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

Implementation programme MCPA

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COLOFON

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

2. PROBLEM DEFINITION

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

Authorization
MCPA is a systemic hormone-type foliar herbicide. The product is effective against annual and perennial broadleaved weeds and is authorised in arable crops, pastures, lawns, sports fields, road verges, temporary and permanently uncultivated land, in public parks and gardens and on slopes of water courses and dry ditch bottoms. In Europe MCPA has an Annex I authorization (chapter 5). The CTB has tested the product (24 February 2006) against the provisional drinking water standard. The 90-percentile over all individual measurements at drinking water intake points is 0.05 µg/l; this means that the drinking water standard is not exceeded (chapter 6).

Use
According to the authorization holder MCPA is mainly used in grassland (60%) and cereals (25%). Public parks and gardens (2-3%) and private use (2-3%) together account for about 5% of the sales volume (table 18).

The substance MCPA
MCPA is a systemic hormone-type foliar herbicide. The product is effective against annual and perennial broadleaved weeds. Grasses are not killed. The product is authorised for use in cereals, flax, grass grown for seed and gladioli; underneath wind fences; in pastures in which no livestock is present, as well as in grass green manure crops; in lawns and sports fields; in road verges, against creeping thistle, spot application only; on temporary and permanently uncultivated land, on borders of arable fields and pastures; in woody crops in public parks and gardens against convolvulus species, in the culture of osier and reed; on slopes of water courses and on dry ditch bottoms, spot application only, and for the control of secondary growth in potatoes.
MCPA has a low toxicity for aquatic organisms, is not bioaccumulating, is not persistent and slightly sensitive to leaching, depending on the pH value of the soil.

Monitoring data in surface water
The Maximum Permissible Concentration (MPC) of 280 µg/l is not exceeded in surface water. In surface water MCPA regularly exceeded the drinking water standard in the field ditch (473 times out of a total of 2244 measurements in 2003/2004) (table 4). At drinking water intake points MCPA regularly exceeded the drinking water standard (>5 times per year of the >100 measurements; maximum concentration 0.42 µg/l) in the period 2000-2005. This occurs throughout the Netherlands and mainly in the period of April to October (table 1). This is a problem for drinking water companies, because it might limit the possibility for water filtration in dunes. Water board 'Hollandse Delta' has analysed MCPA in the urban monitoring network. Here, the drinking water standard is exceeded regularly (up to 16 times of a total of 90 measurements per year. In 2006 the maximum concentration was 2.3 µg/l and the average concentration 0.37 µg/l (table 8).

Monitoring data in groundwater
MCPA is occasionally found in groundwater exceeding concentrations according to the drinking water standard. In 2006 the drinking water standard is exceeded 3 times out of the 690 measurements in the provincial monitoring net (table 10).

Monitoring data in air and rainwater
In air samples MCPA is found in 2000 and 2001 respectively in 11 and 4 out of 351 samples with a maximum average concentration of 0.21 ng/l in the samples above zero (see table 13). MCPA is found in precipitation samples in 2000 and 2001 respectively in 150 and 163 out of 234 samples with a maximum concentration of 15.1 ng/l (see table 14).

Conclusion
MCPA regularly exceeds the drinking water standard in surface water, also at drinking water intake points. The emission may originate from agriculture as well as from use at pavements, in public parks and gardens, and private use.

3. ROUTES OF EMISSION AND SOLUTIONS

During the expert meetings the possible routes of emission and solutions for reducing standard exceedances by MCPA are discussed and shown below in random order.

3.1. Routes of emission

Agricultural use
According to experts MCPA is mainly used in agriculture. The exceedances of the drinking water standard are comparable with the period MCPA is used in agriculture. For example from use on grassland, where MCPA is used against broadleaved weeds.

Direct overspray or drift
It is also allowed to use MCPA on slopes of watercourses (spot application only) with direct overspray or drift MCPA comes in the surface water. Drift depends on concentration of the sprayed material, weather conditions and the mode of use: type of spraying equipment and type of spray nozzles, height above the ground of the spray booms. This can lead to high concentrations of MCPA 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 MCPA is short. A value of 24 days has been selected from laboratory experimentation as the end point to use in risk assessments. In a field study (sandy loam soil) the breakdown of MCPA is more rapid than in the laboratory. After application of 1.68 kg/ha MCPA in May on a sandy loam soil no residues were detected after 21 days in 0 – 15 centimetre soil layer.
Due to the application rate and the reported half-life in soil, a couple of months after application there could still be significant quantity of MCPA remaining. Therefore, the surface water analysis events recorded mainly in June / July could still be regarded as a result of application to cereals earlier in the year. 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.

Leaching through soil
Leaching through soil to ground water is influenced by the half-life of MCPA and also the mobility of the molecule in the soil. The latter is influenced by the pH of the soil. In a lysimeter study with a sandy soil, leaching of MCPA was observed at a very low level. In a second lysimeter study with a silty soil, MCPA was not found in the leachate. During the second expert meeting there was some discussion about the results of the lysimeter studies. Specific sorption and degradation parameters for the lysimeter soils are not available. Therefore, no general conclusions can be drawn about leaching through soil to groundwater from these experiments (no extrapolation possible).

Leaching through drainage
Leaching through field drains can play a significant role. Field drains are usually only 70 – 100 centimetres deep and movement of water with MCPA into the drain can be affected by macropore flow (depth strata). In some cases there may only be 20 – 30 centimetres of undisturbed soil above field drains and therefore it is possible that field drains represent a significant route of MCPA into surface water.

Pavements
The volume of use of MCPA on pavements is low (2-3%). However, the run-off factor from pavements to surface water is at least 10 times higher than on arable land. The run-off of MCPA from pavements will be between 5 and 25%, while for arable farming the run-off is about 1-3%. In 2007 the use of MCPA on pavements increased, because the use of glyphosate on pavements is restricted. In the Netherlands chemical weed control is applied on more than 100.000 ha of pavements. Municipalities use on average 92 g MCPA per ha on pavements (Vlaswinkel et al., 2006).

3.2. Solutions

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

Research for alternatives of MCPA
MCPA is mainly applied for perennial weeds. There are at the moment no alternatives for MCPA to remove perennial weeds. For smaller weeds it is possible to find alternatives. Therefore, the advice is to research alternatives and rank them. For instance, primus with the active ingredient florasulam, might be an alternative for smaller weeds on grassland.

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 MCPA. 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 MCPA.

Develop a brochure about emissions
It is important to raise awareness amongst users of MCPA about emissions to the environment. Therefore, more information has to be given to users of MCPA 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. 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 MCPA 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.

Organize 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 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 MCPA 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 MCPA when the expected amount of rain is more then 20 millimetres in the first three days after application.

Good grassland management
The use of chemical weed control on grassland is for example influenced by damage of the grass caused by driving, drought, and frost. Generally speaking, good grassland management prevents weed development. Good grassland management exists of timely alternation of grazing and mowing or topping, timely grazing by cattle and field work under dry conditions. With good grassland management less MCPA is needed for preventing weed growth.

Use MCPA spot-wise in arable farming
In arable farming MCPA is not used spot-wise, because it is not profitable and practical at the moment. If MCPA 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 in a profitable manner in practice. Therefore, more research is needed.

Develop critical dose tables
For some crops it is possible to apply a lower dose MCPA 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 MCPA. The latter however, has not been scientifically proven.

Call attention to terrain managers
Involved organizations as governmental institutions call terrain managers to attention of the importance of managing slopes and building sites in a proper way, for example by mowing. So spreading of pioneering weeds is limited. The consequence is that farmers suffice with mechanical removing of weeds and use less pesticides containing MCPA.

Join law certification on using pesticides in public space
In the future pesticide use on pavements will be linked by law to certification. For glyphosate the certification system will be available by the end of 2007. It is recommended to act pro-active and integrate MCPA in this certification system. In this way a new problem with MCPA on pavements, as already exists with glyphosate, will be prevented. The Ministry of Housing, Spatial Planning and the Environment (VROM) aims at a legal arrangement that all usage of pesticides on pavements will be certified.

Communication about use on pavements

Use existing non-agricultural communication lines to exchange information about preventing emission from MCPA. Examples of existing non-agricultural communication lines are:

- Practical networks (municipalities, industrial parks and Wageningen University discuss problems about weed control)
- SWEEP-guidelines for use on pavements of pesticides, mainly focused on pavements. The criteria guidelines could be extended for MCPA. Specific shortlists for use of pesticides 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 include, for example, filling spray tanks and cleaning (www.dob-verhardingen.nl).
- News letter 'Sustainable ground management' (2 times a year)
- Spray license course
- Readings about managing public space
- Certification through 'Barometer Sustainable ground management'

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.

Solution 1 (MCPA) is similar to 2,4-D, solution 5	Parties	Actions	State of affairs
Cooperation between drinking water companies, water boards and farmers	**Principal executor:** 'Unie van Waterschappen'	The 'Unie van Waterschappen' stimulates regional water boards to cooperate with drinking water companies and farmers.	
	Ranking experts: 1		
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 2 (MCPA) is similar to 2,4-D, solution 2	Parties	Actions	State of affairs
Develop a brochure about preventing emissions	**Principal executor:** Nefyto	Nefyto stimulates Nufarm UK Ltd. to develop the brochure before the next spraying season.	
	Ranking experts: 2		
Background: it is important to raise awareness amongst users of MCPA about emissions to the environment. Therefore, more information has to be given to users of MCPA 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 (MCPA) is similar to 2,4-D, solution 7	Parties	Actions	State of affairs
Develop critical dose tables for application of MCPA	**Principal executor:** Nefyto	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'.
	Ranking experts: 3		
Background: for some crops it is possible to apply a lower dose MCPA 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 MCPA. However, this has not been scientifically proven yet.	**Executor:** PPO (Applied Plant Research)		
	Together with: AGRODIS and authorization holders		
	Time line: 4th quarter of 2007		

Solution 4 (MCPA)	Parties	Actions	State of affairs
Use existing non-agricultural communication lines to exchange information about preventing emission from MCPA used on pavements.	**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: the volume of use of MCPA on pavements is low (2-3%). However, the run-off factor from pavements to surface water is at least 10 times higher then on arable land. In 2007 the use of MCPA on pavements increased, because use of glyphosate is restricted. Therefore, it is important to communicate about preventing emissions from MCPA used on pavements.	**Executor:** SIDT **Together with:** authorization holders **Time line:** 4th quarter of 2007		

Solution 5 (MCPA) is similar to 2,4-D, solution 3	Parties	Actions	State of affairs
Organize information meetings for advisors about preventing emissions from MCPA	**Principal executor:** LTO-Nederland **Ranking experts:** 5	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 emission, 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 6 (MCPA) is similar to 2,4-D, solution 1	Parties	Actions	State of affairs
Enlarge people's awareness on preventing emissions of MCPA	**Principal executor:** LTO-Nederland **Ranking experts:** 6	LTO-Nederland checks in what way preventing emissions of MCPA can be a subject of, for example, winter readings.	
Background: enlarge people's awareness about the consequences when MCPA 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.	**Executor:** AGRODIS **Together with:** water boards, 'Telen met toekomst', Nefyto, government, DLV Plant, PPO and drinking water companies **Time line:** 4th quarter of 2007		

Solution 7 (MCPA), similar to 2,4-D, solution 9	Parties	Actions	State of affairs
Join law certification on using pesticides in public area	**Principal executor:** Vewin **Ranking experts:** 7	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: pesticide use on pavements will be linked by law to certification. For glyphosate the certification system will be available end of 2007. It is recommended to act pro-active and integrate MCPA in this certification system. In this way a new problem with MCPA on pavements, as already exists with glyphosate, will be prevented. The Ministry of Housing, Spatial Planning and the Environment (VROM) aims at a legal arrangement that all use of pesticides on pavements will be certified.	**Executor:** SIDT **Together with:** authorization holders **Time line: :** 4th quarter of 2007		

Solution 8 (MCPA) is similar to 2,4-D, solution 6	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:** 8	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 MCPA.	**Executor:** SIDT **Together with:** terrain managers **Time line:** 4th quarter of 2007		

Solution 9 (MCPA) similar to 2,4-D, solution 11	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:** 9	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 MCPA. 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 MCPA.	**Executor:** water boards **Together with:** Wageningen UR, RIZA and drinking water companies **Tijdspad:** 4de kwartaal van 2007		

Solution 10 (MCPA) similar to 2,4-D, 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 (MCPA)	Parties	Actions	State of affairs
Stimulate good grassland management.	**Principal executor:** - **Ranking experts:** 11	None, this solution does not fit in the scope of the project Schone bronnen.	
Background: the use of chemical weed control on grassland is for example influenced by damage of the grass through driving, drought, and frost damage. Generally speaking, good grassland management prevents weed development. Good grassland management exists of timely alternation of grazing and mowing or topping, timely grazing by cattle and field work under dry conditions. With good grassland management less MCPA is needed for preventing weed growth.	**Executor:** WUR Animal Sciences **Together with:** NMV, farmers and DLV Plant **Tijdspad:** -		

Solution 12 (MCPA)	Parties	Actions	State of affairs
Research alternatives for MCPA	**Principal executor:** -	None, this solution does not fit in the time frame of the project Schone bronnen.	
	Ranking experts: 12		
Background: MCPA is mainly applied for perennial weeds. There are at the moment no alternatives for MCPA to remove perennial weeds. For smaller weeds it is possible to find alternatives. The advice is to research alternatives and rank them. For example, primus with the active ingredient florasulam, might be an alternative for smaller weeds on grassland.	**Executor:** Applied Plant Research		
	Together with: authorization holders and CTB		
	Budget: -		

Solution 13 (MCPA) similar to 2,4-D, solution 13	Parties	Actions	State of affairs
Use MCPA **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 MCPA is not used spot-wise, because it is not profitable and practical at the moment. If MCPA 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 MCPA at drinking water intake points in surface water ('large' rivers) in comparison with drinking water standard (0.1 µg/l).

Year	Measure-ments (number)	Found (number)	Standard exceedances (number)	Max. concentration standard exceedance (µg/l)	Months with exceedance	Location exceedance
2005	138	60	5	0.18	May, June, July, Oct	Drentsche Aa, Rhine
2004	131	40	2	0.29	Aug	Meuse, Rhine
2003	152	21	5	0.42	May, June, July	Meuse, Drentsche Aa
2002	97	22	6	0.18	Apr, June, July	Meuse, Drentsche Aa
2001	110	28	8	0.3	Apr, June, July, Aug	Meuse, Drentsche Aa
2000	113	19	4	0.21	May, June, Aug	Meuse, Drentsche Aa

Source: REWAB and Vewin, 2000-2005.

Monitoring data MCPA of Waterbedrijf Groningen by Theo Vlaar presented during the expert meeting of 4 June 2007

Next to groundwater extractions, Waterbedrijf Groningen extracts drinking water from surface water in the Drentsche Aa. Since 1994 environmental 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. 'Waterbedrijf Groningen' measures in two ways: a proportional sample every week between March and October and a broader screening every 4 to 12 weeks (see table 2 and 3).

Table 2: Monitoring data MCPA (proportional samples) of 'Waterbedrijf Groningen' in comparison with drinking water standard (0.1 µg/l).

'Waterbedrijf Groningen'	2000	2001	2002	2003	2004	2005
Number of measurements	16	22	25	24	27	28
Number of times found	4	13	11	3	4	12
Number of times with drinking water standard exceedance	3	4	2	3	0	2
Maximum concentration (in µg/l)	0.21	0.51	0.16	0.20	0.07	0.17
Months with exceedance	May, June	Jun, Aug	Apr, July	May, June		May, Sep

Table 3: Monitoring data MCPA (broader screening) of Waterbedrijf Groningen in comparison with drinking water standard (0.1 µg/l).

'Waterbedrijf Groningen'	2000	2001	2002	2003	2004	2005
Number of measurements	3	4	5	29	15	12
Number of times found	1	0	0	3	2	7
Number of times with drinking water standard exceedance	0	0	0	1	0	5
Maximum concentration (in µg/l)	0.06	0.00	0.00	0.11	0.09	0.18
Months with exceedance				July		Feb, May, June, July, Oct

Monitoring data MCPA of Waternet by Jan Peter van der Hoek presented during the expert meeting of 4 June 2007

Waternet uses the river Rhine for about 70% of its drinking water production. Water is extracted from the river Rhine near Nieuwegein. After pre-treatment the water is transported to the dune area and infiltrates in the soil. After a residence time of approximately 3 months the water is extracted and post-treatment is carried out. According to the Dutch legislation, infiltration of water into the soil is only allowed when certain quality criteria are met. One of these criteria concerns the presence of pesticides in the water. The concentration of each compound should not exceed 0.1 µg/l, while the sum of all pesticides should not exceed 0.5 µg/l. One of the pesticides Waternet closely follows is MCPA. The concentration at intake is measured 13 times a year. It is analyzed by GC-MS with a detection limit of 0.02 µg/l. From January 2005 till April 2007 the concentrations were below the drinking water standard of 0.1 µg/l. Therefore, raw water intake could continue. However, Waternet is still worried since this kind of substance should not be present in water of the Rhine. In total five analyses were on or above the detection limit, all around 0.03 µg/l. This was both in 2005 and 2006 during the period of May, July and August.

Monitoring data MCPA of Dune Water Company South-Holland (DZH) by Marco Kortleve presented during the expert meeting of 4 June 2007

DZH takes care of drinking water supply for households and industries, in total 80 million m^3 per year. During a year MCPA is measured 26 times at drinking water intake point. In 2004 the analysis method was changed so a lower detection limit was reached. During 2000-2007 MCPA exceeded the drinking water standard of 0.1 µg/l seven times (see figure 1). The drinking water standard was mainly exceeded in the months: May, June and July. Furthermore it can be concluded that MCPA was found in higher concentrations closer to places where it is used, for example, in grassland, corn and cereals. According to CBS, in 2001 the land in Bommelerwaard (an area that DZH monitors) was used for grassland (70.4%), arable land (21.4%), fruit cultivation (5.2%) and greenhouses (3%). In larger watercourses MCPA is a smaller problem, because MCPA is diluted or dissolved. At Maas Keizersveer MCPA stayed below 0.2 µg/l during 2000 till 2007.

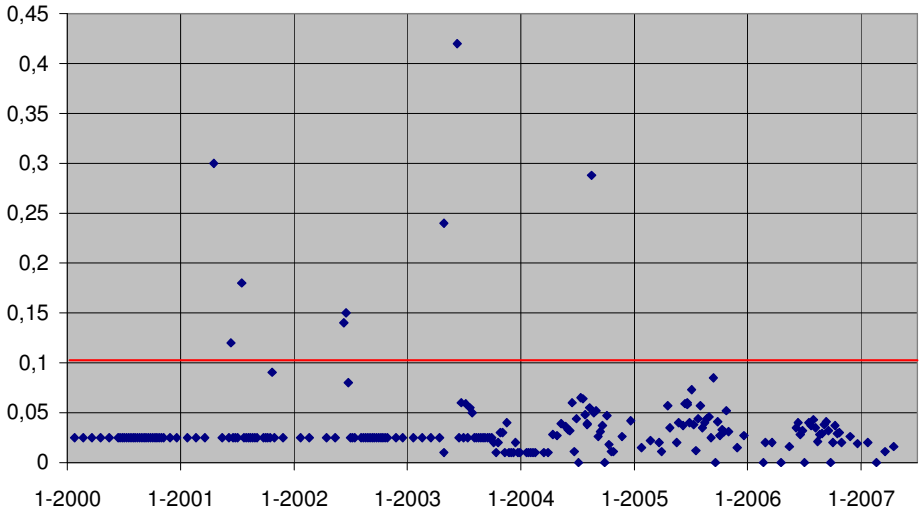


Figure 1: MCPA at drinking water intake point of DZH in comparison with drinking water standard.

For a complete view of MCPA concentrations found in polder areas where DZH extracts drinking water the following figure of Polder PS van Dam is included (see figure 2). In two other polders, polder PS Baanbreker and polder PS DeJong, MCPA concentrations exceeded the drinking water standard respectively 11 out of 36 measurements and 5 out of 27 measurements. In both polders maximum concentrations of MCPA stayed below 0.5 µg/l.

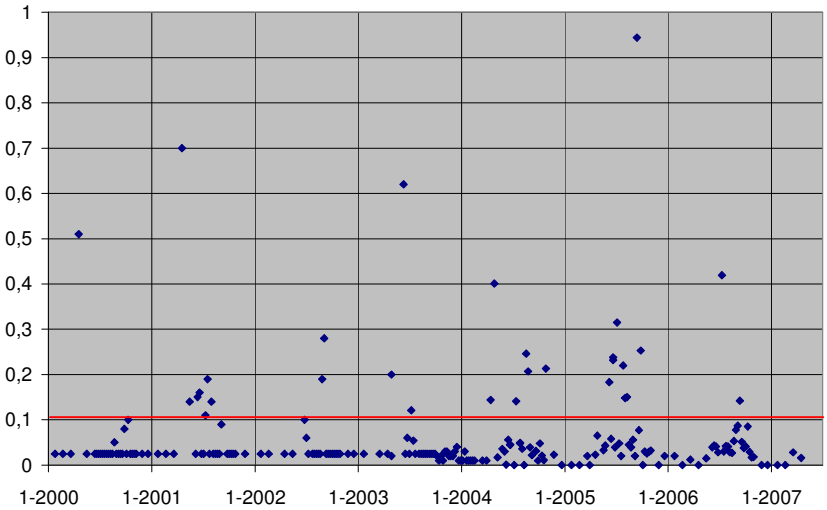


Figure 2: MCPA at Polder PS van Dam in comparison with drinking water standard.

Table 4: Monitoring data MCPA 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 exceedance	Location exceedance
2003-2004	2244	473 on 181 5x5 grids	150<1 µg/l; 31>1 µg/l	All year, mainly Apr-Oct	Throughout the Netherlands, except Limburg (not measured)
2001-2002	1511	309 on 116 5x5 grids	96<1 µg/l; 20>1 µg/l	All year, mainly Apr-Oct	Zeeland, Zuid-Holland, Noord-Holland, Flevoland, Gelderland, Overijssel, Friesland, Drenthe, Groningen
1999-2000	1071	234 on 97 5x5 grids	84<1 µg/l; 13>1 µg/l	Apr-Nov	Throughout the Netherlands, except Limburg (not measured)
1997-1998	1107	237 on 90 5x5 grids	75<1 µg/l; 15>1 µg/l	All year, mainly Apr-Oct	Throughout the Netherlands, except Brabant, Limburg, Drenthe, Zeeland (not measured)

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

MCPA is in third place of the substances that exceed the drinking water standard in surface water in 2003-2004 (MNP, 2006).

Table 5: Monitoring data MCPA in surface water intended for drinking water 2000-2005 according to CTB.

Location	Limit of detection (µg/l)	A/n*	Average conc. ** (µg/l)	90-percentile ** (µg/l)	Max. conc. (µg/l)
Rhine					
Andijk	0.02	3/37	0.012	0.01	0.04
Nieuwegein	0.02	8/37	0.014	0.02	0.04
Nieuwersluis	0.02	20/59	0.018	0.03	0.15
Meuse					
Keizersveer	0.02/0.03/0.05	26/70	0.04	0.08	0.14
Overall (Meuse + Rhine, all loose values of all locations)					
Overall			0.023	0.05	0.15

* Number of observation above limit of detection (A)/total number of observations (n). ** Based on all observations, where values below the limit of detection have been set at half the limit of detection. Source: CTB Order 24 February 2006, Agroxone 50.

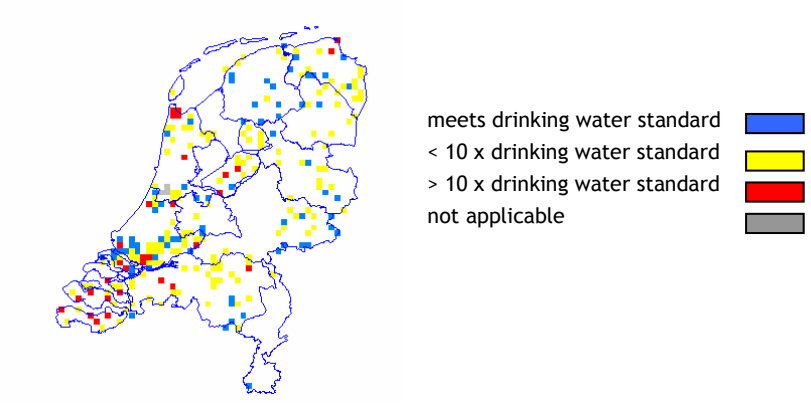


Figure 3: Locations with drinking water standard exceedance of MCPA 2003-2004. Source: Bestrijdingsmiddelenatlas, 2003-2004 (Pesticides Atlas).

Table 6: Monitoring data MCPA in surface water of 16 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	99	46	82	81
Number of times with drinking water standard exceedance	39	34	55	52
Maximum concentration (in µg/l)	7.4	19	14	6,3
Average concentration (in µg/l)	0.18	0.29	0.24	0.14
Months with standard exceedance	spring/summer			
Probably originating from	various sectors (arable farming, fruit, grassland)			
Water board Velt en Vecht	**2003**	**2004**	**2005**	**2006**
Number of monitoring points	19	14	4	
Number of measurements	57	42	12	
Number of times found	28	30	2	
Number of times with drinking water standard exceedance	3	8	2	
Maximum concentration (in µg/l)	0.87	0.65	0.17	
Average concentration (in µg/l)	0.1	0.1	0.15	
Months with standard exceedance	May, July	May, July, Aug	May, June	
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	33	35	35	29
Number of times with drinking water standard exceedance	25	21	14	12
Maximum concentration (in µg/l)	6.37	1.31	1.1	0.58
Average concentration (in µg/l)	0.49	0.24	0.14	0.15
Months with standard exceedance	May-Aug			
Probably originating from	cereals and grass grown for seed			

Table 6 (continued): Monitoring data MCPA in surface water of 16 water boards from 2003-2006 in comparison with the drinking water standard (0.1 µg/l).

Water board Delfland	**2003**	**2004**	**2005**	**2006**
Number of monitoring points		5		
Number of measurements		60		
Number of times found		17		
Number of times with drinking water standard exceedance		10		
Maximum concentration (in µg/l)		0.36		
Average concentration (in µg/l)		0.09		
Months with standard exceedance		May, June, July, Sept		
Water board Hunze en Aa's	**2003**	**2004**	**2005**	**2006**
Number of monitoring points	15	38	44	47
Number of measurements	45	239	275	240
Number of times found	17	71	90	105
Number of times with drinking water standard exceedance	10	34	59	66
Maximum concentration (in µg/l)	8.3	2.9	1.9	7.8
Average concentration (in µg/l)	0.88	0.19	0.23	0.39
Months with standard exceedance	May, Aug, Dec	May, Jun, Sep	May, Jun, Jul, Aug, Sep, Oct	May, Jun, Jul, Aug, Sep, Oct
Probably originating from	?			
Water board Zeeuwse Eilanden	**2003**	**2004**	**2005**	**2006**
Number of monitoring points	14	14	14	
Number of measurements	56	56	56	
Number of times found	52	54	52	
Number of times with drinking water standard exceedance	31	35	27	
Maximum concentration (in µg/l)	9.7	2.64	2.64	
Average concentration (in µg/l)	0.7	0.31	0.32	
Months with standard exceedance	Apr, June, Oct	Apr, June, Aug, Oct	Apr, June, Aug, Oct	
Probably originating from	cereals and grass grown for seed			
Water board Veluwe	**2003**	**2004**	**2005**	**2006**
Number of monitoring points	0	0	9	12
Number of measurements			12	20
Number of times found			4	8
Number of times with drinking water standard exceedance			2	7
Maximum concentration (in µg/l)			0.56	1
Average concentration (in µg/l)			0.23	0.54
Months with standard exceedance			Oct	Oct

Table 6 (continued): Monitoring data MCPA in surface water van 16 water boards van 2003-2006 in comparison with the drinking water standard (0.1 µg/l).

Water board Roer en Meuse	**2003**	**2004**	**2005**	**2006**
Number of monitoring points	0	0	5	0
Number of measurements			20	
Number of times found			5	
Number of times with drinking water standard exceedance			1	
Maximum concentration (in µg/l)			0.21	
Average concentration (in µg/l)			0.07	
Months with standard exceedance			May	
Probably originating from			Germany	
Water Board Rijnland	**2003**	**2004**	**2005**	**2006**
Number of monitoring points	19	22	6	0
Number of measurements	158	173	72	
Number of times found	50	63	31	
Number of times with drinking water standard exceedance	32	32	12	
Maximum concentration (in µg/l)	2.9	1	1	
Average concentration (in µg/l)	0.4	0.38	0.41	
Months with standard exceedance	Jan, Apr-July, Sep-Dec	All year	Mar, Apr, June, Aug, Sep, Oct	
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	1	0
Number of times with drinking water standard exceedance	0	0	1	0
Maximum concentration (in µg/l)	0	0	0.14	0
Average concentration (in µg/l)	0	0	0.14	0
Probably originating from	arable farming and sports fields(?)			
Water Board De Stichtse Rijnlanden	**2003**	**2004**	**2005**	**2006**
Number of monitoring points			5	2
Number of measurements			33	4
Number of times found			17	0
Number of times with drinking water standard exceedance			11	0
Maximum concentration (in µg/l)			0.73	
Average concentration (in µg/l)			0.15	
Months with standard exceedance			Apr, May, July-Oct	

Table 6 (continued): Monitoring data MCPA in surface water of 16 water boards 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	36			
Number of times with drinking water standard exceedance	25			
Maximum concentration (in µg/l)	0.95			
Average concentration (in µg/l)	0.23			
Months with standard exceedance	May, June, Sept			
Water board Rivierenland	**2003**	**2004**	**2005**	**2006**
Number of monitoring points	5			
Number of measurements	20			
Number of times found	12			
Number of times with drinking water standard exceedance	6			
Maximum concentration (in µg/l)	0.22			
Average concentration (in µg/l)	0.11			
Months with standard exceedance	June, Nov			
Water board Brabantse Delta	**2003**	**2004**	**2005**	**2006**
Number of monitoring points	13			
Number of measurements	48			
Number of times found	31			
Number of times with drinking water standard exceedance	29			
Maximum concentration (in µg/l)	4.1			
Average concentration (in µg/l)	0.49			
Months with standard exceedance	Jan, Feb, May, Sept			
Water board De Dommel	**2003**	**2004**	**2005**	**2006**
Number of monitoring points	13			
Number of measurements	56			
Number of times found	25			
Number of times with drinking water standard exceedance	16			
Maximum concentration (in µg/l)	0.88			
Average concentration (in µg/l)	0.22			
Months with standard exceedance	May, June, Sept			

Table 6 (continued): Monitoring data MCPA in surface water of 16 water boards 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		

Source: monitoring data water boards, 2003-2006. The water boards Peel en Maasvallei, Rijn en IJssel, Regge en Dinkel, Groot Salland, Amstel, Gooi en Vecht, Wetterskip Fryslân, Noorderzijlvest, Reest en Wieden submitted no data.

Table 7: Monitoring data MCPA in surface water of water board Zuiderzeeland and Hollands Noorderkwartier from 2001-2005 in comparison with the drinking water standard (0.1 µg/l).

Water board Zuiderzeeland	2001	2002	2003	2004	2005
Number of monitoring points	10	10	9	17	17
Number of measurements	50	50	45	50	50
Number of times found	26	41	27	37	32
Number of times with drinking water standard exceedance	?	?	?	?	?
Maximum concentration (in µg/l)	1.2	1.54	12	1.5	15
Water board Hollands Noorderkwartier	**2001**	**2002**	**2003**	**2004**	**2005**
Number of monitoring points	26	27	31	23	26
Number of measurements	118	126	172	130	169
Number of times found	46	76	81	70	83
Number of times with drinking water standard exceedance	?	?	?	?	?
Maximum concentration (in µg/l)	1.8	25	32	3.5	3.2

Table 8: Monitoring data MCPA in surface water of water board Hollandse Delta from the urban monitoring net 2004-2006 in comparison with 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	7	22	31
Number of times with drinking water standard exceedance	6	12**	16***
Maximum concentration (in µg/l)	0.79	0.58	2.3
Average concentration (in µg/l)	0.35	0.16	0.37
Months with standard exceedance	June, July	June, Aug	June, July, Aug

* 26 points in surface water, 4 effluent samples of sewage treatment plants

** of which 4 times in effluent sewage treatment plant

*** of which 7 times in effluent sewage treatment plant

Monitoring data MCPA of Water board Hollandse Delta by Edith Kruger presented during the expert meeting of 4 June 2007

The area of Water board Hollandse Delta is diverse with agriculture, industry and cities. Since 2002 Water board Hollandse Delta measures surface water in the rural area and from 2004 in cities. 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 on all points: once in February and three times during the spraying period. Hollandse Delta samples in urban areas at 34 locations varying from residential districts, near sport facilities, golf courses and sewage treatment plants. Three times a year samples are taken: in June and August and once every two years in July or February. Figure 4 shows monitoring data per year of Water board Hollandse Delta in different areas. The values above the drinking water standard vary from 0.1 till 19 µg/l. For a complete view figure 5 shows the values per month in different areas.

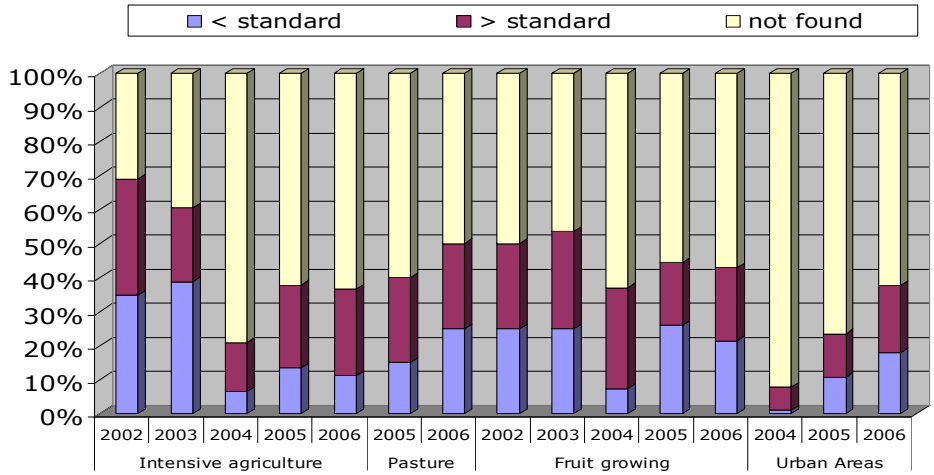


Figure 4: Monitoring data of MCPA in surface water per year of Water board Hollandse Delta in different areas in comparison with the drinking water standard (0.1 µg/l).

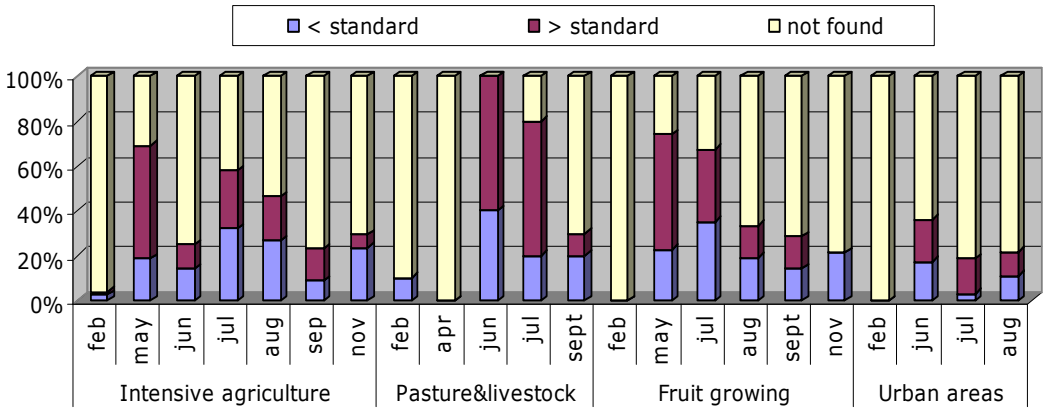


Figure 5: Monitoring data of MCPA in surface water per month during 2002-2006 of Water board Hollandse Delta in different areas in comparison with the drinking water standard (0.1 µg/l).

Most exceedances of the drinking water standard are found in May, June, July, August and September. MCPA is found in areas with intensive agriculture, pasture & livestock, fruit growing and urban areas. The exceedances in May and June fit with usage of MCPA in land with cereals.

Monitoring data MCPA of Water board Velt en Vecht by Harrie de Lang presented during the expert meeting of 4 June 2007

Water board Velt en Vecht measures MCPA in surface water three times a year in 2003 till 2005. In 2006 MCPA was not measured anymore. Most of the measuring points are in large channels. Exceedances of the drinking water standard are found in agricultural places (see figure 6).

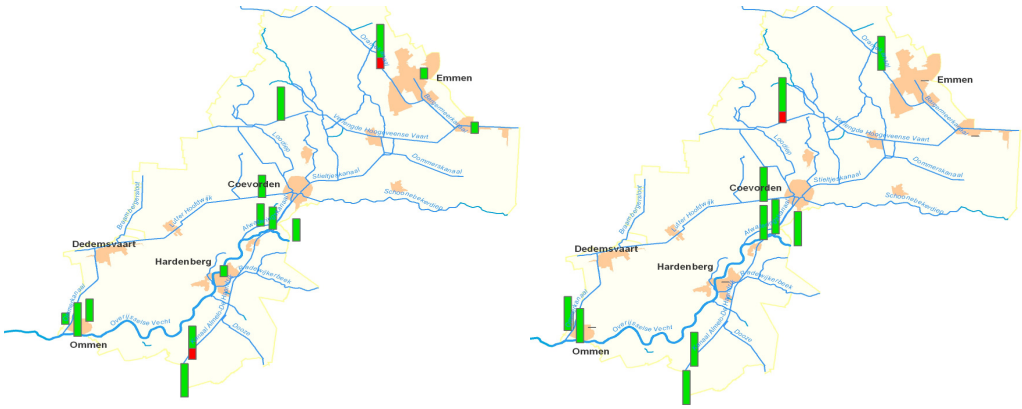


Figure 6: Monitoring data of MCPA in surface water in 2003 (left) and 2004 (right) of Water board Velt en Vecht. In red MCPA exceeds drinking water standard.

From 2003 till 2005 Water board Velt en Vecht worked on an emission reduction project in Kloosterdijk. Velt en Vecht monitored MCPA in small ditches. They also communicated with the farmers about the application moment of MCPA and on which crop (see table 9). Water board Velt en Vecht found MCPA, but not in MPC exceeding concentrations.

Table 9: Emission project in Kloosterdijk from 2003-2005, usage of MCPA and times found in surface water (above MTR of 280 µg/l).

	Used in crop			
Year	**Cereals**	**Potatoes**	**Found**	**Above MTR**
2003	4 times in May	1 time in June/July	2	0
2004	8 times in May	16 times in June/July	3	0
2005	10 times in May		0	0

5.2. Measurements groundwater in comparison with drinking water standard

Table 10: Monitoring data MCPA in groundwater at 10 metre depth of 10 provinces in the Netherlands in 2006.

Drinking water standard in µg/l	Number of measurements	Number drinking water standard exceedances	Maximum concentration in µg/l	Average concentration in µg/l
0.1	690	3	7.07	0.02

Source: RIVM, 2007.

MCPA is detected four times of which three times above the drinking water standard. A measurement in shallow groundwater is a factor seventy above the drinking water standard, while another sample from shallow groundwater is just above the drinking water standard (0.11 µg/l). In deeper groundwater a sample from a depth of 25 metre depth contained MCPA but with a concentration below the standard (0.06 µg/l). One sample from a depth of 10 metre contained MCPA at a concentration with a factor sixty above drinking water standard. The positive samples in deeper groundwater were on places where agricultural use of MCPA is relatively low. Non-agricultural applications can not be excluded. Closer inspection in the environment of the wells could give some clarification (RIVM, 2007).

Monitoring data groundwater from CTB evaluation 24 February 2006
Monitoring data from 93 measurements in Dutch groundwater are available, where in one case MCPA was found above the limit of detection (0.2 µg/l) in a concentration of 0.3 µg/l (at a depth of 9 metres). This concentration cannot be related to a certain field of use. The other measurements (at smaller depths) cannot be interpreted; one of the reasons is that the limit of detection ranged from 0.05 - 1 µg/l. In England groundwater was sampled at 519 locations. In 0.5% of the samples MCPA was detected at concentrations > 0.1 µg/l. In a monitoring programme in Spain MCPA was never found in groundwater at concentrations > 0.1 µg/l.

Royal HasKoning Quickscan risks of pesticides in groundwater protection areas
In Rhine-East MCPA was twice found above the 0.1 µg/l in groundwater bodies in the years 1998-2004. According to Royal Haskoning MCPA in particular, presents a risk for abstraction of riverbank filtrate in view of the fact that the substance is frequently found in surface water (Royal HasKoning, 2006).

5.3. Measurements regional surface water in comparison with MPC

Table 11: Monitoring data MCPA water boards in comparison with MPC 280 µg/l.

Year	MPC used in µg/l	MPC in µg/l	Number of measurements	Number of standard exceedances	Extent standard exceedance per 5x5 grid*	Months with exceedances	Location exceedance
2003-2004	280	280	2244	-	-		
2001-2002	280	280	1511	-	-		
1999-2000	280	280	1071	-	-		
1997-1998	280	280	1107	-	-		

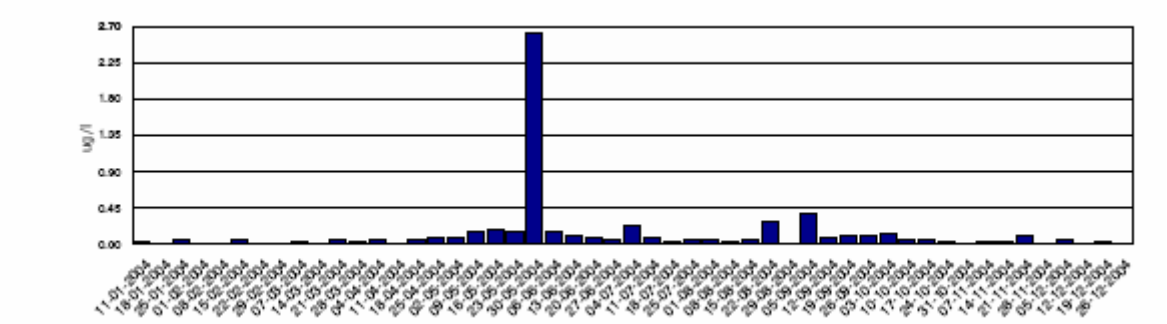
* A grid is a 5x5 kilometre square into which the Netherlands is divided.

Source: Bestrijdingsmiddelenatlas (Pesticides Atlas).

Table 12: Monitoring data MCPA collected by Omegam in 2004 for water quality managers and RIZA in surface water.

Number of measurements	Number found	Average concentration in µg/l	Maximum concentration in µg/l
775	279	0.27	12.14

Source: Bestrijdingsmiddelen in oppervlaktewater. Resultaten in 2004 (Pesticides in surface water. Results in 2004) (Omegam)



Legend: Week average value. Number of measurements: 775; Average (value > reporting limit): 0.275; Maximum measured value: 12.140; Number of measurements > reporting limit: 279 (36,0%); Median (value > reporting limit); 0.120.

Figure 7: Monitoring data MCPA collected by Omegam in 2004 for water quality managers and RIZA in surface water.

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) MCPA was measured in rainwater just as fifty other pesticides, mainly herbicides and fungicides. Figure 8 shows average concentrations per year of pesticides in precipitation, which were found in more than ten percent of precipitation samples. In 2000, 1 out of 234 samples of MCPA is above drinking water standard with a concentration of 0.155 µg/l. In 2001 MCPA stays below the drinking water standard. Table 13 shows MCPA in air and precipitation samples.

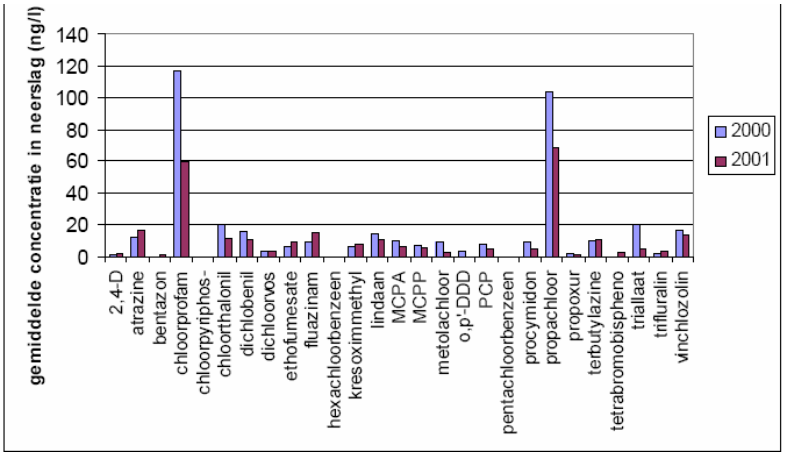


Figure 8: Average annual concentrations of pesticides in precipitation.

Table 13: MCPA in air samples in The Netherlands for 2000 and 2001.

MCPA	2000	2001
Number of monitoring points in air	18	18
Number of measurements air	351	351
Number of times found in air	11	4
Average concentration (in ng/m^3)	0.001	0.002
Average concentration > 0 (in ng/m^3)	0.05	0.21

Table 14: MCPA in precipitation samples in The Netherlands for 2000 and 2001.

MCPA	2000	2001
Number of monitoring points in precipitation	18	18
Number of measurements in precipitation	234	234
Number of times found in precipitation	150	136
Average concentration (in ng/l)	9.7	6.1
Average concentration > 0 (in ng/l)	15.1	10.5

Source: Duyzer en Vonk, 2002.

5.5. Use, authorization and substance properties

Table 15: Number of ha and kg MCPA used in Dutch agriculture (except grassland).

Year	Total ha	Total kg
1998	118 679	69 152
2000	147 634	88 703
2004	154 076	95 436

Source: CBS StatLine, 2007

Table 16: Number of ha and kg MCPA used in agriculture per crop in 2004 (except grassland).

Usage sector	Crop	Total ha	Total kg
Arable farming	Winter wheat	36605	29062
	Summer wheat	19089	13314
	Summer barley	38494	26766
	Flax	3635	790
	Grass seed	15004	8971
	Consumption potatoes	9112	3147
	Starch potatoes	11065	334
Vegetables outdoors	Strawberries	422	83
	Asparagus	41	19
	Cauliflower	21	11
Pome- and stone fruits	Apples	8962	6448
	Pears	4606	2882
Nursery stock	Flower nursery outdoors	583	304
	Forest- and hedge plantation	460	399
	Avenue- and public garden trees	1931	712
	Fruit trees	20	11
	Rose bushes	60	5
	Conifer	671	260
	Perennial plants	597	351
Bulbs and flower turnips	Hyacinths	116	41
	Tulips	781	793
	Narcissus	68	161
	Gladiolus	717	476
	Lilies (bulbs)	241	1
	Potted plants (flower)	142	20
	Bed plants	32	3
Remainder		234	8

Source: CBS StatLine, 2007

MCPA is also used in agriculture on grassland. In 2004 120956 kg MCPA was used on 983381 hectares of grassland (Statement LEI, 2007).

Table 17: Number of kg MCPA used by governmental institutions.

Year	Total kg
1995	4190
2001	5371
2005	5701

Source: CBS StatLine, 2007

According to CBS governmental institutions mainly use MCPA around sport fields and railroads. This only includes sport fields that are managed by governmental institutions for example municipalities. The railroads are managed by Rail Infrabeheer.

Table 18: Sales, according to Nufarm UK Ltd. of the active substance MCPA in percentages per culture in 2002-2006.

Culture	Percentage of sales
Grassland	60 %
Cereals	25 %
Green management	2-3 %
Private use	2-3 %
Other	10 %

Source: statement Nufarm UK Ltd., 2007.

Table 19: Emission of MCPA outside agriculture in 1998 and 2004-2005 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 20: CTB overview MCPA 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		-	-	+	-	-	-	
Cetrol combin B	MCPA	Mecoprop-p	Bromoxinil	-	+	-	-	-	-	
Agrichem MCPA 500	MCPA			-	+	+		+	?	
Agroxone 50	MCPA			-	+	+		+	?	
Agroxone 75	MCPA			-	+	+		+	?	
Dicotex MCPA 500	MCPA			-	+	+	-	+	?	
Luxan MCPA 500 Vlb.	MCPA			-	+	+	-	+	?	
Mega-M	MCPA			-	+	+	-	+	?	
Mega-M5	MCPA			-	+	+	-	+	?	
U46 M	MCPA			-	+	+	-	+	?	

Source: CTB, 2006.

Table 21: Analysis of the contribution of the cultures in the Netherlands (total country) to the drinking water standard exceedance of MCPA 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)
Cereals	very strong	very strong		very strong
Strawberries	very strong	just absent		very strong
Asparagus	very strong			
Perennial plants	very strong			
Floriculture	very strong	very strong		very strong
Potatoes	very strong	strong		present
Fruit growing	very strong			just absent
Grass grown for seed	very strong	strong		very strong
Vegetable crops	very strong			
Brassicae	very strong			
Onions	very strong	strong		very strong

Table 21(continued): Analysis of the contribution of the cultures in the Netherlands (total country) to the drinking water standard exceedance of MCPA 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)
Pavements			present	
Flower bulbs		very strong	present	just absent
Maize			just absent	
Nursery stock	very strong	very strong		strong
Greenhouse cultures	strong	very strong	very strong	present
Grassland	present		very strong	

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

5.5.1. Statutory use Instructions and Directions for use

Mega-M (MCPA) Professional

A. Statutory Use Instructions

Permitted is only the use as herbicide

- in the culture of cereals, potatoes, flax, grass grown for seed, asparagus and gladioli;
- in pastures in the absence of livestock, as well as in grass green manure crops;
- in lawns and sports fields;
- in road verges against creeping thistle, spot application only;
- on temporary uncultivated land, on borders of arable fields and pastures;
- on permanently uncultivated areas;
- in orchards underneath apple and pear trees, underneath wind fences, as well as in the culture of currants and berries;
- in woody crops in parks and public gardens against convolvulus species;
- in the culture of osier and reed;
- on slopes of water courses and on dry ditch bottoms, spot application only;

Permitted is only the use as product for the control of secondary growth in potatoes.

Waiting interval: The period between the last application in potatoes and harvest may not be shorter than 4 weeks. Do not apply in pastures shorter than 7 days before grazing.

B. Directions for use

MEGA-M 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

Spring and winter cereals: Dose rate: 4 litres per ha.
Apply against various weeds when the crop is 15-20 cm high, until not later than one week before the crop comes into ear or panicle. For the control of creeping thistle apply when the crop is 30-35 cm high. With undersown clover only apply when cereal and weed fully cover the clover.

Potatoes

a. For the control of weeds such as fat hen, redshank and creeping thistle after crop emergence. Dose rate: 3-4 litres per ha. In view of the risk of crop damage do not apply before the end of crop flowering but not later than 4 weeks before harvest. This use must be considered as emergence measure.

b. For the control of secondary growth. Dose rate: 2 litres per ha.
Apply as soon as half of the potato plants show sprouting of one or more tubers. In case of continuing high temperatures or in case of another heat period repeat spraying the same dose after at least 10 days. Do not apply before the largest tubers are 28 mm and no longer in August because the induced secondary growth will then hardly have a negative effect on quality.
Do not mix with maneb-tin. This measure must also be considered as emergency measure.

Flax Dose rate: 1-1.5 litres per ha.
Against various weeds. Apply at a crop height of 5-7 cm, while the crop shows no or only slow growth.

Grass grown for seed Dose rate: 4-6 litres per ha.
Dose rate depends on species, cropping method, weed range and weed development. The product is mainly applied for the control of thistles. Preferably apply in late summer. If necessary, spraying can still be carried out in spring; this should be carried out before coming into ear or panicle of the grass crop.

Asparagus Dose rate: 3 litres per ha.
For the control of weeds such as horsetail on production fields during the cutting season, immediately after cutting. Condition is that no new shoots come through.

Gladiolus cormels Dose rate: 4 litres per ha.
For the control of various perennial weeds. Do not apply before the end of July in view of growth aberrations of the gladioli. Preferably apply spot-wise or by using a row-sprayer. N.B. Do not apply in gladioli for flower production in view of the risk of malformation of leaf and/or flower.

Pastures

- against creeping thistle, 4-6 litres per ha, apply during flower bud stage or in the after-growth, provided that sufficient foliage is present;
- against buttercups, 4 litres per ha, apply during start flowering (end April-mid May) of in late summer (September), provided that sufficient foliage is present;
- against dandelions, 4-6 litres per ha, before flowering in spring, of in late summer, provided that sufficient foliage is present;
- against horsetail (field horsetail and marsh horsetail), 2 litres per ha, apply a few times per season from mid April with intervals of 3 to 4 weeks (continue for a number of subsequent years);
- against juncus, 8 litres per ha, apply end of May, when the leaves are 25 cm long; cut leaves 3 weeks after application;
- against wild garlic, 8 litres per ha, apply end April-early May, when the leaves are 25 cm long;
- against ragwort (marsh ragwort and common ragwort), 8 litres per ha, apply end July-early August. Repetition in the following year is usually necessary.

Permit no livestock within one week after application in a pasture in order to give the product sufficient opportunity to properly penetrate the weeds.

Grass green manure crops Dose rate: 4-6 litres per ha. Against creeping thistle and other weeds.

Lawns and sports fields Dose rate: 4-6 litres per ha. Against plantain, buttercup, daisy during the growing season. Control daisy preferably in July/August.
Do not apply on newly sown or very young lawns.

Road verges Dose rate: 4-6 litres per ha.
Only use in exceptional cases and then spot-wise only, when creeping thistles are a nuisance.

Temporary uncultivated land Dose rate: 8-12 litres per ha.
Field mint and a number of other weeds can be controlled in the stubble. Control must be carried out as soon as possible after the stubble has become free, provided that the weeds have developed sufficient foliage.
After that, the stubble must be left alone or about 3 weeks; do not sow cruciferous crops.

Fallow flower bulb land Dose rate: 4-8 litres per ha.
Dose depends on weed range and weed development. Do not apply later than 6-8 weeks before planting.

Borders of arable fields and pastures Dose rate: 4-6 litres per ha.
For the control of creeping thistle and other weeds. Avoid drift of the spray solution to adjacent sensitive crops.

Permanently uncultivated areas Dose rate: 8-12 litres per ha
For the control of creeping thistle and other weeds. If necessary apply in combination with other herbicides.

Underneath apple and pear trees and underneath wind fences Dose rate: 4-8 litres per ha

To avoid damage it is recommended to spray with coarse droplets and to use a shield when spraying the product. Only spray after 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.

Currants and gooseberries (red and black currants, and gooseberries) Dose rate: 4 litres per ha.
Apply for the control of convolvulus species after harvest and after the end buds have closed. Black currents and gooseberries are more sensitive to MCPA than red currants.

In woody crops in parks and public gardens Dose rate: 0.50% (= 500 ml per 100 litres water).
For spot treatment of convolvulus species in rising vegetation. Apply carefully by using a shield before the convolvulus vines have reached the stems and/or branches.

Osier Dose rate: 0.5% (= 500 ml per 100 litres water).
For the control of hedge bindweed. Apply very carefully between the osier shrubs early in the year before the vines of the bindweed have reached the shoots.

Reed Dose rate: 4 litres per ha.
For the control of hedge bond weed. Apply end May – early June. Retreatment is necessary in case of early application.

On slopes of water courses and on dry ditch bottoms Dose rate: 4 litres per ha.
Spot treatment only. For the control of troublesome field weeds such as creeping thistle and perennial sow thistle on slopes and dry ditch bottoms.

Antikiek (2,4-D en MCPA) Professional

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.

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 product 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.

5.5.2. Authorization

Authorization	MCPA
Expiry date	9-9-9999. The expiry date of 9-9-9999 is an 'administrative authorization' of which the duration is determined by EU decision making. And 30 April 2010 for the two newly authorised products Agroxone.
EU evaluation	Included in Annex I
Extension or withdrawal	No
Restriction on label in view of groundwater or surface water	*Professional*: It is not permitted to apply this product by means of an aircraft. It is not permitted to apply this product from 1 September to 1 March. *Home and garden products*: It is forbidden to use this product in groundwater protection areas as referred to in the Soil Protection Act, not including areas in which only physical soil disturbances such us soil drillings are forbidden.
Environmental evaluation as regards content by CTB[1]	24 February 2006
Authorization holder	*Professional*: A.H. Marks and Cie ltd, Nufarm UK Ltd., Agrichem B.V., Bayer Cropscience B.V.; Luxan B.V. *Home and garden products*: Bayer Cropscience B.V., Pokon & Chrysal International B.V.
On the market since	1990

1. Evaluation as regards content CTB 24 February 2006:

- Application in spring. Less than 0.5% of MCPA residues were detected in the percolate in a 2 year period. Most of the residue (about 80% of the total found) was detected in the top soil layer 0-10 cm after 735 days. MCPA was found only in the percolate of the loamy sand lysimeter 1 week after the application, concentration 0.12 µg/l. The average over 1 year was 0.02 µg/l; in the 2nd year no detectable concentrations (<0.05 µg/l) of MCPA were observed. 4-Chloro-2-methyl-phenol was not found (<0.07 µg/l). Standardisation revealed lower concentration for the Dutch standard scenario. The results show that spring applications of MCPA entail no risk of leaching to groundwater. This means that the standard for leaching as included in the Bmb (Order Environmental Authorization Criteria Pesticides) is met.
- Taking the MCPA concentrations in surface water and the standard exceedance factors into account shows that for MCPA all fields of use meet the standard for toxicity aquatic organisms as included in the Order

Environmental Authorization Criteria Pesticides (Bmb).

- Testing against the drinking water standard: The surface water concentrations of MCPA in the field ditch are for the proposed fields of use higher than 0.1 µg/l. Monitoring data at drinking water intake points are available (see table 3); this means that proposing restrictions does for the time being not need to be taken into consideration. The 90-percentile over all individual measurements is 0.05 µg/l. This means that the standard for drinking water of 0.1 µg/l is not exceeded. On the basis of these data it is therefore expected that there are no problems as regards the drinking water standard. This means that the fields of use of MCPA do meet the standard for drinking water.

5.5.3. Criteria and substance properties

Criteria and substance properties	MCPA
CAS number	94-74-6
Chemical name (IUPAC)	4-chloro-*o*-tolyloxyacetic acid
Chemical name (CA)	(4-chloro-2 methylphenoxy) acetic acid
Legal MPC	280 µg/l
MPC Pesticides Atlas	280 µg/l
CTB standard	500 µg/l
KRW (Framework Directive Water) / river basins	• Rhine, Meuse and Eems Dollard basins: The substance has been analysed for but was not detectably present in the surface water. The limit of detection is lower than the environmental quality standard for this substance. This means that the substance is not relevant. • Schelde basin: The substance has been analysed for and was detectably found at 1 or more measurements or locations. The concentrations for all measurements are below the environmental quality standard.
Substance properties in water	
Solubility	Easily soluble: pH = 7 293 g/l
DT_{50} water	20 days
Relevant metabolites in water	No metabolites found in amounts >10%
Substance properties in soil	
DT_{50} lab	38 days
DT_{50} field study	Not applicable
Adsorption/desorption K_{oc}	30 l/kg
pH dependence bond	Yes, lower bond at higher pH
Relevant metabolites in soil	No metabolites found in amounts >10%
Toxicity aquatic organisms	500 µg/l
Bioaccumulation	No bioaccumulation; Log Pow –0.88 to 2.70 (pH-dependent)
Volatilisation	Slightly volatilising

Summary
MCPA has a low toxicity for aquatic organisms, is not bioaccumulating, is not persistent and is slightly sensitive to leaching, depending on the pH value of the soil.

6. INVOLVED EXPERTS

Expert meeting June 4th, 2007

Background	Organization	Person
Authorization holder	Nufarm Ltd. UK	Pol Lambrecht Albert van den Ende Andrew Bond
Drinking water company	Duinwaterbedrijf Zuid-Holland Waternet Waterbedrijf Groningen	Marco Kortleve Jan Peter van der Hoek Theo Vlaar
Water board	Hollandse Delta Velt en Vecht	Edith Kruger Harrie de Lang
Agriculture	LTO (Dutch Federation of Agriculture and Horticulture) NFO	Co Hartman Jaco van Bruchem
Research	PPO (Applied Plant Research) RIVM	Marc Ravesloot Ton van der Linden
Contractor	Claessens Agri-Service	Wim Claessens
Trade	Agrifirm	Aaldrik Venhuizen
Public parks and gardens	SIDT/AIDT	Corné Kempenaar
Schone bronnen	Schuttelaar & Partners	Léon Jansen
Schone bronnen	Schuttelaar & Partners	Laura Mout

Readers: Leen Valstar (Duinwaterbedrijf Zuid-Holland) and Paul Venderbosch (KAVB).

Expert meeting June 25th, 2007

Background	Organization	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 (Dutch Federation of Agriculture and Horticulture) 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: Marco Kortleve (Duinwaterbedrijf Zuid-Holland), Jan Peter van der Hoek (Waternet), Mark Paauw (ZLTO), Paul Venderbosch (KAVB), Marc Ravesloot (PPO), Corné Kempenaar (PRI) and Harrie de Lang (Water board Velt en Vecht).

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