Jenny Kreuger

Pesticides in stream water within a small catchment in southern Sweden

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SUMMARY

A pesticide monitoring study was initialized in spring 1990 to examine the loss of pesticides from an agricultural catchment in southern Sweden under normal management practices. The occurrence of 46 different pesticides (including herbicides, fungicides and insecticides) in the Vemmenhög catchment during the agricultural seasons of 1990-1994 are presented.

During the investigation period 37 pesticides were detected in water samples, including 27 herbicides, 4 fungicides, 4 insecticides and 2 metabolites. The most frequently detected pesticides in water were: terbuthylazine, bentazone, dichlorprop, mecoprop, metazachlor, MCPA and ethofumesate. There was an overall correlation between amounts used in the catchment and concentrations found in the water samples.

Concentrations of pesticides in stream water were observed throughout the sampling periods, with peak concentrations during spraying seasons and following runoff events. The magnitude of concentration peaks varied to a great extent, most often due to changes in stream flow. Indeed, daily average concentrations sometimes varied by one order of magnitude from one day to another. Pesticides were also found in water samples as a result of incautious actions during the handling and application procedures.

Concentrations were lower at the catchment outlet when the water had passed the open part of the stream, compared to concentrations detected in culvert discharge. This was largely a result of dilution from groundwater intrusion during low-flow periods, but some of the pesticides were also trapped in the sediment. Sampling at different sites along the culvert demonstrated that the small village situated in the catchment did not contribute to pesticide findings in the culvert discharge. Winddrift had little influence on stream water quality. Pesticide application for weed control on courtyards resulted in substantial contribution of pesticide load in stream water.

Results from winter-period sampling showed that pesticides were persistent in culvert discharge throughout the winter. Detected pesticides originated from both autumn and spring applications as well as from courtyard application.

Total amounts of pesticides lost in stream flow during May-September each year varied between 0.8 and 2.8 kg during the five year period. Losses of single pesticides were generally less than 0.3% of the applied amount during individual years. As a whole the average loss during May-September was *ca.* 0.1% of the applied amount. Despite differences in concentration levels between culvert discharge and streamflow, the transported loss were comparable between the two sites.

In sediment samples, 11 pesticides were identified, including 5 herbicides, 3 fungicides and 3 insecticides, with the fungicides fenpropimorph and propiconazole and the insecticides DDT and fenvalerate detected at the highest concentrations. Some of the detected pesticides were not found in the water samples.

INTRODUCTION

Monitoring programs throughout Europe and North-America have demonstrated a general presence of pesticides in streams and rivers (Frank et al., 1982; Baker & Richards, 1989; Buser, 1990; Clark et al., 1991; Croll, 1991; Albanis, 1992; Goolsby & Battaglin, 1993; Schottler et al., 1994; Lundbergh et al., 1995). Public concern is focused on possible negative impacts of pesticides on aquatic communities and on human health. For adequate exposure assessment, as part of a risk evaluation, good quality data is needed on pesticide exposure patterns and characteristics. The ecological effects of pesticides on flora and fauna in surface waters are dependent on both peak concentrations and the duration of exposure. Sampling strategies in monitoring studies are, however, seldom adequate for assessing the ecological risks posed by pesticides in surface waters. Improved monitoring strategies are therefore desirable as a basis for exposure assessment and regulatory pollution control measurements. In most monitoring studies there has also been a lack of site specific data relating pesticide occurrence in the water with on-going activities in the catchment area. There is a great need to increase our knowledge of transport pathways within a catchment, including processes (spills, runoff, leaching, drift, etc.) influencing stream water quality, to produce better guidance on minimizing pesticide loss to water.

Objectives of this study

The overall objective of this study was to quantify pesticide concentrations and mass transport in subsurface tile drainflow and streamflow from an agricultural catchment in southern Sweden under normal management practices and to relate these concentrations to use patterns and transport pathways within the catchment.

Specific objectives of the study was to:

1. Determine the occurrence, temporal distribution and mass transport of selected major herbicides, fungicides and insecticides in discharge from the catchment.

2. Determine the occurrence of selected herbicides, fungicides and insecticides in sediments.

3. Test and implement methods for integrated sampling of pesticides in running water.

MATERIALS AND METHODS

Catchment description

The Vemmenhög catchment is located in the far south of Sweden, latitude, 55° 26' N; longitude, 13° 27' E, on the south-western plain of Skåne (Scania province) in Malmöhus county. It forms the upper reach of the Vemmenhögsån drainage basin which empties into the Baltic Sea. The catchment, at an altitude of about 45 m above sea level, has undulating topography with glacial till-derived soils rich in chalk, crystalline rock and shale. The total thickness of the Quaternary deposits is 60-120 meters (Daniel, 1992). A qualitative analysis of clay minerals in the till from this region by X-ray diffraction showed that illite is the dominating fraction, but with a significant portion of smectite (Kirchman & Eriksson, 1993).

This gives these clays different characteristics (e.g. an increased swelling-shrinking capacity) than other Swedish clay soils where illite alone dominates. The catchment has an area of 9 km^2 (900 ha) consisting of 95% arable land, with sandy loam soils dominating. On average, the surface soil contains 2.5% organic matter (with a range of 1.9-2.8% between different sites) and the sandy loam consists of 55% (51-59%) sand, 29% (26-32%) silt and 16% (12-21%) clay. Sand, silt and clay contents are relatively constant with depth, but organic matter decreases to 0.1% at 1-m depth. There are a few small depressions within the catchment (approx. 5% of the total area) with soils richer in organic matter and with a higher clay content.

The climate in the region is maritime due to the dominating westerly winds and the vicinity of the Atlantic Ocean. The mean annual temperature is 7.2°C, with mild winters (mean January temperature -1°C), and fairly cool summers (mean July temperature 16°C). The length of the growing season (mean daily temperature >5°C) is around 220 d. The average annual precipitation is 662 mm and falls mainly as rain. Soil temperature at 50 cm depth is 16°C during July and August and drops to around 2°C during the winter.

Extensive drainage systems have been installed within the area and during the late 1950´s open ditches in a larger part of the catchment were covered and replaced by a large tile system. About 40% of the field area is systematically drained with tile drains and on the remaining area tile drains are installed in a non-regular manner following the natural drainage ways and connecting isolated depressions to the large tile system.

Agricultural practice in the catchment is normally comprised of a 4-year rotation with winter rape, winter wheat, sugar beets and spring barley on almost 80 % of the area and with spring wheat, peas, oats, grass leys, winter barley, rye and spring rape on the remaining area. None of the crops are irrigated. Typical crop yields are 3.5, 7.5, 45 and 6.5 t/ha for winter rape, winter wheat, sugar beets and spring barley, respectively.

There are 23 farms within the catchment area, cultivating 85% of the arable land, and with another 12 farmers, living at some distance from the catchment boundaries, operating the remaining 15% within the catchment.

Data collection

Farm-to-farm survey

Information on crops, fertilizing, pesticide handling, type of spraying equipment used and pesticide usage (i.e. type of pesticides, dosage, time of spraying and location) was collected annually through personal interviews with the 35 farmers operating within the catchment area. Only one farm with 2.5% of the arable land did not participate. The mean acreage operated by farmers within the catchment is 24 ha. The almost 60 non-farming households within the catchment area were also interviewed during the first year of investigation about possible pesticide usage.

Collection sites

Water samples were collected for analyses from 5 sites within the catchment (**Figure 1, Table 1**). Samples from the site NA1 provided a measure of subsurface drainage water from a tile-drained agricultural field. The tile drains are at a depth of *ca.* 1 meter. At certain sites, though, main drains are placed at a depth of 3.5 meters cutting through some hillocks in the field.

Throughout the upper part of the catchment, drainage water is channeled through a large culvert, apart from a small open ditch with a length of 100 m. The culvert collects primarily tile drainage, but can also, as customary in tile-drained areas, carry runoff water due to surface runoff inlets along the tile drains and from farm yards. Subsurface water samples taken from the culvert (sites FA3 and SH5) and at the outlet of the culvert (site UT10) provided a measure of concentrations in drainage and runoff leaving the fields and included losses from areas where pesticides were handled. At the discharge from the catchment (site LU12) the water had flown 1.1 km from the culvert outlet through a small open stream. Just north of LU12 the stream is widened for a stretch of 75 m, forming a small, 0.2-0.4-m deep pond. Samples taken at this site provided a measure of exposure not only to runoff and leaching, but also to spray drift and possible filling and washing of spraying equipment directly in the stream. Along this open part of the stream, sedimentation, degradation and, during low flow periods, ground water intrusion can also take place.

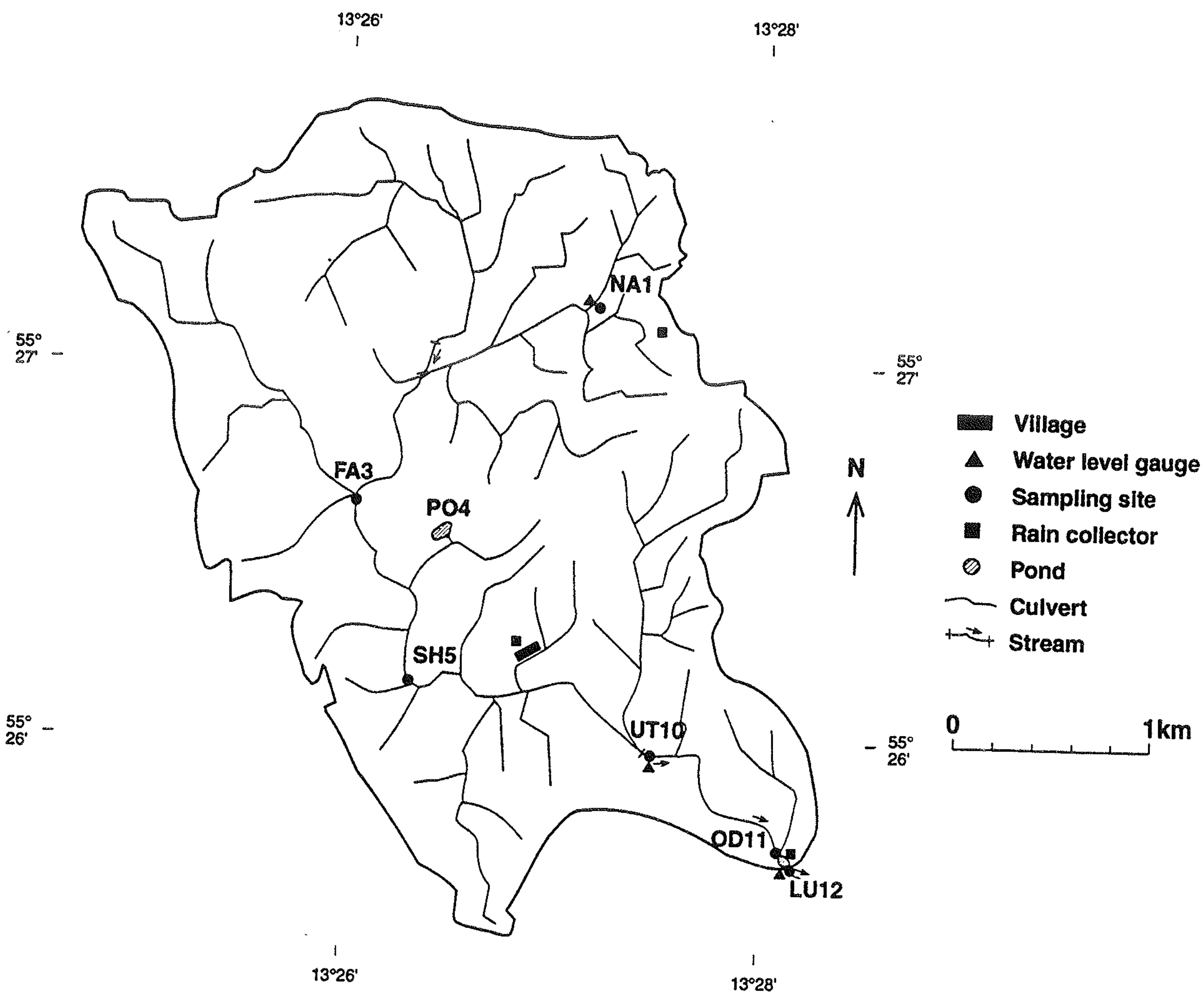


Figure 1. Location of sampling sites and measurement devices in the catchment area.

Table 1. Sampling periods and drainage area at sampling sites

Site	Area (ha)	Sampling periods
NA1	32	1990 Apr-Jun, 1991 May-Jun
FA3	482	1990 May-Jun, 1991 May-Jun
SH5	562	1990 Apr-Jun, 1991 May-Jun
UT10	828	1990 Apr-Jun, 1991 May-Jun
UT10/TP*	828	1992 May-Dec, 1993 Jan-Jun 1994 May-Oct
LU12	902	1990 Apr-Jun, 1991 Feb-May
LU12/TP*	902	1990 May-Sep, 1991 May-Sep 1992 May-Sep

* = Time paced composite samples

Water samples were taken from surface runoff inlet wells in order to investigate the potential impact of runoff water from courtyards where pesticides are handled. These wells were situated on one larger (A) and one smaller (B) farm within the catchment. Runoff water collected in these wells includes runoff from sites where spraying equipment are being filled with pesticides. However, washing of spraying equipment is done outside the collection area of these two wells.

Depth-integrated samples of bottom sediment were collected at four different sites within the catchment: a) in a large pond in the center of the area (PO4); b) in the stream, 200 m south of UT10; c) in the northern part of the pond (OD11) situated in the stream close to the catchment outlet; and d) in the southern part of the pond at LU12.

Measurements

Water outflow from the catchment area was continuously recorded by a water level gauge situated 200 m downstream from sampling location LU12. In April 1991, a Campbell data-logger was installed right at the LU12 sampling location for continuous water flow recordings using a submerged probe. Culvert flow rates at UT10 were measured using a 90-degree V-notch weir and an ultrasonic sensor (ISCO model 3210), starting in April 1993. Culvert flow rates before this date were calculated using a flow ratio between UT10 and LU12 based on measurements obtained after April 1993. Drainage discharge at NA1 was quantified in a subsurface measuring station using a triangular weir and continuous recording by a water level gauge. Lack of flow data during short periods due to technical problems with any of the measurement devices was overcome by retrieving data from closest possible measurement device with correction for differences in the scale factor.

Rainfall was recorded on a daily basis, both within the catchment (one gauge situated close to site NA1 and the other close to site SH5), as well as at an official meteorological station located 6 km to the north-east of the catchment. Starting in 1991, rainfall, using a tipping bucket rain gauge, and temperature were registered on an hourly basis by the data logger at site LU12. Due to technical problems, rainfall measurements at this site were interrupted by the end of 1993.

The sampling period for water samples at each sampling site is given in **Table 1**. Time-paced sampling using programmable automatic samplers (ISCO models 2700, 2700R and 3700FR), was carried out at LU12 during May-September 1990-1992 and at UT10 during May 1992-June 1993 and May-October 1994. All other samples were obtained manually by periodically taking non-composite point samples from the stream flow. With the automatic samplers, time-paced samples were collected at daily or weekly intervals, each sample being a composite of sub-samples taken at 10-minute or hourly intervals, respectively. All composite samples collected after mid-June 1990 were stored at +4°C during the collection period in a sampler refrigerator.

Samples were collected in glass bottles, prewashed with ethanol and capped with Teflon-lined screw caps. To inhibit microbial degradation of the pesticides, dichloromethane was added to the sample bottle in advance, plus distilled water to prevent evaporation losses of the dichloromethane. After completion of the sampling program, the samples were delivered to the laboratory within 48 hours and extracted within 24 hours of delivery.

The sediment cores were taken in June 18, 1991 using a coring device developed by AP Elementa AB, Sweden. The core sampler was made of stainless steel and acrylic plastic tubing, 60 cm in length, and 7.5 cm o.d. and 7 cm i.d. The tubing was reinforced with a sharp edge of stainless steel at the bottom end. To facilitate the sampling procedure, the core was equipped with a frame of 3.0 kg of exchangeable weights. At the top end of the corer a vertically movable lid allowed air to vent during coring insertion and during core extraction it maintained, by tight closure, a vacuum, thus holding the sediment in place. Following extraction of the core the sediment was transferred to a glass bottle, selecting the upper 5-10 centimeters of the sediment column by means of an extruding rod. At each location, five different cores, collected some meters apart, were mixed into one glass bottle. The bottles were returned to the laboratory within 48 hours and stored at -18°C prior to analysis.

Samples of fresh sediment were collected on three occasions from sediment traps located at LU12, the collection periods being May-July and June-July in 1990 and July-September in 1991. During the 1991-period July-September, fresh sediment was also collected close to OD11, just before the stream enters the small pond. The sediment was trapped in glass jars placed in the bottom sediment with the opening a few centimeters above the sediment surface. Five jars were normally used for each integrated sample.

Calculations

Pesticide loads were calculated using measured concentrations in samples obtained by the automatic samplers and stream flow data as follows:

$$\text{Load} = Q \times c_i \times t_i$$

where Q is the mean stream flow (l/s) during the collection period for each composite sample, c_i is the observed concentration in the composite sample (µg/l) and t_i is the time represented by each sample (s). A comparison using daily stream flow averages instead of a mean value for the whole collection period showed that the difference between the two methods was in the order of 1%. Pesticide concentrations below the limit of determination were assigned a value of zero for the load calculations. This means that loads and loss percentage estimates could be underestimated, since pesticides can be present in the water at a concentration just below the limit of determination.

Mean concentrations, since sample intervals varied during the season, were calculated weighting individual samples in relation to the time they represent. These time weighted mean concentrations (TWMCs) were calculated as follows:

$$\text{TWMC} = \frac{\sum c_i t_i}{\sum t_i}$$

where c_i is the observed concentration and t_i is the time represented by each sample (Richards & Baker, 1993)

Analytical procedures

Pesticide residue analyses were conducted by the Organic Environmental Chemistry Unit, Department of Environmental Assessment at the Swedish University of Agricultural Sciences (former National Laboratory for Agricultural Chemistry).

Unfiltered water samples were analyzed by two different procedures, the phenoxy acid method and the multiresidue method. Thereby about 80 different pesticides can be detected. Special effort was made to include, in the analyses, as many as possible of the pesticides used within the catchment. Samples were spiked with surrogate analytes to monitor the accuracy and precision of the analytical procedures.

Phenoxy acids and related compounds were hydrolyzed with alkali for one hour at 100°C. After acidification, the acids were extracted with dichloromethane. Extractive alkylation with pentafluorobensylbromide and gas chromatography were conducted, as described by Åkerblom et al. (1990). Confirmation was by gas chromatography and mass spectrometry (GC-MS), with a limit of determination in the range of 0.1-0.3 µg/l. 2,4,5-TP was added as an internal standard since 1991 and concentrations were corrected according to extraction efficiency of 2,4,5-TP. Pesticides analyzed by this method were bentazone, bromoxynil, clopyralid, 2,4-D, dichlorprop, flamprop-M, fluroxypyr, ioxynil, MCPA and mecoprop. The recovery efficiency were in the range 90-102%, except for clopyralid, fluroxypyr and ioxynil having 60%, 75% and 150% recoveries, respectively, and with a standard deviation of 9-16% (except ioxynil having a standard deviation of 65%). The results reported were not corrected for recovery efficiency.

With the multiresidue method, semi-polar and non-polar pesticides were extracted with dichloromethane. Hydrophobic gel permeation clean-up and capillary column gas chromatography with selective detectors (GC-NP and GC-EC) were conducted according to Åkerblom et al. (1990) and Andersson & Ohlin (1986). Confirmation was by GC-MS, with a general limit of determination in the range of 0.1-0.5 µg/l. Ethion was added as an internal standard since 1991 to confirm that the extraction efficiency was adequate or else the analytical procedure was redone. The recovery efficiency of most substances were in the range 75-100% and with a standard deviation of 13-28%. The results reported were not corrected for recovery efficiency.

Table 2. Limit of determination (µg/l) for pesiticdes included in the investigation

Substance	Type^	1990*	1991*	1992*	1992¤	1992/93#	1993¤	1994¤
a-cypermethrin	i	0.2	0.2	0.1	0.1	0.1	0.1	0.1
atrazine	h	0.1	0.1	0.1	0.1-0.2	0.1	0.1	0.1
atrazine-desethyl	m	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.1-0.2
BAM	m	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.1-0.2
benazolin-ethylester	h	n.a.	0.1	0.1-0.5	0.1-0.5	0.1-0.5	0.2	0.1-0.2
bentazone	h	0.1	0.1	0.1	0.1	0.1	0.1	0.1
bromoxynil	h	n.a.	0.2	n.a.	n.a.	n.a.	n.a.	n.a.
chloridazon	h	n.a.	n.a.	0.5-1.0	0.5-1.0	0.5-1.0	0.5	0.5-1.0
clopyralid	h	0.3	0.3-1.0	0.3	0.3	0.3	0.3	0.3
cyanazine	h	0.1	0.1	0.1-0.3	0.1-0.5	0.1-0.3	0.3	0.1
cyfluthrin	i	0.5	0.5	0.2	0.2	0.2	0.2	0.2
cypermethrin	i	0.2	0.2	0.1-0.5	0.1-0.5	0.1-0.5	0.2	0.2
2,4-D	h	0.1	0.1	0.1	0.1	0.1	0.1	0.1
deltamethrin	i	0.1	0.1	0.1	0.1	0.1	0.1	0.1
dicamba	h	0.1	0.1	n.a.	n.a.	n.a.	n.a.	n.a.
dichlobenil	h	0.1	0.1	0.1-0.5	0.1-0.5	0.1-0.5	0.2	0.1
dichlorprop	h	0.1	0.1	0.1	0.1	0.1	0.1	0.1
dimethoate	i	0.1	n.a.	n.a.	n.a.	n.a.	n.a.	0.1-0.2
diuron	h	0.5	0.5-1.0	0.1-0.5	0.1-0.5	0.1-0.5	0.5	0.1-0.5
esfenvalerate	i	n.a.	0.2	0.1	0.1	0.1	0.1	0.1-0.2
ethofumesate	h	n.a.	0.2	0.1	0.1	0.1-0.2	0.1	0.1
fenitrothion	i	0.1	0.1-0.3	0.1-0.5	0.1-0.5	0.1-0.5	0.1	0.1
fenpropimorph	f	0.3	0.5-0.8	0.1-0.2	0.2	0.1-0.2	0.1	0.1
fenvalerate	i	0.2	0.2	0.2	0.2	0.2	0.2	0.2
flamprop-M	h	n.a.	0.1	0.1	0.1	0.1	0.1	n.a.
fluroxypyr	h	n.a.	2.0	0.1-0.2	0.2	0.1-0.2	0.2	0.2-0.3
hexazinon	h	0.5	n.a.	n.a.	n.a.	n.a.	0.2	n.a.
ioxynil	h	n.a.	0.2	0.2	0.2-0.4	0.2	0.1	n.a.
isoproturon	h	1.0-2.0	0.5-2.0	0.2	0.2	0.1-0.2	0.2	0.3-0.5
lambda-cyhalothrin	i	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.1
lenacil	h	0.5	0.2-1.0	n.a.	n.a.	n.a.	n.a.	n.a.
linuron	h	0.1-1.0	0.3-1.0	0.5-1.0	0.5-1.0	0.2-0.8	0.5	0.2-0.3
MCPA	h	0.1	0.1	0.1	0.1	0.1	0.1	0.1
mecoprop	h	0.1	0.1	0.1	0.1	0.1	0.1	0.1
metamitron	h	1.0-5.0	1.0	0.5	0.5	0.5	0.5	0.5-2.0
metazachlor	h	0.1	0.1	0.1	0.1-0.2	0.1	0.1	0.1-0.2
methabenzthiazuron	h	0.3-3.0	0.3	0.2-0.5	0.2-0.5	0.2-0.5	0.3	0.2-0.3
pendimethalin	h	0.2-0.5	0.2	0.2	0.2	0.2	0.2	0.2
permethrin	i	0.5	0.5	0.1-0.2	0.1-0.2	0.1-0.2	0.2	0.2
phenmedipham	h	1.0-20.0	1.0-2.0	n.a.	n.a.	1.0	1.0	1.0-2.0
pirimicarb	i	0.1	0.1	0.1	0.1	0.1	0.1	0.1
prochloraz	f	n.a.	0.1-0.3	0.1-0.5	0.1-0.5	0.1-0.5	0.2	0.5
propiconazole	f	0.2-0.4	0.2	0.2	0.2	0.2	0.2	0.2
propyzamide	h	0.1	n.a.	0.1-0.5	0.1-0.5	0.1-0.5	0.1	0.1-0.2
simazine	h	0.1	0.1-0.2	0.1-0.2	0.2-0.5	0.1-0.2	0.1	0.1-0.3
terbuthylazine	h	0.1	0.1	0.1	0.1	0.1	0.1	0.1
triadimenol	f	0.5	0.5	0.1-0.8	0.1-1.0	0.1-0.5	0.3	0.2-0.5
tribenuron-methyl	h	n.a.	n.a.	n.a.	n.a.	n.a.	0.01	0.01

* = At LU12, May-September. ¤ = At UT10, May-September. # = At UT10, October-April.
n.a. = not analysed ^ f = fungicide; h = herbicide; i = insecticide; m = metabolite

The limit of determination for each pesticide and year is given in **Table 2**, but with occasional samples having determination limits higher or lower than the specified ones due to matrices effects. Wet sediment samples were extracted with acetone for one hour, thereafter the procedure was the same as for the water samples.

Quality assurance

The possible loss of unstable compounds during the collection and transport procedure was evaluated in two separate studies, using 14 pesticides representing different intrinsic properties. In the first study, spiked surface water samples were run through the automatic water sampler (ISCO model 2700R) in the field, testing the stability during the collection procedure (i.e. passage through the tubes of the sampling equipment) and during storage in the sampler (Kreuger, 1992). In the second study, pesticide stability was tested under different storage conditions, (storage time, storage temperature and following dichloromethane addition), (Kreuger, 1994). The general conclusion of these studies was that the sampling and storage procedures used were adequate, with recoveries within the normal variance of the analytical procedures.

Table 3. Monthly precipitation totals, monthly average temperature and departure from normal, along with monthly flow totals, during sampling periods 1990-1994

Month	Prec. mm	Dep. mm	Temp. °C	Dep. °C	Flow mm
1990					
May	33	-7	12.5	+1.9	10.8
Jun	66	+12	15.3	+0.9	14.3
Jul	85	+21	15.9	-0.1	7.5
Aug	38	-21	16.9	+1.2	5.0
Sep*	142	+77	11.5	-1.1	14.4
	(9)	(-24)	(13.5)	(0.9)	(3.4)
1991					
May	46	+6	9.1	-1.5	34.7
Jun	131	+76	11.5	-2.9	12.7
Jul	63	-1	17.4	+1.4	8.3
Aug	47	-12	16.8	+1.1	4.1
Sep	36	-29	13.0	+0.7	3.7
1992					
May	9	-31	12.7	+2.1	5.9
Jun	2	-52	17.3	+2.9	3.0
Jul	44	-20	17.6	+1.6	2.6
Aug	98	+38	16.4	+0.7	2.6
Sep	58	-7	12.2	-0.1	2.6
1992					
Oct	81	+16	5.6	-3.0	13.1
Nov	140	+64	4.4	+0.4	47.8
Dec	53	-13	2.1	+1.6	38.1
1993					
Jan	86	+29	1.4	+2.6	57.7
Feb	32	-3	0.0	+1.2	37.7
Mar	11	-32	1.8	+0.5	18.2
Apr	15	-23	6.7	+1.6	10.4
May	23	-17	13.1	+2.5	6.5
Jun	37	-17	13.6	-0.8	5.9
1994					
May	36	-4	9.8	-0.8	19.4
Jun	35	-19	13.0	-1.4	8.2
Jul	0	-64	18.8	+2.8	4.0
Aug	80	+21	16.4	+0.7	4.3
Sep	152	+87	12.2	-0.1	22.9
Oct	57	-8	6.9	-1.7	8.6

* In 1990 sampling was interrupted in mid-September, so figures in brackets correspond to the actual sampling period.

RESULTS

Weather

Table 3 and **Figures 2 and 3** summarize the climatic data during the study period. The mean annual precipitation in the area was 731 mm during the study period (1990-1994), which is slightly higher than the long-term (1961-1990) average value (662 mm) measured at the official meteorological station in Skurup (6 km north-east of the catchment). The mean annual air temperature in the area was 8.0°C, which is slightly higher than the long-term (1961-1990) average value (7.2°C) measured at the official meteorological station in Sturup (12 km north-west of the catchment). Precipitation and temperature data described in this report originates from these respective stations. Measurements made within the catchment showed that precipitation amounts were similar to those made at Skurup, i.e. they amounted to 93-95% of the precipitation at Skurup. There is a gradient with slightly higher rainfall amounts moving from south to north, away from the coast.

Amounts of precipitation during the main pesticide application season May-June was quite normal during the initial year (1990) of this study. During 1991, the spring was unusually cold and rainy and precipitation in June was 238% of normal. However, later that year precipitation was less than normal. During 1992, 1993 and 1994, amounts of precipitation were considerably below normal during several months around the main application season each year. Both in 1992 and in 1994 there were long periods with warm and dry weather during the summer, with no precipitation in the catchment area for 60 and 40 days, respectively, even though the spring of 1994 was colder than normal.

Waterflow

Table 3 and **Figures 4 and 5** summarize flow data measured at the catchment outlet during the study period. Average annual flow volume is 268 mm (which amounts to 40% of the average annual precipitation) based on 20 years of flow measurement data from the field site (NA1). The main leaching period normally starts in mid-October and ends in early May, according to these measurements, with a standard deviation from these dates of ±7 weeks in the autumn and ±6 weeks in the spring. In general, there is a low flow situation for several months during the summer, although sudden peaks in the hydrograph in response to intense rainfall may occur.

Flow volumes showed great fluctuations between years. During the cold and rainy spring and early summer of 1991 flow was quite high, whereas during the warm and dry spring and summer of 1992 it was extremely low. 1990 was closer to the average, but with thunderstorms in June and July giving sudden high flow events. At the beginning of 1993 there was very little precipitation for several months, resulting in a low flow situation. Immediately after the sampling was discontinued on the last day of June, there was a change due to cold and rainy weather resulting in substantial discharge later that year. The flow situation during 1994 was close to normal apart from a high flow event in May and also in September, which received more than double the normal amount of precipitation.

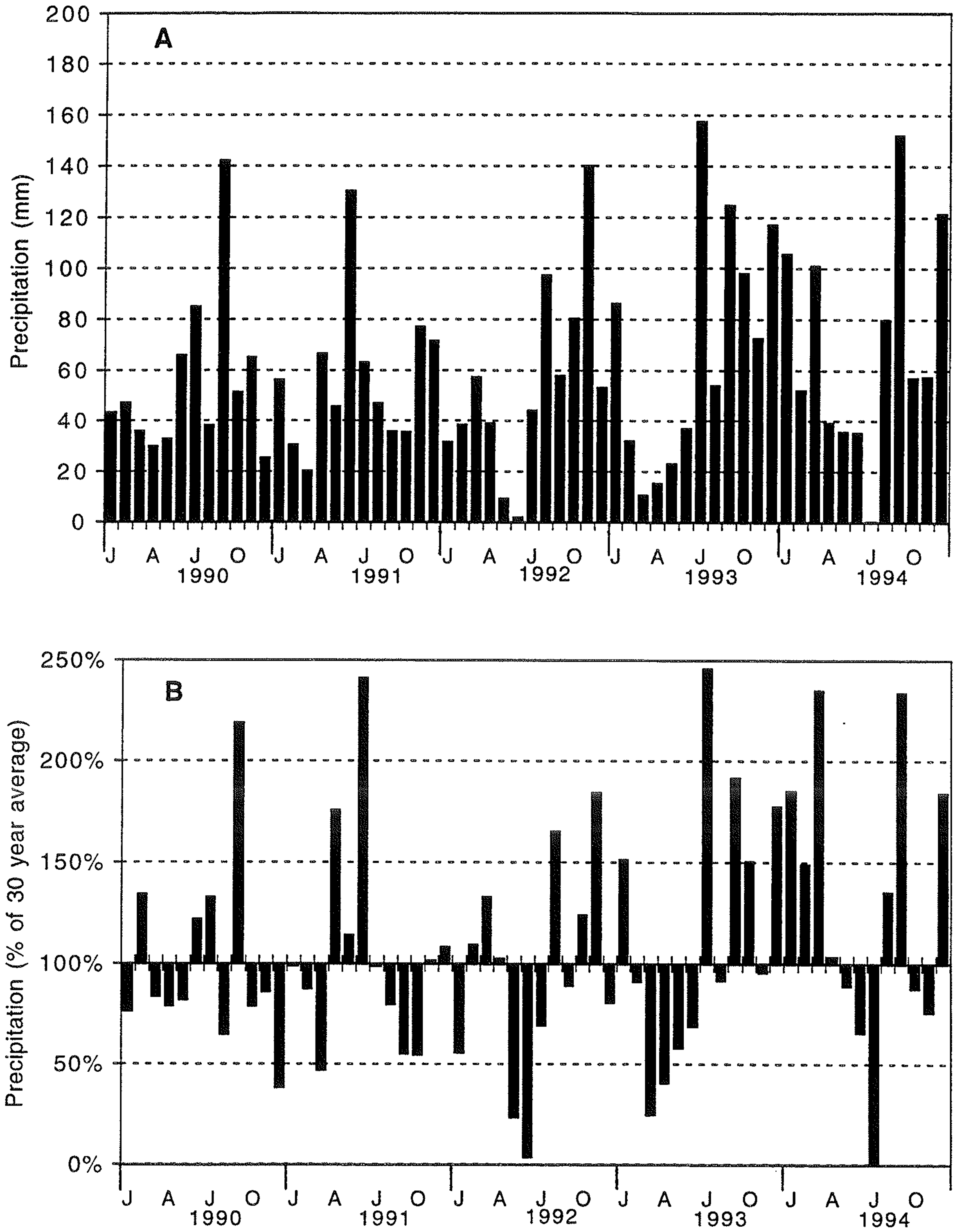


Figure 2. A) Monthly precipitation totals. B) Precipitation as departure from normal (30 year average measured 1961-1990).

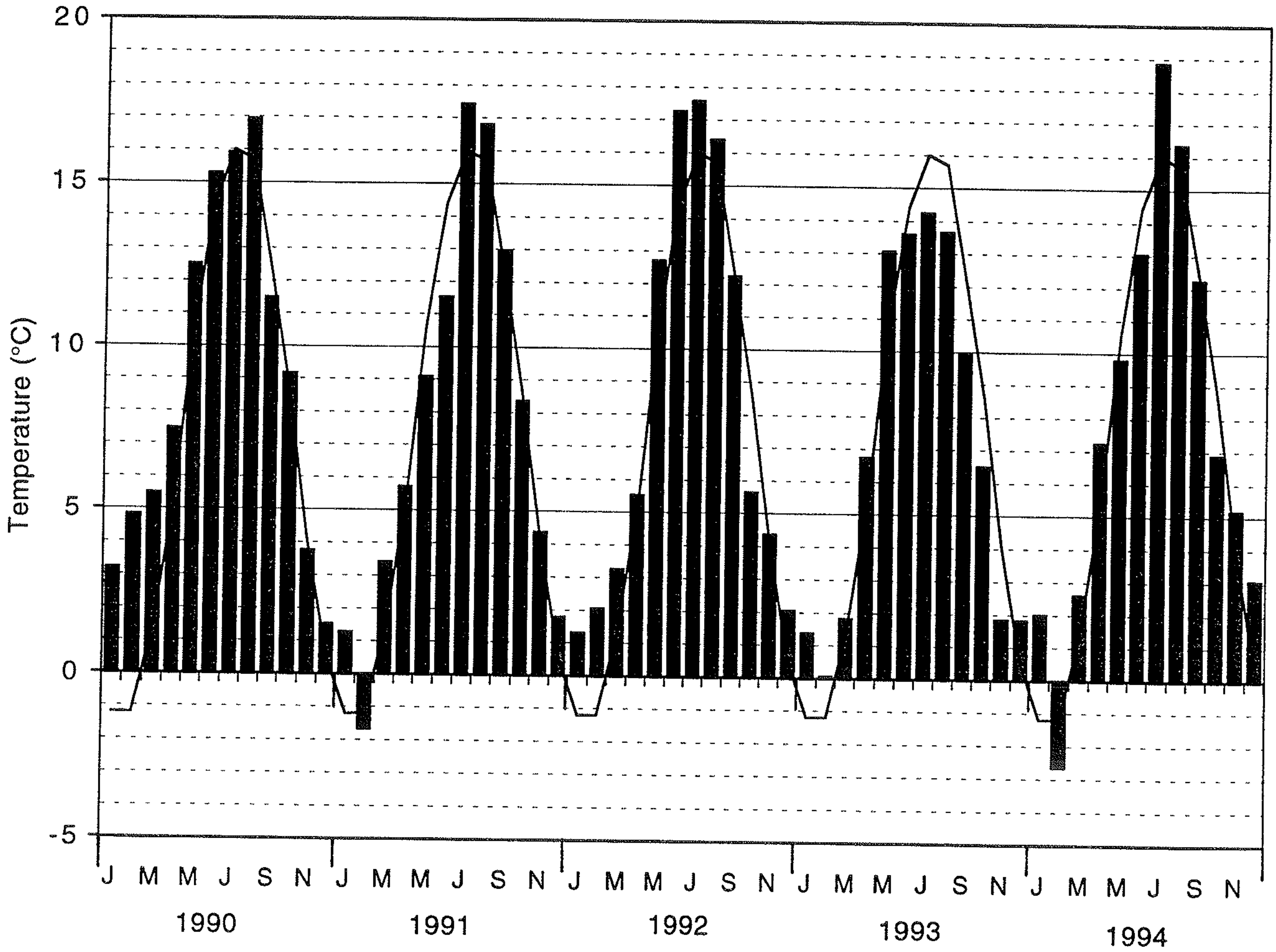


Figure 3. Monthly average temperature during 1990-1994, with the 30 year monthly average temperature indicated as a curve.

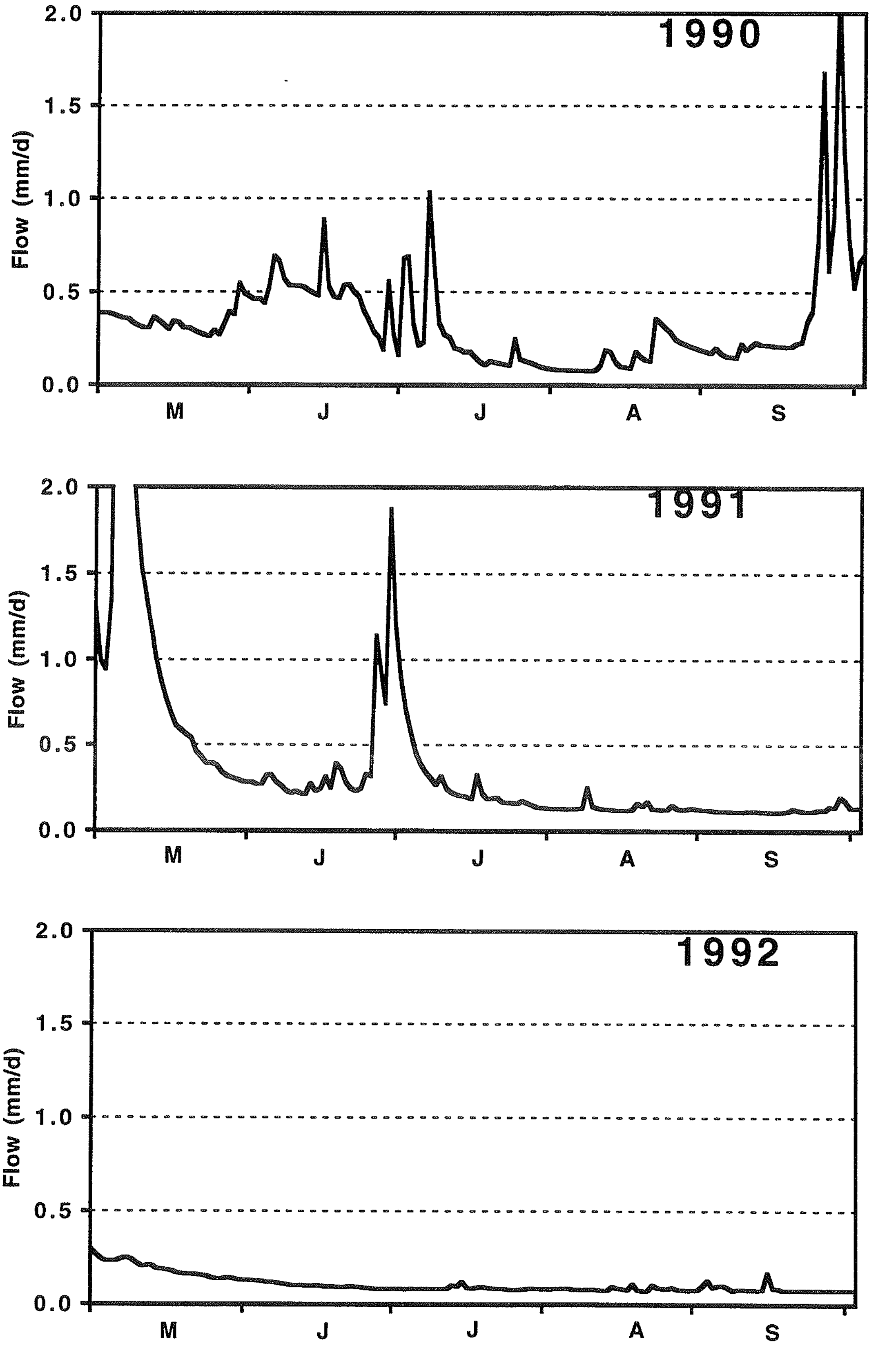


Figure 4. Waterflow from the catchment during the 1990-1992 sampling seasons.
1 mm/day corresponds roughly to 100 l/s.

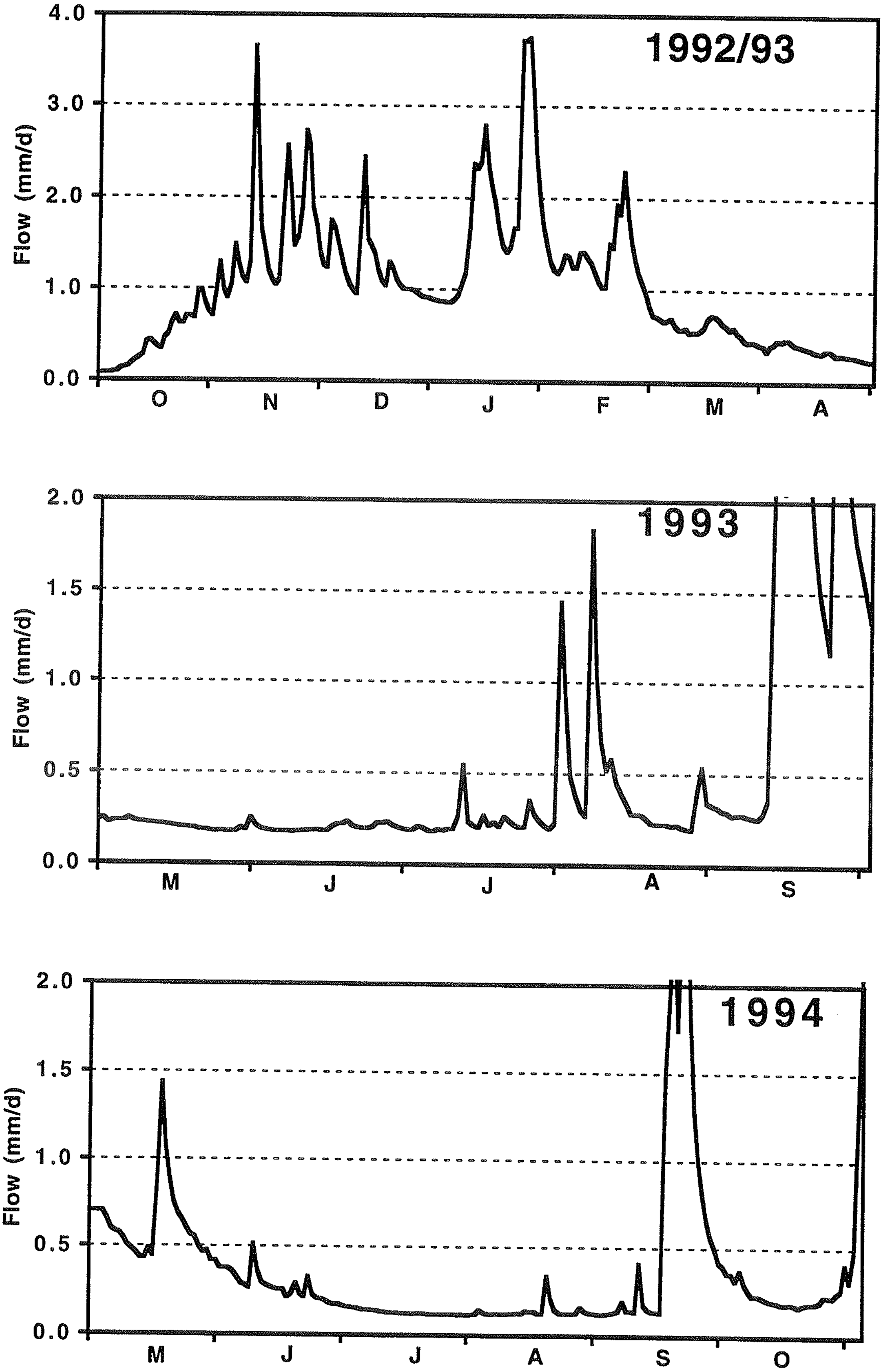


Figure 5. Waterflow from the catchment during the winter of 1992/93 and the summers of 1993 and 1994. Note the different scale of the top figure.

Characterization of stream water

Chemical characterization of water samples for pH, conductivity, suspended solids, alkalinity, dissolved nitrogen, phosphorus and other ions were carried out during the sampling periods. Averages (± standard deviation) of stream water chemical properties, based on weekly grab samples (May-September) were as follows for LU12 (mg/l where appropriate): pH - 7.8 (± 0.3); Conductivity - 60 (± 6); Suspended solids, 10 (±14); TOC, 6.3 (± 2.8); Alkalinity, 326 (± 40); K, 2.9 (±1.6); Na, 13.9 (±1.9); Ca, 113 (± 31); Mg, 7.8 (±1.5); Cl, 21.3 (±3.5); SO_4-S, 12.8 (±3.2); Total P, 0.12 (± 0.14); PO_4-P, 0.03 (±0.07); Total N, 3.4 (± 3.1); NO_3-N, 2.9 (± 2.7); NH_4-N, 0.14 (±0.20).

Corresponding figures for samples collected at UT10 were as follows: pH, 7.7 (±0.2); Conductivity, 71 (± 9); Suspended solids, 21 (±57); TOC, 13.4 (± 9.6); Alkalinity, 317 (± 46); K, 5.4 (±6.5); Na, 22.8 (±8.4); Ca, 124 (±35); Mg, 5.9 (±1.7); Cl, 34.5 (± 8.6); SO_4-S, 19.0 (±7.2); Total P, 0.66 (±0.80); PO_4-P, 0.46 (±0.56); Total N, 11.1 (±3.0); NO_3-N, 9.1 (± 2.9); NH_4-N, 0.59 (± 1.30).

Generally lower values were found for all constituents, but manganese, at LU12 than at UT10 during the summer months. This was largely due to intruding groundwater in the stream between UT10 and LU12 during low flow conditions.

Characterization of agronomic practices and pesticide use

Crops

Table 4 and **Figures 6 and 7** summarize the crop data during the study period. The four crops dominating within the catchment were spring barley, winter wheat, sugar beet and winter

Table 4. Crop distribution in the catchment area during the 5-year investigation period

Crop	1990	1991	1992	1993	1994	Average 90-94
Fallow	1.4%	-	-	-	-	0.3%
Grass ley	2.2%	2.2%	2.1%	1.6%	1.3%	1.9%
Meadow	-	0.8%	0.9%	1.2%	1.5%	0.9%
Oats	1.7%	1.0%	4.5%	2.0%	4.9%	2.8%
Peas	6.4%	2.1%	0.8%	-	-	1.9%
Rye wheat	-	0.3%	1.0%	0.4%	1.0%	0.5%
Set aside land	-	0.4%	0.8%	0.8%	0.9%	0.6%
Spring barley	25.9%	27.2%	23.9%	15.4%	29.8%	24.5%
Spring rape	0.5%	0.4%	-	-	2.2%	0.6%
Spring wheat	5.4%	9.5%	0.8%	15.6%	11.5%	8.6%
Sugar beet	18.9%	10.5%	25.4%	23.4%	16.5%	19.0%
Winter barley	-	-	1.3%	1.8%	8.1%	2.2%
Winter rape	20.7%	22.0%	11.6%	19.3%	0.4%	14.8%
Winter rye	0.9%	0.4%	1.4%	2.3%	3.9%	1.8%
Winter wheat	15.9%	22.7%	25.1%	15.7%	17.6%	19.4%

rape; their average percentage of the cultivated area being 25%, 19%, 19% and 15%, respectively. On some farms a 5-year crop rotation was practiced, including spring wheat in the rotation with an average area being 9% of the total. On average during the 5-year study period, remaining crops were each grown on less than 3% of the totally cultivated area.

During the winter 1993/94, almost 100% of the winter rape out wintered and was replaced by a spring-sown crop, mainly barley.

Pesticide handling

More than 70% of the farmers, that own 90% of the land, use their own spraying equipment, while the remaining 30% let neighbours or relatives apply the pesticides. One third of the spraying equipment, spraying more than 50% of the area, have been through the officially organized voluntary inspection of field crop sprayers. This is in agreement with estimates for the whole country of Sweden, showing that about 50% of the area in Sweden sprayed with pesticides is treated with sprayers which have been through an inspection (Hagenvall, 1994). Inspection of field crop sprayers include a test of the sprayer (e.g. evenness of distribution and deposition, and control of application rate), adjustments and minor repairs, and also advice and information to the operator.

Pesticides were handled, with spraying equipment being filled and rinsed on all, but three, of the 23 farms located within the catchment. Non of these farms had biobeds, a construction intended to retain spillage of pesticides when filling and cleaning spraying equipment (Torstensson & Castillo, 1996).

Less than 10% of the non-farming households used pesticides, mainly herbicides, in their gardens.

Pesticide usage

Courtyard application

About 50% of the farmers living within the catchment applied pesticides for weed control outside the field, mostly on courtyards, but also along roads and on garden lawns. The application was largely dominated by the use of glyphosate. Also, pesticides not registered for use on courtyards, i.e. terbuthylazine, simazine, chloridazon and cyanazine, and restricted pesticides, i.e. atrazine and dichlobenil, were occasionally used.

Field application

The use of pesticides within the catchment is extensive. Only one farmer, with 4 ha of land, do not use any type of pesticides. The total amount of pesticides applied within the catchment during each crop rotation was, on average, *ca.* 1 400 kg AI, with 20% applied in the autumn and 80% during spring/early summer (**Table 5**). The main application season during autumn stretches from the end of August to mid-October and during the spring from the beginning of April to early July, although there are variations between years due to weather conditions. For example, in 1991 most pesticides were applied from mid-May and onwards due to the cold and rainy spring, whereas in 1993 the largest amounts of pesticide were applied before mid-

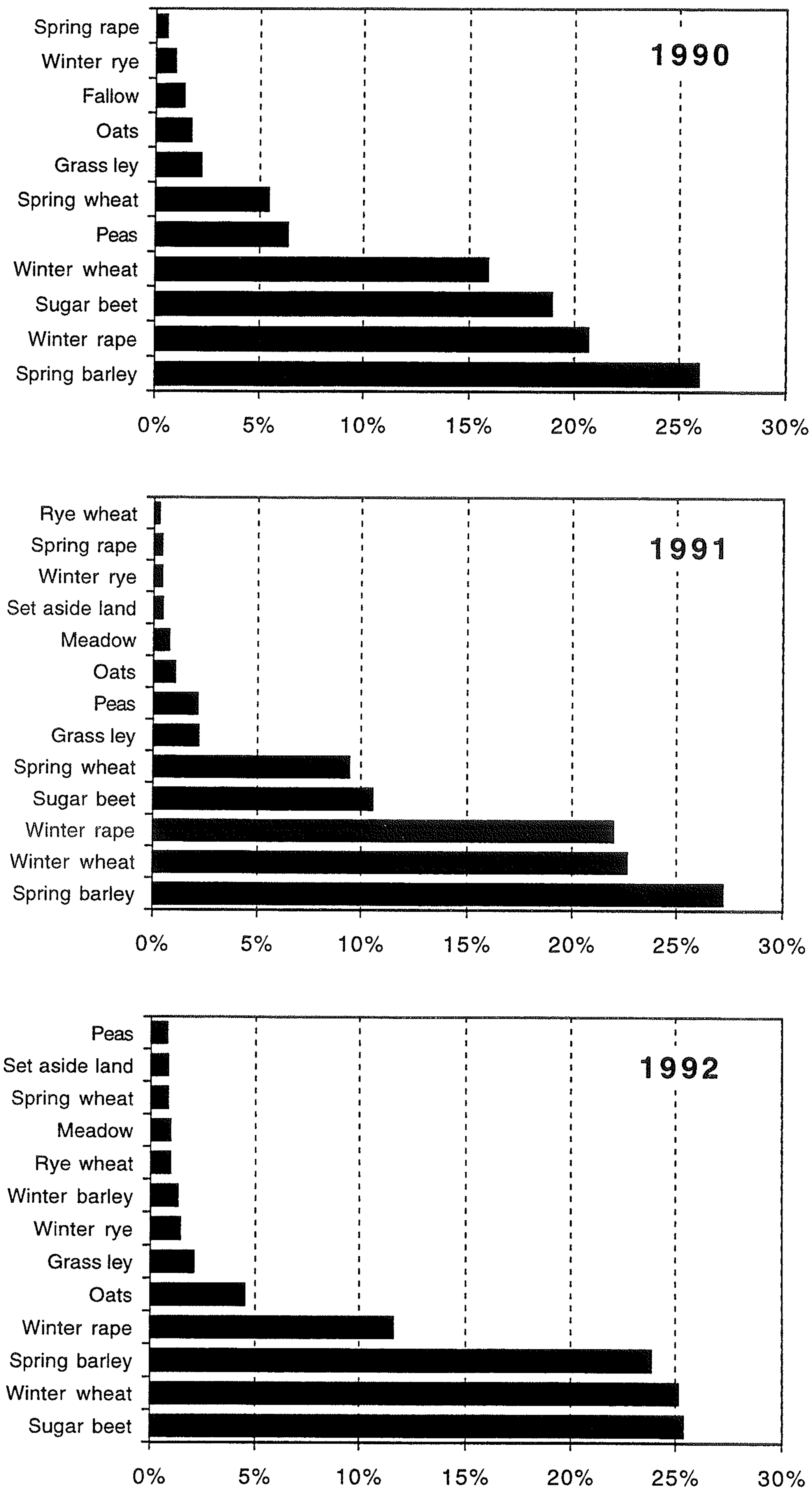


Figure 6. Distribution of crop area in the catchment 1990-1992.

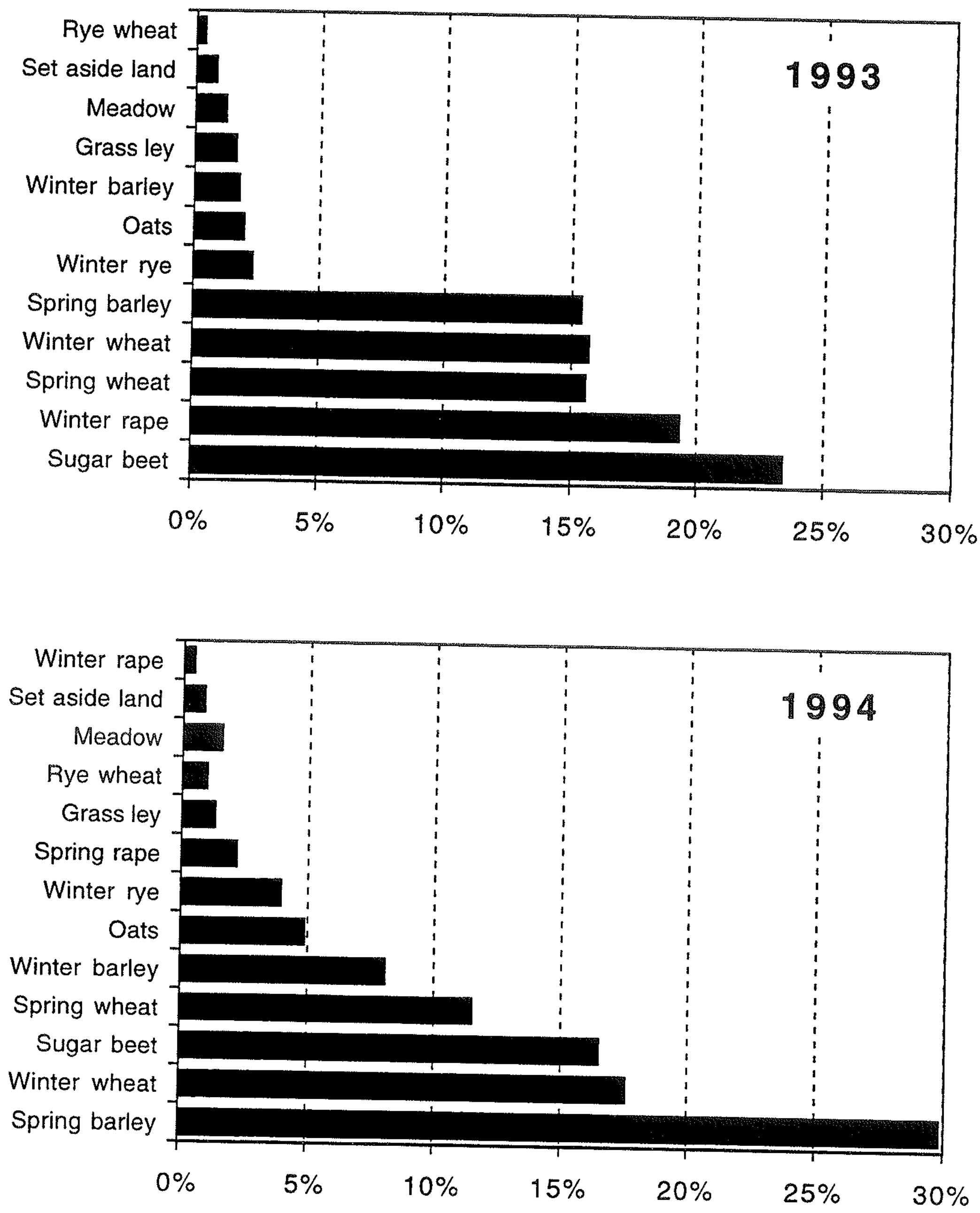


Figure 7. Distribution of crop area in the catchment 1993-1994.

Table 5. Seasonal amounts of field applid pesticides in the catchment

Substance	Type *	autumn 1989 kg	spring 1990 kg	autumn 1990 kg	spring 1991 kg	autumn 1991 kg	spring 1992 kg	autumn 1992 kg	spring 1993 kg	autumn 1993 kg	spring 1994 kg	Total use 1990-94 kg
alpha-cypermethrin	I		0.1									0.1
benazolin	H				1.3	0.7	1.4	0.9	0.5		0.7	5.5
bentazone	H		29.6		8.6		2.9					41.2
bromofenoxim#	H					9.5	2.5					12.0
bromoxynil	H		10.9		9.4	0.4	3.5	4.5	5.3		11.9	45.9
carbendazim#	F				1.2				0.1			1.3
chloridazon	H		113.7		35.2		286.9		175.5		45.2	656.5
chlormequat chloride#	g		3.7				9.4		15.7		31.8	60.6
chlorsulfuron#	H		0.05									0.1
clopyralid	H		0.8		2.0	0.1	3.3	0.2	5.3		1.1	12.8
cyanazine	H		10.4		9.0		1.5		0.6		0.6	22.1
cycloxydim#	H										3.4	3.4
cyfluthrin	I		0.2		0.1		0.3	0.5	0.4		0.1	1.5
cypermethrin	I						0.4	0.4				0.8
2,4-D	H		3.0						2.4			5.3
deltamethrin	I		0.1	0.3	0.4		0.4	0.1	0.7		0.2	2.1
dicamba	H		0.2									0.2
dichlorprop	H		145.4		14.5	5.3	4.1				6.0	
dichlorprop-P	H	5.1	42.8	11.3	126.2	6.7	37.4	16.9	28.7		60.2	510.6
diflufenican#	H									1.8		1.8
dimethoate	I										3.9	3.9
diquat#	H/g		12.6				1.0					13.6
esfenvalerate	I		2.4	0.03	2.1	0.3	4.3	0.6	1.9		2.9	14.6
ethephon#	g		0.6				1.3		1.5		1.5	5.0
ethofumesate	H		25.1		10.2		27.1		32.0		32.7	127.1
fenitrothion	I		1.1						2.0			3.1
fenpropimorph	F		102.7		136.4		73.4		41.3		118.5	472.3
fenvalerate	I		2.0									2.0
flamprop-M	H				0.8		1.6		2.5			5.0
fluroxypyr	H		7.4		8.8		18.4		10.3		8.4	53.4
glyphosate#	H	3.2		33.8		1.8		45.0		8.1		91.9
ioxynil	H		33.9		21.7	4.0	8.5	4.9	8.7		20.2	102.0
isoproturon	H	5.7	13.5	26.3		112.8	19.9	16.3	36.4	20.3	29.5	280.6

Table 5 (continued). Seasonal amounts of field applid pesticides in the catchment

Substance	Type *	autumn 1989 kg	spring 1990 kg	autumn 1990 kg	spring 1991 kg	autumn 1991 kg	spring 1992 kg	autumn 1992 kg	spring 1993 kg	autumn 1993 kg	spring 1994 kg	Total use 1990-94 kg
lambda-cyhalothrin	I										1.4	1.4
lenacil	H		1.1		1.9							2.9
MCPA	H	2.9	234.2		188.0	7.1	81.9	13.7	92.1		123.7	743.6
mecoprop	H		39.1		1.5						}	
mecoprop-P	H		33.6	15.3	58.9	81.4	18.9	31.8	40.8	13.7	181.0 }	516.1
mepiquat chloride#	g		1.2				2.5		3.0		3.0	9.8
metamitron	H		314.3		181.9		470.3		295.6		259.5	1521.6
metazachlor	H	121.5	4.6	182.9		51.8		149.8		41.0	9.2	560.8
methabenzthiazuron	H	55.4	46.2	103.0	25.0	10.5	4.0	4.9	13.7		12.6	275.3
pendimethalin	H	10.7	16.7	7.9			2.0					37.4
phenmedipham	H		57.3		22.9		48.1		53.5		53.7	235.4
pirimicarb	I		43.7		5.6		34.4		3.2		57.0	143.8
prochloraz	*F*		14.9	6.1	28.2		17.4		1.1			67.6
propiconazole	*F*		34.7		46.5		24.1		13.5		39.2	158.0
propyzamide	H					7.0						7.0
sethoxydim#	H		1.8		1.5	1.1	43.6	5.3		1.7	2.8	57.8
sulfur#	*F*				10.4							10.4
terbuthylazine	H					1.8	5.0					6.8
triadimenol	*F*		2.2		3.9		1.9		1.2			9.3
tribenuron-methyl	H				0.9		1.5		1.1		3.2	6.7
Total amount		204.6	1408.0	386.7	964.7	302.4	1265.1	295.8	890.7	86.6	1125.3	6929.9

= Pesticides never included in the analysis

* H=Herbicide; F=Fungicide; I=Insecticide; g=Growth regulator

	autumn 1989	spring 1990	autumn 1990	spring 1991	autumn 1991	spring 1992	autumn 1992	spring 1993	autumn 1993	spring 1994	Total use 1990-94
herbicides	204.6	1198.3	380.3	730.1	302.1	1095.5	294.1	804.9	86.6	866.0	5962.6
fungicides		154.5	6.1	226.4		116.7		57.3		157.8	718.8
insecticides		49.7	0.3	8.1	0.3	39.7	1.7	8.2		65.5	173.5
growth regulators		5.5				13.2		20.2		36.3	75.3
herbicides	100%	85%	98%	76%	100%	87%	99%	90%	100%	77%	86%
fungicides		11%	2%	23%		9%		6%		14%	10%
insecticides		4%	0%	1%	0%	3%	1%	1%		6%	3%
growth regulators		0%				1%		2%		3%	1%

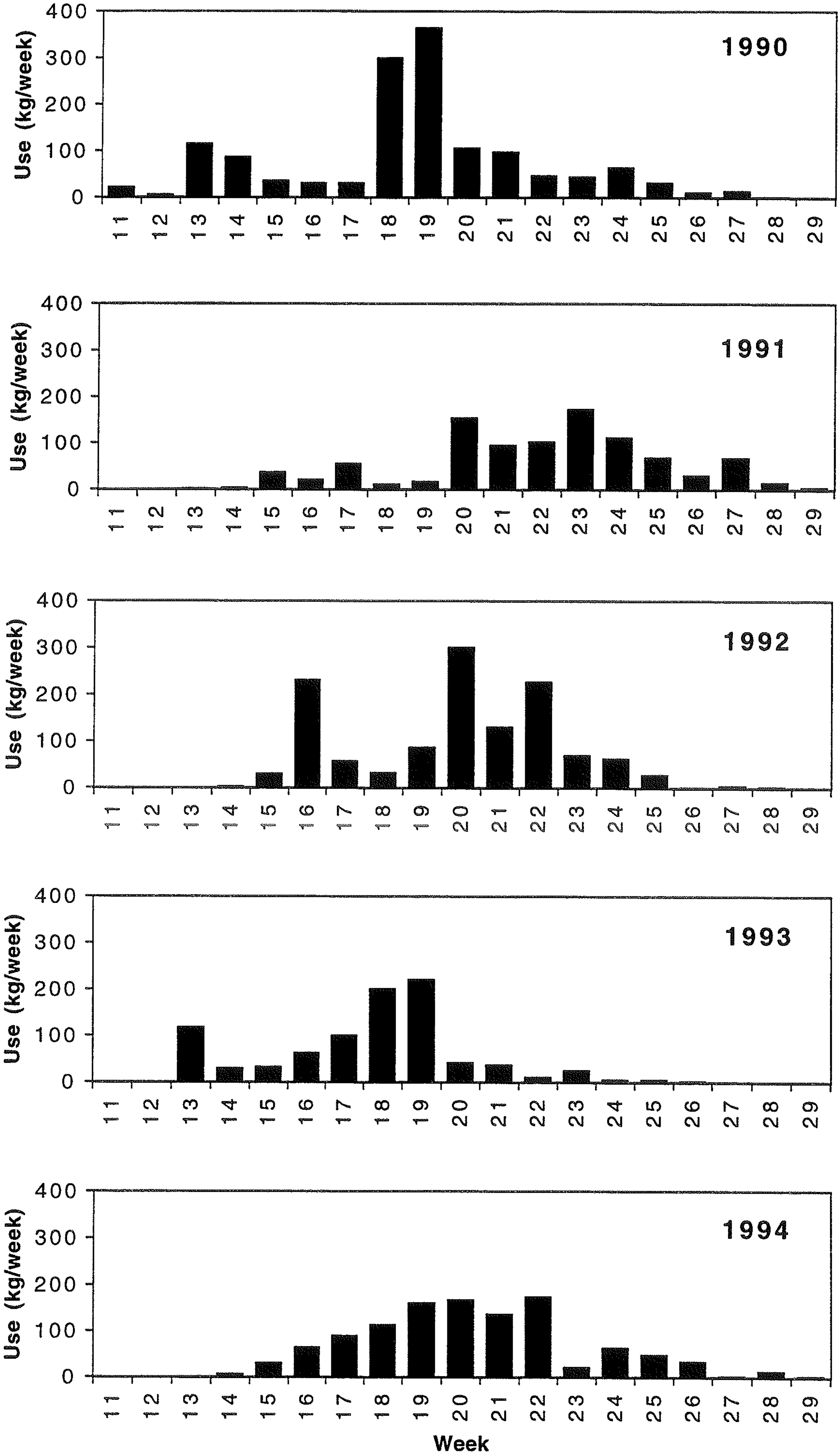


Figure 8. Temporal distribution of spring application of pesticides in the catchment

Table 6. Annually treated area and applied average rate (activities in autumn 1994 are not included in this report)

	Treated area (ha)						Dose (kg/ha)					
	1990	1991	1992	1993	1994	Aver.	1990	1991	1992	1993	1994	Aver.
Spring												
Herbicides	585	560	615	525	724	602	2.0	1.3	1.8	1.5	1.2	1.6
Fungicides	313	414	329	235	492	357	0.5	0.5	0.4	0.2	0.3	0.4
Insecticides	454	224	532	306	624	368	0.1	0.04	0.07	0.03	0.1	0.1
Growth regulators	4	0	12	22	47	17	1.4	-	1.1	0.9	0.8	1.1
Total	596	707	714	680	761	692	2.4	1.4	1.8	1.3	1.5	1.7
Autumn												
Herbicides	271	234	249	74		207	1.4	1.3	1.2	1.2		1.3
Fungicides	14	0	0	0		4	0.4	-	-	-		-
Insecticides	43	27	115	0		46	0.01	0.01	0.01	-		0.01
Growth regulators	0	0	0	0		0	-	-	-	-		-
Total	271	246	251	74		211	1.4	1.2	1.2	1.2		1.3

May (**Figure 8**). However, on average, *ca.* 60% of the total amount of pesticides applied each spring/early summer were applied during May.

The pesticide usage during spring/early summer was dominated by herbicide applications (83%), with the remainder made up of fungicides (13%), insecticides (3%) and growth regulators (1%) (**Table 5**). Autumn application was also dominated by herbicides (99%). During the five year period, 51 different AI's were applied on fields within the catchment (not including pesticides used on farm-yards), with an average annual use of 35 different AI´s. Ten of these AI's accounting for 85% of total weight applied. The herbicide metamitron, applied in sugarbeets, was the pesticide used at the largest amounts in the catchment, with an application of 180 to 470 kg/year and with a total application during the investigation period of 1 520 kg. This amount represented an average application rate of 2.1 kg/ha and year, often split between two or sometimes three different occasions.

Of the total catchment area, on average, 77% (602 ha) was treated with pesticides during spring and early summer and 23% (210 ha) during the autumn, at an average rate of 1.7 kg/ha and 1.3 kg/ha, respectively (**Table 6**). The applied rate was largest during the first year and then dropped due to the introduction of the stereoisomers of dichlorprop and mecoprop (dichlorprop-P and mecoprop-P) and the sulfonylurea herbicide tribenuron-methyl, all active at low doses, in the area. This lead to decreasing amounts of pesticides used in cereals during the investigation period (**Figure 9**).

The area treated with fungicides and insecticides varied greatly between years (**Table 6**) as a result of different weather situations. For example, during 1991 and 1994, the two years having the lowest May-June temperatures, 46-55% of the catchment area was treated with fungicides, compared to 26-37% treated during the remaining years. A compilation of

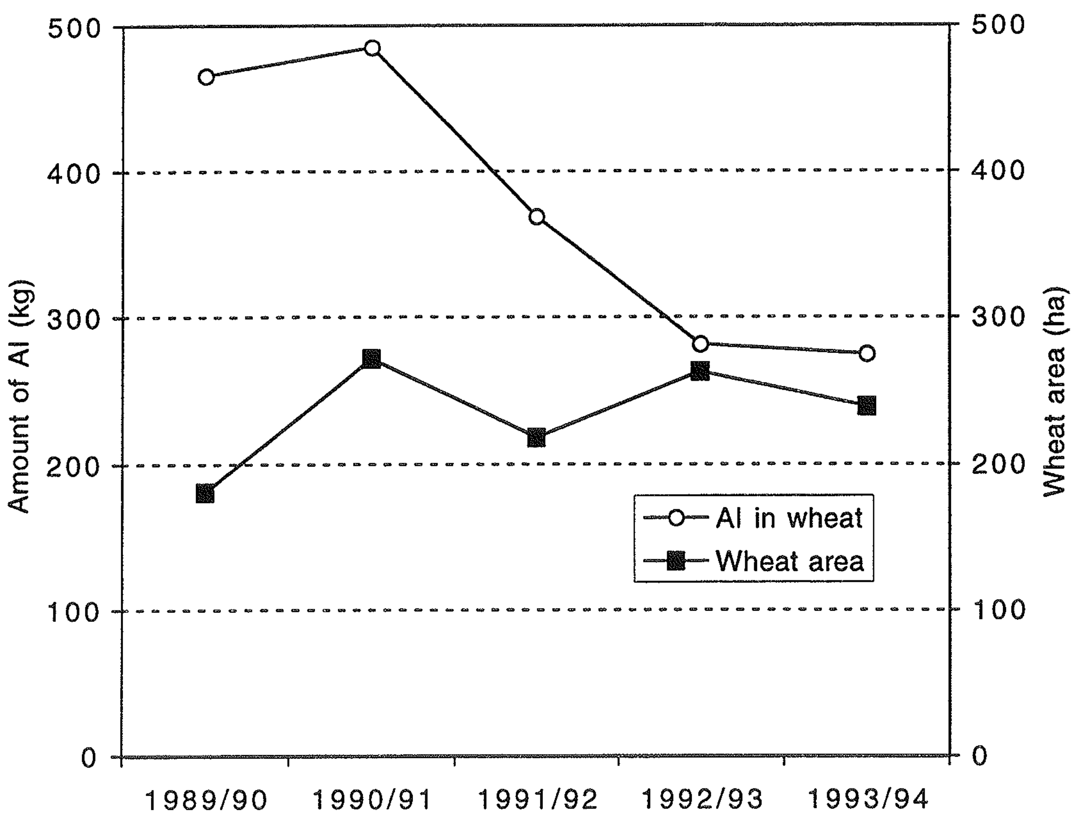


Figure 9. Application of active ingredients (AI) in wheat during the investigation period.

amounts used, area treated, doses and application period during 1990-1994 for each pesticide is given in **Appendix 1**.

Twelve of the 51 pesticides used in the catchment, representing 4% of the total volume applied, were not included in the analyses (**Table 5**). They were not analyzed either due to analytical difficulties or to economical constraints, since some pesticides are only analyzed by separate and costly analytical methods. Three of these "not included" pesticides, i.e. chlormequat chloride, glyphosate and sethoxydim, were applied quite regularly each year, with a total application during the investigation period of 50-100 kg. The remaining nine pesticides were only applied in small quantities with less than 15 kg of total application during the entire five year period.

The total amount of pesticides used within agriculture in Sweden during 1990-1993 decreased from 2 343 tons to 1 464 tons (Kvist, 1994). Pesticide usage in the catchment corresponded to 0.08% of the total amount used within agriculture in Sweden during 1990-1993. The corresponding figures for herbicides, fungicides and insecticides viewed separately, were 0.10%, 0.02% and 0.12%, respectively. Fungicides were proportionally not as extensively used as herbicides and insecticides, which is due to the fact that potatoes are not grown in the catchment.

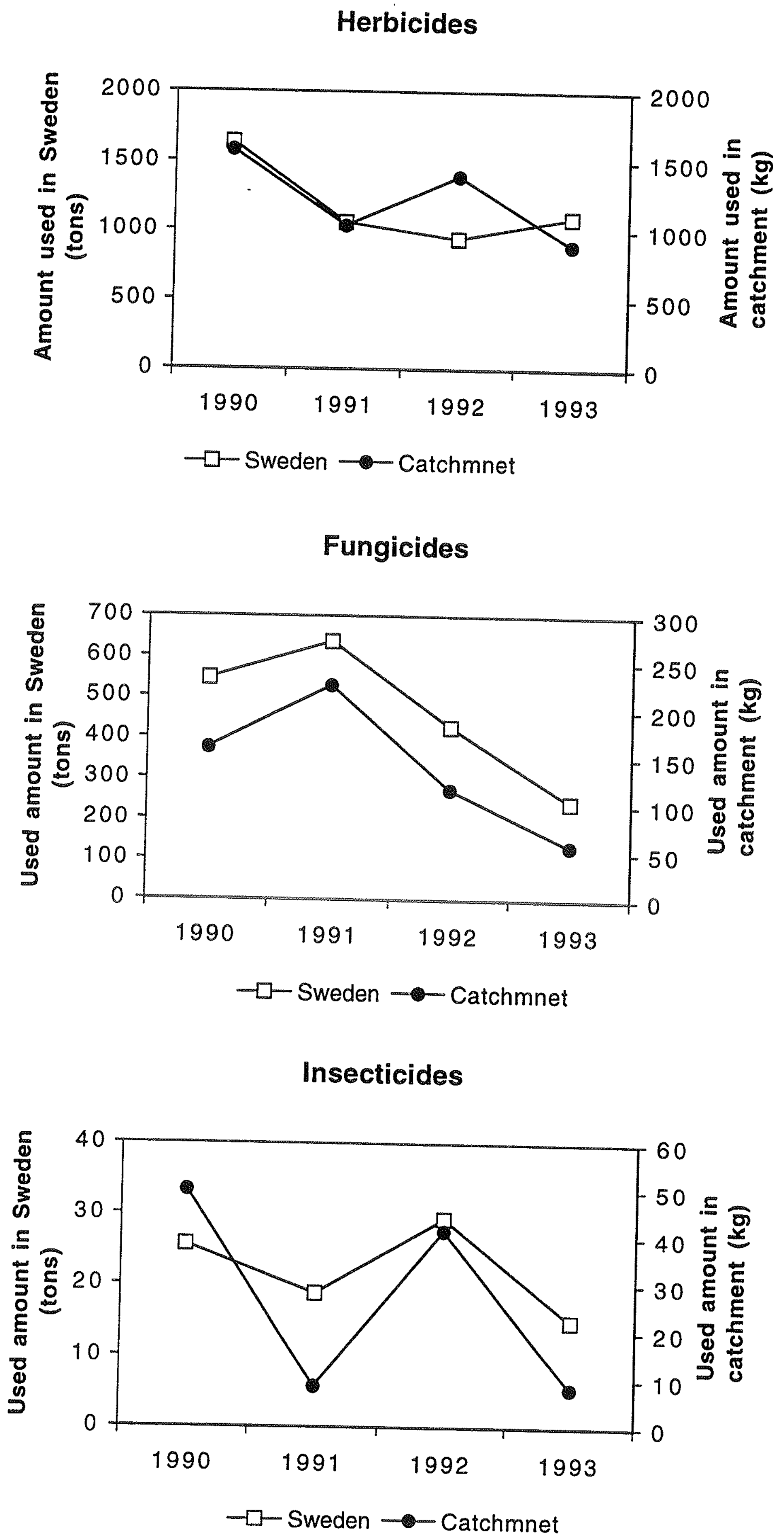


Figure 10. The use of herbicides, fungicides and insecticides in Sweden as a whole and in the catchment 1990-1993.

In **Figure 10** the use of herbicides, fungicides and insecticides in Sweden, and in the catchment, during this period are compared (results from 1994 are not included as information of the 1994 autumn application in the catchment are not included in this report). The result shows that the use of pesticides within the catchment corresponds well with the general development in Sweden. It is only in 1992 that the use of herbicides within the catchment shows a different trend, which can be due to the fact that a larger percentage of the area than usual was then in sugarbeet cultivation and herbicide doses are generally larger per hectare in sugar beets than in cereals.

Pesticide findings

Water

Concentrations

During the initial two years of the investigation, 89 non-composite manual samples were collected at various sites along the culvert, at the outlet from the catchment and on two courtyards. Considering the whole five-year period, 209 time-paced composite samples were collected at the culvert discharge and at the outlet from the catchment. A complete record of the analytical results for water samples collected during the five year period are given in **Appendices 2, 3, 4 and 5** (values in parenthesis in the appendices have been confirmed, but are below the stipulated limit of determination and therefore not quantified with the normal precision). Altogether, forty-six pesticides and two metabolites are included in the tables, with a total of 11 078 individual analyses. Some of the pesticides were only analyzed during part of the investigation period, either due to analytical difficulties, especially in the beginning of the investigation period, or due to the fact that the pesticide had no registered use in the catchment. The analyses of tribenuron-methyl requires a separate analytical procedure and was only included during May-June in 1993 and in 1994, thanks to co-operation with a parallel investigation on the sensitivity of algal communities to sulfonylureas in the catchment (Blanck & Nyström, pers. comm., 1996). As a result of the general nature of the multiresidue analysis, pesticides, not originally included in the screening list, were detected during the course of the investigation. These pesticides possibly originated from either restricted use, on e.g. courtyards, or from earlier applications prior to the start of this investigation.

The overall frequency at which pesticides were identified in water at sites LU12/TP and UT10/TP (including the winter period 1992/93), over the five years, is given in **Table 7**. Altogether, 37 pesticides, distributed among 27 herbicides, 4 fungicides, 4 insecticides and 2 metabolites, were identified. These varied from single events of BAM, dichlobenil, diuron, dimethoate, esfenvalerate, phenmedipham and triadimenol, to findings of more than 50 % detection frequency for the herbicides ethofumesate, MCPA, metazachlor, mecoprop, dichlorprop, bentazone, terbuthyazine and tribenuron-methyl. The very frequent finding of tribenuron-methyl can largely be ascribed to the limited time period (May-June) during which this compound was included in the analyses.

The results from each year at sites LU12/TP and UT10/TP are statistically summarized in **Tables 8-10**. The highest time weighted mean concentrations (TWMC) measured during May-September were for metamitron (1.5 µg/l) at LU12 and for metazachlor (9.8 µg/l) at UT10, with a maximum concentration in an individual sample of 45 µg/l and 200 µg/l, respectively. Looking at the results as a whole, there was a good correlation ($R^2 = 0.88$) between amounts used and the concentrations found in the water samples (**Figure 11**). The

Table 7. Overall frequency of pesticide findings in samples from sites LU12/TP and UT10/TP

0%	0.5% - <10%	10% - <20%	20% - <35%
alpha-cypermethrin	dichlobenil 0.5%	hexazinone 10%	methabenzthiazuron 22%
benazolin-ethylester	triadimenol 0.5%	bromoxynil 13%	flamprop-M 24%
cypermethrin	diuron 1%	cyanazine 13%	fluroxypyr 24%
deltamethrin	esfenvalerate 1%	2,4-D 15%	fenpropimorph 25%
dicamba	linuron 1%	desethylatrazine 17%	isoproturon 28%
fenitrothion	phenmedipham 1%	ioxynil 17%	
fenvalerate	cyfluthrin 2%	simazine 18%	
lambda-cyhalothrin	dimethoate 2%		
lenacil#	propyzamide 3%		
pendimethalin#	BAM 6%		
permethrin#	prochloraz 6%		
	clopyralid 7%		

35% - <50%	50% - <65%	65% -
metamitron 40%	ethofumesate 57%	bentazone 70%
chloridazon 42%	MCPA 57%	terbuthylazine 79%
propiconazole 44%	metazachlor 60%	tribenuron-methyl 93%*
atrazine 46%	mecoprop 62%	
pirimicarb 47%	dichlorprop 63%	

* = Only analyzed during May-June
# = Detected occasionally in non-composite samples 1990-1991

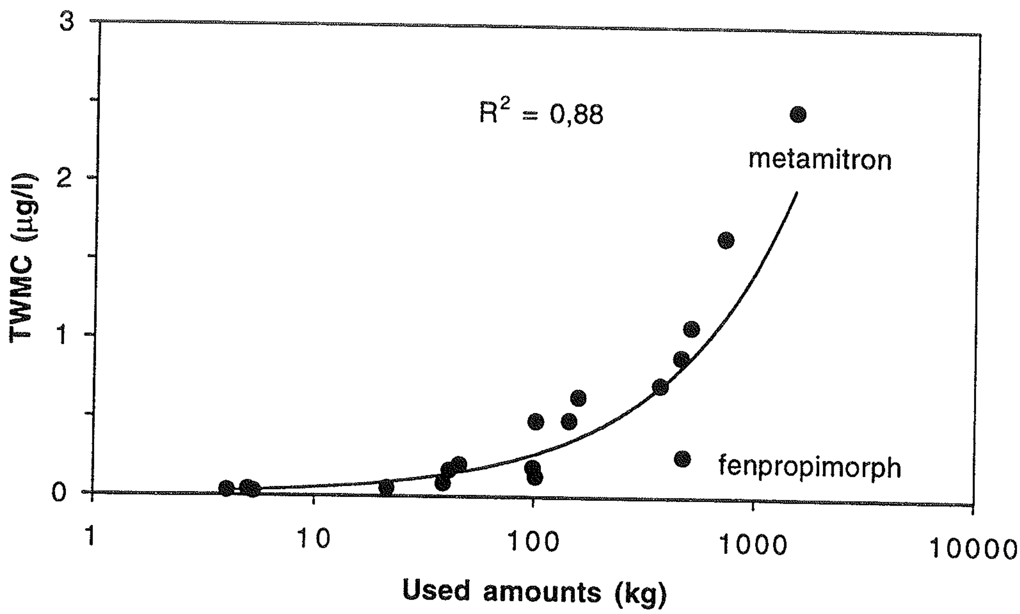


Figure 11. Overall time weighted mean concentrations (TWMC) in water (May-September) as a function of total spring applied amounts (1990-1994). The solid line is a best fit power regression through the points.

Table 8. Results of pesticide analysis of water samples collected at LU12/TP during May-September 1990-1992

ISCO LU12	**1990**					**1991**					**1992**				
Substance	No	Det	Freq	TWMC	Max	No	Det	Freq	TWMC	Max	No	Det	Freq	TWMC	Max
a-cypermethrin	49	0	0%			36	0	0%			30	0	0%		
atrazine	49	22	45%	0.16	9.3	36	15	42%	0.07	0.4	30	10	33%	0.06	0.9
atrazine-desethyl															
BAM															
benazolin-ethylester						36	0	0%			30	0	0%		
bentazone	49	47	96%	0.42	10	36	32	89%	0.10	0.4	30	5	17%	0.01	0.04
bromoxynil						35	5	14%	0.06	1	3	0	0%		
chloridazon											30	7	23%	0.50	10
clopyralid	49	0	0%			36	0	0%			30	0	0%		
cyanazine	49	11	22%	0.06	2.8	36	2	6%	0.02	0.2	30	0	0%		
cyfluthrin	49	0	0%			36	0	0%			30	0	0%		
cypermethrin	49	0	0%			36	0	0%			30	0	0%		
2,4-D	49	9	18%	0.01	1	36	0	0%			30	5	17%	0.46	10
deltamethrin	49	0	0%			36	0	0%			30	0	0%		
dicamba	49	0	0%			36	0	0%							
dichlobenil	49	0	0%			36	0	0%			30	0	0%		
dichlorprop	49	35	71%	0.65	20	36	27	75%	0.38	4	30	11	37%	1.00	20
dimethoate	49	0	0%												
diuron	49	0	0%			36	0	0%			30	0	0%		
esfenvalerate						36	0	0%			30	0	0%		
ethofumesate						34	18	53%	0.06	0.5	30	11	37%	0.21	2
fenitrothion	49	0	0%			36	0	0%			30	0	0%		
fenpropimorph	49	0	0%			36	2	6%	0.05	1	30	3	10%	0.04	0.9
fenvalerate	49	0	0%			36	0	0%			30	0	0%		
flamprop-M						35	2	6%	0.00	0.05	30	2	7%	0.00	0.02
fluroxypyr						35	1	3%	0.18	7	30	1	3%	0.00	0.1
hexazinon	49	0	0%												
ioxynil						35	9	26%	0.06	1	30	2	7%	0.02	0.4
isoproturon	49	0	0%			36	6	17%	0.13	2	30	6	20%	0.02	0.3
lambda-cyhalothrin															
lenacil	49	0	0%			36	0	0%							
linuron	49	2	4%	0.03	1.8	36	1	3%	0.00	0.3	30	0	0%		
MCPA	49	32	65%	1.08	40	36	26	72%	0.47	5	30	12	40%	0.61	10
mecoprop	49	31	63%	0.16	4	36	23	64%	0.49	7	30	16	53%	0.12	0.8
metamitron	49	14	29%	1.52	45	36	7	19%	0.12	2	30	11	37%	0.63	6
metazachlor	49	42	86%	0.53	5.1	36	9	25%	0.17	2	30	8	27%	0.09	0.7
methabenzthiazuron	49	2	4%	0.01	0.6	36	6	17%	0.06	0.2	30	0	0%		
pendimethalin	49	0	0%			36	0	0%			30	0	0%		
permethrin	49	0	0%			36	0	0%			30	0	0%		0
phenmedipham	49	0	0%			35	0	0%							
pirimicarb	49	15	31%	0.13	1.1	36	8	22%	0.02	0.1	30	18	60%	0.09	2
prochloraz						32	0	0%			30	0	0%		
propiconazole	49	27	55%	0.33	2.8	36	8	22%	0.11	0.7	30	11	37%	0.05	1
propyzamide	49	0	0%								30	0	0%		
simazine	49	2	4%	0.00	0.3	36	0	0%			30	0	0%		
terbuthylazine	49	34	69%	0.13	1.1	36	19	53%	0.09	0.4	30	24	80%	0.35	2
triadimenol	49	0	0%			36	0	0%			30	0	0%		
tribenuron-methyl															
Sum pest	49	47	96%	5.22	124	36	34	94%	2.65	22	30	30	100%	4.27	49

No = Number of samples analysed; Det = Number of detections; Freq = Detection frequency
TWMC = Time Weighted Mean Concentration during sampling period (µg/l); Max = Maximum concentration detected (µg/l)

Table 9. Results of pesticide analysis of water samples collected at UT10/TP during May-September 1992-1994

ISCO UT10	1992					1993*					1994				
Substance	No	Det	Freq	TWMC	Max	No	Det	Freq	TWMC	Max	No	Det	Freq	TWMC	Max
a-cypermethrin	29	0	0%			15	0	0%			18	0	0%		
atrazine	29	22	76%	0.60	3	15	7	47%	0.12	0.8	18	12	67%	0.20	1
atrazine-desethyl											18	3	17%	0.02	0.1
BAM											18	1	6%	0.00	0.06
benazolin-ethylester	29	0	0%			15	0	0%			18	0	0%		
bentazone	29	27	93%	0.14	0.5	17	16	94%	0.14	0.6	18	12	67%	1.47	5
bromoxynil															
chloridazon	29	18	62%	1.88	20	15	13	87%	0.83	4	18	9	50%	0.97	10
clopyralid	29	1	3%	0.02	0.4	17	12	71%	1.33	10	18	0	0%		
cyanazine	29	4	14%	0.16	10	15	0	0%			18	10	56%	2.26	10
cyfluthrin	29	2	7%	0.02	0.2	15	3	20%	0.08	1	18	0	0%		
cypermethrin	29	0	0%			15	0	0%			18	0	0%		
2,4-D	29	11	38%	0.70	10	17	3	18%	0.06	0.6	18	4	22%	0.05	0.3
deltamethrin	29	0	0%			15	0	0%			18	0	0%		
dicamba															
dichlobenil	29	0	0%			15	0	0%			18	1	6%	0.01	0.2
dichlorprop	29	27	93%	2.33	25	17	14	82%	0.11	0.5	18	8	44%	0.41	2
dimethoate											9	1	11%	0.83	5
diuron	29	0	0%			15	1	7%	0.05	0.6	18	0	0%		
esfenvalerate	29	0	0%			15	0	0%			18	1	6%	0.01	0.2
ethofumesate	29	28	97%	1.08	6	15	13	87%	0.39	3	18	14	78%	0.63	3
fenitrothion	29	0	0%			15	0	0%			18	0	0%		
fenpropimorph	29	22	76%	0.73	8	15	9	60%	0.98	4	18	8	44%	0.18	1
fenvalerate	29	0	0%			15	0	0%			11	0	0%		
flamprop-M	29	19	66%	0.05	0.4	17	5	29%	0.19	2					
fluroxypyr	29	16	55%	0.09	1	17	15	88%	1.44	6	17	3	18%	0.05	0.3
hexazinon						15	7	47%	0.11	1					
ioxynil	29	7	24%	0.21	3	4	1	25%	0.00	0.1					
isoproturon	29	18	62%	0.37	4	15	14	93%	0.40	1	18	4	22%	0.16	1
lambda-cyhalothrin											18	0	0%		
lenacil															
linuron	29	0	0%			15	0	0%			18	0	0%		
MCPA	29	23	79%	2.87	26	17	14	82%	7.58	60	18	9	50%	0.87	6
mecoprop	29	18	62%	1.46	16	17	16	94%	1.11	9	18	13	72%	1.17	6
metamitron	29	24	83%	6.07	40	15	14	93%	9.39	60	18	9	50%	1.23	10
metazachlor	29	22	76%	4.12	50	15	14	93%	0.31	1	18	10	56%	9.77	200
methabenzthiazuron	29	19	66%	0.59	7	15	9	60%	0.27	1	18	0	0%		
pendimethalin	29	0	0%			15	0	0%			18	0	0%		
permethrin	29	0	0%			15	0	0%			18	0	0%		
phenmedipham						15	1	7%	0.10	2	18	0	0%		
pirimicarb	29	24	83%	1.50	10	15	13	87%	0.88	10	18	12	67%	0.55	4
prochloraz	29	9	31%	0.13	2	15	0	0%			18	0	0%		
propiconazole	29	22	76%	1.48	20	15	13	87%	2.63	20	18	6	33%	0.42	3
propyzamide	29	0	0%			15	0	0%			18	5	28%	0.31	3
simazine	29	9	31%	0.11	1	15	11	73%	3.17	15	18	11	61%	0.99	6
terbuthylazine	29	28	97%	3.05	10	15	15	100%	1.33	5	18	15	83%	3.85	20
triadimenol	29	1	3%	0.02	3	15	0	0%			18	0	0%		
tribenuron-methyl						17	16	94%	0.05	0.4	10	9	90%	0.02	0.04
Sum pest	29	29	100%	29.7	159	18	18	100%	33.0	122	19	19	100%	25.6	213

* = Only May-June

No = Number of samples analysed; Det = Number of detections; Freq = Detection frequency
TWMC = Time Weighted Mean Concentration during sampling period (µg/l); Max = Maximum concentration detected (µg/

Table 10. Results of pesticide analysis of water samples collected at UT10/TP during October 1992-April 1993

ISCO UT10	**1992/93**				
Substance	No	Det	Freq	TWMC	Max
a-cypermethrin	28	0	0%		
atrazine	28	7	25%	0.12	1
atrazine-desethyl					
BAM					
benazolin-ethylester	28	0	0%		
bentazone	28	6	21%	0.04	0.3
bromoxynil					
chloridazon	28	3	11%	0.75	15
clopyralid	28	1	4%	0.02	0.5
cyanazine	28	0	0%		
cyfluthrin	28	0	0%		
cypermethrin	28	0	0%		
2,4-D	28	0	0%		
deltamethrin	28	0	0%		
dicamba					
dichlobenil	28	0	0%		
dichlorprop	28	9	32%	0.04	0.8
dimethoate					
diuron	28	1	4%	0.01	0.2
esfenvalerate	28	0	0%		
ethofumesate	28	4	14%	0.03	0.3
fenitrothion	28	0	0%		
fenpropimorph	28	8	29%	0.16	2
fenvalerate	28	0	0%		
flamprop-M	28	5	18%	0.01	0.1
fluroxypyr	28	1	4%	0.00	0.1
hexazinon	5	0	0%		
ioxynil	28	2	7%	0.01	0.2
isoproturon	28	9	32%	0.21	2
lambda-cyhalothrin					
lenacil					
linuron	28	0	0%		
MCPA	28	2	7%	0.01	0.5
mecoprop	28	11	39%	0.08	1
metamitron	28	2	7%	0.02	0.4
metazachlor	28	18	64%	0.47	5
methabenzthiazuron	28	9	32%	1.79	30
pendimethalin	28	0	0%		
permethrin	28	0	0%		
phenmedipham	15	0	0%		
pirimicarb	28	7	25%	0.05	0.4
prochloraz	28	0	0%		
propiconazole	28	3	11%	0.04	0.4
propyzamide	28	0	0%		
simazine	28	4	14%	0.17	2
terbuthylazine	28	27	96%	8.23	100
triadimenol	28	0	0%		
tribenuron-methyl					
Sum pest	28	27	96%	12.3	146

No = Number of samples analysed; Det = Number of detections; Freq = Detection frequency
TWMC = Time Weighted Mean Concentration during sampling period (µg/l)
Max = Maximum concentration measured (µg/l)

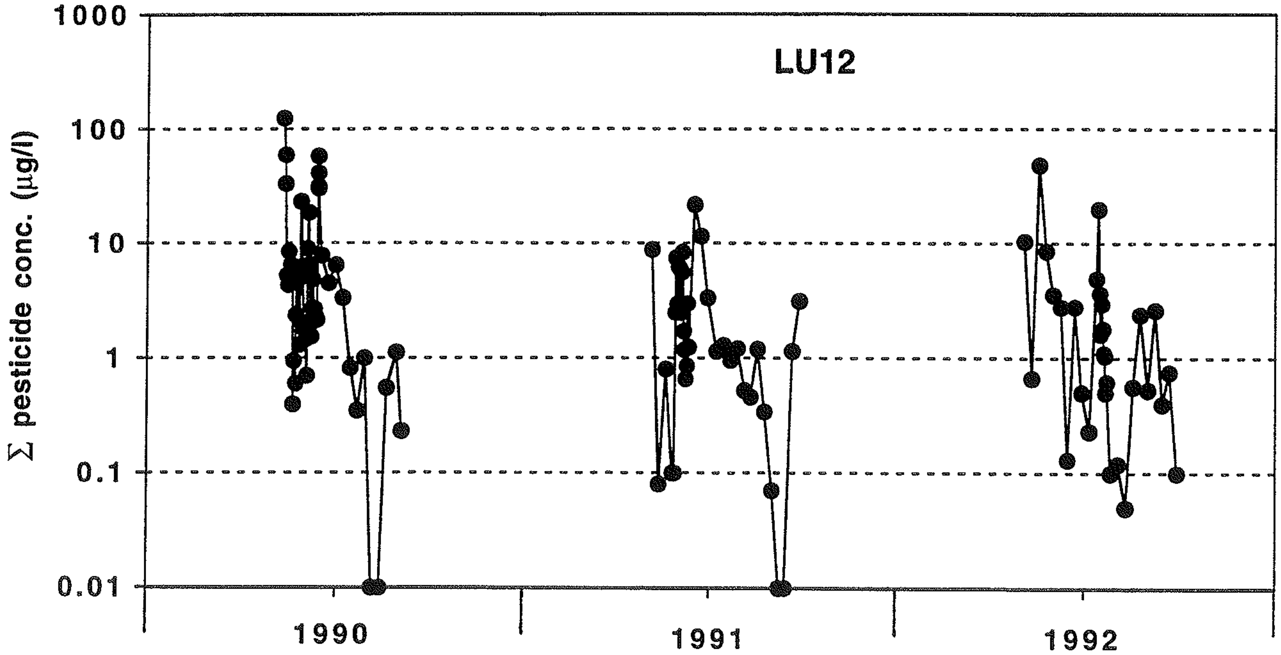
fungicide fenpropimorph, though, had a much lower mean concentration than could be predicted from the large amounts used. Pesticides that were not detected, or detected only on single occasions, were mostly applied at very low amounts, or else a higher limit of determination could explain such non-detections. For example phenmedipham, analyzed at a limit of determination ten times above normal, was only detected on a single occasion even though it was applied regularly in the area.

Concentrations of pesticides in stream water were observed throughout the sampling periods, with peak concentrations during spraying seasons (**Figure 12**). The magnitude of concentration peaks varied to a great extent, most often due to changes in stream flow, with daily average concentration sometimes varying by one order of magnitude from one day to another (**Figure 13**). Occasionally, elevated concentrations were found without any rainfall to transport pesticide residues from the site of application to the culvert or stream. One such occasion was on 10 May 1990, when elevated concentrations were found both in culvert water and at the catchment outlet (comp. **Appendix 5**), without any rainfall during the preceding 10 days. Also, in May-June 1992 there were elevated concentrations in the culvert discharge and streamflow during a long period of time without any rainfall in the area. These incidents were most likely the result of some accidental spillage occurring in the catchment.

Time weighted mean concentrations (TWMC) for each month with composite sampling at LU12 and UT10 are given in **Appendix 6**. Monthly total pesticide TWMC varied between 0.07 and 18.8 μg/l at site LU12 and between 5.8 and 62.9 μg/l at site UT10. As a whole, concentrations were lower at the catchment outlet (LU12), when the water had passed the open part of the stream for 1.1 km, compared to concentrations detected in culvert discharge (UT10). Water flow measurements from these two sites show that there was a substantial contribution to stream flow from groundwater intrusion during low flow conditions, thus diluting pesticide, as well as nutrient, concentrations in the stream.

The difference in concentrations between these two sites was continuously investigated during the warm and dry summer of 1992. In mid July, after two months without rain, 27 mm of rain fell during a three-day period. Some very high concentrations were found in culvert discharge during this period, whereas concentrations were considerably lower in corresponding samples collected at the catchment outlet (**Figures 17 and 18**). Apart from dilution, this could also be explained by the tendency for certain pesticides to distribute to sediment. Some of these pesticides (notably cyfluthrin, methabenzthiazuron and prochloraz) were only detected in culvert discharge and not in the stream at the catchment outlet. The application period had stopped one month earlier for most of the pesticides, but the very dry weather possibly lowered degradation rates of pesticide residues in the topsoil during this period. A dried-out topsoil may also have allowed water flow in cracks, thus moving some of the pesticides rapidly through the topsoil to the tile drains. In a study by Bergström & Jarvis (1993) they found higher concentrations of dichlorprop in leachate from a clay soil under a low irrigation regime than under an intense irriagtion regime, which they attributed to macropore flow in the soil treated with a small water input before leaching started.

The non-composite samples taken at different sites along the culvert and in the stream demonstrate that pesticides were found in subsurface stream water at all sites (**Tables 11-15**). Only small amounts of pesticides were detected, though, at the field site NA1. In 1990, barley was grown on the field draining to NA1 and MCPA (1.0 kg/ha) and dichlorprop (0.6 kg/ha) were applied May 7. Small amounts of these pesticides occurred in the drainage water 2-4



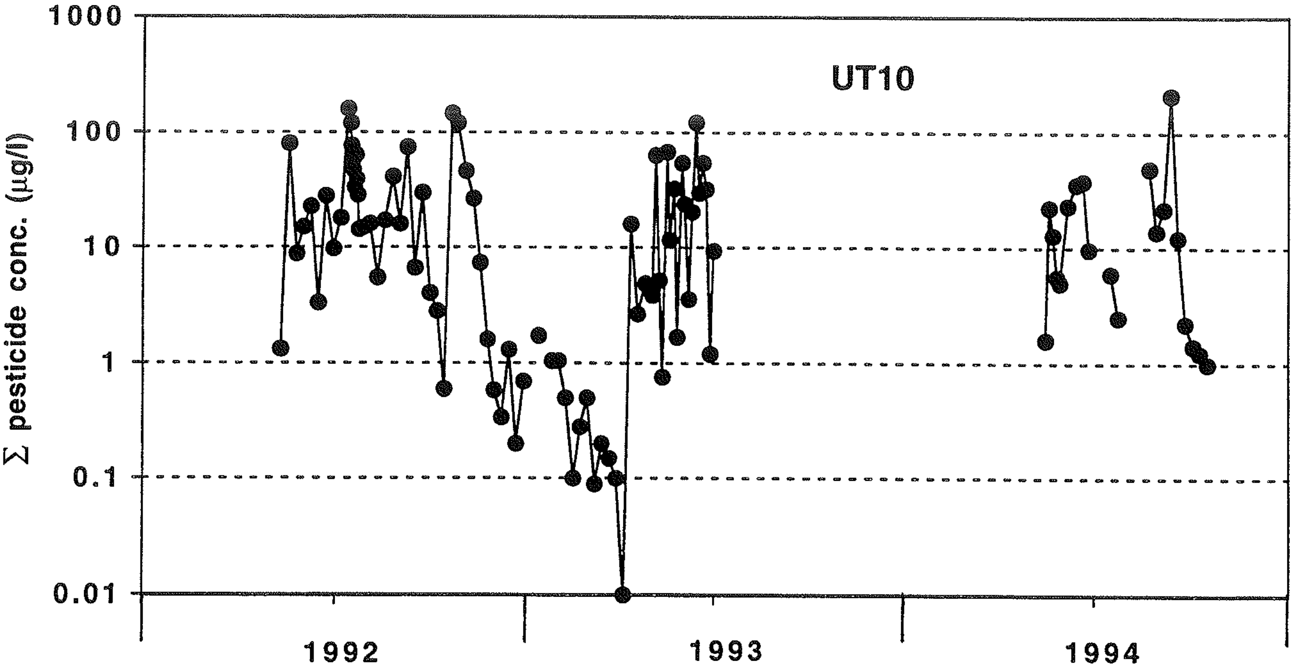
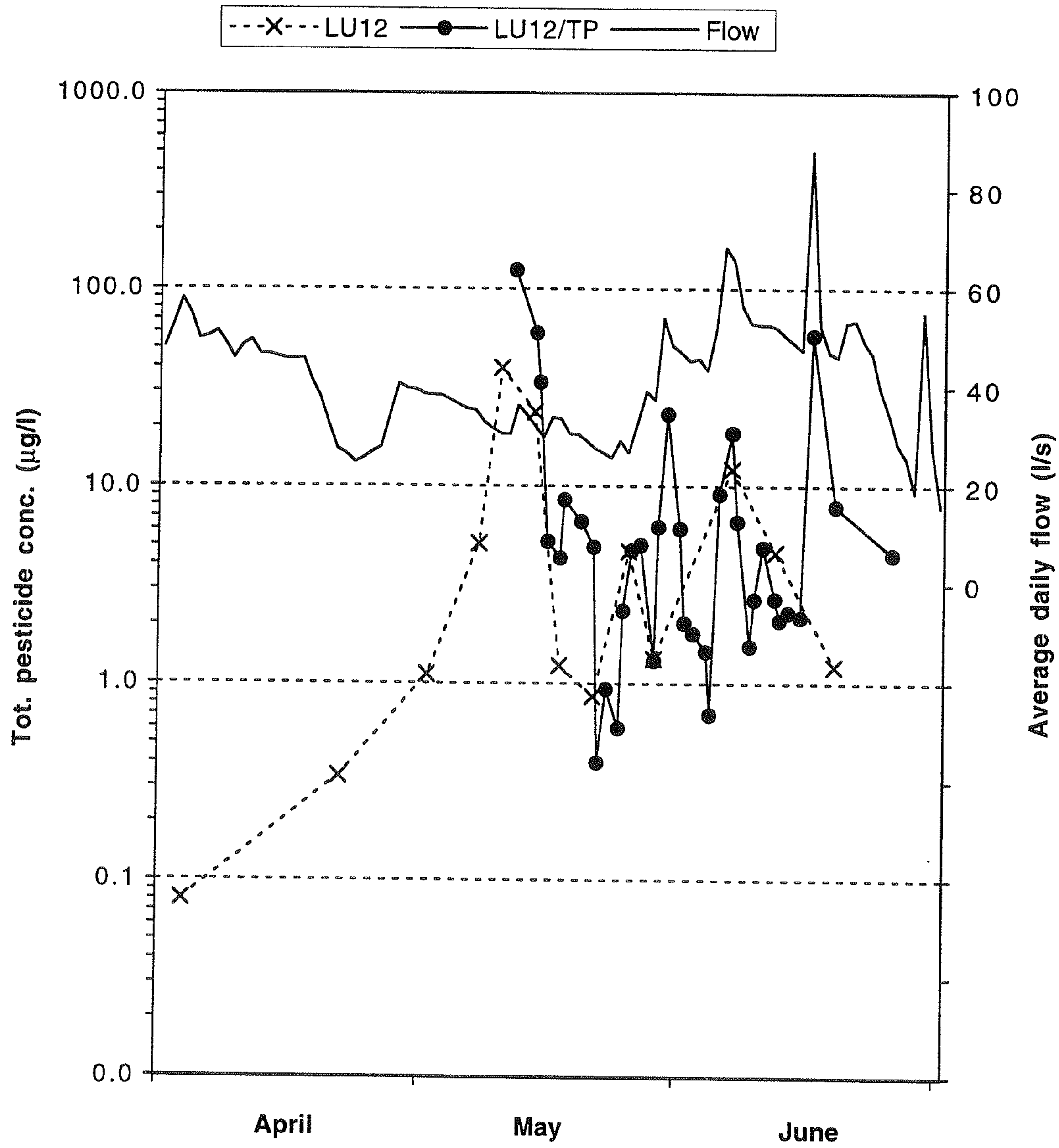


Figure 12. Total pesticide concentration in time paced composite samples collected at LU12 (above) and at UT10 (below)



Figur 13. Relation between pesticide concentrations and stream flow in 1990. Water samples were collected at the catchment outlet by non-composite (LU12) and composite (LU12/TP) sampling procedures.

Table 11. Results of pesticide analysis of water samples collected at NA1 during 1990 and 1991

NA1	Apr-Jun 1990					May-Jun 1991				
Substance	No	Det.	Freq.	Mean	Max	No	Det.	Freq.	Mean	Max
a-cypermethrin						7	0	0%		
atrazine	11	0	0%			7	0	0%		
atrazine-desethyl						7	0	0%		
BAM						7	0	0%		
benazolin-ethylester						7	0	0%		
bentazone	11	3	27%	0.012	0.1	6	0	0%		
bromoxynil						6	0	0%		
chloridazon										
clopyralid	11	0	0%			6	0	0%		
cyanazine	11	1	9%	0.018	0.2	7	0	0%		
cyfluthrin	11	0	0%			7	0	0%		
cypermethrin	11	0	0%			7	0	0%		
2,4-D	11	0	0%			6	0	0%		
deltamethrin	11	0	0%			7	0	0%		
dicamba	11	0	0%			6	0	0%		
dichlobenil	11	0	0%			7	0	0%		
dichlorprop	11	2	18%	0.006	0.06	6	0	0%		
dimethoate	11	0	0%							
diuron	11	0	0%			7	0	0%		
esfenvalerate						7	0	0%		
ethofumesate						7	0	0%		
fenitrothion	11	0	0%			7	0	0%		
fenpropimorph	11	0	0%			7	0	0%		
fenvalerate	11	0	0%			7	0	0%		
flamprop-M						6	0	0%		
fluroxypyr						6	0	0%		
hexazinon	11	0	0%							
ioxynil						6	0	0%		
isoproturon	11	0	0%			7	0	0%		
lambda-cyhalothrin										
lenacil	11	0	0%			7	0	0%		
linuron	11	0	0%			7	0	0%		
MCPA	11	3	27%	0.011	0.07	6	0	0%		
mecoprop	11	0	0%			6	0	0%		
metamitron	11	0	0%			7	0	0%		
metazachlor	11	2	18%	0.055	0.5	7	0	0%		
methabenzthiazuron	11	0	0%			7	0	0%		
pendimethalin	11	0	0%			7	0	0%		
permethrin	11	0	0%			7	0	0%		
phenmedipham	11	0	0%			7	0	0%		
pirimicarb	11	0	0%			7	0	0%		
prochloraz						3	0	0%		
propiconazole	11	0	0%			7	0	0%		
propyzamide	11	0	0%							
simazine	11	0	0%			7	0	0%		
terbuthylazine	11	1	9%	0.018	0.2	7	0	0%		
triadimenol	11	0	0%			7	0	0%		
tribenuron-methyl										
Sum pest	11	5	45%	0.121	1.03	7	0	0%		

No = Number of samples analysed; Det = Number of detections; Freq = Detection frequency
Mean = Mean concentraiton during sampling period (µg/l); Max = Maximum concentration detected (µg/l)

Table 12. Results of pesticide analysis of water samples collected at FA3 in 1990 and 1991

FA3	May-Jun 1990					May-Jun 1991				
Substance	No	Det.	Freq.	Mean	Max	No	Det.	Freq.	Mean	Max
a-cypermethrin						4	0	0%		
atrazine	7	7	100%	0.13	0.2	4	0	0%		
atrazine-desethyl						4	0	0%		
BAM						4	0	0%		
benazolin-ethylester						4	0	0%		
bentazone	7	7	100%	3.61	5.3	4	4	100%	0.28	0.6
bromoxynil						4	1	25%	0.01	0.05
chloridazon										
clopyralid	7	0	0%			4	0	0%		
cyanazine	7	5	71%	0.39	0.8	4	0	0%		
cyfluthrin	7	0	0%			4	0	0%		
cypermethrin	7	0	0%			4	0	0%		
2,4-D	7	0	0%			4	0	0%		
deltamethrin	7	0	0%			4	0	0%		
dicamba	7	0	0%			4	0	0%		
dichlobenil	7	0	0%			4	0	0%		
dichlorprop	7	7	100%	0.05	0.09	4	3	75%	0.10	0.2
dimethoate	7	0	0%							
diuron	7	1	14%	0.10	0.7	4	0	0%		
esfenvalerate						4	0	0%		
ethofumesate						4	1	25%	0.03	0.1
fenitrothion	7	0	0%			4	0	0%		
fenpropimorph	7	3	43%	1.29	4.4	4	0	0%		
fenvalerate	7	0	0%			4	0	0%		
flamprop-M						4	1	25%	0.01	0.05
fluroxypyr						4	0	0%		
hexazinon	7	0	0%							
ioxynil						4	1	25%	0.05	0.2
isoproturon	7	1	14%	0.14	1	4	0	0%		
lambda-cyhalothrin										
lenacil	7	0	0%			4	0	0%		
linuron	7	2	29%	0.49	2	4	0	0%		
MCPA	7	6	86%	0.05	0.1	4	1	25%	0.05	0.2
mecoprop	7	6	86%	0.05	0.1	4	4	100%	0.28	0.6
metamitron	7	4	57%	11.21	30	4	0			
metazachlor	7	7	100%	3.04	7.8	4	0			
methabenzthiazuron	7	2	29%	0.84	3.3	4	0			
pendimethalin	7	3	43%	0.21	0.9	4	0			
permethrin	7	1	14%	0.47	3.3	4	0			
phenmedipham	7	0	0%			4	0	0%		
pirimicarb	7	2	29%	0.31	1.6	4	0	0%		
prochloraz						1	0	0%		
propiconazole	7	4	57%	1.30	2.9	4	1	25%	0.10	0.4
propyzamide	7	0	0%							
simazine	7	0	0%			4	0	0%		
terbuthylazine	7	7	100%	1.06	2	4	1	25%	0.08	0.3
triadimenol	7	0	0%			4	0	0%		
tribenuron-methyl										
Sum pest	7	7	100%	24.7	47.6	4	4	100%	0.97	2.7

No = Number of samples analysed; Det = Number of detections; Freq = Detection frequency
Mean = Mean concentraiton during sampling period (μg/l); Max = Maximum concentration detected (μg/l)

Table 13. Results of pesticide analysis of water samples collected at SH5 in 1990 and 1991

SH5	**Apr-Jun 1990**					**May-Jun 1991**				
Substance	No	Det.	Freq.	Mean	Max	No	Det.	Freq.	Mean	Max
a-cypermethrin						4	0	0%		
atrazine	10	7	70%	0.11	0.3	4	0	0%		
atrazine-desethyl						4	0	0%		
BAM						4	0	0%		
benazolin-ethylester						4	0	0%		
bentazone	10	10	100%	5.30	34	4	3	75%	0.33	0.7
bromoxynil						4	1	25%	0.01	0.05
chloridazon										
clopyralid	10	0	0%			4	0	0%		
cyanazine	10	7	70%	0.34	1	4	0	0%		
cyfluthrin	10	0	0%			4	0	0%		
cypermethrin	10	0	0%			4	0	0%		
2,4-D	10	1	10%	0.04	0.4	4	0	0%		
deltamethrin	10	0	0%			4	0	0%		
dicamba	10	0	0%			4	0	0%		
dichlobenil	10	0	0%			4	0	0%		
dichlorprop	10	10	100%	7.43	73	4	1	25%	0.05	0.2
dimethoate	10	0	0%							
diuron	10	1	10%	0.90	9	4	0	0%		
esfenvalerate						4	0	0%		
ethofumesate						4	1	25%	0.10	0.4
fenitrothion	10	0	0%			4	0	0%		
fenpropimorph	10	2	20%	0.59	3.2	4	0	0%		
fenvalerate	10	0	0%			4	0	0%		
flamprop-M						4	0	0%		
fluroxypyr						4	0	0%		
hexazinon	10	0	0%							
ioxynil						4	1	25%	0.03	0.1
isoproturon	10	1	10%	0.36	3.6	4	0	0%		
lambda-cyhalothrin										
lenacil	10	0	0%			4	0	0%		
linuron	10	5	50%	2.49	22	4	0	0%		
MCPA	10	10	100%	12.24	120	4	1	25%	0.02	0.09
mecoprop	10	10	100%	1.00	8.3	4	4	100%	0.22	0.6
metamitron	10	6	60%	11.20	40	4	0	0%		
metazachlor	10	10	100%	4.08	16	4	0	0%		
methabenzthiazuron	10	3	30%	0.57	2.4	4	0	0%		
pendimethalin	10	1	10%	0.04	0.4	4	0	0%		
permethrin	10	0	0%			4	0	0%		
phenmedipham	10	0	0%			4	0	0%		
pirimicarb	10	2	20%	0.28	1.7	4	0	0%		
prochloraz						1	0	0%		
propiconazole	10	3	30%	0.83	4.2	4	1	25%	0.50	2
propyzamide	10	0	0%							
simazine	10	0	0%			4	0	0%		
terbuthylazine	10	10	100%	0.93	1.8	4	1	25%	0.03	0.1
triadimenol	10	0	0%			4	0	0%		
tribenuron-methyl										
Sum pest	10	10	100%	48.7	314.7	4	4	100%	1.3	4.2

No = Number of samples analysed; Det = Number of detections; Freq = Detection frequency
Mean = Mean concentraiton during sampling period (µg/l); Max = Maximum concentration detected (µg/l)

Table 14. Results of pesticide analysis of water samples collected at UT10 in 1990 and 1991

UT10	**Apr-Jun 1990**					**May-Jun 1991**				
Date	No	Det.	Freq.	Mean	Max	No	Det.	Freq.	Mean	Max
a-cypermethrin						8	0	0%		
atrazine	12	9	75%	0.49	3	8	4	50%	1.53	11
atrazine-desethyl						8	1	13%	0.13	1
BAM						8	0	0%		
benazolin-ethylester						8	0	0%		
bentazone	12	12	100%	3.80	25	8	7	88%	0.23	0.4
bromoxynil						8	2	25%	0.01	0.05
chloridazon										
clopyralid	12	0	0%			8	0	0%		
cyanazine	12	7	58%	0.41	2.6	8	0	0%		
cyfluthrin	12	0	0%			8	0	0%		
cypermethrin	12	0	0%			8	0	0%		
2,4-D	12	1	8%	0.05	0.6	8	1	13%	0.01	0.08
deltamethrin	12	0	0%			8	0	0%		
dicamba	12	0	0%			8	0	0%		
dichlobenil	12	0	0%			8	0	0%		
dichlorprop	12	11	92%	8.59	100	8	5	63%	0.20	0.8
dimethoate	12	0	0%							
diuron	12	2	17%	1.13	13	8	0	0%		
esfenvalerate						8	0	0%		
ethofumesate						8	4	50%	0.16	0.6
fenitrothion	12	0	0%			8	0	0%		
fenpropimorph	12	1	8%	0.08	1	8	0	0%		
fenvalerate	12	0	0%			8	0	0%		
flamprop-M	0					8	1	13%	0.01	0.05
fluroxypyr	0					8	0	0%		
hexazinon	12	0	0%							
ioxynil						8	3	38%	0.04	0.2
isoproturon	12	1	8%	0.45	5.4	8	1	13%	0.06	0.5
lambda-cyhalothrin										
lenacil	12	0	0%			8	0	0%		
linuron	12	5	42%	3.72	40	8	0	0%		
MCPA	12	11	92%	10.44	120	8	5	63%	0.73	4
mecoprop	12	11	92%	1.47	13	8	8	100%	0.18	0.3
metamitron	12	6	50%	17.67	90	8	1	13%	0.06	0.5
metazachlor	12	12	100%	4.63	26	8	1	13%	0.04	0.3
methabenzthiazuron	12	2	17%	0.29	2	8	1	13%	0.25	2
pendimethalin	12	0	0%			8	0	0%		
permethrin	12	0	0%			8	0	0%		
phenmedipham	12	0	0%			8	0	0%		
pirimicarb	12	3	25%	0.16	1	8	1	13%	0.01	0.05
prochloraz						4	0	0%		
propiconazole	12	4	33%	0.77	3	8	2	25%	0.13	0.7
propyzamide	12	0	0%							
simazine	12	0	0%			8	1	13%	0.01	0.06
terbuthylazine	12	12	100%	0.96	3	8	4	50%	0.21	1
triadimenol	12	0	0%			8	0	0%		
tribenuron-methyl										
Sum pest	12	12	100%	55.1	346.1	8	8	100%	4.0	18.53

No = Number of samples analysed; Det = Number of detections; Freq = Detection frequency
Mean = Mean concentraiton during sampling period (µg/l); Max = Maximum concentration detected (µg/l)

Table 15. Results of pesticide analysis of water samples collected at LU12 in 1990 and 1991

LU12	Apr-Aug 1990					Feb-May 1991				
Substance	No	Det.	Freq.	Mean	Max	No	Det.	Freq.	Mean	Max
a-cypermethrin						3	0	0%		
atrazine	14	3	21%	0.07	0.5	4	0	0%		
atrazine-desethyl						3	0	0%		
BAM						3	0	0%		
benazolin-ethylester						3	0	0%		
bentazone	14	11	79%	0.52	3	4	3	75%	0.03	0.05
bromoxynil										
chloridazon										
clopyralid	14	0	0%			4	0	0%		
cyanazine	14	1	7%	0.04	0.5	4	0	0%		
cyfluthrin	14	0	0%			4	0	0%		
cypermethrin	14	0	0%			4	0	0%		
2,4-D	14	0	0%			4	0	0%		
deltamethrin	14	0	0%			4	0	0%		
dicamba	14	0	0%			4	0	0%		
dichlobenil	14	0	0%			4	0	0%		
dichlorprop	14	11	79%	1.13	11	4	2	50%	0.02	0.04
dimethoate	14	0	0%			1	0	0%		
diuron	14	0	0%			4	0	0%		
esfenvalerate						3	0	0%		
ethofumesate						2	0	0%		
fenitrothion	14	0	0%			4	0	0%		
fenpropimorph	14	1	7%	0.26	3.6	4	0	0%		
fenvalerate	14	0	0%			4	0	0%		
flamprop-M										
fluroxypyr										
hexazinon	14	0	0%			1	0	0%		
ioxynil										
isoproturon	14	0	0%			4	0	0%		
lambda-cyhalothrin										
lenacil	14	0	0%			4	1	25%	0.25	1
linuron	14	1	7%	0.06	0.9	4	0	0%		
MCPA	14	12	86%	1.56	16	4	1	25%	0.02	0.06
mecoprop	14	11	79%	0.23	1.2	4	4	100%	0.07	0.2
metamitron	14	3	21%	1.57	15	4	0	0%		
metazachlor	14	10	71%	1.04	7.5	4	0	0%		
methabenzthiazuron	14	0	0%			4	0	0%		
pendimethalin	14	0	0%			4	0	0%		
permethrin	14	1	7%	0.14	1.9	4	0	0%		
phenmedipham	14	0	0%			4	0	0%		
pirimicarb	14	2	14%	0.02	0.2	4	0	0%		
prochloraz										
propiconazole	14	3	21%	0.14	0.7	4	0	0%		
propyzamide	14	0	0%			1	0	0%		
simazine	14	0	0%			4	0	0%		
terbuthylazine	14	9	64%	0.12	0.5	4	0	0%		
triadimenol	14	0	0%			4	0	0%		
tribenuron-methyl										
Sum pest	14	14	100%	6.9	39.7	4	4	100%	0.39	1.05

No = Number of samples analysed; Det = Number of detections; Freq = Detection frequency
Mean = Mean concentraiton during sampling period (μg/l); Max = Maximum concentration detected (μg/l)

weeks later. Occasional findings of four other pesticides at low concentrations could possibly be explained by runoff water from a neighbouring courtyard entering the field tiles. During 1991, when winter rape was grown on the field, no pesticide residues were detected in the drainage water during the subsequent spring following an autumn application of the herbicide metazachlor and a spring application on May 10, of the insecticide deltamethrin (0.0045 kg/ha). The sampling procedure being non-composite and not flow-event related was a draw back when monitoring pesticide transport from a field site. Pesticide transport studies at other sites of similar size have demonstrated that the largest masses of pesticides are most often lost during periods of a very short duration at the early part of a flow event (Kladivko et al., 1991; Brown et al., 1995).

A small village is situated between sites SH5 and UT10 and nutrient analyses showed a marked increase in phosphorus concentrations between these two sites, especially during the summer months, as a result of discharge from households into the culvert. Pesticide concentrations, though, found in the culvert were of the same order of magnitude before (SH5) and after (UT10) the village, indicating that pesticides from household use was not contributing to the findings in the stream. However, atrazine showed increased concentrations between these two sites, due to its application on two courtyards for weed control, both of which were situated downstream from site SH5. Low concentrations of atrazine detected in water at sites FA3 and SH5 likely originated from past uses. Buhler et al. (1993) found atrazine in tile drainage for up to 3 years after use of the compound was discontinued, demonstrating that it may take several years before the impact of altered practices can be evaluated.

Wind drift had little or no influence on stream water quality. Only on one occasion, winddrift was demonstrated to result in increased pesticide concentration in the stream. Dimethoate was detected at 5 μg/l in mid July 1994, during a period with no rain, when an adjacent field had been sprayed with this compound. No fields upstream the sampling site had previously been treated with dimethoate.

Results from sampling during winter 1992/93 (**Table 10**) showed that pesticides were persistent in culvert discharge throughout the winter (**Figure 12**). Detected pesticides originated from both autumn and spring applications in the field, as well as from courtyard applications.

Pesticide usage on courtyards resulted in increased loads in the stream. For example, terbuthylazine was applied on one courtyard for weed control in September 1992. Terbuthylazine was subsequently detected in culvert discharge with a maximum concentration of 100 μg/l at the onset of increased discharge in mid-October, and was thereafter present throughout the winter season. This resulted in a total load of more than 6 kilos of active ingredient during a seven month period. Atrazine, only applied on courtyards in this area, was detected in streamflow throughout the entire investigation period. It is notable that atrazine was withdrawn from sale on the Swedish market in 1989.

High concentrations of a wide range of compounds were detected in water collected in surface runoff inlets on two courtyards (**Table 16**) on three occasions in May-June 1991 and on one occasion in May 1992. Especially in water from the larger (A) farm, some very high concentrations were encountered. Water samples taken on the first two occasions in 1991 were withdrawn from water standing in the well, but a total of *ca.* 20 mm of rain had fallen in

Table 16. Results of pesticide analysis of run-off water samples collected in two courtyard wells 1991 and 1992

	Farm A 1991/92					Farm B 1991/92				
Substance	No	Det.	Freq.	Mean	Max	No	Det.	Freq.	Mean	Max
a-cypermethrin	4	0	0%			4	0	0%		
atrazine	4	4	100%	8.30	30	4	3	75%	0.43	1
atrazine-desethyl	3	1	33%	0.33	1	3	2	67%	0.20	0.4
atrazine-desisopropyl	1	1	100%	1.00	1					
BAM	3	0	0%			3	0	0%		
benazolin-ethylester	4	0	0%			4	0	0%		
bentazone	4	4	100%	9.70	30	4	3	75%	0.11	0.3
bromoxynil	3	3	100%	7.37	20	3	1	33%	0.02	0.05
chloridazon	3	3	100%	40.00	70	1	0	0%		
clopyralid	4	2	50%	2.25	7	4	0	0%		
cyanazine	4	3	75%	0.75	2	4	0	0%		
cyfluthrin	4	0	0%			4	0	0%		
cypermethrin	4	0	0%			4	0	0%		
2,4-D	4	1	25%	0.02	0.06	4	0	0%		
deltamethrin	4	0	0%			4	0	0%		
dicamba	3	0	0%			3	0	0%		
dichlobenil	4	0	0%			4	0	0%		
dichlorprop	4	3	75%	22.63	60	4	3	75%	22.25	60
dimethoate										
diuron	4	1	25%	0.50	2	4	0	0%		
esfenvalerate	4	1	25%	0.13	0.5	4	1	25%	0.18	0.7
ethofumesate	4	3	75%	3.75	6	2	2	100%	0.85	0.9
fenitrothion	4	0	0%			4	0	0%		
fenpropimorph	4	4	100%	4.50	6	4	1	25%	0.03	0.1
fenvalerate	4	0	0%			4	0	0%		
flamprop-M	4	4	100%	2.63	7	4	0	0%		
fluroxypyr	4	4	100%	10.75	30	4	2	50%	0.33	0.9
hexazinon										
ioxynil	4	4	100%	16.33	60	4	3	75%	0.65	2
isoproturon	4	4	100%	675.00	2000	4	1	25%	1.00	4
lambda-cyhalothrin										
lenacil	3	1	33%	0.13	0.4	3	0	0%		
linuron	4	4	100%	132.50	400	4	0	0%		
MCPA	4	4	100%	19.82	70	4	4	100%	4.33	15
mecoprop	4	4	100%	50.21	120	4	3	75%	0.29	0.8
metamitron	4	4	100%	260.00	400	4	3	75%	1.75	4
metazachlor	4	4	100%	97.00	300	4	3	75%	0.25	0.5
methabenzthiazuron	4	4	100%	102.50	300	4	0	0%		
pendimethalin	4	2	50%	0.45	1	4	2	50%	0.35	1
permethrin	4	0	0%			4	0	0%		
phenmedipham	3	1	33%	1.00	3	3	0	0%		
pirimicarb	4	4	100%	19.55	60	4	2	50%	0.18	0.5
prochloraz	4	4	100%	30.25	100	4	2	50%	0.83	3
propiconazole	4	4	100%	45.00	100	4	3	75%	1.58	5
propyzamide	1	0	0%			1	0	0%		
simazine	4	3	75%	1.65	5	4	0	0%		
terbuthylazine	4	4	100%	256.50	900	4	1	25%	0.03	0.1
terbuthylazine-desethyl	1	1	100%	3.00	3					
triadimenol	4	0	0%			4	1	25%	0.50	2
tribenuron-methyl										
triklorfenol	1	1	100%	100.00	100					
Sum pest	4	4	100%	1835.3	4943	4	4	100%	35.6	72.3

No = Number of samples analysed; Det = Number of detections; Freq = Detection frequncy
Mean = Mean concentraiton during sampling period (µg/l); Max = Maximum concentration detected (µg/l)

the area between samples. On the last occasion in 1991, there was an actual runoff event, due to intensive rainfall starting about eight hours before the sample was taken, and a total of *ca.* 40 mm of rain had fallen since the previous sample. Nevertheless, most of the previously detected compounds were still present at elevated concentrations in runoff water from the courtyard, demonstrating the possibility of extended duration of pesticide losses also from point sources within a catchment.

Despite these elevated concentrations attributed to point sources, this did not seem to influence the composition of pesticides in the culvert or stream water during the subsequent runoff events in 1991. For example, metamitron and isoproturon detected in one of the wells at 300 µg/l and 2000 µg/l, respectively, were later only detected occasionally at the catchment outlet and at much lower concentrations (i.e. 2 µg/l or less). There was no flux in the stream containing a similar composition of pesticides as detected in water from either well. This does not, however, eliminate the possibility of point sources contributing to concentrations detected in the stream water.

Transport and loss

Calculated monthly transported quantities and total seasonal losses of each pesticide during 1990-1994 are presented in **Appendices 7 and 8**. The calculations are based on results obtained using time-paced, composite sampling (LU12/TP and UT10/TP), with the exception of the first week of May in 1990 when only non-composite samples were available and therefore incorporated in the calculations. When both the detection frequency and the agricultural use of a specific pesticide were low, there is an uncertainty calculating the actual percentage.

Total amounts of pesticide lost in stream flow during May-September varied between 0.8 and 2.8 kg during the five-year period. Losses for single pesticides were generally less than 0.3% of the applied amount during individual years (**Table 17**) and as a whole the average loss during May-September was *ca.* 0.1% of applied amount (**Figure 14**). Average loss (May-September) for all pesticides showed small changes between years, varying from 0.06% during the dry summer of 1992 to 0.16% in 1990. There were no differences in losses between pesticides applied at different application rates.

Occasional extreme losses of single pesticides were registered during the investigation and were attributed to point source contributions or non-agricultural applications. For example, in 1994 one farmer used cyanazine for weed control on a courtyard. This resulted in elevated cyanazine concentrations in water during several months and transported amounts were clearly not correlated to the amounts used in the field (**Table 17**). The loss figure for dimethoate (0.26%) is based on only one detection (5 µg/l) in 1994, which was caused by winddrift.

In **Figures 15-20** the response of pesticide concentration and transport to streamflow changes during sampling periods are presented. Although concentrations detected in culvert discharge were generally higher than those encountered in streamflow at the catchment outlet, calculated losses were comparable between these two sites.

Losses of the phenoxy acids mecoprop and dichlorprop during the winter period after autumn application were in the same range as those estimated during the summer months (**Table 18**).

Table 17. Losses of field applied pesticides detected in streamflow and culvert discharge during May-September 1990-1994

	Loss at LU12*			Loss at UT10*^			Average loss°	Average loss°
Substance	May-Sep 1990	May-Sep 1991	May-Sep 1992	May-Sep 1992	May-Jun 1993	May-Sep 1994	LU12 1990-92	UT10 1992-94
bentazone	0.72%	0.58%	0.05%	0.16%	n.u.	n.u.	0.45%	0.16%
bromoxynil	n.a.	0.23%	n.a.	n.a.	n.a.	n.a.	0.23%	n.a.
chloridazon	n.a.	n.a.	0.08%	0.02%	0.16%	0.65%	0.08%	0.28%
clopyralid	0.00%	0.00%	0.00%	0.01%	0.15%	0.00%	0.00%	0.05%
cyanazine	0.26%	0.12%	0.00%	0.08%	0.00%	(39.64%)	0.13%	0.04%
cyfluthrin	0.00%	0.00%	0.00%	0.09%	0.71%	0.00%	0.00%	0.27%
2,4-D	0.23%	n.u.	n.u.	n.u.	0.03%	n.u.	0.23%	0.03%
dichlorprop	0.15%	0.15%	0.59%	0.41%	0.01%	0.06%	0.30%	0.16%
dimethoate	n.u.	n.u.	n.u.	n.u.	n.u.	0.26%	n.u.	0.26%
esfenvalerate	n.a.	0.00%	0.00%	0.00%	0.00%	0.06%	0.00%	0.02%
ethofumesate	n.a.	0.24%	0.16%	0.09%	0.02%	0.20%	0.20%	0.11%
fenpropimorph	0.00%	0.01%	0.01%	0.01%	0.01%	0.03%	0.01%	0.02%
flamprop-M	n.u.	0.17%	0.01%	0.03%	0.04%	n.u.	0.09%	0.04%
fluroxypyr	n.a.	(8.42%)	0.001%	0.004%	0.13%	0.02%	0.001%	0.05%
ioxynil	n.a.	0.10%	0.06%	0.04%	n.a.	n.a.	0.08%	0.04%
isoproturon	0.00%	n.u.	0.03%	0.03%	0.01%	0.02%	0.02%	0.02%
MCPA	0.19%	0.12%	0.17%	0.21%	0.06%	0.08%	0.16%	0.11%
mecoprop	0.11%	0.44%	0.10%	0.15%	0.07%	0.07%	0.22%	0.10%
metamitron	0.24%	0.02%	0.03%	0.04%	0.07%	0.11%	0.10%	0.07%
metazachlor	(5.30%)	n.u.	n.u.	n.u.	n.u.	0.04%	-	0.04%
methabenzthiazuron	0.01%	0.05%	0.00%	0.13%	0.04%	0.00%	0.02%	0.06%
phenmedipham	0.00%	0.00%	n.a.	n.a.	0.01%	0.00%	0.00%	0.00%
pirimicarb	0.16%	0.08%	0.03%	0.04%	0.13%	0.05%	0.09%	0.07%
prochloraz	n.a.	0.00%	0.00%	0.01%	n.u.	n.u.	0.00%	0.01%
propiconazole	0.44%	0.10%	0.02%	0.06%	0.10%	0.09%	0.19%	0.08%
triadimenol	0.00%	0.00%	0.00%	0.01%	0.00%	n.u.	0.00%	0.00%
tribenuron-methyl	n.u.	n.a.	n.a.	n.a.	0.12%	0.05%	n.a.	0.09%
Average all pesticides	0.16%	0.12%	0.06%	0.08%	0.09%	0.09%	0.10%	0.07%

* = Figures in brackets are not included in calculations of average loss ^ = Chloridazon loss in 1993 in calculated for Apr.-Jun. and metazachlor in 1994 for May-Aug.

n.u. = not used n.a. = not analysed ° = Average loss during May-September (May-June in 1993)

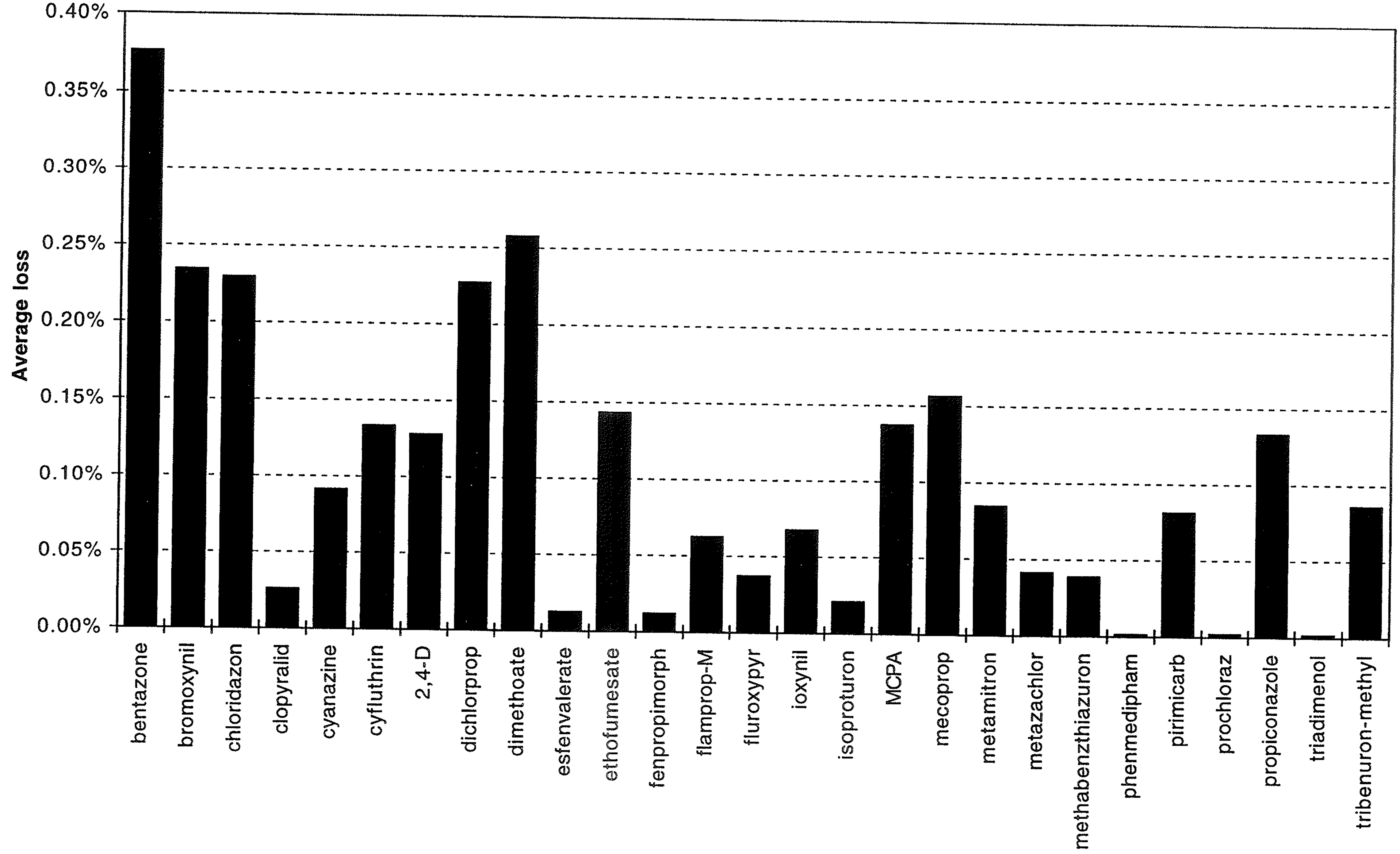


Figure 14. Average loss during May-September as percentage of applied amount, 1990-1994. Note that for some pesticides the figures are based on a smaller number of years.

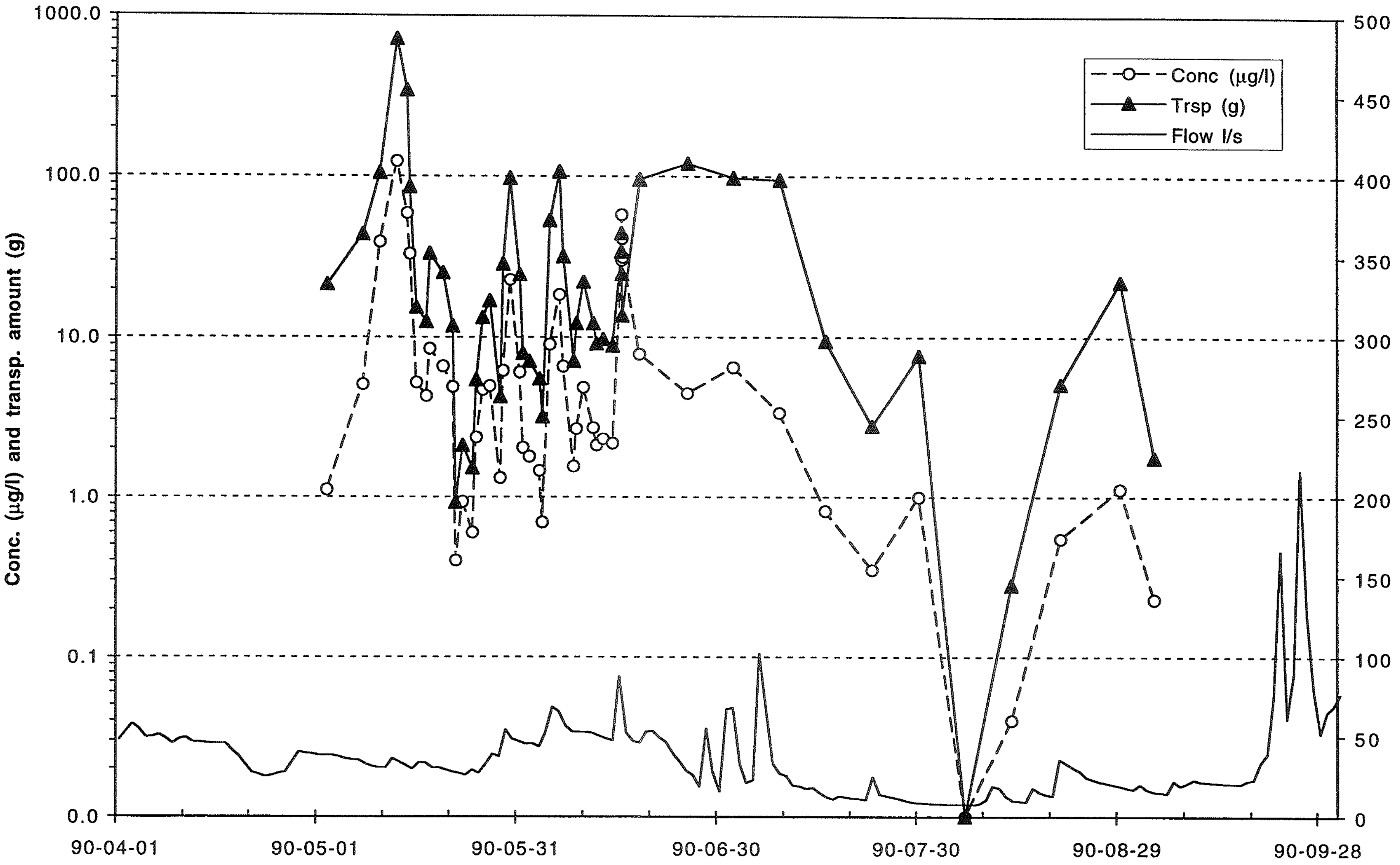


Figure 15. Total pesticide concentration and transported amounts in response to streamflow at LU12/TP in 1990.

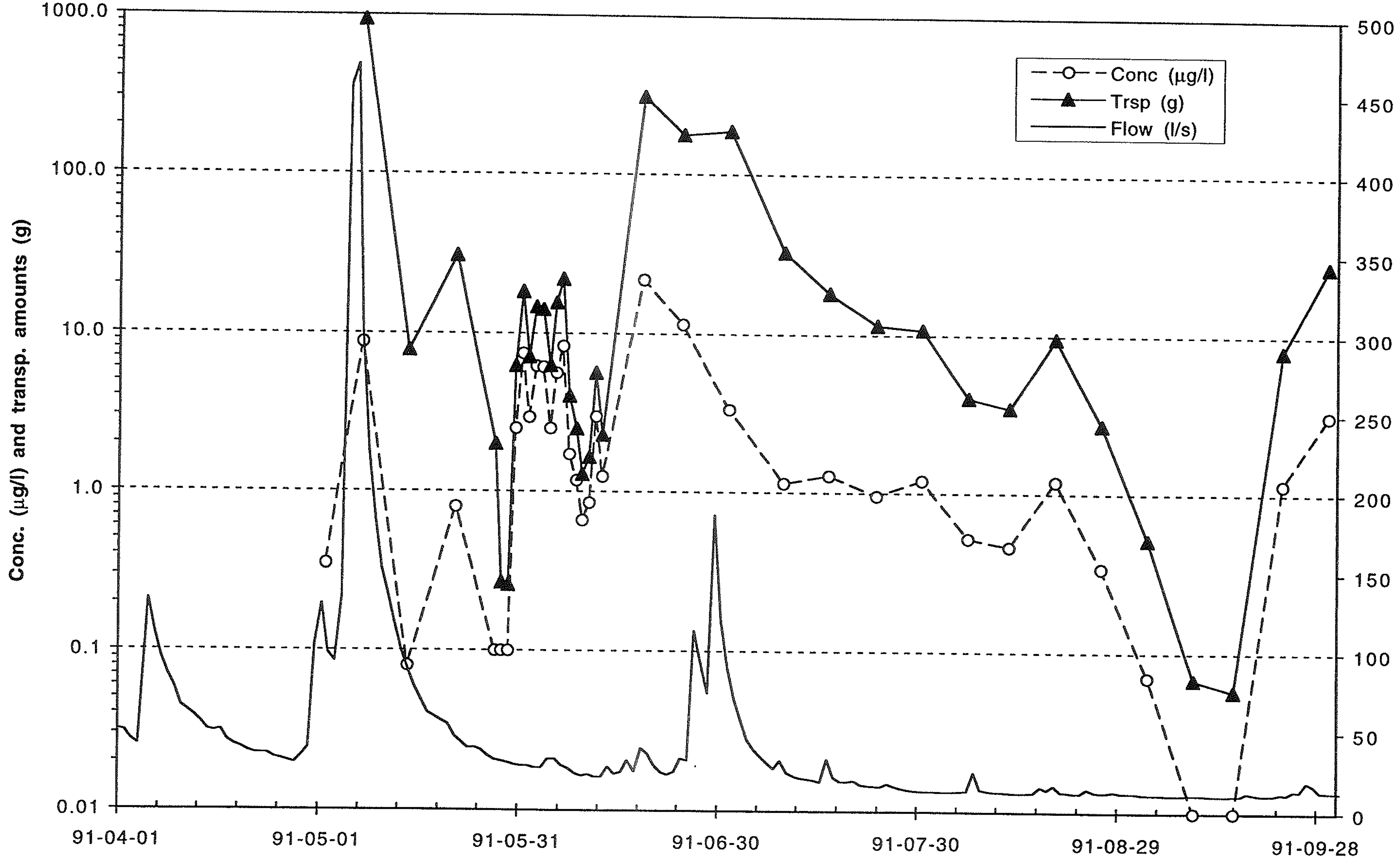


Figure 16. Total pesticide concentration and transported amounts in response to streamflow at LU12/TP in 1991.

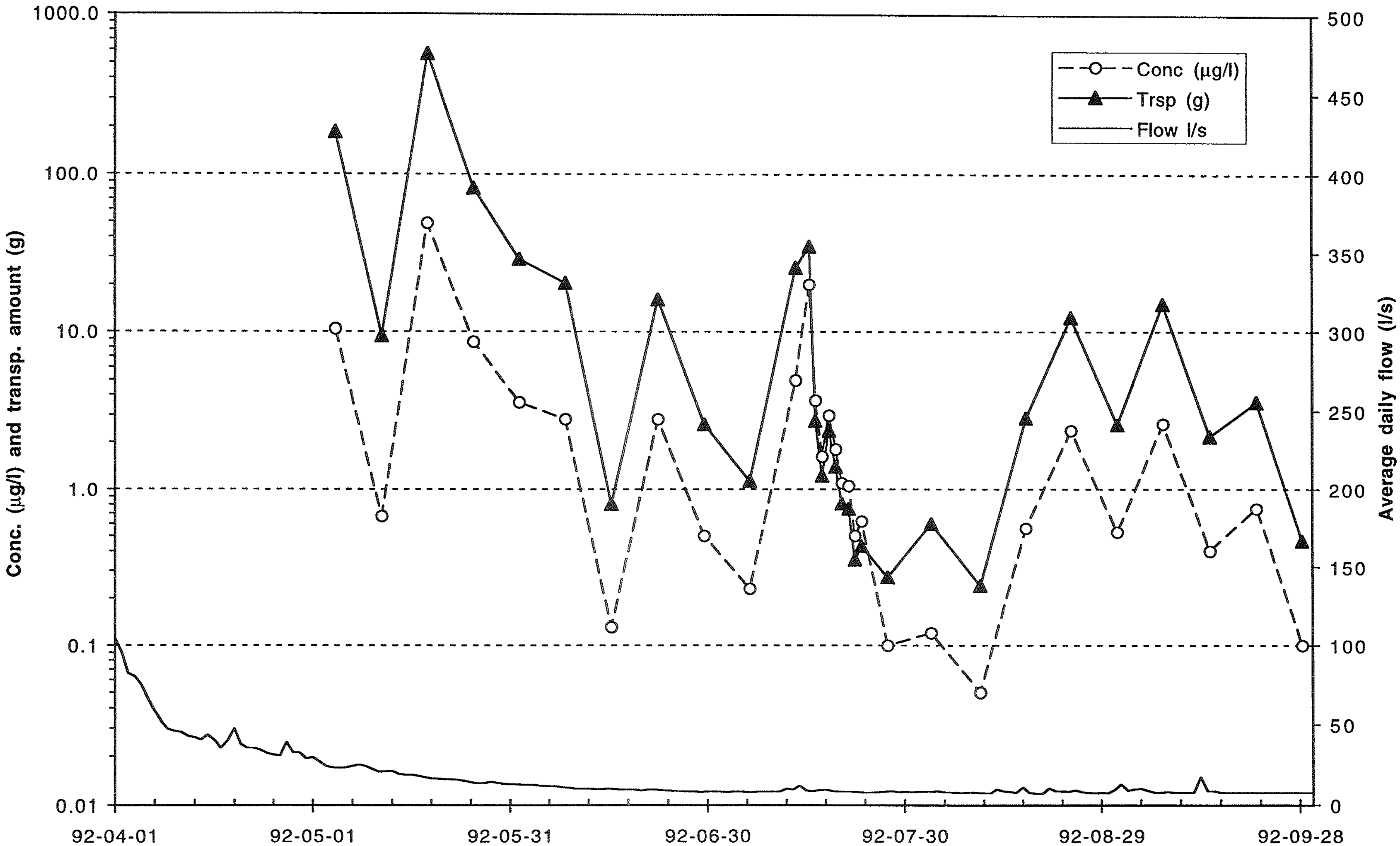


Figure 17. Total pesticide concentration and transported amounts in response to streamflow at LU12/TP in 1992.

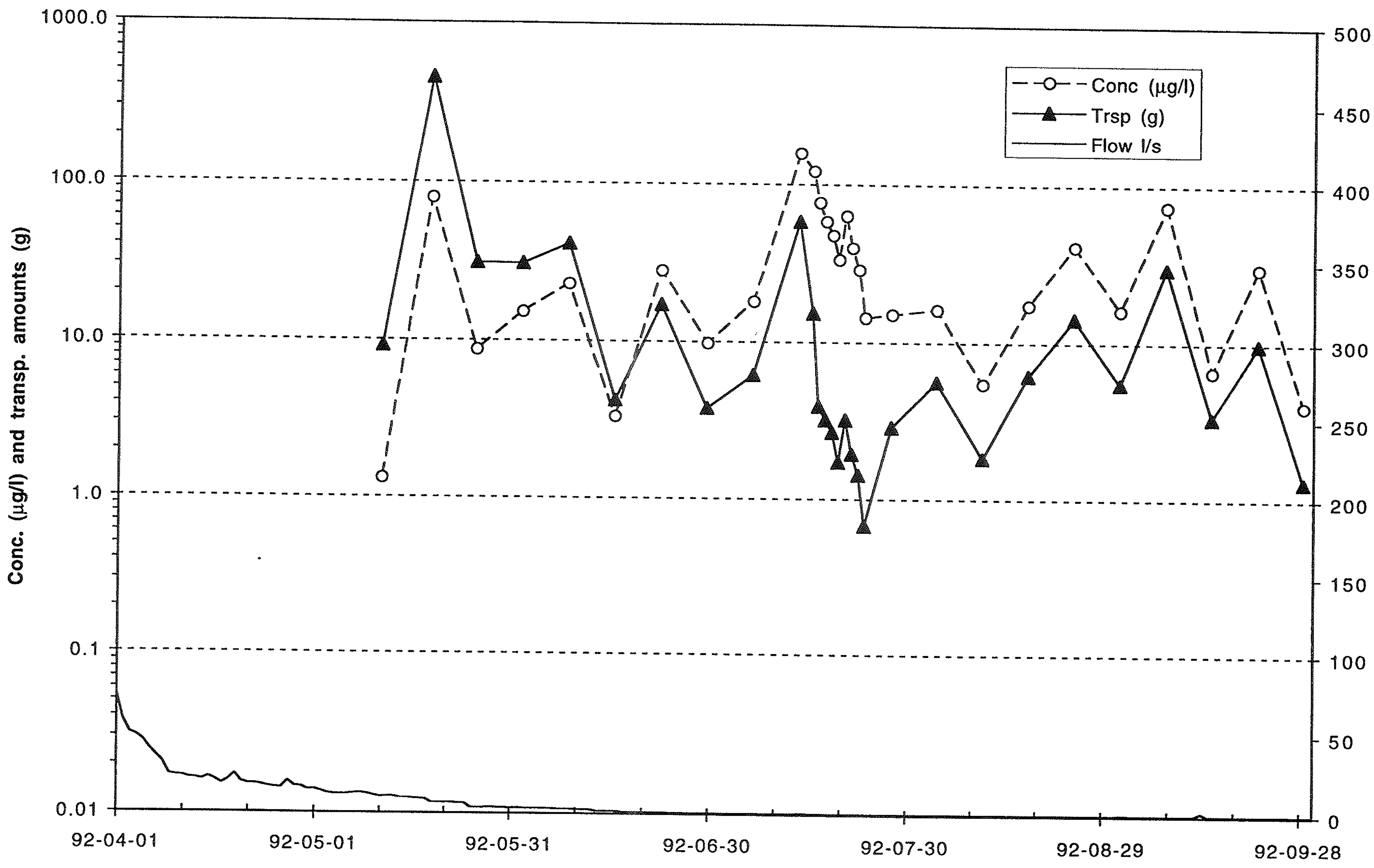


Figure 18. Total pesticide concentration and transported amounts in response to drainage discharge at UT10/TP in 1992.

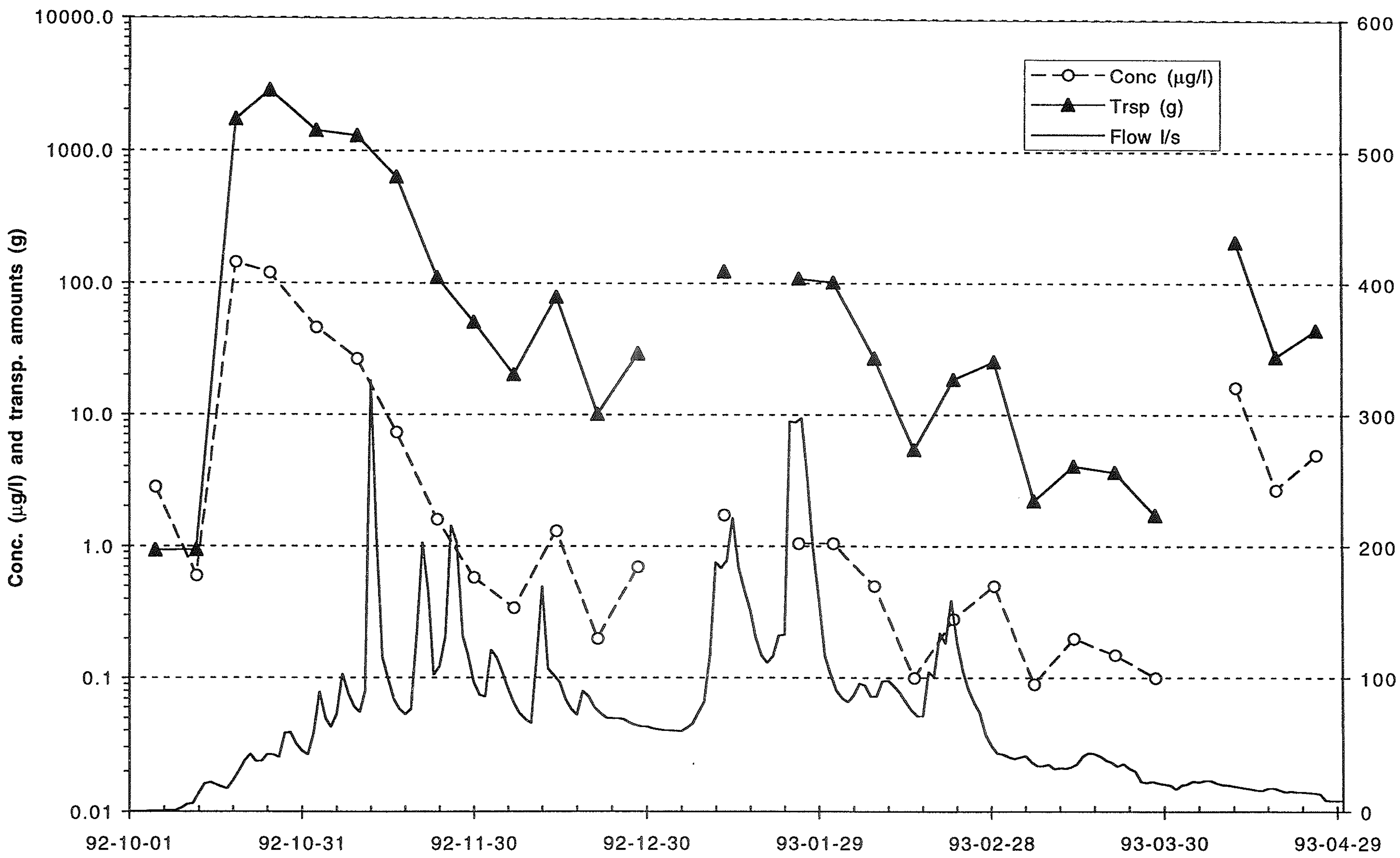


Figure 19. Total pesticide concentration and transported amounts in response to drainage discharge at UT10/TP in 1992/93.

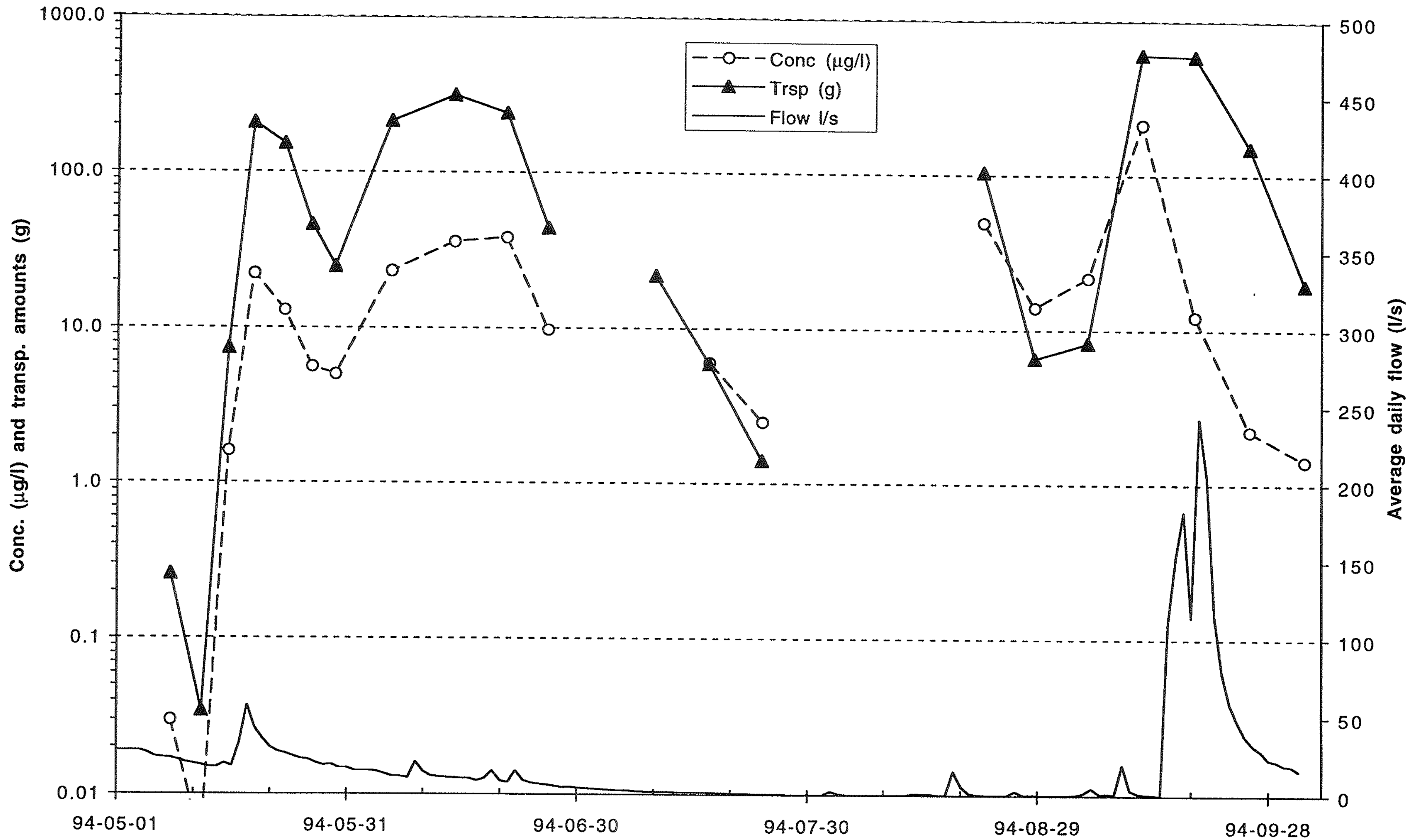


Figure 20. Total pesticide concentration and transported amounts in response to drainage discharge at UT10/TP in 1994.

Table 18. Losses of pesticides in culvert discharge during October-April 1992/1993

Substance	Loss at UT10* Oct-Apr 1992/93
bentazone	n.u.
bromoxynil	n.a.
chloridazon	n.u.
clopyralid	2.93%
cyanazine	n.u.
cyfluthrin	0.00%
2,4-D	n.u.
dichlorprop	0.16%
dimethoate	n.u.
esfenvalerate	0.00%
ethofumesate	n.u.
fenpropimorph	n.u.
flamprop-M	n.u.
fluroxypyr	n.u.
ioxynil	0.07%
isoproturon	1.96%
MCPA	0.01%
mecoprop	0.16%
metamitron	n.u.
metazachlor	0.32%
methabenzthiazuron	(23.75%)
phenmedipham	n.u.
pirimicarb	n.u.
prochloraz	n.u.
propiconazole	n.u.
triadimenol	n.u.
tribenuronmetyl	n.a.
Average all pesticides	0.62%

n.u. = not used; n.a. = not analysed

* = Figures in brackets are not included in calculations of average loss. Due to early autumn application, metazachlor loss is calculated for September-April 1992/93.

Table 19. Losses of spring applied pesticides in culvert discharge calculated for different time periods

Substance	Loss at UT10 May-Sep 1992	Loss at UT10 May-Apr 1992/93
cyanazine	0.08%	0.08%
ethofumesate	0.09%	0.18%
fenpropimorph	0.01%	0.30%
flamprop-M	0.03%	0.46%
fluroxypyr	0.004%	0.02%
metamitron	0.04%	0.04%
pirimicarb	0.04%	0.20%
prochloraz	0.01%	0.01%
propiconazole	0.06%	0.17%
triadimenol	0.01%	0.01%
Average all pesticides	0.04%	0.15%

Isoproturon, on the other hand, showed a hundredfold increase in transported loss (to 1.96%) after autumn application compared to losses after spring application (0.02%), even though it was only applied in spray mixture with dichlorprop and MCPA in cereals in autumn 1992. Isoproturon is more strongly sorbed and has a slower degradation rate than mecoprop, and Harris et al. (1994) found isoproturon (but no mecoprop) in runoff water up to 3 months after autumn application, with total loss amounting to 0.5% of that applied. Most of this isoproturon loss to drainflow occurred as a result of bypass flow through cracks before the soil was wetted up. In another study, Harris et al. (1995) reported isoproturon losses from field plots in the range of 1.7 to 3.3% after autumn application to a heavy clay soil.

Metazachlor, applied in August/September 1992, was detected in culvert discharge throughout the winter with a transported loss of 0.32% of the applied amount. Low concentrations prevailed in discharge for almost a year until sampling was interrupted by the end of June 1993.

Some of the pesticides that were detected in water during the winter period were not applied during autumn, thus enabling transport calculations for some of the pesticides reflecting a 12-month period (**Table 19**). The warm and dry summer of 1992 possibly reduced degradation and leaching of the pesticides, as many of the spring applied pesticides were detected in discharge when a major leaching period started in mid-October. The transported loss of pesticides during May-September 1992 was, on average, only half (0.06% of applied amount) of the measured loss during the two previous years (0.12-0.16% of applied amount). However, taking losses from the winter period into account (average loss 0.15% of applied amount) demonstrated that for several of the pesticides there was a delay in transported amounts reaching surface water.

The most noticeable increase in transported loss during the winter period occurred for the low water soluble and persistent fungicide fenpropimorph. Fenpropimorph was detected in winter discharge, with a maximum loss during a three week period with intense rainfall and low temperatures during January/February, about seven months after the last application. Total losses of fenpropimorph during the twelve-month period was equivalent to 0.3% of that

Table 20. Concentration of pesticides in sediment samples collected in 1990 and 1991

Substance	Location/suspended sediment*				Location/sediment cores*				Det. average
	LU12 1990	LU12 1990	OD11 1991	LU12 1991	PO4 1991	UT10 1991	OD11 1991	LU12 1991	
ΣDDT	*<10*	*<10*	*<2*	*<10*	90	4	(1)	10	26
dichlorprop	*<2*	2	*<2*	*<2*	*<2*	1	traces	2	2
diuron	n.a.	n.a.	(1)	2	*<5*	3	2	3	2
fenpropimorph	200	200	10	40	40	20	30	200	93
fenvalerate	70	60	*<5*	20	*<20*	30	10	80	45
MCPA	*<2*	*<2*	*<2*	*<2*	*<2*	2	traces	1	2
mecoprop	*<2*	*<2*	*<2*	*<2*	*<2*	2	traces	3	3
methabenzthiazuron	*<100*	*<100*	*<10*	20	*<50*	30	20	*<100*	23
permethrin	n.a.	n.a.	*<2*	2	*<20*	(1)	2	3	2
prochloraz	n.a.	n.a.	*<100*	*<100*	*<100*	60	*<100*	*<100*	60
propiconazole	80	60	(5)	20	*<30*	20	20	30	34
Σ Pesticides	350	322	16	104	130	173	85	332	189

* Concentrations are given in µg/kg dw; Values in italic denotes non-detecion at the given limit of determination; Values in parenthesis have been confirmed, but are below the stipulated limit of determination and therefore not quantified with the normal precision.
n.a. = not analysed

applied. Brown et al. (1995) observed extended losses over the winter season for trifluralin, another low water soluble and relatively persistent pesticide. Their results showed that movement on sediment was the dominant mode of transport for trifluralin. Increased transport of this compound during late winter was attributed to increased transport of sediment associated with breakdown of soil aggregates by freezing and thawing cycles over the winter period.

Sediment

Concentrations

Results from the analysis of the sediment cores and suspended sediment samples are given in **Appendices 9 and 10**. Eleven pesticides were identified (**Table 20**) with fungicides and insecticides detected at most elevated concentrations. Fenpropimorph was found at the highest concentrations (200 µg/kg) and the only pesticide detected in all samples. DDT, withdrawn from the Swedish market in 1970 and totally banned in 1975, was detected in sediment cores at all sites (1-90 µg ΣDDT/kg) and with the highest concentration detected in the pond in the central part of the catchment (PO4). This pond with stagnant water during the summer months receives water through runoff and drift from neighbouring fields and atmospheric deposition and has no flow-through by the stream. DDT was never found in the suspended sediment samples that represent the mobile sediment fraction translocated with stream flow.

The insecticide fenvalerate, which was never detected in the water samples, was found in both sediment cores and suspended sediments (10-80 µg/kg). DDT and fenvalerate were the only two pesticides detected in sediment cores collected from five larger streams in this region in 1986, with DDT detected in three out of the five samples at 3-17 µg ΣDDT /kg and fenvalerate in one of the samples at 40 µg/kg (Kreuger, unpublished data).

The insecticide permethrin was detected in two non-composite water samples in 1990 (comp. **Appendix 5**), but was not included in the analysis of the suspended sediment samples collected that year. In 1991, permethrin was found in all sediment cores collected in the stream and in suspended sediment collected at LU12 at 1-3 µg/kg (**Table 20**). However, it was never detected in any of the water samples in 1991. A similar result was shown by the herbicide diuron, that was detected in culvert discharge in 1990 and in sediment samples in 1991 at 1-3 µg/kg.

The herbicide detected at the highest concentrations was methabenzthiazuron (20-30 µg/kg), with findings in sediment cores from June 1991 but with no traces of methabenzthiazuron in water samples until July 1991. The phenoxy acid herbicides dichlorprop, MCPA and mecoprop were present in some sediment samples at 1-3 µg/kg.

The results demonstrate the importance of pesticide distribution between matrices. Pesticides detected at the highest concentrations in sediments samples were either not detected or detected only at low levels in water samples collected at LU12 during the same period. In samples collected at UT10, before the water had passed the open part of the stream, some of these pesticides could be detected more frequently.

DISCUSSION

Because of the higher limit of determination for some of the investigated pesticides, it is likely that some samples had undetected concentrations of these of the order as those encountered for other compounds. This applies in particular to phenmedipham with a limit of determination at 1.0 µg/l or above. Also loadings of metamitron and chloridazon, as well as isoproturon in 1990-1991, might have been underestimated due to elevated limits of determination. This problem might be less pronounced during years of large quantities applied in the area.

Sampling strategies are of vital importance when temporal distribution and mass transport of pesticides are to be measured in small catchments. Results from the initial sampling period in the catchment demonstrated the different results obtained using non-composite and composite sampling (**Figure 13**). Since pesticide fluxes in response to rainfall are most often of very short duration, non-composite sampling on a few occasions, as was the sapling strategy in earlier Swedish monitoring studies (Kreuger & Brink, 1988; Åkerblom, 1992) would likely tend to underestimate the pesticide transport (unless sampling occasions were directed exclusively to runoff situations).

Pesticide analysis in this study was carried out on unfiltered water samples. The relative importance of pesticide transport dissolved in water or adsorbed onto suspended solids has been investigated by several authors (Pereira & Rostad, 1990; Clark et al., 1991; Gomme et al., 1991; Brown et al., 1995) on a range of pesticides (atrazine, chlortoluron, cyanazine, fonofos, isoproturon, mecoprop, metolachlor, propyzamide, simazine, tri-allate and trifluralin). These results suggest that the greater part of the pesticide load is carried dissolved in water. Only for trifluralin, movement on sediment was shown to be the dominant mode of transport. This agrees with the observations of Wauchope (1978)), i.e. that sediment associated transport is the primary process only for pesticides with low water solubilities. Pesticides detected at the highest concentrations in sediment samples in this investigation had low water solubilities.

Table 21. Loss rates to stream water or drainage water of pesticides measured in other studies

Substance	Size of study site	Loss (%)	Reference
		Catchments	
alachlor	38 585 km^2	0.04-0.20	(Schottler et al., 1994)
alachlor	69 300-2 914 000 km^2	0.10-0.47	(Battaglin et al., 1993)
atrazine	Mississippi	0.4-1.7	(Pereira & Rostad, 1990)
atrazine	27 km^2	0.23	(Jaynes et al., 1994)
atrazine	78 ha	0.61	(Laroche & Gallichand, 1995)
atrazine	38 585 km2	0.33-0.62	(Schottler et al., 1994)
atrazine	69 300-2 914 000 km^2	0.58-1.83	(Battaglin et al., 1993)
cyanazine	38 585 km^2	0.32-1.30	(Schottler et al., 1994)
cyanazine	69 300-2 914 000 km^2	0.56-2.77	(Battaglin et al., 1993)
metolachlor	69 300-2 914 000 km^2	0.50-1.07	(Battaglin et al., 1993)
		Field sites	
atrazine	5 ha	0.15	(Muir & Baker, 1976)
atrazine	5 ha	0.05	(Jaynes et al., 1994)
atrazine	14 ha	0.09-1.9	(Frank et al., 1991)
isoproturon	5 ha	0.40	(Traub-Eberhard et al., 1994)
metolachlor	14 ha	0.003-0.01	(Frank et al., 1991)
pendimethalin	5 ha	<0.001	(Traub-Eberhard et al., 1994)
		Field plots	
alachlor	0.1-0.4 ha	0.00-0.01	(Kladivko et al., 1991)
atrazine	0.02 ha	0.009-0.13	(Buhler et al., 1993)
atrazine	*	≤1.2	(Johnson et al., 1995)
atrazine	0.1-0.4 ha	0.01-0.06	(Kladivko et al., 1991)
carbofuran	0.1-0.4 ha	0.05-0.94	(Kladivko et al., 1991)
cyanazine	0.1-0.4 ha	0.00-0.04	(Kladivko et al., 1991)
isoproturon	0.25 ha	0-0.45	(Brown et al., 1995)
isoproturon	0.2 ha	0.5	(Harris et al., 1994)
isoproturon	*	1.7-3.3	(Harris et al., 1995)
isoproturon	0.1 ha	1	(Johnson et al., 1995)
isoproturon	1.1 ha	0.09	(Traub-Eberhard et al., 1994)
mecoprop	0.25 ha	0-0.04	(Brown et al., 1995)
pendimethalin	*	0.009-0.04	(Harris et al., 1995)
prochloraz	*	0.02-0.05	(Harris et al., 1995)
triasulfuron	*	2.9-5.2	(Harris et al., 1995)
trifluralin	0.25 ha	0.001-0.02	(Brown et al., 1995)

* = Size of field plots not reported

Peak concentrations of pesticides during the summer months could be a threat to the flora and fauna living in small headwater streams such as the Vemmenhög catchment. This could lead to less diverse communities if the most sensitive species are affected, but then, on the other hand, less sensitive species could possibly increase in number. During the winter period concentrations were lower, but equal or even larger quantities of some pesticides were transported from the catchment in culvert discharge. It is during this period infiltration to groundwater takes place with an increased risk of pesticides entering groundwater aquifers.

Findings of elevated pesticide concentrations in connection to courtyards is of concern since the lack of a microbiological active soil surface layer at these sites increases the potential risk of rapid pesticide leaching to groundwater aquifers.

Some of the concentrations detected, especially in culvert discharge, were much higher than those encountered in previous Swedish monitoring studies. However, concentrations of pesticides in runoff water at a level of the same order of magnitude have been found in a number of field studies (Burgoa & Wauchope, 1995). Leonard (1990) concluded in a review article that runoff losses at the edge-of-the field may reach several percent of the amount applied and concentrations may reach several milligrams per liter if runoff occurs soon after application. These runoff concentrations are, however, rapidly attenuated in the transport system by dilution, deposition and trapping of sediments along the flow path. Another factor to consider in catchment-scale monitoring is the time of application. Not all of the catchment is treated on the same day. On the other hand, the probability of one or several fields being newly treated with pesticides when rainfall starts increases in a catchment with many fields, managed by many different farmers. In larger catchments, included in previous monitoring studies, rainfall and runoff is usually distributed in time and space such that an additional attenuation of pesticide loads in runoff at the catchment outlet could be expected (Leonard, 1990).

Burgoa & Wauchope (1995) summarized the literature on pesticide losses in runoff waters from agricultural fields and concluded that for the majority of pesticides total losses are 0.5% or less of the amounts applied. Loss rates of pesticides to stream or drainage water measured in some recent studies are summarized in **Table 21.** Total losses reported in these studies are in agreement with Burgoa & Wauchopes findings, although losses found at catchment scale tend to be slightly larger than those found under more controlled conditions at field scale. Most loss rates measured in the Vemmenhög catchment are in agreement with other studies, including studies carried out under controlled conditions, excluding possible point sources.

CONCLUSIONS

The overall findings of the investigation demonstrated that the occurrence of pesticides in surface water was a result of 1) natural processes influenced by soil and weather conditions, together with the intrinsic properties of the compound, as well as 2) point sources such as spills, application on surfaces with no organic content (i.e. courtyards) and, to a small extent, wind drift. Some specific conclusions were as follows:

- Pesticide concentrations were higher during the application season, or shortly thereafter, with maximum concentrations occurring during runoff situations.

- Some pesticides were persistent in streamflow for several months after application and in some cases throughout the year.

- Some pesticides were detected at low concentrations for extended periods, regardless of application period or streamflow. This indicates that these pesticides are likely persistent in shallow groundwater.

- Pesticide concentrations in streams are lowered considerably by dilution, and by pesticide sorption to suspended matter and sediment in the stream.

- Dry weather conditions prevented degradation.

- Winddrift had little influence on stream water quality in this catchment.

- For most pesticides there was a good correlation between amounts used and the concentrations found in the water samples.

- Losses of pesticides in catchment outflow, in percent of applied amount, showed small variations between years and were independent of the pesticide application rate.

- High concentrations of pesticides were found in surface runoff collection wells on courtyards. This could have a potential impact on both stream and groundwater quality. Indeed, a substantial contribution of pesticide loss to stream water was from the application of pesticides on courtyards.

- Pesticides occurring in the stream without any preceding rainfall was supposedly related to mismanagement in connection to filling and cleaning spraying equipment.

- When predicting pesticide load in surface waters, it is important to consider all aspects of pesticide transport routes including natural processes as well as conditions being a result of point sources and mismanagement while handling and applying pesticides.

- Despite a public concern and information campaigns directed to those people applying pesticides during recent years, the decline in pesticide loss to stream water from the catchment area during this five year study period has been marginal.

- An important issue for the future should be to further involve the farmers in the study to investigate the significance of altered practices when handling and applying pesticides within the catchment. The main focus should be to demonstrate the importance of responsible actions to reduce pesticide load to stream water.

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REFERENCES

Albanis, T. A. 1992. Herbicide losses in runoff from the agricultural area of Thessaloniki in Thermaikos Gulf, N. Greece. *Sci. Total Environ.* **114**, 59-71.

Andersson, A. & Ohlin, B. 1986. A capillary gas chromatographic multiresidue method for determination of pesticides in fruits and vegetables. *Vår Föda* **38**, 79-109.

Baker, D. B. & Richards, R. P. 1989. Herbicide concentration patterns in rivers draining intensively cultivated farmlands of Northwestern Ohio. In: *Pesticides in Terrestrial and Aquatic Environments, Proceedings of a National Research Conference, May 11-12, 1989*, D. Weigmann (Ed.) 103-120. Blacksburg, Virginia, Virginia Polytechnic Institute & State University.

Battaglin, W. A., Goolsby, D. A. & Coupe, R. H. 1993. Annual use and transport of agricultural chemicals in the Mississippi River, 1991-92. U.S. Geological Survey, Open-File Report 93-418, 26-40.

Bergström, L. F. & Jarvis, N. J. 1993. Leaching of dichlorprop, bentazone and 36Cl in undisturbed field lysimeters of different agricultural soils. *Weed Sci.* **41**, 251-261.

Blanck, H. & Nyström, B. 1996. Investigation on the sensitivity of algal communities to sulfonylureas. Personal communication. Department of Plant Physiology, Göteborg University, Sweden.

Brown, C. D., Hodgkinson, R. A., Rose, D. A., Syers, J. K. & Wilcockson, S. J. 1995. Movement of pesticides to surface waters from a heavy clay soil. *Pestic. Sci.* **43**, 131-140.

Buhler, D. D., Randall, G. W., Koskinen, W. C. & Wyse, D. L. 1993. Atrazine and alachlor losses from subsurface tile drainage of a clay loam soil. *J. Environ. Qual.* **22**, 583-588.

Burgoa, B. & Wauchope, R. D. 1995. Pesticides in run-off and surface waters. In: *Environmental Behaviour of Agrochemicals*, T. R. Roberts & P. C. Kearney (Eds) 221-255. John Wiley & Sons Ltd.

Buser, H. R. 1990. Atrazine and other *s*-triazine herbicides in lakes and in rain in Switzerland. *Environ. Sci. Technol.* **24**, 1049-1058.

Clark, L., Gomme, J. & Hennings, S. 1991. Study of pesticides in waters from a chalk catchment, Cambridgeshire. *Pestic. Sci.* **32**, 15-33.

Croll, B. T. 1991. Pesticides in surface waters and groundwaters. *J. Inst. Water Environ. Manag.* **5**, 389-395.

Daniel, E. 1992. Beskrivning av jordartskartorna Tomelilla SV och Ystad NV (Description to the Quaternary maps Tomelilla SV and Ystad NV). *SGU*, **Ae 99-100**, 149 pp. Swedish Geological Survey, Uppsala. (In Swedish, with English summary.)

Frank, R., Braun, H. E., van Hove Holdrinet, M., Sirons, G. J. & Ripley, B. D. 1982. Agriculture and water quality in the Canadian Great Lakes Basin: V. Pesticide use in 11 agricultural watersheds and presence in stream water, 1975-1977. *J. Environ. Qual.* **11**, 497-505.

Frank, R., Clegg, B. S. & Patni, N. K. 1991. Dissipation of atrazine on a clay loam soil, Ontario, Canada, 1986-90. *Arch. Environ. Contam. Toxicol.* **21**, 41-50.

Frank, R., Clegg, B. S. & Patni, N. K. 1991. Dissipation of cyanazine and metolachlor on a clay loam soil, Ontario, Canada, 1987-1990. *Arch. Environ. Contam. Toxicol.* **21**, 253-262.

Gomme, J. W., Shurvell, S., Hennings, S. M. & Clark, L. 1991. Hydrology of pesticides in a chalk catchment: surface waters. *J. Inst. Water Environ. Manag.* **5**, 546-552.

Goolsby, D. A. & Battaglin, W. A. 1993. Occurrence, distribution and transport of agricultural chemicals in surface waters of the midwestern United States. U.S. Geological Survey, *Open-File Report* **93-418**, 1-25.

Hagenvall, H. 1994. Environmental safety aspects on field crop sprayers. *Acta Horticulturae* **372**, 17-24.

Harris, G. L., Jones, R. L., Catt, J. A., Mason, D. J. & Arnold, D. J. 1995. Influence of agricultural management and pesticide sorption on losses to surface waters. In: *Pesticide Movement to Water*, A. Walker, R. Allen, S. W. Bailey et al. (Eds) 305-310. BCPC Monograph No 62, Farnham, Surrey, UK.

Harris, G. L., Nicholls, P. H., Bailey, S. W., Howse, K. R. & Mason, D. J. 1994. Factors influencing the loss of pesticides in drainage from a cracking clay soil. *J. Hydrol.* **159**, 235-253.

Jaynes, D. B., Hatfield, J. L. & Soenksen, P. J. 1994. Water and chemical transport in surface and tile discharge of Walnut Creek. In: *Toxic Substances and the Hydrologic Sciences*, 430-445. American Institute of Hydrology.

Johnson, A. C., Batchelor, C. H. & Haria, A. H. 1995. Processes influencing pesticide transport in a drained clay catchment. In: *Effects of Scale on Interpretation and Management of Sediment and Water Quality*, 39-46. IAHS Publ. no 226.

Johnson, D. C., Selim, H. M., Ma, L., Southwick, L. M. & Willis, G. H. 1995. Movement of atrazine and nitrate in Sharkey soil: Evidence of preferential flow. Louisiana Agricultural Experiment Station, Louisiana State University Agricultural Center, No: **846**, 23 pp.

Kirchman, H. & Eriksson, J. 1993. Properties and classification of soils of the Swedish long-term fertility experiments. II. Sites at Öja and Orup. *Acta Agric. Scand., Sect. B, Soil and Plant Sci.* **43**, 193-205.

Kladivko, E. J., Van Scoyoc, G. E., Monke, E. J., Oates, K. M. & Pask, W. 1991. Pesticide and nutrient movement into subsurface tile drains on a silt loam soil in Indiana. *J. Environ. Qual.* **20**, 264-270.

Kreuger, J. & Brink, N. 1988. Losses of pesticides from arable land. *Växtskyddsrapporter Jordbruk* **49**, 50-61.

Kreuger, J. 1992. Provhanteringens påverkan på halten av pesticider i ett vattenprov (Influence of sampling routines on pesticide concentration i water samples). *Report to Swedish EPA, grant no* **65422-8**, 16 pp. (In Swedish.)

Kreuger, J. 1994. Study of pesticide stability during storage of water samples. *Report to Swedish EPA, grant no* **224 313**, 7 pp.

Kvist, S. 1994. Försålda kvantiteter av bekämpningsmedel 1993 (Quantities of pesticides sold in Sweden 1993). Swedish National Chemical Inspectorate, Solna. 41 pp. (In Swedish, with English summary.)

Laroche, A.-M. & Gallichand, J. 1995. Analysis of pesticide residues in surface and groundwater of a small watershed. *Transactions of the ASAE* **38**, 1731-1736.

Leonard, R. A. 1990. Movement of pesticides into surface waters. In: *Pesticides in the Soil Environment: Processes, Impacts, and Modeling*, H. H. Cheng (Ed.) Number 2, 303-350. Madison, Wisconsin, USA, Soil Science Society of America, Inc.

Lundbergh, I., Kreuger, J. & Johnson, A. 1995. *Pesticides in surface waters. A review of pesticide residues in surface waters in Nordic countries, Germany and the Netherlands and problems related to pesticide contamination.* Council of Europe Press, ISBN 92-871-2776-X. 54 pp.

Muir, D. C. & Baker, B. E. 1976. Detection of traizine herbicides and their degradation products in tile-drain water from fields under intensive corn (maize) production. *J. Agric. Food Chem.* **24**, 122-125.

Pereira, W. E. & Rostad, C. E. 1990. Occurrence, distributions and transport of herbicides and their degradation products in the lower Mississippi River and its tributaries. *Environ. Sci. Technol.* **24**, 1400-1406.

Richards, R. P. & Baker, D. B. 1993. Pesticide concentration patterns in agricultural drainage networks in the Lake Erie basin. *Envron. Toxicol. Chem.* **12**, 13-26.

Schottler, S. P., Eisenreich, S. J. & Capel, P. D. 1994. Atrazine, alachlor and cyanazine in a large agricultural river system. *Environ. Sci. Technol.* **28**, 1079-1089.

Torstensson, L. & Castillo, M. d. 1996. Biobeds minimize environmental risks when filling agricultural spraying equipment. In: *Pesticides in Soil and the Environment, Proc. COST 66 Workshop*, 223-224. Stratford-upon-Aven, U.K.

Traub-Eberhard, U., Kördel, W. & Klein, W. 1994. Pesticide movement into subsurface drains on a loamy silt soil. *Chemosphere* **28**, 273-284.

Wauchope, R. D. 1978. The pesticide content of surface water draining from agricultural fields - A review. *J. Environ. Qual.* 7, 459-472.

Åkerblom, M. 1992. Resultat bekämpningsmedel (Pesticide results). In: *Framtida miljöövervakning av jordbruk, utvärdering och förslag (Future monitoring of agriculture, evaluation and recommendation)*, A. Berntell (Ed.) *SNV Rapport* **4108**, 69-83. (In Swedish.)

Åkerblom, M., Thorén, L. & Staffas, A. 1990. Bestämning av bekämpningsmedel i dricksvatten (Determination of pesticides in drinking water). *Vår Föda* **42**, 236-243. (In Swedish, with English summary.)

APPENDICES

Contents

Appendix 1. Used amount of pesticides, area treated, average dose and application period in spring and early summer 1990

Spring/summer 1990	**Total amount**	**Total area**	**Av. dose**	**Spraying period**	
Active ingredient	**(kg)**	**(ha)**	**(kg/ha)**	**Start**	**End**
alpha-cypermethrin	0.1	5	0.03	90-05-18	90-06-01
bentazone	29.6	47	0.63	90-04-28	90-05-08
bromoxynil	10.9	125	0.09	90-04-02	90-05-21
chloridazon	113.7	65	1.75	90-03-29	90-05-20
chlormequat chloride	3.7	4	0.93	90-04-15	
chlorsulfuron	0.05	18	0.003	90-05-07	
clopyralid	0.8	14	0.06	90-03-30	90-06-14
cyanazine	10.4	36	0.29	90-03-27	90-05-05
cyfluthrin	0.2	6	0.03	90-06-19	
2,4-D	3.0	12	0.25	90-03-26	90-04-15
deltamethrin	0.1	13	0.007	90-06-07	90-07-04
dicamba	0.2	2	0.10	90-03-20	
dichlorprop	145.4	206	0.71	90-03-27	90-05-28
dichlorprop-P	42.8	36	1.18	90-05-05	90-05-21
diquat	12.6	23	0.55	90-03-26	90-04-04
esfenvalerate	2.4	94	0.03	90-05-11	90-06-21
ethephon	0.6	4	0.16	90-05-20	
ethofumesate	25.1	83	0.30	90-04-30	90-06-15
fenitrothion	1.1	5	0.25	90-04-30	
fenpropimorph	102.7	294	0.35	90-04-15	90-07-05
fenvalerate	2.0	23	0.09	90-06-07	90-06-15
fluroxypyr	7.4	36	0.21	90-03-27	90-05-09
ioxynil	33.9	215	0.16	90-03-27	90-05-28
isoproturon	13.5	18	0.75	90-05-01	
lenacil	1.1	2	0.64	90-04-11	
MCPA	234.2	292	0.80	90-03-20	90-05-28
mecoprop	39.1	40	0.98	90-03-15	90-05-28
mecoprop-P	33.6	24	1.38	90-03-17	90-05-08
mepiquat chloride	1.2	4	0.31	90-05-20	
metamitron	314.3	134	2.35	90-04-30	90-06-10
metazachlor	4.6	5	1.00	90-05-08	
methabenzthiazuron	46.2	41	1.14	90-03-15	90-04-15
pendimethalin	16.7	30	0.56	90-05-08	
phenmedipham	57.3	138	0.42	90-04-15	90-06-15
pirimicarb	43.7	335	0.13	90-05-06	90-07-13
prochloraz	14.9	43	0.35	90-03-17	90-05-03
propiconazole	34.7	311	0.11	90-04-15	90-07-05
sethoxydim	1.8	8	0.22	90-05-16	
triadimenol	2.2	21	0.11	90-04-14	90-06-07
Total	1408.0	596	2.36		
Herbicides	1198.3	585.0	2.05		
Fungicides	154.5	313.0	0.49		
Insecticides	49.7	454.0	0.11		
Growth regulators	5.5	4.0	1.39		

Appendix 1 (continued). Used amount of pesticides, area treated, average dose and application period in autumn 1990

Autumn 1990	Total amount	Total area	Av. dose	Spraying period	
Active ingredient	**(kg)**	**(ha)**	**(kg/ha)**	**Start**	**End**
deltamethrin	0.3	41	0.01	90-09-04	90-09-18
dichlorprop-P	11.3	13	0.90	90-10-15	
esfenvalerate	0.03	2	0.01	90-09-10	
glyphosate	33.8	32	1.05	90-08-18	90-09-06
isoproturon	26.3	26	1.01	90-10-15	
mecoprop-P	15.3	22	0.69	90-09-26	90-10-15
metazachlor	182.9	149	1.23	90-08-16	90-09-10
methabenzthiazuron	103.0	53	1.95	90-09-10	90-10-10
pendimethalin	7.9	6	1.32	90-09-15	
prochloraz	6.1	14	0.45	90-10-15	
	386.7	271	1.43		
Herbicides	380.3	271	1.40		
Fungicides	6.1	14	0.43		
Insecticides	0.3	43	0.01		
Growth regulators					

Appendix 1 (continued). Used amount of pesticides, area treated, average dose and application period in spring and early summer 1991

Spring/summer 1991 Active ingredient	Total amount (kg)	Total area (ha)	Av. dose (kg/ha)	Spraying period Start	End
benazolin	1.3	2	0.63	91-06-03	
bentazone	8.6	18	0.48	91-05-07	91-05-30
bromoxynil	9.4	118	0.08	91-04-24	91-06-14
carbendazim	1.2	5	0.26	91-05-20	
chloridazon	35.2	14	2.45	91-04-12	91-04-24
clopyralid	2.0	23	0.09	91-04-28	91-06-27
cyanazine	9.0	18	0.50	91-05-07	91-05-30
cyfluthrin	0.1	6	0.02	91-04-15	
deltamethrin	0.4	72	0.005	91-05-10	91-06-17
dichlorprop	14.5	29	0.51	91-04-05	91-06-08
dichlorprop-P	126.2	226	0.56	91-04-24	91-06-21
esfenvalerate	2.1	103	0.02	91-05-10	91-07-02
ethofumesate	10.2	53	0.19	91-05-24	91-06-21
fenpropimorph	136.4	412	0.33	91-05-15	91-07-14
flamprop-M	0.8	1	0.60	91-06-06	
fluroxypyr	8.8	82	0.11	91-03-29	91-05-13
ioxynil	21.7	165	0.13	91-04-05	91-06-21
lenacil	1.9	3	0.64	91-04-14	
MCPA	188.0	307	0.61	91-04-05	91-07-03
mecoprop	1.5	1	1.28	91-06-21	
mecoprop-P	58.9	56	1.05	91-04-13	91-06-14
metamitron	181.9	82	2.22	91-04-27	91-06-21
methabenzthiazuron	25.0	20	1.26	91-04-13	91-05-15
phenmedipham	22.9	82	0.28	91-05-16	91-06-21
pirimicarb	5.6	43	0.13	91-05-13	91-07-15
prochloraz	28.2	97	0.29	91-04-25	91-05-17
propiconazole	46.5	414	0.11	91-05-03	91-07-14
sethoxydim	1.5	5	0.31	91-05-13	
sulfur	10.4	7	1.60	91-06-05	
triadimenol	3.9	37	0.10	91-04-11	91-06-08
tribenuron-methyl	0.9	166	0.005	91-03-29	91-06-11
	964.7	707	1.36		

Herbicides	730.1	560	1.30
Fungicides	226.4	414	0.55
Insecticides	8.1	224	0.04
Growth regulators			

Appendix 1 (continued). Used amount of pesticides, area treated, average dose and application period in autumn 1991

Autumn 1991 Active ingredient	Total amount (kg)	Total area (ha)	Av. dose (kg/ha)	Spraying period Start	End
benazolin	0.7	2	0.35	91-09-25	
bromofenoxim	9.5	18	0.53	91-10-10	
bromoxynil	0.4	6	0.07	91-10-15	
clopyralid	0.1	2	0.06	91-09-25	
dichlorprop	5.3	8	0.70	91-10-10	
dichlorprop-P	6.7	17	0.39	91-10-10	91-10-15
esfenvalerate	0.3	27	0.01	91-08-20	91-09-16
glyphosate	1.8	4	0.53	91-08-28	91-09-15
ioxynil	4.0	25	0.16	91-10-10	91-10-15
isoproturon	112.8	99	1.14	91-10-06	91-10-15
MCPA	7.1	25	0.29	91-10-10	91-10-15
mecoprop-P	81.4	126	0.65	91-09-15	91-10-15
metazachlor	51.8	45	1.15	91-08-18	91-09-25
methabenzthiazuron	10.5	6	1.75	91-09-19	91-10-05
propyzamide	7.0	14	0.50	91-10-15	
sethoxydim	1.1	3	0.44	91-09-10	
terbuthylazine	1.8	18	0.10	91-10-10	
	302.4	246	1.23		

Herbicides	302.1	234	1.29
Fungicides			
Insecticides	0.3	27	0.01
Growth regulators			

Appendix 1 (continued). Used amount of pesticides, area treated, average dose and application period in spring and early summer 1992

Spring/summer 1992	Total amount	Total area	Av. dose	Spraying period	
Active ingredient	**(kg)**	**(ha)**	**(kg/ha)**	**Start**	**End**
benazolin	1.4	3	0.47	92-04-04	92-04-15
bentazone	2.9	7	0.45	92-05-12	92-05-21
bromofenoxim	2.5	3	0.84	92-05-16	
bromoxynil	3.5	41	0.09	92-04-26	92-05-30
chloridazon	286.9	141	2.04	92-04-12	92-06-01
chlormequat chloride	9.4	12	0.79	92-04-25	92-05-05
clopyralid	3.3	27	0.12	92-04-04	92-06-13
cyanazine	1.5	5	0.30	92-04-15	92-05-21
cyfluthrin	0.3	20	0.01	92-05-10	92-06-11
cypermethrin	0.4	5	0.08	92-05-10	
deltamethrin	0.4	66	0.005	92-04-25	92-06-18
dichlorprop	4.1	9	0.45	92-05-25	
dichlorprop-P	37.4	68	0.55	92-04-26	92-06-09
diquat	1.0	2	0.60	92-04-21	
esfenvalerate	4.3	218	0.02	92-05-01	92-06-20
ethephon	1.3	10	0.14	92-05-18	92-05-25
ethofumesate	27.1	162	0.17	92-05-10	92-06-07
fenpropimorph	73.4	292	0.25	92-05-01	92-06-24
flamprop-M	1.6	3	0.60	92-06-12	
fluroxypyr	18.4	171	0.11	92-04-01	92-05-25
ioxynil	8.5	56	0.15	92-04-26	92-06-09
isoproturon	19.9	22	0.90	92-04-06	92-05-30
MCPA	81.9	118	0.69	92-04-06	92-06-09
mecoprop-P	18.9	30	0.63	92-04-10	92-05-20
mepiquat chloride	2.5	10	0.27	92-05-18	92-05-25
metamitron	470.3	189	2.49	92-05-04	92-06-07
methabenzthiazuron	4.0	4	1.05	92-04-10	
pendimethalin	2.0	4	0.51	92-05-12	92-05-21
phenmedipham	48.1	201	0.24	92-05-05	92-06-07
pirimicarb	34.4	307	0.11	92-06-03	92-07-11
prochloraz	17.4	85	0.20	92-05-01	92-05-05
propiconazole	24.1	290	0.08	92-05-01	92-06-24
sethoxydim	43.6	91	0.48	92-04-20	
terbuthylazine	5.0	6	0.83	92-04-15	92-05-16
triadimenol	1.9	16	0.13	92-05-03	92-06-07
tribenuron-methyl	1.5	288	0.005	92-04-01	92-06-01
	1265.1	714	1.77		

Herbicides	1095.5	615	1.78
Fungicides	116.7	329	0.35
Insecticides	39.7	532	0.07
Growth regulators	13.2	12	1.10

Appendix 1 (continued). Used amount of pesticides, area treated, average dose and application period in autumn 1992

Autumn 1992	**Total amount**	**Total area**	**Av. dose**	**Spraying period**	
Active ingredient	**(kg)**	**(ha)**	**(kg/ha)**	**Start**	**End**
benazolin	0.9	2	0.45	92-10-01	
bromoxynil	4.5	47	0.10	92-09-25	92-10-08
clopyralid	0.2	2	0.08	92-10-01	
cyfluthrin	0.5	29	0.02	92-09-01	92-09-06
cypermethrin	0.4	9	0.05	92-09-05	
deltamethrin	0.1	23	0.01	92-09-07	92-09-10
dichlorprop-P	16.9	47	0.36	92-09-25	92-10-08
esfenvalerate	0.6	55	0.01	92-08-31	92-09-15
glyphosate	45.0	48	0.94	92-08-05	92-09-25
ioxynil	4.9	47	0.10	92-09-25	92-10-08
isoproturon	16.3	16	0.99	92-09-25	92-10-08
MCPA	13.7	47	0.29	92-09-25	92-10-08
mecoprop-P	31.8	24	1.33	92-10-02	92-10-05
metazachlor	149.8	133	1.13	92-08-20	92-09-15
methabenzthiazuron	4.9	7	0.70	92-10-05	
sethoxydim	5.3	19	0.27	92-08-25	92-09-15
	295.8	251	1.18		
Herbicides	294.1	249	1.18		
Fungicides					
Insecticides	1.7	115	0.01		
Growth regulators					

Appendix 1 (continued). Used amount of pesticides, area treated, average dose and application period in spring and early summer 1993

Spring/summer 1993	**Total amount**	**Total area**	**Av. dose**	**Spraying period**	
Active ingredient	**(kg)**	**(ha)**	**(kg/ha)**	**Start**	**End**
benazolin	0.5	2	0.23	93-04-15	
bromoxynil	5.3	66	0.08	93-04-28	93-05-26
carbendazim	0.1	1	0.10	93-04-28	
chloridazon	175.5	93	1.88	93-03-31	93-04-28
chlormequat chloride	15.7	19	0.82	93-04-27	93-05-01
clopyralid	5.3	114	0.05	93-04-15	93-05-13
cyanazine	0.6	5	0.12	93-04-15	93-04-25
cyfluthrin	0.4	26	0.01	93-04-25	93-05-12
2,4-D	2.4	5	0.50	93-05-15	
deltamethrin	0.7	121	0.006	93-04-18	93-06-12
dichlorprop-P	28.7	81	0.35	93-04-28	93-05-26
esfenvalerate	1.9	129	0.01	93-04-25	93-06-23
ethephon	1.5	7	0.21	93-04-28	93-05-12
ethofumesate	32.0	151	0.21	93-04-29	93-06-04
fenitrothion	2.0	8	0.25	93-04-26	
fenpropimorph	41.3	224	0.18	93-04-15	93-06-23
flamprop-M	2.5	5	0.50	93-06-03	
fluroxypyr	10.3	130	0.08	93-04-25	93-05-15
ioxynil	8.7	81	0.11	93-04-28	93-05-26
isoproturon	36.4	32	1.15	93-04-20	93-04-28
MCPA	92.1	208	0.44	93-04-28	93-05-26
mecoprop-P	40.8	48	0.84	93-04-15	93-05-15
mepiquat chloride	3.0	7	0.42	93-04-28	93-05-12
metamitron	295.6	189	1.56	93-04-29	93-06-04
methabenzthiazuron	13.7	13	1.05	93-04-15	93-04-25
phenmedipham	53.5	188	0.28	93-04-29	93-06-04
pirimicarb	3.2	36	0.09	93-06-01	93-06-27
prochloraz	1.1	4	0.27	93-04-27	
propiconazole	13.5	221	0.06	93-04-15	93-06-23
triadimenol	1.2	13	0.10	93-04-26	93-05-10
tribenuron-methyl	1.07	98	0.01	93-04-20	93-05-24
	890.7	680	1.31		
Herbicides	804.9	525	1.53		
Fungicides	57.3	235	0.24		
Insecticides	8.2	306	0.03		
Growth regulators	20.2	22	0.92		

Appendix 1 (continued). Used amount of pesticides, area treated, average dose and application period in autumn 1993

Autumn 1993	Total amount	Total area	Av. dose	Spraying period	
Active ingredient	**(kg)**	**(ha)**	**(kg/ha)**	**Start**	**End**
diflufenican	1.8	12	0.14	93-10-05	93-11-05
glyphosate	8.1	8	1.08	93-08-10	93-09-15
isoproturon	20.3	27	0.74	93-10-05	93-11-05
mecoprop-P	13.7	15	0.90	93-10-25	
metazachlor	41.0	40	1.03	93-08-20	93-09-10
sethoxydim	1.7	4	0.44	93-09-10	
	86.6	74	1.17		

Herbicides	86.6	74	1.17
Fungicides			
Insecticides			
Growth regulators			

Appendix 1 (continued). Used amount of pesticides, area treated, average dose and application period in spring and early summer 1994

Spring/summer 1994 Active ingredient	Total amount (kg)	Total area (ha)	Av. dose (kg/ha)	Spraying period Start	End
benazolin	0.7	4	0.18	94-05-08	
bromoxynil	11.9	170	0.07	94-04-27	94-06-02
chloridazon	45.2	28	1.61	94-04-11	94-05-21
chlormequat chloride	31.8	47	0.67	94-04-20	94-05-20
clopyralid	1.1	23	0.05	94-05-08	94-06-01
cyanazine	0.6	4	0.15	94-05-08	
cycloxydim	3.4	8	0.43	94-05-11	
cyfluthrin	0.1	6	0.01	94-05-06	94-06-02
deltamethrin	0.2	29	0.006	94-05-19	94-06-27
dichlorprop	6.0	13	0.48	94-04-17	
dichlorprop-P	60.2	184	0.33	94-04-27	94-06-02
dimethoate	3.9	8	0.48	94-07-12	
esfenvalerate	2.9	181	0.02	94-05-05	94-07-01
ethephon	1.5	14	0.11	94-05-19	94-05-21
ethofumesate	32.7	119	0.27	94-05-06	94-06-12
fenpropimorph	118.5	492	0.24	94-04-19	94-06-30
fluroxypyr	8.4	80	0.11	94-04-20	94-06-07
ioxynil	20.2	184	0.11	94-04-27	94-06-02
isoproturon	29.5	28	1.05	94-05-02	94-05-15
lambda-cyhalothrin	1.4	171	0.008	94-05-02	94-06-30
MCPA	123.7	236	0.52	94-04-27	94-06-02
mecoprop-P	181.0	269	0.67	94-04-08	94-06-12
mepiquat chloride	3.0	14	0.22	94-05-19	94-05-21
metamitron	259.5	130	2.00	94-04-30	94-06-12
metazachlor	9.2	10	0.92	94-05-26	94-05-30
methabenzthiazuron	12.6	12	1.05	94-04-25	
phenmedipham	53.7	130	0.41	94-04-30	94-06-12
pirimicarb	57.0	463	0.12	94-05-02	94-07-20
propiconazole	39.2	489	0.08	94-04-19	94-06-30
sethoxydim	2.8	7	0.44	94-06-21	94-06-24
tribenuron-methyl	3.2	331	0.01	94-04-10	94-06-12
	1125.3	761	1.48		
Herbicides	866.0	724	1.20		
Fungicides	157.8	492	0.32		
Insecticides	65.5	624	0.10		
Growth regulators	36.3	47	0.77		

Appendix 2. Pesticide concentrations in time integrated water samples from LU12/TP 1990-1992

Date	a-cypermethrin	atrazindesethyl	atrazine	BAM	benazolin-ethylester	bentazone	bromoxynil	chloridazon
90-05-11	Start!							
90-05-13	<0.2	n.a.	<0.1	n.a.	n.a.	**10**	n.a.	n.a.
90-05-14	<0.2	n.a.	<0.1	n.a.	n.a.	**3**	n.a.	n.a.
90-05-15	<0.2	n.a.	**0.2**	n.a.	n.a.	**0.6**	n.a.	n.a.
90-05-16	<0.2	n.a.	<0.1	n.a.	n.a.	**0.6**	n.a.	n.a.
90-05-17	<0.2	n.a.	<0.1	n.a.	n.a.	**0.2**	n.a.	n.a.
90-05-18	<0.2	n.a.	<0.1	n.a.	n.a.	**0.8**	n.a.	n.a.
90-05-20	<0.2	n.a.	<0.1	n.a.	n.a.	**0.6**	n.a.	n.a.
90-05-21	<0.2	n.a.	<0.1	n.a.	n.a.	**0.4**	n.a.	n.a.
90-05-22	<0.2	n.a.	<0.1	n.a.	n.a.	**0.2**	n.a.	n.a.
90-05-23	<0.2	n.a.	<0.1	n.a.	n.a.	**0.4**	n.a.	n.a.
90-05-24	<0.2	n.a.	<0.1	n.a.	n.a.	**0.4**	n.a.	n.a.
90-05-25	<0.2	n.a.	<0.1	n.a.	n.a.	**2**	n.a.	n.a.
90-05-26	<0.2	n.a.	<0.1	n.a.	n.a.	**0.6**	n.a.	n.a.
90-05-27	<0.2	n.a.	<0.1	n.a.	n.a.	**0.3**	n.a.	n.a.
90-05-28	<0.2	n.a.	**0.5**	n.a.	n.a.	**0.2**	n.a.	n.a.
90-05-29	<0.2	n.a.	**0.2**	n.a.	n.a.	**0.6**	n.a.	n.a.
90-05-30	<0.2	n.a.	**1.5**	n.a.	n.a.	**2.4**	n.a.	n.a.
90-05-31	<0.2	n.a.	**0.3**	n.a.	n.a.	**2**	n.a.	n.a.
90-06-01	<0.2	n.a.	<0.1	n.a.	n.a.	**0.4**	n.a.	n.a.
90-06-02	<0.2	n.a.	<0.1	n.a.	n.a.	**0.2**	n.a.	n.a.
90-06-03	<0.2	n.a.	<0.1	n.a.	n.a.	**0.2**	n.a.	n.a.
90-06-04	<0.2	n.a.	<0.1	n.a.	n.a.	**0.6**	n.a.	n.a.
90-06-05	<0.2	n.a.	**4**	n.a.	n.a.	**0.5**	n.a.	n.a.
90-06-06	<0.2	n.a.	**1.6**	n.a.	n.a.	**1.9**	n.a.	n.a.
90-06-07	<0.2	n.a.	**0.4**	n.a.	n.a.	**1.1**	n.a.	n.a.
90-06-08	<0.2	n.a.	**0.2**	n.a.	n.a.	**0.5**	n.a.	n.a.
90-06-09	<0.2	n.a.	<0.1	n.a.	n.a.	**0.3**	n.a.	n.a.
90-06-10	<0.2	n.a.	**0.1**	n.a.	n.a.	**0.2**	n.a.	n.a.
90-06-11	<0.2	n.a.	**0.1**	n.a.	n.a.	**0.2**	n.a.	n.a.
90-06-12	<0.2	n.a.	<0.1	n.a.	n.a.	**0.1**	n.a.	n.a.
90-06-13	<0.2	n.a.	<0.1	n.a.	n.a.	**0.1**	n.a.	n.a.
90-06-14	<0.2	n.a.	<0.1	n.a.	n.a.	**(0.07)**	n.a.	n.a.
90-06-15	<0.2	n.a.	**3.3**	n.a.	n.a.	**(0.04)**	n.a.	n.a.
90-06-15	<0.2	n.a.	**9.3**	n.a.	n.a.	**(0.04)**	n.a.	n.a.
90-06-15	<0.2	n.a.	**8.1**	n.a.	n.a.	**(0.03)**	n.a.	n.a.
90-06-15	<0.2	n.a.	**3.7**	n.a.	n.a.	**(0.03)**	n.a.	n.a.
90-06-18	<0.2	n.a.	**0.5**	n.a.	n.a.	**2.4**	n.a.	n.a.
90-06-25	<0.2	n.a.	**0.3**	n.a.	n.a.	**0.4**	n.a.	n.a.
90-07-02	<0.2	n.a.	**0.7**	n.a.	n.a.	**0.3**	n.a.	n.a.
90-07-09	<0.2	n.a.	**0.6**	n.a.	n.a.	**0.4**	n.a.	n.a.
90-07-16	<0.2	n.a.	**0.1**	n.a.	n.a.	**0.1**	n.a.	n.a.
90-07-23	<0.2	n.a.	<0.1	n.a.	n.a.	**(0.05)**	n.a.	n.a.
90-07-30	<0.2	n.a.	**0.1**	n.a.	n.a.	**0.1**	n.a.	n.a.
90-08-06	<0.2	n.a.	<0.1	n.a.	n.a.	<0.1	n.a.	n.a.
90-08-13	<0.2	n.a.	<0.1	n.a.	n.a.	**(0.04)**	n.a.	n.a.
90-08-20	<0.2	n.a.	<0.1	n.a.	n.a.	**(0.05)**	n.a.	n.a.
90-08-29	<0.2	n.a.	**0.1**	n.a.	n.a.	**0.2**	n.a.	n.a.
90-09-03	<0.2	n.a.	<0.1	n.a.	n.a.	**(0.03)**	n.a.	n.a.
90-09-10	<0.2	n.a.	<0.1	n.a.	n.a.	<0.1	n.a.	n.a.
91-05-04	Start!							
91-05-07	<0.4	n.a.	**0.3**	n.a.	<0.2	<0.1	<0.2	n.a.
91-05-14	<0.4	n.a.	<0.1	n.a.	<0.2	<0.1	<0.2	n.a.
91-05-21	<0.2	n.a.	<0.1	n.a.	<0.1	**0.4**	<0.2	n.a.
91-05-27	<0.2	n.a.	<0.1	n.a.	<0.1	**0.1**	<0.2	n.a.
91-05-28	<0.1	n.a.	<0.1	n.a.	<0.2	**(0.07)**	<0.2	n.a.
91-05-29	<0.2	n.a.	<0.1	n.a.	<0.1	**0.1**	n.a.	n.a.
91-05-30	<0.2	n.a.	<0.1	n.a.	<0.1	**0.2**	<0.2	n.a.
91-05-31	<0.2	n.a.	<0.1	n.a.	<0.1	**0.2**	<0.2	n.a.
91-06-01	<0.2	n.a.	<0.1	n.a.	<0.1	**0.2**	<0.2	n.a.

Appendix 2. Pesticide concentrations in time integrated water samples from LU12/TP 1990-1992

Date	a-cypermethrin	atrazindesethyl	atrazine	BAM	benazolin-ethylester	bentazone	bromoxynil	chloridazon
91-06-02	<0.2	n.a.	**(0.08)**	n.a.	<0.1	**0.1**	<0.2	n.a.
91-06-03	<0.2	n.a.	<0.1	n.a.	<0.1	**0.1**	<0.2	n.a.
91-06-04	<0.2	n.a.	<0.1	n.a.	<0.1	**0.2**	<0.2	n.a.
91-06-05	<0.2	n.a.	**0.4**	n.a.	<0.1	**0.1**	<0.2	n.a.
91-06-06	<0.2	n.a.	**(0.07)**	n.a.	<0.1	**0.2**	<0.2	n.a.
91-06-07	<0.2	n.a.	<0.1	n.a.	<0.1	**0.2**	<0.2	n.a.
91-06-08	<0.2	n.a.	<0.1	n.a.	<0.1	**0.2**	<0.2	n.a.
91-06-09	<0.2	n.a.	<0.1	n.a.	<0.1	**0.1**	<0.2	n.a.
91-06-10	<0.2	n.a.	<0.1	n.a.	<0.1	**0.1**	<0.2	n.a.
91-06-11	<0.2	n.a.	**(0.06)**	n.a.	<0.1	**0.1**	<0.2	n.a.
91-06-12	<0.2	n.a.	<0.1	n.a.	<0.1	**0.1**	<0.2	n.a.
91-06-18	<0.2	n.a.	**0.3**	n.a.	<0.5	**0.2**	**1**	n.a.
91-06-24	<0.2	n.a.	**0.4**	n.a.	<0.1	**0.3**	**0.2**	n.a.
91-07-01	<0.2	n.a.	**0.2**	n.a.	<0.5	**0.2**	**(0.05)**	n.a.
91-07-09	<0.2	n.a.	**(0.06)**	n.a.	<0.1	**0.1**	**(0.05)**	n.a.
91-07-16	<0.2	n.a.	<0.1	n.a.	<0.1	**(0.08)**	**(0.05)**	n.a.
91-07-23	<0.2	n.a.	**(0.05)**	n.a.	<0.1	**(0.09)**	<0.2	n.a.
91-07-30	<0.2	n.a.	**(0.05)**	n.a.	<0.1	**0.1**	<0.2	n.a.
91-08-06	<0.2	n.a.	**(0.05)**	n.a.	<0.1	**(0.08)**	<0.2	n.a.
91-08-12	<0.2	n.a.	<0.1	n.a.	<0.1	**(0.06)**	<0.2	n.a.
91-08-19	<0.2	n.a.	**(0.08)**	n.a.	<0.1	**(0.06)**	<0.2	n.a.
91-08-26	<0.2	n.a.	**(0.05)**	n.a.	<0.1	**(0.05)**	<0.2	n.a.
91-09-02	<0.2	n.a.	<0.1	n.a.	<0.1	**(0.04)**	<0.2	n.a.
91-09-09	<0.2	n.a.	<0.1	n.a.	<0.1	<0.1	<0.2	n.a.
91-09-15	<0.2	n.a.	<0.1	n.a.	<0.1	<0.1	<0.2	n.a.
91-09-22	<0.2	n.a.	<0.1	n.a.	<0.1	**(0.02)**	<0.2	n.a.
91-09-29	<0.2	n.a.	**(0.07)**	n.a.	<0.1	**(0.05)**	<0.2	n.a.
92-04-27	Start!							
92-05-04	<0.1	n.a.	**(0.05)**	n.a.	<0.1-0.5	<0.1	<0.1	**10**
92-05-11	<0.1	n.a.	<0.1	n.a.	<0.1-0.5	**(0.04)**	<0.1	**0.5**
92-05-18	<0.1	n.a.	**(0.05)**	n.a.	<0.1-0.5	**(0.03)**	n.a.	**2**
92-05-25	<0.1	n.a.	<0.2	n.a.	<0.1-0.5	<0.1	n.a.	**1**
92-06-01	<0.1	n.a.	<0.1	n.a.	<0.1-0.5	**(0.03)**	<0.1	**(0.3)**
92-06-08	<0.1	n.a.	<0.1	n.a.	<0.1-0.5	<0.1	n.a.	<0.5-1
92-06-15	<0.1	n.a.	<0.1	n.a.	<0.1-0.5	<0.1	n.a.	<0.5-1
92-06-22	<0.1	n.a.	<0.1	n.a.	<0.1-0.5	<0.1	n.a.	<0.5-1
92-06-29	<0.1	n.a.	<0.1	n.a.	<0.1-0.5	<0.1	n.a.	<0.1-0.5
92-07-06	<0.1	n.a.	<0.1	n.a.	<0.1-0.5	<0.1	n.a.	<0.5-1
92-07-13	<0.1	n.a.	**(0.05)**	n.a.	<0.1-0.5	<0.1	n.a.	**0.7**
92-07-15	<0.1	n.a.	**0.9**	n.a.	<0.1-0.5	**(0.04)**	n.a.	**3**
92-07-16	<0.1	n.a.	**(0.05)**	n.a.	<0.1-0.5	<0.1	n.a.	<0.5-1
92-07-17	<0.1	n.a.	<0.1	n.a.	<0.1-0.5	<0.1	n.a.	<0.5-1
92-07-18	<0.1	n.a.	**0.2**	n.a.	<0.1-0.5	<0.1	n.a.	<0.5-1
92-07-19	<0.1	n.a.	<0.1	n.a.	<0.1-0.5	<0.1	n.a.	<0.5-1
92-07-20	<0.1	n.a.	<0.1	n.a.	<0.1-0.5	<0.1	n.a.	<0.5-1
92-07-21	<0.1	n.a.	<0.1	n.a.	<0.1-0.5	<0.1	n.a.	<0.5-1
92-07-22	<0.1	n.a.	<0.1	n.a.	<0.1-0.5	<0.1	n.a.	<0.5-1
92-07-23	<0.1	n.a.	<0.1	n.a.	<0.1-0.5	<0.1	n.a.	<0.5-1
92-07-27	<0.1	n.a.	<0.1	n.a.	<0.1-0.5	<0.1	n.a.	<0.5-1
92-08-03	<0.1	n.a.	<0.1	n.a.	<0.1-0.5	<0.1	n.a.	<0.5-1
92-08-10	<0.1	n.a.	<0.1	n.a.	<0.1-0.5	<0.1	n.a.	<0.5-1
92-08-17	<0.1	n.a.	**0.2**	n.a.	<0.1-0.5	**(0.04)**	n.a.	<0.5-1
92-08-24	<0.1	n.a.	**0.4**	n.a.	<0.1-0.5	<0.1	n.a.	<0.5-1
92-08-31	<0.1	n.a.	**(0.08)**	n.a.	<0.1-0.5	<0.1	n.a.	<0.5-1
92-09-07	<0.1	n.a.	**0.3**	n.a.	<0.1-0.5	<0.1	n.a.	<0.5-1
92-09-14	<0.1	n.a.	<0.2	n.a.	<0.1-0.5	<0.1	n.a.	<0.5-1
92-09-21	<0.1	n.a.	<0.1	n.a.	<0.1-0.5	<0.1	n.a.	<0.5-1
92-09-28	<0.1	n.a.	<0.1	n.a.	<0.1-0.5	<0.1	n.a.	<0.5-1
92-10-05	n.a.	n.a.	n.a.	n.a.	n.a.	<0.1	n.a.	n.a.
92-10-12	n.a.	n.a.	n.a.	n.a.	n.a.	<0.1	n.a.	n.a.

Appendix 2. Pesticide concentrations in time integrated water samples from LU12/TP 1990-1992

Date	clopyralid	cyanazine	cyfluthrin	cypermethrin	2,4-D	deltamethrin	dicamba	dichlobenil	dichlorprop
90-05-11									
90-05-13	<0.3	**2.8**	<0.5	<0.2	**1**	<0.1	<0.1	<0.1	**20**
90-05-14	<0.3	**0.9**	<0.5	<0.2	**(0.07)**	<0.1	<0.1	<0.1	**4**
90-05-15	<0.3	**0.2**	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.5**
90-05-16	<0.3	**0.1**	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.2**
90-05-17	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.1**
90-05-18	<0.3	<0.1	<0.5	<0.2	**(0.02)**	<0.1	<0.1	<0.1	**2**
90-05-20	<0.3	**0.1**	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.2**
90-05-21	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**(0.09)**
90-05-22	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1
90-05-23	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**(0.06)**
90-05-24	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1
90-05-25	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.1**
90-05-26	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**(0.04)**
90-05-27	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.1**
90-05-28	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.1**
90-05-29	<0.3	**0.2**	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.6**
90-05-30	<0.3	**0.2**	<0.5	<0.2	**(0.06)**	<0.1	<0.1	<0.1	**4**
90-05-31	<0.3	**0.1**	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.3**
90-06-01	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**(0.05)**
90-06-02	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**(0.04)**
90-06-03	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**(0.02)**
90-06-04	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1
90-06-05	<0.3	**0.1**	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.9**
90-06-06	<0.3	**0.2**	<0.5	<0.2	**(0.04)**	<0.1	<0.1	<0.1	**3**
90-06-07	<0.3	**0.1**	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.4**
90-06-08	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**(0.05)**
90-06-09	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**(0.07)**
90-06-10	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**(0.09)**
90-06-11	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1
90-06-12	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1
90-06-13	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1
90-06-14	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1
90-06-15	<0.3	<0.1	<0.5	<0.2	**(0.03)**	<0.1	<0.1	<0.1	**(0.08)**
90-06-15	<0.3	<0.1	<0.5	<0.2	**(0.05)**	<0.1	<0.1	<0.1	**0.2**
90-06-15	<0.3	<0.1	<0.5	<0.2	**(0.03)**	<0.1	<0.1	<0.1	**0.4**
90-06-15	<0.3	<0.1	<0.5	<0.2	**(0.02)**	<0.1	<0.1	<0.1	**0.6**
90-06-18	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**(0.06)**
90-06-25	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.6**
90-07-02	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.4**
90-07-09	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.1**
90-07-16	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**(0.02)**
90-07-23	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1
90-07-30	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1
90-08-06	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1
90-08-13	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1
90-08-20	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1
90-08-29	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**(0.07)**
90-09-03	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1
90-09-10	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1
91-05-04									
91-05-07	<1	<0.1	<0.5	<0.4	<0.1	<0.1	<0.1	<0.1	**0.4**
91-05-14	<0.5	<0.1	<0.5	<0.4	<0.1	<0.1	<0.1	<0.1	<0.1
91-05-21	<1	**0.2**	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**(0.1)**
91-05-27	<0.5	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1
91-05-28	<0.3	<0.1	<0.2	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1
91-05-29	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1
91-05-30	<0.5	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.2**
91-05-31	<0.5	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**1**
91-06-01	<1	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.5**

Appendix 2. Pesticide concentrations in time integrated water samples from LU12/TP 1990-1992

Date	clopyralid	cyanazine	cyfluthrin	cypermethrin	2,4-D	deltamethrin	dicamba	dichlobenil	dichlorprop
91-06-02	<1	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.7**
91-06-03	<0.5	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.7**
91-06-04	<0.5	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.3**
91-06-05	<0.5	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.6**
91-06-06	<0.5	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**1.1**
91-06-07	<0.5	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.2**
91-06-08	<0.5	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.2**
91-06-09	<0.5	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**(0.1)**
91-06-10	<0.5	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**(0.1)**
91-06-11	<0.5	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.2**
91-06-12	<0.5	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1
91-06-18	<0.5	<0.3	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**4**
91-06-24	<1	**(0.2)**	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**2**
91-07-01	<0.5	<0.2	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.8**
91-07-09	<0.5	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.3**
91-07-16	<0.5	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.1**
91-07-23	<0.5	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.1**
91-07-30	<0.5	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.2**
91-08-06	<1	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1
91-08-12	<0.5	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**(0.06)**
91-08-19	<0.5	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**(0.08)**
91-08-26	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**(0.04)**
91-09-02	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1
91-09-09	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1
91-09-15	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1
91-09-22	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**(0.03)**
91-09-29	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**(0.08)**
92-04-27									
92-05-04	<0.3	<0.1	<0.2	<0.1-0.5	<0.1	<0.1	n.a.	<0.1-0.5	<0.1
92-05-11	<0.3	<0.1	<0.2	<0.1-0.5	<0.1	<0.1	n.a.	<0.1-0.5	**(0.03)**
92-05-18	<0.3	<0.1	<0.2	<0.1-0.5	**10**	<0.1	n.a.	<0.1-0.5	**20**
92-05-25	<0.3	<0.2	<0.2	<0.1-0.5	**(0.05)**	<0.1	n.a.	<0.1-0.5	**0.2**
92-06-01	<0.3	<0.2	<0.2	<0.1-0.5	<0.1	<0.1	n.a.	<0.1-0.5	**(0.05)**
92-06-08	<0.3	<0.1	<0.2	<0.1-0.5	<0.1	<0.1	n.a.	<0.1-0.5	**0.5**
92-06-15	<0.3	<0.1	<0.2	<0.1-0.5	<0.1	<0.1	n.a.	<0.1-0.5	<0.1
92-06-22	<0.3	<0.1	<0.2	<0.1-0.5	<0.1	<0.1	n.a.	<0.1-0.5	**0.1**
92-06-29	<0.3	<0.1	<0.2	<0.1-0.5	<0.1	<0.1	n.a.	<0.1-0.5	<0.1
92-07-06	<0.3	<0.1	<0.2	<0.1-0.5	<0.1	<0.1	n.a.	<0.1-0.5	<0.1
92-07-13	<0.3	<0.1	<0.2	<0.1-0.5	**0.1**	<0.1	n.a.	<0.1-0.5	**0.9**
92-07-15	<0.3	<0.2	<0.2	<0.1-0.5	**0.1**	<0.1	n.a.	<0.1-0.5	**1**
92-07-16	<0.3	<0.2	<0.2	<0.1-0.5	<0.1	<0.1	n.a.	<0.1-0.5	**(0.04)**
92-07-17	<0.3	<0.2	<0.2	<0.1-0.5	<0.1	<0.1	n.a.	<0.1-0.5	<0.1
92-07-18	<0.3	<0.2	<0.2	<0.1-0.5	**(0.02)**	<0.1	n.a.	<0.1-0.5	**0.1**
92-07-19	<0.3	<0.5	<0.2	<0.1-0.5	<0.1	<0.1	n.a.	<0.1-0.5	<0.1
92-07-20	<0.3	<0.2	<0.2	<0.1-0.5	<0.1	<0.1	n.a.	<0.1-0.5	<0.1
92-07-21	<0.3	<0.2	<0.2	<0.1-0.5	<0.1	<0.1	n.a.	<0.1-0.5	<0.1
92-07-22	<0.3	<0.2	<0.2	<0.1-0.5	<0.1	<0.1	n.a.	<0.1-0.5	<0.1
92-07-23	<0.3	<0.2	<0.2	<0.1-0.5	<0.1	<0.1	n.a.	<0.1-0.5	<0.1
92-07-27	<0.3	<0.2	<0.2	<0.1-0.5	<0.1	<0.1	n.a.	<0.1-0.5	<0.1
92-08-03	<0.3	<0.3	<0.2	<0.1-0.5	<0.1	<0.1	n.a.	<0.1-0.5	<0.1
92-08-10	<0.3	<0.2	<0.2	<0.1-0.5	<0.1	<0.1	n.a.	<0.1-0.5	<0.1
92-08-17	<0.3	<0.2	<0.2	<0.1-0.5	<0.1	<0.1	n.a.	<0.1-0.5	<0.1
92-08-24	<0.3	<0.1	<0.2	<0.1-0.5	<0.1	<0.1	n.a.	<0.1-0.5	<0.1
92-08-31	<0.3	<0.1	<0.2	<0.1-0.5	<0.1	<0.1	n.a.	<0.1-0.5	<0.1
92-09-07	<0.3	<0.1	<0.2	<0.1-0.5	<0.1	<0.1	n.a.	<0.1-0.5	<0.1
92-09-14	<0.3	<0.1	<0.2	<0.1-0.5	<0.1	<0.1	n.a.	<0.1-0.5	<0.1
92-09-21	<0.3	<0.5	<0.2	<0.1-0.5	<0.1	<0.1	n.a.	<0.1-0.5	**(0.05)**
92-09-28	<0.3	<0.3	<0.2	<0.1-0.5	<0.1	<0.1	n.a.	<0.1-0.5	<0.1
92-10-05	<0.3	n.a.	n.a.	n.a.	<0.1	n.a.	n.a.	n.a.	<0.1
92-10-12	<0.3	n.a.	n.a.	n.a.	<0.1	n.a.	n.a.	n.a.	<0.1

Appendix 2. Pesticide concentrations in time integrated water samples from LU12/TP 1990-1992

Date	dimethoate	diuron	esfenvalerate	ethofumesate	fenitrothion	fenpropimorph	fenvalerate	flamprop-M
90-05-11								
90-05-13	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-14	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-15	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-16	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-17	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-18	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-20	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-21	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-22	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-23	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-24	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-25	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-26	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-27	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-28	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-29	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-30	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-31	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-06-01	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-06-02	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-06-03	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-06-04	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-06-05	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-06-06	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-06-07	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-06-08	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-06-09	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-06-10	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-06-11	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-06-12	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-06-13	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-06-14	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-06-15	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-06-15	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-06-15	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-06-15	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-06-18	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-06-25	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-07-02	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-07-09	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-07-16	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-07-23	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-07-30	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-08-06	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-08-13	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-08-20	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-08-29	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-09-03	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-09-10	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
91-05-04								
91-05-07	n.a.	<0.5	<0.2	<0.2	<0.1	<0.7	<0.2	<0.1
91-05-14	n.a.	<0.5	<0.2	<0.2	<0.1	<0.7	<0.2	<0.1
91-05-21	n.a.	<0.5	<0.2	n.a.	<0.1	<0.7	<0.2	<0.1
91-05-27	n.a.	<0.5	<0.2	<0.2	<0.1	<0.7	<0.2	<0.1
91-05-28	n.a.	<0.5	<0.1	<0.1	<0.2	<0.7	<0.2	<0.1
91-05-29	n.a.	<0.5	<0.2	n.a.	<0.1	<0.7	<0.2	n.a.
91-05-30	n.a.	<1	<0.2	**0.5**	<0.1	<0.7	<0.2	<0.1
91-05-31	n.a.	<1	<0.2	**0.5**	<0.1	<0.7	<0.2	<0.1
91-06-01	n.a.	<1	<0.2	**0.2**	<0.1	<0.7	<0.2	<0.1

Appendix 2. Pesticide concentrations in time integrated water samples from LU12/TP 1990-1992

Date	dimethoate	diuron	esfenvalerate	ethofumesate	fenitrothion	fenpropimorph	fenvalerate	flamprop-M
91-06-02	n.a.	<1	<0.2	**(0.1)**	<0.1	<0.7	<0.2	<0.1
91-06-03	n.a.	<1	<0.2	**0.2**	<0.1	<0.7	<0.2	<0.1
91-06-04	n.a.	<0.5	<0.2	**(0.1)**	<0.1	<0.7	<0.2	<0.1
91-06-05	n.a.	<1	<0.2	**(0.1)**	<0.1	<0.7	<0.2	<0.1
91-06-06	n.a.	<1	<0.2	<0.2	<0.1	<0.7	<0.2	<0.1
91-06-07	n.a.	<0.5	<0.2	**0.2**	<0.1	<0.7	<0.2	<0.1
91-06-08	n.a.	<0.5	<0.2	**(0.1)**	<0.3	<0.5	<0.2	<0.1
91-06-09	n.a.	<0.5	<0.2	**(0.1)**	<0.3	<0.5	<0.2	<0.1
91-06-10	n.a.	<0.5	<0.2	**0.3**	<0.1	<0.7	<0.2	<0.1
91-06-11	n.a.	<0.5	<0.2	**(0.1)**	<0.1	<0.7	<0.2	<0.1
91-06-12	n.a.	<0.5	<0.2	**(0.1)**	<0.3	<0.5	<0.2	<0.1
91-06-18	n.a.	<1	<0.2	**0.4**	<0.1	<0.8	<0.2	<0.1
91-06-24	n.a.	<0.5	<0.2	**0.3**	<0.3	**1**	<0.2	**(0.05)**
91-07-01	n.a.	<1	<0.2	**(0.1)**	<0.1	<0.8	<0.2	<0.1
91-07-09	n.a.	<0.5	<0.2	<0.2	<0.3	<0.5	<0.2	<0.1
91-07-16	n.a.	<0.5	<0.2	**(0.1)**	<0.3	**(0.3)**	<0.2	<0.1
91-07-23	n.a.	<0.5	<0.2	<0.2	<0.3	<0.5	<0.2	**(0.05)**
91-07-30	n.a.	<0.5	<0.2	<0.2	<0.3	<0.5	<0.2	<0.1
91-08-06	n.a.	<0.5	<0.2	<0.2	<0.3	<0.5	<0.2	<0.1
91-08-12	n.a.	<0.5	<0.2	<0.2	<0.3	<0.5	<0.2	<0.1
91-08-19	n.a.	<0.5	<0.2	<0.2	<0.3	<0.5	<0.2	<0.1
91-08-26	n.a.	<0.5	<0.2	<0.2	<0.3	<0.5	<0.2	<0.1
91-09-02	n.a.	<0.5	<0.2	<0.2	<0.3	<0.5	<0.2	<0.1
91-09-09	n.a.	<0.5	<0.2	<0.2	<0.3	<0.5	<0.2	<0.1
91-09-15	n.a.	<0.5	<0.2	<0.2	<0.3	<0.5	<0.2	<0.1
91-09-22	n.a.	<0.5	<0.2	<0.2	<0.3	<0.5	<0.2	<0.1
91-09-29	n.a.	<0.5	<0.2	**(0.1)**	<0.3	<0.5	<0.2	<0.1
92-04-27								
92-05-04	n.a.	<0.1-0.5	<0.1	<0.1-0.5	<0.1-0.5	<0.1	<0.2	<0.1
92-05-11	n.a.	<0.1-0.5	<0.1	<0.1-0.5	<0.1-0.5	<0.1	<0.2	<0.1
92-05-18	n.a.	<0.1-0.5	<0.1	**2**	<0.1-0.5	<0.1	<0.2	<0.1
92-05-25	n.a.	<0.1-0.5	<0.1	**1**	<0.1-0.5	<0.2	<0.2	<0.1
92-06-01	n.a.	<0.1-0.5	<0.1	**1**	<0.1-0.5	<0.2	<0.2	<0.1
92-06-08	n.a.	<0.1-0.5	<0.1	<0.1	<0.1-0.5	<0.2	<0.2	<0.1
92-06-15	n.a.	<0.1-0.5	<0.1	<0.1	<0.1-0.5	<0.2	<0.2	<0.1
92-06-22	n.a.	<0.1-0.5	<0.1	**0.2**	<0.1-0.5	<0.1	<0.2	<0.1
92-06-29	n.a.	<0.1-0.5	<0.1	<0.1	<0.1-0.5	<0.1	<0.2	<0.1
92-07-06	n.a.	<0.1-0.5	<0.1	<0.1	<0.1-0.5	<0.2	<0.2	<0.1
92-07-13	n.a.	<0.1-0.5	<0.1	<0.1	<0.1-0.5	<0.2	<0.2	<0.1
92-07-15	n.a.	<0.1-0.5	<0.1	**0.8**	<0.1-0.5	<0.5	<0.2	**(0.02)**
92-07-16	n.a.	<0.1-0.5	<0.1	**0.3**	<0.1-0.5	<0.5	<0.2	<0.1
92-07-17	n.a.	<0.1-0.5	<0.1	**0.1**	<0.1-0.5	**0.2**	<0.2	<0.1
92-07-18	n.a.	<0.1-0.5	<0.1	**0.1**	<0.1-0.5	**0.2**	<0.2	<0.1
92-07-19	n.a.	<0.1-0.5	<0.1	**0.2**	<0.1-0.5	<0.2	<0.2	<0.1
92-07-20	n.a.	<0.1-0.5	<0.1	**0.1**	<0.1-0.5	<0.2	<0.2	<0.1
92-07-21	n.a.	<0.1-0.5	<0.1	**(0.05)**	<0.1	<0.1	<0.2	<0.1
92-07-22	n.a.	<0.1-0.5	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1
92-07-23	n.a.	<0.1-0.5	<0.1	<0.1	<0.1-0.5	<0.2	<0.2	<0.1
92-07-27	n.a.	<0.1-0.5	<0.1	<0.1	<0.1-0.5	<0.2	<0.2	<0.1
92-08-03	n.a.	<0.1-0.5	<0.1	<0.1-0.5	<0.2	<0.2	<0.2	<0.1
92-08-10	n.a.	<0.1-0.5	<0.1	<0.1	<0.1-0.5	<0.1	<0.2	<0.1
92-08-17	n.a.	<0.1-0.5	<0.1	<0.1	<0.1-0.5	<0.1	<0.2	<0.1
92-08-24	n.a.	<0.1-0.5	<0.1	<0.2	<0.1-0.5	<0.2	<0.2	<0.1
92-08-31	n.a.	<0.1-0.5	<0.1	<0.1	<0.1-0.5	<0.1	<0.2	<0.1
92-09-07	n.a.	<0.1-0.5	<0.1	<0.1	<0.1-0.5	**0.9**	<0.2	**(0.02)**
92-09-14	n.a.	<0.1-0.5	<0.1	<0.1	<0.1-0.5	<0.2	<0.2	<0.1
92-09-21	n.a.	<0.1-0.5	<0.1	<0.1	<0.1-0.5	<0.2	<0.2	<0.1
92-09-28	n.a.	<0.1-0.5	<0.1	<0.1	<0.1-0.5	<0.2	<0.2	<0.1
92-10-05	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
92-10-12	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	<0.1

Appendix 2. Pesticide concentrations in time integrated water samples from LU12/TP 1990-1992

Date	fluroxypyr	hexazinon	ioxynil	isoproturon	lenacil	linuron	MCPA	mecoprop	metamitron
90-05-11									
90-05-13	n.a.	<0.5	n.a.	<1.5	<0.5	**1.8**	**40**	**4**	**40**
90-05-14	n.a.	<0.5	n.a.	<1.5	<0.5	**0.4**	**8**	**1**	**40**
90-05-15	n.a.	<0.5	n.a.	<1.5	<0.5	<0.4	**0.7**	**(0.06)**	**30**
90-05-16	n.a.	<0.5	n.a.	<1.5	<0.5	<0.4	**0.4**	**(0.04)**	**(3.5)**
90-05-17	n.a.	<0.5	n.a.	<1.5	<0.5	<0.4	**0.3**	**(0.02)**	**(3.5)**
90-05-18	n.a.	<0.5	n.a.	<1.5	<0.5	<0.4	**3**	**0.5**	<5
90-05-20	n.a.	<0.5	n.a.	<1.5	<0.5	<0.4	**0.4**	**0.1**	**(3.5)**
90-05-21	n.a.	<0.5	n.a.	<1.5	<0.5	<0.4	**0.2**	**(0.04)**	**(3.5)**
90-05-22	n.a.	<0.5	n.a.	<1.5	<0.5	<0.4	<0.1	<0.1	<5
90-05-23	n.a.	<0.5	n.a.	<1.5	<0.5	<0.4	**(0.08)**	<0.1	<5
90-05-24	n.a.	<0.5	n.a.	<1.5	<0.5	<0.4	<0.1	<0.1	<5
90-05-25	n.a.	<0.5	n.a.	<1.5	<0.5	<0.4	**0.2**	**(0.05)**	<5
90-05-26	n.a.	<0.5	n.a.	<2	<0.5	<1	**(0.05)**	**(0.02)**	**(3.5)**
90-05-27	n.a.	<0.5	n.a.	<2	<0.5	<1	**0.3**	**(0.01)**	**(3.5)**
90-05-28	n.a.	<0.5	n.a.	<2	<0.5	<1	**0.3**	**(0.01)**	<5
90-05-29	n.a.	<0.5	n.a.	<2	<0.5	<1	**0.9**	**0.3**	<1
90-05-30	n.a.	<0.5	n.a.	<2	<0.5	<1	**6**	**2.4**	<1
90-05-31	n.a.	<0.5	n.a.	<2	<0.5	<1	**0.4**	**0.2**	<1
90-06-01	n.a.	<0.5	n.a.	<2	<0.5	<1	**(0.06)**	**(0.02)**	<1
90-06-02	n.a.	<0.5	n.a.	<2	<0.5	<1	**(0.04)**	**(0.01)**	<1
90-06-03	n.a.	<0.5	n.a.	<2	<0.5	<1	**(0.03)**	**(0.01)**	<1
90-06-04	n.a.	<0.5	n.a.	<2	<0.5	<1	<0.1	<0.1	<1
90-06-05	n.a.	<0.5	n.a.	<2	<0.5	<1	**1.3**	**0.4**	<1
90-06-06	n.a.	<0.5	n.a.	<2	<0.5	<1	**3**	**1.9**	<1
90-06-07	n.a.	<0.5	n.a.	<1	<0.5	<0.2	**0.4**	**0.2**	<1
90-06-08	n.a.	<0.5	n.a.	<1	<0.5	<0.2	<0.1	<0.1	<1
90-06-09	n.a.	<0.5	n.a.	<1	<0.5	<0.2	**(0.06)**	**(0.05)**	<1
90-06-10	n.a.	<0.5	n.a.	<2	<0.5	<0.2	<0.1	<0.1	<1
90-06-11	n.a.	<0.5	n.a.	<2	<0.5	<0.2	<0.1	<0.1	<1
90-06-12	n.a.	<0.5	n.a.	<2	<0.5	<0.2	<0.1	<0.1	<1
90-06-13	n.a.	<0.5	n.a.	<2	<0.5	<0.2	<0.1	<0.1	<1
90-06-14	n.a.	<0.5	n.a.	<2	<0.5	<0.2	<0.1	<0.1	<1
90-06-15	n.a.	<0.5	n.a.	<2	<0.5	<0.2	**(0.08)**	**(0.04)**	**25**
90-06-15	n.a.	<0.5	n.a.	<2	<0.5	<0.2	**0.1**	**(0.06)**	**45**
90-06-15	n.a.	<0.5	n.a.	<1.5	<0.5	<1	**0.4**	**(0.09)**	**30**
90-06-15	n.a.	<0.5	n.a.	<1.5	<0.5	<1	**1.4**	**(0.05)**	**25**
90-06-18	n.a.	<0.5	n.a.	<1.5	<0.5	<1	**0.2**	**(0.02)**	**(3.5)**
90-06-25	n.a.	<0.5	n.a.	<1.5	<0.5	<1	**0.7**	**0.1**	<1
90-07-02	n.a.	<0.5	n.a.	<1.5	<0.5	<1	**1**	**0.1**	<1
90-07-09	n.a.	<0.5	n.a.	<1.5	<0.5	<1	**0.3**	**(0.07)**	<1
90-07-16	n.a.	<0.5	n.a.	<1.5	<0.5	<0.1	<0.1	<0.1	<1
90-07-23	n.a.	<0.5	n.a.	<1.5	<0.5	<0.1	<0.1	<0.1	<1
90-07-30	n.a.	<0.5	n.a.	<1.5	<0.5	<0.1	<0.1	<0.1	<1
90-08-06	n.a.	<0.5	n.a.	<1	<0.5	<0.2	<0.1	<0.1	<1
90-08-13	n.a.	<0.5	n.a.	<1	<0.5	<0.2	<0.1	<0.1	<1
90-08-20	n.a.	<0.5	n.a.	<1	<0.5	<0.2	<0.1	<0.1	<1
90-08-29	n.a.	<0.5	n.a.	<1	<0.5	<0.2	**0.1**	**(0.05)**	<1
90-09-03	n.a.	<0.5	n.a.	<1	<0.5	<0.2	<0.1	<0.1	<1
90-09-10	n.a.	<0.5	n.a.	<1	<0.5	<0.2	<0.1	<0.1	<1
91-05-04									
91-05-07	**7**	n.a.	<0.2	<2	<0.5	<0.4	**0.2**	**0.6**	<1
91-05-14	<2	n.a.	<0.2	<2	<0.5	<0.4	<0.1	**(0.08)**	<1
91-05-21	<2	n.a.	<0.2	<2	<1	<0.6	<0.1	**0.1**	<1
91-05-27	<2	n.a.	<0.2	<2	<1	<0.6	<0.1	<0.1	<1
91-05-28	<2	n.a.	<0.2	<0.5	<1	<0.5	<0.1	**(0.03)**	<1
91-05-29	n.a.	n.a.	n.a.	<2	<1	<0.3	<0.1	<0.1	<1
91-05-30	<2	n.a.	<0.2	<0.5	<0.2	<0.5	**0.6**	<0.1	**1**
91-05-31	<2	n.a.	<0.2	<0.5	<0.2	<0.5	**5**	<0.1	**(0.8)**
91-06-01	<2	n.a.	<0.2	<0.5	<0.2	<0.5	**2**	**(0.05)**	<1

Appendix 2. Pesticide concentrations in time integrated water samples from LU12/TP 1990-1992

Date	fluroxypyr	hexazinon	ioxynil	isoproturon	lenacil	linuron	MCPA	mecoprop	metamitron
91-06-02	<2	n.a.	<0.2	**(0.7)**	<0.2	<0.5	**2**	**0.5**	**2**
91-06-03	<2	n.a.	**(0.05)**	<0.5	<0.2	<0.5	**5**	**0.1**	<1
91-06-04	<2	n.a.	<0.2	<0.5	<0.2	<0.5	**1.2**	**0.2**	**(0.5)**
91-06-05	<2	n.a.	**(0.05)**	<0.5	<0.2	<0.5	**3**	**0.3**	**1**
91-06-06	<2	n.a.	**0.1**	**2**	<0.2	**(0.3)**	**3**	**1.1**	<1
91-06-07	<2	n.a.	**(0.05)**	<0.5	<0.2	<0.5	**0.9**	**(0.06)**	<1
91-06-08	<2	n.a.	<0.2	<0.6	<0.5	<1	**0.6**	**(0.07)**	<1
91-06-09	<2	n.a.	<0.2	<0.6	<0.5	<1	**0.3**	**(0.06)**	<1
91-06-10	<2	n.a.	**(0.05)**	<0.5	<0.2	<0.5	**0.3**	<0.1	<1
91-06-11	<2	n.a.	**(0.05)**	**0.7**	<0.2	<0.5	**0.5**	**0.1**	**1**
91-06-12	<2	n.a.	<0.2	**0.6**	<0.5	<1	**(0.09)**	**(0.05)**	<1
91-06-18	<2	n.a.	**1**	**2**	<0.5	<0.5	**3**	**7**	**2**
91-06-24	<2	n.a.	**0.3**	**(0.7)**	<0.5	<1	**2**	**3**	<1
91-07-01	<2	n.a.	<0.2	<1	<0.5	<0.5	**0.9**	**0.6**	<2
91-07-09	<2	n.a.	**0.09**	<0.6	<0.5	<1	**0.4**	**(0.08)**	<1
91-07-16	<2	n.a.	<0.2	<0.6	<0.5	<1	**0.1**	<0.1	<1
91-07-23	<2	n.a.	<0.2	<0.6	<0.5	<1	**(0.09)**	**(0.08)**	<1
91-07-30	<2	n.a.	<0.2	<0.6	<0.5	<1	**0.3**	<0.1	<1
91-08-06	<2	n.a.	<0.2	<0.6	<0.5	<1	<0.1	<0.1	<1
91-08-12	<2	n.a.	<0.2	<0.6	<0.5	<1	**0.2**	**(0.04)**	<1
91-08-19	<2	n.a.	<0.2	<0.6	<0.5	<1	**(0.08)**	**(0.04)**	<1
91-08-26	<2	n.a.	<0.2	<0.6	<0.5	<1	<0.1	<0.1	<1
91-09-02	<2	n.a.	<0.2	<0.6	<0.5	<1	**(0.03)**	<0.1	<1
91-09-09	<2	n.a.	<0.2	<0.6	<0.5	<1	<0.1	<0.1	<1
91-09-15	<2	n.a.	<0.2	<0.6	<0.5	<1	<0.1	<0.1	<1
91-09-22	<2	n.a.	<0.2	<0.6	<0.5	<1	**0.1**	<0.1	<1
91-09-29	<2	n.a.	<0.2	<0.6	<0.5	<1	<0.1	**0.2**	<1
92-04-27									
92-05-04	<0.2	n.a.	<0.2	**0.2**	n.a.	<0.5	<0.1	**(0.09)**	<0.5
92-05-11	<0.2	n.a.	<0.2	<0.3	n.a.	<0.5	<0.1	**0.1**	<0.5
92-05-18	<0.2	n.a.	**0.4**	**0.2**	n.a.	<0.5	**10**	**0.1**	**4**
92-05-25	<0.2	n.a.	<0.2	<0.2	n.a.	<1	**0.3**	**(0.04)**	**4**
92-06-01	<0.2	n.a.	<0.2	<0.2	n.a.	<0.5	<0.1	**0.2**	**1**
92-06-08	<0.2	n.a.	<0.2	<0.2	n.a.	<0.5	**1**	**0.4**	**0.9**
92-06-15	<0.2	n.a.	<0.2	<0.2	n.a.	<0.5	<0.1	**(0.03)**	<0.5
92-06-22	<0.2	n.a.	<0.2	<0.3	n.a.	<0.5	**0.4**	**0.8**	**0.5**
92-06-29	<0.2	n.a.	<0.2	<0.2	n.a.	<0.5	<0.1	**0.1**	<0.5
92-07-06	<0.2	n.a.	<0.2	<0.2	n.a.	<0.6	<0.1	**(0.03)**	**(0.2)**
92-07-13	<0.2	n.a.	<0.2	<0.2	n.a.	<0.6	**0.9**	**0.4**	**0.9**
92-07-15	**0.1**	n.a.	**0.4**	**0.3**	n.a.	<0.6	**2**	**0.6**	**6**
92-07-16	<0.2	n.a.	<0.4	**(0.1)**	n.a.	<0.6	**(0.07)**	**(0.03)**	**1**
92-07-17	<0.2	n.a.	<0.2	<0.2	n.a.	<1	**(0.02)**	<0.1	<0.5
92-07-18	<0.2	n.a.	<0.2	**0.1**	n.a.	<1	**0.2**	<0.1	**0.5**
92-07-19	<0.2	n.a.	<0.2	**0.2**	n.a.	<2	<0.1	<0.1	<0.5
92-07-20	<0.2	n.a.	<0.2	<0.2	n.a.	<1	<0.1	<0.1	<0.5
92-07-21	<0.2	n.a.	<0.2	<0.2	n.a.	<1	<0.1	<0.1	<0.5
92-07-22	<0.2	n.a.	<0.2	<0.2	n.a.	<1	<0.1	<0.1	<0.5
92-07-23	<0.2	n.a.	<0.2	<0.2	n.a.	<0.5	**(0.02)**	<0.1	<0.5
92-07-27	<0.2	n.a.	<0.2	<0.2	n.a.	<1	<0.1	<0.1	<0.5
92-08-03	<0.2	n.a.	<0.2	<0.2	n.a.	<0.5	<0.1	<0.1	<0.5
92-08-10	<0.2	n.a.	<0.2	<0.2	n.a.	<0.5	<0.1	<0.1	<0.5
92-08-17	<0.2	n.a.	<0.2	<0.2	n.a.	<0.6	<0.1	**(0.04)**	<0.5
92-08-24	<0.2	n.a.	<0.2	<0.2	n.a.	<0.8	**0.2**	**(0.08)**	**0.5**
92-08-31	<0.2	n.a.	<0.2	<0.1	n.a.	<0.6	<0.1	<0.1	<0.5
92-09-07	<0.2	n.a.	<0.2	<0.2	n.a.	<0.6	<0.1	**0.1**	<0.5
92-09-14	<0.2	n.a.	<0.2	<0.2	n.a.	<0.6	<0.1	<0.1	<0.5
92-09-21	<0.2	n.a.	<0.2	<0.2	n.a.	<0.6	**0.1**	<0.1	<0.5
92-09-28	<0.1	n.a.	<0.2	<0.2	n.a.	<0.1-0.5	<0.1	<0.1	<0.5
92-10-05	<0.1	n.a.	n.a.	n.a.	n.a.	n.a.	<0.1	<0.1	n.a.
92-10-12	<0.1	n.a.	n.a.	n.a.	n.a.	n.a.	<0.1	<0.1	n.a.

Appendix 2. Pesticide concentrations in time integrated water samples from LU12/TP 1990-1992

Date	metazachlor	methabenzthiazuron	pendimethalin	permethrin	phenmedipham	pirimicarb	prochloraz
90-05-11							
90-05-13	**3.6**	<0.6	<0.3	<0.5	<3	<0.1	n.a.
90-05-14	**1.4**	**0.6**	<0.3	<0.5	<3	<0.1	n.a.
90-05-15	**0.6**	**0.4**	<0.3	<0.5	<3	<0.1	n.a.
90-05-16	**0.3**	<1.5	<0.3	<0.5	<3	<0.1	n.a.
90-05-17	**0.2**	<1.5	<0.3	<0.5	<3	<0.1	n.a.
90-05-18	**2**	<1.5	<0.3	<0.5	<3	<0.1	n.a.
90-05-20	**1.4**	<1.5	<0.3	<0.5	<3	<0.1	n.a.
90-05-21	**0.5**	<1.5	<0.3	<0.5	<3	<0.1	n.a.
90-05-22	**0.2**	<1.5	<0.3	<0.5	<3	<0.1	n.a.
90-05-23	**0.3**	<1.5	<0.3	<0.5	<3	<0.1	n.a.
90-05-24	**0.2**	<1.5	<0.3	<0.5	<3	<0.1	n.a.
90-05-25	<0.1	<0.3	<0.3	<0.5	<3	<0.1	n.a.
90-05-26	**0.3**	<3	<0.5	<0.5	<20	<0.1	n.a.
90-05-27	**0.6**	<3	<0.5	<0.5	<20	<0.1	n.a.
90-05-28	**0.2**	<3	<0.5	<0.5	<20	<0.1	n.a.
90-05-29	**2.2**	<3	<0.5	<0.5	<1	<0.1	n.a.
90-05-30	**3.6**	<3	<0.5	<0.5	<1	<0.1	n.a.
90-05-31	**1.9**	<3	<0.5	<0.5	<1	<0.1	n.a.
90-06-01	**0.3**	<3	<0.5	<0.5	<20	<0.1	n.a.
90-06-02	**0.3**	<3	<0.5	<0.5	<20	<0.1	n.a.
90-06-03	**0.1**	<3	<0.5	<0.5	<20	<0.1	n.a.
90-06-04	**0.1**	<3	<0.5	<0.5	<20	<0.1	n.a.
90-06-05	**1.2**	<3	<0.5	<0.5	<20	<0.1	n.a.
90-06-06	**5.1**	<3	<0.5	<0.5	<20	<0.1	n.a.
90-06-07	**2.5**	<2	<0.2	<0.5	<5	<0.1	n.a.
90-06-08	**0.5**	<2	<0.2	<0.5	<5	<0.1	n.a.
90-06-09	**0.3**	<2	<0.2	<0.5	<5	**0.9**	n.a.
90-06-10	**0.4**	<0.5	<0.2	<0.5	<1	**1.1**	n.a.
90-06-11	**0.4**	<0.5	<0.2	<0.5	<1	**0.4**	n.a.
90-06-12	**0.2**	<0.5	<0.2	<0.5	<1	**0.2**	n.a.
90-06-13	**0.2**	<0.5	<0.2	<0.5	<1	**0.2**	n.a.
90-06-14	**0.1**	<0.5	<0.2	<0.5	<1	<0.1	n.a.
90-06-15	**0.1**	<0.5	<0.2	<0.5	<1	**0.8**	n.a.
90-06-15	**0.1**	<0.5	<0.2	<0.5	<1	**0.9**	n.a.
90-06-15	**0.1**	<0.3	<0.3	<0.5	<1	**0.5**	n.a.
90-06-15	<0.1	<0.3	<0.3	<0.5	<1	**0.2**	n.a.
90-06-18	**0.3**	<0.3	<0.3	<0.5	<1	**0.2**	n.a.
90-06-25	**1**	<0.3	<0.3	<0.5	<1	**0.5**	n.a.
90-07-02	**1.6**	<0.3	<0.3	<0.5	<1	**0.7**	n.a.
90-07-09	**0.6**	<0.3	<0.3	<0.5	<1	**1**	n.a.
90-07-16	**0.1**	<0.3	<0.3	<0.5	<1	**0.1**	n.a.
90-07-23	<0.1	<0.3	<0.3	<0.5	<1	<0.1	n.a.
90-07-30	**0.3**	<0.3	<0.3	<0.5	<1	**0.1**	n.a.
90-08-06	<0.1	<0.3	<0.3	<0.5	<2	<0.1	n.a.
90-08-13	<0.1	<0.3	<0.3	<0.5	<2	<0.1	n.a.
90-08-20	**0.2**	<0.3	<0.3	<0.5	<2	<0.1	n.a.
90-08-29	**0.1**	<0.3	<0.3	<0.5	<2	<0.1	n.a.
90-09-03	<0.1	<0.3	<0.3	<0.5	<2	<0.1	n.a.
90-09-10	<0.1	<0.3	<0.3	<0.5	<2	<0.1	n.a.
91-05-04							
91-05-07	<0.1	<0.5	<0.2	<1	<2	<0.1	n.a.
91-05-14	<0.1	<0.5	<0.2	<1	<2	<0.1	n.a.
91-05-21	<0.1	<0.3	<0.2	<0.5	<2	<0.1	n.a.
91-05-27	<0.1	<0.3	<0.2	<0.5	<2	<0.1	n.a.
91-05-28	<0.1	<0.3	<0.2	<0.5	n.a.	<0.1	<0.5
91-05-29	<0.1	<0.3	<0.3	<0.5	<2	<0.1	<1
91-05-30	<0.1	<0.3	<0.2	<0.5	<2	<0.1	<0.3
91-05-31	<0.1	<0.3	<0.2	<0.5	<2	<0.1	<0.3
91-06-01	<0.1	<0.3	<0.2	<0.5	<2	<0.1	<0.3

Appendix 2. Pesticide concentrations in time integrated water samples from LU12/TP 1990-1992

Date	metazachlor	methabenzthiazuron	pendimethalin	permethrin	phenmedipham	pirimicarb	prochloraz
91-06-02	<0.1	<0.3	<0.2	<0.5	<2	<0.1	<0.3
91-06-03	<0.1	<0.3	<0.2	<0.5	<2	<0.1	<0.3
91-06-04	<0.1	<0.3	<0.2	<0.5	<2	<0.1	<0.3
91-06-05	<0.1	<0.3	<0.2	<0.5	<2	<0.1	<0.3
91-06-06	**0.2**	<0.3	<0.2	<0.5	<2	<0.1	<0.3
91-06-07	<0.1	<0.3	<0.2	<0.5	<2	<0.1	<0.3
91-06-08	<0.1	<0.3	<0.2	<0.5	<1	<0.1	<0.3
91-06-09	<0.1	<0.3	<0.2	<0.5	<1	<0.1	<0.3
91-06-10	<0.1	<0.3	<0.2	<0.5	<2	<0.1	<0.3
91-06-11	**(0.07)**	<0.3	<0.2	<0.5	<2	<0.1	<0.3
91-06-12	**0.1**	<0.3	<0.2	<0.5	<1	<0.1	<0.1
91-06-18	<0.2	<0.4	<0.2	<0.5	<2	<0.1	<0.3
91-06-24	<0.2	<0.3	<0.2	<0.5	<1	<0.1	<0.1
91-07-01	<0.2	<0.4	<0.2	<0.5	<2	<0.1	<0.3
91-07-09	<0.1	<0.3	<0.2	<0.5	<1	<0.1	<0.1
91-07-16	<0.1	**(0.2)**	<0.2	<0.5	<1	**(0.05)**	<0.1
91-07-23	<0.1	**(0.2)**	<0.2	<0.5	<1	**0.1**	<0.1
91-07-30	**(0.07)**	**(0.2)**	<0.2	<0.5	<1	**(0.08)**	<0.1
91-08-06	**(0.05)**	**(0.2)**	<0.2	<0.5	<1	**(0.05)**	<0.1
91-08-12	<0.1	<0.3	<0.2	<0.5	<1	**(0.05)**	<0.1
91-08-19	**0.2**	**(0.2)**	<0.2	<0.5	<1	**(0.05)**	<0.1
91-08-26	**(0.05)**	<0.3	<0.2	<0.5	<1	**(0.05)**	<0.1
91-09-02	<0.1	<0.3	<0.2	<0.5	<1	<0.1	<0.1
91-09-09	<0.1	<0.3	<0.2	<0.5	<1	<0.1	<0.1
91-09-15	<0.1	<0.3	<0.2	<0.5	<1	<0.1	<0.1
91-09-22	**1**	<0.3	<0.2	<0.5	<1	<0.1	<0.1
91-09-29	**2**	**(0.2)**	<0.2	<0.5	<1	**(0.05)**	<0.1
92-04-27							
92-05-04	<0.1	<0.2	<0.2	<0.2	n.a.	<0.1	<0.1-0.5
92-05-11	<0.1	<0.2	<0.2	<0.2	n.a.	<0.1	<0.1-0.5
92-05-18	<0.1	<0.2	<0.2	<0.2	n.a.	<0.1	<0.1-0.5
92-05-25	<0.2	<0.2	<0.2	<0.2	n.a.	<0.2	<0.1-0.5
92-06-01	<0.1	<0.2	<0.2	<0.2	n.a.	<0.1	<0.1-0.5
92-06-08	<0.1	<0.2	<0.2	<0.2	n.a.	<0.1	<0.1-0.5
92-06-15	<0.1	<0.2	<0.2	<0.2	n.a.	<0.1	<0.1-0.5
92-06-22	<0.1	<0.2	<0.2	<0.2	n.a.	**0.2**	<0.1-0.5
92-06-29	<0.1	<0.2	<0.2	<0.2	n.a.	**0.1**	<0.1-0.5
92-07-06	<0.1	<0.2	<0.2	<0.1	n.a.	<0.1	<0.1-0.5
92-07-13	**0.2**	<0.2	<0.2	<0.1	n.a.	**0.2**	<0.1-0.5
92-07-15	**0.7**	<0.3	<0.2	<0.2	n.a.	**2**	<0.1-0.5
92-07-16	<0.1	<0.3	<0.2	<0.2	n.a.	**0.7**	<0.1-0.5
92-07-17	<0.1	<0.3	<0.2	<0.1	n.a.	**0.4**	<0.1-0.5
92-07-18	**(0.05)**	<0.3	<0.2	<0.1	n.a.	**0.4**	<0.1-0.5
92-07-19	<0.2	<0.6	<0.3	<0.1	n.a.	**0.5**	<0.1-0.5
92-07-20	<0.1	<0.3	<0.2	<0.1	n.a.	**0.4**	<0.1-0.5
92-07-21	<0.1	<0.2	<0.2	<0.1	n.a.	**0.4**	<0.1-0.5
92-07-22	<0.1	<0.2	<0.2	<0.1	n.a.	**0.1**	<0.1-0.5
92-07-23	<0.1	<0.3	<0.2	<0.2	n.a.	**0.2**	<0.1-0.5
92-07-27	<0.1	<0.3	<0.2	<0.2	n.a.	**(0.05)**	<0.1-0.5
92-08-03	<0.1	<0.5	<0.2	<0.1-0.5	n.a.	**(0.05)**	<0.1-0.5
92-08-10	<0.1	<0.5	<0.2	<0.1	n.a.	<0.1	<0.1-0.5
92-08-17	<0.1	<0.2	<0.2	<0.1	n.a.	**(0.08)**	<0.1-0.5
92-08-24	<0.1	<0.3	<0.2	<0.2	n.a.	**0.2**	<0.1-0.5
92-08-31	**0.1**	<0.1	<0.2	<0.2	n.a.	**(0.05)**	<0.1-0.5
92-09-07	**0.4**	<0.2	<0.2	<0.1	n.a.	**0.1**	<0.1-0.5
92-09-14	**0.4**	<0.2	<0.2	<0.1	n.a.	<0.1	<0.1-0.5
92-09-21	**0.6**	<0.1-0.5	<0.2	<0.2	n.a.	<0.1	<0.1-0.5
92-09-28	**0.1**	<0.1-0.5	<0.2	<0.2	n.a.	<0.1	<0.1-0.5
92-10-05	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
92-10-12	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Appendix 2. Pesticide concentrations in time integrated water samples from LU12/TP 1990-1992

Date	propiconazole	propyzamide	simazine	terbuthylazine	triadimenol	tribenuron-methyl	Sum pest
90-05-11							
90-05-13	<0.4	<0.2	<0.1	**0.9**	<0.5	n.a.	**124.1**
90-05-14	<0.4	<0.2	<0.1	**0.4**	<0.5	n.a.	**59.8**
90-05-15	<0.4	<0.2	<0.1	**0.2**	<0.5	n.a.	**33.5**
90-05-16	<0.4	<0.2	<0.1	**0.1**	<0.5	n.a.	**5.2**
90-05-17	<0.4	<0.2	<0.1	<0.1	<0.5	n.a.	**4.3**
90-05-18	<0.4	<0.2	<0.1	**0.2**	<0.5	n.a.	**8.5**
90-05-20	<0.4	<0.2	<0.1	**0.3**	<0.5	n.a.	**6.6**
90-05-21	<0.4	<0.2	<0.1	**0.2**	<0.5	n.a.	**4.9**
90-05-22	<0.4	<0.2	<0.1	<0.1	<0.5	n.a.	**0.4**
90-05-23	<0.4	<0.2	<0.1	**0.1**	<0.5	n.a.	**0.9**
90-05-24	<0.4	<0.2	<0.1	<0.1	<0.5	n.a.	**0.6**
90-05-25	<0.4	<0.2	<0.1	<0.1	<0.5	n.a.	**2.4**
90-05-26	<0.2	<0.4	<0.1	**0.2**	<0.5	n.a.	**4.7**
90-05-27	<0.2	<0.4	<0.1	**0.2**	<0.5	n.a.	**5.0**
90-05-28	<0.2	<0.4	<0.1	<0.1	<0.5	n.a.	**1.3**
90-05-29	**0.9**	<0.4	<0.1	**0.3**	<0.5	n.a.	**6.2**
90-05-30	**1.9**	<0.4	<0.1	**1.1**	<0.5	n.a.	**23.2**
90-05-31	**0.4**	<0.4	<0.1	**0.5**	<0.5	n.a.	**6.1**
90-06-01	**1**	<0.4	<0.1	**0.2**	<0.5	n.a.	**2.0**
90-06-02	**1**	<0.4	<0.1	**0.2**	<0.5	n.a.	**1.8**
90-06-03	**1**	<0.4	<0.1	**0.1**	<0.5	n.a.	**1.5**
90-06-04	<0.2	<0.4	<0.1	<0.1	<0.5	n.a.	**0.7**
90-06-05	<0.2	<0.4	<0.1	**0.7**	<0.5	n.a.	**9.1**
90-06-06	**1**	<0.4	<0.1	**0.9**	<0.5	n.a.	**18.6**
90-06-07	**1**	<0.4	<0.1	**0.5**	<0.5	n.a.	**6.6**
90-06-08	<0.2	<0.4	<0.1	**0.3**	<0.5	n.a.	**1.6**
90-06-09	**0.9**	<0.4	<0.1	**0.1**	<0.5	n.a.	**2.7**
90-06-10	**2.8**	<0.4	<0.1	**0.2**	<0.5	n.a.	**4.9**
90-06-11	**1.5**	<0.4	<0.1	**0.1**	<0.5	n.a.	**2.7**
90-06-12	**1.6**	<0.4	<0.1	<0.1	<0.5	n.a.	**2.1**
90-06-13	**1.8**	<0.4	<0.1	<0.1	<0.5	n.a.	**2.3**
90-06-14	**2**	<0.4	<0.1	<0.1	<0.5	n.a.	**2.2**
90-06-15	**1**	<0.4	<0.1	**0.1**	<0.5	n.a.	**30.6**
90-06-15	**1.3**	<0.4	**0.3**	**0.9**	<0.5	n.a.	**58.3**
90-06-15	**1.6**	<0.4	**0.2**	**0.3**	<0.5	n.a.	**41.8**
90-06-15	**0.8**	<0.4	<0.1	**0.1**	<0.5	n.a.	**31.9**
90-06-18	**0.6**	<0.4	<0.1	**0.1**	<0.5	n.a.	**7.9**
90-06-25	**0.7**	<0.4	<0.1	**0.2**	<0.5	n.a.	**4.5**
90-07-02	**1.3**	<0.4	<0.1	**0.4**	<0.5	n.a.	**6.5**
90-07-09	<0.2	<0.4	<0.1	**0.3**	<0.5	n.a.	**3.4**
90-07-16	**0.3**	<0.4	<0.1	**0.1**	<0.5	n.a.	**0.8**
90-07-23	**0.3**	<0.4	<0.1	<0.1	<0.5	n.a.	**0.4**
90-07-30	**0.3**	<0.4	<0.1	**0.1**	<0.5	n.a.	**1.0**
90-08-06	<0.2	<0.4	<0.1	<0.1	<0.5	n.a.	**0.00**
90-08-13	<0.2	<0.4	<0.1	<0.1	<0.5	n.a.	**0.04**
90-08-20	**0.3**	<0.4	<0.1	<0.1	<0.5	n.a.	**0.6**
90-08-29	**0.4**	<0.4	<0.1	**0.1**	<0.5	n.a.	**1.1**
90-09-03	**0.2**	<0.4	<0.1	<0.1	<0.5	n.a.	**0.2**
90-09-10	<0.2	<0.4	<0.1	<0.1	<0.5	n.a.	**0.00**
91-05-04							
91-05-07	<0.2	n.a.	<0.1	**0.3**	<0.5	n.a.	**8.8**
91-05-14	<0.2	n.a.	<0.1	<0.1	<0.5	n.a.	**0.1**
91-05-21	<0.2	n.a.	<0.2	<0.1	<1	n.a.	**0.8**
91-05-27	<0.2	n.a.	<0.2	<0.1	<1	n.a.	**0.1**
91-05-28	<0.2	n.a.	<0.2	<0.1	<0.5	n.a.	**0.1**
91-05-29	<0.2	n.a.	<0.2	<0.1	<0.5	n.a.	**0.1**
91-05-30	<0.2	n.a.	<0.2	<0.1	<0.5	n.a.	**2.5**
91-05-31	<0.2	n.a.	<0.2	<0.1	<0.5	n.a.	**7.5**
91-06-01	<0.2	n.a.	<0.2	<0.1	<0.5	n.a.	**3.0**

Appendix 2. Pesticide concentrations in time integrated water samples from LU12/TP 1990-1992

Date	propiconazole	propyzamide	simazine	terbuthylazine	triadimenol	tribenuron-methyl	Sum pest
91-06-02	<0.2	n.a.	<0.2	**(0.09)**	<0.5	n.a.	**6.3**
91-06-03	<0.2	n.a.	<0.2	<0.1	<0.5	n.a.	**6.2**
91-06-04	<0.2	n.a.	<0.2	<0.1	<0.5	n.a.	**2.5**
91-06-05	<0.2	n.a.	<0.2	**0.1**	<0.5	n.a.	**5.7**
91-06-06	<0.2	n.a.	<0.2	**0.3**	<0.5	n.a.	**8.4**
91-06-07	<0.2	n.a.	<0.2	**0.1**	<0.5	n.a.	**1.7**
91-06-08	<0.2	n.a.	<0.2	<0.1	<0.5	n.a.	**1.2**
91-06-09	<0.2	n.a.	<0.2	<0.1	<0.5	n.a.	**0.7**
91-06-10	<0.2	n.a.	<0.2	<0.1	<0.5	n.a.	**0.9**
91-06-11	<0.2	n.a.	<0.2	**0.1**	<0.5	n.a.	**3.0**
91-06-12	<0.2	n.a.	<0.2	**0.2**	<0.5	n.a.	**1.2**
91-06-18	**0.7**	n.a.	<0.3	**0.2**	<0.5	n.a.	**21.8**
91-06-24	**0.7**	n.a.	<0.3	**0.4**	<0.5	n.a.	**11.6**
91-07-01	**0.3**	n.a.	<0.3	**0.2**	<0.5	n.a.	**3.4**
91-07-09	<0.2	n.a.	<0.2	**(0.06)**	<0.5	n.a.	**1.1**
91-07-16	**0.2**	n.a.	<0.2	**0.1**	<0.5	n.a.	**1.3**
91-07-23	**(0.1)**	n.a.	<0.2	**0.1**	<0.5	n.a.	**1.0**
91-07-30	**(0.1)**	n.a.	<0.2	**0.1**	<0.5	n.a.	**1.2**
91-08-06	<0.2	n.a.	<0.1	**(0.09)**	<0.5	n.a.	**0.5**
91-08-12	<0.2	n.a.	<0.1	**(0.05)**	<0.5	n.a.	**0.5**
91-08-19	**0.2**	n.a.	<0.1	**0.2**	<0.5	n.a.	**1.2**
91-08-26	<0.2	n.a.	<0.1	**0.1**	<0.5	n.a.	**0.3**
91-09-02	<0.2	n.a.	<0.2	<0.1	<0.5	n.a.	**0.1**
91-09-09	<0.2	n.a.	<0.2	<0.1	<0.5	n.a.	**0.00**
91-09-15	<0.2	n.a.	<0.2	<0.1	<0.5	n.a.	**0.00**
91-09-22	<0.2	n.a.	<0.2	<0.1	<0.5	n.a.	**1.2**
91-09-29	**0.2**	n.a.	<0.2	**0.2**	<0.5	n.a.	**3.2**
92-04-27							
92-05-04	<0.2	<0.1-0.5	<0.1	**(0.05)**	<1	n.a.	**10.4**
92-05-11	<0.2	<0.1-0.5	<0.1	<0.1	<0.1-0.5	n.a.	**0.7**
92-05-18	<0.2	<0.1-0.5	<0.1	**0.1**	<0.1-0.5	n.a.	**48.9**
92-05-25	<0.2	<0.1-0.5	<0.2	**2**	<0.1-0.5	n.a.	**8.6**
92-06-01	<0.2	<0.1-0.5	<0.2	**1**	<0.1-0.5	n.a.	**3.6**
92-06-08	<0.2	<0.1-0.5	<0.1	<0.1	<0.1-0.5	n.a.	**2.8**
92-06-15	<0.2	<0.1-0.5	<0.1	**0.1**	<0.1-0.5	n.a.	**0.1**
92-06-22	<0.2	<0.1-0.5	<0.1	**0.6**	<0.1-0.5	n.a.	**2.8**
92-06-29	<0.2	<0.1-0.5	<0.2	**0.3**	<0.1-0.5	n.a.	**0.5**
92-07-06	<0.2	<0.1-0.5	<0.1	<0.1	<0.1-0.5	n.a.	**0.2**
92-07-13	**0.3**	<0.1-0.5	<0.1	**0.3**	<0.1-0.5	n.a.	**5.0**
92-07-15	**1**	<0.1-0.5	<0.2	**1**	<0.6	n.a.	**20.0**
92-07-16	**0.6**	<0.1-0.5	<0.2	**0.8**	<0.6	n.a.	**3.7**
92-07-17	**0.4**	<0.1-0.5	<0.1	**0.5**	<0.1-0.5	n.a.	**1.6**
92-07-18	**0.3**	<0.1-0.5	<0.1	**0.8**	<0.1-0.5	n.a.	**3.0**
92-07-19	**0.3**	<0.1-0.5	<0.1	**0.6**	<0.7	n.a.	**1.8**
92-07-20	**0.2**	<0.1-0.5	<0.1	**0.4**	<0.1-0.5	n.a.	**1.1**
92-07-21	**0.2**	<0.1-0.5	<0.1	**0.4**	<0.1-0.5	n.a.	**1.1**
92-07-22	**0.2**	<0.1-0.5	<0.1	**0.2**	<0.1-0.5	n.a.	**0.5**
92-07-23	**0.2**	<0.1-0.5	<0.2	**0.2**	<0.1-0.5	n.a.	**0.6**
92-07-27	<0.2	<0.1-0.5	<0.2	**(0.05)**	<0.1-0.5	n.a.	**0.1**
92-08-03	<0.2	<0.1-0.5	<0.2	**(0.07)**	<0.1-0.5	n.a.	**0.1**
92-08-10	<0.2	<0.1-0.5	<0.2	**(0.05)**	<0.8	n.a.	**0.1**
92-08-17	<0.2	<0.1-0.5	<0.1	**0.2**	<0.1-0.5	n.a.	**0.6**
92-08-24	**0.1**	<0.1-0.5	<0.2	**0.9**	<0.1-0.5	n.a.	**2.4**
92-08-31	<0.2	<0.1-0.5	<0.1	**0.3**	<0.1-0.5	n.a.	**0.5**
92-09-07	<0.2	<0.1-0.5	<0.2	**0.8**	<0.1-0.5	n.a.	**2.6**
92-09-14	<0.2	<0.1-0.5	<0.2	<0.1	<0.1-0.5	n.a.	**0.4**
92-09-21	<0.2	<0.1-0.5	<0.2	<0.1	<0.8	n.a.	**0.8**
92-09-28	<0.2	<0.1-0.5	<0.2	<0.1	<0.1-0.5	n.a.	**0.1**
92-10-05	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	**0.00**
92-10-12	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	**0.00**

Appendix 3. Pesticide concentrations in time integrated water samples from UT10/TP 1992-1994

Date	a-cypermethrin	atrazindesethyl	atrazine	BAM	benazolin-ethylester	bentazone	bromoxynil
92-05-11	<0.1	n.a.	<0.1	n.a.	<0.1-0.5	**(0.09)**	n.a.
92-05-18	<0.1	n.a.	**0.2**	n.a.	<0.1-0.5	**(0.07)**	n.a.
92-05-25	<0.1	n.a.	**(0.1)**	n.a.	<0.1-0.5	**(0.08)**	n.a.
92-06-01	<0.1	n.a.	**(0.1)**	n.a.	<0.1-0.5	**(0.07)**	n.a.
92-06-08	<0.1	n.a.	<0.5	n.a.	<0.1-0.5	**0.1**	n.a.
92-06-15	<0.1	n.a.	<0.2	n.a.	<0.1-0.5	**0.1**	n.a.
92-06-22	<0.1	n.a.	<0.5	n.a.	<0.1-0.5	**0.1**	n.a.
92-06-29	<0.1	n.a.	<0.2	n.a.	<0.1-0.5	**0.2**	n.a.
92-07-06	<0.1	n.a.	**0.2**	n.a.	<0.1-0.5	**0.2**	n.a.
92-07-13	<0.1	n.a.	**0.7**	n.a.	<0.1-0.5	**0.4**	n.a.
92-07-15	<0.1	n.a.	**2**	n.a.	<0.1-0.5	**0.3**	n.a.
92-07-16	<0.1	n.a.	**0.7**	n.a.	<0.1-0.5	**0.3**	n.a.
92-07-17	<0.1	n.a.	**0.5**	n.a.	<0.1-0.5	**0.2**	n.a.
92-07-18	<0.1	n.a.	**2**	n.a.	<0.1-0.5	**0.2**	n.a.
92-07-19	<0.1	n.a.	**0.8**	n.a.	<0.1-0.5	**0.5**	n.a.
92-07-20	<0.1	n.a.	**0.5**	n.a.	<0.1-0.5	**0.3**	n.a.
92-07-21	<0.1	n.a.	**0.4**	n.a.	<0.1-0.5	**0.2**	n.a.
92-07-22	<0.1	n.a.	**0.4**	n.a.	<0.1-0.5	**0.2**	n.a.
92-07-23	<0.1	n.a.	**0.2**	n.a.	<0.1-0.5	**0.2**	n.a.
92-07-27	<0.1	n.a.	**0.3**	n.a.	<0.1-0.5	**0.15**	n.a.
92-08-03	<0.1	n.a.	**0.7**	n.a.	<0.1-0.5	**0.2**	n.a.
92-08-10	<0.1	n.a.	**0.5**	n.a.	<0.1-0.5	**0.1**	n.a.
92-08-17	<0.1	n.a.	**2**	n.a.	<0.1-0.5	**0.1**	n.a.
92-08-24	<0.1	n.a.	**3**	n.a.	<0.1-0.5	**0.1**	n.a.
92-08-31	<0.1	n.a.	**1**	n.a.	<0.1-0.5	**0.3**	n.a.
92-09-07	<0.1	n.a.	**2**	n.a.	<0.1-0.5	**0.3**	n.a.
92-09-14	<0.1	n.a.	**0.3**	n.a.	<0.1-0.5	<0.1	n.a.
92-09-21	<0.1	n.a.	**0.7**	n.a.	<0.1-0.5	**0.1**	n.a.
92-09-28	<0.1	n.a.	**0.2**	n.a.	<0.1-0.5	<0.1	n.a.
92-10-05	<0.1	n.a.	**0.1**	n.a.	<0.1-0.5	<0.1	n.a.
92-10-12	<0.1	n.a.	<0.1	n.a.	<0.1-0.5	<0.1	n.a.
92-10-19	<0.1	n.a.	**1**	n.a.	<0.1-0.5	**0.2**	n.a.
92-10-25	<0.1	n.a.	**1**	n.a.	<0.1-0.5	**0.2**	n.a.
92-11-02	<0.1	n.a.	**0.8**	n.a.	<0.1-0.5	**0.3**	n.a.
92-11-09	<0.1	n.a.	**0.5**	n.a.	<0.1-0.5	**0.2**	n.a.
92-11-16	<0.1	n.a.	**0.2**	n.a.	<0.1-0.5	<0.1	n.a.
92-11-23	<0.1	n.a.	**(0.1)**	n.a.	<0.1-0.5	**0.2**	n.a.
92-11-30	<0.1	n.a.	<0.2	n.a.	<0.1-0.5	<0.1	n.a.
92-12-07	<0.1	n.a.	<0.2	n.a.	<0.1-0.5	**0.2**	n.a.
92-12-14	<0.1	n.a.	<0.1	n.a.	<0.1-0.5	<0.1	n.a.
92-12-21	<0.1	n.a.	<0.1	n.a.	<0.1-0.5	<0.1	n.a.
92-12-28	<0.1	n.a.	<0.1	n.a.	<0.1-0.5	<0.1	n.a.
93-01-04	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
93-01-12	<0.1	n.a.	<0.1	n.a.	<0.1	<0.1	n.a.
93-01-18	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
93-01-25	<0.1	n.a.	<0.1	n.a.	<0.1	<0.1	n.a.
93-01-31	<0.1	n.a.	<0.1	n.a.	<0.1	<0.1	n.a.
93-02-07	<0.1	n.a.	<0.1	n.a.	<0.1	<0.1	n.a.
93-02-14	<0.1	n.a.	<0.1	n.a.	<0.1	<0.1	n.a.
93-02-21	<0.1	n.a.	<0.1	n.a.	<0.1	<0.1	n.a.
93-02-28	<0.1	n.a.	<0.1	n.a.	<0.1	<0.1	n.a.
93-03-07	<0.1	n.a.	<0.1	n.a.	<0.1	<0.1	n.a.
93-03-14	<0.1	n.a.	<0.1	n.a.	<0.1	<0.1	n.a.
93-03-21	<0.1	n.a.	<0.1	n.a.	<0.1	<0.1	n.a.
93-03-28	<0.1	n.a.	<0.1	n.a.	<0.1	<0.1	n.a.
93-04-04	<0.1	n.a.	<0.1	n.a.	<0.1	<0.1	n.a.
93-04-11	<0.1	n.a.	<0.2	n.a.	<0.1	<0.1	n.a.
93-04-18	<0.1	n.a.	**(0.06)**	n.a.	<0.1	<0.1	n.a.
93-04-25	<0.1	n.a.	<0.1	n.a.	<0.1	<0.1	n.a.

Appendix 3. Pesticide concentrations in time integrated water samples from UT10/TP 1992-1994

Date	a-cypermethrin	atrazindesethyl	atrazine	BAM	benazolin-ethylester	bentazone	bromoxynil
93-05-02	<0.1	n.a.	<0.1	n.a.	<0.1	<0.1	n.a.
93-05-05	<0.1	n.a.	<0.1	n.a.	<0.1	**(0.06)**	n.a.
93-05-09	n.a.	n.a.	n.a.	n.a.	n.a.	**(0.06)**	n.a.
93-05-12	n.a.	n.a.	n.a.	n.a.	n.a.	**(0.08)**	n.a.
93-05-16	<0.1	n.a.	<0.1	n.a.	<0.2	**0.3**	n.a.
93-05-19	<0.1	n.a.	<0.1	n.a.	<0.2	**0.6**	n.a.
93-05-23	<0.1	n.a.	<0.1	n.a.	<0.2	**0.2**	n.a.
93-05-26	<0.1	n.a.	<0.1	n.a.	<0.2	**0.1**	n.a.
93-05-30	<0.1	n.a.	<0.1	n.a.	<0.2	**0.1**	n.a.
93-06-02	<0.1	n.a.	**0.8**	n.a.	<0.2	**0.1**	n.a.
93-06-06	<0.1	n.a.	**0.1**	n.a.	<0.2	**0.1**	n.a.
93-06-09	<0.1	n.a.	**0.1**	n.a.	<0.2	**0.2**	n.a.
93-06-13	<0.1	n.a.	**0.1**	n.a.	<0.2	**0.1**	n.a.
93-06-16	<0.1	n.a.	<0.1	n.a.	<0.2	**0.1**	n.a.
93-06-19	<0.1	n.a.	**0.4**	n.a.	<0.2	**0.2**	n.a.
93-06-23	<0.1	n.a.	**0.3**	n.a.	<0.2	**0.1**	n.a.
93-06-27	n.a.	n.a.	n.a.	n.a.	n.a.	**0.1**	n.a.
93-06-30	<0.1	n.a.	**0.2**	n.a.	<0.2	n.a.	n.a.
94-05-04	Start!						
94-05-08	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
94-05-12	n.a.	n.a.	n.a.	n.a.	n.a.	<0.1	n.a.
94-05-15	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	n.a.
94-05-18	<0.1	**(0.07)**	**0.4**	**(0.06)**	<0.1	<0.1	n.a.
94-05-22	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	n.a.
94-05-26	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	n.a.
94-05-29	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	n.a.
94-06-05	<0.1	<0.1	**0.1**	<0.1	<0.1	n.a.	n.a.
94-06-13	<0.1	<0.1	**0.3**	<0.1	<0.1	**5**	n.a.
94-06-20	<0.1	**0.1**	**0.3**	<0.1	<0.1	**5**	n.a.
94-06-26	<0.1	**0.1**	**(0.05)**	<0.1	<0.1	**2**	n.a.
	Sampler interruption!						
94-07-10	Start!						
94-07-17	<0.1	<0.2	**(0.05)**	<0.1	<0.1	**(0.07)**	n.a.
94-07-24	<0.1	<0.2	**0.1**	<0.1	<0.1	**0.4**	n.a.
	Low flow situation!						
94-08-14	Start!						
94-08-21	<0.1	<0.2	**1**	<0.2	<0.2	**3**	n.a.
94-08-28	<0.1	<0.2	**0.3**	<0.2	<0.2	**1**	n.a.
94-09-04	<0.1	<0.2	**0.3**	<0.2	<0.2	**0.9**	n.a.
94-09-11	<0.1	<0.2	**0.2**	<0.2	<0.2	**1**	n.a.
94-09-18	<0.1	<0.2	**0.1**	<0.2	<0.2	**3**	n.a.
94-09-25	<0.1	<0.2	<0.1	<0.2	<0.2	**0.1**	n.a.
94-10-02	<0.1	<0.2	<0.1	<0.2	<0.2	**0.1**	n.a.
94-10-09	<0.1	<0.2	<0.1	<0.2	<0.2	**0.1**	n.a.
94-10-16	<0.1	<0.2	<0.1	<0.2	<0.2	<0.1	n.a.

Appendix 3. Pesticide concentrations in time integrated water samples from UT10/TP 1992-1994

Date	chloridazon	clopyralid	cyanazine	cyfluthrin	cypermethrin	2,4-D	deltamethrin	dichlobenil
92-05-11	**1**	<0.3	<0.2	<0.2	<0.1-0.5	<0.1	<0.1	<0.1-0.5
92-05-18	**6**	<0.3	<0.1	<0.2	<0.1-0.5	**10**	<0.1	<0.1-0.5
92-05-25	**1**	<0.3	<0.2	<0.2	<0.1-0.5	**0.1**	<0.1	<0.1-0.5
92-06-01	**1**	<0.3	<0.2	<0.2	<0.1-0.5	<0.1	<0.1	<0.1-0.5
92-06-08	**0.6**	<0.5	<0.5	<0.2	<0.1-0.5	<0.1	<0.1	<0.1-0.5
92-06-15	<0.5-1	<0.3	<0.2	<0.2	<0.1-0.5	<0.1	<0.1	<0.1-0.5
92-06-22	**1**	<0.3	<0.5	<0.2	<0.1-0.5	**(0.04)**	<0.1	<0.1-0.5
92-06-29	<0.1-0.5	<0.3	<0.5	<0.2	<0.1-0.5	<0.1	<0.1	<0.1-0.5
92-07-06	**0.6**	<0.3	<0.5	<0.2	<0.1-0.5	<0.1	<0.1	<0.1-0.5
92-07-13	**20**	<0.3	**1**	<0.2	<0.1-0.5	**5**	<0.1	<0.1-0.5
92-07-15	**10**	<0.3	<1	<0.2	<0.1-0.5	**0.3**	<0.1	<0.1-0.5
92-07-16	**3**	<0.3	<0.2	<0.2	<0.1-0.5	<0.1	<0.1	<0.1-0.5
92-07-17	**1**	<0.3	<0.5	<0.2	<0.1-0.5	<0.1	<0.1	<0.1-0.5
92-07-18	**1**	<0.3	<1	<0.2	<0.1-0.5	**0.2**	<0.1	<0.1-0.5
92-07-19	**2**	<0.3	<0.5	<0.2	<0.1-0.5	<0.1	<0.1	<0.1-0.5
92-07-20	**1**	<0.3	**10**	<0.2	<0.1-0.5	**(0.03)**	<0.1	<0.1-0.5
92-07-21	**0.6**	<0.3	<0.4	<0.2	<0.1-0.5	<0.1	<0.1	<0.1-0.5
92-07-22	**(0.2)**	<0.3	<0.2	<0.2	<0.1-0.5	**(0.04)**	<0.1	<0.1-0.5
92-07-23	<0.5-1	<0.3	<0.2	<0.2	<0.1-0.5	<0.1	<0.1	<0.1-0.5
92-07-27	**(0.2)**	<0.3	<0.2	<0.2	<0.1-0.5	**0.1**	<0.1	<0.1-0.5
92-08-03	**3**	<0.3	<0.6	<0.2	<0.1-0.5	**0.1**	<0.1	<0.1-0.5
92-08-10	<0.5-1	<0.3	<0.2	<0.2	<0.1-0.5	<0.1	<0.1	<0.1-0.5
92-08-17	<0.5-1	<0.3	<0.2	<0.2	<0.1-0.5	<0.1	<0.1	<0.1-0.5
92-08-24	**2**	<0.3	<0.1	<0.2	<0.1-0.5	**(0.05)**	<0.1	<0.1-0.5
92-08-31	<0.5-1	<0.3	<0.1	<0.2	<0.1-0.5	<0.1	<0.1	<0.1-0.5
92-09-07	**0.5**	<0.3	<0.1	**0.2**	<0.1-0.5	<0.1	<0.1	<0.1-0.5
92-09-14	<0.5-1	**(0.4)**	<0.1	**0.2**	<0.1-0.5	<0.1	<0.1	<0.1-0.5
92-09-21	<0.5-1	<0.3	**0.4**	<0.2	<0.1-0.5	<0.1	<0.1	<0.1-0.5
92-09-28	<0.5-1	<0.3	**0.6**	<0.2	<0.1-0.5	<0.1	<0.1	<0.1-0.5
92-10-05	<0.5-1	<0.3	<0.3	<0.2	<0.1-0.5	<0.1	<0.1	<0.1-0.5
92-10-12	<0.5-1	<0.3	<0.3	<0.2	<0.1-0.5	<0.1	<0.1	<0.1-0.5
92-10-19	<0.5-1	**0.5**	<0.3	<0.2	<0.1-0.5	<0.1	<0.1	<0.1-0.5
92-10-25	<0.5-1	<0.3	<0.3	<0.2	<0.1-0.5	<0.1	<0.1	<0.1-0.5
92-11-02	<0.5-1	<0.3	<0.3	<0.4	<0.1-0.5	<0.1	<0.1	<0.1-0.5
92-11-09	<0.5-1	<0.3	<0.6	<0.2	<0.1-0.5	<0.1	<0.1	<0.1-0.5
92-11-16	<0.5-1	<0.3	<0.6	<0.2	<0.1-0.5	<0.1	<0.1	<0.1-0.5
92-11-23	<0.5-1	<0.3	<0.1	<0.2	<0.1-0.5	<0.1	<0.1	<0.1-0.5
92-11-30	<0.5-1	<0.3	<0.1	<0.2	<0.1-0.5	<0.1	<0.1	<0.1-0.5
92-12-07	<0.5-1	<0.3	<0.1	<0.2	<0.1-0.5	<0.1	<0.1	<0.1-0.5
92-12-14	<0.5-1	<0.3	<0.1	<0.2	<0.1-0.5	<0.1	<0.1	<0.1-0.5
92-12-21	<0.5-1	<0.3	<0.1	<0.2	<0.1-0.5	<0.1	<0.1	<0.1-0.5
92-12-28	<0.5-1	<0.3	<0.1	<0.2	<0.1-0.5	<0.1	<0.1	<0.1-0.5
93-01-04	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
93-01-12	<1	<0.3	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1
93-01-18	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
93-01-25	<1	<0.3	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1
93-01-31	<1	<0.3	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1
93-02-07	<1	<0.3	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1
93-02-14	<1	<0.3	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1
93-02-21	<1	<0.3	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1
93-02-28	<1	<0.3	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1
93-03-07	<1	<0.3	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1
93-03-14	<1	<0.3	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1
93-03-21	<1	<0.3	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1
93-03-28	<1	<0.3	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1
93-04-04	<1	<0.3	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1
93-04-11	**15**	<0.3	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1
93-04-18	**2**	<0.3	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1
93-04-25	**4**	<0.3	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1

Appendix 3. Pesticide concentrations in time integrated water samples from UT10/TP 1992-1994

Date	chloridazon	clopyralid	cyanazine	cyfluthrin	cypermethrin	2,4-D	deltamethrin	dichlobenil
93-05-02	**2**	<0.3	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1
93-05-05	**4**	<0.3	<0.1	**0.3**	<0.1	<0.1	<0.1	<0.1
93-05-09	n.a.	<0.3	n.a.	n.a.	n.a.	<0.1	n.a.	n.a.
93-05-12	n.a.	<0.3	n.a.	n.a.	n.a.	<0.1	n.a.	n.a.
93-05-16	**2**	**0.1**	<0.3	<0.2	<0.2	<0.1	<0.1	<0.2
93-05-19	**(0.4)**	**0.2**	<0.3	<0.2	<0.2	**(0.06)**	<0.1	<0.2
93-05-23	**1**	**1**	<0.3	<0.2	<0.2	<0.1	<0.1	<0.2
93-05-26	<0.5	<0.3	<0.3	<0.2	<0.2	<0.1	<0.1	<0.2
93-05-30	**0.6**	**3**	<0.3	<0.2	<0.2	<0.1	<0.1	<0.2
93-06-02	**0.6**	**0.4**	<0.3	**1**	<0.2	**0.6**	<0.1	<0.2
93-06-06	<0.5	**0.2**	<0.3	<0.2	<0.2	<0.1	<0.1	<0.2
93-06-09	**(0.1)**	**1**	<0.3	<0.2	<0.2	<0.1	<0.1	<0.2
93-06-13	**1**	**10**	<0.3	<0.2	<0.2	<0.1	<0.1	<0.2
93-06-16	**1**	**2**	<0.3	<0.2	<0.2	<0.1	<0.1	<0.2
93-06-19	**1**	**2**	<0.3	**0.4**	<0.2	**0.5**	<0.1	<0.2
93-06-23	**1**	**1**	<0.3	<0.2	<0.2	<0.1	<0.1	<0.2
93-06-27	n.a.	**0.3**	n.a.	n.a.	n.a.	<0.1	n.a.	n.a.
93-06-30	**(0.2)**	n.a.	<0.3	<0.2	<0.2	n.a.	<0.1	<0.2
94-05-04								
94-05-08	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
94-05-12	n.a.	<0.3	n.a.	n.a.	n.a.	<0.1	n.a.	n.a.
94-05-15	**0.6**	<0.3	<0.1	<0.2	<0.2	<0.1	<0.1	<0.1
94-05-18	**10**	<0.3	<0.1	<0.2	<0.2	<0.1	<0.1	**0.2**
94-05-22	**10**	<0.3	<0.1	<0.2	<0.2	<0.1	<0.1	<0.1
94-05-26	**0.8**	<0.3	<0.1	<0.2	<0.2	<0.1	<0.1	<0.1
94-05-29	**0.3**	<0.3	<0.1	<0.2	<0.2	<0.1	<0.1	<0.1
94-06-05	**0.4**	n.a.	**10**	<0.2	<0.2	n.a.	<0.1	<0.1
94-06-13	**0.6**	<0.3	**7**	<0.2	<0.2	<0.1	<0.1	<0.1
94-06-20	**2**	<0.3	**10**	<0.2	<0.2	**0.3**	<0.1	<0.1
94-06-26	**0.3**	<0.3	**0.6**	<0.2	<0.2	**0.2**	<0.1	<0.1
94-07-10								
94-07-17	<0.5	<0.3	**0.1**	<0.2	<0.2	<0.1	<0.1	<0.2
94-07-24	<0.5	<0.3	**0.6**	<0.2	<0.2	<0.1	<0.1	<0.2
94-08-14								
94-08-21	<1	<0.3	**8**	<0.2	<0.2	**(0.08)**	<0.1	<0.1
94-08-28	<0.5	<0.3	**1**	<0.2	<0.2	<0.1	<0.1	<0.1
94-09-04	<1	<0.3	**0.3**	<0.2	<0.2	<0.1	<0.1	<0.1
94-09-11	<0.5	<1	**0.2**	<0.2	<0.2	**0.2**	<0.1	<0.1
94-09-18	<0.5	<0.3	<0.3	<0.2	<0.2	<0.1	<0.1	<0.1
94-09-25	<0.5	<0.3	<0.3	<0.2	<0.2	<0.1	<0.1	<0.1
94-10-02	<1	<0.3	<0.1	<0.2	<0.2	<0.1	<0.1	<0.1
94-10-09	<1	<0.3	<0.1	<0.2	<0.2	<0.1	<0.1	<0.1
94-10-16	<1	<0.3	<0.1	<0.2	<0.2	<0.1	<0.1	<0.1

Appendix 3. Pesticide concentrations in time integrated water samples from UT10/TP 1992-1994

Date	dichlorprop	dimethoate	diuron	esfenvalerate	ethofumesate	fenitrothion	fenpropimorph	fenvalerate
92-05-11	**(0.03)**	n.a.	<0.1-0.5	<0.1	<0.1	<0.1-0.5	<0.2	<0.2
92-05-18	**20**	n.a.	<0.1-0.5	<0.1	**2**	<0.1-0.5	<0.1	<0.2
92-05-25	**0.3**	n.a.	<0.1-0.5	<0.1	**1**	<0.1-0.5	<0.2	<0.2
92-06-01	**0.1**	n.a.	<0.1-0.5	<0.1	**1**	<0.1-0.5	<0.2	<0.2
92-06-08	**2**	n.a.	<0.1-0.5	<0.1	**0.6**	<0.1-0.5	**0.2**	<0.2
92-06-15	**(0.09)**	n.a.	<0.1-0.5	<0.1	**0.4**	<0.1-0.5	**0.4**	<0.2
92-06-22	**0.7**	n.a.	<0.1-0.5	<0.1	**1**	<0.1-0.5	**0.2**	<0.2
92-06-29	**(0.03)**	n.a.	<0.1-0.5	<0.1	**1**	<0.1-0.5	**0.1**	<0.2
92-07-06	<0.1	n.a.	<0.1-0.5	<0.1	**2**	<0.1-0.5	<0.2	<0.2
92-07-13	**25**	n.a.	<0.1-0.5	<0.1	**2**	<0.1-0.5	**6**	<0.2
92-07-15	**1.4**	n.a.	<0.1-0.5	<0.1	**6**	<0.1-0.5	**8**	<0.2
92-07-16	**0.1**	n.a.	<0.1-0.5	<0.1	**5**	<0.1-0.5	**4**	<0.2
92-07-17	**(0.03)**	n.a.	<0.1-0.5	<0.1	**3**	<0.1-0.5	**4**	<0.2
92-07-18	**1**	n.a.	<0.1-0.5	<0.1	**3**	<0.1-0.5	**4**	<0.2
92-07-19	**0.09**	n.a.	<0.1-0.5	<0.1	**4**	<0.1-0.5	**3**	<0.2
92-07-20	**(0.03)**	n.a.	<0.1-0.5	<0.1	**4**	<0.1-0.5	**2**	<0.2
92-07-21	**(0.03)**	n.a.	<0.1-0.5	<0.1	**3**	<0.1	**2**	<0.2
92-07-22	**0.5**	n.a.	<0.1-0.5	<0.1	**2**	<0.1	**1**	<0.2
92-07-23	<0.1	n.a.	<0.1-0.5	<0.1	**1**	<0.1-0.5	**1**	<0.2
92-07-27	**0.2**	n.a.	<0.1-0.5	<0.1	**0.8**	<0.1-0.5	**0.7**	<0.2
92-08-03	**0.8**	n.a.	<0.1-0.5	<0.1	**1**	<0.2	**0.5**	<0.2
92-08-10	**0.4**	n.a.	<0.1-0.5	<0.1	**0.5**	<0.1-0.5	**0.3**	<0.2
92-08-17	**(0.09)**	n.a.	<0.1-0.5	<0.1	**1**	<0.1-0.5	**0.5**	<0.2
92-08-24	**(0.06)**	n.a.	<0.1-0.5	<0.1	**2**	<0.1-0.5	<0.2	<0.2
92-08-31	**(0.04)**	n.a.	<0.1-0.5	<0.1	**0.8**	<0.1-0.5	**0.6**	<0.2
92-09-07	**0.1**	n.a.	<0.1-0.5	<0.1	**1**	<0.1-0.5	**1**	<0.2
92-09-14	**0.1**	n.a.	<0.1-0.5	<0.1	**0.2**	<0.1-0.5	**0.6**	<0.2
92-09-21	**0.5**	n.a.	<0.1-0.5	<0.1	**0.3**	<0.1-0.5	**0.1**	<0.2
92-09-28	**(0.04)**	n.a.	<0.1-0.5	<0.1	**0.1**	<0.1-0.5	<0.2	<0.2
92-10-05	**0.8**	n.a.	<0.1-0.5	<0.1	**0.1**	<0.1-0.5	<0.2	<0.2
92-10-12	<0.1	n.a.	<0.1-0.5	<0.1	<0.2	<0.1-0.5	<0.2	<0.2
92-10-19	**0.2**	n.a.	<0.1-0.5	<0.1	**0.3**	<0.1-0.5	**2**	<0.2
92-10-25	**(0.05)**	n.a.	<0.1-0.5	<0.1	**0.2**	<0.1-0.5	**0.2**	<0.2
92-11-02	**(0.05)**	n.a.	<0.1-0.5	<0.1	<0.3	<0.1-0.5	**0.2**	<0.2
92-11-09	**(0.06)**	n.a.	<0.1-0.5	<0.1	**0.3**	<0.1-0.5	<0.2	<0.2
92-11-16	**(0.06)**	n.a.	<0.1-0.5	<0.1	<0.4	<0.1-0.5	<0.2	<0.2
92-11-23	**(0.03)**	n.a.	<0.1-0.5	<0.1	<0.2	<0.1-0.5	<0.2	<0.2
92-11-30	<0.1	n.a.	<0.1-0.5	<0.1	<0.1	<0.1-0.5	<0.2	<0.2
92-12-07	<0.1	n.a.	<0.1-0.5	<0.1	<0.1	<0.1-0.5	<0.2	<0.2
92-12-14	<0.1	n.a.	**(0.2)**	<0.1	<0.1	<0.1-0.5	<0.2	<0.2
92-12-21	<0.1	n.a.	<0.1-0.5	<0.1	<0.1	<0.1-0.5	<0.2	<0.2
92-12-28	<0.1	n.a.	<0.1-0.5	<0.1	<0.1	<0.1-0.5	<0.2	<0.2
93-01-04	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
93-01-12	**(0.03)**	n.a.	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2
93-01-18	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
93-01-25	<0.1	n.a.	<0.5	<0.1	<0.1	<0.1	**0.4**	<0.2
93-01-31	<0.1	n.a.	<0.5	<0.1	<0.1	<0.1	**0.9**	<0.2
93-02-07	<0.1	n.a.	<0.5	<0.1	<0.1	<0.1	**0.4**	<0.2
93-02-14	<0.1	n.a.	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2
93-02-21	<0.1	n.a.	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2
93-02-28	<0.1	n.a.	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2
93-03-07	<0.1	n.a.	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2
93-03-14	<0.1	n.a.	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2
93-03-21	<0.1	n.a.	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2
93-03-28	<0.1	n.a.	<0.1-0.5	<0.1	<0.2	<0.1	<0.1	<0.2
93-04-04	<0.1	n.a.	<0.1-0.5	<0.1	<0.2	<0.1	<0.1	<0.2
93-04-11	<0.1	n.a.	<0.1-0.5	<0.1	<0.2	<0.1	**0.2**	<0.2
93-04-18	<0.1	n.a.	<0.1-0.5	<0.1	<0.2	<0.1	**0.2**	<0.2
93-04-25	**(0.04)**	n.a.	<0.1-0.5	<0.1	<0.2	<0.1	<0.1	<0.2

Appendix 3. Pesticide concentrations in time integrated water samples from UT10/TP 1992-1994

Date	dichlorprop	dimethoate	diuron	esfenvalerate	ethofumesate	fenitrothion	fenpropimorph	fenvalerate
93-05-02	**(0.06)**	n.a.	<0.1-0.5	<0.1	<0.2	<0.1	<0.1	<0.2
93-05-05	**(0.09)**	n.a.	**0.6**	<0.1	**3**	<0.1	<0.1	<0.2
93-05-09	**(0.07)**	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
93-05-12	**(0.06)**	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
93-05-16	**0.2**	n.a.	<0.5	<0.1	**0.6**	<0.1	<0.1	<0.2
93-05-19	**0.5**	n.a.	<0.5	<0.1	**(0.09)**	<0.1	<0.1	<0.2
93-05-23	**0.2**	n.a.	<0.5	<0.1	**0.2**	<0.1	<0.1	<0.2
93-05-26	**(0.05)**	n.a.	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2
93-05-30	**0.2**	n.a.	<0.5	<0.1	**0.5**	<0.1	**(0.07)**	<0.2
93-06-02	**0.2**	n.a.	**(0.2)**	<0.1	**0.6**	<0.1	**2**	<0.2
93-06-06	<0.1	n.a.	<0.5	<0.1	**0.1**	<0.1	**0.1**	<0.2
93-06-09	<0.1	n.a.	<0.5	<0.1	**(0.06)**	<0.1	**0.1**	<0.2
93-06-13	**(0.08)**	n.a.	<0.5	<0.1	**0.5**	<0.1	**2**	<0.2
93-06-16	**0.2**	n.a.	<0.5	<0.1	**0.2**	<0.1	**2**	<0.2
93-06-19	**0.1**	n.a.	**(0.3)**	<0.1	**0.6**	<0.1	**4**	<0.2
93-06-23	**(0.04)**	n.a.	<0.5	<0.1	**0.3**	<0.1	**4**	<0.2
93-06-27	<0.1	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
93-06-30	n.a.	n.a.	<0.5	<0.1	**0.2**	<0.1	**0.4**	<0.2
94-05-04								
94-05-08	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
94-05-12	<0.1	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
94-05-15	<0.1	n.a.	<0.5	<0.2	<0.1	<0.1	<0.1	<0.2
94-05-18	<0.1	n.a.	<0.5	<0.2	**0.2**	<0.1	<0.1	<0.2
94-05-22	<0.1	n.a.	<0.5	<0.2	**1**	<0.1	<0.1	<0.2
94-05-26	<0.1	n.a.	<0.5	**(0.2)**	**0.6**	<0.1	<0.1	<0.2
94-05-29	<0.1	n.a.	<0.5	<0.2	**0.9**	<0.1	<0.1	<0.2
94-06-05	n.a.	n.a.	<0.5	<0.2	**1**	<0.1	<0.1	<0.2
94-06-13	**2**	n.a.	<0.5	<0.2	**0.6**	<0.1	**(0.07)**	<0.2
94-06-20	**2**	n.a.	<0.5	<0.2	**0.8**	<0.1	**0.2**	<0.2
94-06-26	**1**	n.a.	<0.5	<0.2	<0.1	<0.1	<0.1	<0.2
94-07-10								
94-07-17	**0.1**	**5**	<0.3	<0.2	**0.2**	<0.1	**(0.06)**	<0.2
94-07-24	<0.1	<0.1	<0.3	<0.2	**(0.07)**	<0.1	<0.1	<0.2
94-08-14								
94-08-21	**0.1**	<0.2	<0.1	<0.1	**1**	<0.1	**1**	n.a.
94-08-28	**0.1**	<0.1	<0.1	<0.1	**1**	<0.1	**0.3**	n.a.
94-09-04	**(0.07)**	<0.2	<0.1	<0.1	**3**	<0.1	**0.4**	n.a.
94-09-11	**0.4**	<0.1	<0.1	<0.1	**0.3**	<0.1	**0.2**	n.a.
94-09-18	<0.1	<0.1	<0.1	<0.1	**0.2**	<0.1	**0.5**	n.a.
94-09-25	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	n.a.
94-10-02	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	n.a.
94-10-09	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	n.a.
94-10-16	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	n.a.

Appendix 3. Pesticide concentrations in time integrated water samples from UT10/TP 1992-1994

Date	flamprop-M	fluroxypyr	hexazinon	ioxynil	isoproturon	lenacil	linuron	MCPA	mecoprop
92-05-11	<0.1	<0.2	n.a.	<0.2	<0.2	n.a.	<0.5	<0.1	**0.2**
92-05-18	<0.1	<0.2	n.a.	**0.3**	**0.4**	n.a.	<0.5	**20**	**0.2**
92-05-25	<0.1	<0.2	n.a.	<0.2	<0.2	n.a.	<0.5	**0.9**	**0.1**
92-06-01	<0.1	<0.2	n.a.	<0.2	<0.2	n.a.	<1	<0.1	**0.9**
92-06-08	<0.1	<0.2	n.a.	<0.2	<0.2	n.a.	<2	**7**	**3**
92-06-15	<0.1	<0.2	n.a.	<0.2	<0.2	n.a.	<1	**(0.04)**	**0.2**
92-06-22	<0.1	**(0.07)**	n.a.	<0.2	<0.3	n.a.	<0.5	**2**	**6**
92-06-29	<0.1	<0.2	n.a.	<0.2	**(0.1)**	n.a.	<0.5	<0.1	**0.9**
92-07-06	<0.1	**(0.08)**	n.a.	<0.2	<0.2	n.a.	<0.6	<0.1	**0.5**
92-07-13	**(0.06)**	**(0.1)**	n.a.	**3**	**0.7**	n.a.	<0.9	**26**	**16**
92-07-15	**0.2**	**0.9**	n.a.	**2**	**2**	n.a.	<1	**5**	**1.2**
92-07-16	**0.4**	**1**	n.a.	**0.3**	**4**	n.a.	<0.6	**0.3**	**(0.03)**
92-07-17	**0.3**	**0.4**	n.a.	<0.2	**3**	n.a.	<1	<0.1	<0.1
92-07-18	**0.2**	<0.2	n.a.	<0.2	**3**	n.a.	<3	**1**	<0.1
92-07-19	**0.2**	**0.5**	n.a.	**0.3**	**2**	n.a.	<1	**(0.06)**	**(0.05)**
92-07-20	**0.2**	**0.6**	n.a.	<0.2	**2**	n.a.	<1	<0.1	<0.1
92-07-21	**0.2**	**0.4**	n.a.	<0.2	**2**	n.a.	<1	**(0.02)**	<0.1
92-07-22	**0.1**	**0.2**	n.a.	<0.2	**1**	n.a.	<1	**1.2**	<0.1
92-07-23	**0.1**	**0.2**	n.a.	<0.2	**0.8**	n.a.	<0.5	**(0.02)**	<0.1
92-07-27	**(0.05)**	**(0.09)**	n.a.	<0.2	**0.6**	n.a.	<1	**(0.02)**	<0.1
92-08-03	**(0.03)**	<0.2	n.a.	**0.4**	**(0.1)**	n.a.	<0.5	**0.7**	<0.1
92-08-10	<0.1	<0.2	n.a.	**0.2**	<0.2	n.a.	<0.5	**0.2**	<0.1
92-08-17	**0.1**	**0.3**	n.a.	<0.2	**0.3**	n.a.	<0.6	**(0.08)**	**0.4**
92-08-24	**0.2**	**0.4**	n.a.	<0.2	**0.9**	n.a.	<0.5	**2**	**1.3**
92-08-31	**0.1**	<0.5	n.a.	<0.2	**0.7**	n.a.	<0.6	**0.4**	**0.09**
92-09-07	**0.2**	**0.2**	n.a.	<0.4	**1**	n.a.	<0.6	**0.2**	**1.4**
92-09-14	**(0.04)**	<0.4	n.a.	<0.4	**0.2**	n.a.	<0.6	**0.3**	<0.1
92-09-21	**(0.07)**	**0.1**	n.a.	<0.4	**0.3**	n.a.	<0.1-0.5	**1.4**	**0.2**
92-09-28	**(0.02)**	<0.2	n.a.	<0.2	<0.2	n.a.	<0.1-0.5	**(0.06)**	<0.1
92-10-05	<0.1	<0.2	n.a.	**0.2**	**0.1**	n.a.	<0.1-0.5	**0.5**	<0.1
92-10-12	<0.1	<0.1	n.a.	<0.2	<0.3	n.a.	<1	<0.1	<0.1
92-10-19	**0.1**	<0.1	n.a.	**0.2**	**2**	n.a.	<0.6	**0.1**	**1**
92-10-25	**(0.07)**	**(0.1)**	n.a.	<0.2	**2**	n.a.	<0.6	<0.1	**0.2**
92-11-02	**(0.07)**	<0.2	n.a.	<0.2	**0.9**	n.a.	<1	<0.1	**(0.1)**
92-11-09	**(0.04)**	<0.2	n.a.	<0.2	**0.7**	n.a.	<0.8	<0.1	**(0.1)**
92-11-16	<0.1	<0.2	n.a.	<0.2	**(0.1)**	n.a.	<0.8	<0.1	**(0.08)**
92-11-23	<0.1	<0.2	n.a.	<0.2	**(0.1)**	n.a.	<0.1-0.5	<0.1	**(0.07)**
92-11-30	<0.1	<0.2	n.a.	<0.2	**0.2**	n.a.	<0.3	<0.1	**(0.03)**
92-12-07	<0.1	<0.2	n.a.	<0.2	<0.2	n.a.	<0.3	<0.1	**(0.04)**
92-12-14	<0.1	<0.2	n.a.	<0.2	<0.2	n.a.	<0.2	<0.1	<0.1
92-12-21	<0.1	<0.2	n.a.	<0.2	<0.2	n.a.	<0.2	<0.1	<0.1
92-12-28	<0.1	<0.2	n.a.	<0.2	<0.2	n.a.	<0.2	<0.1	<0.1
93-01-04	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
93-01-12	<0.2	<0.2	n.a.	<0.5	**0.2**	n.a.	<0.2	<0.1	**(0.04)**
93-01-18	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
93-01-25	<0.1	<0.2	n.a.	<0.2	**(0.05)**	n.a.	<0.2	<0.1	<0.1
93-01-31	<0.1	<0.2	n.a.	<0.2	<0.1	n.a.	<0.2	<0.1	<0.1
93-02-07	<0.1	<0.2	n.a.	<0.2	<0.1	n.a.	<0.2	<0.1	<0.1
93-02-14	<0.1	<0.2	n.a.	<0.2	<0.1	n.a.	<0.2	<0.1	<0.1
93-02-21	<0.1	<0.2	n.a.	<0.2	<0.1	n.a.	<0.2	<0.1	**(0.03)**
93-02-28	<0.1	<0.2	n.a.	<0.2	<0.1	n.a.	<0.2	<0.1	<0.1
93-03-07	<0.1	<0.2	n.a.	<0.2	<0.1	n.a.	<0.2	<0.1	<0.1
93-03-14	<0.1	<0.2	n.a.	<0.2	<0.1	n.a.	<0.2	<0.1	<0.1
93-03-21	<0.1	<0.2	n.a.	<0.3	<0.1	n.a.	<0.2	<0.1	<0.1
93-03-28	<0.1	<0.2	<0.2	<0.2	<0.2	n.a.	<0.2	<0.1	<0.1
93-04-04	<0.1	<0.2	<0.2	<0.2	<0.2	n.a.	<0.2	<0.1	<0.1
93-04-11	**(0.01)**	<0.2	<0.2	<0.2	**(0.1)**	n.a.	<0.2	<0.1	<0.1
93-04-18	<0.1	<0.2	<0.2	<0.3	<0.2	n.a.	<0.2	<0.1	<0.1
93-04-25	<0.1	<0.2	<0.2	<0.1	<0.2	n.a.	<0.2	<0.1	**(0.08)**

Appendix 3. Pesticide concentrations in time integrated water samples from UT10/TP 1992-1994

Date	flamprop-M	fluroxypyr	hexazinon	ioxynil	isoproturon	lenacil	linuron	MCPA	mecoprop
93-05-02	<0.1	<0.2	**0.5**	<0.1	**(0.2)**	n.a.	<0.2	<0.1	**0.9**
93-05-05	**(0.07)**	**1**	**1**	n.a.	**1**	n.a.	<0.2	**0.3**	**9**
93-05-09	<0.1	**0.8**	n.a.	<0.1	n.a.	n.a.	n.a.	**(0.08)**	**4**
93-05-12	<0.1	**(0.1)**	n.a.	n.a.	n.a.	n.a.	n.a.	<0.1	**0.5**
93-05-16	<0.1	**0.5**	**0.3**	n.a.	**0.2**	n.a.	<0.5	**1.3**	**1.6**
93-05-19	<0.1	**0.2**	<0.2	n.a.	**(0.2)**	n.a.	<0.5	**1.9**	**0.6**
93-05-23	<0.1	**0.9**	**0.2**	n.a.	**0.3**	n.a.	<0.5	**10**	**0.7**
93-05-26	<0.1	<0.2	<0.2	n.a.	<0.2	n.a.	<0.5	**(0.07)**	**0.1**
93-05-30	<0.1	**4**	<0.2	n.a.	**0.3**	n.a.	<0.5	**30**	**1**
93-06-02	**(0.01)**	**0.6**	<0.2	**0.1**	**0.7**	n.a.	<0.5	**2**	**0.4**
93-06-06	<0.1	**0.2**	<0.2	n.a.	**(0.1)**	n.a.	<0.5	**(0.05)**	**(0.04)**
93-06-09	<0.1	**2**	<0.2	<0.1	**(0.1)**	n.a.	<0.5	**10**	**0.3**
93-06-13	<0.1	**6**	**(0.1)**	n.a.	**0.6**	n.a.	<0.5	**60**	**1**
93-06-16	<0.1	**4**	**(0.1)**	n.a.	**0.4**	n.a.	<0.5	**0.8**	**(0.04)**
93-06-19	**2**	**2**	**(0.1)**	n.a.	**1**	n.a.	<0.5	**3**	**0.2**
93-06-23	**1**	**1**	<0.2	n.a.	**1**	n.a.	<0.5	**0.1**	**(0.04)**
93-06-27	**0.2**	**0.6**	n.a.	n.a.	n.a.	n.a.	n.a.	<0.1	<0.1
93-06-30	n.a.	n.a.	<0.2	n.a.	**0.3**	n.a.	<0.5	n.a.	n.a.
94-05-04									
94-05-08	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
94-05-12	n.a.	<0.3	n.a.	n.a.	n.a.	n.a.	n.a.	<0.1	<0.1
94-05-15	n.a.	<0.3	n.a.	n.a.	<0.5	n.a.	<0.3	<0.1	<0.1
94-05-18	n.a.	<0.3	n.a.	n.a.	**0.6**	n.a.	<0.3	<0.1	**0.6**
94-05-22	n.a.	<0.3	n.a.	n.a.	<0.5	n.a.	<0.3	<0.1	<0.1
94-05-26	n.a.	<0.3	n.a.	n.a.	<0.5	n.a.	<0.3	<0.1	<0.1
94-05-29	n.a.	n.a.	n.a.	n.a.	<0.5	n.a.	<0.3	**0.4**	**0.3**
94-06-05	n.a.	n.a.	n.a.	n.a.	<0.5	n.a.	<0.3	n.a.	n.a.
94-06-13	n.a.	<0.3	n.a.	n.a.	<0.5	n.a.	<0.3	**6**	**3**
94-06-20	n.a.	<0.3	n.a.	n.a.	<0.5	n.a.	<0.3	**2**	**5**
94-06-26	n.a.	<0.3	n.a.	n.a.	<0.5	n.a.	<0.3	**2**	**2**
94-07-10									
94-07-17	n.a.	<0.3	n.a.	n.a.	<0.1	n.a.	<0.5	**(0.06)**	**(0.04)**
94-07-24	n.a.	<0.3	n.a.	n.a.	<0.1	n.a.	<0.5	<0.1	**(0.04)**
94-08-14									
94-08-21	n.a.	**0.3**	n.a.	n.a.	**0.6**	n.a.	<0.3	**0.1**	**0.4**
94-08-28	n.a.	**0.2**	n.a.	n.a.	**0.3**	n.a.	<0.2	**(0.09)**	**1**
94-09-04	n.a.	<0.3	n.a.	n.a.	**1**	n.a.	<0.3	<0.1	**0.6**
94-09-11	n.a.	**0.2**	n.a.	n.a.	<0.3	n.a.	<0.2	**0.4**	**6**
94-09-18	n.a.	<0.2	n.a.	n.a.	<0.3	n.a.	<0.2	**(0.07)**	**0.4**
94-09-25	n.a.	<0.2	n.a.	n.a.	<0.3	n.a.	<0.2	<0.1	<0.1
94-10-02	n.a.	<0.2	n.a.	n.a.	<0.3	n.a.	<0.3	<0.1	**(0.07)**
94-10-09	n.a.	<0.3	n.a.	n.a.	<0.3	n.a.	<0.3	<0.1	**(0.09)**
94-10-16	n.a.	<0.3	n.a.	n.a.	<0.3	n.a.	<0.3	<0.1	**0.1**

Appendix 3. Pesticide concentrations in time integrated water samples from UT10/TP 1992-1994

Date	metamitron	metazachlor	methabenzthiazuron	pendimethalin	permethrin	phenmedipham	pirimicarb
92-05-11	<0.5	<0.1	<0.2	<0.2	<0.2	n.a.	<0.1
92-05-18	**20**	**0.2**	<0.6	<0.2	<0.2	n.a.	<0.1
92-05-25	**4**	**(0.1)**	<0.2	<0.2	<0.2	n.a.	<0.1
92-06-01	**8**	<0.2	<0.2	<0.2	<0.2	n.a.	<0.2
92-06-08	**7**	<0.3	<0.2	<0.2	<0.2	n.a.	**0.3**
92-06-15	**1**	<0.2	**0.5**	<0.2	<0.2	n.a.	<0.2
92-06-22	**10**	<0.2	<0.2	<0.2	<0.2	n.a.	**2**
92-06-29	**4**	<0.1	<0.2	<0.2	<0.2	n.a.	**1**
92-07-06	**9**	**0.1**	**0.5**	<0.2	<0.1	n.a.	**2**
92-07-13	**30**	**6**	<0.8	<0.2	<0.1	n.a.	**4**
92-07-15	**40**	**3**	**7**	<0.2	<0.2	n.a.	**5**
92-07-16	**20**	**2**	**6**	<0.2	<0.2	n.a.	**9**
92-07-17	**10**	**2**	**4**	<0.2	<0.1	n.a.	**8**
92-07-18	**6**	**2**	**3**	<0.2	<0.1	n.a.	**7**
92-07-19	**2**	**2**	**1**	<0.2	<0.1	n.a.	**2**
92-07-20	**10**	**2**	**3**	<0.2	<0.1	n.a.	**10**
92-07-21	**6**	**1**	**3**	<0.2	<0.1	n.a.	**7**
92-07-22	**3**	**0.9**	**2**	<0.2	<0.1	n.a.	**5**
92-07-23	<0.5	**0.8**	**0.8**	<0.2	<0.2	n.a.	**3**
92-07-27	**2**	**0.5**	**0.8**	<0.2	<0.2	n.a.	**3**
92-08-03	**2**	**0.6**	<0.8	<0.2	<0.1-0.5	n.a.	**2**
92-08-10	<0.5	**0.2**	**0.5**	<0.2	<0.1	n.a.	**1**
92-08-17	**3**	**0.4**	**1**	<0.2	<0.1	n.a.	**3**
92-08-24	**10**	**2**	**1**	<0.2	<0.2	n.a.	**3**
92-08-31	**0.8**	**2**	**1**	<0.2	<0.2	n.a.	**1**
92-09-07	**3**	**50**	**2**	<0.2	<0.1	n.a.	**2**
92-09-14	<0.5	**2**	**0.4**	<0.2	<0.1	n.a.	**0.4**
92-09-21	**0.9**	**20**	**0.4**	<0.2	<0.2	n.a.	**0.6**
92-09-28	<0.5	**2**	<0.1-0.5	<0.2	<0.2	n.a.	**0.2**
92-10-05	<0.5	**0.6**	<0.1-0.5	<0.2	<0.2	n.a.	**0.1**
92-10-12	<0.5	**0.4**	<0.5	<0.2	<0.2	n.a.	<0.1
92-10-19	**0.4**	**5**	**30**	<0.2	<0.2	n.a.	**0.3**
92-10-25	**0.3**	**4**	**10**	<0.2	<0.2	n.a.	**0.4**
92-11-02	<0.5	**2**	**10**	<0.2	<0.2	n.a.	**0.3**
92-11-09	<0.5	**1**	**3**	<0.2	<0.1	n.a.	**0.2**
92-11-16	<0.5	**0.7**	**1**	<0.3	<0.1	n.a.	**0.2**
92-11-23	<0.5	**0.1**	**0.3**	<0.2	<0.1	n.a.	<0.1
92-11-30	<0.5	**(0.05)**	<0.2	<0.2	<0.1	n.a.	<0.1
92-12-07	<0.5	<0.1	<0.2	<0.2	<0.1	n.a.	<0.1
92-12-14	<0.5	**0.1**	<0.2	<0.2	<0.1	n.a.	<0.1
92-12-21	<0.5	<0.1	<0.2	<0.2	<0.2	n.a.	<0.1
92-12-28	<0.5	**0.1**	<0.2	<0.2	<0.2	n.a.	<0.1
93-01-04	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
93-01-12	<0.5	**0.2**	**0.2**	<0.2	<0.2	<1	**(0.05)**
93-01-18	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
93-01-25	<0.5	**0.1**	<0.3	<0.2	<0.2	<1	<0.1
93-01-31	<0.5	**(0.05)**	<0.3	<0.2	<0.2	<1	<0.1
93-02-07	<0.5	<0.1	<0.3	<0.2	<0.2	<1	<0.1
93-02-14	<0.5	**(0.05)**	<0.3	<0.2	<0.2	<1	<0.1
93-02-21	<0.5	**(0.05)**	<0.3	<0.2	<0.2	<1	<0.1
93-02-28	<0.5	<0.1	<0.3	<0.2	<0.2	<1	<0.1
93-03-07	<0.5	<0.1	<0.3	<0.2	<0.2	<1	<0.1
93-03-14	<0.5	<0.1	<0.3	<0.2	<0.2	<1	<0.1
93-03-21	<0.5	**(0.05)**	<0.3	<0.2	<0.2	<1	<0.1
93-03-28	<0.5	<0.1	<0.2	<0.2	<0.2	<1	<0.1
93-04-04	<0.5	<0.1	<0.2	<0.2	<0.2	<1	<0.1
93-04-11	<0.5	**0.1**	**0.2**	<0.2	<0.2	<1	<0.1
93-04-18	<0.5	<0.1	<0.2	<0.2	<0.2	<1	<0.1
93-04-25	<0.5	**(0.1)**	**0.5**	<0.2	<0.2	<1	<0.1

Appendix 3. Pesticide concentrations in time integrated water samples from UT10/TP 1992-1994

Date	metamitron	metazachlor	methabenzthiazuron	pendimethalin	permethrin	phenmedipham	pirimicarb
93-05-02	<0.5	<0.2	<0.2	<0.2	<0.2	<1	<0.1
93-05-05	**40**	**0.4**	**0.2**	<0.2	<0.2	**2**	**(0.06)**
93-05-09	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
93-05-12	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
93-05-16	**60**	**0.2**	<0.3	<0.2	<0.2	<1	**(0.08)**
93-05-19	**6**	**0.1**	<0.3	<0.2	<0.2	<1	**0.1**
93-05-23	**15**	**0.2**	**(0.2)**	<0.2	<0.2	<1	**(0.05)**
93-05-26	**1**	**(0.06)**	<0.3	<0.2	<0.2	<1	<0.1
93-05-30	**10**	**0.2**	<0.3	<0.2	<0.2	<1	**(0.04)**
93-06-02	**4**	**0.3**	**0.6**	<0.2	<0.2	<1	**0.1**
93-06-06	**0.6**	**(0.08)**	**(0.2)**	<0.2	<0.2	<1	**(0.04)**
93-06-09	**2**	**0.1**	<0.3	<0.2	<0.2	<1	**(0.04)**
93-06-13	**10**	**0.5**	**(0.2)**	<0.2	<0.2	<1	**10**
93-06-16	**4**	**0.3**	**0.4**	<0.2	<0.2	<1	**0.5**
93-06-19	**4**	**0.8**	**1**	<0.2	<0.2	<1	**2**
93-06-23	**2**	**1**	**1**	<0.2	<0.2	<1	**0.5**
93-06-27	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
93-06-30	**0.3**	**0.4**	**0.3**	<0.2	<0.2	<1	**0.1**
94-05-04							
94-05-08	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
94-05-12	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
94-05-15	**1**	<0.2	<0.3	<0.2	<0.2	<1	<0.1
94-05-18	**10**	**0.1**	<0.3	<0.2	<0.2	<1	<0.1
94-05-22	**2**	<0.2	<0.3	<0.2	<0.2	<1	<0.1
94-05-26	**4**	<0.2	<0.3	<0.2	<0.2	<1	<0.1
94-05-29	**3**	<0.2	<0.3	<0.2	<0.2	<1	<0.1
94-06-05	**4**	**0.1**	<0.3	<0.2	<0.2	<1	**0.1**
94-06-13	**2**	<0.2	<0.3	<0.2	<0.2	<1	**0.2**
94-06-20	**3**	**0.2**	<0.3	<0.2	<0.2	<1	**0.7**
94-06-26	**0.8**	<0.2	<0.3	<0.2	<0.2	<1	**(0.07)**
94-07-10							
94-07-17	<0.5	<0.2	<0.5	<0.2	<0.1	<2	**(0.04)**
94-07-24	<0.5	<0.2	<0.5	<0.2	<0.1	<2	**0.1**
94-08-14							
94-08-21	<2	**0.3**	<0.2	<0.2	<0.2	<2	**4**
94-08-28	<0.5	**0.2**	<0.2	<0.2	<0.2	<1	**1**
94-09-04	<2	**0.3**	<0.2	<0.2	<0.2	<2	**1**
94-09-11	<0.5	**200**	<0.2	<0.2	<0.2	<1	**0.2**
94-09-18	<0.5	**5**	<0.2	<0.2	<0.2	<1	**0.1**
94-09-25	<0.5	**2**	<0.2	<0.2	<0.2	<1	**(0.03)**
94-10-02	<2	**1**	<0.2	<0.2	<0.2	<2	<0.1
94-10-09	<2	**0.7**	<0.2	<0.2	<0.2	<2	<0.1
94-10-16	<2	**0.7**	<0.2	<0.2	<0.2	<2	<0.1

Appendix 3. Pesticide concentrations in time integrated water samples from UT10/TP 1992-1994

Date	prochloraz	propiconazole	propyzamide	simazine	terbuthylazine	triadimenol	tribenuron-methyl	Sum pest
92-05-11	<0.1-0.5	<0.2	<0.1-0.5	<0.2	<0.1	<0.1-0.5	n.a.	**1.3**
92-05-18	<0.1-0.5	<0.2	<0.1-0.5	<0.1	**0.3**	<0.1-0.5	n.a.	**79.7**
92-05-25	<0.1-0.5	<0.2	<0.1-0.5	**(0.1)**	**1**	<0.1-0.5	n.a.	**8.8**
92-06-01	<0.1-0.5	<0.2	<0.1-0.5	<0.2	**4**	<0.1-0.5	n.a.	**15.2**
92-06-08	<0.1-0.5	<0.2	<0.1-0.5	<0.5	**2**	<0.1-0.5	n.a.	**22.8**
92-06-15	<0.1-0.5	<0.2	<0.1-0.5	<0.2	**0.6**	<0.1-0.5	n.a.	**3.3**
92-06-22	<0.1-0.5	**0.8**	<0.1-0.5	<0.5	**4**	<0.1-0.5	n.a.	**27.9**
92-06-29	<0.1-0.5	**0.5**	<0.1-0.5	<0.2	**2**	<0.1-0.5	n.a.	**9.8**
92-07-06	<0.1-0.5	**0.8**	<0.1-0.5	<0.3	**2**	<0.1-0.5	n.a.	**18.0**
92-07-13	**1**	**9**	<0.1-0.5	<0.5	**3**	<2	n.a.	**159.0**
92-07-15	**2**	**20**	<0.1-0.5	<1	**5**	<0.1-0.5	n.a.	**121.3**
92-07-16	**2**	**8**	<0.1-0.5	**1**	**10**	<0.6	n.a.	**77.1**
92-07-17	**1**	**7**	<0.1-0.5	**1**	**10**	**3**	n.a.	**58.4**
92-07-18	**1**	**5**	<0.1-0.5	<1	**8**	<1	n.a.	**47.6**
92-07-19	<0.1-0.5	**5**	<0.1-0.5	**0.8**	**7**	<1	n.a.	**33.3**
92-07-20	**1**	**6**	<0.1-0.5	**0.9**	**10**	<1	n.a.	**63.6**
92-07-21	**0.9**	**5**	<0.1-0.5	<0.6	**8**	<0.1-0.5	n.a.	**39.8**
92-07-22	**0.9**	**4**	<0.1-0.5	<0.4	**6**	<0.1-0.5	n.a.	**28.6**
92-07-23	<0.1-0.5	**2**	<0.1-0.5	**0.2**	**4**	<0.1-0.5	n.a.	**14.3**
92-07-27	**0.5**	**2**	<0.1-0.5	<0.2	**3**	<0.1-0.5	n.a.	**15.0**
92-08-03	<0.1-0.5	**1**	<0.1-0.5	<0.5	**3**	<0.1-0.5	n.a.	**16.1**
92-08-10	<0.1-0.5	**0.6**	<0.1-0.5	<0.3	**1**	<0.1-0.5	n.a.	**5.5**
92-08-17	<0.1-0.5	**1**	<0.1-0.5	<0.5	**4**	<0.1-0.5	n.a.	**17.3**
92-08-24	<0.1-0.5	**3**	<0.1-0.5	**1**	**9**	<0.7	n.a.	**41.0**
92-08-31	<0.1-0.5	**1**	<0.1-0.5	**0.3**	**6**	<0.1-0.5	n.a.	**16.1**
92-09-07	<0.1-0.5	**1**	<0.1-0.5	<0.2	**8**	<0.1-0.5	n.a.	**74.1**
92-09-14	<0.1-0.5	**0.5**	<0.1-0.5	<0.2	**1**	<0.1-0.5	n.a.	**6.6**
92-09-21	<0.1-0.5	**0.6**	<0.1-0.5	**0.3**	**3**	<0.1-0.5	n.a.	**30.0**
92-09-28	<0.1-0.5	<0.2	<0.1-0.5	**0.2**	**0.6**	<0.1-0.5	n.a.	**4.0**
92-10-05	<0.1-0.5	<0.2	<0.1-0.5	<0.2	**0.3**	<0.1-0.5	n.a.	**2.8**
92-10-12	<0.1-0.5	<0.2	<0.1-0.5	<0.2	**0.2**	<1	n.a.	**0.6**
92-10-19	<0.1-0.5	**0.4**	<0.1-0.5	**2**	**100**	<0.1-0.5	n.a.	**145.7**
92-10-25	<0.1-0.5	**0.4**	<0.1-0.5	**2**	**100**	<0.1-0.5	n.a.	**121.1**
92-11-02	<0.1-0.5	**0.3**	<0.1-0.5	**1**	**30**	<0.1-0.5	n.a.	**46.0**
92-11-09	<0.1-0.5	<0.2	<0.1-0.5	**0.4**	**20**	<0.1-0.5	n.a.	**26.5**
92-11-16	<0.1-0.5	<0.2	<0.1-0.5	<0.2	**5**	<0.1-0.5	n.a.	**7.3**
92-11-23	<0.1-0.5	<0.2	<0.1-0.5	<0.1	**0.7**	<0.1-0.5	n.a.	**1.6**
92-11-30	<0.1-0.5	<0.2	<0.1-0.5	<0.2	**0.3**	<0.1-0.5	n.a.	**0.6**
92-12-07	<0.1-0.5	<0.2	<0.1-0.5	<0.2	**0.1**	<0.1-0.5	n.a.	**0.3**
92-12-14	<0.1-0.5	<0.2	<0.1-0.5	<0.2	**1**	<0.1-0.5	n.a.	**1.3**
92-12-21	<0.1-0.5	<0.2	<0.1-0.5	<0.2	**0.2**	<0.1-0.5	n.a.	**0.2**
92-12-28	<0.1-0.5	<0.2	<0.1-0.5	<0.2	**0.6**	<0.1-0.5	n.a.	**0.7**
93-01-04	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
93-01-12	<0.5	<0.2	<0.1	<0.1	**1**	<0.2	n.a.	**1.7**
93-01-18	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
93-01-25	<0.5	<0.2	<0.1	<0.1	**0.5**	<0.2	n.a.	**1.1**
93-01-31	<0.5	<0.2	<0.1	<0.1	**0.1**	<0.2	n.a.	**1.1**
93-02-07	<0.5	<0.2	<0.1	<0.1	**0.1**	<0.2	n.a.	**0.5**
93-02-14	<0.5	<0.2	<0.1	<0.1	**(0.05)**	<0.2	n.a.	**0.1**
93-02-21	<0.5	<0.2	<0.1	<0.1	**0.2**	<0.2	n.a.	**0.3**
93-02-28	<0.5	<0.2	<0.1	<0.1	**0.5**	<0.2	n.a.	**0.5**
93-03-07	<0.5	<0.2	<0.1	<0.1	**(0.09)**	<0.2	n.a.	**0.1**
93-03-14	<0.5	<0.2	<0.1	<0.1	**0.2**	<0.2	n.a.	**0.2**
93-03-21	<0.5	<0.2	<0.1	<0.1	**0.1**	<0.2	n.a.	**0.2**
93-03-28	<0.5	<0.2	<0.1	<0.2	**0.1**	<0.2	n.a.	**0.1**
93-04-04	<0.5	<0.2	<0.1	<0.2	<0.1	<0.2	n.a.	**0.00**
93-04-11	<0.5	<0.2	<0.1	<0.2	**0.6**	<0.2	n.a.	**16.2**
93-04-18	<0.5	<0.2	<0.1	<0.2	**0.4**	<0.2	n.a.	**2.7**
93-04-25	<0.5	<0.2	<0.1	<0.2	**(0.2)**	<0.2	n.a.	**4.9**

Appendix 3. Pesticide concentrations in time integrated water samples from UT10/TP 1992-1994

Date	prochloraz	propiconazole	propyzamide	simazine	terbuthylazine	triadimenol	tribenuron-methyl	Sum pest
93-05-02	<0.5	<0.2	<0.1	<0.2	**0.2**	<0.2	n.a.	**3.9**
93-05-05	<0.5	**0.1**	<0.1	<0.2	**0.1**	<0.2	**0.4**	**63.7**
93-05-09	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	**0.2**	**5.2**
93-05-12	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	**0.02**	**0.8**
93-05-16	<0.2	**(0.1)**	<0.1	<0.1	**0.3**	<0.3	**0.04**	**67.8**
93-05-19	<0.2	**0.2**	<0.1	<0.1	**0.6**	<0.3	**(0.01)**	**11.8**
93-05-23	<0.2	**(0.1)**	<0.1	**2**	**0.4**	<0.3	**0.02**	**32.7**
93-05-26	<0.2	<0.2	<0.1	**0.1**	**0.2**	<0.3	<0.01	**1.7**
93-05-30	<0.2	**0.4**	<0.1	**4**	**0.2**	<0.3	**0.02**	**54.6**
93-06-02	<0.2	**0.6**	<0.1	**4**	**4**	<0.3	**0.01**	**23.9**
93-06-06	<0.2	**(0.1)**	<0.1	**1**	**0.6**	<0.3	**(0.005)**	**3.6**
93-06-09	<0.2	**(0.1)**	<0.1	**4**	**0.3**	<0.3	**0.01**	**20.5**
93-06-13	<0.2	**4**	<0.1	**15**	**0.5**	<0.3	**0.07**	**121.8**
93-06-16	<0.2	**4**	<0.1	**9**	**0.8**	<0.3	**0.02**	**29.9**
93-06-19	<0.2	**20**	<0.1	**6**	**3**	<0.3	**0.03**	**54.6**
93-06-23	<0.2	**9**	<0.1	**4**	**5**	<0.3	**0.02**	**32.4**
93-06-27	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	**(0.005)**	**1.2**
93-06-30	<0.2	**2**	<0.1	**2**	**3**	<0.3	**0.008**	**9.2**
94-05-04								
94-05-08	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	**0.03**	**0.03**
94-05-12	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	**(0.005)**	**0.01**
94-05-15	<0.5	<0.2	<0.1	<0.3	<0.1	<0.5	<0.01	**1.6**
94-05-18	<0.5	<0.2	<0.1	<0.3	**0.1**	<0.5	**0.04**	**22.4**
94-05-22	<0.5	<0.2	<0.1	<0.3	<0.1	<0.5	**0.01**	**13.0**
94-05-26	<0.5	<0.2	<0.1	<0.3	<0.1	<0.5	**0.01**	**5.6**
94-05-29	<0.5	<0.2	<0.1	<0.3	**0.1**	<0.5	**0.02**	**5.0**
94-06-05	<0.5	<0.2	**0.3**	**0.3**	**7**	<0.5	**0.04**	**23.3**
94-06-13	<0.5	<0.2	**1**	**1**	**7**	<0.5	**0.01**	**35.8**
94-06-20	<0.5	**0.7**	**0.8**	**1**	**4**	<0.5	**0.01**	**38.1**
94-06-26	<0.5	<0.2	<0.1	**0.1**	**0.6**	<0.5	n.a.	**9.8**
94-07-10								
94-07-17	<0.2	<0.2	<0.2	<0.1	**0.3**	<0.5	n.a.	**6.0**
94-07-24	<0.2	<0.2	<0.2	**0.2**	**1**	<0.5	n.a.	**2.5**
94-08-14								
94-08-21	<0.5	**3**	**0.2**	**6**	**20**	<0.3	n.a.	**49.1**
94-08-28	<0.5	**0.5**	<0.2	**2**	**5**	<0.2	n.a.	**14.0**
94-09-04	<0.5	**1**	**3**	**2**	**8**	<0.3	n.a.	**21.9**
94-09-11	<0.5	**0.4**	<0.2	**0.9**	**2**	<0.2	n.a.	**212.6**
94-09-18	<0.5	**0.4**	<0.2	**0.5**	**2**	<0.2	n.a.	**12.3**
94-09-25	<0.5	<0.2	<0.2	<0.1	**0.1**	<0.2	n.a.	**2.2**
94-10-02	<0.5	<0.2	<0.2	**(0.05)**	**0.2**	<0.3	n.a.	**1.4**
94-10-09	<0.5	<0.2	<0.2	**(0.05)**	**0.3**	<0.3	n.a.	**1.2**
94-10-16	<0.5	<0.2	<0.2	<0.1	**0.2**	<0.3	n.a.	**1.0**

Appendix 4. Pesticide concentrations in non-composite water samples from NA1, FA3, SH5, UT10 and LU12 in 1990 and 1991

Date	a-cypermethrin	atrazindesethyl	atrazine	BAM	benazolin-ethylester	bentazone	bromoxynil	chloridazon
NA1								
90-04-04	n.a.	n.a.	<0.1	n.a.	n.a.	<0.1	n.a.	n.a.
90-04-22	n.a.	n.a.	<0.1	n.a.	n.a.	<0.1	n.a.	n.a.
90-05-02	n.a.	n.a.	<0.1	n.a.	n.a.	<0.1	n.a.	n.a.
90-05-10	n.a.	n.a.	<0.1	n.a.	n.a.	<0.1	n.a.	n.a.
90-05-14	n.a.	n.a.	<0.1	n.a.	n.a.	<0.1	n.a.	n.a.
90-05-17	n.a.	n.a.	<0.1	n.a.	n.a.	**(0.02)**	n.a.	n.a.
90-05-21	n.a.	n.a.	<0.1	n.a.	n.a.	**0.1**	n.a.	n.a.
90-05-29	n.a.	n.a.	<0.1	n.a.	n.a.	**(0.01)**	n.a.	n.a.
90-06-06	n.a.	n.a.	<0.1	n.a.	n.a.	<0.1	n.a.	n.a.
90-06-11	n.a.	n.a.	<0.1	n.a.	n.a.	<0.1	n.a.	n.a.
90-06-18	n.a.	n.a.	<0.1	n.a.	n.a.	<0.1	n.a.	n.a.
91-05-07	<0.4	<0.2	<0.1	<0.2	<0.2	<0.1	<0.2	n.a.
91-05-14	<0.4	<0.2	<0.1	<0.2	<0.2	<0.1	<0.2	n.a.
91-05-21	<0.4	<0.2	<0.4	<0.2	<0.2	<0.1	<0.2	n.a.
91-05-28	<0.2	<0.2	<0.1	<0.1	<0.1	<0.1	<0.2	n.a.
91-06-04	<0.2	<0.2	<0.1	<0.1	<0.1	n.a.	n.a.	n.a.
91-06-18	<0.2	<0.4	<0.2	<0.1	<0.5	<0.1	<0.2	n.a.
91-06-24	<0.2	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2	n.a.
FA3								
90-05-14	n.a.	n.a.	**0.1**	n.a.	n.a.	**5.3**	n.a.	n.a.
90-05-17	n.a.	n.a.	**0.1**	n.a.	n.a.	**3**	n.a.	n.a.
90-05-21	n.a.	n.a.	**0.1**	n.a.	n.a.	**2**	n.a.	n.a.
90-05-29	n.a.	n.a.	**0.1**	n.a.	n.a.	**5**	n.a.	n.a.
90-06-06	n.a.	n.a.	**0.2**	n.a.	n.a.	**4**	n.a.	n.a.
90-06-11	n.a.	n.a.	**0.1**	n.a.	n.a.	**2**	n.a.	n.a.
90-06-18	n.a.	n.a.	**0.2**	n.a.	n.a.	**4**	n.a.	n.a.
91-05-14	<0.4	<0.2	<0.1	<0.2	<0.2	**0.1**	<0.2	n.a.
91-05-21	<0.4	<0.2	<0.4	<0.2	<0.2	**0.2**	<0.2	n.a.
91-05-28	<0.2	<0.2	<0.1	<0.1	<0.1	**0.2**	<0.2	n.a.
91-06-18	<0.2	<0.4	<0.2	<0.1	<0.5	**0.6**	**(0.05)**	n.a.
SH5								
90-04-22	n.a.	n.a.	<0.1	n.a.	n.a.	**0.1**	n.a.	n.a.
90-05-02	n.a.	n.a.	<0.1	n.a.	n.a.	**0.2**	n.a.	n.a.
90-05-10	n.a.	n.a.	<0.1	n.a.	n.a.	**34**	n.a.	n.a.
90-05-14	n.a.	n.a.	**0.1**	n.a.	n.a.	**3.9**	n.a.	n.a.
90-05-17	n.a.	n.a.	**0.1**	n.a.	n.a.	**2**	n.a.	n.a.
90-05-21	n.a.	n.a.	**0.1**	n.a.	n.a.	**1**	n.a.	n.a.
90-05-29	n.a.	n.a.	**0.1**	n.a.	n.a.	**4**	n.a.	n.a.
90-06-06	n.a.	n.a.	**0.2**	n.a.	n.a.	**4**	n.a.	n.a.
90-06-11	n.a.	n.a.	**0.2**	n.a.	n.a.	**1**	n.a.	n.a.
90-06-18	n.a.	n.a.	**0.3**	n.a.	n.a.	**2.8**	n.a.	n.a.
91-05-14	<0.4	<0.2	<0.1	<0.2	<0.2	<0.1	<0.2	n.a.
91-05-21	<0.2	<0.2	<0.1	<0.1	<0.1	**0.4**	<0.2	n.a.
91-05-28	<0.2	<0.2	<0.1	<0.1	<0.1	**0.2**	<0.2	n.a.
91-06-18	<0.2	<0.4	<0.2	<0.1	<0.5	**0.7**	**(0.05)**	n.a.

Appendix 4. Pesticide concentrations in non-composite water samples from NA1, FA3, SH5, UT10 and LU12 in 1990 and 1991

Date	clopyralid	cyanazine	cyfluthrin	cypermethrin	2,4-D	deltamethrin	dicamba	dichlobenil	dichlorprop
NA1									
90-04-04	<0.5	<0.1	<0.5	<1	<0.1	<0.1	<0.1	<0.1	<0.1
90-04-22	<0.5	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1
90-05-02	<0.5	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1
90-05-10	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1
90-05-14	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1
90-05-17	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1
90-05-21	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**(0.01)**
90-05-29	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.01
90-06-06	<0.3	**0.2**	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**(0.06)**
90-06-11	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1
90-06-18	<0.3	<0.1	<0.5	<0.4	<0.1	<0.1	<0.1	<0.1	<0.1
91-05-07	<1	<0.1	<0.5	<0.4	<0.1	<0.1	<0.1	<0.1	<0.1
91-05-14	<0.5	<0.1	<0.5	<0.4	<0.1	<0.1	<0.1	<0.1	<0.1
91-05-21	<0.5	<0.1	<0.5	<0.4	<0.1	<0.1	<0.1	<0.1	<0.1
91-05-28	<1	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1
91-06-04	n.a.	<0.1	<0.5	<0.2	n.a.	<0.1	n.a.	<0.1	n.a.
91-06-18	<0.5	<0.2	<0.5	<0.2	<0.1	<0.1	<0.2	<0.1	<0.1
91-06-24	<0.5	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1
FA3									
90-05-14	<0.3	**0.7**	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**(0.09)**
90-05-17	<0.3	**0.2**	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**(0.09)**
90-05-21	<0.3	**0.4**	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**(0.02)**
90-05-29	<0.5	**0.8**	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**(0.04)**
90-06-06	<0.3	**0.6**	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**(0.07)**
90-06-11	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**(0.03)**
90-06-18	<0.3	<0.1	<0.5	<0.4	<0.1	<0.1	<0.1	<0.1	**(0.04)**
91-05-14	<1	<0.1	<0.5	<0.4	<0.1	<0.1	<0.1	<0.1	<0.1
91-05-21	<0.5	<0.1	<0.5	<0.4	<0.1	<0.1	<0.1	<0.1	**(0.09)**
91-05-28	<0.5	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.1**
91-06-18	<0.5	<0.2	<0.5	<0.2	<0.1	<0.1	<0.2	<0.1	**0.2**
SH5									
90-04-22	<0.5	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.5**
90-05-02	<0.5	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.3**
90-05-10	<0.3	<0.1	<0.5	<0.2	**0.4**	<0.1	<0.1	<0.1	**73**
90-05-14	<0.3	**1**	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.3**
90-05-17	<0.3	**0.3**	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**(0.02)**
90-05-21	<0.3	**0.3**	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**(0.03)**
90-05-29	<0.5	**1**	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**(0.08)**
90-06-06	<0.3	**0.3**	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**(0.05)**
90-06-11	<0.3	**0.2**	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**(0.02)**
90-06-18	<0.3	**0.3**	<0.5	<0.4	<0.1	<0.1	<0.1	<0.1	**(0.02)**
91-05-14	<1	<0.1	<0.5	<0.4	<0.1	<0.1	<0.1	<0.1	<0.1
91-05-21	<1	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1
91-05-28	<1	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1
91-06-18	<0.5	<0.2	<0.5	<0.2	<0.1	<0.1	<0.2	<0.1	**0.2**

Appendix 4. Pesticide concentrations in non-composite water samples from NA1, FA3, SH5, UT10 and LU12 in 1990 and 1991

Date	dimethoate	diuron	esfenvalerate	ethofumesate	fenitrothion	fenpropimorph	fenvalerate	flamprop-M
NA1								
90-04-04	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-04-22	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-02	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-10	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-14	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-17	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-21	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-29	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-06-06	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-06-11	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-06-18	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
91-05-07	n.a.	<0.5	<0.2	<0.2	<0.1	<0.7	<0.2	<0.1
91-05-14	n.a.	<0.5	<0.2	<0.2	<0.1	<0.7	<0.2	<0.1
91-05-21	n.a.	<0.5	<0.2	<0.2	<0.2	<0.7	<0.2	<0.1
91-05-28	n.a.	<0.5	<0.2	<0.2	<0.3	<0.7	<0.2	<0.1
91-06-04	n.a.	<0.5	<0.2	<0.2	<0.1	<0.7	<0.2	n.a.
91-06-18	n.a.	<1	<0.2	<0.2	<0.1	<0.8	<0.2	<0.1
91-06-24	n.a.	<0.5	<0.2	<0.2	<0.3	<0.5	<0.2	<0.1
FA3								
90-05-14	<0.1	**0.7**	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-17	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-21	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-29	<0.1	<0.5	n.a.	n.a.	<0.1	**4.4**	<0.2	n.a.
90-06-06	<0.1	<0.5	n.a.	n.a.	<0.1	**0.4**	<0.2	n.a.
90-06-11	<0.1	<0.5	n.a.	n.a.	<0.1	**4.2**	<0.2	n.a.
90-06-18	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
91-05-14	n.a.	<0.5	<0.2	<0.2	<0.1	<0.7	<0.2	<0.1
91-05-21	n.a.	<0.5	<0.2	<0.2	<0.2	<0.7	<0.2	<0.1
91-05-28	n.a.	<0.5	<0.2	<0.2	<0.3	<0.7	<0.2	<0.1
91-06-18	n.a.	<1	<0.2	**(0.1)**	<0.1	<0.8	<0.2	**(0.05)**
SH5								
90-04-22	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-02	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-10	<0.1	**9**	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-14	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-17	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-21	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-29	<0.1	<0.5	n.a.	n.a.	<0.1	**2.7**	<0.2	n.a.
90-06-06	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-06-11	<0.1	<0.5	n.a.	n.a.	<0.1	**3.2**	<0.2	n.a.
90-06-18	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
91-05-14	n.a.	<0.5	<0.2	<0.2	<0.1	<0.7	<0.2	<0.1
91-05-21	n.a.	<0.5	<0.2	<0.2	<0.1	<0.7	<0.2	<0.1
91-05-28	n.a.	<0.5	<0.2	<0.2	<0.3	<0.7	<0.2	<0.1
91-06-18	n.a.	<1	<0.2	**0.4**	<0.1	<0.8	<0.2	<0.1

Appendix 4. Pesticide concentrations in non-composite water samples from NA1, FA3, SH5, UT10 and LU12 in 1990 and 1991

Date	fluroxypyr	hexazinon	ioxynil	isoproturon	lenacil	linuron	MCPA	mecoprop	metamitron	metazachlor
NA1										
90-04-04	n.a.	<0.2	n.a.	<0.5	<0.5	<0.2	<0.1	<0.1	<1	<0.1
90-04-22	n.a.	<0.2	n.a.	<0.5	<0.5	<0.2	<0.1	<0.1	<1	<0.1
90-05-02	n.a.	<0.2	n.a.	<0.5	<0.5	<0.1	<0.1	<0.1	<1	<0.1
90-05-10	n.a.	<0.5	n.a.	<1.5	<0.5	<0.4	<0.1	<0.1	<5	**0.1**
90-05-14	n.a.	<0.5	n.a.	<1.5	<0.5	<0.4	<0.1	<0.1	<5	<0.1
90-05-17	n.a.	<0.5	n.a.	<1.5	<0.5	<0.4	**(0.02)**	<0.1	<5	<0.1
90-05-21	n.a.	<0.5	n.a.	<1.5	<0.5	<0.4	**(0.03)**	**(0.01)**	<5	<0.1
90-05-29	n.a.	<0.5	n.a.	<2	<0.5	<1	<0.02	<0.01	<5	<0.1
90-06-06	n.a.	<0.5	n.a.	<2	<0.5	<1	**(0.07)**	<0.1	<1	**0.5**
90-06-11	n.a.	<0.2	n.a.	<1	<0.5	<0.2	<0.1	<0.1	<1	<0.1
90-06-18	n.a.	<0.2	n.a.	<1.5	<0.5	<1	<0.1	<0.1	<5	<0.1
91-05-07	<2	n.a.	<0.2	<2	<0.5	<0.4	<0.1	<0.1	<1	<0.1
91-05-14	<2	n.a.	<0.2	<2	<0.5	<0.4	<0.1	<0.1	<1	<0.1
91-05-21	<2	n.a.	<0.2	<3	<0.5	<0.6	<0.1	<0.1	<2	<0.1
91-05-28	<2	n.a.	<0.2	<2	<1	<0.8	<0.1	<0.1	<1	<0.1
91-06-04	n.a.	n.a.	n.a.	<0.5	<0.5	<0.5	n.a.	n.a.	<1	<0.1
91-06-18	<2	n.a.	<0.2	<1	<0.5	<0.5	<0.1	<0.1	<2	<0.2
91-06-24	<2	n.a.	<0.2	<0.6	<0.5	<1	<0.1	<0.1	<1	<0.1
FA3										
90-05-14	n.a.	<0.5	n.a.	<1.5	<0.5	**2**	**0.1**	<0.1	**30**	**2**
90-05-17	n.a.	<0.5	n.a.	<2	<0.5	<1	**0.1**	**(0.07)**	<5	**2.1**
90-05-21	n.a.	<0.5	n.a.	<1.5	<0.5	**1.4**	**(0.02)**	**(0.03)**	**20**	**3.2**
90-05-29	n.a.	<0.5	n.a.	<2	<0.5	<1	<0.02	**(0.04)**	**25**	**7.8**
90-06-06	n.a.	<0.2	n.a.	**1**	<0.5	<0.2	**(0.07)**	**0.1**	<1	**3**
90-06-11	n.a.	<0.2	n.a.	<2	<0.5	<0.2	**(0.02)**	**(0.04)**	<1	**1**
90-06-18	n.a.	<0.2	n.a.	<1.5	<0.5	<1	**(0.02)**	**(0.04)**	**3.5**	**2.2**
91-05-14	<2	n.a.	<0.2	<2	<0.5	<0.4	<0.1	**0.1**	<1	<0.1
91-05-21	<2	n.a.	<0.2	<3	<0.5	<0.6	<0.1	**0.2**	<2	<0.1
91-05-28	<2	n.a.	<0.2	<2	<1	<0.8	<0.1	**0.2**	<1	<0.1
91-06-18	<2	n.a.	**0.2**	<1	<0.5	<0.5	**0.2**	**0.6**	<2	<0.2
SH5										
90-04-22	n.a.	<0.2	n.a.	<0.5	<0.5	<0.2	**0.2**	**0.2**	<1	**0.1**
90-05-02	n.a.	<0.2	n.a.	<0.5	<0.5	<0.1	**0.1**	**1.1**	<1	**0.12**
90-05-10	n.a.	<0.5	n.a.	**3.6**	<0.5	**22**	**120**	**8.3**	**25**	**16**
90-05-14	n.a.	<0.5	n.a.	<1.5	<0.5	**1.1**	**1.5**	**0.1**	**40**	**3.2**
90-05-17	n.a.	<0.5	n.a.	<1.5	<0.5	**0.4**	**0.2**	**(0.02)**	**3.5**	**2.1**
90-05-21	n.a.	<0.5	n.a.	<1.5	<0.5	**0.8**	**0.2**	**(0.03)**	**15**	**2.4**
90-05-29	n.a.	<0.5	n.a.	<1.5	<0.5	**0.6**	**(0.09)**	**(0.08)**	**25**	**8.6**
90-06-06	n.a.	<0.5	n.a.	<2	<0.5	<1	**(0.08)**	**(0.08)**	<1	**3**
90-06-11	n.a.	<0.2	n.a.	<2	<0.5	<0.2	**(0.03)**	**(0.03)**	<1	**1.4**
90-06-18	n.a.	<0.2	n.a.	<1.5	<0.5	<1	**(0.04)**	**(0.03)**	**3.5**	**3.9**
91-05-14	<2	n.a.	<0.2	<2	<0.5	<0.4	<0.1	**(0.09)**	<1	<0.1
91-05-21	<2	n.a.	<0.2	<2	<1	<0.6	<0.1	**0.1**	<1	<0.1
91-05-28	<2	n.a.	<0.2	<2	<1	<0.8	<0.1	**0.1**	<1	<0.1
91-06-18	<2	n.a.	**0.1**	<1	<0.5	<0.5	**(0.09)**	**0.6**	<2	<0.2

Appendix 4. Pesticide concentrations in non-composite water samples from NA1, FA3, SH5, UT10 and LU12 in 1990 and 1991

Date	methabenzthiazuron	pendimethalin	permethrin	phenmedipham	pirimicarb	prochloraz	propiconazole
NA1							
90-04-04	<0.3	<0.2	<1	<2	<0.1	n.a.	<0.2
90-04-22	<0.3	<0.2	<0.5	<2	<0.1	n.a.	<0.2
90-05-02	<0.3	<0.2	<0.5	<1	<0.1	n.a.	<0.2
90-05-10	<1.5	<0.3	<0.5	<3	<0.1	n.a.	<0.4
90-05-14	<1.5	<0.3	<0.5	<3	<0.1	n.a.	<0.4
90-05-17	<1.5	<0.3	<0.5	<3	<0.1	n.a.	<0.4
90-05-21	<1.5	<0.3	<0.5	<3	<0.1	n.a.	<0.4
90-05-29	<3	<0.5	<0.5	<20	<0.1	n.a.	<0.2
90-06-06	<3	<0.5	<0.5	<20	<0.1	n.a.	<0.2
90-06-11	<0.5	<0.2	<0.5	<1	<0.1	n.a.	<0.2
90-06-18	<0.3	<0.3	<0.5	<1	<0.1	n.a.	<0.2
91-05-07	<0.5	<0.2	<1	<2	<0.1	n.a.	<0.2
91-05-14	<0.5	<0.2	<1	<2	<0.1	n.a.	<0.2
91-05-21	<0.5	<0.2	<1	<2	<0.1	n.a.	<0.2
91-05-28	<0.3	<0.2	<0.5	<2	<0.1	n.a.	<0.2
91-06-04	<0.3	<0.2	<0.5	<1	<0.1	<0.3	<0.2
91-06-18	<0.4	<0.2	<0.5	<2	<0.1	<0.3	<0.2
91-06-24	<0.3	<0.2	<0.5	<1	<0.1	<0.1	<0.2
FA3							
90-05-14	**3.3**	**0.9**	<0.5	<3	<0.1	n.a.	<0.4
90-05-17	<3	<0.5	<0.5	<20	<0.1	n.a.	<0.2
90-05-21	**2.6**	**0.4**	<0.5	<3	<0.1	n.a.	<0.4
90-05-29	<3	<0.5	<0.5	<2	<0.1	n.a.	**2.9**
90-06-06	<2	**0.2**	<0.5	<5	<0.1	n.a.	**1**
90-06-11	<0.5	<0.2	**3.3**	<1	**1.6**	n.a.	**2.9**
90-06-18	<3	<0.3	<0.5	<1	**0.6**	n.a.	**2.3**
91-05-14	<0.5	<0.2	<1	<2	<0.1	n.a.	<0.2
91-05-21	<0.5	<0.2	<1	<2	<0.1	n.a.	<0.2
91-05-28	<0.3	<0.2	<0.5	<2	<0.1	n.a.	<0.2
91-06-18	<0.4	<0.2	<0.5	<2	<0.1	<0.3	**0.4**
SH5							
90-04-22	<0.3	<0.2	<0.5	<2	<0.1	n.a.	<0.2
90-05-02	<0.3	<0.2	<0.5	<1	<0.1	n.a.	<0.2
90-05-10	**1.6**	<0.3	<0.5	<3	<0.1	n.a.	<0.4
90-05-14	**1.7**	**0.4**	<0.5	<2	<0.1	n.a.	<0.4
90-05-17	<1.5	<0.3	<0.5	<3	<0.1	n.a.	<0.4
90-05-21	**2.4**	<0.3	<0.5	<3	<0.1	n.a.	<0.4
90-05-29	<0.3	<0.3	<0.5	<3	<0.1	n.a.	<0.4
90-06-06	<3	<0.5	<0.5	<20	<0.1	n.a.	**0.6**
90-06-11	<0.5	<0.2	<0.5	<1	**1.7**	n.a.	**4.2**
90-06-18	<3	<0.3	<0.5	<1	**1.1**	n.a.	**3.5**
91-05-14	<0.5	<0.2	<1	<2	<0.1	n.a.	<0.2
91-05-21	<0.3	<0.2	<0.5	<2	<0.1	n.a.	<0.2
91-05-28	<0.3	<0.2	<0.5	<2	<0.1	n.a.	<0.2
91-06-18	<0.4	<0.2	<0.5	<2	<0.1	<0.3	**2**

Appendix 4. Pesticide concentrations in non-composite water samples from NA1, FA3, SH5, UT10 and LU12 in 1990 and 1991

Date	propyzamide	simazine	terbuthylazine	triadimenol	tribenuronmetyl	Sum pest
NA1						
90-04-04	<0.2	<0.1	<0.1	<0.5	n.a.	0.00
90-04-22	<0.2	<0.1	<0.1	<0.5	n.a.	0.00
90-05-02	<0.2	<0.1	<0.1	<0.5	n.a.	0.00
90-05-10	<0.2	<0.1	<0.1	<0.5	n.a.	**0.10**
90-05-14	<0.2	<0.1	<0.1	<0.5	n.a.	0.00
90-05-17	<0.2	<0.1	<0.1	<0.5	n.a.	**0.04**
90-05-21	<0.2	<0.1	<0.1	<0.5	n.a.	**0.15**
90-05-29	<0.4	<0.1	<0.1	<0.5	n.a.	**0.01**
90-06-06	<0.4	<0.1	**0.2**	<0.5	n.a.	**1.03**
90-06-11	<0.4	<0.1	<0.1	<0.5	n.a.	0.00
90-06-18	<0.5	<0.1	<0.1	<0.5	n.a.	0.00
91-05-07	n.a.	<0.1	<0.1	<0.5	n.a.	0.00
91-05-14	n.a.	<0.1	<0.1	<0.5	n.a.	0.00
91-05-21	n.a.	<0.2	<0.1	<0.5	n.a.	0.00
91-05-28	n.a.	<0.2	<0.1	<1	n.a.	0.00
91-06-04	n.a.	<0.2	<0.1	<0.5	n.a.	0.00
91-06-18	n.a.	<0.3	<0.2	<0.5	n.a.	0.00
91-06-24	n.a.	<0.2	<0.1	<0.5	n.a.	0.00
FA3						
90-05-14	<0.2	<0.1	**0.8**	<0.5	n.a.	**46.0**
90-05-17	<0.4	<0.1	**0.7**	<0.5	n.a.	**6.4**
90-05-21	<0.2	<0.1	**1.1**	<0.5	n.a.	**31.3**
90-05-29	<0.4	<0.1	**1.5**	<0.5	n.a.	**47.6**
90-06-06	<0.4	<0.1	**2**	<0.5	n.a.	**12.6**
90-06-11	<0.4	<0.1	**0.6**	<0.5	n.a.	**15.8**
90-06-18	<0.5	<0.1	**0.7**	<0.5	n.a.	**13.6**
91-05-14	n.a.	<0.1	<0.1	<0.5	n.a.	**0.2**
91-05-21	n.a.	<0.2	<0.1	<0.5	n.a.	**0.5**
91-05-28	n.a.	<0.2	<0.1	<1	n.a.	**0.5**
91-06-18	n.a.	<0.3	**0.3**	<0.5	n.a.	**2.7**
SH5						
90-04-22	<0.2	<0.1	**0.2**	<0.5	n.a.	**1.3**
90-05-02	<0.2	<0.1	**0.19**	<0.5	n.a.	**2.0**
90-05-10	<0.2	<0.1	**1.8**	<0.5	n.a.	**314.7**
90-05-14	<0.2	<0.1	**0.7**	<0.5	n.a.	**54.0**
90-05-17	<0.2	<0.1	**0.6**	<0.5	n.a.	**9.2**
90-05-21	<0.2	<0.1	**0.8**	<0.5	n.a.	**23.1**
90-05-29	<0.2	<0.1	**1.8**	<0.5	n.a.	**44.1**
90-06-06	<0.4	<0.1	**1.3**	<0.5	n.a.	**9.6**
90-06-11	<0.4	<0.1	**0.8**	<0.5	n.a.	**12.8**
90-06-18	<0.5	<0.1	**1.1**	<0.5	n.a.	**16.6**
91-05-14	n.a.	<0.1	<0.1	<0.5	n.a.	**0.1**
91-05-21	n.a.	<0.2	<0.1	<1	n.a.	**0.5**
91-05-28	n.a.	<0.2	<0.1	<1	n.a.	**0.3**
91-06-18	n.a.	<0.3	**(0.1)**	<0.5	n.a.	**4.2**

Appendix 4. Pesticide concentrations in non-composite water samples collected at NA1, FA3, SH5, UT10 and LU12 in 1990 and 1991

Date	a-cypermethrin	atrazindesethyl	atrazine	BAM	benazolin-ethylester	bentazone	bromoxynil	chloridazon
UT10								
90-04-22	n.a.	n.a.	<0.1	n.a.	n.a.	**0.1**	n.a.	n.a.
90-05-02	n.a.	n.a.	**0.1**	n.a.	n.a.	**0.2**	n.a.	n.a.
90-05-08	n.a.	n.a.	**0.2**	n.a.	n.a.	**0.2**	n.a.	n.a.
90-05-10	n.a.	n.a.	**0.1**	n.a.	n.a.	**25**	n.a.	n.a.
90-05-14	n.a.	n.a.	**0.7**	n.a.	n.a.	**3.1**	n.a.	n.a.
90-05-17	n.a.	n.a.	<0.1	n.a.	n.a.	**2**	n.a.	n.a.
90-05-21	n.a.	n.a.	<0.1	n.a.	n.a.	**1**	n.a.	n.a.
90-05-25	n.a.	n.a.	**3**	n.a.	n.a.	**2.3**	n.a.	n.a.
90-05-28	n.a.	n.a.	**0.5**	n.a.	n.a.	**6**	n.a.	n.a.
90-06-06	n.a.	n.a.	**0.8**	n.a.	n.a.	**4**	n.a.	n.a.
90-06-11	n.a.	n.a.	**0.1**	n.a.	n.a.	**1**	n.a.	n.a.
90-06-18	n.a.	n.a.	**0.4**	n.a.	n.a.	**0.7**	n.a.	n.a.
91-05-07	<0.4	<0.2	<0.1	<0.2	<0.2	<0.1	<0.2	n.a.
91-05-14	<0.4	<0.2	<0.1	<0.2	<0.2	**(0.04)**	<0.2	n.a.
91-05-21	<0.2	<0.2	<0.1	<0.1	<0.1	**0.3**	<0.2	n.a.
91-05-28	<0.2	<0.2	<0.1	<0.1	<0.1	**0.2**	<0.2	n.a.
91-06-04	<0.2	<0.2	**0.2**	<0.1	<0.1	**0.3**	<0.2	n.a.
91-06-11	<0.2	<0.2	**(0.05)**	<0.1	<0.1	**0.3**	<0.2	n.a.
91-06-18	<0.2	**1**	**11**	<0.1	<0.5	**0.4**	**(0.05)**	n.a.
91-06-24	<0.2	<0.5	**1**	<0.1	<0.1	**0.3**	**(0.05)**	n.a.
LU12								
90-04-04	n.a.	n.a.	<0.1	n.a.	n.a.	<0.1	n.a.	n.a.
90-04-22	n.a.	n.a.	<0.1	n.a.	n.a.	**(0.08)**	n.a.	n.a.
90-05-02	n.a.	n.a.	<0.1	n.a.	n.a.	<0.1	n.a.	n.a.
90-05-08	n.a.	n.a.	<0.1	n.a.	n.a.	<0.1	n.a.	n.a.
90-05-10	n.a.	n.a.	<0.1	n.a.	n.a.	**0.4**	n.a.	n.a.
90-05-14	n.a.	n.a.	**0.5**	n.a.	n.a.	**1.5**	n.a.	n.a.
90-05-17	n.a.	n.a.	<0.1	n.a.	n.a.	**0.3**	n.a.	n.a.
90-05-21	n.a.	n.a.	<0.1	n.a.	n.a.	**0.3**	n.a.	n.a.
90-05-25	n.a.	n.a.	<0.1	n.a.	n.a.	**0.6**	n.a.	n.a.
90-05-28	n.a.	n.a.	**0.2**	n.a.	n.a.	**0.6**	n.a.	n.a.
90-06-06	n.a.	n.a.	**0.3**	n.a.	n.a.	**3**	n.a.	n.a.
90-06-11	n.a.	n.a.	<0.1	n.a.	n.a.	**0.1**	n.a.	n.a.
90-06-18	n.a.	n.a.	<0.1	n.a.	n.a.	**0.3**	n.a.	n.a.
90-08-13	n.a.	n.a.	<0.1	n.a.	n.a.	**(0.07)**	n.a.	n.a.
91-02-26	n.a.	n.a.	<0.1	n.a.	n.a.	<0.1	n.a.	n.a.
91-04-08	<0.2	<0.2	<0.1	<0.1	<0.1	**(0.03)**	n.a.	n.a.
91-04-24	<0.2	<0.2	<0.1	<0.1	<0.1	**(0.05)**	n.a.	n.a.
91-05-02	<0.4	<0.2	<0.1	<0.2	<0.2	**(0.05)**	n.a.	n.a.

Appendix 4. Pesticide concentrations in non-composite water samples collected at NA1, FA3, SH5, UT10 and LU12 in 1990 and 1991

Date	clopyralid	cyanazine	cyfluthrin	cypermethrin	2,4-D	deltamethrin	dicamba	dichlobenil	dichlorprop
UT10									
90-04-22	<0.5	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.2**
90-05-02	<0.5	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.3**
90-05-08	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.8**
90-05-10	<0.3	<0.1	<0.5	<0.2	**0.6**	<0.1	<0.1	<0.1	**100**
90-05-14	<0.3	**0.9**	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.2**
90-05-17	<0.3	**0.2**	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.1**
90-05-21	<0.3	**0.3**	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**(0.05)**
90-05-25	<0.3	**0.3**	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1
90-05-28	<0.8	**2.6**	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.4**
90-06-06	<0.3	**0.4**	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.2**
90-06-11	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**(0.04)**
90-06-18	<0.3	**0.2**	<0.5	<0.4	<0.1	<0.1	<0.1	<0.1	**0.8**
91-05-07	<1	<0.1	<0.5	<0.4	<0.1	<0.1	<0.1	<0.1	<0.1
91-05-14	<0.5	<0.1	<0.5	<0.4	<0.1	<0.1	<0.1	<0.1	**(0.08)**
91-05-21	<1	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1
91-05-28	<0.5	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1
91-06-04	<0.5	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.8**
91-06-11	<0.5	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.2**
91-06-18	<0.5	<0.2	<0.5	<0.2	**(0.08)**	<0.1	<0.2	<0.1	**0.2**
91-06-24	<0.5	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.3**
LU12									
90-04-04	<0.5	<0.1	<0.5	<1	<0.1	<0.1	<0.1	<0.1	<0.1
90-04-22	<0.5	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.1**
90-05-02	<0.5	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.3**
90-05-08	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**1.9**
90-05-10	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**11**
90-05-14	<0.3	**0.5**	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**1.2**
90-05-17	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.1**
90-05-21	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**(0.04)**
90-05-25	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**(0.03)**
90-05-28	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**0.1**
90-06-06	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**1**
90-06-11	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1
90-06-18	<0.3	<0.1	<0.5	<0.4	<0.1	<0.1	<0.1	<0.1	<0.1
90-08-13	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**(0.03)**
91-02-26	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**(0.03)**
91-04-08	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1
91-04-24	<0.3	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1
91-05-02	<0.3	<0.1	<0.5	<0.4	<0.1	<0.1	<0.1	<0.1	**(0.04)**

Appendix 4. Pesticide concentrations in non-composite water samples collected at NA1, FA3, SH5, UT10 and LU12 in 1990 and 1991

Date	dimethoate	diuron	esfenvalerate	ethofumesate	fenitrothion	fenpropimorph	fenvalerate	flamprop-M
UT10								
90-04-22	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-02	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-08	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-10	<0.1	**13**	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-14	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-17	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-21	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-25	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-28	<0.1	**0.5**	n.a.	n.a.	<0.1	**1**	<0.2	n.a.
90-06-06	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-06-11	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-06-18	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
91-05-07	n.a.	<0.5	<0.2	<0.2	<0.1	<0.7	<0.2	<0.1
91-05-14	n.a.	<0.5	<0.2	<0.2	<0.1	<0.7	<0.2	<0.1
91-05-21	n.a.	<0.5	<0.2	<0.2	<0.1	<0.7	<0.2	<0.1
91-05-28	n.a.	<0.5	<0.2	<0.2	<0.3	<0.7	<0.2	<0.1
91-06-04	n.a.	<0.5	<0.2	**0.3**	<0.1	<0.7	<0.2	<0.1
91-06-11	n.a.	<0.5	<0.2	**(0.1)**	<0.1	<0.7	<0.2	<0.1
91-06-18	n.a.	<1	<0.2	**0.6**	<0.1	<0.8	<0.2	<0.1
91-06-24	n.a.	<0.5	<0.2	**0.3**	<0.3	<0.5	<0.2	**(0.05)**
LU12								
90-04-04	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-04-22	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-02	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-08	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-10	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-14	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-17	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-21	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-25	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-05-28	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-06-06	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-06-11	<0.1	<0.5	n.a.	n.a.	<0.1	**3.6**	<0.2	n.a.
90-06-18	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
90-08-13	<0.1	<0.5	n.a.	n.a.	<0.1	<0.3	<0.2	n.a.
91-02-26	<0.1	<0.5	n.a.	n.a.	<0.1	<0.7	<0.2	n.a.
91-04-08	n.a.	<0.5	<0.2	<0.2	<0.1	<0.7	<0.2	n.a.
91-04-24	n.a.	<0.5	<0.2	<0.2	<0.1	<0.7	<0.2	n.a.
91-05-02	n.a.	<0.5	<0.2	n.a.	<0.1	<0.7	<0.2	n.a.

Appendix 4. Pesticide concentrations in non-composite water samples collected at NA1, FA3, SH5, UT10 and LU12 in 1990 and 1991

Date	fluroxypyr	hexazinon	ioxynil	isoproturon	lenacil	linuron	MCPA	mecoprop	metamitron
UT10									
90-04-22	n.a.	<0.2	n.a.	<0.5	<0.5	<0.2	**(0.08)**	**0.2**	<1
90-05-02	n.a.	<0.2	n.a.	<0.5	<0.5	<0.1	**0.1**	**0.9**	<1
90-05-08	n.a.	<0.2	n.a.	<0.5	<0.5	<0.1	**0.2**	**2.9**	<1
90-05-10	n.a.	<0.5	n.a.	**5.4**	<0.5	**40**	**120**	**13**	<5
90-05-14	n.a.	<0.5	n.a.	<1.5	<0.5	**1.4**	**0.8**	**(0.06)**	**60**
90-05-17	n.a.	<0.5	n.a.	<1.5	<0.5	<0.4	**0.4**	**(0.03)**	**3.5**
90-05-21	n.a.	<0.5	n.a.	<1.5	<0.5	**1.3**	**0.3**	**(0.04)**	**10**
90-05-25	n.a.	<0.5	n.a.	<1.5	<0.5	**0.4**	<0.1	<0.1	**90**
90-05-28	n.a.	<0.5	n.a.	<1.5	<0.5	**1.5**	**0.6**	**0.3**	**45**
90-06-06	n.a.	<0.5	n.a.	<2	<0.5	<1	**0.1**	**(0.08)**	<1
90-06-11	n.a.	<0.2	n.a.	<2	<0.5	<0.2	**(0.04)**	**(0.03)**	<1
90-06-18	n.a.	<0.2	n.a.	<1.5	<0.5	<1	**2.6**	**0.1**	**3.5**
91-05-07	<2	n.a.	<0.2	<2	<0.5	<0.4	<0.1	**0.2**	<1
91-05-14	<2	n.a.	<0.2	<2	<0.5	<0.4	**(0.05)**	**(0.09)**	<1
91-05-21	<2	n.a.	<0.2	<2	<1	<0.6	<0.1	**(0.08)**	<1
91-05-28	<2	n.a.	<0.2	<2	<1	<0.8	<0.1	**(0.09)**	<1
91-06-04	<2	n.a.	**(0.05)**	<0.5	<0.2	<0.5	**4**	**0.3**	**(0.5)**
91-06-11	<2	n.a.	<0.2	**(0.5)**	<0.2	<0.5	**0.3**	**0.2**	<1
91-06-18	<2	n.a.	**0.2**	<1	<0.5	<0.5	**1**	**0.3**	<2
91-06-24	<2	n.a.	**0.1**	<0.6	<0.5	<1	**0.5**	**0.2**	<1
LU12									
90-04-04	n.a.	<0.2	n.a.	<0.5	<0.5	<0.2	<0.1	**(0.08)**	<1
90-04-22	n.a.	<0.2	n.a.	<0.5	<0.5	<0.2	**(0.06)**	**0.1**	<1
90-05-02	n.a.	<0.2	n.a.	<0.5	<0.5	<0.1	**0.1**	**0.6**	<1
90-05-08	n.a.	<0.2	n.a.	<0.5	<0.5	<0.1	**1.1**	**0.1**	<1
90-05-10	n.a.	<0.5	n.a.	<1.5	<0.5	<0.4	**16**	**1.2**	**3.5**
90-05-14	n.a.	<0.5	n.a.	<1.5	<0.5	**0.9**	**2**	**0.2**	**15**
90-05-17	n.a.	<0.2	n.a.	<2	<0.5	<0.2	**0.3**	**(0.03)**	<5
90-05-21	n.a.	<0.5	n.a.	<1.5	<0.5	<0.4	**0.1**	**(0.02)**	<5
90-05-25	n.a.	<0.5	n.a.	<1.5	<0.5	<0.4	**(0.04)**	<0.1	**3.5**
90-05-28	n.a.	<0.5	n.a.	<2	<0.5	<1	**0.1**	**(0.04)**	<5
90-06-06	n.a.	<0.5	n.a.	<2	<0.5	<1	**2**	**0.8**	<1
90-06-11	n.a.	<0.2	n.a.	<2	<0.5	<0.2	<0.1	<0.1	<1
90-06-18	n.a.	<0.2	n.a.	<1.5	<0.5	<1	**(0.02)**	<0.1	<5
90-08-13	n.a.	<0.2	n.a.	<1	<0.5	<0.2	**(0.02)**	**(0.03)**	<1
91-02-26	n.a.	<0.2	n.a.	<0.5	<0.2	<0.1	<0.1	**(0.02)**	<1
91-04-08	n.a.	n.a.	n.a.	<2	**1**	<0.6	<0.1	**(0.02)**	<1
91-04-24	n.a.	n.a.	n.a.	<2	<1	<0.6	<0.1	**(0.04)**	<1
91-05-02	n.a.	n.a.	n.a.	<2	<0.5	<0.4	**(0.06)**	**0.2**	<1

Appendix 4. Pesticide concentrations in non-composite water samples collected at NA1, FA3, SH5, UT10 and LU12 in 1990 and 1991

Date	metazachlor	methabenzthiazuron	pendimethalin	permethrin	phenmedipham	pirimicarb	prochloraz
UT10							
90-04-22	**0.1**	<0.3	<0.2	<0.5	<2	<0.1	n.a.
90-05-02	**0.18**	<0.3	<0.2	<0.5	<1	<0.1	n.a.
90-05-08	**0.2**	<0.3	<0.1	<0.5	<1	<0.1	n.a.
90-05-10	**26**	<1.5	<0.3	<0.5	<3	<0.1	n.a.
90-05-14	**1.9**	<1.5	<0.3	<0.5	<3	<0.1	n.a.
90-05-17	**1.3**	**1.5**	<0.3	<0.5	<3	<0.1	n.a.
90-05-21	**1.6**	<1.5	<0.3	<0.5	<3	<0.1	n.a.
90-05-25	**1**	**2**	<0.3	<0.5	<3	<0.1	n.a.
90-05-28	**18**	<0.3	<0.3	<0.5	<3	**0.2**	n.a.
90-06-06	**2.4**	<3	<0.5	<0.5	<20	<0.1	n.a.
90-06-11	**0.6**	<0.5	<0.2	<0.5	<1	**1**	n.a.
90-06-18	**2.3**	<0.3	<0.3	<0.5	<1	**0.7**	n.a.
91-05-07	<0.1	<0.5	<0.2	<1	<2	<0.1	n.a.
91-05-14	<0.1	<0.5	<0.2	<1	<2	<0.1	n.a.
91-05-21	<0.1	<0.3	<0.2	<0.5	<2	<0.1	n.a.
91-05-28	<0.1	<0.3	<0.2	<0.5	<2	<0.1	n.a.
91-06-04	<0.1	<0.3	<0.2	<0.5	<2	<0.1	<0.3
91-06-11	<0.1	<0.3	<0.2	<0.5	<2	**(0.05)**	<0.3
91-06-18	<0.2	**2**	<0.2	<0.5	<2	<0.1	<0.3
91-06-24	**0.3**	<0.3	<0.2	<0.5	<1	<0.1	<0.1
LU12							
90-04-04	<0.1	<0.3	<0.2	<1	<2	<0.1	n.a.
90-04-22	<0.1	<0.3	<0.2	<0.5	<2	<0.1	n.a.
90-05-02	<0.1	<0.3	<0.2	<0.5	<1	<0.1	n.a.
90-05-08	<0.1	<0.3	<0.1	**1.9**	<1	<0.1	n.a.
90-05-10	**7.5**	<1.5	<0.3	<0.5	<3	<0.1	n.a.
90-05-14	**1.4**	<1.5	<0.3	<0.5	<3	<0.1	n.a.
90-05-17	**0.4**	<0.5	<0.2	<0.5	<1	<0.1	n.a.
90-05-21	**0.3**	<1.5	<0.3	<0.5	<3	<0.1	n.a.
90-05-25	**0.3**	<1.5	<0.3	<0.5	<3	<0.1	n.a.
90-05-28	**0.2**	<3	<0.5	<0.5	<20	<0.1	n.a.
90-06-06	**3.9**	<3	<0.5	<0.5	<20	<0.1	n.a.
90-06-11	**0.1**	<0.5	<0.2	<0.5	<1	**0.2**	n.a.
90-06-18	**0.2**	<0.3	<0.3	<0.5	<1	<0.1	n.a.
90-08-13	**0.2**	<0.3	<0.2	<0.5	<2	**0.1**	n.a.
91-02-26	<0.2	<0.4	<0.2	<0.5	<1	<0.1	n.a.
91-04-08	<0.1	<0.3	<0.2	<0.5	<2	<0.1	n.a.
91-04-24	<0.1	<0.3	<0.2	<0.5	<2	<0.1	n.a.
91-05-02	<0.1	<0.5	<0.2	<1	<2	<0.1	n.a.

Appendix 4. Pesticide concentrations in non-composite water samples collected at NA1, FA3, SH5, UT10 and LU12 in 1990 and 1991

Date	propiconazole	propyzamide	simazine	terbuthylazine	triadimenol	tribenuronmetyl	Sum pest
UT10							
90-04-22	<0.2	<0.2	<0.1	**0.2**	<0.5	n.a.	**0.9**
90-05-02	<0.2	<0.2	<0.1	**0.26**	<0.5	n.a.	**2.0**
90-05-08	<0.2	<0.2	<0.1	**0.7**	<0.5	n.a.	**5.2**
90-05-10	<0.4	<0.2	<0.1	**3**	<0.5	n.a.	**346.1**
90-05-14	<0.4	<0.2	<0.1	**0.8**	<0.5	n.a.	**69.9**
90-05-17	<0.4	<0.2	<0.1	**0.4**	<0.5	n.a.	**9.4**
90-05-21	<0.4	<0.2	<0.1	**0.6**	<0.5	n.a.	**15.2**
90-05-25	**2.3**	<0.2	<0.1	**0.7**	<0.5	n.a.	**102.0**
90-05-28	<0.4	<0.2	<0.1	**2**	<0.5	n.a.	**78.6**
90-06-06	**1.1**	<0.4	<0.1	**1.8**	<0.5	n.a.	**10.9**
90-06-11	**2.8**	<0.4	<0.1	**0.4**	<0.5	n.a.	**6.0**
90-06-18	**3**	<0.5	<0.1	**0.7**	<0.5	n.a.	**15.0**
91-05-07	<0.2	n.a.	<0.1	<0.1	<0.5	n.a.	**0.2**
91-05-14	<0.2	n.a.	<0.1	<0.1	<0.5	n.a.	**0.3**
91-05-21	<0.2	n.a.	<0.2	<0.1	<1	n.a.	**0.4**
91-05-28	<0.2	n.a.	<0.2	**0.2**	<1	n.a.	**0.5**
91-06-04	<0.2	n.a.	<0.2	**0.1**	<0.5	n.a.	**6.6**
91-06-11	<0.2	n.a.	<0.2	<0.1	<0.5	n.a.	**1.7**
91-06-18	**0.7**	n.a.	<0.3	**1**	<0.5	n.a.	**18.5**
91-06-24	**0.3**	n.a.	**(0.06)**	**0.4**	<0.5	n.a.	**3.9**
LU12							
90-04-04	<0.2	<0.2	<0.1	<0.1	<0.5	n.a.	**0.1**
90-04-22	<0.2	<0.2	<0.1	<0.1	<0.5	n.a.	**0.3**
90-05-02	<0.2	<0.2	<0.1	**0.11**	<0.5	n.a.	**1.1**
90-05-08	<0.2	<0.2	<0.1	**0.1**	<0.5	n.a.	**5.1**
90-05-10	<0.4	<0.2	<0.1	**0.1**	<0.5	n.a.	**39.7**
90-05-14	<0.4	<0.2	<0.1	**0.4**	<0.5	n.a.	**23.6**
90-05-17	<0.2	<0.4	<0.1	**0.1**	<0.5	n.a.	**1.2**
90-05-21	<0.4	<0.2	<0.1	**0.1**	<0.5	n.a.	**0.9**
90-05-25	<0.4	<0.2	<0.1	**0.2**	<0.5	n.a.	**4.7**
90-05-28	<0.2	<0.4	<0.1	**0.1**	<0.5	n.a.	**1.3**
90-06-06	**0.7**	<0.4	<0.1	**0.5**	<0.5	n.a.	**12.2**
90-06-11	**0.6**	<0.4	<0.1	<0.1	<0.5	n.a.	**4.6**
90-06-18	**0.7**	<0.5	<0.1	<0.1	<0.5	n.a.	**1.2**
90-08-13	<0.2	<0.4	<0.1	<0.1	<0.5	n.a.	**0.5**
91-02-26	<0.2	<0.2	<0.3	<0.1	<0.5	n.a.	**0.1**
91-04-08	<0.2	n.a.	<0.2	<0.1	<1	n.a.	**1.1**
91-04-24	<0.2	n.a.	<0.2	<0.1	<1	n.a.	**0.1**
91-05-02	<0.2	n.a.	<0.1	<0.1	<0.5	n.a.	**0.4**

Appendix 5. Pesicide concentrations in water samples from courtyard wells in 1991 and 1992

Date	a-cypermethrin	atrazine	atrazine-desethyl	atrazine-desisopropyl	BAM	benazolin-ethylester	bentazone	bromoxynil	chloridazon	clopyralid
Farm A										
91-05-23	<0.2	**30**	<0.2	n.a.	<0.1	<0.1	**30**	**2**	**70**	**7**
91-06-11	<0.2	**2**	**1**	**1**	<0.1	<0.1	**5**	**0.1**	n.a.	<2
91-06-18	<0.2	**0.4**	<0.4	n.a.	<0.1	<0.5	**0.8**	**20**	**40**	<0.5
92-05-18	<0.5	**0.8**	n.a.	n.a.	n.a.	<1	**3**	n.a.	**10**	**2**
Farm B										
91-05-23	<0.2	**1**	**0.4**	n.a.	<0.1	<0.1	**0.3**	<0.2	n.a.	<1
91-06-11	<0.2	**0.3**	**0.2**	n.a.	<0.1	<0.1	**0.1**	**(0.05)**	n.a.	<0.5
91-06-18	<0.2	**0.4**	<0.4	n.a.	<0.1	<0.5	<0.1	<0.2	n.a.	<0.5
92-05-18	<0.5	<0.2	n.a.	n.a.	n.a.	<1	**(0.05)**	n.a.	<0.5-1	<0.5

Date	cyanazine	cyfluthrin	cypermethrin	2,4-D	deltamethrin	dicamba	dichlobenil	dichlorprop	dimethoate	diuron	esfenvalerate	ethofumesate
Farm A												
91-05-23	**2**	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**60**	n.a.	<0.5	<0.2	<0.2
91-06-11	**0.4**	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	n.a.	<0.5	<0.2	**5**
91-06-18	<0.2	<0.5	<0.2	**(0.06)**	<0.1	<0.1	<0.1	**30**	n.a.	<1	<0.2	**4**
92-05-18	**0.6**	<2	<0.5-1	<0.1	<0.5	n.a.	<1	**0.5**	n.a.	**2**	**0.5**	**6**
Farm B												
91-05-23	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**60**	n.a.	<0.5	**0.7**	n.a.
91-06-11	<0.1	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	**9**	n.a.	<0.5	<0.2	**0.9**
91-06-18	<0.2	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	n.a.	<1	<0.2	n.a.
92-05-18	<0.3	<0.4	<0.5-1	<0.1	<0.5	n.a.	<1	**20**	n.a.	<1	<0.5	**0.8**

Date	fenitrothion	fenpropimorph	fenvalerate	flamprop-M	fluroxypyr	hexazinon	ioxynil	isoproturon	lambda-cyhalotrin	lenacil	linuron
Farm A											
91-05-23	<0.1	**6**	<0.2	**7**	**30**	n.a.	**5**	**2000**	n.a.	<0.2	**400**
91-06-11	<0.1	**5**	<0.2	**0.4**	**4**	n.a.	**0.2**	**400**	n.a.	**0.4**	**100**
91-06-18	<0.1	**2**	<0.2	**0.1**	**1**	n.a.	**60**	**100**	n.a.	<0.5	**20**
92-05-18	<1	**5**	<0.5	**3**	**8**	n.a.	**(0.1)**	**200**	n.a.	n.a.	**10**
Farm B											
91-05-23	<0.1	<0.7	<0.2	<0.1	<3	n.a.	<0.2	<1	n.a.	<0.2	<0.5
91-06-11	<0.1	<0.7	<0.2	<0.1	<3	n.a.	**2**	<1	n.a.	<0.2	<0.5
91-06-18	<0.1	<0.8	<0.2	<0.1	**0.9**	n.a.	**0.4**	<1	n.a.	<0.5	<0.5
92-05-18	<1	**0.1**	<0.5	<0.1	**0.4**	n.a.	**0.2**	**4**	n.a.	n.a.	<2

Appendix 5. Pesicide concentrations in water samples from courtyard wells in 1991 and 1992

Date	MCPA	mecoprop	metamitron	metazachlor	methabenzthiazuron	pendimethalin	permethrin	phenmedipham	pirimicarb	prochloraz
Farm A										
91-05-23	9	120	300	300	300	<0.2	<0.5	<2	60	100
91-06-11	(0.06)	(0.04)	300	60	30	0.8	<0.5	<2	7	10
91-06-18	70	80	40	8	10	<0.2	<0.5	3	1.2	1
92-05-18	0.2	0.8	400	20	70	1	<1	n.a.	10	10
Farm B										
91-05-23	0.5	0.8	<1	<0.1	<0.3	1	<0.5	<2	0.5	<0.3
91-06-11	15	(0.06)	4	0.3	<0.3	<0.2	<0.5	<2	0.2	0.3
91-06-18	0.3	<0.1	(1)	0.2	<0.4	0.4	<0.5	<2	<0.1	<0.3
92-05-18	1.5	0.3	2	0.5	<0.5	<0.5	<1	n.a.	<0.5	3

Date	propiconazole	propyzamide	simazine	terbuthylazine	terbuthylazine-desethyl	triadimenol	tribenuronmetyl	triklorfenol	Sum pest
Farm A									
91-05-23	100	n.a.	5	900	n.a.	<0.5	n.a.	100	4943.0
91-06-11	30	n.a.	0.9	80	n.a.	<0.5	n.a.	n.a.	1043.3
91-06-18	20	n.a.	<0.3	16	3	<0.5	n.a.	n.a.	530.6
92-05-18	30	<1	0.7	30	n.a.	<1	n.a.	n.a.	824.2
Farm B									
91-05-23	5	n.a.	<0.2	(0.1)	n.a.	2	n.a.	n.a.	72.3
91-06-11	0.3	n.a.	<0.2	<0.1	n.a.	<0.5	n.a.	n.a.	32.7
91-06-18	1	n.a.	<0.3	<0.2	n.a.	<0.5	n.a.	n.a.	4.6
92-05-18	<0.4	<1	<0.5	<0.2	n.a.	<1	n.a.	n.a.	32.9

Appendix 6. Monthly time weighted mean concentrations (TWMC) at LU12/TP and UT10/TP during periods of time-paced sampling 1990-1994

	TWMC (µg/l) 1990 at LU12					TWMC (µg/l) 1991 at LU12					TWMC (µg/l) 1992 at LU12				
Substance	May	Jun	Jul	Aug	Sep	May	Jun	Jul	Aug	Sep	May	Jun	Jul	Aug	Sep
a-cypermethrin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
atrazine	0.09	0.48	0.23	0.03	0.00	0.04	0.20	0.05	0.04	0.02	0.02	0.00	0.08	0.15	0.07
atrazine-desethyl	n.a.	n.a.	n.a.	n.a.	n.a.	0.00	0.00	0.00	0.00	0.00	n.a.	n.a.	n.a.	n.a.	n.a.
BAM	n.a.	n.a.	n.a.	n.a.	n.a.	0.00	0.00	0.00	0.00	0.00	n.a.	n.a.	n.a.	n.a.	n.a.
benazolin-ethylester	n.a.	n.a.	n.a.	n.a.	n.a.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
bentazone	1.28	0.56	0.17	0.08	0.01	0.13	0.20	0.10	0.06	0.02	0.02	0.00	0.00	0.01	0.00
bromoxynil	n.a.	n.a.	n.a.	n.a.	n.a.	0.00	0.25	0.03	0.00	0.00	n.a.	n.a.	n.a.	n.a.	n.a.
chloridazon	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	2.14	0.01	0.35	0.00	0.00
clopyralid	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
cyanazine	0.27	0.01	0.00	0.00	0.00	0.05	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
cyfluthrin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
cypermethrin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,4-D	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.27	0.00	0.03	0.00	0.00
deltamethrin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
dicamba	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	n.a.	n.a.	n.a.	n.a.	n.a.
dichlobenil	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
dichlorprop	2.80	0.37	0.05	0.02	0.00	0.12	1.52	0.19	0.04	0.03	4.58	0.14	0.27	0.00	0.01
dimethoate	0.00	0.00	0.00	0.00	0.00	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
diuron	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
esfenvalerate	n.a.	n.a.	n.a.	n.a.	n.a.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ethofumesate	n.a.	n.a.	n.a.	n.a.	n.a.	0.03	0.21	0.03	0.00	0.03	0.87	0.08	0.08	0.00	0.00
fenitrothion	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
fenpropimorph	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.07	0.00	0.00	0.00	0.00	0.01	0.00	0.21
fenvalerate	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
flamprop-M	n.a.	n.a.	n.a.	n.a.	n.a.	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
fluroxypyr	n.a.	n.a.	n.a.	n.a.	n.a.	0.90	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
hexazinon	0.00	0.00	0.00	0.00	0.00	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
ioxynil	n.a.	n.a.	n.a.	n.a.	n.a.	0.00	0.27	0.02	0.00	0.00	0.09	0.00	0.03	0.00	0.00
isoproturon	0.00	0.00	0.00	0.00	0.00	0.00	0.67	0.00	0.00	0.00	0.07	0.00	0.03	0.00	0.00
lambda-cyhalothrin	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
lenacil	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	n.a.	n.a.	n.a.	n.a.	n.a.
linuron	0.14	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MCPA	4.73	0.51	0.13	0.03	0.00	0.21	1.81	0.24	0.06	0.03	2.33	0.33	0.34	0.05	0.02
mecoprop	0.64	0.13	0.02	0.01	0.00	0.14	2.21	0.06	0.02	0.05	0.10	0.32	0.14	0.03	0.02
metamitron	7.09	0.49	0.00	0.00	0.00	0.06	0.55	0.00	0.00	0.00	2.00	0.37	0.68	0.11	0.00
metazachlor	1.33	0.92	0.33	0.07	0.00	0.00	0.01	0.02	0.07	0.77	0.00	0.00	0.09	0.02	0.36
methabenzthiazuron	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.08	0.05	0.00	0.00	0.00	0.00	0.00
pendimethalin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
permethrin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
phenmedipham	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	n.a.	n.a.	n.a.	n.a.	n.a.
pirimicarb	0.00	0.35	0.32	0.00	0.00	0.00	0.00	0.05	0.04	0.01	0.00	0.07	0.29	0.08	0.02
prochloraz	n.a.	n.a.	n.a.	n.a.	n.a.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
propiconazole	0.10	0.99	0.29	0.20	0.06	0.00	0.34	0.10	0.05	0.05	0.00	0.00	0.21	0.02	0.00
propyzamide	0.00	0.00	0.00	0.00	0.00	n.a.	n.a.	n.a.	n.a.	n.a.	0.00	0.00	0.00	0.00	0.00
simazine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
terbuthylazine	0.24	0.23	0.14	0.03	0.00	0.04	0.19	0.09	0.09	0.05	0.67	0.27	0.27	0.33	0.19
triadimenol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
tribenuronmetyl	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Sum pest	18.83	5.04	1.67	0.47	0.07	1.72	8.69	1.20	0.55	1.12	15.16	1.58	2.91	0.81	0.91

n.a. = not analysed

Appendix 6. Monthly time weighted mean concentrations (TWMC) at LU12/TP and UT10/TP during periods of time-paced sampling 1990-1994

Substance	TWMC (µg/l) 1992 at UT10 May	Jun	Jul	Aug	Sep	TWMC (µg/l) 1993 at UT10 May	Jun	TWMC (µg/l) 1994 at UT10 May	Jun	Jul	Aug	Sep
a-cypermethrin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
atrazine	0.07	0.01	0.63	1.54	0.75	0.03	0.22	0.07	0.18	0.06	0.59	0.11
atrazine-desethyl	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.01	0.05	0.02	0.00	0.00
BAM	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.01	0.00	0.00	0.00	0.00
benazolin-ethylester	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
bentazone	0.08	0.13	0.26	0.15	0.09	0.17	0.12	0.00	3.87	0.57	1.81	1.09
bromoxynil	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
chloridazon	2.13	0.43	5.99	0.74	0.12	1.04	0.62	4.04	0.77	0.06	0.00	0.00
clopyralid	0.00	0.00	0.00	0.00	0.09	0.56	2.09	0.00	0.00	0.00	0.00	0.00
cyanazine	0.00	0.00	0.55	0.00	0.23	0.00	0.00	1.05	6.03	0.35	3.76	0.09
cyfluthrin	0.00	0.00	0.00	0.00	0.09	0.06	0.11	0.00	0.00	0.00	0.00	0.00
cypermethrin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,4-D	2.28	0.01	1.18	0.02	0.00	0.03	0.09	0.00	0.12	0.04	0.03	0.05
deltamethrin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
dicamba	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
dichlobenil	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00
dichlorprop	4.61	0.66	5.92	0.21	0.23	0.16	0.06	0.00	1.61	0.26	0.09	0.10
dimethoate	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	2.50	0.00	0.00
diuron	0.00	0.00	0.00	0.00	0.00	0.06	0.04	0.00	0.00	0.00	0.00	0.00
esfenvalerate	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00
ethofumesate	0.87	0.80	2.26	1.07	0.38	0.49	0.30	0.62	0.53	0.12	1.35	0.52
fenitrothion	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
fenpropimorph	0.00	0.21	2.70	0.36	0.40	0.07	1.89	0.00	0.07	0.03	0.61	0.22
fenvalerate	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
flamprop-M	0.00	0.00	0.09	0.09	0.08	0.01	0.38	n.a.	n.a.	n.a.	n.a.	n.a.
fluroxypyr	0.00	0.02	0.21	0.16	0.07	0.95	1.94	0.00	0.00	0.00	0.21	0.05
hexazinon	n.a.	n.a.	n.a.	n.a.	n.a.	0.19	0.03	n.a.	n.a.	n.a.	n.a.	n.a.
ioxynil	0.07	0.00	0.88	0.08	0.01	0.00	0.01	n.a.	n.a.	n.a.	n.a.	n.a.
isoproturon	0.09	0.02	0.95	0.44	0.36	0.25	0.54	0.09	0.00	0.00	0.55	0.13
lambda-cyhalothrin	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.00	0.00	0.00	0.00	0.00
lenacil	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
linuron	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MCPA	4.72	2.11	6.37	0.67	0.49	5.62	9.53	0.09	3.60	0.45	0.08	0.11
mecoprop	0.31	2.40	3.79	0.40	0.37	2.00	0.22	0.14	3.00	0.45	0.68	1.59
metamitron	6.97	5.70	13.45	3.31	0.91	15.65	3.13	3.89	2.11	0.17	0.00	0.00
metazachlor	0.06	0.00	2.12	1.10	17.31	0.14	0.48	0.03	0.06	0.00	0.26	48.51
methabenzthiazuron	0.00	0.13	1.39	0.79	0.65	0.06	0.48	0.00	0.00	0.00	0.00	0.00
pendimethalin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
permethrin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
phenmedipham	n.a.	n.a.	n.a.	n.a.	n.a.	0.19	0.00	0.00	0.00	0.00	0.00	0.00
pirimicarb	0.00	0.84	3.90	2.00	0.75	0.04	1.72	0.01	0.25	0.06	2.24	0.21
prochloraz	0.00	0.00	0.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
propiconazole	0.00	0.33	5.22	1.36	0.49	0.13	5.13	0.00	0.16	0.00	1.62	0.32
propyzamide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.50	0.00	0.61	0.40
simazine	0.01	0.00	0.13	0.29	0.12	0.91	5.43	0.03	0.58	0.08	3.65	0.60
terbuthylazine	1.07	2.21	4.19	4.81	2.96	0.35	2.32	0.77	4.15	0.57	11.71	2.06
triadimenol	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
tribenuronmetyl	n.a.	n.a.	n.a.	n.a.	n.a.	0.08	0.02	0.02	0.02	n.a.	n.a.	n.a.
Sum pest	23.29	15.98	62.87	19.60	26.96	29.24	36.81	10.95	25.34	5.79	29.83	56.14

n.a. = not analysed

Appendix 6. Monthly time weighted mean concentrations (TWMC) at LU12/TP and UT10/TP during periods of time-paced sampling 1990-1994

	TWMC (µg/l) winter 1992/1993 at UT10						
Substance	Oct	Nov	Dec	Jan	Feb	Mar	Apr
a-cypermethrin	0.00	0.00	0.00	0.00	0.00	0.00	0.00
atrazine	0.59	0.23	0.00	0.00	0.00	0.00	0.01
atrazine-desethyl	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
BAM	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
benazolin-ethylester	0.00	0.00	0.00	0.00	0.00	0.00	0.00
bentazone	0.14	0.11	0.05	0.00	0.00	0.00	0.00
bromoxynil	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
chloridazon	0.00	0.00	0.00	0.00	0.00	0.00	5.23
clopyralid	0.11	0.00	0.00	0.00	0.00	0.00	0.00
cyanazine	0.00	0.00	0.00	0.00	0.00	0.00	0.00
cyfluthrin	0.00	0.00	0.00	0.00	0.00	0.00	0.00
cypermethrin	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,4-D	0.00	0.00	0.00	0.00	0.00	0.00	0.00
deltamethrin	0.00	0.00	0.00	0.00	0.00	0.00	0.00
dicamba	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
dichlobenil	0.00	0.00	0.00	0.00	0.00	0.00	0.00
dichlorprop	0.19	0.04	0.00	0.01	0.00	0.00	0.02
dimethoate	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
diuron	0.00	0.00	0.05	0.00	0.00	0.00	0.00
esfenvalerate	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ethofumesate	0.12	0.07	0.00	0.00	0.00	0.00	0.00
fenitrothion	0.00	0.00	0.00	0.00	0.00	0.00	0.00
fenpropimorph	0.53	0.01	0.00	0.39	0.10	0.00	0.09
fenvalerate	0.00	0.00	0.00	0.00	0.00	0.00	0.00
flamprop-M	0.05	0.01	0.00	0.00	0.00	0.00	0.00
fluroxypyr	0.02	0.00	0.00	0.00	0.00	0.00	0.00
hexazinon	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.08
ioxynil	0.08	0.00	0.00	0.00	0.00	0.00	0.00
isoproturon	1.03	0.32	0.00	0.09	0.00	0.00	0.06
lambda-cyhalothrin	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
lenacil	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
linuron	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MCPA	0.10	0.00	0.00	0.00	0.00	0.00	0.00
mecoprop	0.28	0.07	0.01	0.02	0.01	0.00	0.17
metamitron	0.15	0.00	0.00	0.00	0.00	0.00	0.00
metazachlor	2.48	0.57	0.05	0.12	0.03	0.01	0.05
methabenzthiazuron	10.65	1.67	0.00	0.08	0.00	0.00	0.16
pendimethalin	0.00	0.00	0.00	0.00	0.00	0.00	0.00
permethrin	0.00	0.00	0.00	0.00	0.00	0.00	0.00
phenmedipham	n.a.	n.a.	0.00	0.00	0.00	0.00	0.00
pirimicarb	0.22	0.11	0.00	0.02	0.00	0.00	0.00
prochloraz	0.00	0.00	0.00	0.00	0.00	0.00	0.00
propiconazole	0.23	0.02	0.00	0.00	0.00	0.00	0.00
propyzamide	0.00	0.00	0.00	0.00	0.00	0.00	0.00
simazine	1.03	0.16	0.00	0.00	0.00	0.00	0.00
terbuthylazine	47.84	8.07	0.48	0.58	0.21	0.11	0.31
triadimenol	0.00	0.00	0.00	0.00	0.00	0.00	0.00
tribenuronmetyl	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Sum pest	65.84	11.39	0.64	1.31	0.35	0.12	6.19

n.a. = not analysed

Appendix 7. Transported quantities and loss as percentage of applied amounts at LU12 1990-1992

Time period	a-cypermethrin	atrazine	atrazine-desethyl	BAM	benazolin	bentazone	bromoxynil	chloridazon
Transp (g)								
1990								
May	0.0	10.6	n.a.	n.a.	n.a.	117.5	n.a.	n.a.
Jun	0.0	78.4	n.a.	n.a.	n.a.	75.9	n.a.	n.a.
Jul	0.0	18.8	n.a.	n.a.	n.a.	13.6	n.a.	n.a.
Aug	0.0	2.0	n.a.	n.a.	n.a.	4.7	n.a.	n.a.
Sep (1/2)	0.0	0.0	n.a.	n.a.	n.a.	0.2	n.a.	n.a.
May-Sep	0.0	**109.7**	n.a.	n.a.	n.a.	**211.9**	n.a.	n.a.
1991								
May	0.0	31.7	n.a.	n.a.	0.0	18.7	0.0	n.a.
Jun	0.0	23.0	n.a.	n.a.	0.0	22.4	19.9	n.a.
Jul	0.0	2.8	n.a.	n.a.	0.0	6.0	2.1	n.a.
Aug	0.0	1.4	n.a.	n.a.	0.0	2.2	0.0	n.a.
Sep	0.0	0.6	n.a.	n.a.	0.0	0.6	0.0	n.a.
May-Sep	0.0	**59.6**	n.a.	n.a.	0.0	**49.9**	**22.0**	n.a.
1992								
May	0.0	1.5	n.a.	n.a.	0.0	1.1	n.a.	220.3
Jun	0.0	0.0	n.a.	n.a.	0.0	0.0	n.a.	0.0
Jul	0.0	2.0	n.a.	n.a.	0.0	0.1	n.a.	8.8
Aug	0.0	3.5	n.a.	n.a.	0.0	0.2	n.a.	0.0
Sep	0.0	1.7	n.a.	n.a.	0.0	0.0	n.a.	0.0
May-Sep	0.0	**8.7**	n.a.	n.a.	0.0	**1.4**	n.a.	**229.1**
Applied (kg)								
1990								
Spring	0.1	0	-	-	0	29.6	10.9	113.7
Autumn	0	0	-	-	0	0	0	0
1991								
Spring	0	0	-	-	1.3	8.6	9.4	35.2
Autumn	0	0	-	-	0.7	0	0.4	0
1992								
Spring	0	0	-	-	1.4	2.9	3.5	286.9
Autumn	0	0	-	-	0.9	0	4.5	0
Loss (%)								
1990								
May-Sep	0.00%	n.u.	n.a.	n.a.	n.a.	0.72%	n.a.	n.a.
1991								
May-Sep	n.u.	n.u.	n.a.	n.a.	0.00%	0.58%	0.23%	n.a.
1992								
May-Sep	n.u.	n.u.	n.a.	n.a.	0.00%	0.05%	n.a.	0.08%
Average loss								
May-Sep	0.00%				0.00%	**0.45%**	**0.23%**	**0.08%**

n.a. = not analysed   n.u. = no usage in the field   - = metabolite

Appendix 7. Transported quantities and loss as percentage of applied amounts at LU12 1990-1992

Time period	clopyralid	cyanazine	cyfluthrin	cypermethrin	2,4-D	deltamethrin	dichlobenil	dichlorprop
Transp (g)								
1990								
May	0.0	24.7	0.0	0.0	6.5	0.0	0.0	222.4
Jun	0.0	2.2	0.0	0.0	0.3	0.0	0.0	49.1
Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0
Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4
Sep (1/2)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
May-Sep	0.0	**26.9**	0.0	0.0	**6.8**	0.0	0.0	**275.9**
1991								
May	0.0	7.6	0.0	0.0	0.0	0.0	0.0	49.1
Jun	0.0	3.0	0.0	0.0	0.0	0.0	0.0	142.6
Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.0
Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4
Sep	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9
May-Sep	0.0	**10.7**	0.0	0.0	0.0	0.0	0.0	**207.0**
1992								
May	0.0	0.0	0.0	0.0	116.2	0.0	0.0	234.3
Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.2
Jul	0.0	0.0	0.0	0.0	0.7	0.0	0.0	6.5
Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sep	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
May-Sep	0.0	0.0	0.0	0.0	**116.9**	0.0	0.0	**245.2**
Applied (kg)								
1990								
Spring	0.8	10.4	0.2	0	3.0	0.1	0	188.2
Autumn	0	0	0	0	0	0.3	0	11.3
1991								
Spring	2.0	9.0	0.1	0	0	0.4	0	140.7
Autumn	0.1	0	0	0	0	0	0	12.0
1992								
Spring	3.3	1.5	0.3	0.4	0	0.4	0	41.4
Autumn	0.2	0	0.5	0.4	0	0.1	0	16.9
Loss (%)								
1990								
May-Sep	0.00%	0.26%	0.00%	n.u.	0.23%	0.00%	n.u.	0.15%
1991								
May-Sep	0.00%	0.12%	0.00%	n.u.	n.u.	0.00%	n.u.	0.15%
1992								
May-Sep	0.00%	0.00%	0.00%	0.00%	n.u.	0.00%	n.u.	0.59%
Average loss								
May-Sep	0.00%	**0.13%**	0.00%	0.00%	**0.23%**	0.00%		**0.30%**

Appendix 7. Transported quantities and loss as percentage of applied amounts at LU12 1990-1992

Time period	dimethoate	diuron	esfenvalerate	ethofumesate	fenitrothion	fenpropimorph	fenvalerate	flamprop-M
Transp (g)								
1990								
May	0.0	0.0	n.a.	n.a.	0.0	0.0	0.0	n.a.
Jun	0.0	0.0	n.a.	n.a.	0.0	0.0	0.0	n.a.
Jul	0.0	0.0	n.a.	n.a.	0.0	0.0	0.0	n.a.
Aug	0.0	0.0	n.a.	n.a.	0.0	0.0	0.0	n.a.
Sep (1/2)	0.0	0.0	n.a.	n.a.	0.0	0.0	0.0	n.a.
May-Sep	0.0	0.0	n.a.	n.a.	0.0	0.0	0.0	n.a.
1991								
May	0.0	0.0	0.0	2.5	0.0	0.0	0.0	0.0
Jun	0.0	0.0	0.0	19.3	0.0	15.2	0.0	0.8
Jul	0.0	0.0	0.0	1.4	0.0	4.3	0.0	0.6
Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sep	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0
May-Sep	0.0	0.0	0.0	**24.0**	0.0	**19.5**	0.0	**1.4**
1992								
May	0.0	0.0	0.0	40.8	0.0	0.0	0.0	0.0
Jun	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0
Jul	0.0	0.0	0.0	2.0	0.0	0.3	0.0	0.0
Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sep	0.0	0.0	0.0	0.0	0.0	5.1	0.0	0.1
May-Sep	0.0	0.0	0.0	**43.9**	0.0	**5.4**	0.0	**0.1**
Applied (kg)								
1990								
Spring	0	0	2.4	25.1	1.1	102.7	2.0	0
Autumn	0	0	0.03	0	0	0	0	0
1991								
Spring	0	0	2.1	10.2	0	136.4	0	0.8
Autumn	0	0	0.3	0	0	0	0	0
1992								
Spring	0	0	4.3	27.1	0	73.4	0	1.6
Autumn	0	0	0.6	0	0	0	0	0
Loss (%)								
1990								
May-Sep	n.u.	n.u.	n.a.	n.a.	0.00%	0.00%	0.00%	n.a.
1991								
May-Sep	n.u.	n.u.	0.00%	0.24%	n.u.	0.01%	n.u.	0.17%
1992								
May-Sep	n.u.	n.u.	0.00%	0.16%	n.u.	0.01%	n.u.	0.01%
Average loss								
May-Sep			0.00%	**0.20%**	0.00%	**0.01%**	0.00%	**0.09%**

Appendix 7. Transported quantities and loss as percentage of applied amounts at LU12 1990-1992

Time period	fluroxypyr	hexazinon	ioxynil	isoproturon	lenacil	linuron	MCPA	mecoprop	metamitron
Transp (g)									
1990									
May	n.a.	0.0	n.a.	0.0	0.0	12.7	381.4	59.8	609.6
Jun	n.a.	0.0	n.a.	0.0	0.0	0.0	64.5	19.1	133.9
Jul	n.a.	0.0	n.a.	0.0	0.0	0.0	8.4	2.0	0.0
Aug	n.a.	0.0	n.a.	0.0	0.0	0.0	2.0	1.0	0.0
Sep (1/2)	n.a.	0.0	n.a.	0.0	0.0	0.0	0.0	0.0	0.0
May-Sep	n.a.	0.0	n.a.	0.0	0.0	**12.7**	**456.4**	**81.8**	**743.5**
1991									
May	740.8	n.a.	0.0	0.0	0.0	0.0	34.8	75.3	4.4
Jun	0.0	n.a.	19.4	48.0	0.0	0.8	168.4	183.8	38.7
Jul	0.0	n.a.	2.6	0.0	0.0	0.0	16.7	3.3	0.0
Aug	0.0	n.a.	0.0	0.0	0.0	0.0	2.4	0.6	0.0
Sep	0.0	n.a.	0.0	0.0	0.0	0.0	0.7	1.7	0.0
May-Sep	**740.8**	n.a.	**22.0**	**48.0**	0.0	**0.8**	**223.0**	**264.7**	**43.1**
1992									
May	0.0	n.a.	4.6	5.9	0.0	0.0	118.6	6.2	92.4
Jun	0.0	n.a.	0.0	0.0	0.0	0.0	9.6	8.2	9.4
Jul	0.2	n.a.	0.7	0.8	0.0	0.0	8.4	3.3	17.2
Aug	0.0	n.a.	0.0	0.0	0.0	0.0	1.0	0.6	2.6
Sep	0.0	n.a.	0.0	0.0	0.0	0.0	0.5	0.6	0.0
May-Sep	**0.2**	n.a.	**5.3**	**6.7**	0.0	0.0	**138.0**	**18.8**	**121.6**
Applied (kg)									
1990									
Spring	7.4	0	33.9	13.5	0	0	234.2	72.7	314.3
Autumn	0	0	0	26.3	0	0	0	15.3	0
1991									
Spring	8.8	0	21.7	0	0	0	188.0	60.4	181.9
Autumn	0	0	4.0	112.8	0	0	7.1	81.4	0
1992									
Spring	18.4	0	8.5	19.9	0	0	81.9	18.9	470.3
Autumn	0	0	4.9	16.3	0	0	13.7	31.8	0
Loss (%)									
1990									
May-Sep	n.a.	n.u.	n.a.	0.00%	n.u.	n.u.	0.19%	0.11%	0.24%
1991									
May-Sep	(8.42%)	n.a.	0.10%	n.u.	n.u.	n.u.	0.12%	0.44%	0.02%
1992									
May-Sep	0.001%	n.a.	0.06%	0.03%	n.u.	n.u.	0.17%	0.10%	0.03%
Average loss									
May-Sep	**0.001%**		**0.08%**	**0.02%**			**0.16%**	**0.22%**	**0.10%**

Appendix 7. Transported quantities and loss as percentage of applied amounts at LU12 1990-1992

Time period	metazachlor	methabenzthiazuron	pendimethalin	permethrin	phenmedipham	pirimicarb	prochloraz
Transp (g)							
1990							
May	104.3	4.5	0.0	16.4	0.0	0.0	n.a.
Jun	115.4	0.0	0.0	0.0	0.0	40.8	n.a.
Jul	20.3	0.0	0.0	0.0	0.0	30.0	n.a.
Aug	3.8	0.0	0.0	0.0	0.0	0.0	n.a.
Sep (1/2)	0.0	0.0	0.0	0.0	0.0	0.0	n.a.
May-Sep	**243.8**	**4.5**	0.0	**16.4**	0.0	**70.9**	n.a.
1991							
May	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jun	0.8	0.0	0.0	0.0	0.0	0.0	0.0
Jul	0.6	7.1	0.0	0.0	0.0	2.6	0.0
Aug	2.4	3.2	0.0	0.0	0.0	1.6	0.0
Sep	24.4	1.7	0.0	0.0	0.0	0.4	0.0
May-Sep	**28.3**	**12.0**	0.0	0.0	0.0	**4.6**	0.0
1992							
May	0.0	0.0	0.0	0.0	n.a.	0.0	0.0
Jun	0.0	0.0	0.0	0.0	n.a.	1.7	0.0
Jul	2.3	0.0	0.0	0.0	n.a.	7.2	0.0
Aug	0.5	0.0	0.0	0.0	n.a.	1.7	0.0
Sep	7.8	0.0	0.0	0.0	n.a.	0.6	0.0
May-Sep	**10.6**	0.0	0.0	0.0	n.a.	**11.1**	0.0
Applied (kg)							
1990							
Spring	4.6	46.2	16.7	0	57.3	43.7	14.9
Autumn	182.9	103.0	7.9	0	0	0	6.1
1991							
Spring	0	25.0	0	0	22.9	5.6	28.2
Autumn	51.8	10.5	0	0	0	0	0
1992							
Spring	0	4.0	2.0	0	48.1	34.4	17.4
Autumn	149.8	4.9	0	0	0	0	0
Loss (%)							
1990							
May-Sep	(5.30%)	0.01%	0.00%	n.u.	0.00%	0.16%	n.a.
1991							
May-Sep	n.u.	0.05%	n.u.	n.u.	0.00%	0.08%	0.00%
1992							
May-Sep	n.u.	0.00%	0.00%	n.u.	n.a.	0.03%	0.00%
Average loss							
May-Sep		**0.02%**	0.00%		0.00%	**0.09%**	0.00%

Appendix 7. Transported quantities and loss as percentage of applied amounts at LU12 1990-1992

Time period	propiconazole	propyzamide	simazine	terbuthylazine	triadimenol	tribenuron-methyl	Sum pest
Transp (g)							
1990							
May	13.8	0.0	0.0	23.5	0.0	n.a.	1607.5
Jun	117.4	0.0	0.4	30.4	0.0	n.a.	727.8
Jul	8.1	0.0	0.0	10.4	0.0	n.a.	114.7
Aug	10.8	0.0	0.0	2.0	0.0	n.a.	27.5
Sep (1/2)	1.5	0.0	0.0	0.0	0.0	n.a.	1.7
May-Sep	**151.6**	0.0	**0.4**	**66.2**	0.0	n.a.	**2479.2**
1991							
May	0.0	n.a.	0.0	31.7	0.0	n.a.	996.7
Jun	37.2	n.a.	0.0	22.1	0.0	n.a.	765.5
Jul	5.0	n.a.	0.0	5.2	0.0	n.a.	73.3
Aug	1.6	n.a.	0.0	3.5	0.0	n.a.	20.3
Sep	1.7	n.a.	0.0	1.7	0.0	n.a.	35.6
May-Sep	**45.5**	n.a.	0.0	**64.3**	0.0	n.a.	**1891.4**
1992							
May	0.0	0.0	0.0	29.2	0.0	n.a.	871.0
Jun	0.0	0.0	0.0	5.6	0.0	n.a.	39.8
Jul	5.1	0.0	0.0	6.7	0.0	n.a.	72.3
Aug	0.5	0.0	0.0	7.4	0.0	n.a.	17.9
Sep	0.0	0.0	0.0	4.6	0.0	n.a.	21.1
May-Sep	**5.6**	0.0	0.0	**53.4**	0.0	n.a.	**1022.1**
Applied (kg)							
1990							
Spring	34.7	0	0	0	2.2	0	1386.6
Autumn	0	0	0	0	0	0	353.1
1991							
Spring	46.5	0	0	0	3.9	0.9	950.0
Autumn	0	7.0	0	0	0	0	288.1
1992							
Spring	24.1	0	0	0	1.9	1.5	1199.7
Autumn	0	0	0	0	0	0	245.5
Loss (%)							
1990							
May-Sep	0.44%	n.u.	n.u.	n.u.	0.00%	n.a.	0.16%
1991							
May-Sep	0.10%	n.a.	n.a.	n.u.	0.00%	n.a.	0.12%
1992							
May-Sep	0.02%	n.u.	n.u.	n.u.	0.00%	n.a.	0.06%
Average loss							
May-Sep	**0.19%**				0.00%		**0.10%**

Appendix 8. Transported quantities and loss as percentage of applied amounts at UT10 1992-1994

Date	a-cypermethrin	atrazine	atrazine-desethyl	BAM	benazolin	bentazone	chloridazon*	clopyralid
Transp (g)								
1992								
May	0.0	1.4	n.a.	n.a.	0.0	1.5	47.0	0.0
Jun	0.0	0.0	n.a.	n.a.	0.0	0.4	1.7	0.0
Jul	0.0	0.9	n.a.	n.a.	0.0	0.4	9.3	0.0
Aug	0.0	2.5	n.a.	n.a.	0.0	0.3	1.7	0.0
Sep	0.0	1.2	n.a.	n.a.	0.0	0.2	0.2	0.2
May-Sep	0.0	**6.1**	n.a.	n.a.	0.0	**2.7**	**59.9**	**0.2**
1992/93								
Oct	0.0	59.4	n.a.	n.a.	0.0	16.1	0.0	5.9
Nov	0.0	45.1	n.a.	n.a.	0.0	24.0	0.0	0.0
Dec	0.0	0.0	n.a.	n.a.	0.0	11.9	0.0	0.0
Jan	0.0	0.0	n.a.	n.a.	0.0	0.0	0.0	0.0
Feb	0.0	0.0	n.a.	n.a.	0.0	0.0	0.0	0.0
Mar	0.0	0.0	n.a.	n.a.	0.0	0.0	0.0	0.0
Apr	0.0	0.6	n.a.	n.a.	0.0	0.0	259.3	0.0
Oct-Apr	0.0	**105.1**	n.a.	n.a.	0.0	**52.0**	**259.3**	**5.9**
1993								
May	0.0	0.0	n.a.	n.a.	0.0	1.6	11.5	3.5
Jun	0.0	0.9	n.a.	n.a.	0.0	0.3	1.5	4.4
May-Jun	0.0	**0.9**	n.a.	n.a.	0.0	**1.9**	**13.0**	**7.9**
1994								
May	0.0	3.7	0.6	0.6	0.0	0.0	220.2	0.0
Jun	0.0	5.6	1.1	0.0	0.0	84.0	22.8	0.0
Jul	0.0	0.3	0.0	0.0	0.0	4.5	0.6	0.0
Aug	0.0	2.3	0.0	0.0	0.0	6.8	0.0	0.0
Sep	0.0	5.5	0.0	0.0	0.0	157.0	0.0	0.0
Oct	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0
May-Sep	0.0	**17.5**	**1.7**	**0.6**	0.0	**252.3**	**243.6**	0.0
Applied (kg)								
1992								
Spring	0	0	-	-	0.4	1.7	283.8	2.7
Autumn	0	0	-	-	0.9	0	0	0.2
1993								
Spring	0	0	-	-	0.5	0	165.1	5.3
Autumn	0	0	-	-	0	0	0	0
1994								
Spring	0	0	-	-	0.7	0	37.4	0.9
Loss (%)								
1992								
May-Sep	n.u.	n.u.	n.a.	n.a.	0.00%	0.16%	0.02%	0.01%
May-Apr						(3.22%)	0.02%	
Oct-Apr	n.u.	n.u.	n.a.	n.a.	0.00%	n.u.	n.u.	2.93%
1993								
May-Jun	n.u.	n.u.	n.a.	n.a.	0.00%	n.u.	0.16%	0.15%
1994								
May-Sep	n.u.	n.u.			0.00%	n.u.	0.65%	0.00%
Average loss								
May-Sep					0.00%	**0.16%**	**0.28%**	**0.05%**

n.a. = not analysed; n.u. = no usage in the field - = metabolite * = loss in 1993 Apr-Jun

Appendix 8. Transported quantities and loss as percentage of applied amounts at UT10 1992-1994

Date	cyanazine	cyfluthrin	cypermethrin	2,4-D	deltamethrin	dichlobenil	dichlorprop	dimethoate
Transp (g)								
1992								
May	0.0	0.0	0.0	57.7	0.0	0.0	116.2	n.a.
Jun	0.0	0.0	0.0	0.0	0.0	0.0	4.1	n.a.
Jul	0.9	0.0	0.0	1.9	0.0	0.0	9.4	n.a.
Aug	0.0	0.0	0.0	0.1	0.0	0.0	0.5	n.a.
Sep	0.3	0.2	0.0	0.0	0.0	0.0	0.3	n.a.
May-Sep	**1.2**	**0.2**	0.0	**59.7**	0.0	0.0	**130.6**	n.a.
1992/93								
Oct	0.0	0.0	0.0	0.0	0.0	0.0	5.3	n.a.
Nov	0.0	0.0	0.0	0.0	0.0	0.0	10.2	n.a.
Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	n.a.
Jan	0.0	0.0	0.0	0.0	0.0	0.0	2.2	n.a.
Feb	0.0	0.0	0.0	0.0	0.0	0.0	0.0	n.a.
Mar	0.0	0.0	0.0	0.0	0.0	0.0	0.0	n.a.
Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.7	n.a.
Oct-Apr	0.0	0.0	0.0	0.0	0.0	0.0	**18.3**	n.a.
1993								
May	0.0	0.5	0.0	0.1	0.0	0.0	1.5	n.a.
Jun	0.0	0.9	0.0	0.6	0.0	0.0	0.3	n.a.
May-Jun	0.0	**1.4**	0.0	**0.7**	0.0	0.0	**1.7**	n.a.
1994								
May	0.0	0.0	0.0	0.0	0.0	1.9	0.0	n.a.
Jun	217.9	0.0	0.0	2.8	0.0	0.0	34.5	n.a.
Jul	1.9	0.0	0.0	0.4	0.0	0.0	2.4	4.9
Aug	17.4	0.0	0.0	0.2	0.0	0.0	0.3	0.0
Sep	0.7	0.0	0.0	0.6	0.0	0.0	1.2	0.0
Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
May-Sep	**237.8**	0.0	0.0	**3.9**	0.0	**1.9**	**38.3**	**4.9**
Applied (kg)								
1992								
Spring	1.5	0.2	0	0	0.4	0	31.8	0
Autumn	0	0.5	0	0	0.1	0	11.5	0
1993								
Spring	0.6	0.2	0	2.4	0.7	0	28.2	0
Autumn	0	0	0	0	0	0	0	0
1994								
Spring	0.6	0.03	0	0	0.2	0	65.2	1.9
Loss (%)								
1992								
May-Sep	0.08%	0.09%	n.u.	n.u.	0.00%	n.u.	0.41%	n.a.
May-Apr	0.08%							
Oct-Apr	n.u.	0.00%	n.u.	n.u.	0.00%	n.u.	0.16%	n.a.
1993								
May-Jun	0.00%	0.71%	n.u.	0.03%	0.00%	n.u.	0.01%	n.a.
1994								
May-Sep	(39.64%)	0.00%	n.u.	n.u.	0.00%	n.u.	0.06%	0.26%
Average loss								
May-Sep	**0.04%**	**0.27%**		**0.03%**	0.00%		**0.16%**	**0.26%**

Appendix 8. Transported quantities and loss as percentage of applied amounts at UT10 1992-1994

Date	diuron	esfenvalerate	ethofumesate	fenitrothion	fenpropimorph	fenvalerate	flamprop-M
Transp (g)							
1992							
May	0.0	0.0	17.1	0.0	0.0	0.0	0.0
Jun	0.0	0.0	2.6	0.0	1.0	0.0	0.0
Jul	0.0	0.0	3.6	0.0	4.4	0.0	0.1
Aug	0.0	0.0	1.8	0.0	0.7	0.0	0.1
Sep	0.0	0.0	0.6	0.0	0.7	0.0	0.1
May-Sep	0.0	0.0	**25.7**	0.0	**6.8**	0.0	**0.4**
1992/93							
Oct	0.0	0.0	8.2	0.0	34.2	0.0	4.9
Nov	0.0	0.0	14.6	0.0	0.0	0.0	1.9
Dec	12.1	0.0	0.0	0.0	0.0	0.0	0.0
Jan	0.0	0.0	0.0	0.0	129.0	0.0	0.0
Feb	0.0	0.0	0.0	0.0	21.4	0.0	0.0
Mar	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Apr	0.0	0.0	0.0	0.0	4.6	0.0	0.1
Oct-Apr	**12.1**	0.0	**22.8**	0.0	**189.2**	0.0	**7.0**
1993							
May	1.0	0.0	6.6	0.0	0.1	0.0	0.1
Jun	0.3	0.0	1.0	0.0	4.7	0.0	1.0
May-Jun	**1.3**	0.0	**7.6**	0.0	**4.8**	0.0	**1.1**
1994							
May	0.0	1.6	22.9	0.0	0.0	0.0	n.a.
Jun	0.0	0.0	19.4	0.0	1.9	0.0	n.a.
Jul	0.0	0.0	0.6	0.0	0.1	0.0	n.a.
Aug	0.0	0.0	2.6	0.0	2.3	0.0	n.a.
Sep	0.0	0.0	11.7	0.0	25.0	0.0	n.a.
Oct	0.0	0.0	0.0	0.0	0.0	0.0	n.a.
May-Sep	0.0	**1.6**	**57.2**	0.0	**29.2**	0.0	n.a.
Applied (kg)							
1992							
Spring	0	3.9	27.1	0	64.6	0	1.6
Autumn	0	0.6	0	0	0	0	0
1993							
Spring	0	1.7	30.7	2.0	37.5	0	2.5
Autumn	0	0	0	0	0	0	0
1994							
Spring	0	2.6	28.5	0	113.1	0	0
Loss (%)							
1992							
May-Sep	n.u.	0.00%	0.09%	n.u.	0.01%	n.u.	0.03%
May-Apr			0.18%		0.30%		0.46%
Oct-Apr	n.u.	0.00%	n.u.	n.u.	n.u.	n.u.	n.u.
1993							
May-Jun	n.u.	0.00%	0.02%	0.00%	0.01%	n.u.	0.04%
1994							
May-Sep	n.u.	0.06%	0.20%	n.u.	0.03%	n.u.	n.a.
Average loss							
May-Sep		**0.02%**	**0.11%**		**0.02%**		**0.04%**

Appendix 8. Transported quantities and loss as percentage of applied amounts at UT10 1992-1994

Date	fluroxypyr	hexazinon	ioxynil	isoproturon	lenacil	linuron	MCPA	mecoprop	metamitron
Transp (g)									
1992									
May	0.0	n.a.	1.7	2.3	n.a.	0.0	118.0	4.7	145.2
Jun	0.0	n.a.	0.0	0.0	n.a.	0.0	13.9	9.7	21.5
Jul	0.4	n.a.	1.4	1.5	n.a.	0.0	10.3	6.2	22.4
Aug	0.2	n.a.	0.2	0.7	n.a.	0.0	1.2	0.6	5.5
Sep	0.1	n.a.	0.0	0.6	n.a.	0.0	0.7	0.6	1.5
May-Sep	**0.8**	n.a.	**3.3**	**5.2**	n.a.	0.0	**144.0**	**21.8**	**196.1**
1992/93									
Oct	2.3	n.a.	2.4	97.4	n.a.	0.0	1.3	19.4	11.7
Nov	0.0	n.a.	0.0	67.1	n.a.	0.0	0.0	19.3	0.0
Dec	0.0	n.a.	0.0	0.0	n.a.	0.0	0.0	2.4	0.0
Jan	0.0	n.a.	0.0	19.5	n.a.	0.0	0.0	2.9	0.0
Feb	0.0	n.a.	0.0	0.0	n.a.	0.0	0.0	2.0	0.0
Mar	0.0	n.a.	0.0	0.0	n.a.	0.0	0.0	0.0	0.0
Apr	0.0	2.6	0.0	2.3	n.a.	0.0	0.0	5.5	0.0
Oct-Apr	**2.3**	**2.6**	**2.4**	**186.4**	n.a.	0.0	**1.3**	**51.5**	**11.7**
1993									
May	8.2	2.3	n.a.	2.6	n.a.	0.0	36.1	28.1	186.4
Jun	4.4	0.1	n.a.	1.4	n.a.	0.0	18.9	0.7	8.8
May-Jun	**12.7**	**2.4**	n.a.	4.0	n.a.	0.0	**55.1**	**28.8**	**195.2**
1994									
May	0.0	n.a.	n.a.	5.6	n.a.	0.0	2.0	7.0	168.2
Jun	0.0	n.a.	n.a.	0.0	n.a.	0.0	73.9	66.5	76.4
Jul	0.0	n.a.	n.a.	0.0	n.a.	0.0	4.3	4.2	1.6
Aug	0.7	n.a.	n.a.	1.4	n.a.	0.0	0.3	1.3	0.0
Sep	0.6	n.a.	n.a.	0.4	n.a.	0.0	4.5	37.7	0.0
Oct	0.0	n.a.	n.a.	0.0	n.a.	0.0	0.0	1.1	0.0
May-Sep	**1.3**	n.a.	n.a.	**7.4**	n.a.	0.0	**84.9**	**116.8**	**246.2**
Applied (kg)									
1992									
Spring	18.4	0	8.5	14.9	0	0	69.6	14.5	468.6
Autumn	0	0	3.3	9.5	0	0	9.2	31.8	0
1993									
Spring	9.9	0	8.6	36.4	0	0	88.7	40.8	277.7
Autumn	0	0	0	14.1	0	0	0	13.7	0
1994									
Spring	8.0	0	19.9	29.5	0	0	112.7	171.6	223.9
Loss (%)									
1992									
May-Sep	0.00%	n.a.	0.04%	0.03%	n.a.	n.u.	0.21%	0.15%	0.04%
May-Apr	0.02%								0.04%
Oct-Apr	n.u.	n.a.	0.07%	1.96%	n.a.	n.u.	0.01%	0.16%	n.u.
1993									
May-Jun	0.13%	n.u.	n.a.	0.01%	n.a.	n.u.	0.06%	0.07%	0.07%
1994									
May-Sep	0.02%	n.a.	n.a.	0.02%	n.a.	n.u.	0.08%	0.07%	0.11%
Average loss									
May-Sep	**0.05%**		**0.04%**	**0.02%**			**0.11%**	**0.10%**	**0.07%**

Appendix 8. Transported quantities and loss as percentage of applied amounts at UT10 1992-1994

Date	metazachlor^	methabenzthiazuron	pendimethalin	permethrin	phenmedipham	pirimicarb	prochloraz
Transp (g)							
1992							
May	1.3	0.0	0.0	0.0	n.a.	0.0	0.0
Jun	0.0	0.6	0.0	0.0	n.a.	2.1	0.0
Jul	3.4	2.4	0.0	0.0	n.a.	6.0	1.1
Aug	1.8	1.2	0.0	0.0	n.a.	3.5	0.0
Sep	28.1	1.1	0.0	0.0	n.a.	1.3	0.0
May-Sep	**34.6**	**5.4**	0.0	0.0	n.a.	**12.9**	**1.1**
1992/93							
Oct	213.4	888.8	0.0	0.0	n.a.	22.0	0.0
Nov	120.3	253.4	0.0	0.0	n.a.	26.9	0.0
Dec	10.2	0.0	0.0	0.0	n.a.	0.0	0.0
Jan	29.6	14.3	0.0	0.0	0.0	3.6	0.0
Feb	6.0	0.0	0.0	0.0	0.0	0.0	0.0
Mar	1.2	0.0	0.0	0.0	0.0	0.0	0.0
Apr	2.2	7.0	0.0	0.0	0.0	0.0	0.0
Oct-Apr	**382.9**	**1163.6**	0.0	0.0	0.0	**52.5**	0.0
1993							
May	1.4	0.5	0.0	0.0	3.4	0.4	0.0
Jun	1.0	1.2	0.0	0.0	0.0	3.4	0.0
May-Jun	**2.4**	**1.7**	0.0	0.0	**3.4**	**3.8**	0.0
1994							
May	0.9	0.0	0.0	0.0	0.0	0.0	0.0
Jun	2.2	0.0	0.0	0.0	0.0	7.4	0.0
Jul	0.0	0.0	0.0	0.0	0.0	0.3	0.0
Aug	0.7	0.0	0.0	0.0	0.0	8.9	0.0
Sep	961.9	0.0	0.0	0.0	0.0	7.8	0.0
Oct	8.1	0.0	0.0	0.0	0.0	0.0	0.0
May-Sep	**965.8**	0.0	0.0	0.0	0.0	**24.5**	0.0
Applied (kg)							
1992							
Spring	0	4.0	0.4	0	47.7	32.4	16.0
Autumn	128.6	4.9	0	0	0	0	0
1993							
Spring	0	4.0	0	0	50.4	3.0	0
Autumn	37.5	0	0	0	0	0	0
1994							
Spring	9.2	4.0	0	0	53.7	53.8	0
Loss (%)							
1992							
May-Sep	n.u.	0.13%	0.00%	n.u.	n.a.	0.04%	0.01%
May-Apr			0.00%			0.20%	0.01%
Oct-Apr	0.32%	(23.75%)	n.u.	n.u.	n.u.	n.u.	n.u.
1993							
May-Jun	n.u.	0.04%	n.u.	n.u.	0.01%	0.13%	n.u.
1994							
May-Sep	0.04%	0.00%	n.u.	n.u.	0.00%	0.05%	n.u.
Average loss							
May-Sep	**0.04%**	**0.06%**			0.00%	**0.07%**	**0.01%**

^ = loss in 1992 Sep.-Apr. and in 1994 May-Aug.

Appendix 8. Transported quantities and loss as percentage of applied amounts at UT10 1992-1994

Date	propiconazole	propyzamide	simazine	terbuthylazine	triadimenol	tribenuron-methyl	Sum pest
Transp (g)							
1992							
May	0.0	0.0	0.2	13.4	0.0	n.a.	527.7
Jun	0.7	0.0	0.0	7.6	0.0	n.a.	66.0
Jul	8.6	0.0	0.2	6.2	0.2	n.a.	101.1
Aug	2.3	0.0	0.4	8.0	0.0	n.a.	33.4
Sep	0.8	0.0	0.2	4.9	0.0	n.a.	44.0
May-Sep	**12.4**	0.0	**1.0**	**40.0**	**0.2**	n.a.	**772.1**
1992/93							
Oct	23.1	0.0	100.4	4410.6	0.0	n.a.	5926.8
Nov	0.0	0.0	19.5	1479.3	0.0	n.a.	2081.9
Dec	0.0	0.0	0.0	101.5	0.0	n.a.	138.1
Jan	0.0	0.0	0.0	133.3	0.0	n.a.	334.3
Feb	0.0	0.0	0.0	46.6	0.0	n.a.	76.0
Mar	0.0	0.0	0.0	10.3	0.0	n.a.	11.5
Apr	0.0	0.0	0.0	14.7	0.0	n.a.	299.7
Oct-Apr	**23.1**	0.0	**119.9**	**6196.3**	0.0	n.a.	**8868.2**
1993							
May	0.9	0.0	4.9	1.7	0.0	1.2	304.5
Jun	11.4	0.0	12.9	5.8	0.0	0.0	85.9
May-Jun	**12.3**	0.0	**17.8**	**7.5**	0.0	**1.2**	**390.4**
1994							
May	0.0	0.0	0.0	1.4	0.0	1.0	437.6
Jun	4.4	16.5	18.2	152.8	0.0	0.5	808.8
Jul	0.0	0.0	0.3	2.7	0.0	n.a.	29.2
Aug	6.6	0.4	13.6	44.6	0.0	n.a.	110.3
Sep	20.9	1.1	28.3	115.4	0.0	n.a.	1380.3
Oct	0.0	0.0	0.4	3.0	0.0	n.a.	13.2
May-Sep	**31.9**	**18.1**	**60.4**	**316.9**	0.0	**1.5**	**2766.2**
Applied (kg)							
1992							
Spring	21.2	0	0	0	1.9	1.4	1201.9
Autumn	0	0	0	0	0	0	251.0
1993							
Spring	12.3	0	0	0	1.2	1.0	830.4
Autumn	0	0	0	0	0	0	75.1
1994							
Spring	37.4	0	0	0	0	3.1	1022.2
Loss (%)							
1992							
May-Sep	0.06%	n.u.	n.u.	n.u.	0.01%	n.a.	0.08%
May-Apr	0.17%				0.01%		0.15%
Oct-Apr	n.u.	n.u.	n.u.	n.u.	n.u.	n.a.	0.62%
1993							
May-Jun	0.10%	n.u.	n.u.	n.u.	0.00%	0.12%	0.09%
1994							
May-Sep	0.09%	n.u.	n.u.	n.u.	n.u.	0.05%	0.09%
Average loss							
May-Sep	**0.08%**				0.00%	**0.09%**	**0.07%**

Appendix 9. Pesticide concentration in upper 10 cm of sediment cores collected 18 June 1991. Concentrations are in µg/kg dw

	Location			
Substance	PO4	UT10	OD11	LU12
aldrin	<10	<10	<10	<100
atrazine	<30	<80	<80	<100
atrazine-desethyl	<100	<5	<5	<200
BAM	<200	<200	<200	<200
bentazone	<2	<2	<2	<2
α-chlordane	<10	<10	<10	<10
γ-chlordane	<10	<10	<10	<10
chloridazon	<1	<200	<200	<200
clopyralid	<5	<5	<5	<5
cyanazine	<30	<100	<100	<100
cyfluthrin	<200	<20	<20	<20
cypermethrin	<1000	<20	<20	<20
2,4-D	<2	<2	<2	<2
ΣDDT	**90**	**4**	**(1)**	**10**
deltamethrin	<100	<20	<20	<10
dicamba	<2	<2	<2	<2
dichlobenil	<200	<200	<200	<100
dichlorprop	<2	**1**	**traces**	**2**
dieldrin	<200	<50	<50	<50
diuron	<5	**3**	**2**	**3**
endosulfan-α	<5	<5	<5	<5
endosulfan-β	<200	<50	<50	<50
endosulfan-sulfate	<1000	<100	<100	<100
endrin	<500	<50	<50	<50
ethofumesate	<30	<30	<30	<10
fenitrothion	<50	<50	<50	<20
fenpropimorph	**40**	**20**	**30**	**200**
fenvalerate	<20	**30**	**10**	**80**
HCB	<10	<10	<10	<10
HCH-α	<5	<5	<5	<10
HCH-β	<10	<10	<10	<10
heptachlor	<10	<10	<10	<10
isoproturon	<100	<30	<30	<50
lambda-cyhalothrin	<200	<20	<20	<20
lenacil	<200	<200	<200	<200
lindane (HCH-γ)	<10	<10	<10	<100
linuron	<400	<400	<400	<200
MCPA	<2	**2**	**traces**	**1**
mecoprop	<2	**2**	**traces**	**3**
metamitron	<200	<100	<100	<100
metazachlor	<20	<10	<10	<30
methabenzthiazuron	<50	**30**	**20**	<100
metoxuron	<10	<60	<60	<100
pendimethalin	<60	<60	<60	<60
permethrin	<20	**(1)**	**2**	**3**
pirimicarb	<30	<20	<20	<20
prochloraz	<100	**60**	<100	<100
propiconazole	<30	**20**	**20**	**30**
quintozene	<10	<10	<10	<20
simazine	<40	<40	<40	<200
terbuthylazine	<30	<50	<50	<100
triadimenol	<200	<200	<200	<200
Σ Pesticides	**130**	**173**	**85**	**332**

Appendix 10. Pesticide concentration in suspended sediment collected May-July 1990 and July-September 1991. Concentrations are in µg/kg dw

	Location			
Substance	LU12 (1990:1)	LU12 (1990:2)	OD11 (1991)	LU12 (1991)
aldrin	n.a.	n.a.	<10	<10
atrazine	<20	<20	<80	<30
atrazine-desethyl	n.a.	n.a.	<5	<100
BAM	n.a.	n.a.	<200	<200
bentazone	<2	<2	<2	<2
α-chlordane	<10	<10	<10	<10
γ-chlordane	<10	<10	<10	<10
chloridazon	n.a.	n.a.	<50	<0,2
clopyralid	n.a.	n.a.	<5	<5
cyanazine	<20	<20	<100	<30
cyfluthrin	<20	<20	<20	<200
cypermethrin	<10	<10	<20	<1000
2,4-D	<2	<2	<2	<2
ΣDDT	<10	<10	<2	<10
deltamethrin	<10	<10	<20	<100
dicamba	n.a.	n.a.	<2	<2
dichlobenil	n.a.	n.a.	<200	<200
dichlorprop	<2	**2**	<2	<2
dieldrin	<10	<10	<50	<200
diuron	n.a.	n.a.	**(1)**	**2**
endosulfan-α	n.a.	n.a.	<5	<5
endosulfan-β	n.a.	n.a.	<50	<200
endosulfan-sulfate	n.a.	n.a.	<100	<1000
endrin	n.a.	n.a.	<50	<500
ethofumesate	n.a.	n.a.	<30	<30
fenitrothion	<10	<10	<50	<50
fenpropimorph	**200**	**200**	**10**	**40**
fenvalerate	**70**	**60**	<5	**20**
HCB	<10	<10	<10	<10
HCH-α	<10	<10	<5	<5
HCH-β	<20	<20	<10	<10
heptachlor	<10	<10	<10	<10
isoproturon	<50	<50	<30	<30
lambda-cyhalothrin	n.a.	n.a.	<20	<200
lenacil	<20	<20	<200	<200
lindane (HCH-γ)	<10	<10	<10	<10
linuron	n.a.	n.a.	<400	<400
MCPA	<2	<2	<2	<2
mecoprop	<2	<2	<2	<2
metamitron	<200	<200	<100	<200
metazachlor	<40	<40	<10	<20
methabenzthiazuron	<100	<100	<10	**20**
metoxuron	<60	<60	<60	<10
pendimethalin	<80	<80	<60	<60
permethrin	n.a.	n.a.	<2	**2**
pirimicarb	<10	<10	<20	<30
prochloraz	n.a.	n.a.	<100	<100
propiconazole	**80**	**60**	**(5)**	**20**
quintozene	n.a.	n.a.	<10	<10
simazine	<30	<30	<40	<40
terbuthylazine	<30	<30	<50	<30
triadimenol	<60	<60	<200	<200
Σ Pesticides	**350**	**322**	**16**	**104**

n.a. = not analysed

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Swedish University of Agricultural Sciences
Department of Soil Sciences
Division of Water Quality Management
P.O. Box 7072
S-750 07 Uppsala
SWEDEN
Telephone (+46)-(0)18 67 24 60
Telefax (+46)-(0)18 67 34 30

60:- (exkl. moms)