 10 litres per ha Antikiek and 15 litres per ha of a liquid amitrol-containing product, respectively. The waiting interval in that case, however, is at least 6 weeks.

Strawberry crops after harvest
Antikiek is sprayed immediately after the last harvest. The old crop is removed after about 3 weeks and soil tillage can be carried out. New strawberries can be planted or a different crop can be grown as soon as the prescribed waiting interval has passed. Never mix Antikiek with amitrol on an old strawberry crop.

Spot treatment in ornamental crops outdoors

For the control of creeping yellowcress, creeping thistle and perennial sow thistle by means of spot-wise control of weeds with suitable equipment (e.g. weed selector, weed wipers, hand sprayer with shield).

Remarks:

- Only apply when crop and weeds are dry.
- To prevent damage, crop or desired vegetation may absolutely not get into contact with the Antikiek solution.
- Higher dilution may cause dripping and crop damage.
- Vapour effect of Antikiek may cause damage to crop or desired vegetation.
- During storage and transport the emitting parts of weed wipers (rope, cloth, brush, sponge) must be covered by a protecting cover or plastic hood in order to avoid contact with the skin.

Always test Antikiek on a small surface before treating several spots.

Jepolinex (2,4-D en dicamba) Professional use

A. Statutory Use Instructions

Permitted is only the use as herbicide in lawns and sports fields, as well as in the culture of grass grown for seed.

It is forbidden to use this product in groundwater protection areas as referred to in the Soil Protection Act, which does not include areas in which only physical soil disturbances such us soil drillings are forbidden.

B. Directions for use

The product Jepolinex is a combination of two hormone-type foliar herbicides (2,4-D and dicamba) with a systemic mode of action. The product is effective against annual and perennial broadleaved weeds such as knotgrass, chickweed, fat hen, shepherds purse, dandelion, daisy, plantain, white clover, mouse-ear, milfoil, buttercup, thistles, nettles, hawkbit, and coltsfoot. Grasses are not controlled. The weeds are controlled in a younger as well as in an older stage. Spray with a coarse droplet, low pressure, and at least 600 litres water per ha (code 5G). Apply on dry vegetation, during growing weather, when the weeds have formed sufficient leaves. Do not apply during bright sunshine or when rain threatens. Crop damage by drift should be avoided. Chicory, e.g., is very sensitive in summer and autumn.

Fields of use

Lawns and sports fields

Apply the highest dose in case persistent weeds are present such as knotgrass, mouse-ear, milfoil and large areas of daisies, dandelion, plantain, and white clover. This double dose may on fine lawn grasses cause temporary growth inhibition to light yellowing. Spring treatment, during strong weed growth, is to be preferred. Do not apply during drought and shortly before and after cutting. Successful control of, e.g., dandelion and daisy is also possible later in the season (early autumn spray). Lawns and sports fields to be treated must be at least 1 year old.

Dose rate: 4-8 litres per ha

Remark:

- Spot-wise control of perennial weeds should be carried out with a concentration of 1% (100 ml in 10 l water).
- In lawns in which flower bulbs are present do not apply before the above-ground parts have completely died off.
- Do not apply where roots of trees and shrubs are present closely to the surface.
- Do not place the first and second cuttings after spraying on the compost heap to avoid hormone damage when using the compost.

Grass grown for seed

For the control of chickweed, knotgrass, black bindweed, coltsfoot, thistles etc in August/September, depending on the development of coltsfoot. The grass should at the moment of application have 4 to 5 blades.
Dose rate: 4-5 litres per ha.

Gazon-Net-N (2,4-D; MCPA; dicamba) Private use

A. Statutory Use Instructions
Permitted is only the use as herbicide on sports fields and lawns.

It is forbidden to use this product in groundwater protection areas as referred to in the Soil Protection Act, which does not include areas in which only physical soil disturbances such us soil drillings are forbidden.

The product is not intended for professional use.

B. Directions for use
The product is a combination of three hormone-type foliar herbicides with a systemic mode of action. It is effective against annual and perennial broad-leaved weeds. Weeds are controlled in a young as well as in a slightly older stage. The products works best during growing weather; it should not be applied during bright sunshine. It should be dry during application and for some hours afterwards; crop and weeds must be dry as well. The product may damage adjacent crops by drift; application should therefore be carried out carefully. Very sensitive crops are, e.g., beet in a young stage and chicory in a late stage in summer and autumn.
The product should be sprayed with coarse droplets and at low pressure.

Sports fields and lawns
Against frequently occurring weeds such as clover, mouse-ear, daisy, mouse-ear hawkweed, plantain, dandelion, and knotgrass. Application may take place from mid May until early September. Lawns and sports fields should be at least 1 year old before treatment can take place. Weeds should have sufficient foliage at the moment of application to enable good uptake. Cutting can be carried out one week after spraying; cuttings must the first three times not be placed on the compost heap.
Dose rate spraying: 60 ml per 100 m^2, i.e., 6 ml per 10 m^2.
Dose rate watering: 6 ml in 5 litres water for 10 m^2.

HEMA Gazonmest met onkruidbestrijder (2,4-d en dicamba) Private use

A. Statutory Use Instructions
Permitted is only the use in lawns.
It is forbidden to use the product in water abstraction areas.

B. Directions for use
HEMA Gazonmest met onkruidbestrijder destroys white clover, dandelion, plantain and other lawn weeds. Dandelion and creeping buttercup may in some cases be somewhat less susceptible. The grass gets all nutrients that make it green and strong so that it can rapidly take up the place of the dead weeds. Precise observance of the following points is decisive for success. HEMA Gazonmest met onkruidbestrijder works via the leaves. The lawn must therefore be wet (bedewed) to let the fine granules stick to the weed leaves. This is especially the case for clover. Application can be carried out as of about mid May, as long as the weed is growing and the temperature does not fall below 15°C.
Dose rate: 25 g/m^2. Spread evenly; the use of a spreader is therefore recommended.

Application about 1 week after cutting is most effective, after the weeds have again developed sufficient leaves to absorb the product. Remove cuttings. Grass can be cut again about 4 to 5 days after application; the product has then had sufficient opportunity to be absorbed by the weeds. Rain during the first 24 hours after application would wash the fine granules from the weed leaves. Re-treatment may be necessary in such cases. Re-treatment around the end of August may in many cases, in the presence of certain weeds, be necessary to achieve sufficient effect.

Remarks:

- Do not place cuttings of the first 2 to 3 times after application on the compost heap.
- The product may not be applied before tulips, crocuses etc in the lawn have not only finished flowering but all foliage has completely died off.
- The product may not get into plant borders or in the close vicinity of roots of trees or shrubs.

Take care:

Do not use HEMA Gazonmest met onkruidbestrijder on newly sown lawns. The product may not be applied earlier than 1 year after grass emergence.

5.5.2. Authorization

Authorization	2,4-D
Expiry date	The expiry date is 1-10-2012 2,4-D is authorised in a number of mixed products with MCPA, mecoprop and/or dicamba. These products have an expiry date until 9-9-9999; this is an 'administrative authorization' of which the duration is determined via EU decision making.
EU evaluation	Included in Annex I
Extension or withdrawal	The products based on 2,4-D alone were restricted in May 2007 to grass green manure crops, underneath apple and pear trees, underneath windshields, on temporary uncultivated land, on banks of pastures, banks of farming fields and uncultivated bulb fields. The applications in cereals, maize, grass seed, pastures, lawns, sport fields, permanently uncultivated land, banks of watercourses, and dry ditch bottoms (spot treatment only) are forbidden since May 2007 for the single product of 2,4-D.
Restriction on label in view of groundwater or surface water	*Professional*: To protect groundwater the use on temporary uncultivated land in autumn and on fallow flower bulb land in spring is not permitted in groundwater protection areas. To protect groundwater you may not use this product or other products containing 2,4-D during 1st September till 29th February on green manuring crops or fallow flower bulb land. *Home and garden products*: Use of this product in groundwater protection areas, designated by virtue of the Environmental Protection Act, not including areas in which only physical soil disturbances such us soil drillings are forbidden, is not permitted.
Environmental evaluation as regards content by CTB[1]	21st May 2007

Authorization	2,4-D
Authorization holder	*Professional*: Nufarm UK Ltd., Agrichem B.V., Bayer Cropscience B.V., Luxan B.V., AGRIPHAR S.A., COMPO BENELUX, Scotts International B.V. *Home and garden products*: Scotts BENELUX, Pokon & Chrysal International B.V., Barenbrug Tuinprodukten B.V., Intratuin Nederland B.V., HEMA B.V., Luxan B.V., Bayer Cropscience B.V., AGRIPHAR S.A., Agrichem B.V., Scotts International B.V.
On the market since	1974

[1.] Environmental evaluation as regards content by CTB 21st May 2007:

- In the monograph, one non-standardised lysimeterstudy is described, performed with 750 g/ha applied in June to spring cereals. 2,4-D as well as its metabolites (2,4-DCP, 2-CP, 4-CP and 2,4-DCA) were not detected in any of the analyzed leachate or in the soil layers of the lysimeters at the end of the incubation period (after 2 years). The uses in green manuring crops and fallow flower bulb in autumn are not permittable. The uses on fallow flower bulb land in spring and in temporarily uncultivated land in autumn are not permittable in groundwater protection areas. For the remaining applications the product complies with the requirements laid down in Annex VI of Council directive 91/414/EEC concerning persistence and leaching in soil.
- The active substance 2,4-D meets the standards for persistence in soil as laid down in the Regulation of Uniform Principles for Plant protection products (BUBG).
- All proposed uses meet the standards for drinking water as laid down in the BUBG. All proposed applications of the active substance meet the standards for aquatic organisms as laid down in the BUBG. All proposed applications of the active substance meet the standards for sediment organisms as laid down in the BUBG. All proposed applications of the active substance meet the standards for birds as laid down in the BUBG. The active substance meets the standards for bioconcentration as laid down in the BUBG. The proposed uses meet the standards for mammals as laid down in the BUBG. All proposed applications of the active substance meet the standards for bees as laid down in the BUBG. All proposed applications of the active substance do not meet the standards for non-target arthropods as laid down in the BUBG, so the restriction sentence must be put on the label (see above). All proposed applications of the active substance meet the standards for earthworms as laid down in the BUBG. All proposed applications of the active substance meet the standards for soil micro-organisms as laid down in the BUBG. All proposed applications of the active substance cannot be examined against the standards for activated sludge as laid down in the BUBG. The risk for non-target plants of all proposed applications of the active substance is considered to be high. However, the risk assessment to non-target terrestrial plants is not officially part yet of the actual framework of environmental assessment.

5.5.3. Criteria and substance properties

Criteria and substance properties	2,4-D
CAS number	94-75-7
Chemical name (IUPAC)	(2,4-dichorophenoxy) acetic acid; belongs to the chemical group of the phenoxy acids
Legal MPC	26 µg/l
MPC Pesticides Atlas	26 µg/l
CTB standard	< 10 µg/l
KRW (Framework Directive Water) / river basins	• Rhine, Meuse and Schelde basins: The substance has been analyzed for and has been detected at 1 or more measurements or locations. The concentrations for all measurements are below the environmental quality standard. • Eems Dollard: the substance has been analysed for and has not been found; therefore not relevant.
Substance properties in water	
Solubility	44558 mg/l (pH = 7)
DT_{50} water	29 days
Relevant metabolites in water	None
Substance properties in soil	
DT_{50} lab	2 – 59 days (geometrical average: 13.67 days)
DT_{50} field study	4.6 – 17.2 days (Sweden) (geometrical average of the non-standardized $DT_{50's}$: 9.9 days)
Adsorption/desorption K_{oc}	32.5 l/kg
pH dependence bond	At low pH values (e.g. 4 – 6), the adsorption of 2,4-D is greater than at neutral or alkaline pH.
Relevant metabolites in soil	None. A number of metabolites is formed in the soil: 2,4-dichlorophenol, 2-chlorophenol, 4-chlorophenol and 2,4-dichloroanisole. None of these metabolites reached a formation percentage of 10% of the applied amount.
Toxicity arthropods	Hazardous for non target arthropods.
Bioaccumulation	BCF 10 l/kg, the potential for bioaccumulation is considered low.
Volatilisation	No data were provided. The acid is not volatile.

Summary

All proposed uses of 2,4-D in spring, except the use on fallow flower bulb land, meet the standards for leaching to the shallow groundwater as laid down in the Regulation of Uniform Principles for Plant protection products (BUBG). For fallow flower bulb land in spring, and temporarily uncultivated land in autumn, the predicted concentrations for 2,4-D are smaller than 0.1 µg/L but larger than 0.01 µg/L. Therefore, a restriction on the use in groundwater protection areas should be placed on the label. The uses on green manuring crops and fallow flower bulb land in autumn do not meet the standards for leaching to the shallow groundwater as laid down in the BUBG and are therefore not permittable. 2,4-D is hazardous for non-target arthropods. No relevant metabolites.

6. INVOLVED EXPERTS

Expert meeting on 8th May 2007

Steering group/partner	Organisation	Person
Authorization holder	Nufarm Ltd. UK	Albert van den Ende Pol Lambrecht
Drinking water company	WML Waterbedrijf Groningen	Peter van Diepenbeek Theo Vlaar
Water board	Hollandse Delta Zeeuwse Eilanden	Janneke van Gorsel Rien Klippel
Agriculture	LTO Akkerbouw (Farmers' Union Arable Farming)	Henk Scheele
Research	PPO (Applied Plant Research) PRI (Plant Research International)	Rommie van der Weide Arie van der Lans
Trade	Agerland	Wilbert Wijers
Schone bronnen	Schuttelaar & Partners	Sylvia van Nierop
Schone bronnen	Schuttelaar & Partners	Laura Mout

Readers: Eric Gibert (Nufarm Limited UK) and Jan Hekman (Ecoconsult).

Due to the similarity of 2,4-D and MCPA is decided to discuss the solutions for the emission routes of 2,4-D during the second expert meeting of MCPA.

Expert meeting on 25th June 2007

Steering group / partner	Organisation	Person
Authorization holder	Nufarm Ltd. UK	Pol Lambrecht Albert van den Ende Andrew Bond
Drinking water company	Duinwaterbedrijf Zuid-Holland Waterbedrijf Groningen	Leen Valstar Theo Vlaar
Water board	Hollandse Delta	Edith Kruger
Agriculture	LTO (Farmers' Union Grassland) NFO	Co Hartman Jaco van Bruchem
Research	PPO (Applied Plant Research) RIVM	Rommie van der Weide Ton van der Linden
Contractor	Claessens Agri-Service	Wim Claessens
Trade	Agrifirm	Aaldrik Venhuizen
Schone bronnen	Schuttelaar & Partners	Léon Jansen
Schone bronnen	Schuttelaar & Partners	Laura Mout

Readers: Peter van Diepenbeek (WML), Janneke van Gorsel (Water board Hollandse Delta), Rien Klippel (Water board Zeeuwse Eilanden), Henk Scheele (LTO Akkerbouw), Arie van der Lans (PRI), Wilbert Wijers (Agerland), Eric Gibert (Nufarm Ltd. UK) and Jan Hekman (Ecoconsult).

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